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4 WAGE STRUCTURE AND THE INCENTIVE EFFECTS OF PROMOTIONS⁵⁴

This chapter studies wage structure characteristics and their incentive effects within one firm. Using personnel records and an employee survey, we provide evidence that wages are attached to jobs and that promotions play a dominant role as a wage determinant. We furthermore show that a promotion affects both intrinsic and extrinsic motivation significantly, though in two different ways: an expected promotion increases extrinsic motivation, whereas intrinsic motivation is highest subsequent to a realized promotion. The relationship between extrinsic motivation and expected promotions implies that promotions have a clear incentive effect, consistent with a key prediction of the tournament model.

4.1 Introduction

Are wages attached to jobs and do promotions play an important role as a wage determinant? Does the expectation of a possible promotion affect motivation? And, does a recently realized promotion make the incremental motivation disappear completely? We empirically address these questions, which are all related to tournament theory (see Lazear and Rosen, 1981).⁵⁵

Although empirical research into personnel economics has its origins in 1980 (Medoff and Abraham, 1980), it has only recently emerged from its infancy (e.g. Lazear, 1992 & 1999; BGH, 1994a & 1994b; Treble et al., 2001; Dohmen et al., 2004). These empirical studies indicate regularities regarding promotions, wages, and performance evaluations but are unable to answer the questions mentioned above unequivocally.

Following the example of BGH (1994a & 1994b), our data were collected at a single research site, which had the benefit of homogeneous company culture and the lack of other unobserved heterogeneity of company characteristics. Using the corporate labor agreements and the personnel files of a listed Anglo-Dutch company, we determine the effect of individual promotions on wages relative to the effect of incentive compensation on wages. Many of the stylized facts found in previous case studies are again accounted for in this firm. The results are not only substantiated by the personnel data, but also by the corporate labor agreements, indicating that they are intentionally instituted by the company. We find that the wage-pattern is convex, and that promotions are the dominant factor in establishing this wage pattern. The direct effect of a promotion on base wages is 5 percentage points. Further analyses show that promotions increase the automatic annual average wage growth of 3.6 percent points to 4.4 percent points, implying an additional average growth rate of 25 percent. These results are consistent with BGH (1994a &

⁵⁴ Parts of this chapter were presented at the 15th Annual Conference of the European Association of Labour Economists, 18-21 September 2003, Seville, Spain, and presented at a seminar at Aarhus Business School. A different version of this paper is published in *Kyklos* (Van Herpen et al., 2006), while selections have been published in Dutch in *ESB* (Cools et al., 2003). Special thanks to George Baker, Ben Kriechel, Michael Waldman for helpful comments and discussions.

⁵⁵ Although universal answers to these questions are unlikely to exist, we will try to find mechanisms that increase our understanding in the functioning of the tournament model in practice.

1994b). The effect of incentive compensation on wages is limited and close to zero percent in this instance.

Besides analyzing (the determinants of) wage patterns, we provide evidence on the relationship between promotions and motivation. From a survey among all individual employees, we find a positive significant effect of promotions on both intrinsic and extrinsic motivation. The positive association between (expected) promotions and *extrinsic* motivation is consistent with the tournament model. Extrinsic motivation is high if an employee expects to be promoted in the near future. *Intrinsic* motivation is not only affected by an expected promotion but even more so by a recently realized promotion. Long periods without a realized or expected promotion lead to decreased motivation. Therefore, we conclude that promotions, the most dominant incentive instrument within this organization, do not only serve as a tool to increase extrinsic motivation prior to the promotion but also increase intrinsic motivation following a promotion. This premium effect of promotions on motivation has not been recognized in previous economic studies.

The chapter proceeds as follows. In Section 4.2, we discuss the theoretical background, with a special focus on the tournament model and motivational aspects. Section 4.3 continues with a discussion of the research site, which is followed by the results. Finally, Section 4.4 concludes.

4.2 Theoretical Background

The internal economics of firms have stimulated many theorists to develop models of wage growth. Gibbons (1997) distinguishes four main models that explain career ladders and wage structures: namely, task-assignment, learning, human capital theory, and the tournament model. All models have been discussed in the theoretical background of this dissertation.

This chapter focuses on the fourth model: tournament theory. As Lawler (1987) noted, the performance of employees is a product of ability and effort. The tournament model focuses on the incentive effect of a wage structure (and not on heterogeneous or uncertain levels of ability) (Lazear and Rosen, 1981). The main characteristics of the tournament model are that: no formal contracts exist; all contestants are ranked-based on their performance. The winner(s) (i.e. the worker(s) with the highest performance) are promoted and will participate in the next round of the tournament.

Testable implications of the tournament model are the existence of fixed wage-slots and a convex wage-structure. Although these characteristics are necessary conditions, they are not unique for the tournament model. They can also be consistent with task-assignment models, learning models or the human capital theory. There is empirical evidence supporting these implications of the tournament model within sporting events (e.g. Ehrenberg and Bognanno, 1990a & 1990b; Taylor and Trogdon, 2002) and in firms (e.g. O'Reilly et al. (1988), Main et al. (1993), Knoeber and Thurman (1994), Eriksson (1999), Bingley and Eriksson (2001) and Coupé et al. (2004)). Earlier, Section 2.2.4.3 discussed recent empirical works.

A testable and unique characteristic of the tournament model is that promotions based on relative performance evaluation provide incentives. Lazear (1995) writes about this incentive effect of tournaments based on relative performance evaluation: "... many, including myself, believe that most motivation is produced not by an absolute reward, but by compensation that is based on relative comparisons." Consequently, the relevance and working of the tournament model can also be studied by analyzing the motivating and

incentive effect of promotions in corporate practice, besides empirically analyzing direct implications concerning wage structure.

In general, economists discussing incentives and motivation, refer to one type of motivation: extrinsic motivation (Frey, 1997b; Bénabou and Tirole, 2003). Extrinsic motivation is a type of behavior induced by external interventions, such as monetary rewards, praise by your boss, or status (Frey, 1997a). Based on their (implicit) contract with the employer, employees receive external rewards conditional upon delivering a certain performance. In our study, this means that the prospect of monetary rewards, either in the form of incentive compensation or promotions, will increase extrinsic motivation.

Recently, economists have also become interested in the incongruent component of extrinsic motivation: intrinsic motivation (e.g. Frey, 1997b; Kreps, 1997; Kunz and Pfaff, 2002; Bénabou and Tirole, 2003). Intrinsic motivation (see Section 2.2.3) is defined as the individual's desire to perform a task for its own sake (Bénabou and Tirole, 2003; Deci, 1975). We analyze the distinct effects of promotions on intrinsic and extrinsic motivation. Previous studies of the crowding-out effect, i.e. the measurement of the effect of an intervention on both intrinsic and extrinsic motivation (see Section 2.2.3), have mainly been limited to monetary compensation. However, promotions rather than monetary compensation are expected to affect intrinsic motivation. As Bénabou and Tirole (2003) note, "discretionary" or "ex post" rewards, such as promotions, can increase the self-esteem and intrinsic motivation of an individual. A promotion can also be a signal of trust and lead to empowerment, which in turn has a positive association with intrinsic motivation (Deci and Ryan, 1985). We shall analyze the full incentive effect of promotions by including measures of both extrinsic and intrinsic motivation into our analyses.

4.3 Research Site

The research site is the Dutch headquarters of an Anglo-Dutch listed company. Three sources of data were used for our study. First, the collective labor agreement and other regulations were studied to understand the wage structure, as the company explicitly designed it. Secondly, annual employee data were collected from personnel files in 2002 stretching back to 1998, just after a merger that led to adjustments in the wage policies, systems and procedures. The third source of data consists of survey results. All employees for whom employee data are available were sent (by e-mail) a questionnaire, which was designed after extensively interviewing employees and managers throughout the company. The completed questionnaires were matched with the employee data.⁵⁶ In this section the merged databases will be analyzed in three steps. We first discuss the internal rules and regulations, we then analyze the personnel data, and, finally, we examine the combined set of personnel and survey data.

4.3.1 Internal rules and regulations

In this section the Collective Labor Agreement (CLA) is discussed. The CLA is a temporary contract, which specifies general rules for salary, increases (and decreases), benefits, bonuses, promotions or demotions, assessment scores, vacations, etc. A Dutch CLA is negotiated between the management of a company or a representative group of employers

⁵⁶ Discrete and anonymous handling of the questionnaires was guaranteed by the management, the workers' council, and the researchers in order to avoid the risk of socially desirable answers. The response rate was 28 percent.

within an industry, on the one side, and the trade unions, on the other.⁵⁷ It is common to strictly enforce the CLA, including with non-union employees. Consequently, the regulations in the CLA strongly determine the salary structure. The results show that this company does not deviate from earlier findings, meaning that U.S.-based companies (e.g. BGH, 1994a & 1994b) show wage-structure patterns that are similar to the one in this particular CLA. Two distinct components form the basis of the remuneration system in this CLA: the broadband system and the merit matrix.

4.3.1.1 *Broadbands*

The intended salary structure of this company is the result of a job weighting system in which each job is rated on the basis of certain criteria. Jobs are classified, on the basis of these ratings, in one of seven salary scales, called broadband. Each broadband is divided into four quartiles and has a specified minimum and maximum salary (see Figure 4.1). The strict application of this salary system confirms the observation that wages are primarily attached to jobs and not to individuals (Doeringer and Piore, 1971; BGH, 1994a).

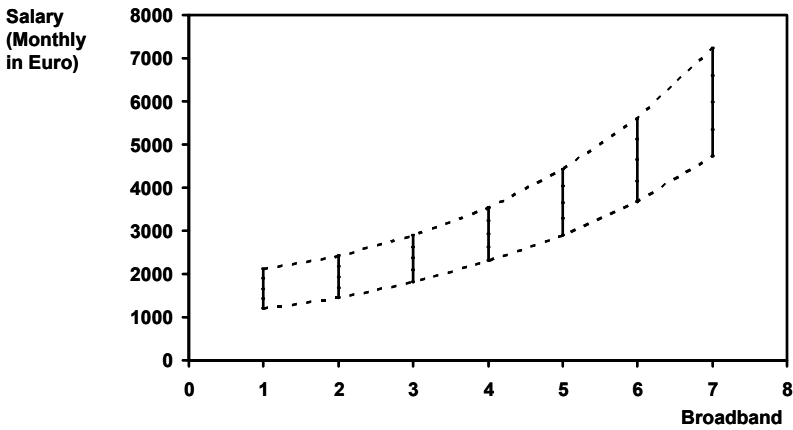


Figure 4.1: Broadbanding in the collective labor agreement

As one can see, the relationships between the maximums of the broadband are characterized by a convex line and the same holds for the minimums. This is illustrated in Table 4.1, which also shows two additional regularities. The first is that the scale maximum (and minimum) does not increase with a constant multiplier, but that the multiplier itself is enlarged over the broadband. The difference between the maximum of broadband 1 and 2 is 14.4 percent, while that between broadband 6 and 7 is 28.9 percent. The broadband are therefore also slightly convex in the logarithm of the wages. The second regularity is the different multipliers that are being used for the minimum and maximum of the broadband. In the changes between broadband 1 => 2, 2 => 3, and 3 => 4, the increase in terms of percentage is higher for the minimum of the broadband than for the maximum of the broadband. The result is that the *relative* spread between the maximum and the minimum of these broadband decreases.

⁵⁷ Top management is often not covered by the CLA, which is also the case in this instance.

Table 4.1: Salary increase between broadband maximums and minimums

	1 → 2	2 → 3	3 → 4	4 → 5	5 → 6	6 → 7
Minimum	19.6%	26.0%	28.3%	24.7%	26.8%	28.9%
Maximum	14.4%	20.2%	22.2%	24.7%	26.8%	28.9%

4.3.1.2 Merit matrix

To determine the annual salary increase of each individual employee, a merit matrix is incorporated in the CLA. The merit matrix uses two input variables. The first variable is the quartile in which the employee is ranked within the broadband.⁵⁸ The second variable is the assessment score of the employees. Employees receive an annual assessment score on a 5-point scale, based on their individual performance benchmarked against targets that vary over jobs. “A” is the most positive assessment score (“Consistently exceeds the requirements of the job, excellent performance”), “C” the norm (“Normal performance, meets all requirements of the job”), and “E” the most negative score (“Below standard”). Hence, performance pay in this company has the form of performance dependent annual salary increases. The actual salary increase is the factor determined by the merit matrix, multiplied by a percentage (N).⁵⁹ The N factor is usually the outcome of negotiations between the unions and the management. The maximums and minimums of the broadbands are also raised by N each year. The complete matrix is displayed in Table 4.2.

Table 4.2: Merit matrix

		Quartile				
		1	2	3	4	5
Assessment score	A	2 * N	1.75 * N	1.5 * N	1.35 * N	0.8 * N
	B	1.75 * N	1.5 * N	1.35 * N	1.2 * N	0.4 * N
	C	1.5 * N	1.35 * N	1.2 * N	1 * N	0 * N
	D	0.8 * N	0.6 * N	0.4 * N	0.2 * N	0 * N
	E	0 * N	0 * N	0 * N	0 * N	0 * N

The table shows that the lower quartiles have a higher multiplier factor than the higher quartiles. For example, in the first quartile the employees receive 1.5 times N, while they will receive N for the same assessment score in the fourth quartile. There are two possible explanations for this. The first explanation draws on human capital theory. One can expect young, newly hired employees to start in the first quartile of a broadband. Learning on the job will make them invest in their abilities, which can build firm-specific human capital. In order to compensate for these investments and reward the learning curve, employees in the lower quartiles will receive a higher reward. Compensation based on tenure in the broadband, which will be an outcome of the matrix used, is an indication that wages are not solely attached to the job function but also to the individual employees. The second explanation for the merit matrix used is based on equity theory (e.g. Locke and Henne, 1986). This theory explains that employees prefer to receive fair compensation compared

⁵⁸ The merit matrix also uses a “fifth quartile”, intended for employees who have a salary that exceeds the scale maximum for some historic reasons.

⁵⁹ This multiplication factor ranges between 2 for an employee in the bottom quartile of a broadband and an “A” assessment score, to 0 for an employee in the top quartile of a broadband and an “E” assessment score.

with their peers (other employees). In line with this point of view, a convergence to the same salary level for employees at the same position is desired.⁶⁰

The significance of assessment scores for salary increases is illustrated by studying the differences in impact of an A-assessment score and a D-score, both relative to a C-score. Looking at the first quartile, we see that receiving an A-score will give an extra salary increase of $0.5 * N$ compared with the C-score. A D-score will reduce the salary increase by $0.7 * N$. This implies that a D-assessment score in one year cannot be fully compensated by an A-score in the next year. This is even stronger in the fourth quartile: an A-score increases the compensation by $0.35 * N$, while a D-score decreases the compensation by $0.80 * N$. The conclusion is that although a positive assessment has a positive effect on salary increases, the negative effect of a low assessment score is much larger, potentially leading to a decrease in real wages. The company seems to use a stick, rather than a carrot, to motivate employees.⁶¹

Besides applying official rules for structuring wages within a broadband, partly based on the employee's performance, the company also prescribes the salary increase resulting from a promotion from a lower broadband to a higher broadband:

"If an employee is transferred or starts working in another function within his department, and the new function is classified in a higher broadband than the employee's current broadband, his salary will be increased by 5% as of the date of transfer or commencement of the new function with a minimum of Dfl 300.- (Euro 136.13), whereby the new salary must be at least equal to the minimum salary of the new broadband."

The (minimum) increase of 5 percent is similar to the result found by BGH (1994a & 1994b) of 5.1 percent to 7.4 percent. In the next section we will investigate how the rules affect real-time wages.⁶²

4.3.2 Personnel data

We have collected five years (1998-2002) of personnel data for all employees at the research site in 2002 (632 persons), which is also the survey year. Table 4.3 presents the statistics of the total sample and of the returned questionnaires.

⁶⁰ Equity theory can likewise be used to explain the existence of the fifth quartile. Employees who, for historical reasons receive salaries exceeding the broadband maximum will receive substantially less salary increase, if any.

⁶¹ In a discussion with the management of the company, it became apparent that the asymmetry in rewarding above- and below-average performance was not supported by the current management. As a matter of fact, after having discussed these findings, the management decided to change the compensation system and eliminate the asymmetry.

⁶² In the year 2001, 42 employees received promotions, defined as an increase in broadband. A demotion is rare. In the entire period 1999 – 2002 we find evidence of 32 demotions.

Table 4.3: Descriptive statistics

		Total Sample		Questionnaire	
		<i>N</i>	<i>Percentage</i>	<i>N</i>	<i>Percentage</i>
<i>Age</i>	Age < 25	25	4.0%	10	5.6%
	Age 25 - 35	151	23.9%	58	32.4%
	Age 35 - 45	206	32.6%	54	30.2%
	Age 45 - 55	165	26.1%	39	21.8%
	Age > 55	85	13.4%	10	5.6%
	Unknown	0	0.0%	8	4.5%
<i>Tenure</i>	Tenure < 3	125	19.8%	37	20.7%
	Tenure 3 - 5	202	32.0%	64	35.8%
	Tenure 5 - 10	61	9.7%	22	12.3%
	Tenure 10 - 15	41	6.5%	7	3.9%
	Tenure > 15	199	31.5%	41	22.9%
	Unknown	4	0.6%	8	4.5%
<i>Gender</i>	Male	452	71.5%	131	73.2%
	Female	180	28.5%	40	22.3%
	Unknown	0	0.0%	8	4.5%
<i>Broadband</i>	Broadband 1	22	3.5%	5	2.8%
	Broadband 2	139	22.0%	24	13.4%
	Broadband 3	114	18.0%	37	20.7%
	Broadband 4	116	18.4%	33	18.4%
	Broadband 5	86	13.6%	33	18.4%
	Broadband 6	68	10.8%	22	12.3%
	Broadband 7	25	4.0%	5	2.8%
	Unknown	62	9.8%	20	11.2%
<i>Total</i>		632		179	

A smaller database of 376 employees was compiled from the complete personnel file. This sample consists of all employees who had been officially evaluated between 2000 and 2002. We will start this section with a comparison of the actual data and the CLA. In the remainder, we will focus on promotions.

In the previous section we introduced the existence of regulations concerning the maximums and minimums within each broadband. A plot of the actual data is displayed in Figure 4.2. The figure shows that the maximums are not strictly enforced. Especially in broadband 2 the salaries of some employees surpass the maximum. These salaries in quartile 5 are frozen, but it is very unlikely that they will easily fall back into the broadband range.

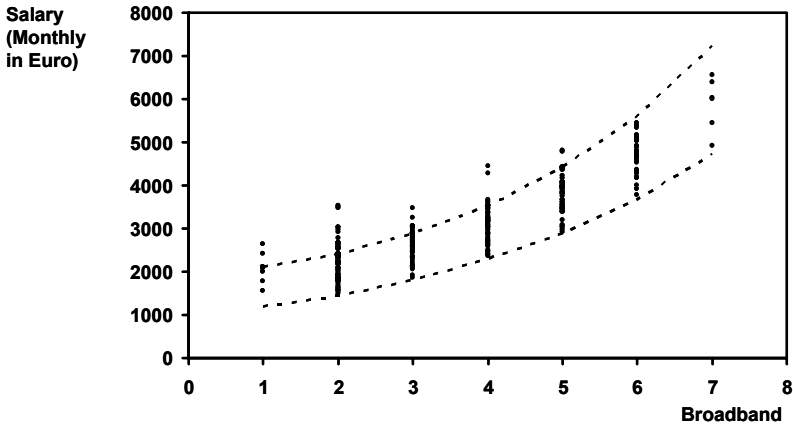


Figure 4.2: Employees' position in the broadband

Table 4.4 shows where the employees in our sample are located in the merit matrix. 24 employees receive a salary above the maximum permitted. Quartile 4 includes most employees: 31.6 percent. None of the employees was rewarded an E-score for their performance over the year 2001. An A-score was almost equally rare: only 5 employees received such an assessment. A C-score was very commonly used; 70.7 percent of all employees received this assessment score.

Table 4.4: Number of observations in the merit matrix

		Quartile					
		1	2	3	4	5	6
Assessment score	A	2	2	1	0	0	5
	B	17	20	28	20	5	90
	C	46	46	65	92	17	266
	D	2	2	2	7	2	15
	E	0	0	0	0	0	0
Total		67	70	96	119	24	376

The combination of Table 4.3 and Table 4.4 leads us to conclude that incentive compensation is not heavily used: the merit matrix has only a limited monetary effect once a positive assessment score is obtained. Moreover, there is little variation between the assessment scores of the various employees. Therefore, we expect the motivating effect of the monetary reward system to be quite limited.

Another way to motivate employees is through promotions. In the year 2001, 42 employees received promotions, defined as an increase in broadband. In 2000 the number of employees with a promotion was 47.⁶³ As previously stated a promotion is accompanied by a salary increase of (at least) 5 percent. Figure 4.3 displays the average salary increase attached to a promotion per broadband. Combining this figure with the merit matrix, we see

⁶³ A demotion is rare. In the period 1999 – 2002, we find evidence of 32 demotions. This finding is consistent with BGH. We will not discuss demotions in greater detail.

that the motivating effect of promotions is not limited to the salary increase in the first year. In addition, promotions transfer employees to a broadband where they will typically be placed in a lower quartile with a larger multiplier, based on the merit matrix. Consequently, the percentage salary increase for subsequent years will be higher than without a promotion, given a certain assessment score. The maximum of the broadband to which the employee is promoted is also higher than the maximum of the old broadband. Thus, to summarize, (1) a promotion gives an immediate salary increase of at least 5 percent, (2) the merit matrix will give a higher multiple conditional upon assessment scores, and (3) the spread towards the maximum of the broadband is greater.

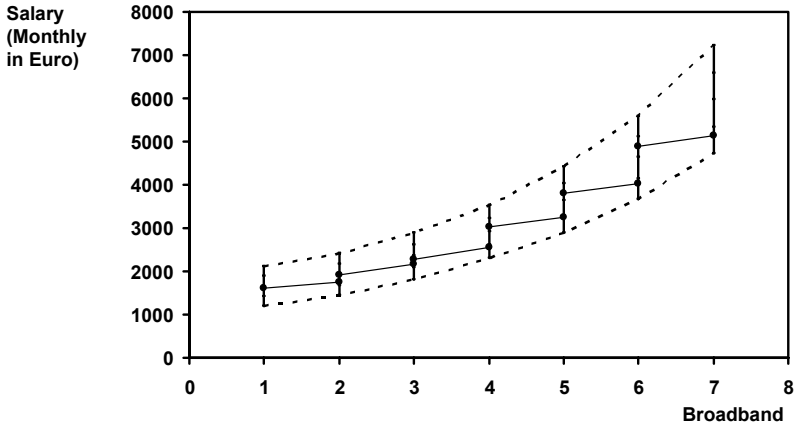


Figure 4.3: Average promotion between broadbands

The earlier discussion of the CLA and the personnel data has concentrated on the various ways in which salaries can increase similar to Medoff and Abraham (1980), BGH (1994a & 1994b), Lazear (1992), Lazear (1999), and Treble et al. (2001). As has been shown, annual salary increases are the combined effect of different factors: the quartile position, the assessment score, and promotions. To gain a better understanding of these separate factors, in particular assessment scores and promotions, we analyze their determinants and potential interrelationships as well as the impact of the three factors (quartiles, assessment scores, and promotions) on the annual salary increases *over an individual's career*. This extension will shed light on the incentive effect of promotions relative to the effects of assessment scores and fixed salary increases for employees until their retirement.

4.3.2.1 Determinants of assessment scores and promotion probability

The probability that an employee receives a specific assessment score is estimated on the subsample of 376 employees. The explanatory variables are a combination of demographic variables (age and gender) and individual information (firm tenure, broadband, quartile, assessments scores and promotions for the last two years). The variables "Age" and "Tenure" are continuous, whereas "Male" is a dummy variable equal to 1 for males and 0 for females. The variables "Broadband" and "Quartile" describe the position of the employee within the firm and have an ordinal scale: "Broadband" ranges from 1 to 7, and "Quartile" from 1 to 5. The variable "Assessment" is an ordinal variable between 1 and 5; 1 for an E-score, and 5 for an A-score. In practice, E-scores did not

occur. The variable “Promotions” is a dummy variable, which is 1 if the employee was promoted to a higher broadband in a certain year.

The regression techniques we use are ordered probit and logit models. Two regressions are conducted on the assessment scores: one that includes promotions as an independent variable, and one which does not. The regression results are depicted in Table 4.5 and will be used in the next section.

Table 4.5: Regression results: Prediction of assessment scores and promotions

	(1) Assessment t = 0		(2) Assessment t = 0		(3) Promotion	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Assessment t - 1	0.738***	(0.146)	0.711***	(0.145)	0.403	(0.384)
Assessment t - 2	0.445***	(0.155)	0.378**	(0.152)	0.693*	(0.401)
Promotion t = 0	-0.404*	(0.223)				
Promotion t - 1	-0.554**	(0.218)			-0.826	(0.662)
Promotion t - 2					0.381	(0.552)
Age	-0.012	(0.011)	-0.007	(0.011)	-0.099***	(0.035)
Broadband	0.047	(0.061)	0.068	(0.059)	-0.534***	(0.187)
Male	0.132	(0.169)	0.005	(0.163)	1.001**	(0.451)
Quartile	-0.099	(0.075)	-0.073	(0.072)	0.570**	(0.230)
Tenure	-0.012*	(0.007)	-0.009	(0.007)	-0.050**	(0.023)
Intercept					4.848***	(1.703)
Cut_off 1	1.558		0.920			
Cut_off 2	3.436		2.748			
Cut_off 3	6.156		5.425			
Chi squared	69.38		60.21		55.03	
Pseudo R ²	0.119		0.104		0.209	
Number of obs.	376		376		376	

*p < .10, two-tailed tests.

**p < .05, two-tailed tests..

***p < .01, two-tailed tests.

The results show that assessment scores are significantly related to historical performance; they are even linked to the assessment scores of two years ago. This finding is consistent with BGH’s (1994b) finding on serially-correlated wage changes insofar as assessment scores are a determinant of wages. Underlying ability is likely to be an important driver of this result. Assessment scores are also related to promotions. On the one hand, assessment scores are significantly worse after an employee has received a promotion, consistent with Lazear’s (2004) and other explanations of the Peter Principle.⁶⁴

We find that employees with a higher assessment score are more likely to receive a promotion. Furthermore, we see that males are more likely to receive a promotion than female workers. The quartile of the employees has a positive relationship with the probability of a promotion. This implies that the company has a tendency to promote employees at the higher end of the salary range. The results also indicate that promotions are less likely for older employees and for employees with a longer firm tenure.

⁶⁴ In order to further test for the Peter Principle, we have also tested a model that includes interactions with age and tenure. However, the multicollinearity was extremely high and the additional interaction terms did not increase the significance of the model (determined by an F-test). Therefore, we concluded that the current specification is preferred.

4.3.2.2 *Impact of quartile position, assessment score, and promotion on wage development*

We use Monte Carlo analysis to calculate the expected monetary payoff of each individual’s career, in various contingencies, i.e. with(out) promotions and with(out) incentive compensation (i.e. performance dependent annual salary increases). The main aim of the Monte Carlo analysis is to identify the relative effect of promotions on lifetime compensation as compared with the other factors. We calculate the predicted probability for each assessment score and a promotion using the regression results of Table 4.5.⁶⁵ Referring to the rules in the corporate labor agreement, we then calculate the expected salary level for each employee. The assessment scores and promotions that the employees receive in one year are used as an input variable for next year’s probability estimation and so on, until the employees reach retirement. The N factor in the merit matrix was set to the average N of the previous two years: 2.76 percent.

We ran the model 200 times for four contingencies. The first is the situation in which every employee receives salary increases based on C-assessment scores, and promotions are excluded. In effect, this comes down to a system in which neither incentive compensation nor promotions are used. The second condition includes the possibility of variation in assessment scores, but excludes promotion opportunities. The third condition includes promotions, but excludes assessment scores, whilst the fourth simulation includes both variables, and therefore estimates the current situation within the firm. In each condition, the end-salary of the employees at the retirement age of 60 is calculated. The average annual salary increases derived for the four situations are depicted in Tables 4.6 and 4.7 and in Figure 4.4. (Note that the overall averages in Table 4.6 are the result of various effects, including the age of the employees).

The first result shown in Table 4.6 is the very limited influence of the assessment scores on average compensation. The average annual salary increase until retirement will be 3.08 percent once we exclude promotions and assessments. If the impact of assessment scores on the wage development is added, the comparable salary increase is 3.05 percent on average.⁶⁶ A similar small effect of assessment scores is found given the occurrence of promotions (3.44 percent salary increase in situation 3 versus 3.40 percent in situation 4). Overall, promotions have a positive effect on the wage increase. Including promotions in the Monte Carlo analyses leads to an annual salary increase of 3.40 percent (3.44 percent without assessment scores) relative to the 3.05 percent (3.08 percent without assessment scores) without the option of promotions.⁶⁷

⁶⁵ To calculate the expected probability based on ordered probit results, we use normal distributions and the calculated cut-off points. To calculate the expected probability of promotions, we use the logit results and applied the formula
$$p^* = \frac{1}{1 + \exp(-y^*)}$$
 to determine the partial effect.

⁶⁶ This negative effect of the assessment scores is a result of the merit matrix. As discussed previously in Section 4.3.1.2, a D-assessment score punishes the employees quite harshly, leading to this result.

⁶⁷ The differences in population means between the contingencies without promotions (situations 1 and 2) and those with promotion (situations 3 and 4) are significant at the 1 percent level.

Table 4.6: Descriptive statistics of the Monte Carlo results

		Minimum	Median	Average	Maximum	St. dev.
(1)	No promotions No evaluations	0.00%	3.10%	3.08%	4.14%	$0.60 \cdot 10^{-2}$
(2)	No promotions With evaluations	0.00%	3.10%	3.05%	4.83%	$0.66 \cdot 10^{-2}$
(3)	With promotions No evaluations	0.00%	3.45%	3.44%	8.19%	$0.77 \cdot 10^{-2}$
(4)	With promotions With evaluations	0.00%	3.42%	3.40%	8.91%	$0.89 \cdot 10^{-2}$

We now investigate the average salary increase after splitting the sample on the basis of the age of the employees. The fraction of salary increases that depends on promotions is dependent on the age of the employees. For employees younger than 30 years old, the average salary increase amounts to 24.85 percent after introducing promotions (see Table 4.7). The importance of promotions diminishes over time: promotions are less likely for older employees and their impact on overall salary for the whole population is therefore smaller.

Table 4.7: Monte Carlo results organized by age groups

		Age			
		<30	30-40	40-50	50-60
(1)	No promotions No evaluations	3.56%	3.37%	3.03%	2.75%
(2)	No promotions With evaluations	3.55%	3.38%	3.00%	2.70%
(3)	With promotions No evaluations	4.36%	3.89%	3.37%	2.90%
(4)	With promotions With evaluations	4.43%	3.95%	3.33%	2.74%
2 ↔ 4		24.85%	16.80%	10.97%	1.55%

Our analysis of the personnel data shows that promotions have an important effect on overall compensation. Promotions increase the expected lifetime wage increases, which are largely dependent on tenure, by roughly 25 percent.⁶⁸ This is the sum of two effects: namely, the immediate salary increase of at least 5 percent upon promotion, and the salary increases caused by the lower quartile position within the broadband subsequent to a promotion. Appendix A4 shows how this study compares to the results by Medoff and Abraham (1980) and BGH (1994a & 1994b).

⁶⁸ This is a conservative presentation of the importance of promotions in overall wage increases. One could argue that the N-factor, representing the inflation, is the inflation correction for the wage. Calculating the *real* wage increase would lead to an expected average annual wage increase of 0.79 percent without promotions and 1.67 percent with promotions for employees under 30 years old.

4.3.3 Empirical analysis of motivation

We have shown that promotions affect salary levels, and we therefore expect to find a positive effect of promotions on extrinsic motivation. We have obtained the data on the motivation of individual employees by means of a questionnaire. The questionnaire was also used to obtain other employee-specific information not available from the personnel data, such as education⁶⁹ and expectations regarding promotions. The response rate was 28.3 percent (179 out of 632 employees returned a completed questionnaire: see Table 4.3).⁷⁰ Three levels of education are distinguished, ranging from secondary school to university. Intrinsic and extrinsic motivation were measured by constructs consisting of 16 statements⁷¹ (see Table 4.8), while questions were scored on a 5-point scale. Factor analysis confirmed the common wisdom in psychology that a two-factor solution is plausible.⁷² The rotated factor solutions are depicted in Table 4.8. Cronbach's alpha for the combination of the nine statements regarding intrinsic motivation is .75. The alpha score for extrinsic motivation was .73.

Table 4.8: Factor loadings of the constructs extrinsic and intrinsic motivation

	Component 1: Extrinsic Motivation	Component 2: Intrinsic Motivation
The manner in which I am compensated ensures that I am motivated to give the fullest effort possible.	0.612	0.055
I'm satisfied with the way in which my compensation is determined.	0.657	-0.200
I get the feeling that <i>the company</i> finds it important to have a solid and clear compensation system.	0.580	0.097
I find the compensation system to be motivating.	0.719	0.047
The agreed targets motivate me to exert effort.	0.538	-0.003
I have full control over my ability to get promoted.	0.472	0.067
There are enough promotion possibilities that stimulate me to work hard.	0.597	0.163
If it's really necessary I'm prepared to work overtime, even if I don't get paid for this specifically.	0.075	0.456
I get a lot of satisfaction out of the work I do.	0.381	0.650
I often have to force myself to go to work.	-0.103	-0.762
Usually I'm enthusiastic about my job.	0.388	0.662
While at work I often feel like the day will never end.	-0.109	-0.627
I think I understood my work pretty well.	-0.320	0.566
I'm good at my work, compared with other colleagues.	-0.232	0.456
My job makes all my effort worthwhile.	0.313	0.666
I feel tense while working.	0.121	-0.287

⁶⁹ Three levels of education are distinguished, ranging from mid-school to university.

⁷⁰ Z-tests show that the sample has a relatively high fraction of young workers (age below 35) and under-represents workers above the age of 55. Also, the fraction of employees with tenure of more than 10 years is smaller for the sample than it is for the entire population. Thus, the fraction of employees that have most of their career in front of them is relatively high in the sample used.

⁷¹ The constructs are similar to the ones developed in Van Herpen et al. (2005). In order to measure extrinsic motivation, we included statements regarding motivational aspects of the compensation system, performance measurement, and promotions. Reliability analysis and factor analysis confirmed the validity of these elements.

⁷² The scree plot is presented in Figure A4.1. A sudden drop after the second factor and the fact that the third factor has an eigenvalue close to 1 has made us decide to choose the second factor solution.

We expect that the date of the last promotion as well as the anticipated moment of the next promotion have an impact on the level of motivation. Both economic and motivational theories predict a positive relationship between extrinsic motivation and the prospect of a promotion. Motivational theories (see crowding theory) also imply a positive relationship between the prospect of a promotion and intrinsic motivation, because of higher level of self-determination. Motivational theory further implies a negative relationship between the amount of time since the last promotion and intrinsic motivation. If employees have been doing the same job for a very long time, it would seem logical that the job provides fewer challenges and thereby lowers the level of immediate need satisfaction, and consequently decreases the level of intrinsic motivation.

To test the hypothesized relationship between expected and realized promotions, on the one hand, and intrinsic and extrinsic motivation, on the other, we run regressions in which the constructs intrinsic and extrinsic motivation (measured both by the average of the component statements and by the factor results) are the dependent variables. The independent variables are the time of the realized and expected promotions and control variables. Four dummy variables describe the timing of the realized promotions: the first three dummy variables are 1 if a promotion has occurred at $t-1$, $t-2$ and $t-3$, respectively. If no promotion has occurred, the fourth dummy is equal to 1 (this dummy variable is excluded from the regression). Another set of four dummy variables describes the timing of the next expected promotion, based on the employees' perception, i.e. the next promotion is expected within one year, within 3 years or within 5 years. The reference category is "after 5 years, or no promotion expected". Table 4.9 shows the results of the regressions. In order to test the robustness of the results, we conducted the analyses by using both the average compiled scores of motivation as well as the factor results as dependent variables. We also included intrinsic and extrinsic motivation as independent variables to control for spillover effects. The VIF scores, testing for multicollinearity, were well below critical levels with a highest score of 2.2.

First, the results show that extrinsic motivation is mainly affected by the expectation of a future promotion. If an employee expects a promotion in the near future, i.e. within one to three years, his or her extrinsic motivation increases. The result holds for both the average score and the factor result.⁷³ Second, intrinsic motivation is affected by both realized and expected promotions. A past promotion has an increasing effect on intrinsic motivation. This effect is significant in the second and third year after a promotion, not the first. It seems to take employees one to two years to get used and become knowledgeable and somewhat experienced in their new job/position before they get full satisfaction from their work. Also the expectancy of a future promotion increases intrinsic motivation. The effects of the control variables are also notable: older employees and employees in the higher broadbands have higher levels of intrinsic and extrinsic motivation.

⁷³ One could argue that the statements regarding promotions included in the measure of extrinsic motivation drive the results. Excluding these statements does not alter the results: the expectancy of a future promotion is significantly positively related to extrinsic motivation.

Table 4.9: Regression results: Promotions in a time-frame

	Averages								Factor Results			
	Extrinsic Motivation				Intrinsic Motivation				Extrinsic Motivation		Intrinsic Motivation	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Hist. Promotion t - 1	0.215	(0.145)	0.186	(0.146)	0.143	(0.105)	0.120	(0.106)	0.359	(0.265)	0.223	(0.261)
Hist. Promotion t - 2	0.183	(0.155)	0.124	(0.159)	0.287**	(0.112)	0.268**	(0.112)	0.282	(0.282)	0.513*	(0.278)
Hist. Promotion t - 3	0.248	(0.182)	0.169	(0.188)	0.390***	(0.132)	0.364***	(0.132)	0.527	(0.331)	0.856**	(0.327)
Exp. Promotion < 1 year	0.347**	(0.157)	0.301*	(0.159)	0.228**	(0.114)	0.191	(0.116)	0.654**	(0.286)	0.342	(0.282)
Exp. Promotion 2-3 years	0.273**	(0.138)	0.224	(0.141)	0.244**	(0.100)	0.215**	(0.101)	0.470*	(0.251)	0.527**	(0.248)
Exp. Promotion 4-5 years	-0.012	(0.206)	-0.007	(0.204)	-0.026	(0.149)	-0.025	(0.148)	0.113	(0.375)	-0.029	(0.369)
Age	0.012	(0.008)	0.010	(0.008)	0.013**	(0.006)	0.012**	(0.006)	0.025*	(0.014)	0.031**	(0.014)
Broadband	0.062	(0.042)	0.045	(0.043)	0.083***	(0.030)	0.077**	(0.030)	0.108	(0.076)	0.142*	(0.075)
Male	-0.173	(0.124)	-0.169	(0.123)	-0.019	(0.090)	0.000	(0.090)	-0.424*	(0.226)	0.052	(0.223)
Tenure (log)	-0.250	(0.159)	-0.248	(0.158)	-0.010	(0.115)	0.017	(0.116)	-0.466	(0.290)	0.066	(0.286)
Education low	0.243*	(0.135)	0.232*	(0.134)	0.052	(0.098)	0.026	(0.098)	0.346	(0.246)	-0.040	(0.242)
Education middle	0.041	(0.130)	0.064	(0.131)	-0.115	(0.094)	-0.119	(0.094)	0.105	(0.238)	-0.356	(0.234)
Assessment t - 1	0.165	(0.104)	0.171	(0.104)	-0.030	(0.076)	-0.048	(0.076)	0.253	(0.190)	-0.175	(0.188)
Intrinsic Motivation (avg)			0.203	(0.134)			0.106	(0.070)				
Extrinsic Motivation (avg)							0.106	(0.070)				
Constant	1.554***	(0.409)	0.990*	(0.552)	2.780***	(0.296)	2.615***	(0.314)	-2.118***	(0.745)	-1.596**	(0.735)
R ²	0.238		0.255		0.327		0.341		0.212		0.254	
R ² adjusted	0.144		0.154		0.244		0.253		0.115		0.162	
Number of observations	118		118		118		118		118		118	

**p* < .10, two-tailed tests.

***p* < .05, two-tailed tests.

****p* < .01, two-tailed tests.

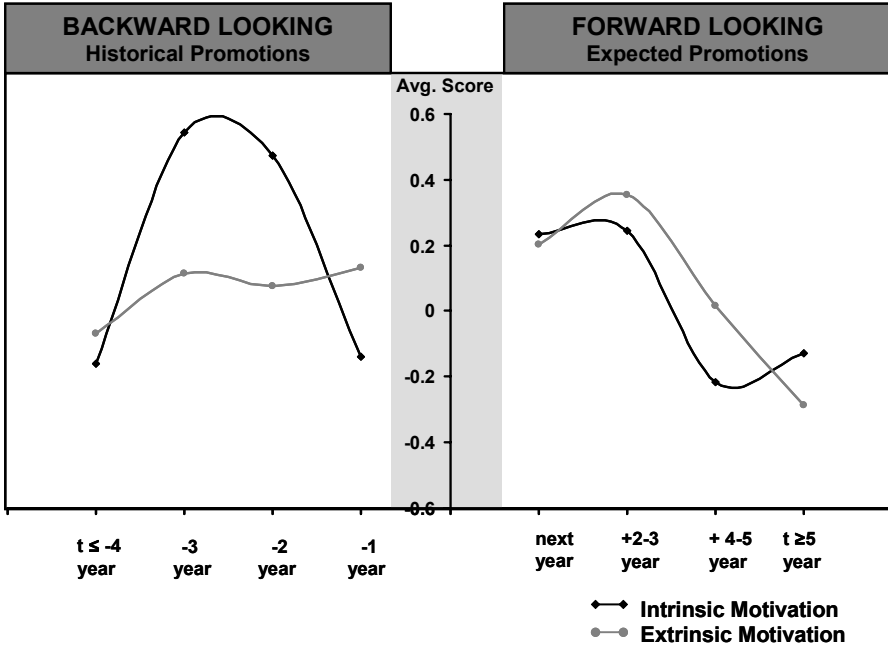


Figure 4.4a: Standardized average scores of motivation

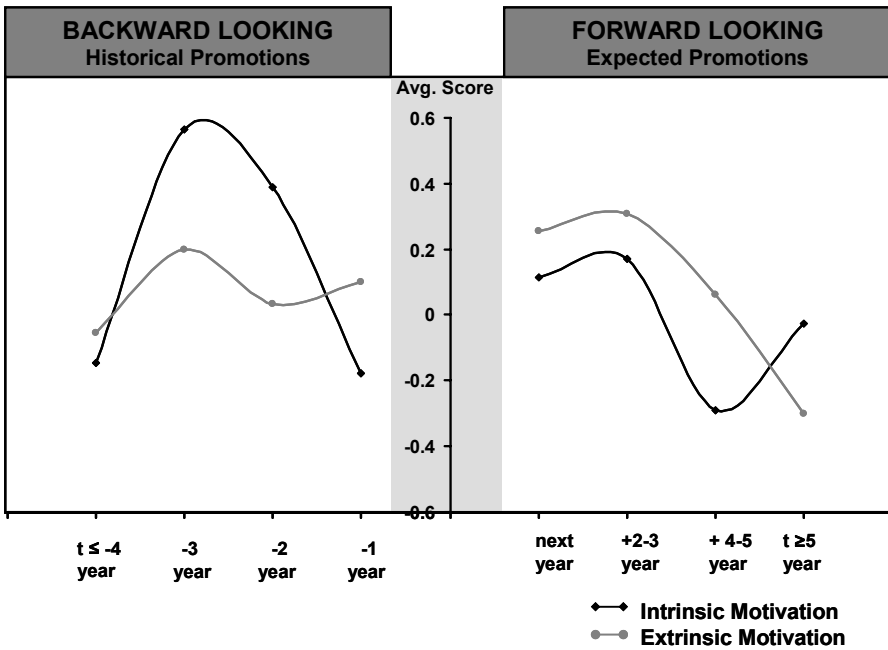


Figure 4.4b: Factor results for motivation

Figure 4.4 presents the results graphically. The scores for extrinsic and intrinsic motivation are displayed for the four dummies of historical promotions and for the four dummies on the expectancy of promotions. Figure 4.4a presents the standardized average scores, and Figure 4.4b the factor scores. The graphs show that intrinsic motivation as a function of historical and prospective promotions can best be characterized by two inverted U-shapes. The forward-looking inverted U-shape is much more damped than the backward-looking one. It appears that intrinsic motivation is highest in the middle period between two promotions (two to three years after a previous promotion, with the expectation of getting another promotion within two years). The graph for extrinsic motivation shows a different shape. The expectation of a promotion has a positive effect on extrinsic motivation and this effect diminishes over time. For extrinsic motivation the backward-looking effect is much more damped than the forward-looking graph. Therefore, the overall conclusion is that intrinsic motivation is most heavily affected by historical promotions, whereas extrinsic motivation is affected by future promotions.

4.4 Conclusion

In this chapter, we have analyzed wage structure characteristics and the incentive effects of promotions within an Anglo-Dutch company. Our first investigations of this Anglo/Dutch company have mainly addressed the CLA the company uses. We report that wages are attached to jobs, although wage variation within a job level still exists, in line with human capital theory (see BGH, 1994a & 1994b). Furthermore, the immediate wage increase upon promotion is 5 percent points. Previous studies within personnel economics have distinguished many stylized facts of internal labor markets. Within this chapter, similar features have been identified in the wage policy of the company, such as an overlap of wage ranges of different job levels, the rareness of nominal wage cuts, and smaller wage increases for those who begin in higher quartiles of the wage distribution. We also find that the company uses a convex wage structure, and that promotions contribute very significantly to lifetime income: roughly 25 percent of lifetime wage changes are a direct or indirect result of promotions. The impact on total rewards of incentive compensation based on subjective assessment scores is very limited because of its design (small effect of assessment score on wages) and its use and implementation (assessment scores are fairly uniform).

We have also investigated whether, and to what extent, promotions do indeed generate incentives such that motivation is affected. We demonstrate that the results are in line with the expectations of the tournament model. Indeed, the prospect of a promotion increases the level of extrinsic motivation (and also intrinsic motivation). Moreover, a realized promotion affects extrinsic motivation only modestly, but intrinsic motivation strongly. We find an inverted U-shaped relationship between the amount of time passed between promotions and intrinsic motivation. Extrinsic motivation increases with the expectation of a promotion, but falls back after the promotion has occurred.

Apart from their theoretical implications, empirical studies on internal labor markets can also have managerial impact. Previous studies have investigated the effect of various forms of *incentive compensation* on performance, focusing on both lower-level employees (for example Lazear, 2000b) as well as senior management, in particular CEOs (for example, Hall and Liebman, 1998). A univocal positive effect on extrinsic motivation has not been established in all instances and for all hierarchical levels. Even stronger, the relationship between incentive compensation and intrinsic motivation is possibly non-existent (see Chapter 3), and potentially even negative (crowding theory). As a novelty, this study shows that an expected *promotion* will increase not only extrinsic motivation, but also intrinsic motivation. Two years after a promotion, employees will have reached, on

average, their highest level of intrinsic motivation, which diminishes over time afterwards. The significant relationship between promotion and intrinsic motivation cannot be mimicked by incentive compensation. Therefore, our findings indicate that promotions are a very interesting and unique HR instrument to motivate employees, both intrinsically and extrinsically.

The limitations of this study are mainly related to problems arising from the data source used. The research site is a single company and the results might therefore not generally hold (although our findings are strikingly consistent with BGH (1994a & 1994b)). In particular, our conclusions regarding the lifetime wage increase do not include the possibility of leaving the company to work elsewhere and the accompanying impact on the wage level. However, the single company approach did provide us with the possibility to investigate the issues in a uniform cultural setting, where a single compensation system was used. This supports the precise measurement of effects. A second limitation is that the expectation of a promotion is measured subjectively. The data gave us little room to create an inflow and outflow model that would be able to derive the expectancies of a promotion more objectively. On the other hand, motivation is caused by the perceived expectations of a promotion, irrespective of whether this expectation is correct. Moreover, motivation was measured by means of perceived work effort instead of objectively measured performance, which would be preferable. Such an objective measure was not available, however

Overall, the research site provides a unique setting to analyze a combination of data from the labor agreement, personnel files, and the survey about motivation among employees, enabling the study of some implications of tournament theory and to validate an important prediction of the model: promotions provide incentives.

Appendix A4

The detailed personnel data and the CLA enables us to compare our results with those of previous single-firm studies, such as the Medoff and Abraham study (1980) and the BGH studies (1994a & 1994b). When comparing their main conclusions (see Table 2.4) with our results we find the following (previously found stylized facts in italics).⁷⁴

- 1d *Demotions are rare.* We find similar results, with a total of 32 demotions (1.6 percent) over a four-year period.
- 2a *There is wage variation within job levels and wage ranges overlap.* Figures 4.1 and 4.2 both indicate that we find support for these stylized facts. In our case, not only do we observe these facts in the data from personnel files (Figure 4.2) but they are also already embedded within the firm's wage policy (Figure 4.1).
- 2b *Wage ranges of job levels overlap.* Evidence in favor of this stylized fact follows directly from Figures 4.1 and 4.2.
- 2c *Promotions are essential for sustained wage growth.* This chapter finds strong support for this result. Promotions are necessary for wage growth, as has been shown by the Monte Carlo analysis (see Table 4.6).
- 2d *Wage increases precede promotions.* This conclusion can be partly supported by indirect evidence. High assessment scores (not taken into account in the BGH studies (1994a & 1994b)) that lead to wage increases (though minor) precede promotions.
- 3a *The presence of a cohort effect.* Since the regulations are enforced by a strict wage policy, deviating starting wages (due to external market conditions) will last throughout the career of the specific cohort.
- Q2 *Nominal wage cuts are rare, real wage cuts are not.* Some employees whose wages exceed the maximum receive no wage increase. Employees with a poor assessment score receive limited wage increases, but the merit matrix shows no negative values, supporting this stylized fact.
- Q3 *Serial correlation in wage changes.* We have found indirect support for this fact based on two grounds. First of all, assessment scores are serially correlated, but as, we have shown, the wage effect of an assessment score is modest. Second, and more important, the current quartile position of an employee is an important determinant of subsequent wage increases. Thus, differences in wage increases are mainly caused by the quartile position, which is serially-correlated.
- Q5 *Promotions are associated with a large wage increase, but a wage increase that is smaller than the difference in average wage between the two levels.* The wage policy has indicated that promotions lead to a direct wage increase of 5 percent, which is smaller than the difference in the average wage between two levels (i.e. broadbands). Figure 4.3 graphically shows the support for this stylized fact.

⁷⁴ Baker and Holmstrom (1995) and Gibbons (1997) provide a list with stylized facts, which we will use as a guideline. The order of the questions and numbering is the same as in Table 2.4. We do not present results for questions 1a, 1b, 1c and 1e, since we are unable to draw conclusions on these stylized facts.

- Q7 *Promotions come from, and go to, all deciles of the wage distribution.* The data does not support this stylized fact. A promotion gives a direct wage increase of 5 percent, while the maximum of the broadbands differ between 19.6 and 28.9 percent (see the difference in the maximum, as presented in Table 4.1). Thus, promoted employees, who were at the maximum of their old broadband, will not immediately go to the top deciles of the new broadband. This makes it impossible for employees to be promoted to the top deciles of the wage distribution.
- Q8 *Wage increases are smaller for those who begin in higher quartiles of the wage distribution of that level.* Support for this conclusion can be directly established from the merit matrix (Table 4.2).
- Q9 *Wage increases and promotions are more likely with higher performance evaluations.* This result, originally found by Medoff and Abraham (1980), is partly supported by the wage policy and partly by the personnel files. The merit matrix shows a direct positive link between individual performance and wage increases, although little variation in assessment scores is found. The personnel data have indicated the positive relationship between assessment scores and promotions (Table 4.5).
- Q10 *The effect of seniority on wages is independent of the presence of controls for performance evaluations.* In this company, the performance evaluations have only a modest one-year effect on the wage level of an individual. Tenure has a large effect on current wage levels. The results in Table 4.5 have shown that the tenure or the position in the salary scale (i.e. the relevant quartile) does not explain the assessment score. Thus, seniority (tenure) does indeed explain the wage level, independent of the assessment scores.

Because personnel data are only available for a few years and as a result of the negative growth of the organization, we are unable to further examine the stylized facts, e.g. regarding fast tracks, organizational stability, lateral job moves, and ports of entry/exit. All features we were able to examine have pointed to a remarkable similarity of results, given differences in decades, continents, and industries. Some of the previously-established stylized facts are supported by the results from analyzing the personnel files, and some are supported by the regulations of the company. The CLA has shown that many of the facts are direct and intentional results of the wage policy of the firm.

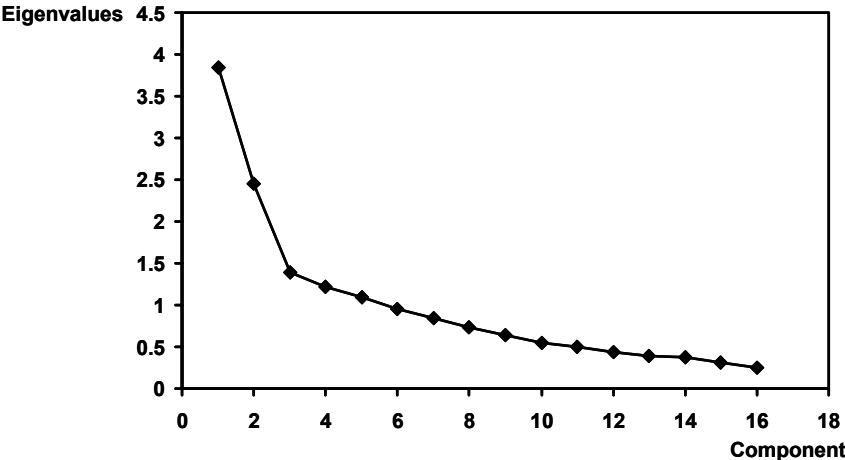


Figure A4.1: Scree plot

