İŞLETME ARAŞTIRMALARI DERGİSİ
JOURNAL OF BUSINESS RESEARCH-TURK
2022, 14(2), 1628-1642
https://doi.org/10.20491/isarder.2022.1461

Correlates of Turnover: Salary and Bonuses

Emre EKİNCİ [a]

[a] Koç University, College of Administrative Sciences and Economics, Department of Economics, Turkey. emekinci@ku.edu.tr

ARTICLE INFO

Keywords:
Labor turnover
Bonus payments
Salaries
Wealth maximization hypothesis
Promotions

Received 14 March 2022
Revised 23 June 2022
Accepted 25 June 2022

Article Classification:
Research Article

ABSTRACT

Purpose – This paper investigates how salaries and bonus payments are related to turnover.

Design/methodology/approach – The wealth maximization hypothesis posits that turnover is negatively related to the worker's expected future earnings at the current firm. Thus, salary and bonuses should be related to turnover to the extent they provide information about the worker's future earnings at the firm. To evaluate this hypothesis, this paper uses data coming from the personnel records of a medium-sized US firm in the financial services industry.

Results – The regression results show that pay variables are serially correlated and they signal future promotions in the firm. Thus, both salaries and bonuses provide information about the worker's future earnings through these two channels. Further, as predicted by the wealth maximization hypothesis, both salaries and bonuses are related to turnover. In particular, the results show that the growth rate of salary and bonus size (as well as earning a bonus in the current year) are negatively related to turnover.

Discussion – The findings of this study underscore the importance of pay variables on turnover behavior. While most existing studies focus on salaries, thereby ignoring bonuses, the current analysis shows that bonus payments are an important determinant of turnover. Hence, in addition to providing workers with effort incentives, the retention function of bonuses should be taken into account for designing optimal compensation schemes.

1. Introduction

Worker turnover has been one of the fundamental themes in labor economics since it is prevalent, especially among young workers, and has long-lasting effects on workers' lifetime earnings. In their influential study on the mobility of young men in the US, Topel and Ward (1992) find that two-thirds of workers either change jobs or become unemployed in their first year of employment. They also show that wage increases due to job changes constitute about one third of total wage growth in the first ten years of workers' careers. There is also a substantial amount of empirical evidence indicating wage effects of worker mobility (e.g., Bartel and Borjas, 1981; McLaughlin, 1991; Keith and McWilliams, 1995). Overall, the empirical evidence points out the importance of understanding how pay is related to turnover.

This paper aims to contribute to the literature by focusing on the components of worker compensation. Specifically, it examines how pay is related to turnover with an emphasis on bonus payments. Notably, while the existing studies focus on salaries (e.g., Gautier *et al*., 2002; Munasinghe, 2006; Dale-Olsen, 2006; Barth and Dale-Olsen, 2009; Cottini *et al*., 2011), bonuses have received little attention. This paper attempts to fill this gap by documenting the effects of bonus payments on turnover after controlling for salaries.

The wealth maximization hypothesis is employed to motivate the empirical analysis. Under this hypothesis, workers make a separation decision in each period to maximize the expected present value of their lifetime earnings. Thus, the probability of turnover should decrease with the worker's expected future earnings at the current firm. To translate this general prediction into testable predictions, I first investigate the extent to which the current values of salary and bonuses provide information about the worker's future earnings in the current firm. This mechanism works through two ways. First, a worker's salary and bonuses change over time even if the worker remains at the same job level. Second, pay variables, particularly bonuses, can be associated with higher future compensation through signaling future promotions (Fuchs, 2015; Ekinci, 2019).

The empirical analysis is based on data coming from the personnel records of a medium-sized US firm operating in the financial services industry. This firm-level dataset, first used by Baker *et al*. (1994a,1994b),

Suggested Citation
Ekinci, E. (2022). Correlates of Turnover: Salary and Bonuses, *Journal of Business Research-Turk*, 14 (2), 1628-1642.

includes detailed information about workers' salaries and bonus payments. Further, the data include subjective performance ratings submitted by supervisors and hierarchical job levels. As will be discussed in detail, these variables enable me to control for the worker's current performance and his or her promotion prospects at the firm.

The empirical analysis has two parts. The first part investigates the two mechanisms through which the current values of pay variables provide information about future earnings at the firm. To this end, I first examine serial correlations in pay. The analysis reveals that both bonuses and salaries are correlated over time, even after controlling for worker characteristics including job level and performance. Next, I examine the extent to which pay variables are related to the worker's probability of earning a promotion. Consistent with the literature, both the level and growth rate of salaries are positively related to the probability of earning a promotion. Further, both earning a bonus and its size are positively related to being promoted. Overall, the empirical evidence suggests a link between the current values of both salary and bonuses and the worker's future compensation. Hence, they are expected to be related to turnover according to the wealth maximization hypothesis.

The second part examines the extent to which salary and bonuses are related to turnover. The results, which should be interpreted as correlative rather than causal, show that the current salary level seems to be unrelated to turnover when data are pooled over time, whereas it is positively related to turnover after controlling for time-invariant unobserved worker heterogeneity. By contrast, the growth rate of salary is negatively related to turnover both in pooled and fixed-effects regressions. Because the growth rate of salary is both serially correlated over time and is positively related to the probability of earning a promotion, this finding supports the wealth maximization hypothesis. Finally, bonuses and salaries (the level and growth rates of salaries) are included in the estimating equation to see if bonuses provide information about turnover behavior after controlling for salary. The results support the wealth maximization hypothesis. First, earning a bonus is negatively related to turnover. Second, both pooled and fixed-effects regressions indicate that bonus size is negatively related to turnover. These results are robust to including proxies for worker performance and promotion prospects.

In the earlier literature, Blakemore *et al*. (1987) argue that bonuses are responsive to internal and external market conditions, and therefore, they can be used as a retention device by the firm to match the outside job offers received by current employees. The authors then use a sample drawn from the Panel Study of Income Dynamics (PSID) 1970-81 and find evidence that firms use bonuses to prevent voluntary turnover. Their empirical findings should be interpreted with caution because they measure bonuses using supplementary incomes, which may include bonus awards, commissions, tips, or overtime pay (that is, they cannot identify the exact form of income). Also, their analysis provides only cross-sectional evidence and may suffer from small sample size since it is based on 425 worker-years of data. In a more recent analysis, Ekinci (2019) develops a signaling model in which the firm uses bonuses to communicate with the worker that he or she has good prospects at the firm. Using the same data as does this paper, he then shows that bonuses are related to turnover. The current analysis differs from that study in two ways. First, it employs the wealth maximization hypothesis to argue that the current values of both salary and bonuses provide information about future earnings. Thus, the approach in the current paper captures the signaling mechanism proposed in that paper. Second, it focuses on the role of bonuses on turnover by conditioning on salary (both the level and growth rate) as well as on the proxies for performance and promotion prospects. Hence, the current analysis is complementary to that in Ekinci (2019).

The current analysis contributes to the literature in the following ways. First, it provides additional evidence regarding the role of salary on turnover, thereby shedding light on why the general prediction of the job-search theories—the current salary should be negatively related to turnover—is not supported by the data. The analysis reveals that the current salary is not related to turnover in pooled regressions, but it is positively related in fixed-effects regressions. In other words, the cross-sectional evidence does not show any relationship between the current salary and turnover, whereas the evidence from within-worker variation in salaries is not consistent with the job-search theories. By contrast, the growth rate of salary is negatively related to turnover in both pooled and fixed-effects regressions. Second, the analysis provides robust evidence concerning bonuses. The negative relationship between bonuses and turnover remains significant after controlling for salary (either the current level or the growth rate) as well as performance ratings and job levels.

The rest of the paper is organized as follows. The next section provides a discussion of the wealth maximization hypothesis. Then, the data and the key variables used in the empirical analysis are described. The last section presents and discusses the empirical results. The paper is concluded with some remarks.

2. Theoretical Discussion

The primary goal of this paper is to document empirical evidence that bonus payments provide information about turnover even after controlling for performance and salary. To motivate the empirical analysis along these lines, I use the wealth maximization hypothesis.

In his classic work, Burdett (1978) argues that workers change jobs to maximize the expected present value of their lifetime earnings. Building upon this argument, Mortensen (1988) develops a job-search model in which the worker's optimal separation decision in each period maximizes the expected present value of his or her future earnings. That is, the worker compares the value of his or her current job, given by the expected present value of future earnings at the same firm, with the value of an outside job offer, and then chooses to quit when the latter is greater than the former. Thus, this framework yields a general prediction that separations should decline with the current wage while wage growth should not affect turnover (Jovanovic, 1979; MacDonald, 1988). This prediction hinges on the theoretical result that the current wage possesses all information about the quality of the match between the firm and the worker, and therefore, other variables, including bonuses, should have no effect on turnover. However, there is empirical evidence inconsistent with this hypothesis. For example, Topel and Ward (1992) find that the initial wage has a significant positive effect on turnover after controlling for current wage, experience, and tenure. Clearly, if the current wage is fully informative about the value of the job, the initial wage is expected to have no effect on turnover. Munasinghe (2000) argues that this puzzle can be explained by the heterogeneity in within-job wage growth rates.

Although this framework does not consider bonuses, the link it provides between the worker's expected earnings at the firm and turnover can be used to examine the relationship between bonuses and turnover. To this end, the analysis begins with two conjectures that are empirically investigated in the next section. First, serial correlation in pay variables provides information about workers' future earnings at the firm. Second, the current value of a pay variable is associated with higher future compensation to the extent it predicts future promotions, which are, in turn, associated with higher earnings.

Note that the second channel may be evident in serial correlations as well. However, serial correlations in bonuses do not fully capture this relationship. Because bonus payments increase with job level (Ekinci *et al*., 2019), promoted workers become eligible to earn bonuses of larger size; yet it does not mean that they will eventually earn those bonuses. Consistent with this argument, Belzil and Bognanno (2008) find that promotions have a positive effect on the growth of salaries but not on bonuses. Nevertheless, the expected earnings of a promoted worker increase since promotions are associated with large salary increases (as documented by, for example, Lazear (1992) and McCue (1996)). Hence, bonuses may be associated with higher future compensation through signaling future promotions since the promoted workers earn higher salaries and become eligible to earn larger bonuses.

As noted, bonus payments signal higher future compensation to the extent they are associated with future promotions. Fuchs (2015) shows that bonuses can be used as a communication device when the firm privately observes the worker's type. Applying this idea to hierarchical firms, Ekinci (2019) shows that firms pay discretionary bonuses to credibly signal that the worker has good career prospects at the firm. In other words, firms pay bonuses because they expect that the worker is going to be sufficiently productive to get promoted in the future. Because workers who think they have no bright future at the firm may be attracted easier by outside firms, this mechanism implies that earning a bonus is associated with lower turnover.

Similarly, the growth rate of salaries may also predict higher future compensation through promotions. Baker *et al*. (1994b) find that workers who experience higher wage growth in a given job level are more likely to be promoted to the next job level. This suggests that the growth rate of salaries also reduces the probability of turnover by signaling the possibility of future promotions.

The approach taken in this paper to examine turnover is closest in spirit to that of Galizzi and Lang (1998) and Munasinghe (2006). To proxy the worker's expected future wages at the firm, Galizzi and Lang (1998) use

wages of workers with similar observable attributes. Consistent with the wealth maximization hypothesis, they find that the probability of turnover decreases with the expected future wages at the current firm. The approach in this paper differs from theirs because it uses the worker's own pay to infer his or her future earnings at the firm instead of relying on similar workers' earnings. Munasinghe (2006) examines the relationship between job prospects and turnover by using data on workers' own assessments regarding their expected duration at the current job and promotion prospects. He finds that workers who do not expect to remain at the current job for a long period and those with limited promotion prospects have higher turnover rates.

3. Description of Data and Key Variables

The empirical analysis is based on data coming from the personnel records for managerial employees of a medium-sized US firm in the financial services industry. The original dataset includes year-end-records for the 1969-1988 period. Although the time period of the data seems to be a caveat to our analysis, using these data offers two main advantages. First, it is well known in the literature. The same dataset was first used by Baker *et al*. (1994a, 1994b) in their influential study on workers' careers. Their main findings concerning the firm's wage and personnel policies have been accepted as stylized facts in the personnel economics literature, and therefore, they provided the empirical basis for the development of new theories on careers (e.g., Bernhardt (1995), Chiappori *et al*. (1999), Gibbons and Waldman (1999, 2006), Fairburn and Malcomaon (2001)). Further, the same dataset is used by other papers including Gibbs (1995), Kahn and Lange (2014), DeVaro and Waldman (2012), Ekinci (2019), and Ekinci *et al*. (2019). Second, as will be explained below, this dataset provides variables such as individual bonuses, hierarchical levels, and performance measures, which are essential to our analysis.

Because information on bonuses is available only for the 1981-1988 period, the analysis uses this part of the data when bonuses enter the estimating equation. The analysis is further restricted to US male workers because all pay variables are denominated in US dollars and other dynamics that affect the turnover behavior of foreign and female workers are likely to confound the relationship between turnover and pay variables.

To construct a turnover variable, the panel dimension of the data is used. Specifically, if there is no record for a worker in a given year, the previous year becomes the worker's last year at the firm. Taking this approach to derive a turnover variable has two implications. First, turnover is not possible for observations in last year of the dataset, 1988, since whether or not workers stay at the firm in the following year is not observed. Second, it is not possible to distinguish quits from layoffs.

The dataset is suitable for this study because it includes include performance ratings and hierarchical levels. Although performance ratings are based on subjective evaluations submitted by supervisors, they are correlated with promotions (Gibbs, 1995), future wage increases (Dohmen, 2004), and with both the probability of earning a bonus and the size of the bonus (Ekinci *et al*., 2019). Hence, I use ratings to worker performance. Performance ratings are measured on a five-point scale in which 1 reflects the best performance. Since there are few worker-years at which the performance rating equals 5, I combine rating 5 with rating 4. Results do not change when rating 4 and rating 5 enter regressions separately.

Because the HR department of this firm did not report job levels in the raw data, Baker *et al*. (1994a) use movements between job titles to identify job levels. Specifically, they identify 8 levels, where level 8 reflects the CEO of the company. Because the dynamics that determine the CEO's compensation is different and there are fewer employees at higher levels due to the pyramidal structure of the firm, observations in level 8 are dropped and observations in levels 6 and 7 are combined with those in level 5. There are three main reasons to include job level in the empirical analysis. First, as will be discussed in detail, turnover rates depend on job level. Second, the probability of being promoted depends on job level (Gibbs, 1995). Third, bonus size increases with job level (Baker *et al*., 1994b; Ekinci *et al*., 2019).

Table 1. Summary Statistics

	Stayers		Leavers		
	Mean	Standard Deviation	Mean	Standard Deviation	t-statistic (difference in means)
Age	40.887	8.853	37.864	9.478	12.59***
High School	0.334	0.472	0.215	0.411	9.56***
College	0.327	0.469	0.410	0.492	-6.52***
Professional	0.242	0.428	0.289	0.453	-4.076***
PhD	0.095	0.293	0.086	0.280	1.17
Tenure at firm	6.397	4.107	5.282	3.859	9.77***
Tenure at level	3.872	3.177	3.433	2.858	5.16***
Level=1	0.153	0.360	0.181	0.385	-2.86***
Level=2	0.211	0.408	0.225	0.418	-1.23
Level=3	0.273	0.445	0.270	0.444	0.19
Level=4	0.321	0.467	0.301	0.459	1.59
Level=5	0.041	0.199	0.022	0.147	3.69***
Rating	1.881	0.729	2.101	0.790	-9.10***
Earned bonus	0.400	0.490	0.325	0.469	5.71***
Log(bonus)	8.728	0.863	8.690	0.959	0.95
Log(salary)	10.914	0.402	10.887	0.394	2.53*

Notes: The statistics for performance ratings are based on worker-years for which performance ratings are available. Statistical significance at the 10%, 5%, and 1% levels denoted by *, **, and ***, respectively.

Overall, the full sample includes 31,524 worker-years of data, while the restricted sample, which consists of workers for which a bonus earning is reported, includes 10,575 worker-years of data. Table 1 presents the summary statistics for the key variables. All pay variables are measured in real terms in 1988 dollars while age and tenure variables are measured in years. To examine if observable characteristics are significantly different across two subsamples, 'leavers' and 'stayers', average values are computed separately for each group and t-statistics for the differences between the means are reported in the last column. It is observed that stayers are, on average, older, less educated, and have longer tenure at the firm. Also, they have higher performance ratings, as expected. Finally, they have higher salaries, and they are more likely to earn a bonus.

4. Discussion of Empirical Results

4.1. Preliminary Analysis

Before turning to the relationship between pay variables and turnover, the analysis focuses on the two channels through which the current value of a pay variable provides information about the worker's future earnings at the firm. To this end, serial correlations in pay are examined first. As discussed, if pay variables are highly correlated over time, one can argue that their current values provide information about the worker's future compensation, and therefore, they are likely to affect turnover.

Table 2 reports serial correlations of total compensation, salaries, and bonus payments between three adjacent years. The results indicate that the level of total compensation is highly correlated over time both in adjacent periods and two-period windows. The same pattern is observed for salary level: the serial correlation in the level of salary at the current period is close to 1 both for 1 period and 2 periods back. The serial correlations in bonuses are weaker, but they are also significant and positive. The weak correlation in bonuses explains why the serial correlation in total compensation is slightly weaker than that in salaries.

Table 2. Serial Correlations in Pay

	Correlation between pay variable in the current period and:		Correlation between residual pay variable in the current period and:	
	1 period back	2 periods back	1 period back	2 periods back
Log(compensation)	0.973*	0.843*	0.719*	0.694*
ΔLog(compensation)	-0.017	-0.022	-0.112*	-0.073*
Log(salary)	0.985*	0.956*	0.693*	0.656*
Δlog(salary)	0.325*	0.276*	0.178*	0.138*
Log(bonus)	0.207*	0.193*	0.171*	0.148*

Notes: Superscript * indicates significance of the Pearson correlation statistic at the one percent level. Columns 2 and 3 report serial correlations between vectors of the corresponding pay variable. Columns 4 and 5 report serial correlations between vectors of residuals from linear regressions of the corresponding pay variable on age, tenure at firm, education, race, job level and salary (for bonus regressions only).

Looking at the serial correlations in growth rates, a striking difference is observed between total compensation and salary. Since there are few workers for which a bonus earning is reported in subsequent periods, the analysis does not include the growth rate of bonuses. Specifically, the serial correlation in the growth rate of salaries is positive (and statistically significant), whereas the serial correlation in the growth rate of total compensation is negative and not statistically significant. The disparity follows from the fact that workers do not earn bonuses in each period. Therefore, the growth rate in total compensation has a considerably different pattern over time than the growth rate in salaries. Finally, a finding common to both levels and growth rates of pay variables is that the correlation is slightly stronger for adjacent periods than the correlation between the current period and two periods back.

To what extent these serial correlations are driven by worker heterogeneity is important. For example, workers at higher job levels or those with longer tenure may receive higher salary increases or bonuses. To account for these possibilities, abnormal variation in pay variables (residuals) after controlling for age, tenure at the firm, education, race, job level and salary (for bonus regressions only) are computed. Columns 4 and 5 report the serial correlations in residuals in three adjacent years. As expected, serial correlations in salaries and bonus payments are somewhat smaller, but still significant at the one percent level. Interestingly, the serial correlation in the growth rate of total compensation becomes negative and statistically significant at the one percent level after controlling for worker characteristics. Overall, the results indicate that although worker characteristics explain a substantial portion of variation in pay across years, the serial correlations remain statistically significant after removing these effects.

Next, the extent to which pay is associated with promotions is investigated. To this end, logit models are estimated, where the dependent variable is an indicator variable that takes on a value of one if the worker earns promotion in the current year and zero if not. The results are reported in Table 3. In addition to performance ratings and tenure at the current job level, each specification includes controls for job level, education, race, and age. Consistent with the earlier literature, both performance ratings and tenure at the current job level are strongly correlated with the probability of promotions (e.g., Gibbs, 1995). The results show that both the level and growth rate of salaries have a statistically significant positive effect on the probability of promotions (columns 1 and 2). This result is consistent with the finding that workers with higher wage growth are more likely to earn a promotion (Baker *et al*., 1994b).

Table 3. Promotions and Pay

	(1)	(2)	(3)	(4)	(5)	(6)
Rating=2	-0.407***	-0.393***	-0.396***	-0.412***	-0.389***	-0.335***
	(0.0784)	(0.0850)	(0.0786)	(0.0842)	(0.0787)	(0.0965)
Rating=3	-1.339***	-1.235***	-1.266***	-1.269***	-1.256***	-1.161***
	(0.117)	(0.124)	(0.118)	(0.124)	(0.118)	(0.143)
Rating=4	-2.467***	-2.307***	-2.504***	-2.496***	-2.500***	-1.903***
	(0.595)	(0.598)	(0.596)	(0.597)	(0.596)	(0.609)
Tenure at level=2	1.046***	1.125***	1.081***	1.026***	1.078***	0.855***
	(0.0961)	(0.115)	(0.0959)	(0.115)	(0.0959)	(0.113)
Tenure at level=3	0.991***	1.087***	1.050***	0.997***	1.047***	0.717***
	(0.115)	(0.130)	(0.115)	(0.129)	(0.115)	(0.133)
Tenure at level=4	0.689***	0.837***	0.750***	0.703***	0.746***	0.463***
	(0.148)	(0.160)	(0.148)	(0.159)	(0.148)	(0.176)
Tenure at level>=5	0.999***	1.145***	1.095***	1.046***	1.094***	0.703***
	(0.129)	(0.141)	(0.129)	(0.140)	(0.129)	(0.158)
Log(salary)	1.135***					
	(0.164)					
ΔLog(salary)		3.837***				
		(0.593)				
Earned bonus			0.442***	0.437***		
			(0.073)	(0.080)		
Earned bonus last period				0.129		
				(0.086)		
Log(bonus)					0.037***	0.025***
					(0.006)	(0.007)
Log(bonus last period)						0.023***
						(0.008)
N(worker-years)	11,763	11,124	11,764	11,126	11,763	6,855
Log-likelihood	-3059	-2783	-3065	-2786	-3062	-2015
R^2	0.197	0.202	0.196	0.202	0.196	0.192

Notes: The results from logit models in which the dependent variable indicates whether the worker earns a promotion in a given year. All specifications include control variables for job level, education, race, age, and year dummies. 'Rating=1' and 'Tenure at level=1' are the omitted categories. Statistical significance at the 10%, 5%, and 1% levels denoted by *, **, and ***, respectively.

More interestingly, the findings indicate that earning a bonus, as well as the size of the bonus, is correlated with promotion even after controlling for performance. The results in column 3 show that workers who have earned a bonus in the current period are more likely to earn a promotion. Since the data provide a snapshot for each year, we do not know the exact timing of promotion decisions. Therefore, this finding indicates that the worker who earns a bonus in the current period is more likely to be assigned to the next job level in the next period. We see that the effect of earning a bonus in the previous year is positive, but not significant at conventional levels (column 4). In line with our expectations, bonus size is positively related to the probability of earning a promotion (column 5). The same result holds for the bonus payment in the previous year as well. The size of bonuses earned in both the current and previous periods have positive effect on the probability of earning a promotion (column 6).

Table 4. Separation Rates by Job Level and Salary Decile

Level	Bottom	2nd	3rd	4th	5th	6th	7th	8th	9th	Top	Total
1	0.120	0.104	0.106	0.107	0.109	0.123	0.091	0.108	0.127	0.092	0.108
2	0.097	0.088	0.105	0.103	0.106	0.088	0.098	0.111	0.094	0.089	0.098
3	0.108	0.093	0.082	0.098	0.069	0.421	0.100	0.104	0.087	0.123	0.126
4	0.089	0.064	0.077	0.096	0.095	0.722	0.076	0.098	0.085	0.093	0.150
5	0.149	0.146	0.132	0.066	0.104	0.063	0.048	0.048	0.058	0.029	0.083
Total	0.104	0.089	0.092	0.098	0.093	0.074	0.088	0.100	0.091	0.095	

Notes: Annual separation rates by job level and salary decile. Salary deciles are calculated within each hierarchical level and year.

Table 5. Separation Rates by Job Level and Salary Increase Decile

Level	Bottom	2nd	3rd	4th	5th	6th	7th	8th	9th	Top	Total
1	0.184	0.111	0.082	0.074	0.085	0.088	0.067	0.075	0.043	0.121	0.093
2	0.165	0.107	0.083	0.059	0.095	0.092	0.083	0.074	0.092	0.111	0.096
3	0.158	0.075	0.079	0.089	0.066	0.082	0.085	0.073	0.089	0.097	0.089
4	0.157	0.096	0.079	0.069	0.071	0.083	0.068	0.065	0.067	0.091	0.085
5	0.085	0.155	0.117	0.103	0.068	0.113	0.031	0.069	0.010	0.010	0.076
Total	0.157	0.098	0.082	0.075	0.075	0.087	0.073	0.070	0.072	0.095	

Notes: Annual separation rates by job level and salary increase decile. Salary increase deciles are calculated within each hierarchical level and year.

Before estimating the correlates of turnover, it is worth examining exit rates by job level and pay decile. Pay deciles are calculated within each hierarchical level and year. Therefore, one can see how exit rates vary across pay deciles within a job level. Table 4 presents exit rates by job level and salary decile. The results indicate that there is little variation in exit behavior across salary deciles. Across levels, on the other hand, workers at levels 3 and 4 are more likely to separate than workers at other job levels. Tables 5 examines the pattern of exit rates by job level and deciles of salary increase. Two patterns are noticeable in all job levels but level 5: first, exit rates are the highest in the bottom decile and decrease afterwards; second, exit rates start to increase in the highest two deciles. Interestingly, workers at top deciles leave the firm more often than worker at lower deciles. One possibility is that the firm has limited slots to grant promotions (a situation referred to as promotion bottlenecks). Hence, workers who are not granted a promotion leave the firm since their earnings cannot go beyond the upper limit imposed by pay scales unless they are promoted to the upper job level. The constraint on wage raises imposed by pay scales is referred to as the 'Green Card' effect by Baker *et al*. (1994a). This effect implies that in a given job category workers at lower wage deciles experience higher raises than workers at higher wage deciles. Therefore, the finding that workers at top wage deciles are more likely to separate is consistent with the green card effect in the sense that workers who are not satisfied with their wage raises have higher propensities to separate. Finally, Table 6 reports exit rates by job level and bonuses. Because bonuses are not earned in each period, the relationship between bonus payments and exit rates are erratic, especially in levels 1 and 5.

Table 6. Separation Rates by Job Level and Bonus Decile

Level	Bottom	2nd	3rd	4th	5th	6th	7th	8th	9th	Top	Total
1	0.087	0.170	0.205	0.057	0.200	0.028	0.127	0.128	0.115	0.164	0.129
2	0.143	0.083	0.127	0.080	0.094	0.030	0.098	0.090	0.033	0.096	0.087
3	0.107	0.076	0.059	0.068	0.067	0.103	0.068	0.046	0.059	0.113	0.074
4	0.073	0.103	0.106	0.063	0.062	0.091	0.087	0.071	0.071	0.111	0.085
5	0.179	0.036	0.029	0.028	0.108	0.143	0.065	0.056	0.083	0.071	0.079
Total	0.103	0.096	0.096	0.065	0.080	0.086	0.085	0.067	0.067	0.111	

Notes: Annual separation rates by job level and bonus decile. Bonus deciles are calculated within each hierarchical level and year.

4.2. Pay Variables and Turnover

This section examines how salaries and bonuses related to turnover. To this end, logit models are estimated, where the dependent variable is an indicator variable that takes on a value of one if the worker turnovers in the current year and zero if not. The discussion starts with how the level and growth rate of salaries are related to the probability of turnover. This analysis is based on the full sample. The next part of analysis turns to the relationship between bonuses and turnover after controlling for salary (both its level and growth rate). Since bonuses are available only in the restricted sample, this part of the analysis is based on that sample.

TABLE 7A. Salary and Turnover (Pooled Logits)

Log(salary)	-0.124	0.223*	0.0696			
	(0.0943)	(0.128)	(0.132)			
ΔLog(salary)				-6.495***	-3.794***	-3.432***
				(0.435)	(0.539)	(0.544)
Level=2	0.233***	0.190***	0.300***	0.252***	0.257***	0.348***
	(0.0553)	(0.0695)	(0.0722)	(0.0661)	(0.0778)	(0.0818)
Level=3	0.295***	0.274***	0.434***	0.395***	0.406***	0.516***
	(0.0654)	(0.0841)	(0.0889)	(0.0706)	(0.0855)	(0.0895)
Level=4	0.368***	0.362***	0.572***	0.519***	0.605***	0.707***
	(0.0927)	(0.123)	(0.129)	(0.0800)	(0.102)	(0.104)
Level=5	0.255	0.212	0.544*	0.322*	0.529*	0.669**
	(0.196)	(0.306)	(0.310)	(0.176)	(0.281)	(0.282)
Rating=2		0.379***	0.350***		0.288***	0.278***
		(0.0578)	(0.0583)		(0.0669)	(0.0670)
Rating=3		0.937***	0.859***		0.740***	0.709***
		(0.0751)	(0.0768)		(0.0861)	(0.0864)
Rating=4		1.897***	1.791***		1.556***	1.527***
		(0.184)	(0.185)		(0.196)	(0.196)
Tenure at level=2			0.171**			0.0960
			(0.0669)			(0.0774)
Tenure at level=3			0.305***			0.215**
			(0.0871)			(0.0925)
Tenure at level=4			0.408***			0.306***
			(0.107)			(0.111)
Tenure at level>=5			0.559***			0.474***
			(0.111)			(0.113)
N(worker-years)	31,524	21,153	21,153	25,614	18,145	18,145
Log-likelihood	-10380	-6617	-6603	-8044	-5565	-5555
R^2	0.0361	0.0568	0.0588	0.0515	0.0595	0.0611

Notes: The results from pooled logit models in which the dependent variable indicates whether the worker separates in a given year. Models are estimated using the full sample described in the text. 'Level=1', 'Rating=1', and 'Tenure at level=1' are the omitted categories. Statistical significance at the 10%, 5%, and 1% levels denoted by *, **, and ***, respectively.

To address the effect of unobserved worker heterogeneity on propensities to turnover, both pooled and fixed-effects (FE) logits are estimated. All pooled logits include controls for age, tenure at firm, education level, year, and race, whereas these variables are dropped in fixed-effects estimations. Overall, three different specifications are estimated for each pay variable. The baseline specification includes the set of control variables enumerated above (only for pooled regressions) and indicator variables for job levels. The second one augments the baseline specification with indicator variables for performance ratings, while the third specification further augments it by adding indicator variables for tenure at the current job level.

Table 7A and 7B display the results from pooled and FE logit models, respectively, in which the pay variable of interest is salary. The results from pooled logits (columns 1 to 3 on Table 7A) indicate that salary level is not

related to turnover. By contrast, in the FE logits the coefficient estimates for salary level are positive and significant at the one percent level (see columns 1 to 3 on Table 7B). This means that workers with higher salaries are more likely to turnover even after controlling for time-invariant worker heterogeneity. As discussed earlier, this finding is not consistent with the search theories predicting a negative effect of the current wage on the probability of turnover. However, there is no consensus in the empirical literature about the effect of current salary on turnover. For example, Galizzi and Lang (1998) also find a positive relationship between the current wage level and turnover. A possible explanation for this finding might be that higher salaries reflect workers for which the labor market demand is higher. For example, if the skills of workers with higher salaries are more transferable to outside firms, they are more likely to receive wage offers higher than their current wages. Consistent with this argument, Murphy and Zabojnik (2004) show that an increase in the transferability of the worker's skills (i.e., an increase in the ratio of general to firm-specific human capital) leads to fewer internal promotions, more external hires, and increase in average wages. However, the data do not permit us to test this hypothesis.

TABLE 7B. Salary and Turnover (Fixed-Effects Logits)

Log(salary)	7.107***	9.193***	4.441***			
	(0.381)	(0.631)	(0.930)			
ΔLog(salary)				-7.317***	-7.403***	-2.632**
				(0.544)	(0.846)	(1.119)
Level=2	4.276***	4.582***	11.79***	4.486***	5.228***	12.94***
	(0.385)	(0.599)	(0.858)	(0.458)	(0.727)	(0.962)
Level=3	7.651***	7.998***	21.53***	8.418***	9.349***	23.39***
	(0.462)	(0.703)	(1.243)	(0.531)	(0.821)	(1.360)
Level=4	10.91***	12.61***	32.78***	12.97***	15.97***	35.19***
	(0.577)	(1.239)	(1.972)	(0.679)	(1.385)	(2.078)
Level=5	12.44***	14.48***	42.96***	15.72***	18.72***	45.58***
	(0.782)	(1.636)	(2.614)	(0.885)	(1.652)	(2.687)
Rating=2		1.000***	0.853***		0.973***	0.858***
		(0.136)	(0.214)		(0.137)	(0.208)
Rating=3		2.400***	1.714***		2.026***	1.570***
		(0.165)	(0.251)		(0.168)	(0.247)
Rating=4		4.343***	3.248***		3.093***	2.855***
		(0.320)	(0.411)		(0.307)	(0.408)
Tenure at level=2			2.948***			2.617***
			(0.249)			(0.257)
Tenure at level=3			5.471***			5.287***
			(0.341)			(0.355)
Tenure at level=4			7.844***			7.840***
			(0.426)			(0.447)
Tenure at level>=5			10.78***			10.90***
			(0.508)			(0.539)
N(worker-years)	18,270	7,950	7,950	14,406	6,736	6,736
Log-likelihood	-3370	-1407	-720.8	-2876	-1353	-700.0
R^2	0.314	0.411	0.698	0.258	0.336	0.657

Notes: The results from fixed-effect logit models in which the dependent variable indicates whether the worker separates in a given year. Models are estimated using the full sample described in the text. 'Level=1', 'Rating=1', and 'Tenure at level=1' are the omitted categories. Statistical significance at the 10%, 5%, and 1% levels denoted by *, **, and ***, respectively.

Unlike salary level, the growth rate of salary has a negative and statistically significant (at the one percent level) effect on turnover. Specifically, both pooled logits (columns 4 to 6 on Table 7A) and FE logits (columns 4 to 6 on Table 7B) indicate that the probability of turnover declines with the growth rate of salary in the current period. Recall my conjecture that because the growth rate of salaries is positively related to the worker's future compensation, it should be negatively related to turnover. Based on this rationale, one expects

that the negative effect of the growth rate of salary on turnover should decline, in absolute terms, when the worker's current performance and his promotion prospects are accounted for. The results are generally consistent with this postulate; the point estimate for the growth rate of salary decreases, in absolute value, after controlling for performance and tenure at the current job level. Indeed, the decrease is more dramatic in FE logits since the point estimate almost reduces to the one third of its level in the baseline specification.

Before turning to other pay variables, it is worth discussing how the control variables for worker performance and promotion prospects are related to turnover. The point estimates for performance ratings and tenure at the current level are in line with our expectations. The probability of turnover decreases with the worker's performance. The relationship between the probability of turnover and binary indicators for tenure at the current job level, which are intended to capture the variation in promotion probabilities, is monotonic. Workers with longer tenure at the current job level are more likely to turnover after controlling for tenure at the firm. This suggests that the tenure at the current job level may be used to proxy the worker's promotion prospects.

As noted before, the analysis on bonus payments is based on the restricted sample since the bonus data span the 1981-1988 period. The following two robustness checks are performed. First, all specifications reported in Table 7A and 7B, which are based on the full sample, are re-estimated using the restricted sample. Results from the restricted sample are qualitatively the same and quantitatively very similar to the results from the full sample. Therefore, one can conclude that the growth rate of salary has a statistically significant negative effect on the probability of turnover in both samples. Second, to examine whether bonus recipients and non-recipients are any different towards their propensities to turnover, Table 7A and 7B are reproduced separately for the two sub-groups. The pooled logits indicate that workers in these subgroups are very similar in terms of their turnover behavior. However, the results from FE logits estimated using the subsample of non-recipients are not informative since there are very few observations to estimate these models.

TABLE 8. Pay Variables and Turnover (Pooled Logits)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(salary)	0.151	0.140	0.350*	0.162			
	(0.192)	(0.146)	(0.185)	(0.192)			
ΔLog(salary)					-5.545***	-2.686***	-2.351***
					(0.584)	(0.689)	(0.691)
Earned bonus	-0.192**						
	(0.0807)						
Log(bonus)		-0.022***	-0.015**	-0.014**	-0.020***	-0.016**	-0.014**
		(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)
Level=2	0.318***	0.149	0.190	0.318***	0.251**	0.332***	0.449***
	(0.121)	(0.0965)	(0.117)	(0.121)	(0.111)	(0.127)	(0.132)
Level=3	0.439***	0.183*	0.251*	0.437***	0.427***	0.479***	0.625***
	(0.143)	(0.109)	(0.136)	(0.143)	(0.116)	(0.138)	(0.143)
Level=4	0.664***	0.262*	0.411**	0.662***	0.650***	0.801***	0.941***
	(0.197)	(0.148)	(0.185)	(0.197)	(0.127)	(0.154)	(0.158)
Level=5	0.414	-0.121	-0.0530	0.415	0.316	0.573	0.817**
	(0.453)	(0.296)	(0.439)	(0.453)	(0.249)	(0.385)	(0.389)
Rating=2	0.483***		0.514***	0.483***		0.405***	0.390***
	(0.0913)		(0.0905)	(0.0913)		(0.0975)	(0.0978)
Rating=3	1.095***		1.164***	1.096***		1.013***	0.978***
	(0.115)		(0.113)	(0.115)		(0.124)	(0.124)
Rating=4	1.762***		1.872***	1.764***		1.606***	1.559***
	(0.254)		(0.252)	(0.254)		(0.263)	(0.263)
Tenure at level=2	0.134			0.135			0.114
	(0.106)			(0.106)			(0.116)
Tenure at level=3	0.259**			0.260**			0.248*
	(0.130)			(0.130)			(0.135)
Tenure at level=4	0.511***			0.512***			0.501***

	(0.158)			(0.158)			(0.160)
Tenure at level>=5	0.581***			0.582***			0.591***
	(0.162)			(0.162)			(0.162)
N(worker-years)	8,628	12,746	8,628	8,628	11,492	8,152	8,152
Log-likelihood	-2848	-4330	-2856	-2848	-3755	-2647	-2638
R^2	0.0629	0.0369	0.0603	0.0629	0.0490	0.0619	0.0649

Notes: The results from pooled logit models in which the dependent variable indicates whether the worker separates in a given year. Models are estimated using the restricted sample. 'Level=1', 'Rating=1', and 'Tenure at level=1' are the omitted categories. Statistical significance at the 10%, 5%, and 1% levels denoted by *, **, and ***, respectively.

To examine the effect of bonus payments on turnover, logit models with different specifications are estimated. The results from pooled and FE logits are displayed in Tables 8 and 9, respectively. Before looking at how bonus size is related to turnover, it is first examined whether earning a bonus in the current period affects turnover. The results in column 1 (in both pooled and FE logits) show that earning a bonus in the current period is negatively related to turnover, controlling for the current level of salary. This is true even in the richest specification where the worker's performance and promotion prospects are controlled for. This result suggests that bonuses provide additional information in understanding turnover.

To be consistent with the earlier approach, the paper first tests the effect of bonus payments conditioned on the current salary level (columns 2 to 4 on Tables 8 and 9) and repeats the analysis replacing the level of current salary with the growth rate of salary (columns 5 to 7 on Tables 8 and 9). The results from pooled logits indicate that the size of the bonus payment in the current period has a negative and statistically significant effect on the probability of turnover after controlling for the current salary level. Note that the negative effect of bonuses persists after fixed effects are taken into account. Particularly, the estimated negative effect decreases in absolute value in pooled logits, whereas the effect peaks in column 4 in which performance and promotions prospects are controlled for in FE logits. Consistent with the earlier results, salary level has no significant effect on the probability of turnover when data are pooled, whereas it has a statistically significant and positive effect in FE regressions.

TABLE 9. Pay Variables and Turnover (Fixed-Effects Logits)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(salary)	39.07***	39.03***	52.24***	60.09***			
	(2.217)	(2.215)	(4.620)	(7.239)			
ΔLog(salary)					-5.986***	-3.904***	-2.724
					(0.990)	(1.476)	(2.056)
Earned bonus	-0.969***						
	(0.202)						
Log(bonus)		-0.072***	-0.045*	-0.092**	-0.070***	-0.055***	-0.056***
		(0.015)	(0.027)	(0.040)	(0.009)	(0.013)	(0.018)
Level=2	3.817***	3.810***	4.525	8.369***	4.503***	4.443***	14.04***
	(1.304)	(1.305)	(3.003)	(2.114)	(1.017)	(1.084)	(1.737)
Level=3	6.021***	6.029***	6.692*	13.43***	9.327***	8.946***	25.37***
	(1.911)	(1.921)	(3.693)	(2.864)	(1.437)	(1.498)	(2.762)
Level=4	7.665***	7.673***	20.33	38.72	14.29***	26.58	52.64
	(2.426)	(2.428)	(1,450)	(8,074)	(1.772)	(563.3)	(925.9)
Level=5	13.26	13.27	39.42	63.26	17.05***	43.46	83.21
	(35.05)	(34.95)	(86,991)	(19,268)	(2.114)	(3,045)	(6,161)
Rating=2			0.911**	0.496		0.847***	0.456
			(0.452)	(0.635)		(0.221)	(0.323)
Rating=3			3.491***	2.770***		2.116***	1.201***
			(0.545)	(0.758)		(0.297)	(0.428)
Rating=4			5.327***	4.446***		2.204***	1.281*
			(0.749)	(0.977)		(0.500)	(0.682)

Tenure at level=2				1.343**			2.816***
				(0.603)			(0.485)
Tenure at level=3				4.321***			5.898***
				(0.876)			(0.759)
Tenure at level=4				7.801***			9.296***
				(1.243)			(1.042)
Tenure at level>=5				11.60***			12.97***
				(1.669)			(1.321)
N(worker-years)	3,269	3,269	1,669	1,669	2,920	1,561	1,561
Log-likelihood	-394.0	-394.2	-137.3	-78.24	-759.2	-381.6	-184.7
R^2	0.643	0.643	0.764	0.865	0.227	0.299	0.660

Notes: The results from fixed-effects logit models in which the dependent variable indicates whether the worker separates in a given year. Models are estimated using the restricted sample. 'Level=1', 'Rating=1', and 'Tenure at level=1' are the omitted categories. Statistical significance at the 10%, 5%, and 1% levels denoted by *, **, and ***, respectively.

When both the growth rate of salary and the bonus payment are included in the estimating equation, the results are consistent with the hypothesis that both of these variables have negative effects on turnover. Comparing the point estimates for bonuses across specifications leads to the following conclusions. First, bonus payments have a negative and significant effect on the probability of turnover in both pooled and FE logits. Second, similar to point estimates for the growth rate of salary, the point estimates for bonus payments slightly decrease when controls for performance ratings and tenure at the current job level are included. Overall, the negative effects of both the growth rate of salary and bonus payments are robust to model specification.

5. Conclusion

This paper examines how pay is related to turnover. The wealth maximization hypothesis posits that the current values of salary and bonuses can relate to turnover to the extent they provide information about the worker's future compensation. Accordingly, because the probability of turnover should be negatively related to the worker's expected future earnings at the firm, salaries and bonuses are expected to be negatively related to turnover to the extent they are associated with higher future earnings at the firm. The analysis reports supporting evidence for this hypothesis.

The empirical analysis yields several results. First, the growth rate of salary is negatively related to turnover with or without including worker fixed effects. By contrast, the level of current salary is positively related to turnover only when worker fixed effects are included. Second, bonuses are related to turnover. More specifically, both earning a bonus and the size of the bonus are negatively related to turnover, holding the current salary or the growth rate of salary constant. Further, the negative relationship between bonuses and turnover is robust to including proxies for performance and promotion prospects. Hence, the results provide support for the wealth maximization hypothesis.

The findings contribute to the literature by providing robust evidence concerning the mitigating role of bonuses on turnover. Several aspects of the analysis differ from those of the existing studies. First, it focuses on workers at managerial jobs while the existing studies use data either from blue collar workers or from a single profession. Second, it employs individual-level pay, rather than team-based bonuses or aggregate performance-pay schemes. Third, the data include detailed information about the worker's performance and job level. Finally, due to the longitudinal nature of the date, the analysis takes into account unobserved worker heterogeneity.

These features contrast with some recent studies which also report a negative relationship between bonuses and turnover. For example, O'Halloran (2012) uses data from the National Longitudinal Survey of Youth (NLSY) to construct a sample for the 1988-2000 period. Although he finds that earning a bonus is negatively

related to turnover, his regressions do not control for either performance or unobserved worker heterogeneity, and he does not report any results concerning bonus size. Ryu and Jinnai (2021), on the other hand, focus on teachers in North Carolina schools and find that the relationship between bonuses and turnover hinges on the worker's salary. Yet, they consider group-based bonuses, rather than individual bonuses. Finally, Van der Stede *et al*. (2020) use compensation data of production line workers in an electronic chip manufacturing plant in China. They find that bonuses are negatively related to turnover after controlling for tenure at the firm and task complexity. However, they do not control for worker performance and promotion prospects.

The current analysis implies that bonuses should be taken into account in the examination of worker turnover. As discussed, while the relationship between salary and turnover hinges on the econometric specification, evidence concerning the role of bonuses in mitigating turnover is robust. Thus, if pay is an important explanatory variable, salary and bonuses should be used separately in the analysis. Moreoever, the analysis yields practical implications for the firm. To retain productive employees, the firm should pay bonuses, rather than raising salaries, because salary increases may be counterproductive while bonuses may have the intended effect on turnover.

The results of the paper also point out some directions for future research. For example, some results concerning the role of salaries or bonuses on turnover may be driven by idiosyncrasies of the firm studied here. Therefore, it would be interesting to use a multi-firm dataset set to examine the extent to which the results hold across firms from a range of industries.

References

Baker, G., Gibbs, M., & Holmstrom, B. (1994a). The Internal Economics of the Firm: Evidence from Personnel Data. *Quarterly Journal of Economics, 109*(4), 881-919.

Baker, G., Gibbs, M., & Holmstrom, B. (1994b). The wage policy of a firm. *Quarterly Journal of Economics, 109*(4), 921-955.

Barth, E., & Dale-Olsen, H. (2009). Monopsonistic discrimination, worker turnover, and the gender wage gap. *Labour Economics*, 16(5), 589-597.

Bartel, A. P., & Borjas, G. J. (1981). Wage Growth and Job Tunover: An Empirical Analysis. In S. Rosen, *Studies in Labor Markets* (pp. 65-84). Chicago: University of Chicago Press.

Belzil, C., & Bognanno, M. (2008). Promotions, Demotions, Halo Effects, and the Earnings Dynamics of American Executives. *Journal of Labor Economics, 26*(2), 287-310.

Bernhardt, D. (1995). Strategic promotion and compensation. *The Review of Economic Studies*, 62(2), 315-339.

Blakemore, A. E., Low, S. A., & Ormiston, M. B. (1987). Employment Bonuses and Labor Turnover. *Journal of Labor Economics, 5*(4), S124-S135.

Burdett, K. (1978). Employee Search and Quits. *American Economic Review, 68*, 212-220.

Chiappori, P. A., Salanie, B., & Valentin, J. (1999). Early starters versus late beginners. *Journal of Political Economy*, 107(4), 731-760.

Cottini, E., Kato, T., & Westergaard-Nielsen, N. (2011). Adverse workplace conditions, high-involvement work practices and labor turnover: Evidence from Danish linked employer–employee data. *Labour Economics*, 18(6), 872-880.

Dale-Olsen, H. (2006). Wages, fringe benefits and worker turnover. *Labour economics*, 13(1), 87-105.

DeVaro, J., & Waldman, M. (2012). The Signalling Role of Promotions: Further Theory and Evidence. *Journal of Labor Economics, 30*(1), 91-147.

Dohmen, T. J. (2004). Performance, Seniority, and Wages: Formal Salary Systems and Individual Earning Profiles. *Labour Economics, 11*, 741-763.

Ekinci, E. (2019). Discretionary bonuses and turnover. *Labour Economics*, 60, 30-49.

Ekinci, E., Kauhanen, A., & Waldman, M. (2019). Bonuses and promotion tournaments: Theory and evidence. *The Economic Journal*, *129*(622), 2342-2389.

Fairburn, J. A., & Malcomson, J. M. (2001). Performance, promotion, and the Peter Principle. *The Review of Economic Studies*, 68(1), 45-66.

Fuchs, W. (2015). Subjective Evaluations: Discretionary Bonuses and Feedback Credibility. *American Economic Journal: Microeconomics, 7*(1), 99-108.

Galizzi, M., & Lang, K. (1998). Relative Wages, Wage Growth, and Quit Behavior. *Journal of Labor Economics, 16*(2), 367-391.

Gautier, P. A., Van den Berg, G. J., Van Ours, J. C., & Ridder, G. (2002). Worker turnover at the firm level and crowding out of lower educated workers. *European Economic Review*, 46(3), 523-538.

Gibbs, M. (1995). Incentive Compensation in a Corporate Hierarchy. *Journal of Accounting and Economics, 19*, 247-277.

Gibbons, R., & Waldman, M. (1999). A theory of wage and promotion dynamics inside firms. *The Quarterly Journal of Economics*, 114(4), 1321-1358.

Gibbons, R., & Waldman, M. (2006). Enriching a theory of wage and promotion dynamics inside firms. *Journal of Labor Economics*, 24(1), 59-107.

Jovanovic, B. (1979). Job matching and the theory of turnover. *Journal of Political Economy, 87*(5), 972-990.

Kahn, L. B., & Lange, F. (2014). Employer learning, productivity, and the earnings distribution: Evidence from performance measures. *The Review of Economic Studies*, 81(4), 1575-1613.

Keith, K., & McWilliams, A. (1995). The Wage Effects of Cumulative Job Mobility. *Industrial and Labor Relations Review, 49*(1), 121-137.

Lazear, E. P. (1992). The Job as a Concept. In W. J. Burns, *Performance Measurement, Evaluation and Incentives* (pp. 183-215). Cambridge, MA: Harvard Business School Press.

MacDonald, G. M. (1988). Job Mobility in Market Equilibrium. *Review of Economic Studies, 55*, 153-168.

McCue, K. (1996). Promotions and wage growth. *Journal of Labor Economics, 14*(2), 175-209.

McLaughlin, K. J. (1991). A theory of quits and layoffs with efficient turnover. *Journal of Political Economy, 99*(1), 1-30.

Mortensen, D. T. (1988). Wages, Separations, and Job Tenure: On-the-Job Specific Traning or Matching? *Journal of Labor Economics, 6*(4), 445-471.

Munasinghe, L. (2000). Wage growth and the theory of turnover. *Journal of Labor Economics, 18*(2), 204-220.

Munasinghe, L. (2006). Expectations matter: Job prospects and turnover dynamics. *Labour Economics, 13*(5), 1-21.

Murphy, K. J., & Zabojnik, J. (2004). CEO Pay and appointments: A market-based explanation for recent trends. *American Economic Review, 94*(2), 192-196.

O'Halloran, P. L. (2012). Performance pay and employee turnover. *Journal of Economic Studies*, 39(6), 653-674.

Ryu, S., & Jinnai, Y. (2021). Effects of monetary incentives on teacher turnover: A longitudinal analysis. *Public Personnel Management*, 50(2), 205-231.

Topel, R. H., & Ward, M. P. (1992). Job Mobility And The Careers of Young Men. *Quarterly Journal of Economics, 107*(2), 439-479.

Van der Stede, W. A., Wu, A., & Wu, S. Y. C. (2020). An empirical analysis of employee responses to bonuses and penalties. *The Accounting Review*, 95(6), 395-412.