Effects of managerial labor market on executive compensation: Evidence from job-hopping ☆

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A R T I C L E   I N F O

A B S T R A C T

We find that companies dramatically raise their incumbent executives' pay, especially equity-based pay, after losing executives to other firms. The pay raise is larger when incumbent executives have greater employment mobility in the labor market, when companies lose senior executives, and when job-hopping executives receive favorable job offers in their new firms. A company's subsequent pay raise to incumbent executives after losing an executive diminishes its deficiency in executive compensation relative to its industry peer firms, and is effective at retaining its incumbent executives. Overall, our evidence suggests that executive job-hopping activity has significant effects on firms' compensation policies.

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1. Introduction

In this paper, we shed light on how the managerial labor market influences executive compensation from the perspective of executive job-hopping. Executive job-hopping refers to the case in which one executive leaves her current firm and subsequently takes an executive position in another firm the following year (in most cases, for greater pay and/or for a higher position). We examine how firms adjust their compensation schemes for incumbent executives after losing executives to other companies.

Based on 510 executive job-hopping events from 1993 to 2011, we find that companies dramatically raise pay for their incumbent executives after losing executives in a job-hopping event. From the year prior to the job-hopping event to the year afterwards, the median total compensation for these incumbent executives increases from $1.40 million to $2.04 million (an increase of 46%). Moreover, this pay raise is mainly allotted in the form of equity-based compensation.

The median cash compensation increases from $0.76 million to $0.90 million (an increase of 18%); in contrast, the median equity-based compensation increases from $0.39 million to $0.79 million (an increase of 102%). To the extent that the vesting period associated with restricted stock and option grants can help to retain managers (Balsam and Miharjo, 2007), this evidence suggests that after losing top executives, firms not only increase the level of total compensation for their remaining managers, but also rely more on equity-based compensation for the purpose of better retention.

We further find that the subsequent pay raise of the job-hopping firm (the firm that loses its executives in a job-hopping event) for its incumbent executives is positively associated with its incumbent executives' mobility in the managerial labor market. We use a few proxies to measure a manager's employment mobility. First, considering that it is more difficult for a CEO to find an equivalent or higher-ranking job in another firm, a CEO is expected to have lower mobility than non-CEO executives. Second, high stock ownership helps to retain managerial talent (Balsam and Miharjo, 2007); for this reason, we expect executives with higher stock ownership to have lower employment mobility. Third, if a manager already receives a high level of compensation from her current employer, she is less likely to look for a new employer (*i.e.*, "job-hop") and thus has lower employment mobility. Fourth, managers usually have greater employment mobility in industries with a large number of companies, in industries engaging more in outside hiring, and in industries of high homogeneity (Deng and Gao, 2013; Cremers and Grinstein, 2013). Finally, when managers approach retirement or have stayed with a firm for a long period of time, they are less likely to look for new jobs and thus have lower mobility in the labor market (Balsam and Miharjo, 2007; Gibbons and Murphy, 1992). Based on these proxies for employment mobility, we find that, after losing executives, companies raise pay more aggressively for incumbent executives with higher mobility than for those with lower mobility.

The characteristics of the job-hopping executive (henceforth referred to as the "job-hopper") also play an important role in explaining the magnitude of the firm's pay raise to its remaining managers. We find that firms raise pay more aggressively for incumbent executives when they lose senior executives to other firms, and when they lose executives to companies that offer higher positions and/or greater compensation.

To further our understanding of the impact of job-hopping on executive compensation, we ask whether job-hopping firms generally under-pay their executives relative to their industry peers prior to job-hopping events. Does the job-hopping effect bring remaining executives back to a "normal" level of pay in the industry or to a greater level than the industry norm? We investigate these questions by comparing executive compensation between job-hopping firms and their industry peer firms. We find that, in the year prior to the job-hopping event, executives in job-hopping firms receive significantly lower compensation, especially lower equity-based compensation, than executives in their industry peer firms. However, in the year following the job-hopping event, there is no remarkable difference in executive compensation between the two groups. This result suggests that job-hopping events reduce the pay deficiency of job-hopping firms relative to their industry peers (*i.e.*, job-hopping firms "re-equilibrate" their pay practice after losing executives).

Finally, we investigate whether the job-hopping firm's subsequent pay raise indeed helps to retain its incumbent managers. We find that the pay raise is negatively associated with the likelihood of subsequent job-hopping by incumbent executives, which suggests that the raise in pay helps to prevent incumbent managers from moving to other firms.

This paper contributes to the literature on executive compensation in four ways. First, while most of the existing research on executive compensation has focused on the contracting problem between a firm and a manager in isolation (Edmans and Gabaix, 2009), a surging amount of literature has proposed that executive compensation is better understood in the context of the managerial labor market (Frydman, 2007; Murphy and Zábojník, 2004, 2007). However, given that the detailed firm-level executive hiring process is largely a black box (Oyer and Schaefer, 2011), many features of the managerial labor market are not sufficiently examined in the current empirical work. Our paper helps to fill this gap by empirically revealing the importance of executive job-hopping in the labor market on firms' compensation policies.

Second, much of the existing literature on the design of compensation contracts has concentrated on inducing optimal effort (see, for example, Holmstrom, 1979), leaving the role of the participation constraint (*i.e.*, the manager's reservation wage) relatively under-explored. From a theoretical perspective, Oyer (2004) points out that agency theory's often-overlooked participation constraint may be an important determinant of some common compensation schemes. Empirical evidence on this issue is, however, relatively scarce and has mainly focused on explaining the absence of relative performance evaluation (RPE) in executive compensation contracts. For example, Rajgopal et al. (2006) provide evidence supporting the view that the absence of RPE may be optimal if the manager's reservation wage varies with the economy's fortunes. In the context of CEO turnover, Eisfeldt and Kuhnen (2013) show that when industry conditions are correlated with managers' outside options, both the overall industry performance and the firm performance relative to their industry peers should be used in a CEO turnover decision. Complementing this line of research, our evidence suggests that managers' outside opportunities play an important role in increasing their compensation and especially their equity-based compensation.

Third, our study is also related to recent research that examines how an executive's personal connection influences her compensation. Hallock (1997) examines the relation between reciprocally interlocking boards of directors and executive compensation, and finds that interlocked CEOs earn significantly higher pay than non-interlocked ones. Hwang and Kim (2009) find that CEOs who have strong social ties with their outside directors are paid more. Engelberg et al. (2013) find that executives with stronger personal associations with other firms' executives or directors receive higher compensation. A common interpretation of these results is cronyism: these connections entrench the managers, weaken the board monitoring, and thus result in more rent-extracting behavior in the pay setting process (Brick et al., 2006; Fracassi and Tate, 2012). Our results suggest an alternative viewpoint: well-connected managers have better mobility in the labor market, and thus the firm has to pay more to retain them.

Lastly, our study also contributes to the literature that examines the benchmarking practice in executive compensation. A common practice of the firm in the executive pay-setting process is to benchmark pay levels against a set of comparable companies. Bizjak et al. (2008) find that the use of benchmarking is widespread and is a practical and efficient mechanism to gauge the market wage necessary to retain valuable managerial talent. Faulkender and Yang (2010) find that firms tend to select highly paid peers in the benchmark group so that they can justify a high level of compensation to their own executives. Albuquerque et al. (2013) further show that the choice of highly paid peers mostly represents compensation for unobserved managerial talent. While these studies increase our understanding of how firms design their compensation to prevent losing executives in the first place (*i.e.*, an *ex ante* perspective), our study provides new evidence on how firms adjust their compensation policies after having lost some of their executives (*i.e.*, an *ex post* perspective).

The rest of this paper is organized as follows. Section 2 illustrates the theoretical framework. Section 3 describes the data collection process and the construction of the main variables. Section 4 presents the empirical results. Additional investigations are conducted in Section 5. Finally, Section 6 concludes the paper.

2. Theoretical framework

Following the framework of Gabaix and Landier (2008), Giannetti (2011), Murphy and Zábojník (2004), and Terviö (2008), we hypothesize that a firm pays its manager i based on the estimated probability of her receiving a competing job offer from other firms (denoted as p_i), and in equilibrium (*ex ante*), manager i's compensation is positively associated with p_i.[1] Although it is difficult to estimate p_i empirically, we predict that it is positively correlated with the external employment opportunities of other managers in the same firm: for example, p_j of manager j who is in the same firm as manager i. *Ex post*, when manager j receives a better job offer and voluntarily switches to the new job, the posterior p_j is revised up to 1. Given the predicted positive correlation between p_i and p_j, this job-hopping event could also signal better outside opportunities for manager i, and thus the firm will revise up the posterior p_i, and raise the pay for manager i accordingly. In summary, under the condition of a positive correlation between p_i and p_j, we expect firms to raise the pay for their incumbent managers in response to a job-hopping event. In contrast, if p_i and p_j are uncorrelated or negatively correlated, we would not expect incumbent managers to receive a pay raise (unless they experience some internal promotion or have increased responsibility after the job-hopper leaves).

We expect that an executive's outside employment opportunities are positively correlated with those of other executives in the same firm for four reasons. First, executives in the same firm are more likely to have shared social networks, and these social ties between individuals, such as friends, former colleagues, and employee referrals, facilitate the executive hiring process (Montgomery, 1991; Rees, 1966). Second, executives in the same firm are likely subject to the same firm-level compensation policy. When an executive finds the competing job offer more attractive and leaves for the new firm, other executives may also find that the pay package from potential outside opportunities is appealing. Third, executives in the same firm are likely to have similar institutional knowledge, and thus be subject to the same demand from the labor market. For example, when an executive realizes that her institutional knowledge is highly valued by competing firms in the labor market and accepts the new job offer, other executives in the same firm are likely to face the same demand. Lastly, the departing executive could simply tempt her previous colleagues to follow her to the new firm.

The framework above extends traditional principal-agent models in two aspects. In traditional models (*e.g.*, Holmstrom, 1979; Holmstrom and Milgrom, 1987), the compensation contract is between a single firm (the principal) and its manager (the agent). The firm makes a take-it-or-leave-it offer to its manager. Managerial pay is set by her effort, subject to the reservation wage lower bound, which is common knowledge. In equilibrium, the manager always takes the job.

In our framework, the reservation wage is no longer common knowledge, but uncertain, and depends on how much other firms are willing to pay. Managers may not perfectly anticipate their outside opportunity in the first place. The departure of a peer for a higher-paying job likely causes incumbent executives to have a higher opinion of their outside opportunities, which in turn encourages these executives to test the waters and look for potential outside offers. If the current employer wants to retain them, then the employer will likely increase their pay.

Moreover, the agent in our framework is not committed to working with only one principal, but has the opportunity to quit and work for other potential employers in the labor market. For this reason, the principal's problem is not simply about how to induce managerial efforts, but also about how to retain its managers. Thus, the compensation contract does not only depend on a single principal and an agent in isolation, but also on how competitive the external labor market is.

3. Sample formation

Our primary data source is the Standard & Poor's (S&P's) ExecuComp database from 1993 to 2011. ExecuComp records compensation data on corporate executives (typically the top five executives) reported in proxy statements for the firms comprising the S&P 1500 index.

ExecuComp assigns a unique identifier (EXECID) to each executive in the database, allowing us to track EXECIDs to locate each executive's position across different firms over the sample period. We define an executive job-hopping event when one

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[1] See Giannetti (2011) for a formal model about this hypothesis. In particular, Implication 1 of Giannetti (2011) predicts that managers receive higher compensation when they are more likely to receive outside offers.

executive leaves her current firm and subsequently takes an executive position in another firm the following year. If a firm experiences some executive departures but we cannot identify the new employer of the departing executive in the ExecuComp database, we exclude it from our sample. The initial search yields 838 executive job-hopping events over the sample period.

Given that we are interested in the effects of job-hopping activities on executive compensation and that several job-hopping cases may be correlated with some confounding factors, we further impose the following sampling criteria.

First, if the job-hopper is the firm's CEO, the effect of job-hopping on incumbent executives' compensation may be a result of corporate tournament. After a new CEO is appointed, the incumbent executives who lose in the horse race of becoming the CEO may leave the firm because the promotion perspective no longer exists. To retain them, firms may provide higher pay to compensate for the diminishing probability of promotion. Thus, we exclude the job-hopping cases in which the job-hopper is the firm's CEO (114 cases).

Second, if the job-hopper's position is unfilled the following year, incumbent executives may have to share some workload left by the job-hopper and thus require additional pay. To rule out this consideration, we exclude the cases in which the job-hopper's position is not filled in the year following the job-hopping event (208 cases).

Lastly, some job-hopping events may be confounded with forced executive turnover. We search all available news reports in Factiva and investigate the reason leading to each job-hopping event. Following Parrino (1997), an executive job-hopping event is regarded as "forced turnover" if the press reports that the executive is fired, is forced out, or resigns due to pressure (6 cases). After excluding these cases, our final sample consists of 510 job-hopping events.[2]

For each job-hopping event, we collect the compensation information for all incumbent executives in the year prior to and the year after the job-hopping event. We include only those incumbent executives who stay with the same firm and have the same job titles before and after the job-hopping event. By imposing such sampling criteria, we rule out the possibility that some incumbent executives are internally promoted to fill in the vacant position and thus receive a pay raise. The final sample consists of 1,949 executive-year observations in the year prior to the job-hopping event and 1,949 executive-year observations in the year after the job-hopping event, based on 510 job-hopping events.

To capture the effect of job-hopping on incumbent executives' compensation, we use a pre/post design and compare incumbent executives' pay in the year following the job-hopping event to their pay in the year prior to the job-hopping event.[3] An executive's total compensation in a given year (ExecuComp variable TDC1) includes the executive's salary, bonus, the grant-date value of restricted stock awards, the Black–Scholes value of granted options, and other compensation.[4] To measure the possible change in the structure of executive pay after the job-hopping event, following standard procedure, we also break down the total compensation into cash and equity components.

Finally, we collect accounting information from Compustat and stock price information from CRSP. We include a set of standard control variables in the executive compensation literature, including firm size, firm age, ROA, cash holding, capital expenditures, R&D expenditures, stock return, and stock volatility. All monetary variables are measured in 2011 dollars and all continuous variables are winsorized at the 1st and 99th percentiles.

4. Job-hopping and executive compensation

4.1. Descriptive statistics

Table 1 presents the annual frequency of job-hopping events. We find that job-hopping events are distributed fairly evenly over time. Table 2 provides the descriptive statistics, and detailed variable definitions are in the appendix. Panel A reports the characteristics of incumbent executives in the job-hopping firms. An average executive receives a total pay of $3.24 million ($1.76 million is in the form of stock and options), owns 0.47% of the firm's shares, has worked in the firm for more than six years, and is 51 years old. About 22% of the executives are CEOs.

Panel B reports job-hopping firms' characteristics. These firms are large, mature firms with average sales of $7.96 billion and an average firm age of 28 years. On average, cash, capital expenditures, and R&D account for 12.12%, 5.64%, and 2.84% of total assets, respectively. These firms perform well with an average annual stock return of 15.59% and an ROA of 3.82%, suggesting that the departure of job-hoppers is unlikely due to poor firm performance.

Panel C reports the characteristics of job-hoppers' new firms versus their former firms. The total pay of job-hoppers increases by more than 200% (64%) on average (at median) after joining the new firm. Moreover, about 28% of job-hoppers are non-CEOs in the former firms but are promoted to the CEO position in the new firms.[5] Overall, these job-hoppers are clearly better off in the new firms, typically with greater pay and/or higher positions.

It is worth mentioning that Fee and Hadlock (2004) examine the new employment of executives after they are fired by their former employers and find that the dismissed executives suffer greatly in the labor market. For example, only about

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[2] Our results are similar if we keep these excluded job-hopping cases in the sample.

[3] As a robustness check, in Table 8 we also compare the pay change of incumbent executives in job-hopping firms to the pay change of their propensity-score-matched executives in non-job-hopping firms (a difference-in-differences test). Our references are unchanged.

[4] Starting in 2006, there is a slight change in the definition of TDC1. Following Walker (2011), we reconcile the TDC1 definition between the 1993–2005 period and the 2006–2011 period, although these specifications do not change our results.

[5] For job-hoppers who do not take a CEO position in the new firms, their total pay, on average, is also significantly increased.

Table 1
Sample distribution of job-hopping events by year.

Year	of Job-hopping events	Percentage of job-hopping events
1993	24	4.71%
1994	32	6.27%
1995	40	7.84%
1996	38	7.45%
1997	38	7.45%
1998	34	6.67%
1999	41	8.04%
2000	23	4.51%
2001	23	4.51%
2002	20	3.92%
2003	21	4.12%
2004	16	3.14%
2005	21	4.12%
2006	25	4.90%
2007	45	8.82%
2008	32	6.27%
2009	17	3.33%
2010	10	1.96%
2011	10	1.96%
Total	510	100%

Note: this table reports the annual frequency of 510 executive job-hopping events from 1993 to 2011, obtained from the ExecuComp database. An executive job-hopping event refers to the case in which one of the firm's executives leaves the firm in a given year and subsequently takes an executive position in another firm the following year.

one-third of fired executives obtain top management positions afterwards, and their compensation in the new firms is significantly lower than that in their former firms. The findings in Panel C indicate that our job-hopping measure is unlikely correlated with forced turnover and that the sample formation process in Section 3 has done well to exclude these forced turnover cases.

4.2. Univariate tests

Table 3 reports the univariate comparison of incumbent executives' compensation in the year prior to the job-hopping event to their compensation in the year following the job-hopping event. The average (median) total compensation in the pre-hopping year is $2.88 million ($1.40 million); in contrast, their average (median) total compensation in the post-hopping year is $3.59 million ($2.04 million). The *t*-test and Wilcoxon *z*-test reported in the last two columns indicate that total compensation in the post-hopping year is significantly larger than that in the year prior to the job-hopping event.

In terms of cash pay, the average (median) cash compensation is $1.15 million ($0.76 million) in the year prior to the job-hopping event, while the corresponding value is $1.33 million ($0.89 million) in the year following the job-hopping event. These differences are significant at the 1% level. The difference in equity pay is also sizeable: the average (median) equity compensation is $1.57 million ($0.39 million) in the year prior to the job-hopping event, while the corresponding value is $1.95 million ($0.79 million) in the year following the job-hopping event. The two-sample tests of differences (*i.e.*, the *t*-test and Wilcoxon *z*-test) also reject the null that equity pay in the post-hopping year is the same as that in the pre-hopping year at the 1% level. Furthermore, the proportion of equity pay in total compensation is significantly larger in the post-hopping year than that in the pre-hopping year, indicating that the growth in equity pay is more pronounced than the growth in cash pay.

Overall, Table 3 provides some preliminary evidence suggesting that firms raise pay, especially equity-based pay, for their incumbent executives in response to a job-hopping event.

4.3. Executive job-hopping and pay raise

Our main hypothesis is that firms raise pay for incumbent executives after losing executives to other firms. We test this hypothesis by estimating the following model in Table 4:

$$Ln \ (Total \ pay)_{it+1} = \alpha + \beta_1 (Post-hopping)_{it} + \beta_2 (Stock \ return)_{it} + \beta_3 \ Volatility_{it} + \beta_4 ROA_{it}$$
$$+ \beta_5 Ln(Sales)_{it} + \beta_6 (Cash \ ratio)_{it} + \beta_7 (Capital \ expenditure)_{it} + \beta_8 (R\&D \ intensity)_{it}$$

Table 2
Sample Descriptive Statistics.

Panel A: Executive characteristics

Variable	Mean	Std	P25	Median	P75
Total pay (thousands)	3236	4410	822	1732	3660
Cash pay (thousands)	1242	1258	512	822	1465
Equity pay (thousands)	1763	3406	8.99	576	1838
Equity pay/total pay	36.13%	28.66%	1.19%	36.17%	58.73%
Value of restricted stock and unvested options (thousands)	2683	5919	0	541	2399
Share number of restricted stock and unvested options (thousands)	248	493	15	85	237
CEO indicator	0.22	0.42	0.00	0.00	0.00
Ownership	0.47%	1.99%	0.00%	0.02%	0.10%
Tenure	6.79	8.72	2	3	8
Age	51.01	7.51	46	51	56

Panel B: Firm characteristics

Variable	Mean	Std	P25	Median	P75
Sales (millions)	7963	17635	1092	2812	7533
Cash	12.12%	15.41%	1.71%	5.15%	16.38%
Capex	5.64%	4.28%	2.53%	4.77%	7.56%
R&D	2.84%	4.75%	0.00%	0.08%	3.56%
Stock return	15.59%	46.12%	− 10.92%	10.77%	35.56%
Volatility	11.07%	5.43%	7.18%	9.69%	13.33%
ROA	3.82%	9.73%	1.60%	4.32%	8.17%
Firm age	28.37	21.78	11	23	39
Number of firms in the same industry	270.10	225.08	78	203	427
Many industrial rivals (indicator)	0.50	0.50	0.00	0.00	1.00
Percentage of outside-hired CEOs	19.79%	17.36%	6.90%	19.23%	26.83%
Many industry outside hiring (indicator)	0.50	0.50	0	1	1
Overpaid (indicator)	0.28	0.45	0	0	1
Herfindahl index	0.061	0.059	0.031	0.044	0.069
High industry homogeneity (indicator)	0.50	0.50	0	1	1

Panel C: Job-hoppers' new firms versus former firms.

Variable	Mean	Std	P25	Median	P75
Total pay of first year in new firm/total pay of last year in former firm	3.89	8.35	0.71	1.64	3.55
Total pay of 2nd year in new firm/total pay of 2nd last year in former firm	2.19	2.69	0.79	1.43	2.41
CEO in new firm (indicator)	0.28	0.44	0	0	1
Pay rank in former firm	3.13	1.37	2	3	4
Tenure in former firm	4.92	4.30	3	4	6
High rank in former firm (indicator)	0.50	0.50	0	1	1
Long tenure in former firm (indicator)	0.50	0.50	0	1	1
Higher pay in new firm (indicator)	0.65	0.48	0	1	1

Note: the sample consists of 1,949 executive-year observations in the year prior to the job-hopping event and 1,949 executive-year observations in the year after the job-hopping event, based on 510 job-hopping events from 1993 to 2011. An executive job-hopping event refers to the case in which one of the firm's executives leaves the firm in a given year and subsequently takes an executive position in another firm the following year. Variable definitions are provided in the appendix. All monetary variables are measured in 2011 dollars, and all continuous variables are winsorized at the 1st and 99th percentiles.

$$+\beta_9 Ln(Firm\ age)_{it} + \beta_{10}(CEO\ indicator)_{it} + \beta_{11}Ownership_{it}$$
$$+\ Year\ fixed\ effects + Industry\ fixed\ effects + \varepsilon, \tag{1}$$

where i indexes firms, and t indexes time. The dependent variable is the natural logarithm of total compensation of each incumbent executive. The key independent variable is the *Post-hopping* indicator, which takes the value of 1 if the executive-year observation is in the year after the job-hopping event, and 0 if the observation is in the year prior to the job-hopping event. We also add a set of conventional control variables, including firm size, firm age, firm performance, growth opportunity, stock return volatility, availability of cash, investment, R&D, CEO indicator, and executive ownership. Industry fixed effects based on a 2-digit SIC code and year fixed effects are included to control for industry and time variation in executive compensation. Given that many of these independent variables are measured at the firm level, p-values are estimated based on robust standard errors clustered at the firm level.[6]

Table 4 shows a positive and significant association between the *Post-hopping* indicator and executive pay level, indicating that companies raise pay dramatically for their remaining executives in response to losing executives to other firms. In Column (1), we only include the *Post-hopping* indicator as the independent variable and control for year and

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[6] In untabulated tests, we also compute the robust standard errors clustered at the executive level and our inferences are unchanged.

Table 3
Univariate tests.

	Pre job-hopping		Post job-hopping		Test of differences	
	Mean (1)	Median (2)	Mean (3)	Median (4)	t-Test (1)–(3)	Wilcoxon z-test (2)–(4)
Total pay (thousands)	2881	1395	3590	2039	0.000***	0.000***
Cash pay (thousands)	1152	759	1332	895	0.000***	0.000***
Equity pay (thousands)	1573	392	1953	792	0.001***	0.000***
Equity pay/total pay	32%	30%	40%	41%	0.000***	0.000***

Note: this table presents the univariate tests on the difference in executive compensation between the year prior to the job-hopping event and the year following the job-hopping event. The sample consists of 1,949 executive-year observations in the year prior to the job-hopping event and 1,949 executive-year observations in the year after the job-hopping event, based on 510 job-hopping events from 1993 to 2011. Variable definitions are provided in the appendix. All monetary variables are measured in 2011 dollars, and all continuous variables are winsorized at the 1st and 99th percentiles. The last two columns present the p-values in the t-test and the Wilcoxon z-test, respectively. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 4
Pay Growth and executive job-hopping.

Dependent variable=Ln(total pay)	(1)	(2)	(3)	(4)	(5)
Post-hopping	0.300***	0.276***	0.232***	0.222***	0.14***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Stock return		0.123*	0.131**	0.053	0.073
		(0.055)	(0.035)	(0.347)	(0.186)
Volatility		0.374	0.193	−0.013	0.158
		(0.595)	(0.783)	(0.991)	(0.868)
ROA		0.598**	0.678***	0.228	0.074
		(0.014)	(0.005)	(0.549)	(0.851)
Ln(sales)		0.352***	0.341***	0.126	0.074
		(0.000)	(0.000)	(0.178)	(0.437)
Cash		0.416*	0.405*	−0.165	0.212
		(0.093)	(0.091)	(0.690)	(0.603)
Capex		−0.685	−0.527	−0.029	0.037
		(0.282)	(0.383)	(0.969)	(0.960)
R&D		1.685**	1.642**	1.355	1.475
		(0.027)	(0.030)	(0.439)	(0.369)
Ln(firm age)		−0.081**	−0.084***	0.070	0.029
		(0.022)	(0.007)	(0.217)	(0.591)
CEO indicator			1.076***	1.036***	0.036
			(0.000)	(0.000)	(0.591)
Ownership			−1.185	−0.899	0.369
			(0.307)	(0.440)	(0.870)
Constant	6.989***	5.779***	4.812***	5.621***	5.868***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	No	No
Firm fixed effects	No	No	No	Yes	No
Executive fixed effects	No	No	No	No	Yes
Adjusted R-squared	0.115	0.277	0.452	0.330	0.181
No. of observations	3898	3809	3809	3809	3809

Note: the sample consists of 1,949 executive-year observations in the year prior to the job-hopping event and 1,949 executive-year observations in the year after the job-hopping event, based on 510 job-hopping events from 1993 to 2011. The dependent variable is the natural logarithm of executive total compensation. Post-hopping is an indicator variable, taking the value of 1 for the executive-year observations in the year after the job-hopping event, and 0 for the executive-year observations in the year prior to the job-hopping event. Variable definitions are provided in the appendix. All monetary variables are measured in 2011 dollars, and all continuous variables are winsorized at the 1st and 99th percentiles. Industry is classified using the first 2-digit of SIC codes. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. p-Values based on robust standard errors clustered at the firm level are reported in parentheses.

industry fixed effects. The coefficient on the *Post-hopping* indicator is 0.300 and is significant at the 1% level, indicating that the total pay increases by 35% ($= e^{0.3} - 1$) after the firms experience job-hopping events. In Column (2), we add a set of commonly used firm characteristics, including firm performance, stock return volatility, firm age, sales, cash holding, investment, and R&D expenditures. The coefficient on the *Post-hopping* indicator is 0.276, and its significance still remains at the 1% level, implying a 32% ($= e^{0.276} - 1$) higher pay to incumbent executives after firms lose managerial talent, even after controlling for firm characteristics.

Table 5
Pay structure and executive job-hopping.

	(1) Ln(cash pay)	(2) Ln(equity pay)	(3) Equity pay/total pay	(4) Ln(value of restricted stock and unvested options)	(5) Ln(share number of restricted stock and unvested options)
Post-hopping	0.103***	0.822***	0.054***	1.173***	0.805***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Stock return	0.121***	0.192	0.006	0.828***	0.060
	(0.000)	(0.382)	(0.765)	(0.000)	(0.571)
Volatility	−1.236***	−2.997	0.082	−6.910***	−0.608
	(0.004)	(0.243)	(0.728)	(0.008)	(0.717)
ROA	0.172	0.568	0.211**	0.533	−0.561
	(0.297)	(0.525)	(0.025)	(0.599)	(0.265)
Ln(sales)	0.256***	0.404***	0.030***	0.412***	0.296***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash	−0.032	0.816	0.153*	1.246	0.624
	(0.839)	(0.321)	(0.053)	(0.130)	(0.161)
Capex	−1.343***	1.519	0.336	−0.451	0.238
	(0.009)	(0.515)	(0.114)	(0.841)	(0.860)
R&D	0.354	4.581*	0.710***	3.292	2.647*
	(0.481)	(0.054)	(0.003)	(0.175)	(0.059)
Ln(firm age)	−0.009	−0.175	−0.032***	−0.178	−0.127*
	(0.712)	(0.154)	(0.005)	(0.162)	(0.078)
CEO indicator	0.787***	1.507***	0.095***	1.785***	1.681***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ownership	−0.625	−9.194**	−0.763**	−12.035***	−7.797**
	(0.359)	(0.025)	(0.027)	(0.005)	(0.015)
Constant	4.056***	2.594**	0.354***	1.906*	−1.004
	(0.000)	(0.028)	(0.001)	(0.082)	(0.132)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.487	0.160	0.168	0.191	0.217
No. of observations	3809	3809	3809	3809	3809

Note: the sample consists of 1,949 executive-year observations in the year prior to the job-hopping event and 1,949 executive-year observations in the year after the job-hopping event, based on 510 job-hopping events from 1993 to 2011. The dependent variable is the natural logarithm of cash pay in Column (1), the natural logarithm of equity pay in Column (2), the percentage of equity pay in total pay in Column (3), the natural logarithm of value of restricted stock and unvested stock options in Column (4), and the natural logarithm of the share number of restricted stock and unvested stock options in Column (5), respectively. Post-hopping is an indicator variable, taking the value of 1 for the executive-year observations in the year after the job-hopping event, and 0 for the executive-year observations in the year prior to the job-hopping event. Variable definitions are provided in the appendix. All monetary variables are measured in 2011 dollars, and all continuous variables are winsorized at the 1st and 99th percentiles. Industry is classified using the first 2-digit of SIC codes. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. p-Values based on robust standard errors clustered at the firm level are reported in parentheses.

We further control for the CEO indicator and executive ownership in Column (3), and find that the coefficient on *Post-hopping* is again positive and significant at the 1% level, indicating that the effect of job-hopping on executive compensation is robust after controlling for various firm and executive characteristics. As expected, the positive and significant coefficient on the CEO indicator suggests that the CEO is paid more than non-CEO executives. The coefficient on executive ownership is negative and significant, consistent with the view that higher ownership substitutes for higher annual compensation for the purpose of retention (Core et al., 1999).

To mitigate the concern that some time-invariant unobservable firm characteristics drive our results, we include firm fixed effects in Column (4). The coefficient on the *Post-hopping* indicator is 0.222 and is significant at the 1% level. For robustness, we also include executive fixed effects in Column (5) and find that, even after controlling for unobservable executive characteristics, the coefficient on the *Post-hopping* indicator is 0.148 and significant at the 1% level. This result indicates that each remaining executive receives, on average, 16% ($= e^{0.148} - 1$) higher compensation in the post-hopping year as compared to the pay in the year prior to the job-hopping event.

Overall, the results in Table 4 show that firms raise pay greatly for their incumbent executives in response to a job-hopping event. The effect of job-hopping on executive pay is significant both statistically and economically.

In Table 5, we break the total compensation further into different components. The dependent variable is the natural logarithm of cash pay in Column (1), and the coefficient on the *Post-hopping* indicator is 0.103 and is significant at the 1% level. This result indicates that after experiencing a job-hopping event, the level of cash pay (salary and bonus) for the firm's incumbent executives increases by 11% ($= e^{0.103} - 1$). Using the natural logarithm of equity pay as the dependent variable in Column (2), we find a significant coefficient of 0.822 on the *Post-hopping* indicator, indicating a 128% ($= e^{0.822} - 1$) higher

equity pay in the post-hopping year than that in the pre-hopping year. It is worth noting that this coefficient is much larger in magnitude of that in Column (1), indicating that firms raise equity-based compensation more aggressively than salary and bonus to retain executives.[7] This is consistent with the view that the vesting period associated with restricted stock and option grants can better retain executives than salary and bonus can (Balsam and Miharjo, 2007; Core and Guay, 1999).

Moreover, the greater raise in equity pay relative to cash pay suggests that the structure of executive compensation packages changes after the job-hopping event. To further examine the structure of compensation, we include *Equity pay/ total pay* as the dependent variable in Column (3). The positive and significant coefficient on the *Post-hopping* indicator suggests that firms increase the proportion of equity-based compensation for their incumbent executives in response to a job-hopping event.

In addition to annual compensation, an executive's total equity portfolio can also influence her retention incentive. We further investigate the value of the executive's total holding of restricted stock and unvested stock options in Column (4) and the number of shares of restricted stock and unvested options in Column (5), respectively. The coefficients on the *Post-hopping* indicator are positive and significant in both columns, indicating that there is a significant increase in restricted stock and unvested options held by incumbent executives after their firms experienced job-hopping events. Our results are broadly consistent with Balsam and Miharjo (2007), who show that unvested equity holdings can help to reduce voluntary executive turnover.

4.4. The effect of employment mobility

If firms raise pay for incumbent executives in order to retain them after losing executives in a job-hopping event, we should expect that incumbent executives with better employment mobility receive a higher pay raise than those with poorer employment mobility. In this subsection, we carry out additional tests to examine this prediction. The model specification in Table 6 is the same as that in Column (3) of Table 4, except that we further include the interaction terms between the *Post-hopping* indicator and executive employment mobility. In particular, we use eight different proxies to measure the mobility of an executive in the labor market.

First, it is possible for a non-CEO executive to join another firm as a CEO, but it is less likely for a CEO to join another firm voluntarily as a non-CEO executive. Therefore, a CEO should have lower mobility in the labor market than a non-CEO executive, and the firm does not need to raise as much pay to the incumbent CEO after losing executives in a job-hopping event compared to an incumbent non-CEO executive. To test this view empirically, we include the interaction term, *Post-hopping × CEO indicator*, in Column (1) of Table 6, and find that the coefficient on *Post-hopping* is 0.316 and significant at the 1% level, while the coefficient on the interaction *Post-hopping × CEO indicator* is −0.373 and also significant at the 1% level. We conduct an *F*-test to test whether the sum of *Post-hopping* and its interaction is significantly different from zero. The corresponding *p*-value is 0.269, implying the sum is indistinguishable from zero. These results indicate that, after the job-hopping event, the pay raise in job-hopping firms is about 37% ($= e^{0.316} - 1$) for incumbent non-CEO executives and is insignificant for incumbent CEOs. This evidence suggests that job-hopping of lower-level executives does not affect CEO pay.

Second, high stock ownership can help to retain managers (Balsam and Miharjo, 2007). Thus, a top manager is less likely to leave the firm for another when she owns a large stake of the firm's stock. Therefore, the pay raise for incumbent executives with higher ownership is expected to be relatively lower. Consistent with this prediction, we find a negative and significant coefficient on the interaction, *Post-hopping × Ownership*, in Column (2), which indicates a greater pay raise to incumbent executive with lower stock ownership.

Third, Balsam and Miharjo (2007) show that excessive pay helps to prevent voluntary executive turnover. Thus, the pay raise for overpaid executives should be lower than that for other remaining executives. To define "overpaid" executives, we first run the following pooled OLS regression to estimate the predicted level of compensation, based on all executive-year observations in ExecuComp:

$$
\begin{aligned}
\text{Ln}(Total\ pay) = {} & \alpha + \beta_1 Ln(Sales) + \beta_2 ROA + \beta_3 Stock\ return + \beta_4 Volatility \\
& + \beta_5 CEO\ indicator + \beta_6 CFO\ indicator + \beta_7 COO\ indicator \\
& + Year\ fixed\ effects + Industry\ fixed\ effects + \varepsilon
\end{aligned}
\tag{2}
$$

Then, we define *excess pay* as the difference between the executive's actual pay and her predicted pay. To mitigate the concern that we do not know the true regression model of fair-market executive pay, we flag a manager as "being overpaid" if her *excess pay* is in the top quartile of the population. In this way, our definition of "overpaid" is less sensitive to errors in the predicted pay level, as we are only selecting managers in the high extremes of the compensation distribution. In Column (3), the interaction, *Post-hopping × Overpaid*, has a significant coefficient of −0.359, while the coefficient on *Post-hopping* is a significant 0.272. The *F*-test indicates that the sum of *Post-hopping* and its interaction is not significantly different from zero. These results indicate that there is no significant pay raise for an incumbent executive who is already paid excessively, while other incumbent executives receive a significant pay raise of 31% ($= e^{0.272} - 1$).[8]

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[7] The Chow test on the equality of these two coefficients indicates that they are significantly different at the 1% level.

[8] Excess pay may also reflect unobserved managerial talent (Abowd et al., 1999; Graham et al., 2012). Given that talented managers have better mobility in the labor market (Rajgopal et al., 2006), one should expect overpaid incumbent managers to receive a larger pay raise following the job-hopping event, which is opposite to our findings.

Table 6
Employment mobility, pay growth, and executive job-hopping.

Dependent variable =Ln(total pay)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-hopping	0.316***	0.257***	0.272***	0.164***	0.153***	0.173***	0.207***	0.524***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Post-hopping × CEO indicator	−0.373***							
	(0.000)							
Post-hopping × Ownership		−5.198***						
		(0.005)						
Post-hopping × Overpaid			−0.359***					
			(0.000)					
Post-hopping × Many industrial rivals				0.137**				
				(0.025)				
Post-hopping × Many industry outside hiring					0.147**			
					(0.032)			
Post-hopping × High industry homogeneity						0.124**		
						(0.042)		
Post -hopping × Retirement							−0.303**	
							(0.014)	
Post-hopping × Long tenure								−0.506***
								(0.000)
Overpaid			0.782***					
			(0.000)					
Many industrial rivals				−0.405***				
				(0.000)				
Many industry outside hiring					−0.058			
					(0.332)			
High industry homogeneity						0.038		
						(0.649)		
Retirement							0.154	
							(0.202)	
Long tenure								0.531***
								(0.000)
Stock return	0.131**	0.135**	0.132**	0.123**	0.131**	0.136**	0.150**	0.194***
	(0.035)	(0.028)	(0.032)	(0.050)	(0.037)	(0.027)	(0.026)	(0.002)
Volatility	0.185	0.176	0.633	0.230	0.230	0.186	0.570	0.299
	(0.792)	(0.802)	(0.331)	(0.740)	(0.744)	(0.791)	(0.442)	(0.668)
ROA	0.683***	0.667***	0.675***	0.660***	0.701***	0.692***	0.652**	0.434*
	(0.005)	(0.006)	(0.002)	(0.007)	(0.004)	(0.005)	(0.014)	(0.083)
Ln(sales)	0.340***	0.341***	0.350***	0.337***	0.341***	0.338***	0.343***	0.375***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash	0.410*	0.412*	0.232	0.462*	0.405*	0.393	0.379	0.658**
	(0.088)	(0.085)	(0.286)	(0.053)	(0.089)	(0.101)	(0.158)	(0.012)
Capex	−0.550	−0.533	−0.540	−0.598	−0.467	−0.473	−0.514	−0.063
	(0.364)	(0.379)	(0.335)	(0.315)	(0.434)	(0.470)	(0.470)	(0.919)
R&D	1.654**	1.647**	1.320*	1.597**	1.643**	1.701**	1.902**	1.631**
	(0.028)	(0.029)	(0.058)	(0.035)	(0.030)	(0.026)	(0.030)	(0.026)
Ln(firm age)	−0.085***	−0.084***	−0.080***	−0.074**	−0.085***	−0.083***	−0.079**	−0.083**
	(0.006)	(0.007)	(0.005)	(0.017)	(0.006)	(0.007)	(0.024)	(0.018)
CEO indicator	1.281***	1.077***	0.998***	1.077***	1.076***	1.072***	0.980***	1.036***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ownership	−1.301	1.353	−1.077	−1.173	−1.206	−1.266	−1.688	-0.902
	(0.263)	(0.378)	(0.300)	(0.310)	(0.297)	(0.269)	(0.172)	(0.489)
Constant	4.762***	4.808***	4.846***	4.777***	4.716***	4.203***	4.126***	2.905***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.457	0.454	0.505	0.456	0.453	0.453	0.429	0.495
No. of observations	3809	3809	3809	3809	3809	3,809	2897	2861
F-test: sum of Post-hopping and its interaction (p-value)	0.269	0.007***	0.194	0.000***	0.000***	0.000***	0.436	0.829

Note: the sample consists of 1,949 executive-year observations in the year prior to the job-hopping event and 1,949 executive-year observations in the year after the job-hopping event, based on 510 job-hopping events from 1993 to 2011. The dependent variable is the natural logarithm of executive total compensation. Post-hopping is an indicator variable, taking the value of 1 for the executive-year observations in the year after the job-hopping event, and 0 for the executive-year observations in the year prior to the job-hopping event. Variable definitions are provided in the appendix. All monetary variables are measured in 2011 dollars, and all continuous variables are winsorized at the 1st and 99th percentiles. Industry is classified using the first 2-digit of SIC codes. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. p-Values based on robust standard errors clustered at the firm level are reported in parentheses.

Next, the external hiring opportunity for executives is expected to increase with the number of industry peer firms: managers have more outside opportunities when there are a large number of industry peer firms available (Deng and Gao, 2013). In Column (4), we define the *Many industrial rivals* indicator based on the sample median of the number of firms in an industry and then include the interaction *Post-hopping × Many industrial rivals*. We find positive and significant coefficients on *Post-hopping* (0.164) and its interaction term (0.137), implying that the pay raise for incumbent executives in a job-hopping firm is more pronounced when there are a large number of potential industry rivals. In terms of economic magnitude, incumbent managers in job-hopping firms receive a pay raise of 35% ($=e^{(0.164+0.137)}-1$) when there are many industrial rivals, and receive a pay raise of 18% ($=e^{0.164}-1$) otherwise.

Moreover, executives may have better employment mobility in industries with more external hiring (Cremers and Grinstein, 2013); thus, the positive association between job-hopping and pay level is expected to be stronger in these industries. To test this prediction, we first define an external CEO as the one who takes the CEO position within one year of joining the firm. We then compute the *Many industry outside hiring* indicator variable as 1 if the percentage of outside-hired CEOs in the firm's industry during the past three years is above the sample median, and 0 otherwise.[9] In Column (5), the interaction, *Post-hopping × Many industry outside hiring*, attracts a significantly positive coefficient of 0.147, and the *Post-hopping* indicator attracts a significantly positive coefficient of 0.153. This result is consistent with our prediction that in an industry with greater external executive hiring (better employment mobility), job-hopping firms raise pay more substantially to remaining executives in response to losing executives. On average, incumbent managers receive a pay raise of 35% ($=e^{(0.153+0.147)}-1$) in an industry with prevalent outside hiring, and receive a pay raise of 17% ($=e^{0.153}-1$) otherwise.

Furthermore, employment mobility is also likely to be correlated with industry homogeneity. In a homogeneous industry, it is easier for executives to move among firms, and thus their employment mobility is greater. In Column (6), we follow Giroud and Mueller (2010) to compute the Herfindahl index as the sum of squared market shares based on firms' sales among all Compustat firms in the same industry and same year. A lower Herfindahl index value indicates that products in the industry are highly homogeneous. We then define the *High industry homogeneity* indicator as 1 if the industry Herfindahl index is below the sample median, and 0 otherwise. We find a significant coefficient of 0.124 on the interaction term *Post-hopping × High industry homogeneity*, implying that the pay raise for incumbent executives following the job-hopping event is more pronounced in a homogeneous industry. Considering that the coefficient on *Post-hopping* is a significant 0.173, incumbent managers receive a pay raise of 35% ($=e^{(0.173+0.124)}-1$) in a homogeneous industry, and receive a pay raise of 19% ($=e^{0.173}-1$) otherwise.

In addition, managerial career concerns may also influence a manager's employment mobility, as near-retirement managers and long-tenure managers are less likely to leave for a new company (Balsam and Miharjo, 2007; Gibbons and Murphy, 1992). In Column (7), we define the *Retirement* indicator, using the age of 65 as the cutoff, and include its interaction with *Post-hopping* in the regression. The coefficient on *Post-hopping* is 0.207 and significant at the 1% level; the coefficient on *Post-hopping × Retirement* is −0.303 and significant at the 5% level. The sum of *Post-hopping* and its interaction is not significantly different from zero (the *p*-value of the corresponding *F*-test is 0.436). These findings indicate that there is no significant pay raise for incumbent managers who are retiring, while other incumbent managers receive a significant pay raise of 23% ($=e^{0.207}-1$).

Finally, in Column (8), we further define the *Long tenure* indicator based on the sample median of executive tenure and include its interaction with *Post-hopping*. The coefficients on *Posting-hopping* and *Post-hopping × Long tenure* are 0.524 and −0.506, respectively; both coefficients are significant at the 1% level. The sum of *Post-hopping* and its interaction is not significantly different from zero (the *p*-value of the corresponding *F*-test is 0.829). These findings indicate that the pay raise is trivial for incumbent managers who have stayed in office for a long time, but is 68% ($=e^{0.524}-1$) for other incumbent managers.[10]

In summary, the positive association between the *Post-hopping* indicator variable and executive pay is more pronounced when incumbent executives have greater employment mobility in the labor market. However, job-hopping has no effect on compensation of incumbent executives who are CEOs, who are close to retirement, or who have stayed in the firm for a long period. These results imply that the purpose for job-hopping firms to raise pay for their incumbent top managers is to retain these managers against potential competing job offers.

4.5. The effect of the Job-hopper

The magnitude of pay raise for remaining executives after a job-hopping event may also depend on the characteristics of the job-hopper. We further examine this possibility in Table 7 by exploring four job-hoppers' characteristics.

First, we expect that the job-hopping effect on compensation depends on the importance of the job-hopper. Compared to a lower-ranking job-hopper's exit from her firm, a higher-ranking manager who job-hops may trigger a more pronounced pay raise in the job-hopping firm as an attempt to retain remaining executives. In Column (1), we use the job-hopper's rank

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[9] We only compute the number of external CEOs because of the data limitation in the ExecuComp database. The date of joining the firm and the date of taking the executive position are poorly recorded for non-CEO executives.

[10] The age (tenure) information is missing for about 21% (45%) of executives in the ExecuComp database; for this reason, the number of observations in Columns (7) and (8) is smaller than that in other columns.

Table 7
The effect of job-hopper's characteristics.

Dependent variable=Ln(total pay)	(1)	(2)	(3)	(4)
Post-hopping	0.158***	0.125**	0.190***	0.140**
	(0.000)	(0.039)	(0.000)	(0.015)
Post-hopping × High rank in former firm	0.132**			
	(0.033)			
Post-hopping × Long tenure in former firm		0.142*		
		(0.052)		
Post-hopping × CEO in new firm			0.109*	
			(0.079)	
Post-hopping × Higher pay in new firm				0.137**
				(0.030)
High rank in former firm	−0.182***			
	(0.001)			
Long tenure in former firm		−0.183***		
		(0.005)		
CEO in new firm			0.072	
			(0.215)	
Higher pay in new firm				−0.136**
				(0.016)
Stock return	0.127**	0.101	0.124**	0.127**
	(0.042)	(0.195)	(0.046)	(0.040)
Volatility	0.394	0.292	0.235	0.173
	(0.575)	(0.698)	(0.733)	(0.805)
ROA	0.830***	0.533**	0.621***	0.670***
	(0.001)	(0.044)	(0.008)	(0.005)
Ln(sales)	0.345***	0.366***	0.329***	0.339***
	(0.000)	(0.000)	(0.000)	(0.000)
Cash	0.470**	0.488**	0.414*	0.392
	(0.049)	(0.047)	(0.078)	(0.101)
Capex	−0.537	0.093	−0.545	−0.446
	(0.365)	(0.889)	(0.368)	(0.461)
R&D	1.544**	1.779**	1.518**	1.631**
	(0.044)	(0.036)	(0.044)	(0.031)
Ln(firm age)	−0.082***	−0.073**	−0.080***	−0.080***
	(0.008)	(0.044)	(0.009)	(0.009)
CEO indicator	1.070***	1.069***	1.079***	1.078***
	(0.000)	(0.000)	(0.000)	(0.000)
Ownership	−1.157	−1.440	−1.172	−1.195
	(0.325)	(0.285)	(0.312)	(0.304)
Constant	4.843***	4.442***	4.278***	4.862***
	(0.000)	(0.000)	(0.000)	(0.000)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R-squared	0.453	0.453	0.467	0.453
No. of observations	3809	2710	3809	3809
F-test: sum of Post-hopping and its interaction (p-value)	0.000***	0.000***	0.000***	0.000***

Note: the sample consists of 1,949 executive-year observations in the year prior to the job-hopping event and 1,949 executive-year observations in the year after the job-hopping event, based on 510 job-hopping events from 1993 to 2011. The dependent variable is the natural logarithm of executive total compensation. Post-hopping is an indicator variable, taking the value of 1 for the executive-year observations in the year after the job-hopping event, and 0 for the executive-year observations in the year prior to the job-hopping event. Variable definitions are provided in the appendix. All monetary variables are measured in 2011 dollars, and all continuous variables are winsorized at the 1st and 99th percentiles. Industry is classified using the first 2-digit of SIC codes. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. p-Values based on robust standard errors clustered at the firm level are reported in parentheses.

of compensation prior to the job-hopping event to proxy for the relative importance of this executive in the firm. The variable, *High rank in former firm*, takes the value of 1 if the job-hopper's rank of compensation in her previous firm is greater than the sample median, and 0 otherwise. The coefficient on the interaction *Post-hopping × High rank in former firm* is 0.132 and significant at the 5% level, implying that the pay raise for incumbent executives in a job-hopping firm is more pronounced after a more important executive leaves for a new job. Given that the coefficient on *Post-hopping* is a significant 0.158, incumbent executives in job-hopping firms receive a pay raise of 34% ($= e^{(0.158+0.132)} - 1$) when firms lose high-ranking executives, and receive a pay raise of 17% ($= e^{0.158} - 1$) otherwise.

Second, we also use the job-hopper's tenure as another proxy for her importance in her pervious firm. In Column (2), we define the *Long tenure in former firm* indicator variable based on the sample median of the job-hopper's tenure in her previous firm, and include this variable and its interaction with *Post-hopping*. We find that the interaction, *Post-hopping × Long tenure in former firm*, has a positive and significant coefficient of 0.142, and the *Post-hopping* indicator has

a positive and significant coefficient of 0.125. This result also indicates that firms raise pay for their incumbent executives more dramatically after losing a more important executive. On average, incumbent managers in job-hopping firms receive a pay raise of 31% ($= e^{(0.125 + 0.142)} - 1$) when firms lose long-tenured executives to other companies, and receive a pay raise of 13% ($= e^{0.125} - 1$) otherwise.

Third, the pay raise to incumbent managers may also depend on how attractive the job-hopper's new job offer is. We construct the *CEO in new firm* indicator variable to flag the case, in which the job-hopper is hired as the CEO in the new firm. We find a positive and significant coefficient of 0.109 on *Post-hopping × CEO in new firm*, and a positive and significant coefficient of 0.190 on *Post-hopping*. This result indicates that the pay raise for incumbent managers in a job-hopping firm is 35% ($= e^{(0.190 + 0.109)} - 1$) if the job-hopper moves to a new firm that provides a higher position, compared to a pay raise of 21% ($= e^{0.190} - 1$) otherwise.

Lastly, if the job-hopper receives higher compensation in the new firm than in her former firm, it may clearly signal that the job-hopping firm's compensation is not competitive and thus, as a response, this firm should have a greater pay raise for remaining executives to compete against potential outside rivals. In Column (4), we flag the *Higher pay in new firm* indicator as 1 if the job-hopper's second-year total compensation in the new firm is larger than her total compensation in the second last year in the former firm, and 0 otherwise.[11] We find positive and significant coefficients on *Post-hopping* (0.140) and its interaction with *High pay in new firm* (0.137). Consistent with the argument above, the increase in pay of remaining executives is 32% ($= e^{(0.140 + 0.137)} - 1$) when the job-hopper's compensation in her new company is more attractive than her compensation in the former company, and is 15% ($= e^{0.140} - 1$) otherwise.

In summary, Table 7 shows that the pay increase for incumbent executives in response to a job-hopping event is more dramatic when the firm loses a more important executive and when the job-hopper receives a more attractive job offer in the new firm.

5. Additional investigation

5.1. Propensity score matching

So far, we have used the compensation in the year prior to the job-hopping event as the control group and the compensation in the year following the job-hopping event as the event group. As a robustness check, we also conduct difference-in-differences tests to examine the compensation change of incumbent executives in job-hopping firms against the compensation change of their propensity-score-matched peers in non-job-hopping firms.

Based on all executive-year observations in ExecuComp, we first estimate the propensity scores using a probit model in which the dependent variable is an indicator that takes the value of 1 for incumbent executives in a job-hopping firm, and 0 otherwise. The independent variables are the full set of firm and executive characteristics as defined in Column (3) of Table 4. We then use the predicted probabilities (propensity scores) from the probit regression to match each incumbent executive-year observation in a job-hopping firm to the executive-year observation in a non-job-hopping firm that minimizes the absolute value of the difference between the propensity scores, using the nearest neighborhood matching technique with a replacement. Bootstrapped standard errors based on 50 replications are used to conduct statistical inferences.

As a diagnostic test, Table 8 Panel A reports the univariate comparisons of the pre-hopping characteristics between incumbent executives in job-hopping firms and their matched peers in non-job-hopping firms. The univariate tests reported in Panel A show that most of the differences are trivial and are not significantly different from zero, which suggests that the propensity score matching process has formed a control group of closely-matched executives who are highly similar to the job-hopping firms' remaining executives in the pre-hopping year.

In Table 8 Panel B, we first compute the pay change as the difference between the post-hopping year and the pre-hopping year for each group (*i.e.*, Ln(pay) in the pre-hopping year subtracted from Ln(pay) in the post-hopping year). We then compare the pay change of remaining executives in job-hopping firms to the pay change of their matched executives over the same time period (difference-in-differences test). We find that incumbent executives in job-hopping firms receive a significantly larger pay raise than their matched peers in non-job-hopping firms, and the higher pay raise is mainly due to a larger increase in equity-based compensation.

In Table 8 Panel C, we compare the level of executive compensation in job-hopping firms to the level of compensation of propensity-score-matched executives in non-job-hopping firms, to answer the following questions. Did job-hopping firms generally under-pay their executives relative to the firms' industry peers prior to the job-hopping events? Does the job-hopping effect bring the remaining executives back to a "normal" level of pay in the industry or to a greater level than the industry norm? We find that, in the pre-hopping year, managers in job-hopping firms receive significantly lower compensation (especially lower equity-based compensation) than their matched peers in non-job-hopping firms. However, in the post-hopping year, these differences in pay are largely trivial and not significant. This result suggests that job-hopping

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[11] We use the job-hopper's compensation in the second year of her new firm and in the second last year of her previous firm to account for the possibility that the job-hopper may leave her previous firm (or joins her new firm) in the middle of a fiscal year and thus her last-year compensation in her previous firm (or first-year compensation in the new firm) may not fully capture her annual compensation.

Table 8
Tests based on propensity score matching.

Panel A: Differences in characteristics between incumbent executives in job-hopping firms and their matched executives in the year prior to the job-hopping event.

	Incumbent executives in job-hopping firms		Matched executives in non-job-hopping firms		Test of differences (p-value)	
	Mean (1)	Median (2)	Mean (3)	Median (4)	t-Test (1)–(3)	Wilcoxon z-test (2)–(4)
Stock return	13.34%	9.21%	12.10%	9.61%	0.408	0.578
Volatility	10.99%	9.64%	10.99%	9.79%	0.994	0.662
ROA	4.57%	4.43%	3.43%	4.51%	0.622	0.925
Ln(sales)	8.23	8.25	8.27	8.36	0.431	0.260
Cash	12.16%	4.95%	11.92%	5.58%	0.630	0.199
Capex	5.50%	4.45%	5.62%	4.48%	0.441	0.629
R&D	2.80%	0.12%	2.86%	0%	0.677	0.029**
Ln(firm age)	3.11	3.21	3.12	3.25	0.490	0.474
CEO indicator	0.25	0	0.25	0	1.000	1.000
Ownership	0.53%	0.02%	0.52%	0.05%	0.865	0.000***

Panel B: Comparing the change in compensation.

	Incumbent executives in job-hopping firms (post-hopping–pre-hopping)	Matched executives in non-job-hopping firms (post-hopping–pre-hopping)	Difference-in-differences test (p-value of t-test)
Ln(total pay)	0.33	0.19	0.000***
Ln(equity pay)	1.09	0.54	0.000***
Ln(cash pay)	0.16	0.10	0.000***
Equity pay/ total pay	7.67%	4.13%	0.002***

Panel C: Comparing the level of compensation.

	Year prior to the job-hopping			Year after the job-hopping		
	Incumbent executives in job-hopping firms	Matched executives in non-job-hopping firms	Test of difference (p-value of t-test)	Incumbent executives in job-hopping firms	Matched executives in non-job-hopping firms	Test of difference (p-value of t-test)
Ln(total pay)	7.327	7.503	0.000***	7.657	7.688	0.362
Ln(equity pay)	4.621	5.154	0.000***	5.710	5.704	0.949
Ln(cash pay)	6.700	6.854	0.000***	6.862	6.950	0.000***
(Equity pay/ total pay)	32.24%	34.44%	0.007***	39.86%	38.59%	0.160

Note: this table presents difference-in-differences tests on how job-hopping influences incumbent executives' compensation. For each incumbent executive in job-hopping firms, we match her to an executive in non-job-hopping firms with the closest propensity score in the year prior to the job-hopping event using the nearest neighbor algorithm. The variables we use to match are the full set firm and executive characteristics in Column (3) of Table 4. Panel A reports the univariate comparison of the characteristics between incumbent executives in job-hopping firms and their matched peers in non-job-hopping firms. Panel B reports results of the difference-in-differences tests that compare the compensation change for incumbent executives in job-hopping firms to the compensation change for their matched executives over the period from the pre-hopping year to the post-hopping year. Panel C reports results comparing the level of compensation between incumbent executives in job-hopping firms and their matched executives in non-job-hopping firms. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

firms do not pay their executives as competitively as their rivals do prior to the job-hopping event. The pay raise following the job-hopping event diminishes the pay deficiency in the job-hopping firms relative to their peer firms.

5.2. Executive compensation in job-hopping firms and their industry peer firms, regression analysis

In this subsection, we further use regressions to compare the level of executive compensation in job-hopping firms to that in their industry peer firms.

We first match each job-hopping firm to a non-job-hopping firm that is in the same industry, and is closest in sales in the year prior to the job-hopping event. Then, based on the executive-year observations in the job-hopping firms and their matched industry peers, we estimate the following regression:

$$Ln\,(Pay)_{it+1} = \alpha + \beta_1(Job-hopping\,firm)_{it} + \beta_2(Stock\,return)_{it} + \beta_3\,Volatility_{it} + \beta_4 ROA_{it} + \beta_5 Ln(Sales)_{it}$$

Table 9
Executive compensation of job-hopping firms versus their industry peers, regression analysis.

	Year prior to the job-hopping				Year after the job-hopping			
	(1) Ln(total pay)	(2) Ln(cash pay)	(3) Ln(equity pay)	(4) Equity pay/total pay	(5) Ln(total pay)	(6) Ln(cash pay)	(7) Ln(equity pay)	(8) Equity pay/total pay
Job-hopping firm	−0.109***	−0.090***	−0.514***	−0.025**	0.042	−0.034	0.231	0.024*
	(0.002)	(0.001)	(0.000)	(0.043)	(0.283)	(0.252)	(0.132)	(0.076)
Stock return	0.135***	0.101***	0.160	0.018	0.156**	0.098**	0.388	0.025
	(0.004)	(0.001)	(0.363)	(0.296)	(0.025)	(0.021)	(0.127)	(0.263)
Volatility	1.177**	−1.069**	4.351**	0.740***	0.930	−0.905**	0.811	0.581***
	(0.041)	(0.010)	(0.046)	(0.000)	(0.130)	(0.032)	(0.730)	(0.007)
ROA	0.778***	0.416**	1.343	0.172*	0.937***	0.179	2.973***	0.423***
	(0.009)	(0.030)	(0.209)	(0.083)	(0.000)	(0.424)	(0.004)	(0.000)
Ln(sales)	0.359***	0.286***	0.452***	0.029***	0.383***	0.292***	0.431***	0.032***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash	0.200	0.033	−0.461	0.019	0.426**	0.041	0.121	0.080
	(0.289)	(0.844)	(0.516)	(0.772)	(0.034)	(0.779)	(0.870)	(0.295)
Capex	−0.121	−0.694	2.469	0.248	0.309	−0.233	3.319	0.379*
	(0.824)	(0.108)	(0.242)	(0.187)	(0.529)	(0.599)	(0.116)	(0.051)
R&D	1.493**	0.341	3.260	0.585***	1.702**	0.039	6.040**	0.829***
	(0.019)	(0.427)	(0.112)	(0.004)	(0.015)	(0.933)	(0.013)	(0.000)
Ln(firm age)	−0.075***	−0.037*	−0.021	−0.016*	−0.079***	−0.009	−0.044	−0.027**
	(0.004)	(0.072)	(0.830)	(0.055)	(0.008)	(0.683)	(0.711)	(0.010)
CEO indicator	1.123***	0.817***	1.916***	0.124***	0.892***	0.710***	0.767***	0.039***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ownership	−0.590	0.372	−12.271***	−0.982***	−2.088***	−0.117	−14.890***	−1.199***
	(0.486)	(0.552)	(0.000)	(0.000)	(0.003)	(0.842)	(0.000)	(0.000)
Constant	4.065***	4.531***	−0.605	−0.100	3.891***	4.343***	0.531	0.003
	(0.000)	(0.000)	(0.523)	(0.181)	(0.000)	(0.000)	(0.633)	(0.972)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.445	0.509	0.177	0.187	0.466	0.479	0.163	0.205
No. of observations	4,130	4,130	4,130	4,130	4,206	4,206	4,206	4,206

Note: this table compares the executive compensation in job-hopping firms to that in their industry peer firms. For each job-hopping firm, its industry peer firm is a non-job-hopping firm that is in the same industry and is closest in sales in the year prior to the job-hopping event. Columns (1)−(4) present the results in the year prior to the job-hopping event; Columns (5)−(8) present the results in the year following the job-hopping event. The dependent variable is the natural logarithm of executive total compensation in Columns (1) and (5), the natural logarithm of cash pay in Columns (2) and (6), the natural logarithm of equity pay in Columns (3) and (7), and the percentage of equity pay in total pay in Columns (4) and (8), respectively. Job-hopping firm is an indicator variable, taking the value of 1 for the job-hopping firm, and 0 for its industry peer firm. Variable definitions are provided in the appendix. All monetary variables are measured in 2011 dollars, and all continuous variables are winsorized at the 1st and 99th percentiles. Industry is classified using the first 2-digit of SIC codes. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. p-Values based on robust standard errors clustered at the firm level are reported in parentheses.

$$+\beta_6 (Cash\ ratio)_{it} + \beta_7 (Capital\ expenditure)_{it} + \beta_8 (R\&D\ intensity)_{it} + \beta_9 Ln(Firm\ age)_{it}$$

$$+\ \beta_{10}(CEO\ indicator)_{it} + \beta_{11}(Ownership)_{it}$$

$$+Year\ fixed\ effects+Industry\ fixed\ effects+\varepsilon \tag{3}$$

The *Job-hopping firm* indicator takes the value of 1 for the job-hopping firm, and 0 for its matched industry peer without experiencing any job-hopping. We estimate the above equation in the year prior to the job-hopping event and the year following the job-hopping event, separately. Table 9 presents the results.

In Columns (1)–(4), we focus on the year prior to the job-hopping event and the dependent variables are Ln(*total pay*), Ln(*equity pay*), Ln(*cash pay*), and equity/total pay, respectively. The coefficients on *Job-hopping firm* are all negative and significant. This result indicates that, in the year prior to the job-hopping event, job-hopping firms pay their executives significantly lower compensation and especially lower equity-based compensation, as compared to their industry peer firms. In Columns (5)-(8), we repeat our analysis but focus on the year following the job-hopping event. We find that the coefficients on *Job-hopping firm* are usually not significantly different from zero (except that the coefficient estimate is significant at the 10% level in Column (8)), implying that there is no significant difference in executive compensation between job-hopping firms and their industry peers after job-hopping firms raise pay to their incumbent executives.

Overall, Table 9 suggests that, prior to the job-hopping event, job-hopping firms do not pay their executives as competitively as their industry peers. After the job-hopping event, job-hopping firms adjust their compensation policies to match their industry peers. This result is also consistent with Table 8 Panel C.

Table 10
Executive retention after the pay raise.

Dependent variable=Job-hopping indicator	(1)	(2)	(3)
Pay growth	−0.134**	−0.146**	−0.279***
	(0.047)	(0.019)	(0.001)
Stock return		0.105	0.184
		(0.644)	(0.428)
Volatility		1.980	2.761
		(0.309)	(0.188)
ROA		0.488	0.361
		(0.573)	(0.667)
Ln(sales)		0.177***	0.164**
		(0.006)	(0.015)
Cash		−0.607	−0.633
		(0.423)	(0.425)
Capex		−4.822*	−4.330
		(0.058)	(0.104)
R&D		1.563	0.382
		(0.465)	(0.878)
Ln(firm age)		0.065	0.060
		(0.639)	(0.666)
CEO indicator			0.146
			(0.539)
Ownership			−5.683***
			(0.008)
Constant	−2.784***	−4.575***	−4.387***
	(0.000)	(0.000)	(0.000)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Pseudo R-squared	0.096	0.141	0.196
No. of observations	1,949	1,908	1,908

Note: this table reports the probit regression that investigates whether the pay raise following the job-hopping event can help to prevent incumbent executives from moving to other firms. The dependent variable is an indicator variable that takes the value of 1 if the incumbent executive moves to another firm at the end of the post-hopping year, and 0 otherwise. The sample consists of 1,949 executive-year observations in the post-hopping year. Pay growth is the difference in Ln(total pay) between the post-hopping year and the pre-hopping year (i.e., Ln(total pay) in the pre-hopping year subtracted from Ln(total pay) in the post-hopping year). Variable definitions are provided in the appendix. All monetary variables are measured in 2011 dollars, and all continuous variables are winsorized at the 1st and 99th percentiles. Industry is classified using the first 2-digit of SIC codes. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. p-Values based on robust standard errors clustered at the firm level are reported in parentheses.

5.3. Does the increase in pay following a job-hopping event help to retain executives?

So far, we have shown that firms tend to raise pay for their incumbent executives in response to losing executives in a job-hopping event. A natural question follows: does the pay raise help to retain these executives? The empirical test to answer this question is implemented as follows: Conditional on a job-hopping event in year t, we investigate whether incumbent managers' job-hopping activity in year $t+1$ is related to her pay raise in previous periods. In particular, we estimate the following probit regression model in Table 10:

$$Probability(Job-hopping)_{it+1} = \alpha + \beta_1(Pay\ growth)_{i,\ t-1\ to\ t+1} + \beta_2(Stock\ return)_{it} + \beta_3\ Volatility_{it} + \beta_4 ROA_{it}$$
$$+ \beta_5\ Ln(Sales)_{it} + \beta_6(Cash\ ratio)_{it} + \beta_7(Capital\ expenditure)_{it} + \beta_8(R\&D\ intensity)_{it}$$
$$+ \beta_9 Ln(Firm\ age)_{it} + \beta_{10}(CEO\ indicator)_{it} + \beta_{11} Ownership_{it}$$
$$+ Year\ fixed\ effects + Industry\ fixed\ effects \tag{4}$$

The dependent variable is an indicator variable that takes the value of 1 if the incumbent executive also moves to another firm at the end of the post-hopping year, and 0 otherwise. The independent variable *Pay growth* is the difference in Ln(*total pay*) between the pre-hopping year and the post-hopping year (*i.e.*, Ln(*total pay*) in the pre-hopping year subtracted from Ln(*total pay*) in the post-hopping year). The sample used in this analysis is the 1,949 incumbent executive-year observations in the post-hopping year.

In Column (1), we only include the *Pay growth* variable and year and industry fixed effects. The coefficient on *Pay growth* is negative and significant at the 5% level, indicating that a pay raise after the job-hopping event helps to prevent incumbent executives from following suit and moving to other firms. In Columns (2) and (3), we additionally control for various firm and executive characteristics, and we continue to find that the coefficients on *Pay growth* are negative and significant at or lower than the 5% level.

Overall, the results in Table 10 indicate that the pay raise following a job-hopping event indeed helps to retain incumbent executives.

5.4. Further discussion

There could be an alternative explanation for the positive relation between job-hopping and executive pay: one executive's job-hopping decision can increase the marginal value of remaining executives, leading to their pay raise. For example, when one executive leaves, the remaining executives' institutional knowledge can be, on the margin, more valuable, and therefore the firm raises executive pay in response to the increased marginal value of the remaining executives.

If this explanation is true, we should expect the pay raise to be more pronounced for the remaining executives who possess more institutional knowledge. Considering that CEOs, executives with high ownership, and long-tenure executives are likely to know more institutional details about the firm than other remaining executives, under this explanation, these three types of executives should experience a greater pay raise after the job-hopping event occurs. In contrast to this prediction, Columns (1), (2) and (8) of Table 6 show that these executives actually have a lower pay raise due to their poorer employment mobility. For this reason, the pay raise of remaining executives after a job-hopping event is not a reflection of increased marginal value for remaining executives.

6. Conclusions

The influence of the managerial labor market on executive compensation is relatively under-explored in the existing literature, probably because the detailed information on executive recruiting is largely confidential. In this paper, we shed new insight on the importance of the managerial labor market on compensation from the perspective of executive job-hopping. We find a strong job-hopping effect on compensation: companies raise pay (especially equity-based pay) dramatically for their incumbent executives after losing executives to other firms.

Further analysis reveals that the job-hopping effect on executive compensation is largely consistent with optimal contracting. First, the cross-sectional variation of the job-hopping effect is mostly driven by the market force. In particular, the pay raise is more pronounced when incumbent executives have greater employment mobility in the labor market, when companies lose senior executives, and when job-hoppers receive favorable job offers from other firms. Second, we show that executive compensation in job-hopping firms is not as competitive as their industry peers in the pre-hopping period, but this pay deficiency largely diminishes in the post-hopping period. This suggests that job-hopping events make an under-paying firm "re-equilibrate" its compensation schemes. Lastly, we find that the pay raise following a job-hopping event effectively helps to retain remaining executives. Overall, our paper provides empirical evidence that executive job-hopping activities in the managerial labor market are an important determinant of corporate compensation policies.

Finally, it is worth noting that our paper may even underestimate the importance of job-hopping on executive compensation for two reasons. First, in response to rivals poaching for managerial talent, firms may increase executive compensation in the first place so that some potential job-hopping cases are prevented and thus not observable in the data. Moreover, although we focus on the job-hopping activities within public firms, such job-hopping could also be prevalent across public firms and large private firms, non-US firms, hedge funds, and private equity funds. Those "attempted but prevented" job-hopping cases, and the job-hopping activities between public firms and other types of firms could be two interesting areas for future research.

Appendix. Variable definitions

Variable	Definition
Age	The age of the named executive officer.
CEO indicator	Indicator variable that equals to 1 if the incumbent executive is the CEO, and 0 otherwise.
CEO in new firm	Indictor variable that equals to 1 if the job-hopper is hired as the CEO in the new firm, and 0 otherwise.
Capex	Capital expenditures normalized by book value of total assets.
Cash	Cash plus short-term investments normalized by book value of total assets.
Cash pay	The sum of salary and bonus.
Equity pay	The sum of the grant-date value of restricted stock awards and the Black–Scholes value of granted options.
Firm age	The number of years since the firm first shows up in CRSP.
Herfindahl index	The sum of squared market shares based on firms' sales among all Compustat firms in the same industry and same year.
High industry homogeneity	Indicator variable that equals to 1 if the industry Herfindahl index is below the sample median, and 0 otherwise.
High rank in former firm	Indicator variable that equals to 1 if the job-hopper's pay rank among all the top executives in the former company is above the sample median, and 0 otherwise. Higher rank indicates higher compensation relative to other executives.
Higher pay in new firm	Indicator variable that equals to 1 if the job-hopper's 2nd year total compensation in the new company is higher than her 2nd last year total compensation in the former company, and 0 otherwise.
Job-hopping firm	Indicator variable that equals to 1 for job-hopping firms, and 0 for the matched industry peers without experiencing any job-hopping event.
Long tenure	Indicator variable that equals to 1 if the incumbent executive's tenure is above the sample median, and 0 otherwise.
Long tenure in former firm	Indicator variable that equals to 1 if the job-hopper's tenure in the former company is above the sample median, and 0 otherwise.

Many industry outside hiring	Indicator variable that equals to 1 if the percentage of outside-hired CEOs in the firm's industry is above the sample median, and 0 otherwise. An outside-hired CEO is the one who takes the CEO position within one year since she joins the firm.
Many industrial rivals	Indicator variable that equals to 1 if the number of firms in the same industry is larger than the sample median, and 0 otherwise.
Overpaid	Indicator variable that equals to 1 if the residual of a pooled OLS regression of executive's total compensation (Ln(*Total pay*)=$a+\beta_1$ Ln(*Sales*)+β_2 *ROA*+β_3 *Stock return*+β_4 *Volatility*+β_5 *CEO indicator*+β_6 *CFO indicator*+β_7 *COO indicator*+*Year fixed effects*+*Industry fixed effects*) is in the top quartile of the population, and 0 otherwise.
Ownership	The number of shares owned by the executives normalized by total shares outstanding.
Pay growth	The difference in Ln(total pay) between the pre-hopping year and the post-hopping year.
Percentage of outside-hired CEOs	The number of outside-hired CEOs relative to all CEO appointments in the firm's industry during the past 3 years.
Post-hopping	Indicator variable that equals to 1 for the executive-year observations in the year after the job-hopping event, and 0 for the executive-year observations in the year prior to the job-hopping event.
R&D	R&D expenditures normalized by book value of total assets.
Retirement	Indicator variable that equals to 1 if the incumbent executive is aged 65 or above, and 0 otherwise.
ROA	Net income normalized by book value of total assets.
Share number of restricted stock	The number of shares of unvested restricted stock.
Share number of unvested options	The number of shares of unvested options.
Stock return	The yearly stock return.
Tenure in former firm	The job-hopper's tenure in the former firm.
Total pay	The variable *TDC1* in ExecuComp, which is the sum of salary, bonus, the grant-date value of restricted stock awards, and the Black–Scholes value of granted options, and other compensation.
Value of restricted stock	The market value of unvested restricted shares.
Value of unvested options	The market value of in-the-money unvested options.
Volatility	The standard deviation of monthly stock return for the prior 60 months.

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