Pay Growth Along the Corporate Ladder: A Look Beneath the Surface

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Abstract

Using granular, individual-level compensation data for US public companies, we study within-firm pay inequality by focusing on the gap in *pay growth* between executives and rank-and-file employees ("pay growth gap") and its relation to a firm's idiosyncratic return, the "skill" component of stock performance. We find that among firms with below-average performance, the pay growth gap is reversely related to past idiosyncratic returns, i.e., executives enjoy higher pay growth relative to employees when firm performance is worse. This "reverse incentive alignment" is driven by the pay growth of executives, especially higher-ranked ones, rather than that of employees, and does not exist in firms with above-average performance. Among poorly performing firms, we also observe lower turnover rates for executives relative to employees when firm performance is worse. Our evidence is more consistent with managerial rent extraction than with other explanations such as differential talent or labor market conditions across the corporate hierarchy.

Key words: pay growth, within-firm pay inequality, CEO-to-median-employee pay gap, corporate hierarchy, managerial rent extraction, Longitudinal Employer-Household Dynamics database, executive compensation

JEL number: G30, G34, J31

1. INTRODUCTION

Over the past few decades, pay inequality in a society or workplace has attracted tremendous amount of attention from a wide spectrum of parties, including media reporters, regulators, working professionals, academic researchers, and the like.[1] The popular press often reports the escalating CEO-to-employee pay gap with a negative tone, blaming it for the rising social instability and other unsettling public issues. For example, a 2018 Forbes article states that "*If you have any doubt about our country's disappearing middle class, check out the current CEO-to-employee pay gap… Last year, CEO pay at an S&P 500 Index firm soared to an average of 361 times more than the average rank-and-file worker…*". Intuitively, a high pay gap could be caused by managerial rent extraction and the resulting managerial overpayment, an intuition illustrated by Bebchuk, Cremers, and Peyer (2011) who find that higher CEO pay relative to the aggregate pay of top executives leads to worse firm performance and lower firm value. In August 2015, the Securities and Exchange Commission finalized a regulation based on Section 953(b) of the Dodd-Frank Act that requires US publicly listed companies to disclose CEO-to-median-employee pay ratios.[2] This legislative move reflects the widespread public concerns over workplace inequality and the potential agency explanations for large executive-employee pay gaps.

Contrary to the conventional wisdom, however, recent academic studies suggest that the pay gap across corporate hierarchy may not be an appropriate measure of workplace inequality, nor is it necessarily caused by managerial rent extraction. For example, Mueller, Ouimet, and Simintzi (2017) and Cheng, Ranasinghe, and Zhao (2017) find that within-firm pay gaps positively predict firm value, operating performance, stock performance, and acquisition outcomes, consistent with the idea that pay gaps could be driven by managerial talent rather than rent extraction. Frydman and Papanikolaou

[1] For example, the public resentment for income inequality is manifested in some recent political events in the U.S., such as the "We are the 99%" movement (the "Occupy" movement) starting in late 2011.
[2] U.K. public firms are also required to disclose their CEO-to-median-employee pay ratios and the associated justifications starting from June 2018.

(2018) develop a model in which pay inequality is driven by manager's ability to identify new investment opportunities and find supporting empirical evidence using managerial compensation data. Further, evaluating pay gaps without considering firm performance might fail to reveal the true degree of managerial entrenchment and the corresponding pay inequality because a higher pay gap could simply reflect the greater marginal contribution of executives to shareholder wealth than that of rank-and-file employees. As emphasized by Murphy and Jensen (2018), the evidence from nonbinding Say-on-Pay votes on CEO compensation indicates that shareholders actually care more about the alignment between pay and performance rather than the level of CEO pay.[3]

Unlike the previous studies that focus on the difference in pay *levels* between executives and employees, this paper examines the differential *percentage growth* in pay between these two groups. Compared to pay level gaps, pay growth gaps are less likely to be driven by managerial talent. A greater difference in talent between top managers and employees may give rise to a larger gap in pay level but not necessarily a larger gap in percentage pay growth, as long as such talent does not increase disproportionately faster at the top of the corporate ladder.

Our empirical analyses match the pay records for executives from the S&P Capital IQ data and those for rank-and-file employees from the Longitudinal Employer-Household Dynamics (LEHD) data of the US Census Bureau between 1999 and 2008.[4] For a given firm-year, we calculate the pay growth for either the top executives or the rank-and-file employees as the percentage change in their average compensation from the previous year to the current year. Since the average compensation could change due to turnovers over the year, we take the advantage of our granular,

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[3] For example, Murphy and Jensen (2018) use the Equilar voting data of 2,444 Russell 3000 firms reporting Say-on-Pay votes from May 1, 2016 through April 30, 2017 and find that only 1.6% of the firms received a "failing" vote. Additionally, Murphy and Sandino (2017) find evidence that the failing Say-on-Pay votes are mainly caused by a combination of high CEO pay and low performance.

[4] The LEHD data, derived from employee wage records that firms submit to state unemployment insurance (UI) offices, has an administrative nature and thus less subject to the usual self-reporting biases or measurement errors associated with household surveys. Besides, it covers almost all forms of monetary compensation, including gross wages and salaries, bonuses, stock options, tips and other gratuities, and even meals and lodging.

individual-level data and require each executive or employee in our sample to work for the firm in both years. The average pay growth gap for our sample firm-years is 11.8%, as the average annual pay growth is 18.5% for executives but only 6.7% for employees. This difference in pay growth is positive in each year of our sample period and peaks in 2006, the year before the global financial crisis.

While the consistently higher pay growth for top executives might be driven by managerial rent extraction, it could also reflect a disproportionate increase in managerial talent or efforts over time. To distinguish between these two explanations, we relate the pay growth gap of a firm to its stock performance, which mostly reflects the skills and efforts of the top management team.[5] Specifically, we follow the literature (e.g., Jenter and Kanaan, 2015; Bertrand and Mullainathan, 2001; Garvey and Milbourn, 2006) to decompose a firm's total stock return into the predicted return (i.e., the return common to its peer group), which is generally referred to as the "luck" component of performance, and the remaining idiosyncratic return, which is regarded as the "skill" component. We then examine whether a larger pay growth gap is indeed associated with a higher idiosyncratic return in the previous year.

We sort our sample firms into deciles of lagged idiosyncratic returns by year and examine their pay growth gaps across the return deciles. The results are striking: While the pay growth gap is relatively stable for firms in the top five deciles, it almost monotonically *decreases* with idiosyncratic returns in the bottom five deciles. That is, among poorly performing firms, the worse the performance, the *higher* the pay growth gaps. This *negative* relation between pay growth gaps and idiosyncratic returns among poorly-performing firms, which reveals a phenomenon of "reverse incentive alignment" between shareholders and managers, is consistent with managerial rent extraction in such firms and unlikely to be explained by alternative stories. For example, a disproportionate increase in talent or

[5] Note that executives, held responsible for stock price maximization, hire rank-and-file employees on behalf of shareholders. Hence, even the performance of employees is partially determined by the managerial skills to identify and recruit talented workers.

efforts for executives relative to employees cannot explain this finding: Since a firm's idiosyncratic return largely depends on and reflects its managerial quality or efforts, one would expect a *positive* relation between its pay growth gap and the idiosyncratic return. Likewise, this finding is unlikely to be explained by the differential labor market conditions or bargaining power in the wage negotiating process for agents across the corporate hierarchy because it is unclear why managers with worse performance would enjoy better job prospects or have more bargaining power relative to employees.

To corroborate the evidence from the sorting analysis, we conduct formal regression analyses using two approaches. For the first approach, we divide all firm-years into two subsamples based on their lagged idiosyncratic returns, and estimate regressions of pay growth on each subsample separately. For each firm-year, we construct two observations of pay growth, one for executives and the other for employees. The main dependent variable is the interaction of an executive indicator and lagged idiosyncratic returns. For the second approach, we use the full sample and create two variables to capture the positive and negative parts of the lagged idiosyncratic returns, respectively. We then estimate regressions of pay growth on the executive indicator and its interactions with both parts of returns. We control for firm×year fixed effects in all these regressions. Consistent with the sorting analysis, the results of both regression approaches consistently show a *negative* relation between pay growth gaps and idiosyncratic returns among poorly performing firms (those with negative idiosyncratic returns). In contrast, this negative relation does not exist for well performing firms (those with positive idiosyncratic returns).

We conduct a broad set of robustness tests using alternative measures of pay inequality or model specifications. First, we use the annual growth rate of the CEO-to-median-employee pay gap as the dependent variable rather than using the pay growth for executives and employees separately. Second, we repeat our regression analysis using only the cash component of executive pay instead of the total calculated compensation. Third, we include the interaction of the executive dummy with squared idiosyncratic returns in the regressions rather than the separate interactions with the positive and negative parts of idiosyncratic returns. Fourth, we use an alternative method of constructing idiosyncratic and predicted returns by controlling for firm size.[6] In all these robustness tests, we consistently find a negative relation between the pay growth gap and idiosyncratic returns for poorly-performing firms.

It is possible that the reverse incentive alignment in pay growth at times of low returns is a form of compensation for turnover risk. If this is the case, we should observe that among the poorly performing firms, the turnover rate of executives relative to employees is higher upon worse idiosyncratic returns. On the contrary, if the reverse incentive alignment in pay growth among poorly performing firms is driven by managerial rent extraction, then such agency problems can spill over to the turnover outcomes, in which case we would find that the turnover rates of executives relative to employees are lower upon worse idiosyncratic returns. To test these competing hypotheses, we again exploit the granular nature of our data and calculate turnover rates for individual executives and employees. We find that the turnover rate of executives is unconditionally lower than that of employees. More importantly, the turnover rate of executives relative to employees is *positively* related to lagged idiosyncratic returns among poorly performing firms. In other words, for these firms the worse the idiosyncratic performance, the *lower* the turnover rates of executives relative to employees, suggesting rigged incentives for executives even in the context of job retention.[7]

The pay growth gap is driven by the pay growth rates of both executives and employees. If

[6] In untabulated analysis, we also conduct three more robustness tests. First, we reconstruct our pay growth gap measure after dropping the last year of an executive at a firm to address the concern that her total compensation before departure might include a big one-time severance package or pension payout (Stefanescu et al. 2018). Second, we examine the gap between the median (as opposed to the mean) pay growth rate of the executives and employees. Third, we estimate regressions of pay growth at the individual level rather than at the firm level. Specifically, for each individual executive or employee who stays at a firm for both the previous and the current year, we calculate her or his percentage pay growth and estimate the regressions of pay growth. Our findings hold in all these robustness tests.

[7] Due to data limitations, we do not observe the reasons for the departures of executives/employees, and thus are unable to distinguish between voluntary and involuntary turnovers. Therefore, the evidence on turnovers should be interpreted with caution.

the observed reverse incentive alignment is caused by managerial rent extraction, we would expect such empirical patterns to show up more clearly in the pay growth of executives than that of employees. We find that this is indeed the case: Executive pay growth is significantly negatively (insignificantly positively) related to lagged idiosyncratic returns among poorly-performing (well-performing) firms. Additionally, the reverse incentive alignment among poorly-performing firms is more pronounced for higher-ranked executives (especially the CEO) than lower-ranked ones. In contrast, there is a significantly positive relation between employee pay growth and lagged idiosyncratic returns among all firms. [8]

Besides the within-firm pay inequality between executives and employees, the one among employees of different demographic attributes has also been a focus of the existing literature. For example, many papers document gender and race disparities in which female or African American employees receive significantly lower wages than their male or white peers (e.g., Altonji and Blank, 1999; Lang and Lehman, 2012). Hence, in the last part of our paper, we examine the pay growth rates of subgroups of rank-and-file employees based on gender, age, and race. We find that on average, female, older, and non-white employees have significantly lower pay growth rates than their male, younger, and white counterparts. These results provide new evidence on the pay disparities among rank-and-file employees from the perspective of pay growth.

Our paper extends the fast-growing literature on within-firm pay inequality. Whereas existing studies mostly focus on the gap in pay *level* between executives and rank-and-file employees, our paper examines the gap in pay *growth* along the corporate ladder and relates it to firm performance. The granular nature of our individual-level pay records allows us to overcome several common difficulties in the existing literature on pay gaps or executive compensation due to data limitations. For example,

[8] We also examine the sensitivity of pay growth to firm performance for quintiles of rank-and-file employees further down the corporate ladder, because, as pointed out by Edmans, Gabaix, and Jenter (2017), relatively less attention has been paid to the incentive provision for employees other than top executives. The results are summarized in later sections.

we can fix the pool of executives/employees in two consecutive years when calculating their annual pay growth. We are also able to provide a comprehensive picture of the overall incentive provision by combining the analysis of turnover with pay growth. We document a phenomenon of "reverse incentive alignment", i.e., a *negative* relation between the executive-employee pay growth gap and idiosyncratic returns among poorly-performing firms, which is consistent with managerial rent extraction in such firms but unlikely to be explained by other factors such as the disproportional growth in talent/efforts by the managers relative to employees or differential labor market conditions for these two groups of agents. Our findings therefore shed new light on the important topic of workplace pay inequality by providing evidence consistent with managerial rent extraction found in CEO compensation (e.g., Bebchuk, Cremers, and Peyer, 2011; Morse, Nanda, and Seru, 2011).

Our paper also has important policy implications, given the recent debate on whether public firms should be required to disclose their CEO-to-median-employee pay ratios. While the proponents argue that this policy will help keep the top executive power under check and potentially reduce workplace inequality, the critics point out that such disclosure rules impose excessive costs and miss the key point in offering optimal incentives, namely, the pay for performance sensitivity. Our evidence shows that top executives in some firms tend to share the gains when firm performance is good but pass the blame to employees when firm performance is bad. Hence, the mandatory disclosure rule should pay close attention to the differential sensitivity of pay growth to firm performance across the corporate hierarchy in addition to the relative level of pay.

2. RELATION TO THE EXISTING LITERATURE

The escalating pay inequality between executives and rank-and-file employees has attracted much attention from the public, including news media, government officials, and academic scholars. The current finance literature has proposed two major explanations for within-firm pay inequality:

managerial rent extraction and managerial talent.

First, the classic theory of agency problems (e.g., Jensen, 1986) suggests that corporate executives may engage in rent extraction behaviors when agency conflicts are severe, giving rise to excessive pay at the top of the management team and in turn high within-firm pay inequality (e.g., Bebchuk and Fried, 2004). Follow-up empirical work has found supporting evidence for this agency-based view. For example, Bebchuk, Cremers, and Peyer (2011) examine the distribution of managerial compensation across the top five executives in a firm with a focus on "CEO Pay Slice (CPS)", namely, the fraction of aggregate executive compensation that belongs to the CEO. Consistent with CEO rent extraction, they find that CPS negatively predicts firm performance and value. There is also a large finance literature showing that agency conflicts between shareholders and managers can significantly influence the design of managerial compensation contracts. For example, Garvey and Milbourn (2006) find that the sensitivity of CEO pay to the "luck" component of firm performance is significantly smaller when there is bad luck than when there is good luck. Further, Morse, Nanda, and Seru (2011) provide evidence that CEOs induce boards to shift the weight of performance evaluation towards the better performance measures, and that such "rigging" behavior of incentive pay accounts for at least 10% of the pay-for-performance sensitivity in their sample U.S. firms.

Managerial rent extraction, as well as the corresponding tendency to overpay top executives, has been the most common reason cited by news media when they discuss pay gaps.[9] Meanwhile, policy makers have also taken actions to facilitate the public scrutiny of within-firm pay inequality. For instance, in August 2015, the Securities and Exchange Commission started to require U.S. publicly listed companies to disclose CEO-to-median-employee pay ratios. Similarly, starting from June 2018, U.K. firms are required to disclose the ratio of their CEO pay to the median, 25th, and 75th percentiles

[9] For example, a 2011 *Fortune* article ("*How can we address excessive CEO pay?*"), while discussing the tremendous growth of CEO-to-average-worker pay ratios, cites a statement by Jack Bogle, the founder of the Vanguard Group, that "*The current levels of compensation for CEOs in corporate America are, in a word, outrageous.*"

of employee pay.

While pay inequality can be associated with managerial rent extraction, it might also be driven by managerial talent, which is scarce and increasingly important in today's world. Gabaix and Landier (2008) develop a theoretical model in which CEOs have differential talent, and show that in equilibrium, CEO pay is determined by both the size of her employer and that of the aggregate firm in the economy. Following this study, Edmans, Gabaix, and Landier (2009) and Edmans and Gabaix (2011) show that in competitive market equilibrium, a CEO's compensation reflects the level of her rare talent. Tervio (2008) further argues that while managerial talent scales with firm size, rank-and-file employees' talent does not scale with firm size, leading to wider pay gaps in larger firms.

A number of recent empirical studies find support for the managerial talent explanation. Using comprehensive firm-level data on employee pay in the U.K., Mueller, Ouimet, and Simintzi (2017) find that, consistent with the theoretical predictions of talent-based models, within-firm pay differentials between the top- and bottom-level jobs are indeed bigger in larger firms. Additionally, the pay level gap in their sample of firms positively predicts firm value and operating performance. Similarly, Faleye, Reis, and Venkateswaran (2013), using the voluntarily-reported employee wage data from Compustat, also find a positive relation between a US public firm's CEO-employee pay ratio and its operating performance. Further, Cheng, Ranasinghe, and Zhao (2017), relying on a snapshot of firm-level worker pay in the year of 2011 obtained from PayScale.com, document that CEO-employee pay ratios are positively related to the quality of acquisitions and CEO turnover-performance sensitivity.[10] Frydman and Papanikolaou (2018) develop a market-based model in which managers not only participate in production decisions like ordinary employees, but also have the ability

[10] Labor economists have also proposed a third rationale for pay inequality based on tournament theory (e.g., Lazear and Rosen, 1981; Heyman, 2005). Specifically, a higher pay gap between employees of different ranks can promote competition and increase employees' productivity. However, this theory is less relevant in the case of CEO-employee pay gaps because an average rank-and-file employee is unlikely to compete for the job of CEO.

to identify new investment opportunities. In equilibrium pay inequality will rise when there are greater investment opportunities in the economy. They calibrate their model using the data of executive compensation and find evidence supporting the model predictions.

While the pay level gap is by far the most commonly examined metric of pay inequality in the literature as well as news stories or regulatory documents, it may not be the most appropriate measure to detect possible managerial rent extraction and the associated pay inequality at workplace. This is because, as the recent empirical evidence shows, a higher pay level gap might simply reflect the greater marginal contribution of executives to shareholder wealth than that of rank-and-file employees. Further, an exclusive focus on the level of pay as opposed to its sensitivity to performance might miss the goal of proper incentive provision, which matters the most for firm value maximization. As the evidence from nonbinding Say-on-Pay votes on CEO compensation indicates, shareholders care more about the alignment between pay and performance rather than the level of CEO pay (Murphy and Jensen, 2018). For example, only a very small percentage of Say-on-Pay votes are disapprovals, and these cases concentrate in firms with both a high CEO pay and poor stock performance (Murphy and Sandino, 2017; Murphy and Jensen, 2018).

We differ from the previous studies by focusing on pay growth gaps rather than pay level gaps. While a higher pay level for executives could be driven by their superior talent, as shown by the existing theoretical and empirical studies, greater pay growth at the top of the corporate ladder is less likely to be driven by managerial talent, as long as the talent of executives does not increase disproportionately faster than that of rank-and-file employees. Additionally, to the best of our knowledge, we are the first to relate pay growth gaps to past idiosyncratic stock returns (Jenter and Kanaan, 2015), namely, the "skill" component of firm performance. A related study by Bell, Pedemonte, and Van Reenen (2018) examines the relation between CEO pay level and idiosyncratic firm performance for U.K. companies. Their relative (idiosyncratic) performance measure is defined similarly to ours except that they construct benchmark returns differently. Consistent with the asymmetric response of pay growth gap to good and poor firm performance that we document, they find an asymmetric response of CEO pay to performance increases and decreases. Further, they find a *negative* relation between CEO pay and the relative performance for firms with poor governance but not for firms with good governance, which also suggests managerial rent extraction.

Finally, our study also contributes to the broad literature on workplace discrimination (e.g., e.g., Altonji and Blank, 1999; Lang and Lehman, 2012) by examining the within-firm pay growth for employees along multiple dimensions such as gender, age, and race. Our results provide new evidence that female, older, and non-white employees, in addition to receiving lower levels of compensations, also have significantly lower pay growth than their male, older, and white counterparts.

3. DATA, SAMPLE SELECTION, AND SUMMARY STATISTICS

3.1 Data and Sample Selection

Data used in this paper come from multiple sources. We obtain individual executives' annual compensation data for U.S. publicly traded firms from the S&P Capital IQ database. Capital IQ collects detailed information on the compensation, title, and professional rank of senior managers and directors of public firms since 1996 from the firms' regulatory filings (including forms 8-K, 10-Q, 10-K, and DEF 14A).[11] Given that the first two years of Capital IQ data have very limited coverage of U.S. public firms, we start our sample period from 1998. Since our main variable, pay growth, uses two consecutive years of pay information, our final sample starts in 1999, one year after the start of our Capital IQ sample period.

[11] Details about the Capital IQ database can be found at https://www.spglobal.com/marketintelligence/en/solutions/sp-capital-iq-platform.

We obtain individual rank-and-file employees' wages and personal characteristics from the Longitudinal Employer-Household Dynamics (LEHD) program of the U.S. Census Bureau. Combining the Unemployment Insurance (UI) earnings records from participating states with additional administrative and economic survey data, the LEHD database contains quarterly earnings for each employee-employer pair and individual employees' personal characteristics such as gender, age, race, and education. It covers over 95% of the employment in the private sector of all the states in the U.S.[12] Our LEHD sample includes 26 participating states, which agree to share their data with external (i.e., non-Census) researchers over the period of 1990-2008.[13]

We link employers in the LEHD to firms in Compustat in two steps. We first match establishments in the LEHD to those in the Longitudinal Business Database (LBD) database, which covers the entire universe of U.S. establishments in all states, by Employer Identification Number (EIN), state, and county, using the Business Register Bridge (BRB) file created by the Census. We then use and improve upon a bridge file provided by the Census (i.e., the Compustat-SSEL Bridge) to link LBD to Compustat.[14]

We exclude employers in the LEHD that cannot be matched to Compustat. Since we do not have access to the full LEHD database, we further exclude a firm-year for which the LEHD data we have access to cover less than 90% of its workforce (measured either by its total number of employees or by its total payroll in the LBD). At the individual worker level, we require an employee in our sample to be aged between 25 and 64, have at least two quarterly pay records from an LEHD firm-year, and earn at least the federal minimum wage in her working quarters. [15]

[12] See Abowd et al. (2009) for a comprehensive overview of the LEHD data.
[13] The 26 LEHD states in our sample are Arizona, California, Colorado, Delaware, Georgia, Hawaii, Idaho, Illinois, Indiana, Louisiana, Maryland, Maine, New Jersey, New Mexico, Nevada, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Utah, Vermont, Washington, and Wisconsin.
[14] Further details of the matching process are described in He, Shu, and Yang (2018).
[15] Our results are almost identical if we annualize the pay for employees working fewer than four quarters of a year.

Finally, we obtain financial statement information and accounting data for our sample firms from Compustat and stock return data from the Center for Research in Security Prices (CRSP) database. After merging the LEHD, Capital IQ, Compustat, and CRSP datasets together, our final sample consists of about 4,500 firm-years between 1999 and 2008.[16]

3.2 Variable Definitions and Summary Statistics

For each firm-year, we calculate the average pay growth for executives (*GrowthComp_Exec*) and rank-and-file employees (*GrowthComp_Emp*) as the percentage change in their average pay from the previous to the current year. To mitigate the concern that the change in average compensation could be caused by the turnovers of the executives or employees in these two years, we fix the pool of each group, i.e., requiring each executive and employee to stay in the firm at both years, when calculating the percentage pay growth. Individual executives' compensation is measured by Capital IQ's Total Calculated Compensation (CTYPE18) in 2008 dollars (i.e., adjusted for inflation). This pay measure has been used to capture executive compensation in a number of recent finance studies (e.g., Correa and Lel, 2016; Burns, Minnick, and Starks, 2017), and includes salaries, bonuses, restricted stock and option awards, long-term incentive plans, changes in pension plans, and all other compensation. In robustness tests, we also use Capital IQ's Total Annual Cash Compensation (CTYPE15) as an alternative measure of individual executives' pay.

Before calculating the average pay growth for rank-and-file employees in our LEHD sample, we exclude the top-N-paid employees, where N is the number of executives used in the calculation of executive pay growth, under the assumption that these top-paid employees in the LEHD might include some or all of the executives covered by the Capital IQ.[17] We then aggregate individual employees'

[16] The number of firm-years in our sample is rounded to the nearest hundreds according to the disclosure requirements of the U.S. Census Bureau.
[17] All our results are robust to adding these top-paid employees back.

quarterly earnings to the annual level, adjust them for inflation, and calculate the percentage change in the average annual pay.

Following the CEO pay and turnover literature (e.g., Jenter and Kanaan, 2015; Bertrand and Mullainathan, 2001; Garvey and Milbourn, 2006), we decompose a firm's annual stock return into the predicted and idiosyncratic components using the following model:

$$TotalRet_{i,t} = \alpha + \beta PeerRet_{i,t} + \epsilon_{i,t}, \qquad (1)$$

where $TotalRet_{i,t}$ is firm i's stock return in year t, and $PeerRet_{i,t}$ is the value-weighted average return of all other CRSP firms in the same industry (based on the Fama-French 48 industry classifications) in year t. We estimate Eq. (1) for our sample firms between 1990 and 2008.[18] Firm i's predicted return in year t, *PredRet*, is defined as the predicted value from Eq. (1), and its idiosyncratic return, *IdioRet*, is defined as the difference between *TotalRet* and *PredRet*. In some tests, we split *IdioRet*, *PredRet*, and *TotalRet* into two components. *IdioRetHigh* equals *IdioRet* when *IdioRet* is positive (i.e., above its median), and zero otherwise. *IdioRetLow* equals *IdioRet* when *IdioRet* is negative, and zero otherwise. *PredRetHigh (PredRetLow)* equals *PredRet* if it is above (below) the median in the annual cross-section, and zero otherwise. *TotalRetHigh* (*TotalRetLow*) equals *TotalRet* if it is above (below) the median in the annual cross-section, and zero otherwise. We follow the literature and winsorize all continuous variables in the paper at the 1st and 99th percentiles to mitigate the impact of outliers in the data.

Table 1 Panel A reports the summary statistics for the key variables used in our study. The average annual pay growth for executives, *GrowthComp_Exec*, is 18.5%, which is about three times as large as the 6.7% for rank-and-file employees (*GrowthComp_Emp*). There is substantial variation in the pay growth for both groups across firm-years, as the standard deviations of *GrowthComp_Exec* and

[18] We follow the standard practice in the literature to estimate model (1) only using our sample firms, but our results are almost identical if we estimate it using the entire universe of CRSP firms and then match to our sample firms.

GrowthComp_Emp are 45.0% and 16.3%, respectively. On average, firms in our sample have annual predicted, idiosyncratic, and total returns of 12.8%, 2.1% and 14.9%, respectively.

Panel A also report the summary statistics of the firm-level characteristics used in our analyses, including the natural logarithm of market capitalization (*LnME*), the natural logarithm of firm age (*LnFirmAge*), sales per employee (*SalesEmp*), return on assets (*ROA*), asset tangibility (*PPEAssets*), book leverage (*BookLev*), and Tobin's Q (*TobinQ*). The construction of these variables is described in the Appendix. Our sample firms on average have log market capitalization of 12.10, log age of 2.55, sales per employee of 0.30, ROA of 4.5%, asset tangibility of 20.3%, book leverage of 17.1%, and Tobin's Q of 1.87. These characteristics are very similar to those of the Compustat universe during our sample period (i.e., 1999-2008).[19]

Panel B of Table 1 presents the industry distribution of our sample firms using the Fama-French 12 classifications. The Finance industry has the highest number of firm-years in our sample (about 29%), followed by the Business Equipment industry (about 20%). The Telephone and Television Transmission industry has the least number of firm-years (less than 2%).[20]

4. EMPIRICAL ANALYSES

4.1 Pay Growth Gaps: Univariate Patterns

In Figure 1, we plot the overall time trend of pay growth gap over our sample period of 1999-2008. For a given year, we calculate the pay growth gap between top executives and rank-and-file employees for each sample firm and plot the cross-sectional averages for the sample years in Panel A. As can be seen, the average pay growth gap for our sample firms is positive in each year of our sample

[19] Specifically, an average Compustat firm during 1999-2008 has log market capitalization of 12.30, log age of 2.462, sales per employee of 0.307, ROA of 3.6%, asset tangibility of 23.4%, book leverage of 21.3%, and Tobin's Q of 1.992.

[20] The number of firm-years in the Telephone and Television Transmission industry is marked "N.D." (non-disclosable) because it is a small number that would be rounded to zero according to the disclosure guidelines of the Census.

period. It decreases from 1999 to 2000, the year when the tech bubble burst, and then gradually increases to the peak of 2006, before declining again in the financial crisis periods of 2007 and 2008. We also plot the average annual growth rate of the CEO-to-median-employee pay gap in the same figure and find a very similar pattern. Panel B of Figure 1 plots the average annual pay growth separately for CEOs, executives, and employees. It shows that the time-series pattern of the pay growth gap in Panel A is mostly driven by the time trend in executive pay growth (especially CEO pay growth) rather than employee pay growth (which actually drops over the sample period). In Panel C of Figure 1, we plot the time trend of the average CEO-to-median-employee pay level gap and find a big jump from around 17% in 1999 to over 30% in 2008, consistent with the general pattern in this ratio documented by other studies and the news media.

To explore whether the consistently positive pay growth gap (in all market situations) is more likely driven by managerial rent extraction or disproportional increases in managerial talent/efforts over time, we further examine the relation between pay growth gap and firm performance. The talent explanation predicts a positive relation between these two variables, but the explanation based on managerial rent extraction predicts a non-positive or even negative relation.

For each year, we sort firms in our sample into ten deciles based on their performance in the previous year and calculate the average pay growth gap for firm-years in each decile. The results are presented in Figure 2. Panel A shows a negative correlation between pay growth gaps and total stock returns among firms with below-median performance in the previous year (i.e., those in deciles 1-5), indicating a reverse incentive alignment for such firms. For firms with above-median total returns (i.e., those in deciles 6-10), the relation between pay growth gaps and total returns shows no clear patterns. However, as previous literature argues, total stock returns might reflect both the skills/efforts of the top management team and the "luck" component that is merely due to overall economic/industry conditions. Hence, we follow the literature to decompose the total return into two components and examine each of their associations with the pay growth gap. As shown in Panel B of Figure 2, the phenomenon of reverse incentive alignment still exists even if we tease out the influence of economic/industry conditions: the pay growth gap is relatively stable for firms in the top five deciles of idiosyncratic returns, but almost monotonically decreases in the bottom five deciles. In contrast, there is no clear relation between pay growth gaps and predicted returns for firms with below-median performance, and this relation is slightly positive for firms with above-median predicted returns (Panel C of Figure 2).

The *negative* relation between pay growth gaps and idiosyncratic returns among poorly-performing firms, which reveals a phenomenon of reverse incentive alignment between shareholders and managers, is consistent with managerial rent extraction in those firms and unlikely to be explained by alternative stories. For example, the disproportionate increase in talents or efforts for top executives relative to rank-and-file employees cannot explain this finding: Since a firm's idiosyncratic return largely depends on and reflects its managerial quality or efforts, one would expect a *positive* relation between its pay growth gap and the idiosyncratic return. Likewise, this finding is unlikely to be explained by the differential labor market conditions or bargaining power in the wage negotiating process for agents across the corporate hierarchy because it is unclear why the worst performing managers would enjoy better job prospects or have more bargaining power relative to employees than those managers with moderate underperformance.

4.2 Pay Growth Gap Tests: Regression Analyses

To dig into the evidence from the sorting analysis in a more rigorous fashion, we conduct formal regression analyses using two approaches. First, we estimate regressions of pay growth on an executive dummy for poorly-performing and well-performing firms separately. The subsample of poorly (well) performing firms consists of firms with below (above)-median performance in the previous year. For each firm-year, there are two observations, one for the executives and the other for rank-and-file employees, which have different values for pay growth rates but are identical otherwise. We then estimate the following regression model for the two subsamples separately:

$$PayGrowth_{i,t,k} = \beta_1 DummyExec_{i,t,k} + \beta_2 FirmPerf_{i,t-1} \times DummyExec_{i,t,k} + Firm_i \times Year_t + \epsilon_{i,t,k}, \quad (2)$$

where $PayGrowth_{i,t,k}$ is the pay growth for agent group *k* (either executives or employees) of firm *i* in year *t*, which takes the value of *GrowthComp_Exec* for executives and the value of *GrowthComp_Emp* for rank-and-file employees. *DummyExec* is an indicator variable that equals one for the observation of executives and zero for that of employees. $FirmPerf_{i,t-1}$ is firm *i*'s performance in year *t-1* as measured by *IdioRet*, *PredRet*, or *TotalRet* (Jenter and Kanaan, 2015). $Firm_i \times Year_t$ denotes firm×year fixed effects. The coefficient of interest, β_2, captures the change in pay growth gap between executives and employees in response to the change in firm performance. Note that $FirmPerf_{i,t-1}$ itself is dropped from the regression because it is fully absorbed by firm×year fixed effects. Similarly, any time-invariant and time-variant firm characteristics have also been absorbed by such fixed effects. To account for any within-firm correlation of the error term, we cluster the standard errors in all our models by firm.

The estimation results are presented in Table 2. Panel A splits the sample into firm-years with above-median (i.e., positive) and below-median (i.e., negative) idiosyncratic returns (*IdioRet*). Consistent with the univariate results in Figure 1, the significantly positive coefficients of *DummyExec* in Columns (1) to (4) show that the pay growth gap between these two groups of agents is positive across all performance ranges. More importantly, the significantly negative coefficient of the interaction term between *IdioRet* and *DummyExec* in Column (1) shows that for poorly performing firms, the pay growth gap between executives and employees is larger when the firm's idiosyncratic return, *IdioRet*, is worse (i.e., more negative), indicating the phenomenon of reverse incentive alignment as discussed above. In terms of economic magnitudes, a one standard deviation decrease in

IdioRet is associated with a 4.35% (=0.078×0.557×100%) increase in pay growth gap, which is economically non-trivial given that the means of *GrowthComp_Exec* and *GrowthComp_Emp* are 18.5% and 6.7%, respectively. This result is robust to the inclusion of the interaction of *PredRet* and *DummyExec* (Column (2)). On the contrary, Columns (3) and (4) show that for firms with good idiosyncratic performance, there is no significant relation between pay growth gaps and *IdioRet*, as the coefficients of the interaction terms are insignificant.

In Panel B of Table 2, we split the sample firms based on the median of predicted returns, *PredRet*. In stark contrast to the results in Panel A, we find that for both subsamples the coefficient of the interaction term, *IdioRet* × *DummyExec*, is statistically insignificant, suggesting that there are no significant relations between pay growth gaps and predicted returns. Panel C further reports the subsample analyses based on the median of total returns, *TotalRet*. The coefficient of the interaction term is again significantly negative for the poorly performing subsample of firms, which is consistent with the reverse incentive alignment found in the tests of idiosyncratic returns.

In our second regression approach, we use the full sample and regress pay growth gaps on an executive dummy and its interaction with past performance, after controlling for firm×year fixed effects. To explore any nonlinear patterns in the above relationship, we also create two variables to capture the above- and below-average past firm performance and then estimate regressions of pay growth on the executive dummy and its interactions with both these two performance variables.

The results are reported in Table 3. We first include interactions of the executive dummy with the idiosyncratic return and the predicted return in columns (1) to (3). The interaction of the idiosyncratic return is significantly negative and that of the predicted return is insignificant, showing that there is an overall negative relation between pay growth gaps and *IdioRet*, but no significant relations between pay growth gaps and *PredRet*. In Column (4), we define two variables to capture whether a firm's idiosyncratic return is high or low. *IdioRetHigh* (*IdioRetLow*) equals *IdioRet* when

IdioRet >0 (<=0), and 0 otherwise. We find that the interaction of *IdioRetLow* is significantly negative while the interaction of *IdioRetHigh* is insignificant, which show that the negative overall relation between pay growth gaps and *IdioRet* is driven by firms with poor idiosyncratic performance (i.e., those with negative *IdioRet*). In Column (5), we repeat the analysis using *PredRet* and find a significantly positive relation between pay growth gaps and *PredRet* for firms with below-median performance, suggesting that executives receive greater pay cuts than employees when they have "bad luck". Column (6) includes the interactions of *DummyExec* with the high (i.e., *Pos*) and low (i.e., *Neg*) components of both *IdioRet* and *PredRet*. The negative relation between pay growth gaps and *IdioRetLow* among firms with poor idiosyncratic returns remains robust. Further, there is some evidence that the pay growth gap is significantly lower when firms' predicted returns (i.e., the "luck" components of stock performance) are extreme (i.e., either very high or very low).

Taken together, Tables 2 and 3 suggest that pay growth gaps between executives and rank-and-file employees are negatively (reversely) related to idiosyncratic stock returns for poorly performing firms. This reverse incentive alignment is consistent with managerial rent extraction.

4.2 Robustness Tests

We conduct a number of robustness checks of our results. In Panel A of Table 4, we use the percentage growth rate of the CEO-to-median-employee pay gap as the dependent variable. The model specifications are similar to those in Columns (3) and (6) of Table 3, but with several differences. Specifically, there is only one observation for each firm-year in this test, and because of this, *DummyExec* and its interactions are no longer included in the model. Accordingly, we replace firm×year fixed effects with industry×year fixed effects. Further, we add a broad set of firm characteristics that are commonly used in the literature as control variables, including firm size, leverage ratio, firm age, sales per employee, ROA, Tobin's Q, and asset tangibility. The results in Panel A are consistent with our baseline results in Table 3. For example, in Column (2), the interaction of

IdioRetLow is significantly negative and that of *IdioRetHigh* is insignificant, suggesting reverse incentive alignment among poorly performing firms but not well performing firms.[21]

To address the concern that our results might be purely driven by the non-cash parts of executive compensation (such as stocks and options), we repeat the regression analysis using the total cash compensation from Capital IQ as the compensation measure for executives. The compensation measure for rank-and-file employees remains unchanged (i.e., calculated using the LEHD data). Panel B of Table 4 repeats the same model specifications as those of Table 3 (columns (3) and (6)) and finds very similar results. The interaction of *IdioRetLow* is significantly negative and that of *IdioRetHigh* is insignificant, showing that our results are robust to using only the cash compensation components.

In Panel C of Table 4, we include the interactions of *DummyExec* with squared predicted and idiosyncratic returns into the regressions rather than its separate interactions with the high (i.e., *Pos*) and low (i.e., *Neg*) components of both types of returns. As can be seen, *IdioRet* × *DummyExec* has a significantly negative coefficient, while $IdioRet^2$ × *DummyExec* has a significantly positive coefficient, consistent with the convex relation between the pay growth gap and past idiosyncratic returns found in earlier tables.

Daniel, Li, and Naveen (2016) suggest that it is important to control for firm size when decomposing stock returns into the "luck" and the "skill" components. We therefore decompose a firm's annual stock return into the predicted and idiosyncratic components using an alternative model as proposed by Daniel et al. (2016):

$$TotalRet_{i,t} = \alpha + \beta_1 \text{LnME}_{i,t-1} + \beta_2 PeerRet_{EW\,i,t} + \beta_3 PeerRet_{VW\,i,t} + \beta_4 \text{LnME}_{i,t-1} \times PeerRet_{EW\,i,t} + \beta_5 \text{LnME}_{i,t-1} \times PeerRet_{VW\,i,t} + Year_t + \epsilon_{i,t}, \quad (3)$$

[21] Note that the number of observations for this test is smaller than our baseline regression because we require a firm's CEO (as opposed to any executive) to work for the firm in both the current and the previous year.

where $LnME_{i,\ t\text{-}1}$ is the natural logarithm of firm *i*'s market capitalization at the end of year *t-1*. $PeerRet_{EWi,t}$ is the equal-weighted average return of all other CRSP firms in the same industry in year *t*. $PeerRet_{VWi,t}$ is the value-weighted average return of all other CRSP firms in the same industry in year *t*, and $Year_t$ denotes the year fixed effects. We denote the predicted and idiosyncratic returns estimated from Eq. (2) as *SizeAdjPredRet* and *SizeAdjIdioRet*, respectively. We also define *SizeAdjIdioRetHigh*, *SizeAdjIdioRetLow*, *SizeAdjPredRetHigh*, and *SizeAdjPredRetLow* in a similar way. Panel D of Table 4 reports the results of this robustness test, which shows that the interaction of *SizeAdjIdioRetLow* is significantly negative and that of *SizeAdjIdioRetHigh* is insignificant. These results suggest that our findings are not affected by the alternative way of calculating idiosyncratic returns.

4.3 Turnover Rate Tests

It is possible that executives in firms with worse performance face greater turnover risk relative to employees and as a result enjoy higher pay growth. If that is the case, the observed reverse incentive alignment in pay growth among such firms can still be more or less efficient. Under this hypothesis, we expect the turnover rate of executives relative to employees to be higher when lagged idiosyncratic returns decrease among poorly performing firms. On the contrary, if the reverse incentive alignment in pay growth is driven by managerial rent extraction, then such agency problems can spill over to the turnover outcomes and reduce the relative turnover rates for executives when lagged idiosyncratic returns drop. To test these competing hypotheses, we exploit the granular nature of our data by calculating turnover rates for individual executives and employees separately.[22]

Different from the sample used in pay growth gap tests where we require a given individual to stay at the firm for both the current and previous years, the sample for our turnover-rate tests consists

[22] Another benefit of this test is that it helps provide a more complete picture of incentive provisions across the corporate hierarchy. Previous studies tend to focus only on either the compensation level/structure or turnover events for CEOs (executives), whereas our paper examines both aspects of labor market consequences and relate them to firm performance.

of all executives/employees of a firm in the previous year. The turnover rate for a group of executives (employees) in a given year is defined as the number of executives (employees) that leave the firm in that year divided by the total number of executives (employees) at the end of the previous year.

Using the same model specifications as in Table 2, we divide sample firms into two groups based on idiosyncratic returns and estimate the regressions of the gap in turnover rates between executives and rank-and-file employees (henceforth "the turnover rate gap") on firm performance in the previous year. In Panel A of Table 5, Column (1) shows that the coefficient of the executive dummy is significantly negative, which indicates that the turnover rate of executives is unconditionally lower than that of employees. More importantly, the interaction of the executive dummy and idiosyncratic returns is significantly positive, suggesting that the turnover rate gap increases in idiosyncratic returns when they are negative. In other words, executives at the worst performing firms have *lower* turnover rates relative to employees than those at the moderately underperforming firms, which is consistent with rigged incentives for executives even in the context of job retention. In terms of economic magnitudes, a one standard deviation decrease in *IdioRet* is associated with a decrease in turnover rate gaps of 6.6% (=0.118×0.557×100%), which is also economically significant. Column (2) presents the results for well performing firms (i.e., those with positive idiosyncratic returns), in which the interaction term is insignificant, showing no significant relation between *IdioRet* and turnover rate gaps. Taken together, these results reveal that the reverse incentive alignment among poorly-performing firms in the pay growth analysis also shows up in turnover rates.

We further adopt our second regression approach to conduct the turnover rate tests on the full sample of firms and report the results in Panel B of Table 5. The settings of these regressions are similar as those in Table 3 except that the dependent variable now is turnover rate. Column (1) shows that on average, the turnover rate gap between executives and employees significantly increases in *IdioRet*. Columns (2) splits *IdioRet* into positive and negative components and Column (3) further controls for the positive and negative components of the predicted return. In both models, the coefficient is significantly negative for the interaction of the positive idiosyncratic return and significantly positive for that of the negative idiosyncratic return. These results are consistent with those for the subsample analysis (in Panel A) that the rigged incentive provisions at poorly performing firms also manifest in turnover outcomes.

5. PAY GROWTH GAPS AMONG EXECUTIVES AND RANK-AND-FILE EMPLOYEES

5.1 Analyses of Pay Growth for Executives and Non-Executive Employees Separately

To shed light on whether executives or non-executive employees contribute more to the observed patterns of reverse incentive alignment, we examine the relation between pay growth and firm performance for executives and non-executive employees separately.

Figure 3 plots the average pay growth of executives and non-executive employees for firms across deciles of stock performance. In Panel A, we first sort firms into deciles by year based on their idiosyncratic returns in the previous year and plot the average executive pay growth and employee pay growth for firms in each decile. There is a negative relation between executive pay growth and idiosyncratic returns for poorly performing firms (i.e., those in deciles 1-5), whereas the pay growth of employees generally increases in firm performance. These results demonstrate that it is the executives rather than rank-and-file employees that drive the reverse incentive alignment between pay growth gaps and idiosyncratic returns among poorly performing firms. Panels B and C repeat the analyses using predicted returns and total returns, respectively. The relations between pay growth and predicted returns are mostly positive for both executives and non-executive employees, and the results using total returns are similar to the ones using idiosyncratic returns.

We also conduct multivariate analyses and estimate the following model for executives and non-executive employees separately:

$$PayGrowth_{i,t} = \beta FirmPerf_{i,t-1} + \gamma X_{i,t-1} + Ind \times Year_t + \epsilon_{i,t}, \quad (4)$$

where $PayGrowth_{it}$ is the growth rate of the average compensation for either executives or employees of firm i in year t; $FirmPerf_{i,t-1}$ is a measure of firm i's stock performance in year $t-1$; and $X_{i,t-1}$ consists of the same set of control variables as in Panel A of Table 4. The estimation results are reported in Table 6. Columns (1) and (2) estimate regressions for executives, and Columns (3) and (4) present results regarding rank-and-file employees. Column (1) includes only the idiosyncratic and predicted returns while Column (2) examines a full model that further includes the positive and negative parts of these return components. In Column (2), the coefficient of *IdioRetLow* is significantly negative and that of *IdioRetHigh* is insignificantly positive, suggesting a phenomenon of reverse incentive alignment for executive pay growth among poorly performing firms. On the other hand, the coefficients of *IdioRetLow* and *IdioRetHigh* in Column (4) are both significantly positive, indicating that the reverse incentive alignment in pay growth does not apply to rank-and-file employees. Overall, Table 6 shows that it is the executives (rather than employees) that drive the reverse incentive alignment in pay growth gaps among poorly performing firms.[23]

In Panel A of Table 7, we repeat the regression analyses in Table 6 for three subgroups of executives: CEOs, high-rank non-CEO executives and low-rank non-CEO executives, where the two subgroups of non-CEO executives are defined based on whether their professional ranks in the previous year are above or below the within-firm medians.[24] In Columns (1) to (3), the coefficient of *IdioRetLow* is significantly negative and the magnitude increases in executive rank. Specifically, the coefficients for CEOs, high-rank non-CEO executives and low-rank non-CEO executives are -0.181,

[23] In untabulated analysis, we find a similar pattern of reverse incentive alignment in executive pay growth when examining the universe of Capital IQ firms over our sample period.
[24] Executives' professional rank data are obtained from the Capital IQ database.

-0.165, and -0.074, respectively. These results suggest that the reverse incentive alignment in pay growth is stronger for higher ranked executives, especially CEOs, than for lower ranked executives.

In Panel B of Table 7, we also divide non-executive employees (within a firm-year) into five quintiles based on their total earnings in the previous year and repeat the regression analysis. Columns (1) to (5) show that the coefficient of *IdioRetLow* is positive for all five subgroups and statistically significant for four out of five of them. Morevoer, the magnitude of the coefficients does not change substantially across the subgroups.

Taken together, Tables 6 and 7 suggest that the reverse incentives alignment in pay gap growth among poorly performing firms is mainly driven by executives and especially CEOs and higher ranked executives.

5.2 Analyses of Pay Growth across Employee Demographic Characteristics

While the focus of our paper is the pay growth gap between executives and rank-and-file employees, it is also interesting to examine the differential pay growth rates across employee groups based on their demographic characteristics. This analysis can provide new evidence on workplace inequality from the perspective of pay growth.

Due to the limited availability of employee characteristics in LEHD, we examine four demographic attributes of employees in our sample, namely, gender, age, and race. For each firm-year in our sample, we divide its non-executive employees into two groups along four different dimensions: male vs. female, old vs. young (based on sample medians), and white vs. non-white. Then we calculate the growth rate of the average pay for each group of employees and estimate the following model:

$$PayGrowth_{i,t,k} = \beta_1 Dummy_{i,t,k} + \beta_2 FirmPerf_{i,t-1} \times Dummy_{i,t,k} + \gamma X_{i,t-1} + Firm_i \times Year_t + \epsilon_{i,t,k}, \quad (5)$$

where $PayGrowth_{i,t,k}$ is the pay growth for employee group k of firm i in year t; $Dummy_{i,t,k}$ is a dummy variable indicating male, older, or white employees; $FirmPerf_{i,t-1}$ is a measure of firm i's stock performance in year $t-1$; and $X_{i,t-1}$ consists of the average pay rank and the average demographic characteristics of the employees, except the one used to divide the sample; and $Firm_i \times Year_t$ denotes firm×year fixed effects. The demographic characteristics for the group of employees include their average age (*AveAge_Emp*), the fraction of white (*AveWhite_Emp*), the fraction of male employees (*AveMale_Emp*), the average number of years of education (*AveEdu_Emp*), and the average personal labor income diversification measure of the employees (*PerDiverse_Emp*s), where the personal diversification measure for each employee equals one minus the ratio of her annual labor income from the focal firm to her total annual labor income from all jobs (He, Shu and Yang, 2018). Further, to control for the effect of corporate hierarchy on pay growth, we also include the average pay rank of an employee (*PayRank*) in our analysis, where the pay rank of an employee is defined as one minus the rank of an employee's pay within a firm-year divided by the total number of employees in that firm-year. The coefficient β_1 captures the unconditional difference in pay growth between the two groups of employees, and the coefficient β_2 captures the difference in the response of pay growth to firm performance between the two groups.

Table 8 presents the results. In all three models, the coefficient of the dummy variable (β_1) is significant, suggesting that there is unconditional difference in pay growth across employees with various demographic attributes. Specifically, the results show that female employees, older employees, and non-white employees, and less educated employees receive significantly lower pay growth than their male, younger, and white counterparts. Additionally, the coefficients of the interaction terms between the demographic-group dummy variables and stock return measures are largely insignificant, suggesting that there is no major difference in the response of pay growth to firm performance across the examined demographic characteristics.

6. CONCLUSION

Pay inequality at workplace has attracted a lot of attention in recent years. While most of the media coverage and academic studies focus on the gap of pay levels between executives and rank-and-file employees, we examine the *pay growth gap* between executives and employees, an important dimension of within-firm pay inequality. Our granular, individual-level data allow us to closely examine the pay growth gap along the corporate ladder and its relation to firm performance.

We find that the pay growth of executives is consistently higher than that of rank-and-file employees over our sample period of 1999 to 2008. More importantly, an interesting divergence emerges when we examine the relation between pay growth gaps and the firms' past idiosyncratic returns, i.e., the "skill" component of firm performance. Among poorly performing firms, those with worse past idiosyncratic returns have *higher* pay growth gaps between executives and rank-and-file employees. This "reverse incentive alignment" does not exist among well performing firms. These findings hold in both sorting and regression analyses, and in a broad set of robustness tests using alternative empirical specifications.

The reverse incentive alignment among poorly performing firms is consistent with managerial rent extraction in such firms and unlikely to be explained by alternative stories based on managerial talent/effort, labor market conditions, or bargaining power. Consistent with rigged managerial incentives, we also find the presence of reverse incentive alignment in turnover outcomes. Among poorly performing firms, firms with worse performance have *lower* executive turnover rates relatively to rank-and-file employees. Additionally, the reverse incentive alignment in pay growth gaps is driven by the pay growth of executives, especially that of CEOs or highly ranked executives rather than that of rank-and-file employees.

We also examine the pay growth across various demographic characteristics among rank-and-file employees and find significant disparities in pay growth along these dimensions. Specifically, female, older, and non-white employees have significantly lower pay growth than their male, younger, and white counterparts.

While existing studies on within-firm pay inequality mostly focus on the gap in pay *levels* between executives and employees, our paper provides new evidence by examining the pay growth gap along the corporate ladder. The documented reverse incentive alignment in pay growth gaps among poorly performing firms is consistent with the managerial rent extraction found in CEO compensation (e.g., Bebchuk, Cremers, and Peyer, 2011; Morse, Nanda, and Seru, 2011). Regarding policy implications, our evidence suggests regulators should pay a closer attention to the differential sensitivity of pay growth to firm performance across the corporate hierarchy rather than the relative levels of pay.

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Appendix: Variable Definitions

Variable	Definition
GrowthComp_Exec	The percentage growth rate of the average total compensation for a firm's executives from the previous year to the current year, where each individual executive's compensation is measured by the total calculated compensation reported by the Capital IQ database and adjusted for inflation.
GrowthCashComp_Exec	The percentage growth rate of the average cash compensation for a firm's executives from the previous year to the current year, where each individual executive's compensation is measured by the total cash compensation reported by the Capital IQ database and adjusted for inflation.
GrowthComp_Emp	The percentage growth rate of the average compensation for a firm's non-executive full-time employees from the previous year to the current year, where each individual employee's compensation is measured by the total compensation reported by LEHD and adjusted for inflation.
TotalRet	A firm's raw stock return in a year.
PredRet	The predicted return of a firm from the panel regression of a firm's total return on the peer-group return, i.e., the value-weighted average return of all other firms in the same Fama-French 48 industry (Jenter and Kanaan, 2015).
IdioRet	The idiosyncratic return of a firm, defined as *TotalRet* minus *PredRet*.
IdioRetHigh	Equals *IdioRet* when *IdioRet* >0 (its median) and 0 otherwise.
IdioRetLow	Equals *IdioRet* when *IdioRet* <=0 (its median) and 0 otherwise.
PredRetHigh	Equals *PredRet* if it is above the median in the annual cross-section, and 0 otherwise.
PredRetLow	Equals *PredRet* if it is below the median in the annual cross-section, and 0 otherwise.
TotalRetHigh	Equals *TotalRet* if it is above the median in the annual cross-section, and 0 otherwise.
TotalRetLow	Equals *TotalRet* if it is below the median in the annual cross-section, and 0 otherwise.
SizeAdjPredRet	The predicted return of a firm from the panel regression of a firm's total return on the equal-weighted and value-weighted peer-group returns (the equal-weighted and value-weighted average returns of all other firms in the same Fama-French 48 industry), the lagged natural logarithm of the firm's market capitalization, the interactions of the peer-group returns and the lagged logarithm of the firm's market capitalization, and year dummies (Daniel et al, 2016).
SizeAdjIdioRet	Equals *TotalRet* minus *SizeAdjPredRet*.
SizeAdjIdioRetHigh	Equals *SizeAdjIdioRet* when *SizeAdjIdioRet* >0 (its median) and 0 otherwise.
SizeAdjIdioRetLow	Equals *SizeAdjIdioRet* when *SizeAdjIdioRet* <=0 (its median) and 0 otherwise.

SizeAdjPredRetHigh	Equals *SizeAdjPredRet* if it is above the median in the annual cross-section, and 0 otherwise.
SizeAdjPredRetLow	Equals *SizeAdjPredRet* if it is below the median in the annual cross-section, and 0 otherwise.
TurnoverRate	The turnover rate for a group of employees, defined as the number of employees that leave the firm in a year divided by the number of employees at the end of the previous year.
LnME	The natural logarithm of a firm's market capitalization.
LnFirmAge	The natural logarithm of a firm's age. Firm age is defined as the number of years that the firm has been in Compustat.
SalesEmp	A firm's total sales divided by its number of employees.
ROA	Return on assets, defined as operating income before depreciation (OIBDP) divided by book value of total assets (AT).
PPEAssets	Property, plant & equipment (PPENT) divided by book value of assets (AT).
BookLev	Book leverage, defined as book value of long-term debt (DLTT) plus book value of debt in current liabilities (DLC) divided by book value of total assets (AT).
TobinQ	Tobin's Q, defined as market value of equity (PRCC_F×CSHO) plus book value of assets (AT) minus book value of equity (CEQ) minus deferred taxes (TXDB) (set to zero if missing) divided by book value of assets.
AveAge_Emp	Average age (in years) of a given group of employees.
AveWhite_Emp	The fraction of white employees among a given group of employees.
AveEdu_Emp	Average number of years of education for a given group of employees.
AveMale_Emp	The fraction of male employees among a given group of employees.
PerDiverse_Emp	Average personal diversification measure of a given group of employees, where the personal diversification measure for each employee equals one minus the ratio of her annual labor income from the focal firm to her total annual labor income.
PayRank	One minus the rank of an employee's pay within a firm-year divided by the total number of employees in that firm-year. *PayRank* is bounded between 0 and 1 and increases (within a firm-year) in an employee's pay.
AvePayRank_Emp	Average *PayRank* of a subgroup of employees.

Table 1: Summary Statistics and Sample Distributions

Panel A reports the summary statistics of the variables used in this paper. The sample includes the U.S. listed firms that are covered by both the Capital IQ database and the Longitudinal Employer-Household Dynamics (LEHD) program from 1999 to 2008. Definitions of the variables are provided in the Appendix. All variables are winsorized at the 1st and 99th percentiles. Panel B reports the distribution of sample firm-years across Fama-French 12 industries. In both panels, the number of firm-years is rounded to the nearest hundreds according to the disclosure requirements of the U.S. Census Bureau. In Panel B, the number of firm-years in the Telephone and Television Transmission industry is marked "N.D." (non-disclosable) because it is a positive number that would be rounded to zero.

Panel A: Summary Statistics

Variable	**Mean**	**S.D.**	**Firm-Years**
GrowthComp_Exec	0.185	0.450	4,500
GrowthCashComp_Exec	0.130	0.337	4,500
GrowthComp_Emp	0.067	0.163	4,500
PredRet	0.128	0.167	4,500
IdioRet	0.021	0.557	4,500
TotalRet	0.149	0.575	4,500
IdioRetHigh	0.208	0.406	4,500
IdioRetLow	-0.187	0.260	4,500
PredRetHigh	0.052	0.128	4,500
PredRetLow	-0.029	0.049	4,500
TotalRetHigh	0.236	0.437	4,500
TotalRetLow	-0.141	0.206	4,500
LnME	12.10	1.814	4,500
LnFirmAge	2.548	0.699	4,500
SalesEmp	0.298	0.271	4,500
ROA	0.045	0.169	4,500
PPEAssets	0.203	0.227	4,500
BookLev	0.171	0.168	4,500
TobinQ	1.869	1.470	4,500

Panel B: Sample Distribution across Fama-French 12 Industries

Industry	**Firm-Years**
Consumer Nondurables	200
Consumer Durables	100
Manufacturing	400
Energy	100
Chemicals	100

Industry	Firm-Years
Business Equipment	900
Telephone and Television Transmission	N.D.
Utilities	100
Wholesales, Retails and Some Services	300
Healthcare	500
Finance	1,300
Other	400

Table 2: Pay Growth and Stock Performance: Subsample Analysis

This table reports the results of panel regressions of a firm's executive and non-executive pay growth on the firm's stock performance measures in the previous year. For each firm-year in our sample, there are two observations, one for executives and the other for non-executive employees. The dependent variable, *Pay Growth*, takes the value of executives' pay growth (*GrowthComp_Exec*) for executives and the value of non-executive employees' pay growth (*GrowthComp_Emp*) for non-executive employees. *DummyExec* is a dummy variable that equals one for the observation of executives and zero for that of non-executive employees. *IdioRet*, *PredRet*, and *TotalRet* are the firm's idiosyncratic return, predicted return, and total return, respectively. Definitions of all variables are provided in the Appendix. All variables are winsorized at the 1st and 99th percentiles. In each panel, the sample firm-years are divided into two groups based on the median of *IdioRet* (Panel A) and *PredRet* (Panel B). All regressions include firm×year fixed effects. In all regressions, the number of firm-years is rounded to the nearest hundreds according to the disclosure requirements of the U.S. Census Bureau. We report in the parentheses t-statistics based on robust standard errors that are adjusted for heteroskedasticity and within-firm clustering. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A: Subsamples based on Idiosyncratic Return

	Dependent Variable: Pay Growth$_t$			
Subsamples	*Below-Median Idiosyncratic Return*		*Above-Median Idiosyncratic Return*	
	(1)	(2)	(3)	(4)
DummyExec	0.113***	0.120***	0.098***	0.096***
	(7.77)	(7.79)	(8.54)	(7.51)
IdioRet$_{t-1}$ × *DummyExec*	-0.078**	-0.099***	-0.011	-0.013
	(-2.19)	(-2.65)	(-0.58)	(-0.66)
PredRet$_{t-1}$ × *DummyExec*		-0.100		0.028
		(-1.61)		(0.40)
Firm×Year FEs	YES	YES	YES	YES
Observations	4,500	4,500	4,500	4,500
Adj. R^2	0.089	0.089	0.117	0.116

Panel B: Subsamples based on Predicted Return

	Dependent Variable: Pay Growth$_t$	
Subsamples	*Below-Median Predicted Return*	*Above-Median Predicted Return*
	(1)	(2)
DummyExec	0.107***	0.141***
	(9.89)	(10.05)
PredRet$_{t-1}$ × *DummyExec*	0.025	-0.068
	(0.21)	(-1.22)
Firm×Year FEs	YES	YES
Observations	4,500	4,500
Adj. R^2	0.083	0.112

Table 3: Pay Growth and Stock Performance: Pooled-sample Analysis

This table reports the results of panel regressions of a firm's executive and non-executive pay growth on the firm's stock performance measures in the previous year. For each firm-year in our sample, there are two observations, one for executives and the other for non-executive employees. The dependent variable, *Pay Growth*, takes the value of executives' pay growth (*GrowthComp_Exec*) for executives and the value of non-executive employees' pay growth (*GrowthComp_Emp*) for non-executive employees. *DummyExec* is a dummy variable that equals one for the observation of executives and zero for that of non-executive employees. *IdioRet*, *PredRet*, and *TotalRet* are the firm's idiosyncratic return, predicted return, and total return, respectively. *IdioRetHigh (IdioRetLow)* equals *IdioRet* when *IdioRet* >0 (<=0), and 0 otherwise. *PredRetHigh (PredRetLow)* equals *PredRet* if it is above (below) the median in the annual cross-section, and 0 otherwise. Definitions of all variables are provided in the Appendix. All variables are winsorized at the 1st and 99th percentiles. All regressions include firm×year fixed effects. In all regressions, the number of firm-years is rounded to the nearest hundreds according to the disclosure requirements of the U.S. Census Bureau. We report in the parentheses t-statistics based on robust standard errors that are adjusted for heteroskedasticity and within-firm clustering. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Pay Growth$_t$						
	(1)	(2)	(3)	(4)	(5)	(6)
DummyExec	0.118***	0.119***	0.121***	0.103***	0.136***	0.120***
	(19.43)	(14.64)	(14.75)	(10.95)	(17.69)	(11.80)
IdioRet$_{t-1}$ × *DummyExec*	-0.043***		-0.043***			
	(-3.21)		(-3.22)			
PredRet$_{t-1}$ × *DummyExec*		-0.014	-0.020			
		(-0.30)	(-0.42)			
IdioRetHigh$_{t-1}$ × *DummyExec*				-0.016		-0.005
				(-0.85)		(-0.29)
IdioRetLow$_{t-1}$ × *DummyExec*				-0.094***		-0.138***
				(-3.16)		(-4.19)
PredRetHigh$_{t-1}$ × *DummyExec*					-0.099	-0.196***
					(-1.64)	(-2.98)
PredRetLow$_{t-1}$ × *DummyExec*					0.470***	0.581***
					(3.39)	(4.18)
TotalRetHigh$_{t-1}$ × *DummyExec*						
TotalRetLow$_{t-1}$ × *DummyExec*						
Firm×Year FE	YES	YES	YES	YES	YES	YES
Observations	9,000	9,000	9,000	9,000	9,000	9,000
Adj. R^2	0.102	0.099	0.101	0.102	0.101	0.106

Table 4: Pay Growth and Stock Performance: Robustness Tests

This table reports robustness tests for the baseline analysis. Panel A reports regressions of a firm's growth of CEO-to-median-employee pay gap on its stock market performance in the previous year, where the dependent variable is the percentage change in the CEO-to-median-employee pay gap from the previous year to the current year. There is one observation for each firm-year in this sample. The regressions include firm-level control variables. Panel B reports regressions similar to Columns (3) and (6) of Table 3 except that the dependent variable for executives is the growth of cash compensation rather than the growth of total compensation. Panel C reports regressions similar to Columns (3) and (6) of Table 3 except that we examine the squared terms of return measures instead of their "*Pos*" and "*Neg*" versions. Panel D reports regressions similar to Columns (3) and (6) of Table 3 except that we use the firm size-adjusted return measures instead of the original return measures. *DummyExec* is a dummy variable that equals one for executives and zero for non-executive employees. Definitions of other variables are in the Appendix. All variables are winsorized at the 1st and 99th percentiles. Panel A includes industry×year fixed effects, and Panels B to D include firm×year fixed effects. According to the disclosure requirements of the U.S. Census Bureau, the number of firm-years is rounded to the nearest hundreds. T-statistics (in parentheses) are based on robust standard errors that are adjusted for heteroskedasticity and within-firm clustering. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A: Growth of CEO-to-Median Employee Pay Gap

	Dependent Variable: Growth of Pay Gap$_t$	
	(1)	(2)
IdioRet$_{t-1}$	-0.049*	
	(-1.90)	
PredRet$_{t-1}$	-0.624	
	(-0.28)	
IdioRetHigh$_{t-1}$		0.023
		(0.69)
IdioRetLow$_{t-1}$		-0.223***
		(-3.20)
PredRetHigh$_{t-1}$		0.167
		(0.08)
PredRetLow$_{t-1}$		-3.052
		(-0.71)
LnME$_{t-1}$	0.038***	0.041***
	(5.06)	(5.50)
BookLev$_{t-1}$	-0.019	-0.029
	(-0.25)	(-0.38)
LnFirmAge$_{t-1}$	-0.012	-0.008
	(-0.65)	(-0.45)
SalesEmp$_{t-1}$	0.015	0.012
	(0.27)	(0.23)
ROA$_{t-1}$	-0.186**	-0.156*
	(-2.17)	(-1.83)
TobinQ$_{t-1}$	-0.025**	-0.024**
	(-2.45)	(-2.39)
PPEAssets$_{t-1}$	0.059	0.071

	Dependent Variable: Growth of Pay Gap$_t$	
	(1)	(2)
Industry×Year FE	YES	YES
Observations	3,700	3,700
Adj. R^2	0.059	0.061

Panel B: Growth of Cash Pay

	Dependent Variable: Cash Pay Growth$_{t+1}$	
	(1)	(2)
DummyExec	0.060***	0.051***
	(9.42)	(6.76)
IdioRet × *DummyExec*	-0.051***	
	(-4.63)	
PredRet × *DummyExec*	0.030	
	(0.79)	
IdioRetHigh × *DummyExec*		-0.010
		(-0.62)
IdioRetLow × *DummyExec*		-0.144***
		(-5.61)
PredRetHigh × *DummyExec*		-0.091*
		(-1.67)
PredRetLow × *DummyExec*		0.298***
		(2.68)
Firm×Year FE	YES	YES
Observations	9,000	9,000
Adj. R^2	0.116	0.120

Panel C: Using Squared Terms

	Dependent Variable: Pay Growth$_{t+1}$	
	(1)	(2)
DummyExec	0.111***	0.100***
	(15.87)	(10.65)
$IdioRet_{t-1}$ × *DummyExec*	-0.059***	-0.072***
	(-3.70)	(-4.24)
$IdioRet_{t-1}^2$ × *DummyExec*	0.024*	0.035**
	(1.81)	(2.45)
$PredRet_{t-1}$ × *DummyExec*		0.208**
		(2.27)
$PredRet_{t-1}^2$ × *DummyExec*		-0.435***
		(-3.10)
Firm×Year FE	YES	YES
Observations	9,000	9,000
Adj. R^2	0.102	0.104

Panel D: Using Size-Adjusted Measures of Firm Performance

	Dependent Variable: Pay Growth$_t$	
	(1)	(2)
DummyExec	0.112***	0.108***
	(14.93)	(10.04)
SizeAdjIdioRet$_{t-1}$ × *DummyExec*	-0.055***	
	(-3.82)	
SizeAdjPredRet$_{t-1}$× *DummyExec*	0.017	
	(0.70)	
SizeAdjIdioRetHigh$_{t-1}$ × *DummyExec*		-0.012
		(-0.53)
SizeAdjIdioRetLow$_{t-1}$ × *DummyExec*		-0.129***
		(-4.07)
SizeAdjPredRetHigh$_{t-1}$ × *DummyExec*		-0.133**
		(-2.46)
SizeAdjPredRetLow$_{t-1}$ ×*DummyExec*		0.082
		(1.02)
Firm×Year FE	YES	YES
Observations	9,000	9,000
Adj. R^2	0.103	0.104

Table 5: Turnover Rate and Stock Performance: Regression Analysis

This table reports the results of panel regressions of a firm's executive and non-executive turnover rates on the firm's stock performance measures in the previous year. In Panel A: for each firm-year in our sample there are two observations, one for executives and the other for non-executive employees. The dependent variable, *Turnover Rate*, is calculated for executives and non-executive employees separately, as the number of executives (or non-executive employees) that leave the company in a year divided by the number of executives (or non-executive employees) at the end of the previous year. *DummyExec* is a dummy variable that equals one for the observation of executives and zero for that of non-executive employees. *IdioRet* is the firm's idiosyncratic return. The sample firm-years are divided into two groups based on 0, which is the median of *IdioRet*. Panel B further estimates regressions on the full sample of firms. *IdioRetHigh (IdioRetLow)* equals *IdioRet* when *IdioRet* >0 (<=0), and 0 otherwise. *PredRetHigh (PredRetLow)* equals *PredRet* if it is above (below) the median in the annual cross-section, and 0 otherwise. Definitions of all variables are provided in the Appendix. All variables are winsorized at the 1st and 99th percentiles. All regressions include firm×year fixed effects. In all regressions, the number of firm-years is rounded to the nearest hundreds according to the disclosure requirements of the U.S. Census Bureau. T-statistics (in parentheses) are based on robust standard errors that are adjusted for heteroskedasticity and within-firm clustering. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A: Subsamples based on Idiosyncratic Return

	Dependent Variable: Turnover Rate$_t$	
Subsamples	*Below-Median Idiosyncratic Return*	*Above-Median Idiosyncratic Return*
	(1)	(2)
DummyExec	-0.031***	-0.074***
	(-4.61)	(-15.86)
IdioRet$_{t-1}$ × *DummyExec*	0.118***	-0.007
	(8.42)	(-1.08)
Firm×Year FEs	YES	YES
Observations	4,500	4,500
Adj. R^2	0.172	0.150

Panel B: Full samples

	Dependent Variable: Turnover Rate$_t$		
	(1)	(2)	(3)
DummyExec	-0.074***	-0.051***	-0.044***
	(-21.96)	(-11.31)	(-9.14)
IdioRet$_{t-1}$ × *DummyExec*	0.010**		
	(2.21)		
IdioRetHigh$_{t-1}$ × *DummyExec*		-0.032***	-0.024***
		(-4.79)	(-3.49)
IdioRetLow$_{t-1}$ × *DummyExec*		0.088***	0.059***
		(7.57)	(4.78)
PredRetHigh$_{t-1}$ × *DummyExec*			-0.135***
			(-6.44)
PredRetLow$_{t-1}$ × *DummyExec*			0.251***
			(4.76)

	Dependent Variable: Turnover Rate$_t$		
	(1)	(2)	(3)
Firm×Year FE	Yes	Yes	Yes
Observations	9,000	9,000	9,000
Adj. R^2	0.156	0.168	0.177

Table 6: Pay Growth and Stock Performance: Executives and Non-Executive Employees Separately

This table reports the results of panel regressions of a firm's executive and non-executive pay growth on the firm's stock performance measures in the previous year. The dependent variable, *Pay Growth*, is the pay growth of either executives or non-executive employees. *IdioRet*, *PredRet*, and *TotalRet* are the firm's idiosyncratic return, predicted return, and total return, respectively. *IdioRetHigh (IdioRetLow)* equals *IdioRet* when *IdioRet* >0 (<=0), and 0 otherwise. *PredRetHigh (PredRetLow)* equals *PredRet* if it is above (below) the median in the annual cross-section, and 0 otherwise. *TotalRetHigh* (*TotalRetLow*) equals *TotalRet* if it is above (below) the median in the annual cross-section, and 0 otherwise. The regressions also control for a broad set of firm characteristics. Definitions of all variables are provided in the Appendix. All variables are winsorized at the 1st and 99th percentiles. All regressions include industry×year fixed effects. In all regressions, the number of firm-years is rounded to the nearest hundreds according to the disclosure requirements of the U.S. Census Bureau. T-statistics (in parentheses) are based on robust standard errors that are adjusted for heteroskedasticity and within-firm clustering. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Pay Growth$_t$			
	Executives		Non-Executive Employees	
	(1)	(2)	(3)	(4)
$IdioRet_{t-1}$	-0.013		0.029***	
	(-0.80)		(4.61)	
$PredRet_{t-1}$	-5.125***		-2.049***	
	(-3.32)		(-3.69)	
$IdioRetHigh_{t-1}$		0.025		0.021**
		(1.10)		(2.40)
$IdioRetLow_{t-1}$		-0.098**		0.050***
		(-2.45)		(3.27)
$PredRetHigh_{t-1}$		-5.484***		-2.322***
		(-4.08)		(-3.88)
$PredRetLow_{t-1}$		-1.535		-0.832
		(-0.37)		(-0.41)
$LnME_{t-1}$	0.034***	0.036***	0.006***	0.005***
	(7.63)	(7.92)	(3.29)	(3.06)
$BookLev_{t-1}$	0.034	0.028	0.017	0.018
	(0.70)	(0.58)	(0.92)	(0.97)
$LnFirmAge_{t-1}$	-0.023**	-0.020*	-0.017***	-0.017***
	(-2.03)	(-1.83)	(-3.71)	(-3.80)
$SalesEmp_{t-1}$	-0.006	-0.01	0.027**	0.027**
	(-0.19)	(-0.30)	(2.16)	(2.20)
ROA_{t-1}	-0.198***	-0.181***	0.009	0.005
	(-3.81)	(-3.47)	(0.47)	(0.25)
$TobinQ_{t-1}$	-0.012**	-0.012**	0.010***	0.010***
	(-2.04)	(-2.00)	(3.54)	(3.49)
$PPEAssets_{t-1}$	-0.038	-0.032	-0.002	-0.004
	(-0.76)	(-0.65)	(-0.13)	(-0.18)
Industry×Year FE	YES	YES	YES	YES
Observations	4,500	4,500	4,500	4,500
Adj. R^2	0.068	0.069	0.115	0.115

Table 7: Pay Growth and Stock Performance: CEOs, Non-CEO Executives, and Subgroups of Employees along the Corporate ladder

This table reports the results of panel regressions of the pay growth for a firm's various employee groups along the corporate ladder on the firm's stock performance measures in the previous year. The dependent variable, *Pay Growth*, is the pay growth of a specific subgroup of executives or non-executive employees. In Panel A, executives are divided into CEOs and non-CEO executives, where non-CEO executives are further divided into two groups either by their professional rank within the firm-year (reported by Capital IQ). In Panel B, non-executive employees in each firm-year are divided into five quintiles based on their pay rank in the previous year, where quintile 1 (quintile 5) indicates the lowest-paid (highest-paid) employees. *IdioRet*, *PredRet*, and *TotalRet* are the firm's idiosyncratic return, predicted return, and total return, respectively. *IdioRetHigh (IdioRetLow)* equals *IdioRet* when *IdioRet* >0 (<=0), and 0 otherwise. *PredRetHigh (PredRetLow)* equals *PredRet* if it is above (below) the median in the annual cross-section, and 0 otherwise. The regressions also control for a broad set of firm characteristics. Definitions of all variables are provided in the Appendix. *SalesEmp* is multiplied by 10^{-3}. All variables are winsorized at the 1st and 99th percentiles. All regressions include industry×year fixed effects. In all regressions, the number of firm-years is rounded to the nearest hundreds according to the disclosure requirements of the U.S. Census Bureau. T-statistics (in parentheses) are based on robust standard errors that are adjusted for heteroskedasticity and within-firm clustering. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A: Subsamples of CEOs and Non-CEO Executives

	Dependent Variable: Pay Growth$_t$		
		Non-CEO Executives	
	CEO	**High Rank**	**Low Rank**
	(1)	(2)	(3)
IdioRetHigh$_{t-1}$	0.035	0.074**	0.025
	(1.07)	(2.07)	(0.91)
IdioRetLow$_{t-1}$	-0.181***	-0.165***	-0.074*
	(-2.76)	(-2.77)	(-1.65)
PredRetHigh$_{t-1}$	0.299	-8.879***	-5.215***
	(0.15)	(-4.78)	(-3.05)
PredRetLow$_{t-1}$	0.303	3.887	-4.216
	(0.08)	(0.70)	(0.75)
LnME$_{t-1}$	0.049***	0.039***	0.035***
	(6.93)	(5.20)	(6.31)
BookLev$_{t-1}$	0.01	0.084	-0.009
	(0.13)	(1.17)	(0.15)
LnFirmAge$_{t-1}$	-0.026	-0.042**	-0.031**
	(-1.52)	(-2.37)	(-2.36)
SalesEmp$_{t-1}$(×10^{-3})	-0.009	0.029	-0.017
	(-0.18)	(0.63)	(-0.50)
ROA$_{t-1}$	-0.171**	-0.081	-0.192***
	(-2.12)	(-0.96)	(-2.94)
TobinQ$_{t-1}$	-0.019**	-0.012	-0.015**
	(-2.01)	(-1.29)	(-2.13)
PPEAssets$_{t-1}$	0.082	-0.042	-0.168***
	(1.06)	(-0.54)	(-3.13)

	Dependent Variable: Pay Growth$_t$		
		Non-CEO Executives	
	CEO	High Rank	Low Rank
	(1)	(2)	(3)
Industry×Year FE	YES	YES	YES
Observations	3,700	3,600	4,400
Adj. R^2	0.062	0.057	0.041

Panel B: Subsamples of Non-Executive Employees

	Dependent Variable: Pay Growth$_t$				
	Lowest Pay	**2**	**3**	**4**	**Highest Pay**
	(1)	(2)	(3)	(4)	(5)
IdioRetHigh$_{t-1}$	0.042***	0.006	0.01	0.012	0.034***
	(3.02)	(0.53)	(0.97)	(1.17)	(2.81)
IdioRetLow$_{t-1}$	0.012	0.043**	0.040**	0.042**	0.051**
	(0.49)	(2.22)	(2.18)	(2.36)	(2.51)
PredRetHigh$_{t-1}$	-0.700	-0.947	-1.431**	-2.250***	-3.046***
	(-0.83)	(-1.62)	(-2.15)	(-3.41)	(-3.50)
PredRetLow$_{t-1}$	3.053**	2.992**	4.818*	4.688	-0.12
	(2.33)	(2.08)	(1.95)	(1.47)	(-0.04)
LnME$_{t-1}$	0.001	0.006**	0.006***	0.008***	0.010***
	(0.28)	(2.35)	(2.76)	(4.02)	(4.28)
BookLev$_{t-1}$	-0.004	0.008	0.022	-0.00033	0.03
	(-0.11)	(0.32)	(0.99)	(-0.02)	(1.15)
LnFirmAge$_{t-1}$	-0.075***	-0.023***	-0.012**	-0.012**	-0.017***
	(-8.14)	(-4.00)	(-2.19)	(-2.37)	(-2.69)
SalesEmp$_{t-1}$$(\times 10^{-3})$	-0.020	0.023	0.022*	0.048***	0.048**
	(-0.84)	(1.34)	(1.67)	(3.43)	(2.45)
ROA$_{t-1}$	0.031	-0.018	0.006	-0.002	0.008
	(0.75)	(-0.63)	(0.23)	(-0.10)	(0.29)
TobinQ$_{t-1}$	0.030***	0.017***	0.015***	0.016***	0.006
	(5.63)	(4.25)	(3.98)	(4.19)	(1.62)
PPEAssets$_{t-1}$	0.02	-0.017	-0.043*	0.004	-0.005
	(0.44)	(-0.56)	(-1.81)	(0.17)	(-0.20)
Industry×Year FE	YES	YES	YES	YES	YES
Observations	4,500	4,500	4,500	4,500	4,500
Adj. R^2	0.182	0.109	0.09	0.107	0.092

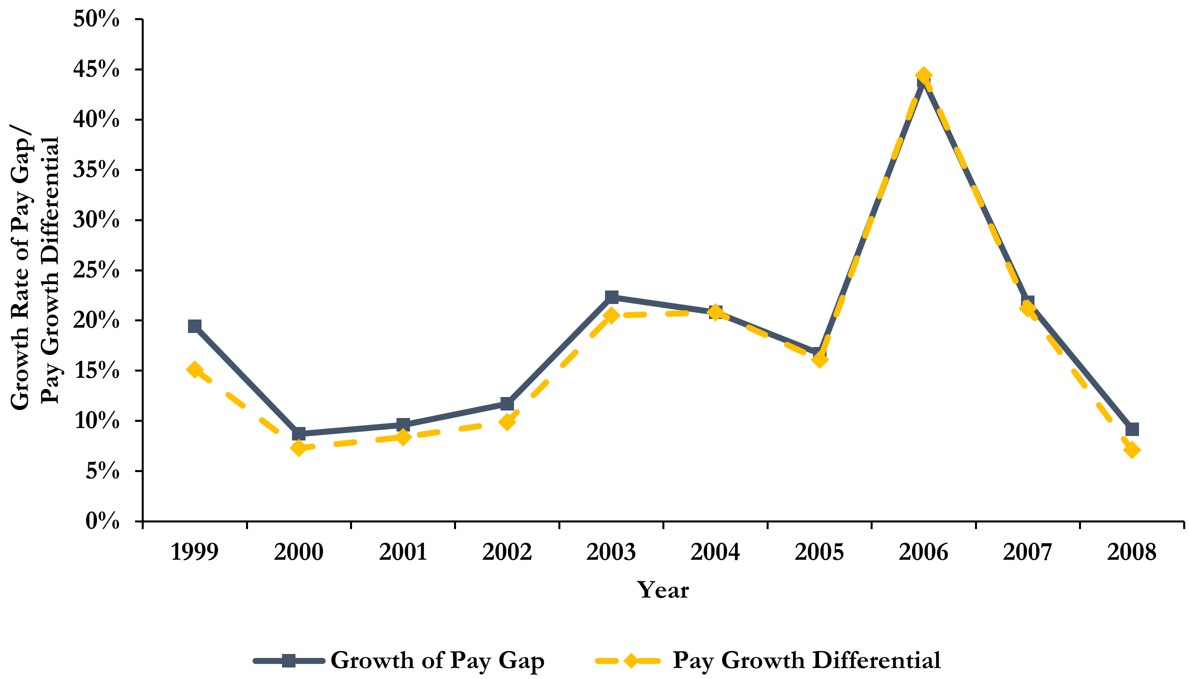
Table 8: Regression of Pay Growth on Employee Demographic Characteristics and Past Performance

This table reports the results of panel regressions of a firm's non-executive employee pay growth on the firm's stock performance measures interacted with these employees' demographic characteristics. The dependent variable, *Pay Growth*, is the pay growth of a specific group of non-executive employees. Non-executive employees in each firm-year are divided into two groups based on gender (column 1), age (column 2), and race (columns 3), respectively. For each firm-year, there are two observations corresponding to each employee group. *Dummy* is an indicator variable that equals one for the observation of male employees (columns 1), older employees with age above sample median (columns 2), and white employees (columns 3), and zero for the complementary employee group. The average demographic characteristics for each group of employees, except the one used to divide the sample, are controlled for in each regression. *IdioRetHigh (IdioRetLow)* equals *IdioRet* when *IdioRet* >0 (<=0), and 0 otherwise. *PredRetHigh (PredRetLow)* equals *PredRet* if it is above (below) the median in the annual cross-section, and 0 otherwise. Definitions of all variables are provided in the Appendix. *AveAge_Emp* is multiplied by 10^{-3}. All variables are winsorized at the 1st and 99th percentiles. All regressions include firm×year fixed effects. In all regressions, the number of firm-years is rounded to the nearest hundreds according to the disclosure requirements of the U.S. Census Bureau. T-statistics (in parentheses) are based on robust standard errors that are adjusted for heteroskedasticity and within-firm clustering. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

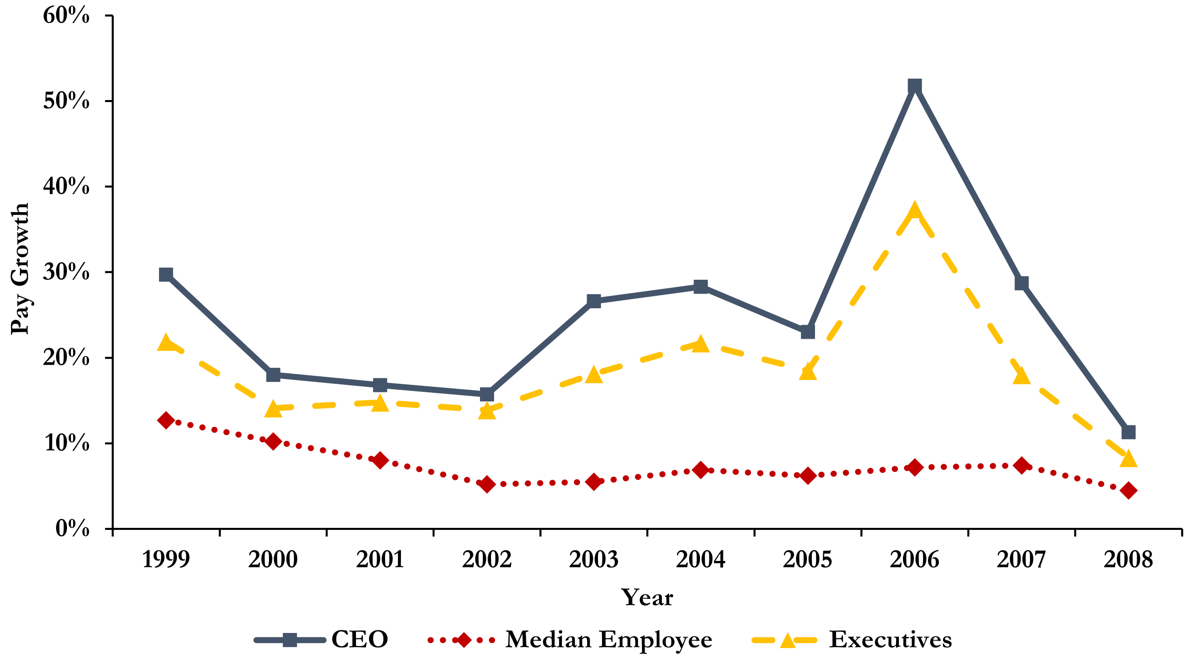
	Dependent Variable: Pay Growth$_t$		
	Dummy (Male)	**Dummy (Old)**	**Dummy (White)**
	(1)	(2)	(3)
Dummy	0.059***	-0.012***	0.015***
	(8.56)	(-2.64)	(3.56)
IdioRetHigh$_{t-1}$ × *Dummy*	0.003	0.005	0.009
	(0.49)	(0.99)	(1.63)
IdioRetLow$_{t-1}$ × *Dummy*	0.013	0.007	0.01
	(1.64)	(0.92)	(1.18)
PredRetHigh$_{t-1}$ × *Dummy*	-0.015	0.029*	0.036*
	(-0.84)	(1.67)	(1.93)
PredRetLow$_{t-1}$ × *Dummy*	0.106***	0.04	0.03
	(3.34)	(1.33)	(0.78)
AveAge_Emp$_{t-1}$(×10^{-3})	-0.480		-0.032
	(-0.53)		(-0.04)
AveEdu_Emp$_{t-1}$	0.012***	0.004	0.016***
	(2.97)	(1.29)	(3.51)
PerDiverse_Emp$_{t-1}$	-0.620***	-0.690***	-0.706***
	(-6.80)	(-7.23)	(-7.85)
AveMale_Emp$_{t-1}$		0.027	0.090***
		(1.02)	(3.70)
AveWhite_Emp$_{t-1}$	0.034	0.017	
	(1.32)	(0.89)	
AvePayRank_Emp$_{t-1}$	-0.118***	-0.113***	-0.214***
	(-4.22)	(-3.20)	(-6.49)
Firm×Year FE	Yes	Yes	Yes
Observations	9,000	9,000	8,900
Adj. R^2	0.804	0.811	0.783

Figure 1: Time Trends of Pay Growth for Executives and Non-Executive Employees
This figure plots the time trends of average annual pay growth for executives and non-executive employees of our sample, which includes the U.S. listed firms that are covered by both the Capital IQ database and the Longitudinal Employer-Household Dynamics (LEHD) program from 1999 to 2008. Figure A plots the average annual growth rate of the CEO-to-median-employee pay gap and the average (within-firm) difference between CEO pay growth and median-employee pay growth. Panel B plots the average annual pay growth rates for CEOs, executives, and median employees, separately. Panel C plots the average CEO-to-median-employee pay gap over time.

Panel A: Growth in Pay Gap and Pay Growth Gap between CEOs and Median Employees



Panel B: Pay Growth for Executives and Non-Executive Employees Separately



Panel C: Average CEO-to-Median-Employee Pay Gap

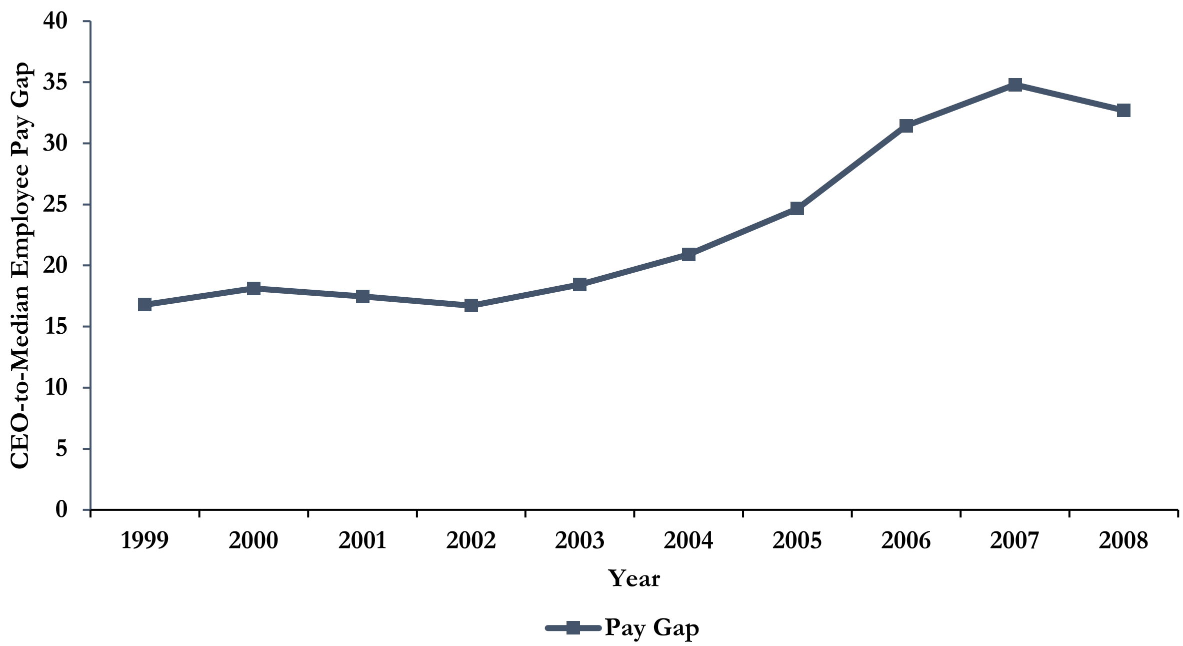
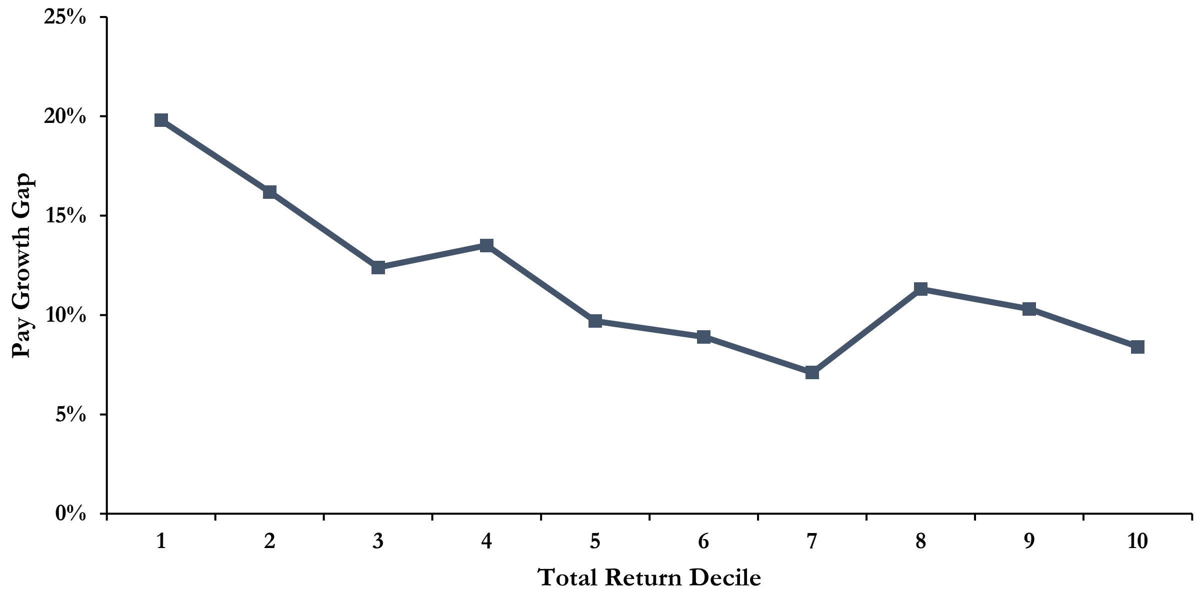
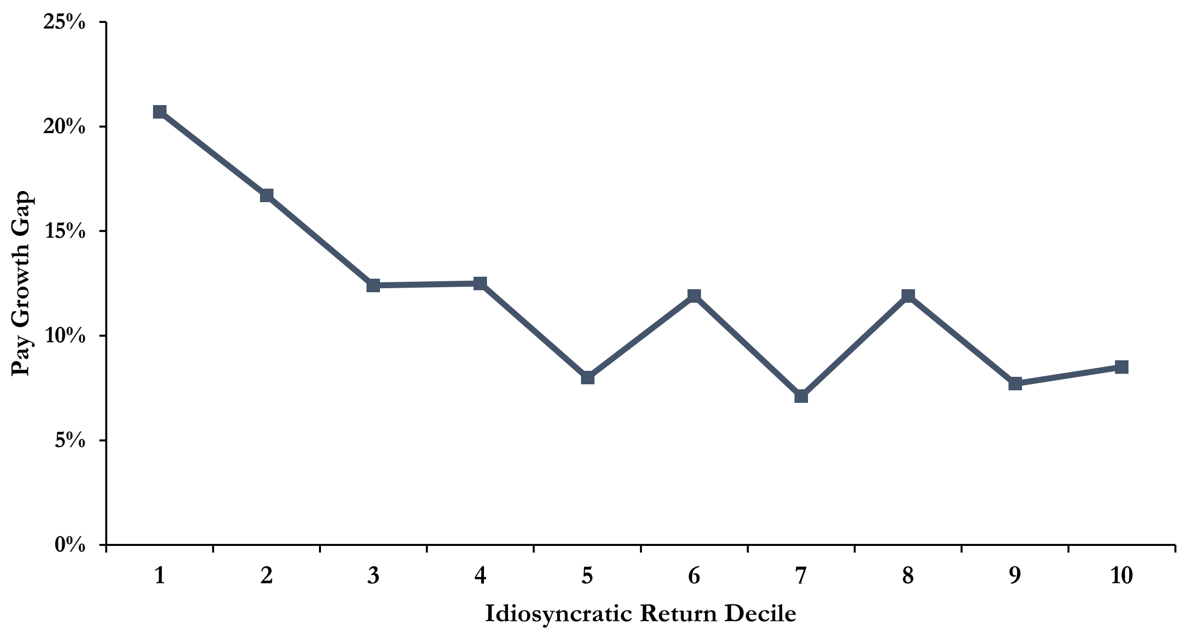


Figure 2: Pay Growth Gap between Executives and Employees across Past Stock Returns
This figure plots the average (within-firm) difference between executive pay growth and employee pay growth across firm performance deciles. The sample consists of U.S. listed firms that are covered by both the Capital IQ database and the Longitudinal Employer-Household Dynamics (LEHD) program from 1999 to 2008. In each year, firms are divided into deciles based on their total returns (Panel A), idiosyncratic returns (Panel B), or predicted returns (Panel C) in the previous year, with Decile 1 indicating the worst performance and Decile 10 indicating the best performance. Definitions of the variables are provided in the Appendix.

Panel A: Pay Growth Gap across Deciles of Total Returns



Panel B: Pay Growth Gap across Deciles of Idiosyncratic Returns



Panel C: Pay Growth Gap across Deciles of Predicted Returns

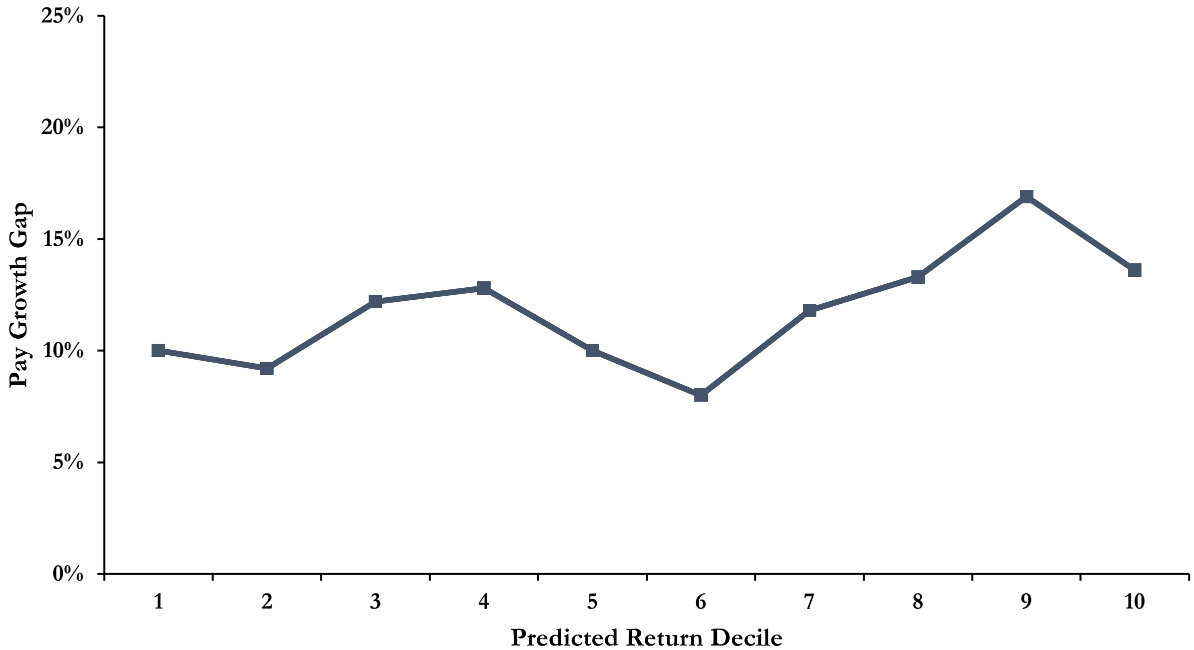
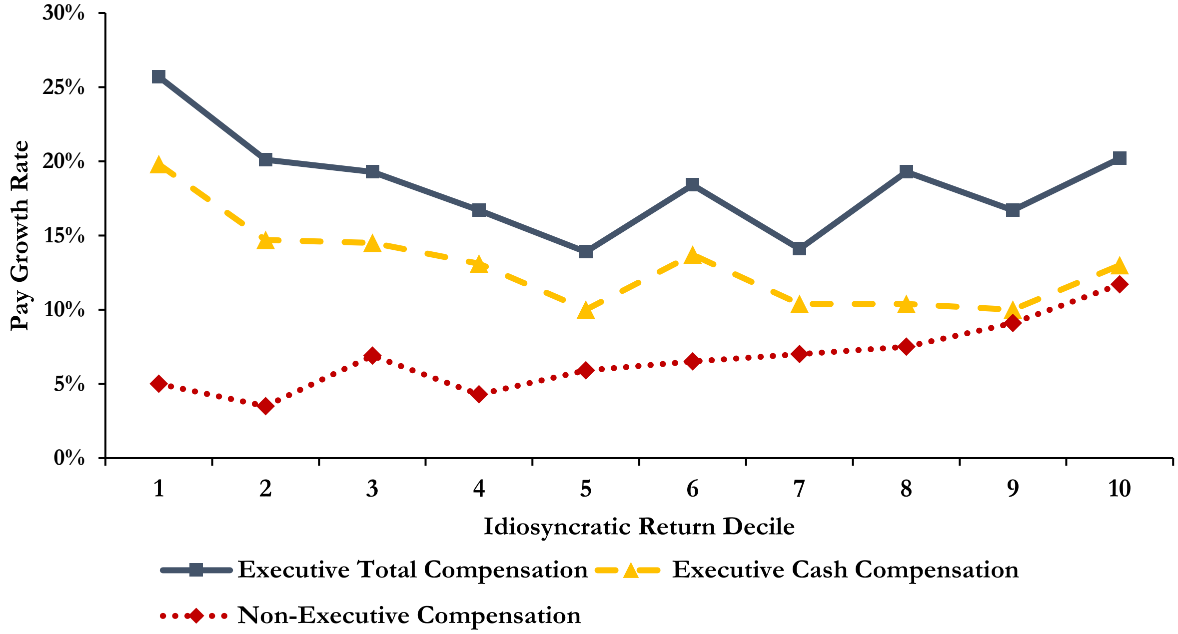
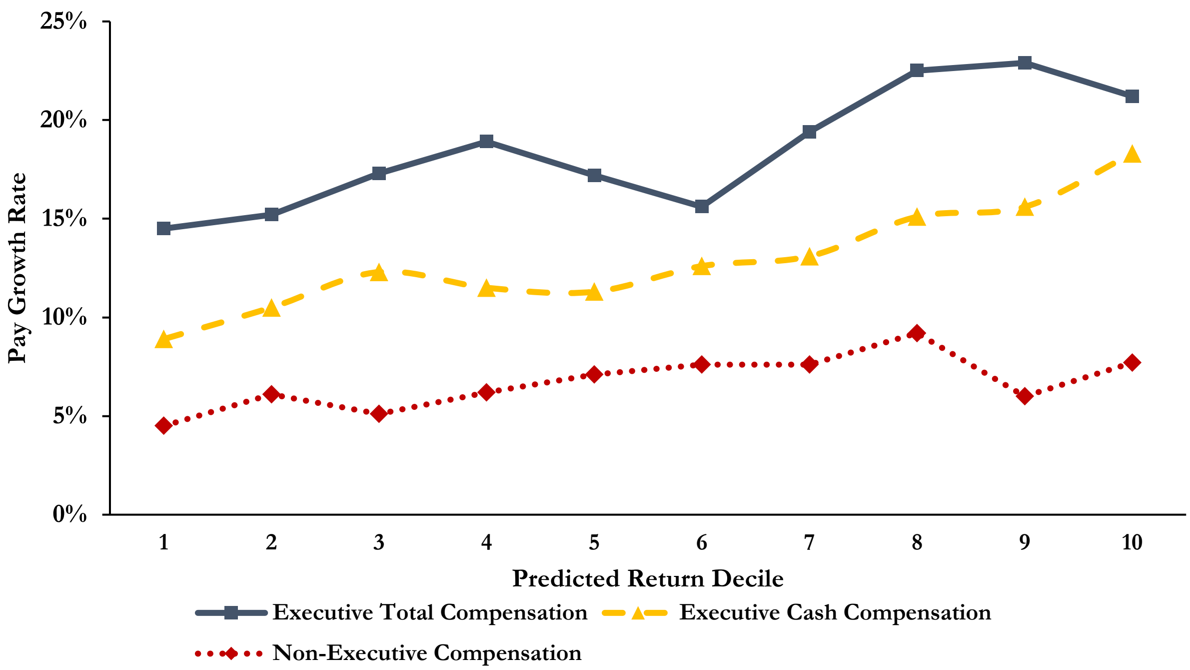


Figure 3: Pay Growth for Executives and Employees Separately across Past Stock Returns
This figure plots the average pay growth rates for executives and non-executive employees across past firm performance deciles. The sample consists of U.S. listed firms that are covered by both the Capital IQ database and the Longitudinal Employer-Household Dynamics (LEHD) program from 1999 to 2008. In each year, firms are divided into 10 deciles based on their idiosyncratic return (Panel A), predicted return (Panel B), or total return (Panel C) in the previous year, with Decile 1 being the worst performing firms and Decile 10 the best performing firms.

Panel A: Pay Growth across Deciles of Idiosyncratic Returns



Panel B: Pay Growth across Deciles of Predicted Returns



Panel C: Pay Growth across Deciles of Total Returns