Workplace Inequality in the U.S. and Managerial Rent Extraction: Evidence from Pay Growth Gaps*

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Abstract

Using granular, individual-level compensation data, we study the escalating US workplace inequality by examining the within-firm difference in pay *growth* between executives and non-executive employees (i.e., "pay growth gap"). We document a large pay growth gap that increases in not only a firm's idiosyncratic stock return, but also its systematic stock return. Importantly, there is a strong asymmetry in pay growth gaps: Executives, relative to employees, are rewarded for good idiosyncratic stock performance but not penalized as much for bad performance. This asymmetry becomes more pronounced when corporate governance is weaker, and further analyses support managerial rent extraction as a likely explanation rather than others. Unlike existing literature that mostly rationalizes the dramatic workplace pay inequality in an optimal contracting framework, our findings indicate that managerial rent extraction also plays an important role in the tremendous surge in such inequality.

Key words: within-firm pay inequality, pay growth gap, managerial rent extraction, corporate disclosure, corporate hierarchy, Longitudinal Employer-Household Dynamics database

JEL number: G30, G34, J31

1. INTRODUCTION

The United States has witnessed escalating income inequality over the last several decades, a notable trend that is absent in many other developed countries.[1] Song et al. (2019) find that one-third of the US income inequality escalation can be attributed to the rising *within-firm* pay inequality. So far the majority of academic studies rationalize this rising workplace inequality in an optimal contracting framework, resorting to reasons such as the differential talent between top executives and rank-and-file employees.[2] In the meantime, however, the dramatic increase in income inequality has caused tremendous concerns for social "unfairness" across the nation. Partially out of the concern that workplace pay inequality reflects such social "unfairness", the Securities and Exchange Commission (SEC), in August 2015, required US publicly listed companies to be more transparent about their pay practices and disclose their CEO-to-median-employee pay ratios on an annual basis.[3]

In this paper, we study workplace pay inequality in the U.S. and extend the literature in two important ways. First, previous research on within-firm pay inequality mainly relies on voluntarily reported wages from Compustat, international data, or executive pay records only due to the lack of granular US data on employee pay. To overcome this data hurdle, we exploit a comprehensive individual-level dataset of employee pay-records from the U.S. Census Bureau to accurately measure within-firm pay inequality for US companies.

Second, previous studies focus on the within-firm difference in pay *levels* (i.e., "pay level gap"), whereas we focus on the differential *percentage growth* in pay between executives and

[1] Nolan, Richiardi, and Valenzuela (2019) examine 31 developed countries from 1980 to 2013, and find that the increase of income inequality in the U.S. is over three times as large as the average of other developed countries.
[2] We discuss the existing literature in detail in Section 2.
[3] This regulation was controversial and only came into effect in 2018. There were pushbacks from both the practitioners and the legal entities. See, for example, the Financial CHOICE Act in June 2017, passed by the House of Representatives with an aim to repeal the disclosure rule.

employees (i.e., "pay growth gap") to explicitly examine the factors that have caused the dramatic increase in US pay inequality. To the extent that pay growth gaps are less affected by the executive-employee talent differential than pay level gaps (see more discussions in Section 2), this approach allows us to deviate from the mainstream literature and zoom in on other factors, especially managerial rent extraction, as potential drivers of the rising pay inequality in the U.S. Furthermore, pay growth inequality by itself is an important dimension of pay inequality, as people care about not only fairness in pay level but also fairness in pay growth. For example, a *Wall Street Journal* article questions the executive pay practice in S&P 500 companies by noting a median pay growth rate of 6.6% for their CEOs in 2018 while the median stock return of these companies was merely -5.8%.[4]

We begin our empirical analyses by merging the Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) database on employee pay with the S&P Capital IQ database on executive pay during 1990-2008. For a given firm-year, we calculate the percentage growth of average pay for its executives and rank-and-file employees separately. We find that the average executive pay growth is 16.8%, more than three times higher than the average employee pay growth of 5.2%, leading to a large pay growth gap of 11.6%.[5] This result shows that, consistent with the well-documented increase in pay level gaps over time, US executives enjoy much larger pay growth than rank-and-file employees.

It is worth noting that large pay growth gaps per se do not necessarily indicate "unfairness"

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[4] See the news article at: https://www.wsj.com/articles/big-companies-pay-ceos-for-good-performanceand-bad-11558085402?mod=hp_lead_pos6. It is worth noting that we do not advocate focusing only on pay growth rather than pay level, or argue that pay growth dominates pay level for all purposes. Both pay growth and pay level are important dimensions of pay inequality, but pay growth may be more suitable than pay level for examining the influence of non-talent-based factors such as managerial rent extraction on within-firm pay inequality.

[5] Further, average executive pay growth exceeds average employee pay growth in every single year of our sample period, with around one-third of the firms having pay growth gaps above 20% and around 10 percent having pay growth gaps above 50%.

in within-firm allocation of labor income along the corporate ladder. Executives, relative to rank-and-file employees, can be rewarded with higher pay growth for a greater *increase* in their marginal contributions to shareholder wealth (i.e., equity value) over time.[6] If this is the case, then pay growth gaps ought to be larger when shareholder wealth experiences a faster growth. Therefore, we further investigate the association between pay growth gaps and stock performance. We follow the literature (e.g., Bertrand and Mullainathan, 2001; Jenter and Kanaan, 2015; Daniel, Li, and Naveen, 2020) to decompose a firm's total stock return into a systematic component (i.e., return common to its peer group, or "luck return") and an idiosyncratic component (i.e., return unique to the firm, or "skill return"), and adopt a fixed-effect regression approach.[7]

For each firm-year in our sample, we create two observations of pay growth, one for executives and the other for non-executive employees. We then regress pay growth on an executive indicator, firms' performance measures, and the interaction between the two. Our regressions include firm×year fixed effects, which is a powerful approach that controls for all time-invariant and time-varying firm characteristics (such as size, industry, corporate culture, and governance structures) that affect pay growth. The regression results show that, interestingly, pay growth gaps strongly increase in both idiosyncratic returns and systematic returns.

While the positive relation between pay growth gaps and systematic performance (which is largely independent of firm-specific labor input) seems at odds with classical optimal contracting theories, this finding is consistent with the model of Gabaix and Landier (2008), in which the pay of CEOs, due to their scalable talent, is an increasing function of firm size whereas the pay of

[6] In fact, investors care more about the alignment between pay and performance than the level of CEO pay (Murphy and Jensen, 2018). For example, Ertimur, Ferri, and Oesch (2013) show that proxy advisors are more likely to recommend voting against management-sponsored CEO pay proposals for firms with poor performance but higher CEO pay.

[7] It is worth noting that even "skill return" might include "idiosyncratic luck" that is orthogonal to systematic (industry/market) return. Despite this caveat, the literature has generally argued that idiosyncratic returns, relative to systematic returns, better reflect the labor contributions of a firm.

lower-ranked employees does not change with firm size. Hence, according to the model, a higher stock return (systematic or idiosyncratic), which corresponds to a higher increase in firm size (market capitalization), should be associated with a higher pay growth gap in equilibrium.

However, interestingly, we also find that the positive relation between pay growth gaps and stock performance appears to be asymmetric: While pay growth gaps increase in stock returns among firms with good performance, there is little correlation between pay growth gaps and stock returns among firms with poor performance. This asymmetric relation indicates that executives, relative to rank-and-file employees, enjoy higher pay growth upon good performance, but do not suffer from lower pay growth (i.e., pay cuts) to the same degree upon bad performance.

We further find that the asymmetry in pay growth gaps exists only for idiosyncratic returns but not for systematic returns. When firm performance is good, a one standard-deviation increase in idiosyncratic returns is associated with an increase of 4.7% in pay growth gaps, whereas when firm performance is bad, a one standard-deviation decrease in idiosyncratic returns is associated with a decrease of only 1.6% in pay growth gaps. These results survive a broad set of robustness tests that use alternative return decompositions, examine accounting performance rather than stock performance, include only employees with similar demographic characteristics (such as gender, age, education, or ethnicity) as executives, or examine only the cash pay or base pay (i.e., the non-incentive part of the pay) of executives.[8]

As far as we know, our study is the first to reveal a convex relation between firms' compensation practices and idiosyncratic stock performance.[9] Previous studies on pay asymmetry

[8] We also examine the possibility that executives who leave upon bad performance receive a big severance package or pension payout and push up their pay growth in the terminal year (Yermack 2006; Stefanescu, Wang, Xie, and Yang, 2018). Our finding of the asymmetric relation is robust after we drop the last year of an executive in the firm.

[9] Note that the documented asymmetry is not simply caused by a convex relation between the *realized payoff* of executive option compensation and stock performance: Our study, as well as other existing studies on pay asymmetry, uses the ex-ante value of option compensation calculated on the *grant* date rather than on the *exercise* date.

focus on CEO/executive pay levels, and either document a reverse asymmetry in CEO/executive pay (i.e., a *concave* rather than a convex pay-performance relation) or debate about the existence of pay asymmetry in *systematic/luck* returns.[10]

Theoretically, our finding of an asymmetry in pay growth gaps cannot be easily explained by optimal contract design. For example, Gabaix and Landier (2008), as discussed above, would predict a positive relation between pay growth gaps and firm performance but not an asymmetric relation. Similarly, the implicit contract theories (e.g., Harris and Holmstrom, 1982; Holmstrom, 1983; Chaigneau and Sahuguet, 2018), in which risk-neutral firms offer downward-rigid compensation contracts to attract/retain risk-averse workers (regardless of their pay ranks within the corporate hierarchy), cannot explain our findings either. This is because the observed asymmetry in pay growth gaps only holds for idiosyncratic but not for systematic firm performance: it is unclear why workers are only risk averse with respect to idiosyncratic but not systematic stock returns. Further, for such theories to explain the asymmetry in pay growth *gaps*, they have to assume that executives, despite their better wealth management and diversification abilities, are more risk averse towards their jobs than rank-and-file employees, which seems unclear either theoretically or empirically.

On the other hand, the asymmetry in pay growth gaps might be more easily explained by managerial rent extraction (Frydman and Jenter, 2010). A large literature has shown that the *level* of CEO compensation could be affected by managerial entrenchment and rent extraction (e.g., Jensen, 1986; Holthausen, Larcker, and Sloan, 1995; Bebchuk, Cremers, and Peyer, 2011; Dikolli et al., 2018). By the same token, such undue managerial power might also help executives extract rent from rank-and-file employees via exploitative hiring/retention practices (e.g., not providing

[10] See, for example, Leone, Wu, and Zimmerman (2006), Dechow (2006), Garvey and Milbourn (2006), Shaw and Zhang (2010), Daniel, Li, and Naveen (2020).

enough downside protection for employee pay or job security in undesirable situations), giving rise to an asymmetry in pay growth gaps. If managers have unchecked power, then such asymmetry can exist for both idiosyncratic and systematic returns. Otherwise, the asymmetry in pay growth gaps may manifest mostly in idiosyncratic returns, which is a more covert practice than pay growth asymmetry in the more easily measurable systematic returns. Our finding is consistent with the latter scenario.[11]

We conduct several tests to investigate the rent-extraction explanation. First, since managerial rent extraction is a consequence of poor corporate governance, we exploit the staggered enactments of the Universal Demand (UD) laws across US states, which represent exogenously negative shocks to corporate governance (Bourveau, Lou, and Wang, 2018; Appel, 2019; Lin, Liu, and Manso, 2020; Huang et al., 2020). Consistent with the rent-extraction explanation, we find that the asymmetry in pay growth gaps is much stronger for firms whose corporate governance is weakened after the passage of UD laws.

Second, we find that the asymmetry in pay growth gaps is significantly stronger among firms with less analyst coverage (and thus less transparency and external monitoring, see, e.g., Yu, 2008; Bradley et al., 2017; Samuels, Taylor, and Verrecchia, 2021). The asymmetry is also significantly stronger among firms with lower union coverage or lower labor productivity, in which cases employees are less able to discipline the management due to their lack of bargaining power (e.g., Hilary, 2006; Aobdia and Cheng, 2018; Lin, Schmid, and Xuan, 2018).

We also evaluate explanations other than rent extraction. First, the labor market condition could be more favorable for executives (as a scarce source of talent) than for rank-and-file

[11] It is worth noting that any explanation for the observed asymmetry in pay growth gaps must go beyond specific forms of compensation (such as stocks, options, bonus, or other incentive pay) because the *design* of labor compensation contracts itself as well as their *execution* may be influenced by managers and reflect managerial rent extraction (e.g., Bebchuk, Fried, and Walker, 2002, Dikolli et al., 2020).

employees, which prevents firms from cutting executive pay upon bad performance. Inconsistent with this explanation, we find little relation between the asymmetry in pay growth gaps and executives' outside employment options. Second, executive pay, relative to employee pay, may have a higher upper bound but a binding lower bound, resulting in greater room for executive pay raises than for pay cuts. This explanation, however, cannot explain why pay growth gaps respond symmetrically to systematic stock returns, in which case the same logic would also apply. Third, the asymmetry can be caused by firms encouraging their managers to take extra risk. However, inconsistent with this explanation, we find the asymmetry in pay growth gaps is not more pronounced among industries that require more risk-taking (e.g., innovative, high-tech, or high-growth industries).

To complement the analysis of pay growth gaps, we further examine turnover rate gaps between executives and employees, especially given that the punishments to executives upon bad performance may take the form of job termination rather than pay cuts (Defond and Hung, 2004; Gao, Harford, and Li, 2012). We find that executives' turnover rates relative to employees' are *lower* upon worse stock performance among poorly performing firms. This finding, which suggests that turnover risk is unlikely to drive the asymmetry in pay growth gaps, is more consistent with CEOs' power to unduly influence their own turnover decisions (e.g., Dikolli, Mayew, and Nanda, 2014).[12] Overall, our results are more consistent with rent extraction than other explanations.

Finally, motivated by the nascent literature on gender and racial inequality in employee pay (e.g., Altonji and Blank, 1999; Tate and Yang, 2015; Bayer and Charles, 2018), we examine pay growth across rank-and-file employees' demographic groups. We find that female and

[12] We also find that executives have significantly lower turnover rates than rank-and-file employees, which again suggests that the large pay growth gaps are unlikely to be compensation for greater executive turnover risk.

minority employees have significantly lower pay growth than their male and white counterparts.[13] These results complement the existing studies by identifying the growing *within-firm* gender and racial disparities as contributing factors to the widely-concerned gender and racial inequality.

Our paper extends the literature along several dimensions. To the best of our knowledge, we are the first to use granular, individual-level employee pay records of a comprehensive set of US public firms to examine within-firm pay inequality in the U.S. Our results offer a first look at the gap in pay *growth* along the corporate ladder, which represents an important notion of social fairness in within-firm pay practices in addition to the pay level gap. We document a previously unexplored asymmetry in pay growth gaps and conduct additional analyses on this novel pattern to show that managerial rent extraction affects the profit sharing between shareholders (i.e., capital contributors) and workers (i.e., labor contributors) of differential ranks, which contributes to the rising within-firm pay inequality. Unlike most existing literature that rationalizes the dramatic workplace pay inequality in an optimal contracting framework, our results echo the finding of Rouen (2020) that such inequality can be attributable to both a rational compensation design and managerial rent extraction.

Our study also has important policy implications for corporate disclosure, especially considering the recent debate on whether public firms should be required to disclose their CEO-to-median-employee pay ratios on an annual basis. While the proponents argue that this policy will help keep the power of top executives under check and potentially reduce workplace inequality, the critics point out that such disclosure rules impose excessive accounting costs and miss the key point in offering optimal incentives, namely, pay-performance sensitivity. Our evidence on the asymmetry in pay growth gaps and the rent extraction explanation suggests that the SEC's

[13] For example, female employees on average receive 4.1% lower annual pay growth than their male peers. Further, female employees exhibit less sensitivity of pay growth to firm performance than male employees.

disclosure requirement is at least partially justified as a device to induce greater scrutiny of companies' pay practices.

2. RELATION TO THE EXISTING LITERATURE

Economists have long noticed a sharp rise in wage inequality in the United States. Nolan, Richiardi, and Valenzuela (2019) examine the increase in income inequality in 31 developed countries from 1980 to 2013, and find that the increase in U.S. is over three times larger than the average of developed countries (see their Table 1). Because of the lack of individual-level employee compensation data, to this date the empirical evidence on within-firm pay inequality in the U.S. has been scarce. The existing literature mainly relies on foreign data (e.g., employee-group level U.K. data in Mueller, Ouimet, and Simintzi, 2017), selective wage records from Compustat (Faleye, Reis, and Venkateswaran, 2013), executive compensation data only (Frydman and Papanikolaou, 2018), or self-reported employee pay information from Glassdoor.com (Green and Zhou, 2019).[14]

The rising within-firm inequality has two major potential explanations. 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 (see, e.g., the reviews by Murphy, 1999; Bebchuk and Weisbach, 2010). A large literature provides evidence that agency conflicts can lead to the manipulation of managerial pay (e.g., Holthausen, Larcker, and Sloan, 1995; Bertrand and Mullainathan, 2001; Yermack, 2006, Abernethy, Kuang, and Qin, 2015). While managerial rent extraction may also increase the pay inequality between executives and rank-and-file employees, to this date there has been little academic research on the relation between managerial rent

[14] Two recent studies by Boone, Starkweather, and White (2020) and Pan, Pikulina, Siegel, and Wang (2020) use the short-panel US data of 2018 and 2019 to study the disclosure requirement of CEO-to-median-employee pay ratios.

extraction and within-firm pay inequality.

In contrast, recent literature suggests that managerial talent explains the escalating workplace pay inequality (e.g., Gabaix and Landier, 2008; Terviö, 2008; Edmans, Gabaix, and Landier, 2009). Consistent with this explanation, several empirical studies find that within-firm pay level gap positively predicts a firm's value and future performance (e.g., Faleye, Reis, and Venkateswaran, 2013; Mueller, Ouimet, and Simintzi, 2017; Cheng, Ranasinghe, and Zhao, 2017; Frydman and Papanikolaou, 2018). While existing empirical evidence mostly supports the managerial talent explanation, Rouen (2020) uses the establishment-level employment data from the U.S. Bureau of Labor Statistics and finds that the expected component of within-firm pay inequality positively predicts future performance, but the unexpected component negatively predicts future performance. This divergence suggests that the rising within-firm pay inequality could be attributable to rent extraction in addition to rational compensation design.

We differ from the previous studies in that we use the granular individual-level employee pay records from the LEHD data, which have an administrative nature and thus are not subject to the self-reporting biases, to study within-firm executive-employee pay inequality of US firms. Combining the Unemployment Insurance (UI) earnings records 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. This unique dataset enables us to provide comprehensive US evidence on within-firm pay inequality.

Our second major difference from the existing literature is that we focus on pay growth gaps rather than pay level gaps. While people consider pay growth in addition to pay level when they evaluate the "fairness" in workplace pay practices, pay growth gaps as an important aspect of pay inequality have not been studied by the existing literature. More importantly, compared to pay level gaps, pay growth gaps are less likely to be driven by the differential talent of executives and employees (a predominant explanation for within-firm pay inequality) and therefore more suitable for investigating other possible explanations. While greater talent unambiguously leads to a higher pay level in any labor market equilibrium, a positive association between talent and pay growth is less clear and requires additional assumptions. For example, Gabaix and Landier (2008) show that the very small dispersion in CEO talent across firms translates into a huge dispersion in cross-sectional pay levels because in equilibrium, more-talented CEOs are matched to larger firms and CEO pay is an increasing function of firm size. However, according to their model, this magnifying mechanism has minimal impact on the cross-firm comparison of CEO pay growth and analogously the comparison of pay growth between executives and employees.[15] Hence, focusing on pay growth gaps instead of pay level gaps allows us to mitigate the influence of managerial talent when exploring other economic forces underlying the salient phenomenon of workplace pay inequality.[16] Using this new metric, we provide evidence that managerial rent extraction plays an important role in shaping the rising within-firm inequality in the U.S.

Our study also adds to the broad literature on the compensation of rank-and-file employees along two dimensions. First, we extend the literature of workplace discrimination (e.g., Altonji and Blank, 1999; Lang and Lehmann, 2012; Tate and Yang, 2015) by examining the within-firm

[15] Gabaix and Landier's (2008) calibration shows that if CEOs are ranked by talent, then replacing CEO number 250 by CEO number one will only increase firm size (market value) by 0.016%. Because of the magnifying talent-size match, CEO number one's pay level is over 500% more than that of CEO number 250. According to their model, however, the equilibrium difference in pay growth between the two CEOs will be roughly equal to the difference in these CEOs' firm size growth. Hence, the pay growth difference between CEO number 250 and CEO number one should be close to 0.016%. Therefore, pay growth, relative to pay level, is much less sensitive to managerial talent.

[16] In unreported results, we find that while pay level gaps have a significantly positive relation with firm size in our sample of US firms, as predicted by the model of Gabaix and Landier (2008) and confirmed by UK data from Mueller, Ouimet, and Simintzi (2017), the relation between pay growth gaps and firm size is much smaller and statistically insignificant in most model specifications. These results support our argument that pay growth gaps, relative to pay level gaps, are much less sensitive to the executive-employee talent differential.

pay growth for employees with differential demographic attributes such as gender and race. Our results provide new evidence that female and minority employees, in addition to receiving lower levels of compensation, also have significantly lower pay growth than their male and white counterparts. Second, relatively less is known about the incentive provision for employees other than top executives. Our results shed light on this important question by linking the pay growth of rank-and-file employees to firm performance.

3. DATA, SAMPLE SELECTION, AND SUMMARY STATISTICS

3.1 Data and Sample Selection

Data used in this paper are from multiple sources. 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 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.[17] Our LEHD sample includes 26 states that agree to share their data with external (i.e., non-Census) researchers over the period of 1990-2008.[18]

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 US establishments in all states, based on Employer

[17] See Abowd et al. (2009) for a comprehensive overview of the LEHD data.
[18] 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.

Identification Number (EIN), state, and county, using the Business Register Bridge (BRB) file created by the Census. We then use and improve upon another bridge file provided by the Census (i.e., the Compustat-SSEL Bridge) to link LBD to Compustat.[19]

To ensure that the 26 states in our LEHD data have a good coverage of a sample firm's employees, we further require that for each firm-year in our sample, the LEHD data cover at least 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. Such workers are more likely to be full-time employees than part-time or seasonal ones. To make sure we accurately calculate a given employee's percentage change in annual pay between two consecutive years, we annualize the pay for all employees who work for fewer than four quarters in a year.[20]

We obtain individual executives' annual compensation data for US publicly traded firms from the S&P Capital IQ database. Capital IQ collects detailed information on the compensation, titles, and professional ranks 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).[21] Given that the first two years of Capital IQ data have very limited coverage of US public firms, we use the Capital IQ data since 1998. Since our main variable, pay growth, uses two consecutive years of pay information, our sample period starts in 1999.

[19] Further details of the matching process are described in He, Shu, and Yang (2020).
[20] Our results are almost the same if we do not perform the annualization. Our results are also robust to including only full-quarter employees at quarter t that work for the firm in both quarters t-1 and t+1.
[21] Details about the Capital IQ database can be found at https://www.spglobal.com/marketintelligence/en/solutions/sp-capital-iq-platform.

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.[22]

3.2 Variable Definitions and Summary Statistics

For each firm-year, we calculate the percentage change in the average executive pay (*PayGrowthExec*) and that in the average rank-and-file employee pay (*PayGrowthEmp*) from the previous year. To address the concern that the change in average compensation could be affected by turnovers of executives or employees, we fix the pool of each group by requiring each executive and employee to stay with the firm in both years for this calculation.[23] Individual executives' compensation is measured by Capital IQ's Total Calculated Compensation (CTYPE18) in 2008 dollars (i.e., adjusted for inflation). This executive pay measure has been used by a number of recent 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 executive pay.[24]

Before calculating the average pay for rank-and-file employees in our LEHD sample, we

[22] 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.
[23] A caveat for our pay growth measure is that it does not account for the pay growth of individuals who leave the focal firm. Ideally, we could infer the pay growth of leaving individuals by examining their next jobs' salaries. However, doing so faces at least two difficulties. First, it is impossible to track the wages of rank-and-file employees whose next jobs are not within the 26 LEHD states in our sample or the wages of executives who move to private companies (that are not covered by Capital IQ). Second, any assumptions used to assign a value of pay growth (e.g., 0 or -100%) to fired individuals who stop working afterwards seem ad hoc. Confronted by similar difficulties, the existing literature typically examine CEO compensation and their turnover separately. Therefore, we complement our main analyses on pay growth with the analysis of turnover in Section 4.5.
[24] ExecuComp modifies the definitions of some compensation variables after 2006 (Faulkender and Yang, 2010). We conduct a robustness test using only the sample period prior to 2006, and our results continue to hold.

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.[25] We then aggregate individual employees' quarterly earnings to the annual level and calculate the growth in the average employee pay.

Following the recent literature on CEO compensation (e.g., Daniel, Li, and Naveen, 2020), we decompose a firm's monthly stock returns into the systematic component ("luck") and the idiosyncratic component ("skill") using the following model:

$$FirmRet_{i,m} = \alpha_i + \beta_i IndustryRet_{j,m} + \delta_i MarketRet_m + \epsilon_{i,m}, \qquad (1)$$

where $FirmRet_{i,m}$ is firm i's stock return in month m, $IndustryRet_{j,m}$ is the equally-weighted average return of firms in the same industry (based on the Fama-French 48 industry classifications) in month m, and $MarketRet_m$ is the equally-weighted average return of all CRSP firms in month m. Firm i's idiosyncratic return in month m equals the estimated intercept plus the residual from Eq. (1), i.e., $\alpha_i + \epsilon_{i,m}$. We estimate Eq. (1) for each of our sample firms using their monthly returns between 1999 and 2008.[26] Firm i's idiosyncratic return in fiscal year t, *IdioRet*, is defined as its annualized average monthly idiosyncratic return over the year, and its systematic return in year t, *SysRet*, equals its annual total stock return (*TotalRet*) minus *IdioRet*. In some tests, we split *IdioRet* and *SysRet* into two components based on their magnitudes: *IdioRetHigh* equals *IdioRet* if it is above the sample median in the annual cross-section and zero otherwise; *IdioRetLow* equals

[25] All our results are robust to adding these top-paid employees back.

[26] When estimating Eq. (1), we follow Daniel, Li, and Naveen (2020) to use equally-weighted market and industry returns (including the return for the firm itself) and run the regression for each firm using its monthly returns over the entire sample period. In untabulated robustness tests, we also estimate Eq. (1) by (1) using value-weighted industry and market returns, (2) excluding the firm itself from industry return calculation, or (3) using a three-year rolling window to obtain the intercept and residual for each firm-year. Our results are robust to these alternative estimation procedures.

IdioRet if it is below the sample median in the annual cross-section and zero otherwise. *SysRetHigh* and *SysRetLow* are similarly defined.

Table 1 Panel A reports the summary statistics for the key variables used in our study. The average annual pay growth for executives (*PayGrowthExec*) is 16.8%, over three times larger than the 5.2% growth for rank-and-file employees (*PayGrowthEmp*). There is substantial variation in the pay growth for both groups across firm-years, as the standard deviations of *PayGrowthExec* and *PayGrowthEmp* are 37.5% and 7.6%, respectively.

Panel A also reports the summary statistics of the firm-level variables used in our analyses. The construction of these variables is described in the Appendix. The characteristics of our sample firms are very similar to those of the Compustat universe during our sample period. We winsorize the pay growth variables and firm performance variables at the 5th and 95th percentiles to mitigate the impact of outliers.[27] All other variables are winsorized at the 1st and 99th percentiles. Panel B of Table 1 presents the industry distribution of our sample firms using the Fama-French 12-industry classification. 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%).[28]

4. EMPIRICAL ANALYSES

4.1 Pay Growth Gap and Its Relation with Firm Performance

The large pay growth gap (16.8% vs. 5.2%) indicates that executives, who receive much greater pay than their employees to begin with, also enjoy much higher pay growth during our sample period. Panel A of Figure 1 plots the growth in average pay for CEOs, executives, and non-

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[27] Our results are qualitatively similar if we winsorize these key variables at the 1% or 2.5% levels.

[28] 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.

executive employees separately. Two interesting patterns emerge. First, executive pay growth is higher than employee pay growth in every single year of our sample period.[29] Second, executive pay growth exhibits significant variation over time and experiences large increases when economy is booming, while employee pay growth remains relatively stable even during the boom period.

Panel B of Figure 1 plots the time trend of the average CEO-to-median-employee pay *level* gap, which has attracted a lot of attention in recent years. There is a big jump in pay level gaps for our sample firms from around 17 times in 1999 to over 30 times in 2008, consistent with the general pattern of this ratio documented by other studies and the news media. Taken Panels A and B together, the time trends of pay gaps are mostly accounted for by the pay growth of CEOs and executives rather than that of employees.

Next, we examine the relation between pay growth gaps and firm performance. We begin with the univariate analyses that sort sample firms into stock performance deciles and plot the average pay growth gaps for firm-years across these performance deciles. In Figure 2, we find that pay growth gaps increase in firm performance (i.e., stock returns) especially for firms with above-median performance. We then conduct formal regression analyses to examine this pattern in a more rigorous fashion. For each firm-year, we create two observations, one for the executives and the other for rank-and-file employees. Those two observations have different values for pay growth rates but are identical otherwise. We estimate the following regression model:

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

[29] In untabulated analysis, we find that in any given year of our sample period, about one-third of the firms have pay growth gaps above 20%, and around 10 percent of the firms have extremely high pay growth gaps (above 50%).

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 *PayGrowthExec* for executives and the value of *PayGrowthEmp* for rank-and-file employees. *DummyExec* is an indicator variable that equals one for the observation of executives and zero for that of employees. $FirmPerf_{i,t}$ is firm i's stock performance in year t. $Firm_i \times Year_t$ denotes firm×year fixed effects, which thoroughly control for all the time-invariant and time-varying firm characteristics. The coefficient of interest, β_2, captures the change in pay growth gaps between executives and employees in response to the change in firm performance. Note that $FirmPerf_{i,t}$ itself is dropped from the regression because it is fully absorbed by firm×year fixed effects. To account for any within-firm correlation of the error term, we cluster the standard errors by firm in all our models.

Column (1) of Table 2 presents the regression result, in which the coefficient on the interaction of the executive dummy and stock performance is significantly positive, suggesting an overall positive relation between pay growth gaps and firm performance. Columns (2) and (3) further present the regressions on idiosyncratic returns ("*IdioRet*") and systematic returns ("*SysRet*"), respectively. The coefficients of the interaction term are significantly positive for both return components, with that of *SysRet* (0.120, t-statistics 6.25) being even larger and more significant than that of *IdioRet* (0.088, t-statistic 5.74). These patterns continue to hold when we include both *IdioRet* and *SysRet* in Column (4).

While the positive relation between pay growth gaps and systematic performance seems inconsistent with pay-performance alignment because systematic performance is largely independent of labor input, this result can be explained by Gabaix and Landier's (2008) rational compensation framework in which CEO pay, but not employee pay, is an increasing function of firm size. Positive stock returns, whether idiosyncratic or systematic, represent an increase in firm size (market capitalization), and thus are associated with larger pay growth gaps.

4.2 Asymmetric Relation Between Pay Growth Gaps and Firm Performance

Besides presenting a positive relation between pay growth gaps and firm performance as discussed in the previous section, Figure 2 also shows that this relation seems to be asymmetric. Specifically, among firms with below-median performance (i.e., those in deciles 1-5), the curve of pay growth gaps is almost flat, indicating a very weak relation between pay growth gaps and firm performance. However, for firms with above-median total stock returns (i.e., those in deciles 6-10), the curve is upward sloping, indicating a strongly positive relation between pay growth gaps and stock performance.

The asymmetric sensitivity of CEO pay level to firm performance has attracted quite some attention in the existing literature as it can have important implications for the design of managerial compensation contracts as well as agency conflicts. Hence, we formally examine the asymmetry in pay growth gaps by creating two variables to capture the above- and below-median idiosyncratic or systematic components of stock performance (described in Section 3.2). We then estimate regressions of pay growth on the executive dummy and its interactions with both these high- and low-return variables.

Columns (1) and (2) of Table 3 report the regression results for the idiosyncratic performance and the systematic performance, respectively, and Column (3) includes both components in the same regression. The results show a strong asymmetric relation between pay growth gaps and idiosyncratic returns. For example, Column (3) shows that the coefficient estimate of the *IdioRetHigh* interaction is large and significant at the 1% level (0.126, with a t-stat of 4.98), while that of the *IdioRetLow* interaction is much smaller in magnitude and only marginally significant (0.042, with a t-stat of 1.75). Further, these two coefficients are significantly different at the 5% level (with an F-stat of 4.23 and a p-value of 0.04). In terms of economic magnitudes, the above result indicates that when idiosyncratic performance is good (i.e., above the cross-sectional median), a one standard-deviation increase in idiosyncratic returns is associated with an increase in pay growth gaps of 4.7% (=0.375*0.126*100%), but when performance is poor (i.e., below the cross-sectional median), a one standard-deviation decrease in idiosyncratic returns is associated with a decrease in pay growth gaps of only 1.6% (=0.375*0.042*100%).

In contrast, the results in Columns (2) and (3) show that there is no asymmetric relation with respect to systematic stock performance. For example, Column (3) shows that both the *SysRetHigh* and *SysRetLow* interactions are significantly positive, but their coefficients (0.126 vs. 0.097) are not significantly different from each other (with an F-stat of 0.61 and a p-value of 0.43). Therefore, we cannot reject the null hypothesis that the relation between pay growth gaps and the systematic component of firm performance is symmetric.

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). Column (4) of Table 3 shows that our findings are robust to the use of cash pay growth for executives.[30] Taken together, the regression analyses confirm an asymmetric relation between pay growth gaps and the idiosyncratic performance but not the systematic performance.

We conduct a number of robustness checks of the above results. Panel A of Table 4 presents the robustness tests using alternative measures of firm performance. First, we use an alternative approach to construct the idiosyncratic and systematic components of stock returns based on panel

[30] In untabulated results, we also repeat the regression analysis using executives' base pay (instead of total pay) from Capital IQ, and find a similar asymmetry in pay growth gaps.

regressions rather than time-series regressions (e.g., Bertrand and Mullainathan, 2001; Garvey and Milbourn, 2006). Specifically, we run the following panel regression:

$$TotalRet_{i,t} = \alpha + \beta PeerRet_{i,t} + \epsilon_{i,t}, \qquad (3)$$

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. (3) for our sample firms between 1990 and 2008.[31] Firm i's predicted return in year t, *PredRet*, is defined as the predicted value from Eq. (3), and its idiosyncratic return, *ResRet*, is defined as the difference between *TotalRet* and *PredRet*. Similar to our baseline approach, we split *PredRet* and *ResRet* into two components. *PredRetHigh* (*PredRetLow*) equals *PredRet* when *PredRet* is above (below) the median in the annual cross-section, and zero otherwise. *ResRetHigh* and *ResRetLow* are defined similarly. Column (1) in Panel A of Table 4 shows that our findings are robust to this alternative way of return decomposition.

To corroborate the analyses using stock performance, we repeat the regression analyses using industry-adjusted sales growth and ROA as alternative measures of firm performance and report the results in Columns (2) and (3) of Panel A, respectively. Consistent with our results in Table 3, there is a very strong asymmetric relation between pay growth gaps and these operating performance measures. For example, the p-values of the F-tests for the asymmetry in pay growth gaps are 0.00 (<0.001) and 0.03.

We further conduct robustness tests using alternative model specifications in Panel B of Table 4. In Column (1), we include the interactions of *DummyExec* with the squared idiosyncratic and systematic returns in the regression. Both *IdioRet* × *DummyExec* and $IdioRet^2$ × *DummyExec*

[31] We follow the standard practice in the literature to estimate Eq. (3) using only our sample firms, but our results are almost identical if we estimate it using the entire universe of CRSP firms.

are significantly positive, suggesting an upward-sloping convex relation between pay growth gaps and the idiosyncratic returns.[32] In Column (2) of Panel B, we redefine high and low return components using zero rather than the cross-sectional median as the cutoff, and continue to find an asymmetric relation between pay growth gaps and idiosyncratic returns. We also examine alternative sets of fixed effects in Panel C of Table 4. Column (1) uses industry×year fixed effects; Column (2) uses industry and year fixed effects; and Column (3) uses industry×year fixed effects and firm fixed effects. Our findings are robust to all these alternative sets of fixed-effects.

One might argue that executives and non-executive employees differ in important attributes other than pay ranks inside the firm, which might give rise to the differential pay growth patterns in response to firm performance. Since executives in our sample tend to be male, white, and highly educated, we select the subsample of "matched" employees with these characteristics, and separately compare the pay growth of old and young matched employees to that of executives in Columns (1) and (2) of Table 5 as age can have multiple effects on pay growth.[33] The results in both columns show that the asymmetry in pay growth gaps persists when we compare executives to employees with similar demographic attributes.

Our study is the first in the literature to document an asymmetry in within-firm pay practices with respect to idiosyncratic firm performance, i.e., a convex relation between pay and stock returns. Leone, Wu, and Zimmerman (2006) examine the level of CEO cash pay and find a

[32] The coefficient of $IdioRet^2$ × *DummyExec* is 0.059, indicating that the relation between pay growth gaps and idiosyncratic returns is convex. Further, since the coefficient of *IdioRet* × *DummyExec* is 0.082, the relation between pay growth gaps and *IdioRet* is positive as long as *IdioRet* is higher than -0.695 [=(-1)*0.082/(2*0.059)]. Note that even the mean of *IdioRet* (0.052) minus one standard deviation is -0.323, much higher than -0.695. This indicates that for the majority of the values of *IdioRet* over its range, we would observe an upward-sloping convex relationship between pay growth gaps and *IdioRet.*

[33] While old employees are more entrenched and thus enjoy a higher pay growth, young employees might actually have a higher pay growth due to their faster human capital accumulation. Thus, it is unclear whether we should only compare executives to old or young employees. For robustness, we compare the pay growth of executives to both young and old employees separately.

concave relation between such pay and stock performance. Garvey and Milbourn (2006) focus on the relation between CEO pay level and *systematic* returns and document a convex relation (i.e., the "asymmetric pay for luck"), while a recent study by Daniel, Li, and Naveen (2020) find little evidence of such asymmetry. Differing from these studies, we extend the literature by providing new evidence of a convex relation between pay growth gaps and idiosyncratic firm performance. In this section, we explore potential explanations of this pattern.

4.3 Potential Explanations of the Observed Asymmetry in Pay Growth Gaps

4.3.1 Managerial rent extraction: A quasi-natural experiment

An asymmetric pay-performance relation, i.e., greater rewards for good performance and less penalty for bad performance, can be consistent with managerial rent extraction (Frydman and Jenter, 2010). Since managerial rent extraction results from poor corporate governance, we investigate this explanation by exploiting an exogenous shock to firms' corporate governance arising from the state-level staggered enactments of the Universal Demand (UD) laws in the U.S. We use UD laws for our analyses not only because commonly used corporate governance measures such as the G-Index and the E-Index are endogenous, but also because these measures are unavailable for a large fraction of our sample firms.

Derivative lawsuit is one of the most effective mechanisms for shareholders to discipline managers when the latter breach their fiduciary duties. In derivative lawsuits, shareholders can sue managers or directors of a company and claim compensation on behalf of the company. Corporate governance reforms are usually part of the derivative lawsuit settlements. Without actually initiating litigation, the mere threat of derivative lawsuits may lead the managers and the board to preemptively strengthen their firms' corporate governance provisions (see, e.g., Appel, 2019 and Lin, Liu, and Manso, 2020, for a discussion of the related literature). UD laws, which have been enacted in different states at different times, significantly reduce the threat to managers and directors by requiring shareholders to seek board approval prior to launching a derivative lawsuit. Such approval is rarely granted, as the defendants in derivative lawsuits usually include the directors themselves. Therefore, if the observed asymmetry in pay growth gaps is attributable to managerial rent extraction, we should find that, everything else equal, this asymmetry is more pronounced among firms incorporated in states that have passed UD laws.[34]

To exploit the potentially exogenous nature of state-level UD law enactments, we first divide our sample firms into two groups based on whether or not their states of incorporation have passed UD laws, and then re-run our baseline regressions (as in Table 3) on those two subsamples separately. Specifically, a firm-year in our sample is classified as being subject to the UD laws if the firm is incorporated in Hawaii while the year is on or after 2001, or in Iowa while year is on or after 2003, or in Massachusetts while the year is on or after 2004, or in Rhode Island while the year is on or after 2005, or in South Dakota while the year is on or after 2005, or if the firm is incorporated in the following states (all of which have passed UD laws prior to 1999, the beginning year of our sample period): Georgia, Michigan, Florida, Wisconsin, Montana, Virginia, Utah, New Hampshire, Mississippi, North Carolina, Arizona, Nebraska, Connecticut, Maine, Pennsylvania, Texas, Wyoming, and Idaho.

Columns (1) and (2) of Table 6 present the results. Consistent with our prediction, we find that firms whose states of incorporation have passed UD laws exhibit a much stronger asymmetric relation between pay growth gaps and the idiosyncratic component of performance than those not

[34] The setting of UD laws has been widely used by many studies (e.g., Bourveau, Lou, and Wang, 2018; Houston, Lin, and Xie, 2018; Huang, Roychowdhury, and Sletten, 2020; Huang et al., 2020; Manchiraju, Pandey, and Subramanyam, 2021). A recent study by Donelson et al. (2021) finds no significant decrease in the number of derivative lawsuits after the passage of UD laws. However, the authors acknowledge the possibility that UD laws might indeed decrease the *risk/threat* of derivative lawsuits against managers/directors, which worsens corporate governance, leads to more perverse managerial behavior, and ultimately triggers more derivative lawsuits filed by unsatisfied shareholders.

subject to the UD laws. Specifically, the difference between the coefficients of the *IdioRetHigh* interaction and the *IdioRetLow* interaction is 0.276 (with a p-value of 0.004) for firms incorporated in states with UD laws, but only 0.051 (with a p-value of 0.044) for firms incorporated in states without UD laws.

To corroborate the subsample analysis, we also use the full sample to perform a triple-difference regression analysis that includes the three-way interactions among the performance-related variables, the executive dummy, as well as UD, a dummy variable that equals one if a firm is incorporated in a state that has passed universal demand laws and zero otherwise. In Column (3) of Table 6, we find that the coefficient on the *IdioRetHigh* × *DummyExec* × *UD* interaction is significantly positive (0.133, with a t-stat of 2.39) but that on the *IdioRetLow* × *DummyExec* × *UD* interaction is negative and marginally significant (-0.093, with a t-stat of -1.64). The opposite signs of these two coefficients are consistent with Columns (1) and (2) that the asymmetry in pay growth gaps is significantly more pronounced for firms subject to the UD laws, which exacerbate agency problems and in turn managerial rent extraction.

4.3.2 Additional analysis for managerial rent extraction: Cross-sectional tests

We further investigate the managerial rent extraction explanation by examining the cross-sectional variation in the asymmetry in pay growth gaps. First, we examine whether the asymmetry is more pronounced when a firm is subject to greater information asymmetry between corporate insiders and outsiders (due to a lack of analyst coverage), as information asymmetry can exacerbate agency conflicts and thus managerial rent extraction (see, e.g., Yu, 2008; Bradley, Gokkaya, Liu, and Xie, 2017). Columns (1) and (2) in Table 7 present the subsample analyses for firms with above-median and below-median analyst coverage, respectively. Interestingly, the coefficient of the *IdioRetLow* interaction is large and statistically significant for high-analyst-coverage firms

(0.086, with a t-stat of 2.32) but slightly negative and insignificant for low-analyst-coverage firms (-0.011, with a t-stat of -0.37), indicating that executives are punished less upon poorer performance when analyst coverage is lower. Therefore, these results are consistent with the managerial rent extraction explanation.

Second, we examine whether our baseline results are more pronounced when a firm is subject to less monitoring by employees. As labor unions represent a form of organized labor that actively monitors managerial behavior (see, e.g., Hilary, 2006; Aobdia and Cheng, 2018; Lin, Schmid, and Xuan, 2018), employees in unionized firms tend to have greater bargaining power to align their pay growth with that of managers, which might in turn reduce the asymmetry in pay growth gaps. Hence, we classify firms into two groups based on the union coverage of their industries, and examine them separately in Columns (3) and (4) of Table 7. Consistent with our prediction, the asymmetry in pay growth gaps exists only in low-union-coverage firms but not in high-union-coverage firms.

We also split our sample by a firm's labor productivity as measured by the ratio of sales to the number of employees. Higher labor productivity can enhance employees' bargaining power and discipline managers' potential rent extraction. Therefore, under the rent extraction explanation, we would expect the asymmetry in pay growth gaps to be stronger among firms with lower labor productivity. Columns (5) and (6) of Table 7 find evidence consistent with this prediction: While the asymmetric relation between pay growth gaps and idiosyncratic performance is pronounced and statistically significant in low-labor-productivity firms, it becomes insignificant in high-labor-productivity firms. Overall, the cross-sectional analyses in this subsection suggest that the observed asymmetry in pay growth gaps is associated with managerial rent extraction.

4.3.3 Alternative explanations

For a balanced analysis, we examine several potential explanations for the observed asymmetry in pay growth gaps other than rent-extraction.

First, many top managers receive a big one-time severance package or pension payout before their departure (e.g., Yermack 2006; Stefanescu, Wang, Xie, and Yang, 2018). Therefore, the asymmetry in pay growth gaps might be caused by managers with worse performance being forced to leave and receiving a big severance package. However, even if we require executives to work for a firm in the year after the measurement of pay growth (i.e., require them to stay at the firm at year t+1), we still find similar results (Column (1) of Table 8) to the baseline ones in Table 3. Therefore, the observed asymmetry in pay growth gaps does not seem to be driven by managerial severance packages.

Second, if the labor market for talented executives is relatively more competitive (due to their more limited supply relative to the supply of rank-and-file employees), then a firm may avoid cutting executives' pay upon bad performance in an effort to retain the executives. In that case, we would expect the asymmetry in pay growth gaps to be more pronounced when the executives possess better outside options. We follow the literature (e.g., Parrino, 1997; He, Huang, and Zhao, 2019) and measure executives' outside employment options using the average stock return of its peer firms (i.e., other firms in the same industry). Under the labor market explanation, we would expect a stronger asymmetry in pay growth gaps when peer firms' stock returns are higher, as outside employment opportunities tend to be better for executives (rather than employees) when other firms in the focal firms' industry, which compete for the same pool of managerial talents, are doing well and better able to offer competitive compensation packages. On the other hand, the labor market for rank-and-file employees, compared to that for executives, is less tight and thus less affected by industry-wide shocks due to the more inelastic supply of such workers whose human capital is more easily replaceable. We repeat the baseline regression analyses for the two subsamples of high-peer-return (i.e., above-cross-sectional-median) firms and low-peer-return (i.e., below-cross-sectional-median) firms in Columns (2) and (3) of Table 8, respectively. Contrary to the labor market explanation, we find that the asymmetry in pay growth gaps is slightly stronger in the subsample of low peer returns than in the subsample of high peer returns.[35] Hence, our findings do not seem to be explained by the differential labor market conditions.

Third, it is possible that firms attempt to encourage workers' risk taking by rewarding their good performance while tolerating their bad performance. To investigate this explanation, we conduct empirical analysis by dividing our sample firms into subgroups based on the industry-level R&D intensity (R&D expenditures scaled by total assets), growth opportunities (Tobin's Q), or whether a firm is in high-tech industries.[36] Under the risk-taking explanation, we would expect to observe a stronger asymmetry in innovative (high R&D intensity) industries, growth industries, or high-tech industries where firms need to make risky long-term investments. In untabulated analysis, however, we find that, inconsistent with this alternative explanation, the asymmetry in pay growth gaps is not significantly different (either economically or statistically) across these subgroups.

Fourth, the realized value of option compensation may increase with a positive stock return but not decrease with a negative stock return. This convex nature of stock option payoffs, however, is irrelevant to our asymmetry finding because our study, as well as existing studies of pay asymmetry, calculates the value of option compensation on the *grant* date rather than the exercise

[35] To the extent that the low peer returns also represent poorer outside options for rank-and-file employees (and thus their weaker bargaining power against the managers who set their pay), this result implies that executives tend to exploit the lower-ranked employees (i.e., reap the corporate profits at good times but shift the blame to employees at bad times) to a greater extent when the overall labor market condition is poor, which is again indicative of an agency problem.

[36] Following the literature (e.g., Chemmanur et al. 2018), we define high-tech firms as those with 3-digit SIC codes 357, 366, 367, 372, 381, 382, and 384.

date. More broadly, any explanation for the observed asymmetry in pay growth gaps must go beyond specific forms of compensation because the design of compensation contracts itself as well as its execution may be influenced by managers and reflect managerial rent extraction (e.g., Bebchuk, Fried, and Walker, 2002, Dikolli et al., 2020).

4.4 Turnover Rate Gaps Between Executives and Rank-and-File Employees

Turnover and pay are two major labor market consequences that are closely related and sometimes jointly determined (Defond and Hung, 2004; Gao, Harford, and Li, 2012). In our setting, the higher pay growth of executives than employees may be justified by the potentially higher turnover risks of executives than employees. Since the granular nature of our data allows us to examine turnover rates for individual executives and employees, we complement the pay growth analysis by studying the turnover rate gaps between executives and employees.

While our baseline sample requires a given individual to stay with the firm for both the current and previous years, the sample for our turnover-rate tests consists of all executives/employees of a firm in the previous year. The turnover rate for executives (employees) in a given year is defined as the number of executives (employees) that leave the firm in that year divided by the number of executives (employees) at the end of the previous year.

Following the CEO turnover literature (e.g., Jenter and Kanaan, 2015), we regress the turnover rates of executives and employees in a given year on a dummy for executives and its interaction with stock performance in the previous year.[37] Column (1) of Table 9 presents the results using total return and Column (2) presents the regressions including both the idiosyncratic and the systematic returns. In both regressions, the coefficient of *DummyExec* is significantly

[37] This is because turnover is an ex-post decision whereas pay growth can be influenced by the ex-ante compensation contracts.

negative (while the interaction terms are small and insignificant), suggesting that on average executives have *lower* rather than higher turnover risk than rank-and-file employees. Furthermore, the insignificant coefficients on return interactions show that the difference in turnover rates for executives and employees does not vary much with the firm's performance measures. These results indicate that the large pay growth gap is unlikely driven by the compensation for turnover risk.

Next, we examine if turnover risk can explain the asymmetry in pay growth gaps. Specifically, firms are found to use large pay-cuts and firing as substitute punishments for CEOs upon bad performance (Gao, Harford, and Li, 2012). Therefore, an alternative explanation of the asymmetry in pay growth gaps is that when performance is poor, firms more often use firing instead of pay cuts as punishments for executives relatively to employees. Under this alternative explanation, we expect the turnover rate of executives (relative to employees) to be higher when idiosyncratic returns are poorer.

Column (3) of Table 9 shows that the coefficient is significantly negative for the *IdioRetHigh* interaction, which indicates that when the idiosyncratic performance is good, the probability of executive turnover relative to employee turnover decreases with performance. In sharp contrast, the coefficient is significantly positive for the *IdioRetLow* interaction, indicating that when the idiosyncratic performance is poor, the probability of executive turnover relative to employee turnover *increases* with firm performance, i.e., the relative turnover probability is *lower* for worse performing managers. These results suggest that turnover risk is unlikely to explain the asymmetry in pay growth gaps, and in the meantime provide new evidence supporting CEOs' (executives') substantial influence on their own turnover decisions (e.g., Dikolli, Mayew, and Nanda, 2014).

5. PAY GROWTH ACROSS EMPLOYEE GROUPS BASED ON DEMOGRAPHIC CHARACTERISTICS

While the focus of our paper is the pay growth gap between executives and rank-and-file employees, we examine in this section the relation between pay growth and employee demographic characteristics. Motivated by the large literature that documents the gender and racial disparities of pay levels in workplace (e.g., Altonji and Blank, 1999; Tate and Yang, 2015), we hope this analysis will shed new light on pay disparities at workplace from the perspective of pay growth.[38]

We utilize the employee gender and race data provided by the LEHD database. Specifically, for each firm-year in our sample, we divide its non-executive employees into two groups along one of the two dimensions: female vs. male, and minority (non-white) vs. white. Then we calculate the growth rate of the average pay for each group of employees and estimate the following model:

$$PayGrowth_{i,t,k} = \beta_1 Dummy_{i,t,k} + \beta_2 FirmPerf_{i,t} \times Dummy_{i,t,k} + \gamma X_{i,t-1} + Firm_i \times Year_t + \epsilon_{i,t,k}, \quad (4)$$

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 female or minority employees; $FirmPerf_{i,t}$ is a measure of firm i's stock performance in year t; 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. The demographic characteristics for the group of employees include the fraction of male employees, the fraction of white workers, the average number of years of education, the average age, and the average personal labor income diversification measure of the employees, where the personal diversification measure

[38] One caveat for this analysis is that we do not observe the exact job title/nature of each rank-and-file employee, though we control for their relative position on the corporate ladder using their pay rank within a given firm-year.

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 her jobs (He, Shu, and Yang, 2020). Further, to control for the effect of corporate hierarchy on pay growth, we also include the average lagged pay rank of an employee (*PayRank*), which 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 10 presents the results. Column (1) shows that for an average firm, the annual pay growth for female employees is 4.1% lower than that of the male employees.[39] This difference is substantial given the average employee pay growth of 5.2%. Interestingly, the coefficients on the performance interactions are negative, suggesting that female employees' pay growth is less sensitive to firm performance than male employees. Column (2) shows that, for an average firm, minority employees receive 1.2% lower pay growth than white workers. The insignificant coefficients on performance interactions suggest little difference in the sensitivity of pay growth to firm performance between minority and white workers. These results suggest that female and minority employees are significantly disadvantaged in terms of pay growth.

6. CONCLUSION

The dramatic increase in within-firm pay inequality in the U.S., an important manifestation of the sharp rise in income inequality in the US society, has attracted a lot of attention in recent years. The limited number of existing studies on U.S. within-firm pay inequality utilize either voluntarily reported employee wage data from Compustat or executive pay data only. We use the

[39] The 4.1% is calculated by (-0.041-0.006*0.171 + 0.016*0.135 - 0.027*0.097 + 0.022*0.066) *100%.

granular employee wage data from the U.S. Census Bureau to study the within-firm pay inequality in the U.S.

Differing from previous studies, we focus on the pay *growth* gap between executives and employees, which not only is an important dimension of pay inequality by itself, but also allows us to isolate the effect of managerial talent and study other possible drivers of the dramatic increase in within-firm inequality. We find that the pay growth of executives is consistently higher, both in the cross-section and over time, than that of rank-and-file employees over our sample period of 1999 to 2008. Pay growth gaps increase in not only idiosyncratic firm performance ("skill return"), but also systematic firm performance, which is generally considered driven by "luck", which is consistent with Gabaix and Landier's (2008) theoretical model.

More importantly, the relation between pay growth gaps and the idiosyncratic returns is asymmetric: Executives, relative to employees, are rewarded by high pay growth when firms perform well but not penalized as much by pay cuts when firms perform poorly. Consistent with the managerial rent extraction explanation, we find that the asymmetric relation in pay growth gaps is much more pronounced for firms with lower analyst coverage, less union coverage, or smaller labor productivity. Using exogenous shocks to corporate governance from the staggered implementations of state-level UD laws, we find that the asymmetric relation is much stronger among firms with worse corporate governance, which also supports the rent extraction explanation. In contrast, we show that the asymmetric relation is unlikely to be explained by alternative stories. Further analysis reveals that, consistent with the rent extraction explanation, executives also enjoy lower turnover rates relative to employees upon poorer performance.

Overall, our paper provides new evidence that managerial rent extraction can be an important driver of within-firm pay inequality. Regarding policy implications, our evidence suggests that regulators, investors, and other stakeholders, rather than focusing on the disclosure of CEO-to-median-employee pay level ratios, should pay close attention to the disclosure of differential sensitivity of pay growth to firm performance across the corporate hierarchy.

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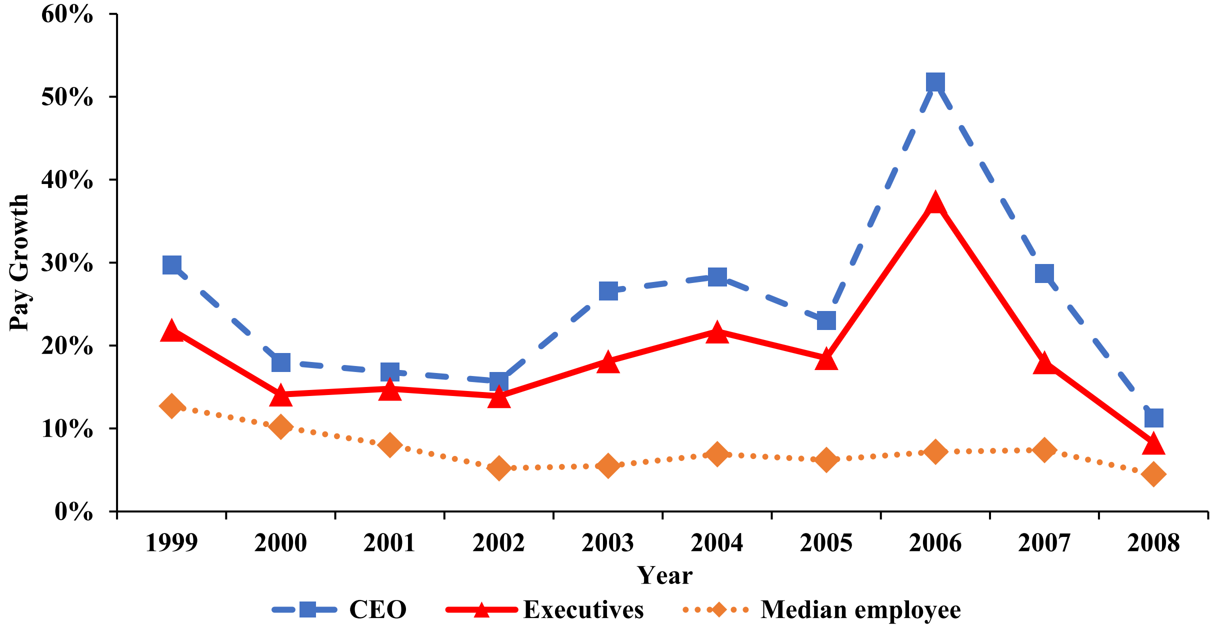
Figure 1: Time Trends of Pay Growth for Executives and Employees

This figure plots the time trends of average annual pay growth for executives and non-executive employees for our sample firms from 1999 to 2008. The sample includes US publicly listed firms that are covered by both the Capital IQ database and the Longitudinal Employer-Household Dynamics (LEHD) database. Panel A plots the average pay growth rates for CEOs, executives, and median non-executive employees, separately. Panel B plots the average CEO-to-median-employee pay gap over time.

Panel A: Pay Growth for CEOs, Executives, and Non-Executive Employees Separately



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

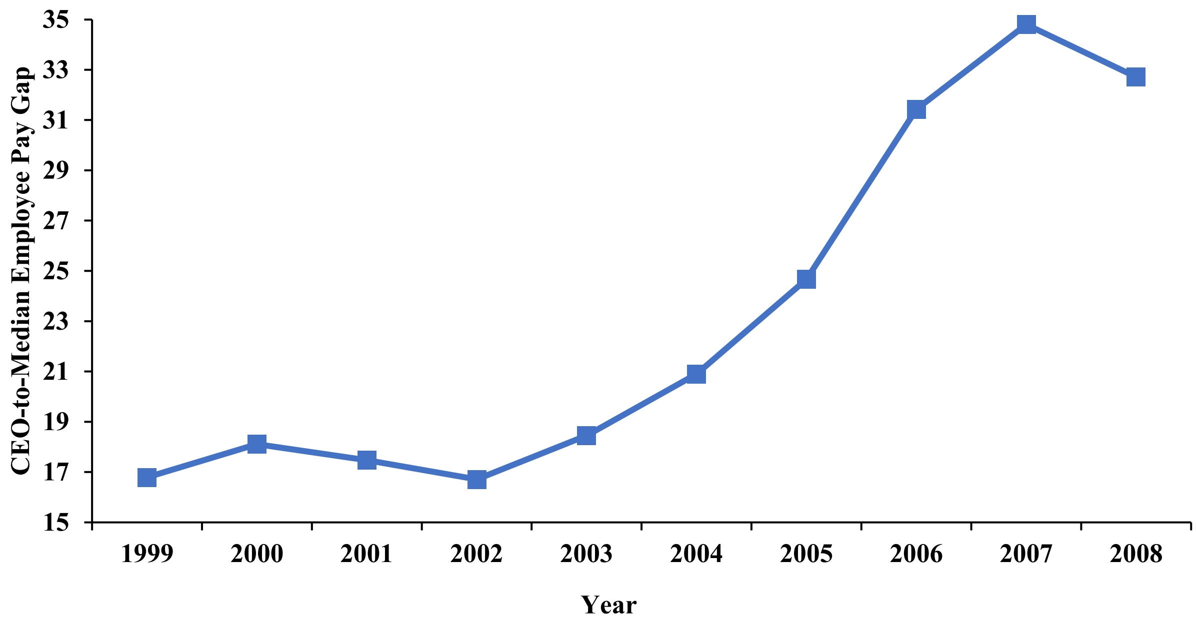


Figure 2: Executive-Employee Pay Growth Gaps across Deciles of Stock Performance

This figure plots the average pay growth gap and average industry-year adjusted pay growth gap across firm performance deciles, where a firm's pay growth gap equals the difference between its executives' pay growth (*PayGrowthExec*) and non-executive employees' pay growth (*PayGrowthEmp*). The sample consists of US publicly listed firms that are covered by both the Capital IQ database and the Longitudinal Employer-Household Dynamics (LEHD) database from 1999 to 2008. In each year, firms are divided into deciles based on their stock returns, with Decile 1 indicating the worst performance and Decile 10 indicating the best performance. Definitions of the variables are provided in the Appendix.

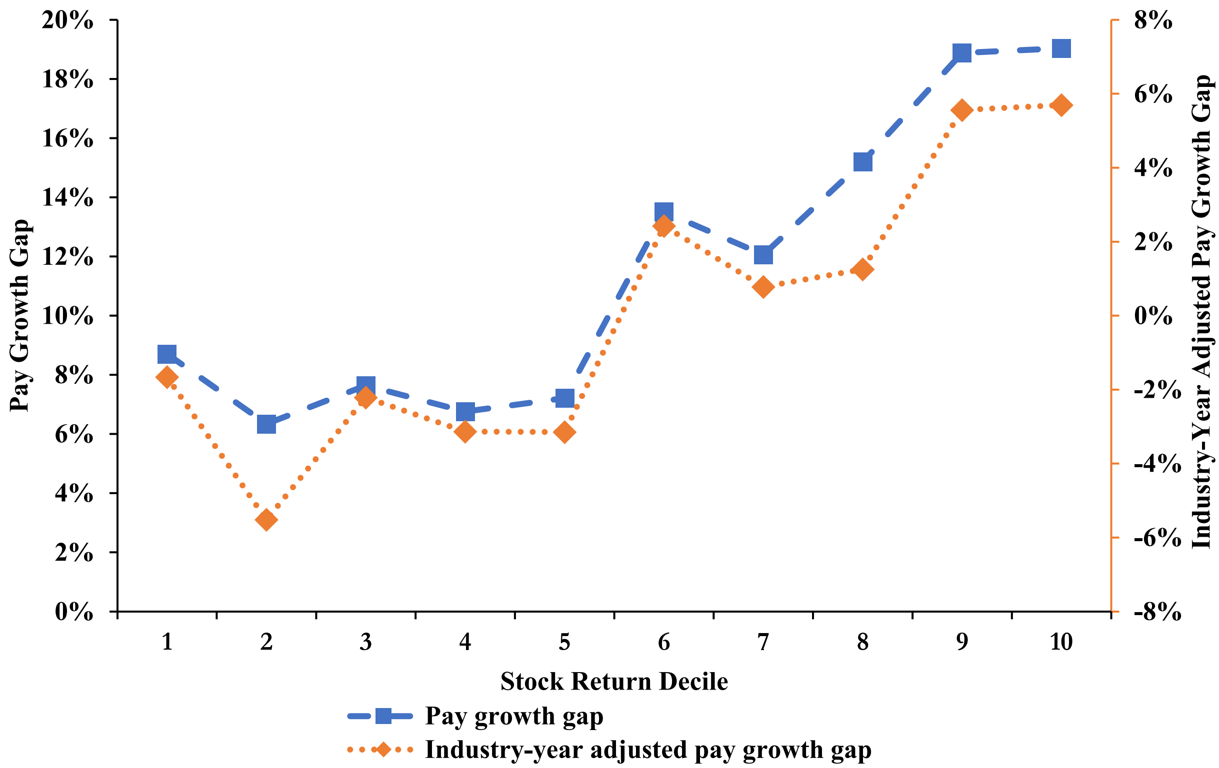
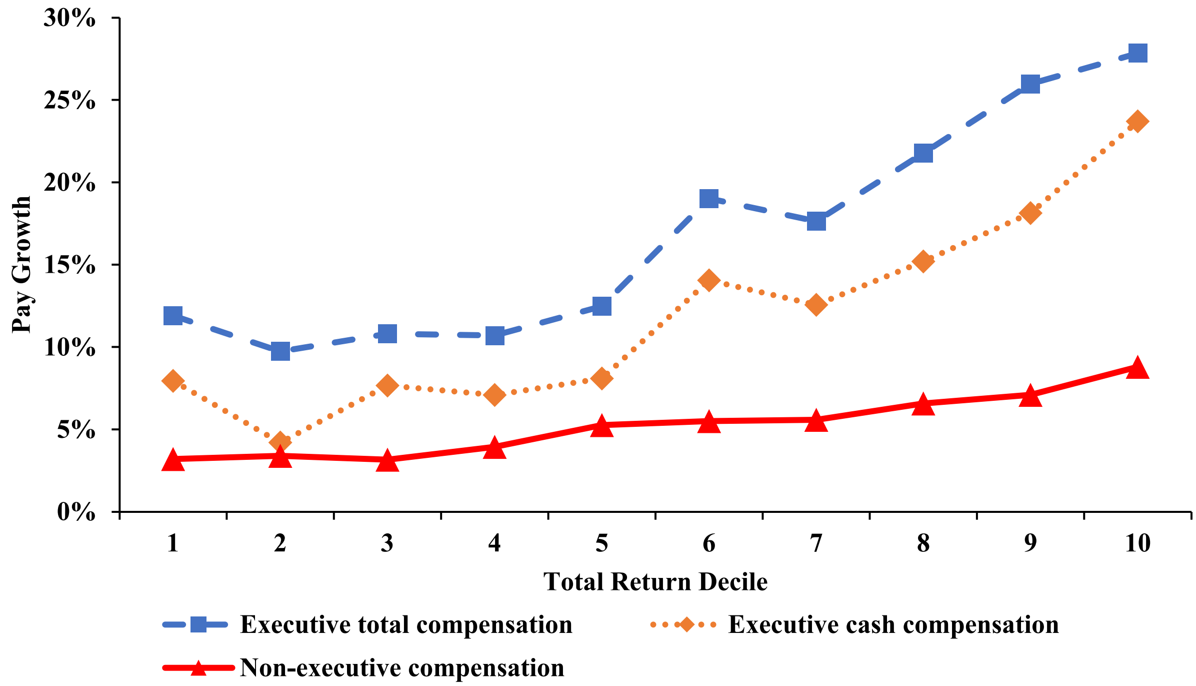


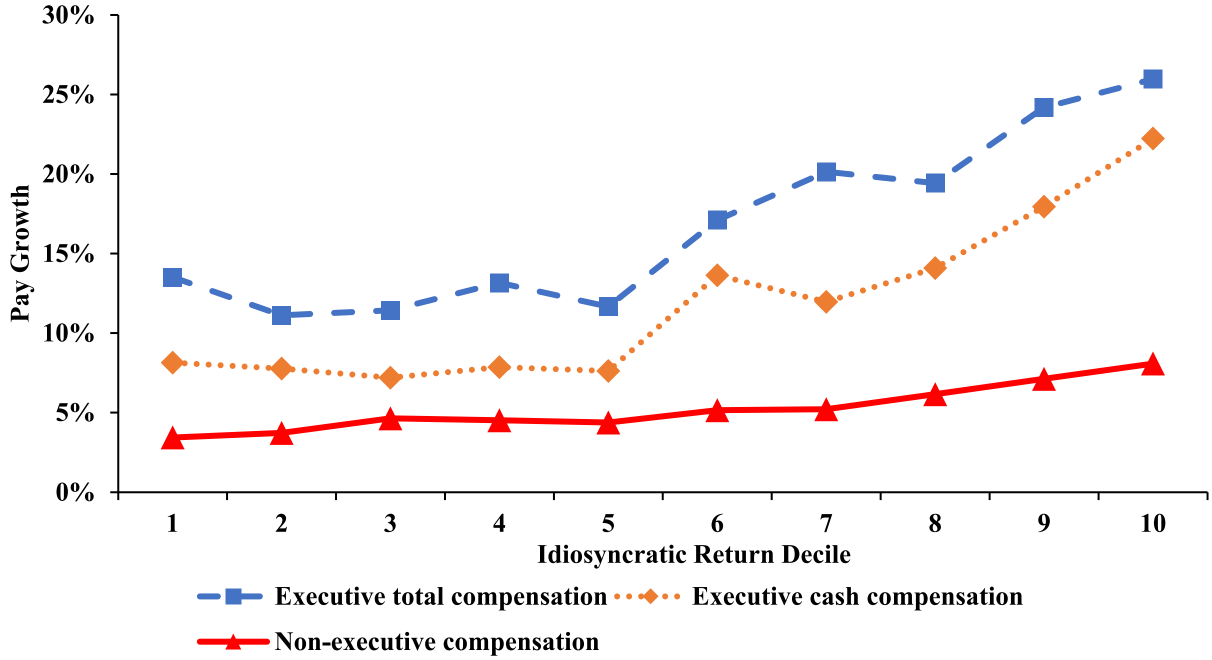
Figure 3: Pay Growth across Deciles of Stock Performance: Executives and Non-Executive Employees Separately

This figure plots the average pay growth rates for executives and non-executive employees across firm performance deciles. The sample consists of US publicly listed firms that are covered by both the Capital IQ database and the Longitudinal Employer-Household Dynamics (LEHD) database from 1999 to 2008. In each year, firms are divided into deciles based on their total returns (Panel A), idiosyncratic returns (Panel B), or systematic returns (Panel C), with Decile 1 being the worst performing firms and Decile 10 the best performing firms. We then calculate the average executive or employee pay growth for each decile and plot the time-series averages across years.

Panel A: Pay Growth across Deciles of Total Returns



Panel B: Pay Growth across Deciles of Idiosyncratic Returns



Panel C: Pay Growth across Deciles of Systematic Returns

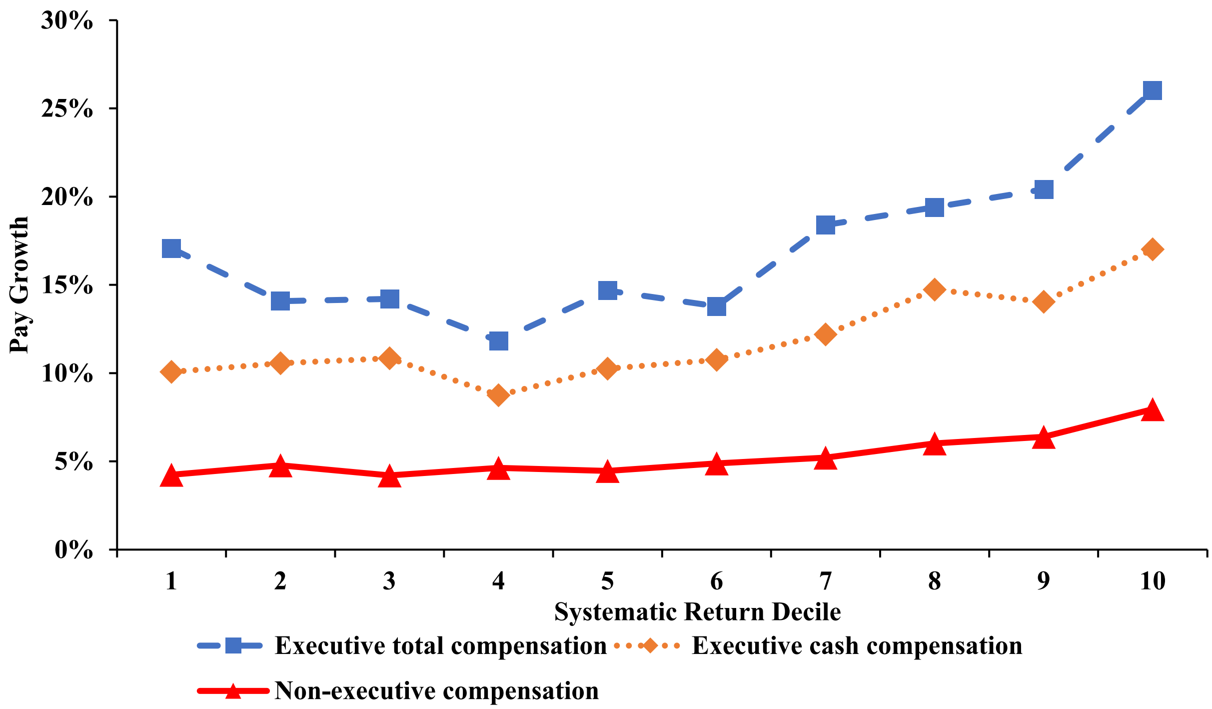


Table 1: Summary Statistics and Sample Distributions

Panel A reports the summary statistics for selected variables used in this paper. The sample includes US publicly 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 variables are provided in the Appendix. 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**
PayGrowthExec	0.168	0.375	4,500
CashPayGrowthExec	0.118	0.286	4,500
PayGrowthEmp	0.052	0.076	4,500
IdioRet	0.052	0.375	4,500
SysRet	0.044	0.291	4,500
TotalRet	0.100	0.461	4,500
IdioRetHigh	0.171	0.249	4,500
IdioRetLow	-0.135	0.254	4,500
SysRetHigh	0.097	0.200	4,500
SysRetLow	-0.066	0.240	4,500
PayGrowthGap	0.115	0.371	4,500
LnME	12.110	1.869	4,500
LnFirmAge	2.543	0.715	4,500
SalesEmp	0.307	0.315	4,500
ROA	0.056	0.208	4,500
PPEAssets	0.204	0.230	4,500
BookLev	0.174	0.177	4,500
TobinQ	1.914	1.674	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
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

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. For each firm-year in our sample, there are two observations, one for executives and the other for non-executive employees. The dependent variable, *PayGrowth*, takes the value of executives' pay growth (*PayGrowthExec*) for executives and the value of non-executive employees' pay growth (*PayGrowthEmp*) for non-executive employees. *DummyExec* is a dummy variable that equals one for the observations of executives and zero for those of non-executive employees. Definitions of all other variables are provided in the Appendix. 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 standard errors clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: $PayGrowth_t$			
	(1)	(2)	(3)	(4)
DummyExec	0.105***	0.111***	0.110***	0.105***
	(20.87)	(22.38)	(22.36)	(21.02)
$TotalRet_t$ × *DummyExec*	0.103***			
	(8.34)			
$IdioRet_t$ × *DummyExec*		0.088***		0.094***
		(5.74)		(6.16)
$SysRet_t$ × *DummyExec*			0.120***	0.127***
			(6.25)	(6.65)
Firm×Year FE	YES	YES	YES	YES
Observations	9,000	9,000	9,000	9,000
Adj. R^2	0.114	0.107	0.108	0.116

Table 3: Pay Growth and Stock Performance: Tests for Asymmetric Relation

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. For each firm-year in our sample, there are two observations, one for executives and the other for non-executive employees. *PayGrowth* takes the value of executives' pay growth (*PayGrowthExec*) for executives and the value of non-executive employees' pay growth (*PayGrowthEmp*) for non-executive employees. *CashPayGrowth* takes the value of executives' cash pay growth (*CashPayGrowthExec*) for executives and the value of non-executive employees' pay growth (*PayGrowthEmp*) for non-executive employees. *DummyExec* is a dummy variable that equals one for the observations of executives and zero for those of non-executive employees. *IdioRetHigh* (*IdioRetLow*) equals idiosyncratic return if it is above (below) the sample median in the annual cross-section and zero otherwise, where idiosyncratic return is the return unique to the firm. *SysRetHigh* (*SysRetLow*) equals systematic return if it is above (below) the sample median in the annual cross-section and zero otherwise, where systematic return is the return common to the firm's peer group. Definitions of all other variables are provided in the Appendix. 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 standard errors clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	***$PayGrowth_t$***			***$CashPayGrowth_t$***
	(1)	(2)	(3)	(4)
DummyExec	0.101***	0.109***	0.094***	0.036***
	(13.40)	(19.59)	(12.06)	(6.21)
$IdioRetHigh_t$ × DummyExec (SH×D)	0.114***		0.126***	0.148***
	(4.59)		(4.98)	(7.38)
$IdioRetLow_t$ × DummyExec (SL×D)	0.043*		0.042*	0.007
	(1.82)		(1.75)	(0.36)
$SysRetHigh_t$ × DummyExec (LH×D)		0.122***	0.126***	0.103***
		(4.57)	(4.73)	(4.79)
$SysRetLow_t$ × DummyExec (LL×D)		0.086***	0.097***	0.068***
		(3.60)	(3.95)	(3.49)
Firm×Year FE	YES	YES	YES	YES
F-test for *SH×D= SL×D*	3.26	-	4.23	20.01
(p-value)	*(0.071)*	-	*(0.040)*	*(0.000)*
F-test for *LH×D= LL×D*	-	0.96	0.61	1.30
(p-value)	-	*(0.327)*	*(0.434)*	*(0.255)*
Observations	9,000	9,000	9,000	9,000
Adj. R^2	0.107	0.107	0.115	0.128

Table 4: Asymmetry in Pay Growth Gaps: Alternative Performance Measures and Model Specifications

This table reports the robustness test results for our baseline regressions (Table 3). Panel A is similar to Table 3 except that we examine alternative firm performance measures rather than idiosyncratic return and systematic return. *ResRetHigh* and *ResRetLow* capture the above- and below-median parts of a firm's residual return, and *PredRetHigh* and *PredRetLow* capture the above- and below-median parts of predicted return. *SalesGrwHigh* and *SalesGrwLow* capture the above- and below-median parts of sales growth. *ROAHigh* and *ROALow* capture the above- and below-median parts of ROA. Panel B is similar to Table 3 but with alternative model specifications, using squared return components or using zero instead of median to define the high/low returns. Definitions of all variables are provided in the Appendix. Panel C is similar to Table 3 except using alternative fixed effects including Industry×Year fixed effects, Industry and Year fixed effects, and Industry×Year together with Firm 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 standard errors clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A: Alternative Firm Performance Measures

	Dependent Variable: *PayGrowth*$_t$		
	(1)	(2)	(3)
DummyExec	0.117***	0.102***	0.108***
	(12.52)	(17.69)	(18.14)
ResRetHigh$_t$ × DummyExec (SH× D)	0.130***		
	(5.28)		
ResRetLow$_t$ × DummyExec (SL× D)	0.049*		
	(1.96)		
PredRetHigh$_t$ × DummyExec (LH× D)	0.044*		
	(1.78)		
PredRetLow$_t$ × DummyExec (LL× D)	0.260***		
	(6.19)		
SalesGrwHigh$_t$ × DummyExec (PH× D)		0.186***	
		(3.86)	
SalesGrwLow$_t$ × DummyExec (PL× D)		0.000	
		(-0.20)	
ROAHigh$_t$ × DummyExec (PH× D)			0.149**
			(2.05)
ROALow$_t$ × DummyExec (PL× D)			-0.020
			(-0.84)
Firm×Year FE	YES	YES	YES
F-test for *SH×D= SL×D*	3.58	-	-
(p-value)	*(0.059)*	-	-
F-test for *LH×D= LL×D*	14.91	-	-
(p-value)	*(0.000)*	-	-
F-test for *PH× D = PL× D*	-	14.93	4.52
(p-value)	-	*(0.000)*	*(0.034)*
Observations	9,000	9,000	9,000
Adj. R^2	0.121	0.103	0.100

Panel B: Alternative Model Specifications

	Dependent Variable: *PayGrowth*$_t$	
	(1)	(2)
DummyExec	0.110***	0.104***
	(15.43)	(11.58)
IdioRet$_t$ × *DummyExec*	0.082***	
	(5.10)	
SysRet$_t$ × *DummyExec*	0.133***	
	(6.93)	
IdioRet$_t$^2 × *DummyExec*	0.059*	
	(1.77)	
SysRet$_t$^2 × *DummyExec*	-0.159***	
	(-3.48)	
IdioRetPos$_t$ × *DummyExec (SP× D)*		0.132***
		(5.19)
IdioRetNeg$_t$ × *DummyExec (SN× D)*		0.033
		(1.36)
SysRetPos$_t$ × *DummyExec (LP× D)*		0.058*
		(1.81)
SysRetNeg$_t$ × *DummyExec (LN× D)*		0.146***
		(5.08)
Firm×Year FE	YES	YES
F-test for *SP×D= SN×D*	-	5.78
(p-value)	-	*(0.016)*
F-test for *LP×D= LN×D*	-	3.06
(p-value)	-	*(0.080)*
Observations	9,000	9,000
Adj. R^2	0.118	0.116

Panel C: Alternative Fixed Effects

	Dependent Variable: *PayGrowth*$_t$		
	(1)	(2)	(3)
DummyExec	0.085***	0.084***	0.090***
	(10.77)	(10.78)	(11.06)
IdioRetHigh$_t$ × *DummyExec (SH× D)*	0.173***	0.171***	0.165***
	(6.79)	(6.73)	(6.09)
IdioRetLow$_t$ × *DummyExec (SL× D)*	0.051**	0.059**	0.057**
	(2.07)	(2.46)	(2.32)
SysRetHigh$_t$ × *DummyExec (LH× D)*	0.135***	0.166***	0.121***
	(4.76)	(5.87)	(4.24)
SysRetLow$_t$ × *DummyExec (LL× D)*	0.082***	0.087***	0.099***
	(3.23)	(3.44)	(3.88)

	Dependent Variable: ***PayGrowth$_t$***		
	(1)	(2)	(3)
Industry×Year FE	YES	-	YES
Industry FE	-	YES	-
Year FE	-	YES	-
Firm FE	-	-	YES
F-test for *SH×D= SL×D*	8.80	7.43	6.40
(p-value)	*(0.003)*	*(0.007)*	*(0.012)*
F-test for *LH×D= LL×D*	1.85	4.27	0.31
(p-value)	*(0.174)*	*(0.039)*	*(0.58)*
Observations	9,000	9,000	9,000
Adj. R^2	0.098	0.088	0.098

Table 5: Asymmetry in Pay Growth Gaps: Matched Employee Samples

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. The regression design is the same as Table 3 except that we use alternative employee samples. For each firm-year in our sample, there are two observations, one for executives and the other for non-executive employees. In column (1), the dependent variable takes the value of executives' pay growth (*PayGrowthExec*) for executives of a firm, and takes the value of the pay growth of the firm's old employees with similar demographic characteristics (in terms of gender, race, and education) to those of a typical executive for non-executive employees. In column (2), the dependent variable takes the value of executives' pay growth (*PayGrowthExec*) for executives of a firm, and takes the value of the pay growth of the firm's young employees with similar demographic characteristics (in terms of gender, race, and education) to those of a typical executive for non-executive employees. *DummyExec* is a dummy variable that equals one for the observations of executives and zero for those of non-executive employees. Definitions of all other variables are provided in the Appendix. Both 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 standard errors clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: $PayGrowth_t$	
	Old Matched employees	**Young Matched employees**
	(1)	(2)
DummyExec	0.063***	0.053***
	(7.74)	(6.46)
$IdioRetHigh_t$ × *DummyExec (SH× D)*	0.116***	0.122***
	(4.31)	(4.68)
$IdioRetLow_t$ × *DummyExec (SL× D)*	0.028	0.036
	(1.05)	(1.41)
$SysRetHigh_t$ × *DummyExec (LH× D)*	0.101***	0.126***
	(3.63)	(4.52)
$SysRetLow_t$ × *DummyExec (LL× D)*	0.077***	0.076***
	(3.01)	(2.90)
Firm×Year FE	YES	YES
F-test for *SH×D= SL×D*	4.06	4.06
(p-value)	*(0.044)*	*(0.044)*
F-test for *LH×D= LL×D*	0.37	1.61
(p-value)	*(0.541)*	*(0.205)*
Observations	8,600	8,600
Adj. R^2	0.109	0.090

Table 6: Asymmetry in Pay Growth Gaps: Shocks to Corporate Governance from Universal Demand Laws

This table reports the differential response of a firm's executive and non-executive pay growth to the firm's stock performance measures based on the staggered passage of state-level universal demand (UD) laws. UD is a dummy variable that equals one if a firm is incorporated in a state that had previously adopted a universal demand law, and zero otherwise. For each firm-year in our sample, there are two observations, one for executives and the other for non-executive employees. *PayGrowth* takes the value of executives' pay growth (*PayGrowthExec*) for executives and the value of non-executive employees' pay growth (*PayGrowthEmp*) for non-executive employees. *DummyExec* is a dummy variable that equals one for the observations of executives and zero for those of non-executive employees. Definitions of all the variables are provided in the Appendix. Columns (1) and (2) examine firm-years incorporated in states without and with UD laws, respectively. Column (3) has all firm-years in our sample. All regressions include firm×year fixed effects. The number of firm-years is rounded to the nearest hundreds according to the disclosure requirements of the U.S. Census Bureau. T-statistics are based on standard errors clustered by firm and state. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: *PayGrowth*$_t$		
Sample:	**Without UD Laws**	**With UD Laws**	**Full Sample**
	(1)	(2)	(3)
DummyExec	0.104***	0.039*	0.104***
	(10.48)	(2.14)	(10.54)
IdioRetHigh$_t$ × DummyExec (SH × D)	0.106***	0.239***	0.106***
	(6.97)	(4.36)	(7.01)
IdioRetLow$_t$ × DummyExec (SL × D)	0.055***	-0.037	0.055***
	(2.88)	(-0.69)	(2.89)
SysRetHigh$_t$ × DummyExec (LH × D)	0.115***	0.187***	0.115***
	(3.71)	(3.75)	(3.73)
SysRetLow$_t$ × DummyExec (LL × D)	0.101***	0.095*	0.101***
	(4.64)	(2.15)	(4.67)
DummyExec × UD			-0.065***
			(-3.19)
IdioRetHigh$_t$ × DummyExec × UD			0.133**
			(2.39)
IdioRetLow$_t$ × DummyExec × UD			-0.093
			(-1.64)
SysRetHigh$_t$ × DummyExec × UD			0.072
			(1.25)
IdioRetLow$_t$ × DummyExec × UD			-0.006
			(-0.12)
Firm×Year FE	YES	YES	YES
F-test for *SH × D = SL × D*	4.54	12.41	-
(p-value)	*(0.044)*	*(0.004)*	-
F-test for *LH× D = LL × D*	0.08	2.31	-
(p-value)	*(0.778)*	*(0.155)*	-
Observations	7,600	1,400	9,000
Adj. R^2	0.112	0.140	0.116

Table 7: Asymmetry in Pay Growth Gaps: Additional Evidence for Managerial Rent Extraction

This table reports additional evidence for managerial rent extraction based on subsample analysis. For each firm-year in our sample, there are two observations, one for executives and the other for non-executive employees. *PayGrowth* takes the value of executives' pay growth (*PayGrowthExec*) for executives and the value of non-executive employees' pay growth (*PayGrowthEmp*) for non-executive employees. *DummyExec* is a dummy variable that equals one for the observations of executives and zero for those of non-executive employees. *IdioRetHigh* (*IdioRetLow*) equals idiosyncratic return if it is above (below) the sample median in the annual cross-section and zero otherwise, where idiosycnratic return is the return unique to the firm. *SysRetHigh* (*SysRetLow*) equals systematic return if it is above (below) the sample median in the annual cross-section and zero otherwise, where systematic return is the return common to the firm's peer group. Definitions of all the variables are provided in the Appendix. Columns (1) and (2) examine firms with above- and below-median analyst coverage (*AnaCov*), respectively. Columns (3) and (4) examine firms with above- and below-median industry-level union coverage (*UnionCov*), respectively. Columns (5) and (6) examine firms with above- and below-median labor productivity, i.e., sales per employee (*SalesEmp*), respectively. 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 standard errors clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: $PayGrowth_t$					
Subsample:	**High *AnaCov***	**Low *AnaCov***	**High *UnionCov***	**Low *UnionCov***	**High Labor Prod.**	**Low Labor Prod.**
	(1)	(2)	(3)	(4)	(5)	(6)
DummyExec	0.121***	0.062***	0.105***	0.083***	0.093***	0.095***
	(10.22)	(6.32)	(8.80)	(8.37)	(8.26)	(8.70)
$IdioRetHigh_t$ × *DummyExec (SH× D)*	0.103***	0.159***	0.143***	0.102***	0.134***	0.119***
	(2.78)	(4.73)	(3.77)	(3.05)	(3.42)	(3.68)
$IdioRetLow_t$ × *DummyExec (SL× D)*	0.086**	-0.011	0.079**	0.011	0.132***	-0.013
	(2.32)	(-0.37)	(2.25)	(0.35)	(3.65)	(-0.41)
$SysRetHigh_t$ × *DummyExec (LH× D)*	0.142***	0.084**	0.151***	0.100***	0.213***	0.053
	(3.61)	(2.34)	(4.01)	(2.65)	(5.30)	(1.50)
$SysRetLow_t$ × *DummyExec (LL× D)*	0.104***	0.108***	0.104***	0.086***	0.084**	0.107***
	(2.96)	(3.52)	(2.89)	(2.60)	(2.27)	(3.20)
Firm×Year FE	YES	YES	YES	YES	YES	YES
F-test for *SH × D = SL × D*	0.07	10.78	1.09	2.93	0.00	6.20
(p-value)	*(0.788)*	*(0.001)*	*(0.297)*	*(0.087)*	*(0.982)*	*(0.013)*
F-test for *LH× D = LL × D*	0.45	0.28	0.72	0.07	5.01	1.16
(p-value)	*(0.504)*	*(0.600)*	*(0.396)*	*(0.785)*	*(0.026)*	*(0.282)*
Observations	4,800	4,200	4,500	4,500	4,500	4,500
Adj. R^2	0.110	0.121	0.132	0.097	0.132	0.100

Table 8: Asymmetry in Pay Growth Gaps: Alternative Explanations

This table uses alternative samples to perform panel regressions of a firm's executive and non-executive pay growth on the firm's stock performance measures. For each firm-year in our sample, there are two observations, one for executives and the other for non-executive employees. *PayGrowth* takes the value of executives' pay growth (*PayGrowthExec*) for executives and the value of non-executive employees' pay growth (*PayGrowthEmp*) for non-executive employees. *DummyExec* is a dummy variable that equals one for the observations of executives and zero for those of non-executive employees. *IdioRetHigh* (*IdioRetLow*) equals idiosyncratic return if it is above (below) the sample median in the annual cross-section and zero otherwise, where idiosyncratic return is the return unique to the firm. *SysRetHigh* (*SysRetLow*) equals systematic return if it is above (below) the sample median in the annual cross-section and zero otherwise, where systematic return is the return common to the firm's peer group. Definitions of all the variables are provided in the Appendix. Column (1) keeps only executives that remain with the firm in year *t+1* for the executive pay growth calculation. Columns (2) and (3) examine firms with above- and below-median peer returns, respectively. 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 standard errors clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: *PayGrowth$_t$*		
Alternative sample:	**Require Exec Stay in *t+1***	**High Peer Returns**	**Low Peer Returns**
	(1)	(2)	(3)
DummyExec	0.121***	0.104***	0.083***
	(9.98)	(8.80)	(7.66)
IdioRetHigh$_t$ × DummyExec (SH× D)	0.139***	0.110***	0.140***
	(3.49)	(2.87)	(4.21)
IdioRetLow$_t$ × DummyExec (SL× D)	-0.017	0.064**	0.011
	(-0.38)	(2.02)	(0.30)
SysRetHigh$_t$ × DummyExec (LH× D)	0.028	0.081**	0.199***
	(0.57)	(2.21)	(4.96)
SysRetLow$_t$ × DummyExec (LL× D)	0.134**	0.121***	0.081***
	(2.35)	(2.88)	(2.62)
Firm×Year FE	YES	YES	YES
F-test for *SH × D = SL × D*	4.78	0.61	4.94
(p-value)	*(0.029)*	*(0.434)*	*(0.027)*
F-test for *LH× D = LL × D*	1.95	0.46	5.16
(p-value)	*(0.163)*	*(0.498)*	*(0.023)*
Observations	6,700	4,500	4,500
Adj. R^2	0.112	0.106	0.126

Table 9: Turnover Rate and Stock Performance: Asymmetric Relation

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. 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*, 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 observations of executives and zero for those of non-executive employees. *IdioRetHigh* (*IdioRetLow*) equals idiosyncratic return if it is above (below) the sample median in the annual cross-section and zero otherwise, where idiosyncratic return is the return unique to the firm. *SysRetHigh* (*SysRetLow*) equals systematic return if it is above (below) the sample median in the annual cross-section and zero otherwise, where systematic return is the return common to the firm's peer group. Definitions of all the variables are provided in the Appendix. 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 standard errors clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Turnover Rate$_t$		
	(1)	(2)	(3)
DummyExec	-0.075***	-0.075***	-0.056***
	(-19.81)	(-19.73)	(-10.83)
TotalRet$_{t-1}$ × *DummyExec*	0.002		
	(0.31)		
IdioRet$_{t-1}$ × *DummyExec*		-0.001	
		(-0.16)	
SysRet$_{t-1}$ × *DummyExec*		0.01	
		(0.84)	
IdioRetHigh$_{t-1}$ × *DummyExec (SH× D)*			-0.054***
			(-4.65)
IdioRetLow$_{t-1}$ × *DummyExec (SL× D)*			0.066***
			(4.36)
SysRetHigh$_{t-1}$ × *DummyExec (LH× D)*			0.000
			(-0.03)
SysRetLow$_{t-1}$ × *DummyExec (LL× D)*			0.019
			(1.01)
Firm×Year FE	YES	YES	YES
F-test for *SH* × *D* = *SL* × *D*	-	-	27.28
(p-value)	-	-	*(0.000)*
F-test for *LH* × *D* = *LL* × *D*	-	-	0.52
(p-value)	-	-	*(0.471)*
Observations	9,000	9,000	9,000
Adj. R^2	0.149	0.149	0.156

Table 10: Employee Pay Growth and Demographic Characteristics

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 dummy variables of employee demographic characteristics. The dependent variable, *PayGrowth*, is the pay growth for a specific group of non-executive employees. We divide non-executive employees in each firm-year into two groups based on gender (column 1) or race (column 2). In each column, there are two observations for each firm-year, corresponding to those two employee groups, respectively. *Dummy* is an indicator variable that equals one for the observation of employees with male employees (column 1), or minority (non-white) employees (column 2), and zero otherwise. *IdioRetHigh* (*IdioRetLow*) equals idiosyncratic return if it is above (below) the sample median in the annual cross-section and zero otherwise, where idiosyncratic return is the return unique to the firm. *SysRetHigh* (*SysRetLow*) equals systematic return if it is above (below) the sample median in the annual cross-section and zero otherwise, where systematic return is the return common to the firm's peer group. Definitions of all the variables are provided in the Appendix. The average demographic characteristics (female, minority, education, age, and personal labor income diversification) for each group of employees, except the one used to divide the sample, are controlled for in each regression. All regressions also include firm×year fixed effects and the average lagged within-firm-year pay rank for an individual employee. 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 standard errors clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Non-Executive *PayGrowth*$_t$	
***Dummy* stands for:**	**Female**	**Minority**
	(1)	(2)
Dummy	-0.041***	-0.012***
	(-7.32)	(-3.74)
IdioRetHigh$_t$ × *Dummy (SH× D)*	-0.006	-0.003
	(0.93)	(-0.43)
IdioRetLow$_t$ × *Dummy (SL× D)*	-0.016**	-0.01
	(-2.36)	(-1.39)
SysRetHigh$_t$ × *Dummy (LH× D)*	-0.027***	-0.012
	(-4.02)	(-1.54)
SysRetLow$_t$ × *Dummy (LL× D)*	-0.022***	-0.009
	(3.77)	(-1.10)
Controls	YES	YES
Firm×Year FE	YES	YES
F-test for *SH* × *D* = *SL* × *D*	0.91	0.35
(p-value)	*(0.340)*	*(0.557)*
F-test for *LH* × *D* = *LL* × *D*	0.32	3.03
(p-value)	*(0.569)*	*(0.082)*
Observations	9,000	8,900
Adj. R^2	0.784	0.751

Appendix: Variable Definitions

Variable	Definition
PayGrowthExec	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.
CashPayGrowthExec	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.
PayGrowthEmp	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.
PayGrowthGap	The difference between *PayGrowthExec* and *PayGrowthEmp*.
TotalRet	A firm's raw stock return in a year.
IdioRet	Equals the annualized average monthly idiosyncratic returns of a firm in a fiscal year, where the idiosyncratic returns are the intercept plus the residuals from a time-series regression of the firm's monthly returns on monthly (equally-weighted) market average returns and monthly (equally-weighted) industry average returns (Daniel et al., 2020).
SysRet	Equals *TotalRet* minus *IdioRet* (Daniel et al., 2020).
IdioRetHigh	Equals *IdioRet* if it is above the sample median in the annual cross-section and 0 otherwise.
IdioRetLow	Equals *IdioRet* if it is below the sample median in the annual cross-section and 0 otherwise.
SysRetHigh	Equals *SysRet* if it is above the sample median in the annual cross-section and 0 otherwise.
SysRetLow	Equals *SysRet* if it is below the sample median in the annual cross-section and 0 otherwise.
IdioRetPos	Equals *IdioRet* if it is greater than 0 and 0 otherwise.
IdioRetNeg	Equals *IdioRet* if it is less than 0 and 0 otherwise.
SysRetPos	Equals *SysRet* if it is greater than 0 and 0 otherwise.
SysRetNeg	Equals *SysRet* if it is less than 0 and 0 otherwise.
PredRet	The predicted return of a firm from the panel regression of a firm's total returns on the peer-group returns, i.e., the value-weighted average returns of all other firms in the same Fama-French 48 industry (Jenter and Kanaan, 2015).
ResRet	The idiosyncratic return of a firm, defined as *TotalRet* minus *PredRet*.
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.
ResRetHigh	Equals *ResRet* when *ResRet* >0 (i.e., its median) and 0 otherwise.
ResRetLow	Equals *ResRet* when *ResRet* <=0 (i.e., its median) and 0 otherwise.
Turnover	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 lagged 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 (PRCCF×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.
SalesGrwHigh	Equals industry-year adjusted sales growth if it is above median in the annual cross-section and 0 otherwise.
SalesGrwLow	Equals industry-year adjusted sales growth if it is below median in the annual cross-section and 0 otherwise.
ROAHigh	Equals industry-year adjusted ROA if it is above median in the annual cross-section and 0 otherwise.
ROALow	Equals industry-year adjusted ROA if it is below median in the annual cross-section and 0 otherwise.
UnionCov	Dummy variable that equals one if the fraction of an industry's employees covered by unions is greater than the sample median in the annual cross-section and 0 otherwise.
AnaCov	Dummy variable that equals one if the number of analysts following a firm is greater than the sample median in the annual cross-section and 0 otherwise.