Equity Pay Beyond the C-Suite[*]

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Abstract

Equity pay is now widespread, but levels vary dramatically across firms. Using hand-collected data on S&P 1500 firms over 1994–2019, we show that firm-level equity pay is highly persistent: lagged values explain over 60% of cross-firm dispersion ten years out, and initial values at IPO are the dominant driver of long-run differences. Financial constraints and peer effects shape these initial values, and firms subsequently manage grants to partially offset stock-price moves. By contrast, CEO equity pay is markedly less persistent and is lower at younger high-growth firms. A dynamic model with financing and retention benefits from accumulated unvested grants rationalizes these patterns, and a counterfactual decomposition attributes over 80% of the rise in equity-pay inequality to rising human capital intensity and productivity volatility.

Keywords: Equity Compensation, Inequality

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1 Introduction

The vast majority public U.S. firms currently use equity-based compensation. In 2019, 84% of firms in the S&P 1500 utilized equity pay outside of the C-Suite. Equity pay is also used broadly across many industries, not only in "tech" and finance, but also in health and energy-related industries, for example. While utilizing equity pay has become very common among firms, dispersion in equity pay across firms remains very large. The substantial heterogeneity in firm-level equity pay policies leads to a large amount of equity-pay inequality among workers. Figure 1 plots the Lorenz curves for equity pay below the C-Suite and for CEO equity pay. This figure shows that the distribution of equity pay is quite unequal and displays higher inequality than the distribution of CEO equity pay.

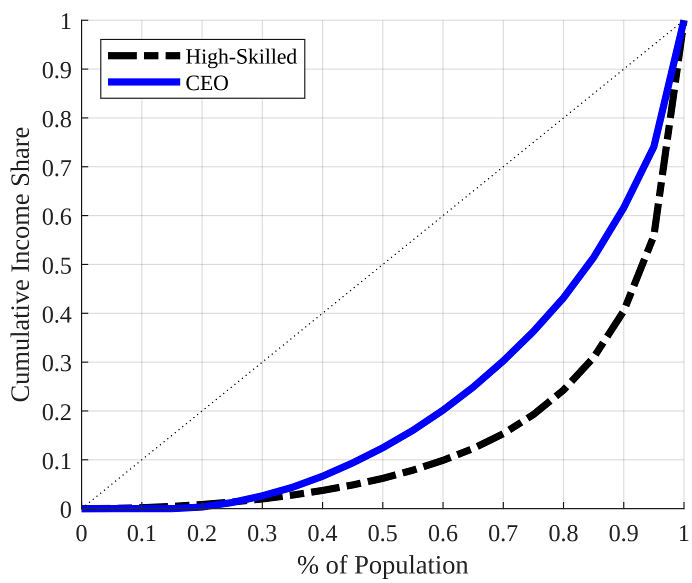


Figure 1: **Lorenz Curve.** This figure plots Lorenz curves of equity pay for high-skilled employees and CEO as of 2019. Gini coefficients for each item are 0.72 for high-skilled and 0.55 for CEO. Equity pay for high-skilled is defined as the value of granted shares per high-skilled employee.

We argue that equity pay beyond the C-Suite is both a compensation and a capital structure decision. As compensation, it defers pay, lowers turnover through unvested equity, and aligns workers with the firm. As capital structure, it lets firms borrow from workers and conduct regularly scheduled repurchases.[1] While the CEO pay literature emphasizes the use of equity pay to sat-

[1]See the Internet Appendix of Eisfeldt, Falato, and Xiaolan (2022) for documentation of the positive relationship between equity pay and repurchases, as well as the difference between diluted and non-diluted earnings per share, at the firm level.

isfy incentive constraints (see the important surveys by Frydman and Jenter (2010) and Edmans, Gabaix, and Jenter (2017)), equity pay can also help with retention and satisfy participation constraints (Oyer, 2004; Sun and Xiaolan, 2019) because it typically requires a vesting period. The retention function may be particularly important beyond the C-Suite where arguably effort has a smaller effect on firm outcomes. We document both similarities and differences between CEO equity pay and equity pay beyond the C-Suite.

Inequality in equity pay beyond the C-Suite can be decomposed into three driving factors, namely, variation in initial values, variation in firms' granting policies, and variation in firm-level stock price dynamics. We find that initial values are very important in determining firm-level heterogeneity in equity pay. Granting policies are very persistent, with average firm-level autoregressive coefficients over 0.8. Panel regressions of equity pay on firm-level characteristics reveal that, similar to firms' capital structures, much of the variation in equity pay across firms is explained by firm fixed effects that in turn cannot be explained by standard characteristics such as size, market-to-book ratios, etc. By contrast, initial values explain a substantial amount of the firm-level variation in equity pay.

What then drives initial values of firms' equity pay? We find two main drivers, financial constraints and peer effects.[2] Firms which hold more cash, don't pay dividends, and which subsequently experience high employment growth have higher equty pay. In terms of cohort effects, we find that industry times initial year fixed effects capture over 10% of the variation in firms' initial equity pay. We also document geographic concentration in equity pay, with equity pay being highest in California, Massachusetts, and New York.[3]

The persistence of initial values mirrors a well-known finding for capital structure. Lemmon, Roberts, and Zender (2008) show that "the majority of variation in leverage ratios is driven by an unobserved time-invariant effect that generates surprisingly stable capital structures". We document the analogous pattern for equity pay by sorting firms into portfolios on initial values and tracking them over time. The rankings of these portfolios, sorted on initial values, does not change

[2] Sun and Xiaolan (2019) show that firms borrow from workers to finance human-related intangibles. Falato, Kadyrzhanova, and Sim (2013) documents the effect of intangibles on capital structure. Faulkender and Yang (2010), Bizjak, Lemmon, and Naveen (2008), Bizjak, Lemmon, and Nguyen (2011), and Albuquerque, De Franco, and Verdi (2013) document peer effects on CEO compensation.

[3] See Hartman-Glaser, Thibodeau, and Yoshida (2023) for a study showing that after trading restrictions on employees are lifted house price changes are linked to the newly-public firms' returns; Albuquerque, Bennett, Custódio, and Cvijanović (2023) document a complementary link between local real estate prices and CEO compensation.

over time. The very-highest equity paying firms do tend to revert downward over many years, but other groups have very stable levels of pay, shares granted, and shares of market capitalization owned by employees.[4]

Persistence is not just a feature of equity pay's dollar value—it also holds for the underlying number of shares granted. A simple AR(1) summarizes firms' share-granting processes well, with a pooled-panel R^2 of about 83%. This finding echoes the main finding in Shue and Townsend (2017) which documents the persistence in the number of options granted to CEOs. When comparing our result to that for CEOs, we show that the persistence in grants is even greater beyond the C-Suite. For the level of the value of equity pay (per-high-skilled-employee shares granted times stock price), the persistence is also high (AR(1) coefficient of 0.68), and the share of variation explained by its own lag is substantial (R^2 of 56%).

Next, we perform a decomposition of the variance across firms in the levels of equity pay, and show that lagged equity pay is a key driver of firm-level heterogeneity in pay. We show that the lag of equity pay explains about 80% of the variation in levels of equity pay even four years later, and about 60% ten years later. For the remaining variation, we show that changes in stock prices are much more important than changes in shares granted. This indicates that workers at firms that experience large capital gains garner higher pay than those at firms with lower stock returns. We compare the results for workers beyond the C-Suite to the results for CEOs. CEO equity pay is less persistent, in the sense that the lag of pay explains less of the cross sectional variation, in particular at shorter horizons. Additionally, the granting policy for CEOs contributes more to the cross-sectional variation in pay than it does beyond the C-Suite. This is consistent with firms needing to manage CEO pay more actively.

We then turn from levels to dynamics. At one extreme, firms could fix the initial grant and let workers absorb all stock-price risk; at the other, they could adjust grants to fully insure workers against price moves. We find that firms provide some insurance to workers in the sense that they both manage grants against share price changes and because lagged equity pay is a strong determinant of current equity pay (consistence with our persistence findings). At the same time, equity pay does expose workers to substantial own-firm stock price risk.

We decompose the variation in the growth rates of equity pay into the contribution from share

[4] DeAngelo and Roll (2015) critique the stable capital structure findings in Lemmon et al. (2008). Thus, we provide additional evidence of persistence for equity pay.

price growth and growth in grants. We show that, at horizons up to five years, about 40% of the variation across firms' equity pay growth rates is due to variation in share price changes, while 60% is due to variation in grant growth rates. This evidence supports the idea that, while workers are exposed to own-firm stock price risk, firms do actively manage grants. Overall, equity pay may impose less labor leverage than wages, but the evidence suggests that there is considerable stickiness.[5]

Our growth-rate variance decomposition also reveals both similarities with and differences to empirical findings in the capital structure literature. In particular, Welch (2004), concludes that "Stock returns are the primary known component of capital structure and capital structure changes". We show that, while stock returns are important for the dynamics of equity pay, changes in share granting policies are much more important for equity pay than for capital structure. Relative to CEO pay, on the other hand, equity pay below the C-suite is much less actively managed. For CEO equity pay, at horizons up to five years, 5-20% of the variation across firms' equity pay growth rates is due to variation in share price changes, while 95-80% is due to variation in grant growth rates. Thus, relative to CEOs, a much larger fraction of the variation in firm-level growth rates in equity pay beyond the C-Suite is due to equity pay's exposure to stock price changes.

Our data on equity-pay-per-high-skilled employee builds on Eisfeldt, Falato, and Xiaolan (2022), whose measurement separates the number of shares granted from share prices—a feature we exploit throughout the paper to decompose equity-pay variation into granting-policy and stock-price components. We greatly extend their data along two dimensions: we cover S&P 1500 firms across all industries, rather than manufacturing only (including hand-collected data from 1996–2019), and we focus on firm-level dispersion rather than aggregate implications for the labor share.

To understand the forces behind these empirical findings, we develop a dynamic model of equity compensation. A firm uses high-skilled human capital to produce output and can irreversibly adopt equity pay by paying a one-time fixed cost. Equity pay creates a stock of unvested equity—an "equity overhang"—that depreciates gradually through vesting. The firm chooses how much human capital to accumulate and how much equity to commit to employees each period, subject to convex adjustment costs on both the equity stock and the equity payout flow.

[5] See Lemmon et al. (2008) and Welch (2004) for evidence on the stickiness of capital structure, and Xiaolan (2014a), Donangelo, Gourio, Kehrig, and Palacios (2019), and Favilukis, Lin, and Zhao (2020) for evidence on labor leverage and wage stickiness at the firm level.

Equity pay operates through two channels. First, a *financing channel*: equity grants substitute for cash wages, deferring compensation and freeing up cash flow for investment. This is particularly valuable for firms that would otherwise face costly external financing. Second, a *retention channel*: the accumulated equity overhang acts as "golden handcuffs," reducing voluntary turnover because employees forfeit unvested equity if they leave. Both channels make equity pay especially attractive for younger, faster-growing firms with high desired investment in human capital.

The model generates the key empirical patterns. Adjustment costs on the equity stock and payout flow produce the high persistence of equity pay documented in the data. The irreversible adoption decision generates path dependence: firms that adopt early accumulate more human capital along persistently higher growth trajectories, rationalizing the dominant role of initial values in driving cross-sectional heterogeneity. The model also produces active but sluggish grant management—firm value responds instantly to productivity shocks while equity commitments adjust gradually—consistent with our evidence that firms partially insure workers against stock price movements.

We use the model to ask what has driven the rise in equity pay inequality documented in Figure 1. We compare two steady states calibrated to 1990s and 2010s parameters and decompose the change in the 90/25 interpercentile ratio of equity pay using Shapley values. Four structural changes contribute: declining adoption costs (due to regulatory simplification and SaaS administration platforms), lower shareholder dilution costs, rising human capital intensity, and increasing firm-level productivity volatility. The model accounts for a substantial fraction of the observed increase in equity pay inequality and the rise in adoption rates.

The paper proceeds as follows. Section 2 briefly describes the data, with further details contained in the Appendix, Section A. Section 3 presents the main stylized facts about the level and variation in equity pay from 1994 to the present. Section 4 presents the evidence for understanding how the firm-level distribution of equity pay has been determined. Section 5 discusses the dynamics of equity pay beyond the C-suite. Section 6 presents a benchmark model of equity compensation that rationalizes the empirical patterns. Section 7 uses the model to decompose the rise in equity pay inequality. Section 8 concludes.

Related Literature There is an established literature on equity compensation in finance, which has focused mainly on the C-suite (see Frydman and Jenter (2010) and Edmans et al. (2017) for comprehensive surveys). Our finding of persistence is closest to Shue and Townsend (2017) who find that CEO stock option grants are sticky. A handful of papers have examined equity pay beyond the C-suite, with the analysis limited to either the largest firms in the S&P500 index (Hall and Murphy (2003)) or a short time series for which commercial data on broad-based equity grants was available (Babenko, Lemmon, and Tserlukevich (2011)). Oyer and Schaefer (2005) test alternative theories for why firms grant options to all employees, finding more support for sorting and retention than for incentive provision, and Oyer and Schaefer (2006) quantify the costs of broad-based plans relative to cash compensation. McKeon (2015) links the cash proceeds from employee option exercises to firms' equity issuance decisions, connecting equity pay to capital structure. Kim and Ouimet (2014) examine the related but institutionally distinct case of Employee Stock Ownership Plans (ESOPs), finding that small ESOPs raise productivity and worker pay but that average effects are small because ESOPs are often adopted for non-incentive reasons such as cash conservation or takeover defense. On the theoretical side, Oyer (2004) argues that firms grant equity to address participation and retention constraints rather than to provide incentives, and Chen (2024) models firm-level performance pay for non-executive workers as insurance against promotion risk in internal tournaments; our model emphasizes a complementary retention and financing mechanism through unvested equity overhang. A small but growing recent literature emphasizes the importance of equity pay as a component of labor income with material consequences for the labor share (see Eisfeldt et al. (2022), Smith, Yagan, Zidar, and Zwick (2018), Smith, Yagan, Zidar, and Zwick (2021), McGrattan and Prescott (2010), Bhandari and McGrattan (2020), and McGrattan (2020)).[6] Across these strands, our distinct empirical contribution is to systematically document the cross-sectional heterogeneity in firm-level equity-granting policies, and its implications on the long-run inequality of compensation across firms.

[6]For related papers on participation constraints and equity pay see Eisfeldt and Papanikolaou (2013) and Hartman-Glaser, Lustig, and Xiaolan (2019a). For contributions to the large literature on incentive constraints and equity pay in the context of executive compensation see the papers cited in these important surveys: Frydman and Jenter (2010), Edmans et al. (2017), Bertrand and Mullainathan (2001), and Garvey and Milbourn (2006). Lemieux, MacLeod, and Parent (2009) is an important exception to the more typical C-suite-only focus in studies of incentive compensation. For private equity pay as labor income, see Smith, Yagan, Zidar, and Zwick (2018) and Smith, Yagan, Zidar, and Zwick (2021). For sweat equity, see McGrattan and Prescott (2010), Bhandari and McGrattan (2020), and McGrattan (2020). For the mis-measurement of high-skilled pay due to missing equity pay in standard compensation sources such as BEA and BLS data see Eisfeldt et al. (2022).

The literature on income inequality has documented large wage differences across workers that have widened over time (Piketty and Saez (2003) and Piketty, Saez, and Zucman (2018); see also Autor (2014), Caicedo, Robert E. Lucas, and Rossi-Hansberg (2016), Gabaix, Lasry, Lions, and Moll (2016), Stokey (2016)). Song, Price, Guvenen, Bloom, and Von Wachter (2019) show that average differences in wages across firms account for the bulk of the wage differences across workers. Lemieux, MacLeod, and Parent (2009) show that performance pay contributes to income inequality. Gabaix and Landier (2008), Kaplan and Rauh (2010), and Frydman and Papanikolaou (2015) examine the link between CEO pay and inequality. To the best of our knowledge, we are the first to provide large sample evidence on inequality for equity pay beyond the C-suite.[7]

Our new data on equity pay at the firm level suggests that such pay may actually bear a closer relation to the capital structure literature (and capital structure decisions) than one might have expected ex-ante. Equity pay sounds like a compensation decision. However, it also has a capital structure component since it likely has effects on employee firm ownership and certainly has implications for firms' abilities to do scheduled repurchases. Our findings of persistence and peer effects in equity pay are in line with the evidence in the capital structure literature that firm leverage is persistent (Lemmon et al. (2008) and Welch (2004))[8] and that industry peer capital ratios are an important determinant of firm capital structures (Leary and Roberts (2014)).

2 Data Description

2.1 Sample Construction

Our sample is based on S&P 1500 firms, following the procedure used to construct Execucomp.[9] The S&P 1500 is constructed to be a benchmark for the U.S. equity market. It contains large, mid-cap, and small firms.[10] We use Fama and French industry definitions,[11] and also construct six

[7]See also Autor (2019), Frydman and Saks (2010).

[8]DeAngelo and Roll (2015) partially qualify the findings of perisitence of leverage ratios by showing that it holds over the medium run but not over the longer run of 20 years and longer.

[9]Execucomp states that from 1994 onward they begin including the full S&P 1500 as well as companies that were once part of the index that are still trading. See https://wrds-www.wharton.upenn.edu/pages/grid-items/compustat-execucomp-basics/.

[10]"The S&P 1500 is designed for investors seeking to replicate the performance of the U.S. equity market, or benchmark against a representative universe of tradable stocks. The S&P 1500 combines three widely followed indices—the S&P 500, S&P MidCap 400, and S&P SmallCap 600—in proportion to their free-float market capitalizations." https://www.spglobal.com/en/research-insights/articles/the-sp-composite-1500-an-efficient-measure-of-the-u-s-equity-market.

[11]https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

broad industries following Xiaolan (2019). Figure 11 Panel A shows the industry composition of our sample over time. Our sample uniformly spans all major industries, with high tech and health industries accounting for an average of 17% and 20% of the sample in 2019.

2.2 Annual Firm-Level Equity Grant Data

Following Eisfeldt, Falato, and Xiaolan (2022), we use firm-level data on shares reserved for employee compensation to generate annual firm-level observations on the contemporaneous flow of equity-based pay. Reserved shares are authorized by the board of directors, and appear as a treasury stock liability on firms' balance sheets. Compustat defines the *reserved share* (RS) variable as the item that "... represents shares reserved for stock options outstanding as of year-end plus options that are available for future grants."

Securities law requires firms to disclose shares reserved for compensation in order to disclose the expected dilution to existing shareholders. To be in compliance with the SEC, firms must reserve shares in an amount that reflects the value of shares granted. This is because equity compensation involves issuing underpriced shares, thereby diluting existing shareholders. Thus, firms face a tradeoff in that they do not want to reserve too many shares and signal too much future dilution to shareholders. On the other hand, they do not want to reserve too few shares and be in violation of SEC rules. We note that offsetting dilution due to issuing underpriced shares to employees is an allowed reason for regular repurchases under IRS rules. The data Appendix A.3 contains additional details on the construction of our annual firm-level equity grants.

Each observation is the average equity pay at firm i in year t, where equity pay is defined as the value of granted shares per high-skilled employee. We use the number of employees in Compustat, and multiply this number by the ratio of high-skilled to total workers. To compute the ratio of high-skilled employees, we use the ONET data as described in the Appendix Section A.1. Because our estimates are derived from firm-level data and not worker-level data, we cannot identify the precise workers who receive equity-based compensation at a particular firm. We allocate all of equity pay to high-skilled labor. IRS data shows that 97% of equity pay goes to earners in the top 10% of the income distribution for the available sample from 2008-2017, and this fraction is nearly constant over that time period.[12] Other auxiliary data sources, such as levels.fyi, suggest

[12]The cutoff for the 90th income percentile was $108,000 in 2017. See Table 6A of the publicly-available W2 data

that equity-based compensation is used heavily for engineers and for a broad set of managers.

We obtain the estimate of equity pay for CEOs from the Execucomp dataset, and Appendix A.2 includes details of CEO equity pay construction. Table 2 presents summary statistics for equity pay beyond the C-Suite and for CEOs, as well as for shares reserved for compensation relative to total shares.

3 Equity Pay Inequality

In this section we describe overall inequality in equity pay by documenting the heterogeneity across firms and industries in equity pay beyond the C-Suite.

Figure 1 plots the Lorenz curves for equity pay beyond the C-Suite and for CEO equity pay in 2019. Equity pay beyond the C-Suite generates the most unequal distribution plotted. The Gini coefficient for equity pay beyond the C-Suite is 0.72, compared to 0.55 for CEO equity pay. Panel B of Figure 12 shows dynamics of the relative degree of equity-pay inequality for CEOs vs. beyond the C-Suite by plotting the time series of the Gini coefficients from each distribution. While inequality in CEO equity pay has declined fairly steadily since 2001, inequality in equity pay beyond the C-Suite has increased in the most recent two decades following the Great Financial Crisis.

Panel A of Figure 12 graphs the median equity pay for high-skilled labor and for CEOs over time, in thousands. The blue line plots median equity pay over time at the employee level, meaning there is one observation per high-skilled employee. The dashed red line plots median CEO equity pay over time. While the median CEO equity pay has mostly increased from 1994 to 2019, equity pay beyond the C-Suite grew steadily from 1994 to 2007, when it declined sharply before reverting to growing at a slower rate than before the Great Financial Crisis.

Panel C of Figure 12 plots the 25th, median, 75th and 90th percentiles of equity paying firms. Each observation is per-high-skilled-employee pay in a firm/year. The 90th percentile of equity pay across firms is over $275K in 2019. Inequality in equity pay is large. Inequality in equity pay across firms grew from 1994 to 2007, and contracted in the Global Financial Crisis. Following the Global Financial Crisis, inequality grew again, and is currently at the highest level ever in

available at https://www.irs.gov/pub/irs-soi/17inallw2.xls. See also McGrattan and Prescott (2010), who emphasize the outsized earnings from capital gains by managerial and professional workers in the Federal Reserve's Survey of Consumer Finances.

terms of the 90th-10th percentile range, as well as in terms of the interquartile range. Growth in inequality is primarily driven by growth in the right tail, as can be observed in Panel C of Figure 12. The median and 25th percentiles of equity pay have not increased, or have decreased, since the mid-2000s. Panel A of Figure 13 plots the interquartile range of equity pay over time. Combining the messages in Figures 12 and 13 shows that the interquartile range increased due to the increase in equity pay by the top quartile of equity-paying firms.

We compare the ratio of the interquartile range (IQR) of equity pay beyond the C-Suite to the ratio for CEOs in Panel B of Figure 13. While the IQR/median ratio has declined fairly steadily for CEOs over the last 25 years, this ratio has remained flat for equity pay beyond the C-Suite. Thus this figure provides further evidence of the rise of inequality in equity pay across firms is among employees beyond the C-Suite. We also show how equity pay contributes to overall income inequality within the broad manufacturing sector covered by the NBER-CES data.[13] Figure 22 plots the median wages for low and high-skilled employees along with the median total pay (wages plus equity pay) for high-skilled workers. The figure shows that, when equity pay is allocated to high-skilled labor consistent with IRS statistics, equity pay has typically increased inequality between skilled and unskilled workers. One exception is during the financial crisis, when overall pay contracted much more for high-skilled workers with equity pay.

Next, we provide evidence that equity pay beyond the C-Suite is used in a wide array of industries, but certain industries utilize equity pay more. As we show below, industry times initial year fixed effects contribute significantly to initial levels of equity pay beyond the C-Suite, consistent with some level of industry concentration. In terms of overall industry composition, recall that Panel A of Figure 11 plots the industry share of firms in our S&P 1500 sample, which is designed to be representative of U.S. industries. Panel B of Figure 11 plots the industry shares of total equity pay. A comparison of these two figures shows that Finance, Health and High Tech have a higher share of equity pay than their share of the number of firms. Panel B additionally shows that the importance of different industries in total equity pay varies over time. High Tech is important for

[13] See `https://www.nber.org/research/data/nber-ces-manufacturing-industry-database`. We are constrained to broad manufacturing industries due to the use of wage data in this figure. For this figure only, we use the NBER-CES data to classify workers as high or low skilled, and for wage data, as in Eisfeldt et al. (2022). The median of total high-skilled pay is constructed across industries after building industry-level total pay using the median firm-level per-worker equity pay and the high-skilled wage for each 4-digit SIC code industry from the NBER-CES. This data ends in 2018.

overall equity pay, but more so in the earlier sample. The share of equity pay in Health is growing faster than the number of Health firms in our sample. Finance is significant, but perhaps not as important as one might expect, especially relative to Consumer and Manufacturing firms.

Panel C of Figure 11 plots the industry composition of the top 10% of firms in terms of per-high-skilled-employee equity pay. That is, we order firms by the level of their per-high-skilled-employee equity pay each year and plot the share of firms from each industry in this top decile of equity-paying firms. The figure shows that although Finance is not the largest share of equity pay overall, it is on average the largest industry represented in the top 10% highest equity pay firms. High Tech and Health are also important for the top 10%, with the importance of High Tech shrinking, while Health's share of the top 10% is growing. In 2008, the share of High Tech in the top 10% shrank the most, while the Health share grew. Note that "other" includes Business Services, and has a non-negligible share of top equity paying firms. The Appendix provides further industry breakdowns.

4 Equity Pay Persistence and the Importance of Initial Values

Mechanically, the current distribution can be decomposed into the effect from the initial values of the level of equity pay in our sample ($P^i_{\text{Init}} N^i_{\text{Init}}$), the path of shares granted over time by each firm ($N^i_{t\in\{\text{Init},t\}}$), and the dynamics of firms' capital gains ($P^i_{t\in\{\text{Init},t\}}$). In this section, we document the importance of initial values and persistence in equity pay in contributing to firm-level heterogeneity in equity pay beyond the C-Suite. In particular, we establish three facts regarding equity pay persistence. First, persistence in equity pay from initial values can be seen by comparing the findings in Lemmon et al. (2008) for leverage ratios in firms' capital structures to an analogous analysis for equity pay. Second, AR(1) regressions also show a strong and persistent effect of initial values (and lagged equity pay) on equity pay over firms' life cycles. Initial values are, as is true for firms' capital structure, largely driven by unexplained firm effects. However we show that financial constraints and peer effects play a significant role. Much of the persistence in equity pay comes from highly persistent share granting policies (the AR(1) coefficient of N_t on its own lag is 0.83.) while changes in stock prices reduce pay persistence. Finally, using a cross-sectional variance decomposition for the cross-section of the levels of equity pay across firms, we show that even at medium to long horizons, lagged equity pay explains the majority of this variance.

4.1 Back to the Beginning: The Importance of Initial Values of Equity Pay

Following Lemmon et al. (2008), we plot the dependence of equity pay on initial values. In the following exercise, the initial value is defined as the level of equity pay at the beginning of our sample 1994. Specifically, we execute the following procedure:

1. Starting in 1994, we sort firms into quartiles based on equity pay (P_tN_t), shares granted (N_t), or the ratio of reserved shares to shares outstanding. We label these quartile portfolios High, Medium-High, Medium-Low, and Low.

2. We compute the equally-weighted average values within each of these 1994-sorted portfolios for the subsequent 10 years, holding the portfolio composition constant.

3. We conduct this sorting and within-portfolio averaging for the four portfolios sorted in each subsequent year from 1995 to 2019, using as many post-sort years as are available up to a maximum of 10 years.

4. We average the portfolio values across sorting years for each "event year", that is, for one year post-sort, two years post-sort, etc. This yields time series averages for portfolios High, Medium-High, Medium-Low, and Low in event years.

5. Finally, we repeat this analysis using the subsample of firms that exist throughout each post-sort period (*Survivors*).

The results are plotted in Figure 14. The figures clearly show that equity pay is determined by firm effects that are fairly constant over long periods of time. Panel A of Figure 14 plots the results for P_tN_t. The bottom three quartiles of equity pay grow very slowly over time. However, the portfolio with the highest numbers of initial shares granted reverts downward over time. Panel B of Figure 14 plots the results for reserved shares to shares outstanding. These are also very persistent, but do converge at a low rate over time. Finally, Panel C of Figure 14 plots the results for the number of shares granted. The bottom three quartiles of equity pay have nearly constant numbers of shares granted over time. However, the portfolio with the highest numbers of initial shares granted reverts downward over time. We repeat our analysis using the subsample of firms that are "survivors" over the entire 10 years since portfolio formation in the Appendix. The results are robust to this alternative.[14]

Panel D of Figure 14 plots results analogous to Panel A for CEOs. The patterns across pay levels are quite different from the results for pay beyond the C-Suite. The main difference between CEO pay and equity pay beyond the C-suite is that beyond the C-Suite higher paying firms tend to decrease pay faster over time than is the case for high CEO-equity pay.

4.2 Persistence and Initial Values

The Lemmon et al. (2008) results illustrate the persistent effects of initial conditions on firms' equity pay policies. In this section, we directly document the persistence of firms' equity pay policies. Table 3 reports regressions of N_t on (1) a firm fixed effect, (2) a constant and the initial value of N_{Init}, and (3) a constant and N_{t-1}. We present results in levels and logs. The result illustrates the strong persistence of N_t. While firm fixed effects, and initial conditions, are important, the own lag of N_t explains 83% of the variation and the AR(1) coefficient is high, 0.87. Prices are also very persistent, as shown in Table 4. The persistence of equity pay is lower (0.72) than that of shares granted (see Table 5). This is consistent with firms tending to reduce the number of shares granted when capital gains are large.

Table 6 presents analogous results to those in Table 5 but for CEOs, and shows that CEO pay is much less persistent in the sense that it has a much lower AR(1) coefficient than that estimated on data beyond the C-Suite. Additionally, the R^2 in Column 2 and 3 show that initial values and lagged values explain a much smaller amount (2.2% and 9.2%, respectively) of the variation in CEO equity pay.

4.3 Explaining Initial Values: Financial Constraints and Peer Effects

Clearly, initial values play an important role in the distribution of equity pay many years later. But, what determines these initial values? We show that a large fraction of the variation is explained by cohort effects, namely, initial year × industry fixed effects, and also find that financial constraints matter.[15] Table 7 presents the results. Column 1 shows that the fraction of cross-sectional variation

[14] See Figure 23.

[15] See **?** for evidence that peer effects may not be equal across peers and a methodology to measure the heterogeneous effects.

in initial values of equity pay that can be explained by the initial year × industry fixed effects is 16%. This table also shows that the variation in initial values is consistent with equity pay being used to relax financial constraints, potentially in the context of financing intangible assets. Falato et al. (2013) documents the tendency of intangible-dependent firms to hold greater cash and Sun and Xiaolan (2019) shows that intangible-intensive firms relies on deferred equity pay for financing, consistent with the highly significant relationship between cast to assets and initial equity pay values across firms. Firms that do not pay dividends also have higher initial equity pay.[16] In a multivariate regression including variables capturing financial constraints and industry average equity pay in the initial year we are able to capture about 75% of the variation explained by IPO year × Industry fixed effects.

The significant industry fixed effects point to the importance of peer effect for equity pay. A deferred compensation component is typically used for employee retention, i.e. to match employees' outside option from other firms within industry.[17] In line with this retention mechanism, geographic peer effects also appear to play a role in initial values for equity pay. Figure 15 presents a heat map describing the average equity pay in 2019 to provide context. Table 7 documents the relationship between initial values for equity pay and industry and city average equity pay, and shows that both industry and geographical peers seem to influence firms' setting of initial equity pay. This is consistent with equity pay being used partly to satisfy participation constraints (Sun and Xiaolan, 2019), and with employees outside options being determined by local and industry practices.

Causal Evidence: Financial Constraints and Equity Pay. To provide causal evidence that equity pay is related to firms' financial constraints, we exploit a series of court decisions that strengthened creditor rights for patent-holding firms incorporated in Delaware, as documented by Mann (2018). These rulings allowed firms to more effectively pledge patents as collateral for debt financing, thereby relaxing their financial constraints through an alternative channel. If equity pay serves in part as an internal financing tool—substituting for costly external finance—then firms that gain access to patent-backed debt should have less need to rely on equity compensation.

[16] In the regression of table 7, we allow the pre-1994 value if the first-time equity pay was issued before 1994. There is decent overlap between the initial value and the value of equity pay at the initial year, but it is not always the case.

[17] A long-term compensation contract features a deferred component to satisfy employees' participation constraints. See, for instance, Xiaolan (2019); Sun and Xiaolan (2019).

We estimate a difference-in-differences specification comparing Delaware-incorporated firms (treated) to other firms around the court decisions, with the event window centered on 2002. Table 8 reports the results. Columns 1–3 show that the simple treatment effect (Treated × Post) is not statistically significant on its own. The key result appears in columns 4–6, which interact the treatment with the number of pledged patents. The triple-interaction term (Treated × Pledged Patents × Post) is negative and highly significant: firms that are both incorporated in Delaware and hold more pledgeable patents reduce their equity pay after the court decisions relax their access to debt financing. This result holds across different sample windows (±5 and ±10 years around the event) and when controlling for lagged equity pay. The finding is consistent with equity pay serving a financing function: when an alternative source of financing becomes available, firms substitute away from equity compensation.

4.4 Decomposing Cross-Sectional Variation in Equity Pay Beyond the C-Suite

The current distribution of equity pay exhibits very large inequality. To understand the current distribution of $P_t N_t$, we documented drivers of the initial values of the level of equity pay of firms in our sample ($P^i_{\text{Init}} N^i_{\text{Init}}$). Next, we study the joint dynamics of the shares granted over time by each firm ($N^i_{t\in\{\text{Init},t\}}$) and the dynamics of firms' capital gains ($P^i_{t\in\{\text{Init},t\}}$). Figure 16 Panel A plots the variance decomposition of changes in the value of equity pay over horizons from one to ten years. As can be seen in the Figure, the largest fraction of variation is explained by lagged equity pay. After lagged equity pay, variation in price returns explains the next largest fraction of variation in equity pay, up to 28% at a ten-year horizon.

Figure 16 Panel B presents the same variance decomposition for CEOs. Comparing the figures, it is clear that, in the short run, the lag of pay explains a much smaller fraction of the variation in CEO equity pay. Instead, shares granted captures a much higher fraction of the variation in the short run, as well as in the long run. The fraction of variation in equity pay explained by its own lag can be interpreted as a measure of smoothing or insurance, and under this interpretation the variance decompositions show that equity pay for workers beyond the C-Suite provides more insurance than that for CEOs.

5 Understanding the Dynamics of Equity Pay Beyond the C-Suite

We explore the main drivers of variation in the growth rates for equity pay across firms. The highly persistent equity pay resembles features in firms' capital structure choices (Lemmon et al., 2008). Indeed, shares of equity granted to employees are part of firms' capital structure decisions. The next natural question is whether changes in equity pay share similar features as firms' capital structure dynamics.

5.1 Decomposing Cross-Sectional Variation in the Growth of Equity Pay Beyond the C-Suite

First, we implement the variance decomposition for the growth of equity pay. Intuitively, the growth of equity pay can be decompose to price effect and share effect. Table 12 documents those results over five-year horizon. In contrast, for equity pay, changes in share prices and "active" changes in shares granted contribute 40% and 60% of variation across firms, and this decomposition is very stable across horizons up to five years. For CEOs, "active" changes in shares contribute an even greater amount to the overall cross-section variation in equity pay growth rates. Table 12 Panel C shows that share prices contribute 4% to 18% of variation while changes in shares contribute the remaining 96% to 82% (Panel D), with the contribution from changes in shares granted declining over time.

5.2 Equity Pay and Capital Structure Dynamics

Welch (2004) shows that firms are not actively managing the leverage ratios, and changes in equity share prices are the primary "known" driver of differences across firms' leverage ratios. Interestingly, our results show that firms managing equity pay more actively than capital structure.

We conduct a similar exercise as Welch (2004) by estimating the following regression:

$$\frac{P_{t+k}RS_{t+k}}{P_{t+k}S_{t+k}+D_{t+k}} = \alpha_0 + \alpha_1 \cdot \frac{P_tRS_t}{P_tS_t+D_t} + \alpha_2 \cdot \frac{P_{t+k}RS_t}{P_{t+k}S_t+D_t} + \epsilon_t, \text{ for } k = 1...10, \tag{1}$$

where RS_t is the number of reserved shares, S_t is the number of shares outstanding, and D_t is the book value of debt. If changes in the share of equity pay as a fraction of total firm value are mainly driven by changes in stock prices P_t in the subsequent periods, α_1 should be close to zero, and α_2 should be close to 1. Table 15 Panel A shows the estimation results. Across the horizon span from one year to the ten years, α_1 is larger and more significant than α_2. The results are far from the null that there is no active adjustment in shares granted.

Furthermore, in Panel B we instead include the term $\frac{P_t RS_{t+k}}{P_t S_{t+k}+D_t}$ which fixes the price level while allowing the shares granted to vary over time:

$$\frac{P_{t+k}RS_{t+k}}{P_{t+k}S_{t+k}+D_{t+k}} = \alpha_0 + \alpha_1 \cdot \frac{P_t RS_t}{P_t S_t + D_t} + \alpha_2 \cdot \frac{P_t RS_{t+k}}{P_t S_t + D_t} + \epsilon_t. \tag{2}$$

Panel B of Table 15 shows that the estimates of α_2 are significantly larger in regression (2) than in regression (1) over the short run. Over the longer run, initial value is still the most important factor in explaining the equity pay difference across firms.

5.3 Firm Management of Equity Pay

In this section we document that high-equity pay firms more actively manage equity pay by decreasing shares granted over time, that firms that have high equity pay subsequently experience greater employment growth, and that younger firms have higher equity pay. We also show that the analogous patterns for CEOs are quite different.

Table 13 utilizes the portfolio formation methodology in Lemmon et al. (2008) and examines the persistence of equity pay and shares granted for low to high equity-paying firms. Panel A shows that equity pay persistence is slightly lower for high equity pay firms, while shares granted is slightly more persistent. Panel B shows that the lower persistence of equity pay for higher firms coincides with a more active management of equity pay against stock returns. Firms tends to reduce the amount of shares granted following a period of poor stock performance. Equity pay beyond the C-suite is sticky. Table 14 presents the analysis for CEOs and shows the generally lower persistence of pay and shares granted, as well as a lack of management of pay against share price movements. Instead, equity pay for CEOs tends to rise following a period of strong performance, indicating incentive-driven nature of equity pay in the CEO compensation.

Next, we provide evidence that equity pay is used to finance employment growth, providing new evidence that growing firms tend to borrow from workers by using deferred equity pay. Michelacci and Quadrini (2005) and Garmaise (2008) document that small, growing firms borrow from workers by offering lower initial wages, but higher wage growth over time.[18] Figure 19 Panel A uses the methodology from Lemmon et al. (2008) and forms portfolios based on the initial level of equity pay, but instead of plotting equity pay over the subsequent years, we plot employment growth. The figure clearly shows that firms that have higher equity pay subsequently and persistently experience much higher employment growth. Figure 19 Panel B plots the analogous analysis for CEOs and actually shows the opposite pattern. Firms with higher equity pay for CEOs tend to experience lower employment growth over time, especially at horizons beyond one or two years.

Finally, we describe the dynamics of equity pay by firm age, and show that younger firms have tended to have higher equity pay. Figure 20 Panel A plots equity pay for four age categories from 1994 to 2019 and shows that younger firms tend to have higher equity pay. Figure 20 Panel B shows that, again, the opposite is true for CEOs. CEO equity pay has consistently been greater at older firms. Notably, the distribution of equity pay across firm ages is also much more compressed than that for equity pay beyond the C-Suite.

6 A Model of Equity Compensation

In this section we present a simple dynamic model that rationalizes the key empirical patterns documented above: the persistence of equity pay, the role of initial values, the financing benefit of equity compensation, and the retention of high-skilled employees.

6.1 The Setup

Inputs. There is a single type of input: high-skilled human capital (h_t). The firm can irreversibly adopt equity pay to substitute cash wages by paying a one-time fixed cost F. Equity stock accumulates slowly while adjusting both the stock and the payout flow is costly.

Production. Output depends on high-skilled human capital:

$$Y_t = z_t \, h_t^{\alpha}, \qquad \alpha \in (0,1),$$

where z_t is an idiosyncratic productivity shock that follows an AR(1) process in logs.

[18]See also Agrawal and Matsa (2013) for a survey of labor and financing decisions.

Wages and Equity Pay. Without equity pay, the cash wage bill is

$$W_t = w\,h_t,$$

where w is the per-unit wage rate, which will be endogenous in our extended full dynamic model. If the firm adopts equity pay, it accumulates an equity stock G_t representing the total equity commitments to employees. G_t is theoretical counterpart of reserved shares in our data. The equity stock depreciates at standard rate $\delta_e \in (0, 1)$ due to vesting, forfeiture or cancellation. The firm chooses next period's equity stock G_{t+1}, which implicitly determines the equity payout flow:

$$E_{t+1} = G_{t+1} - (1 - \delta_e)\,G_t,$$

where $E_{t+1} \geq 0$ is the net new equity commitment to all employees h_t. The equity payout E_{t+1} reduces the current cash wage bill, while the predetermined payout E_t represents the cost of previously committed equity that vests in the current period. In the equity regime, E_t is a predetermined state variable (chosen last period).

Retention and Dynamics of h_t. High-skilled labor is slow-moving due to costly replacement. Without equity pay, the firm faces a baseline mobility depreciation rate $\bar{\delta}_m$:

$$h_{t+1} = (1 - \delta_h - \bar{\delta}_m)\,h_t + i_t^h,$$

where δ_h is natural depreciation and i_t^h is net hiring and training investment. With equity pay, turnover decreases in the chosen equity stock G_{t+1}:

$$\delta_m(G_{t+1}) = \frac{\bar{\delta}_m}{1 + \kappa\,G_{t+1}}, \qquad \kappa > 0,$$

so

$$h_{t+1} = \big(1 - \delta_h - \delta_m(G_{t+1})\big)\,h_t + i_t^h.$$

Firms that commit to larger equity stocks retain more high-skilled employees, capturing the empirical finding that high-equity-pay firms experience lower turnover.

Adjustment Costs. The firm faces three types of convex adjustment costs. First, adjusting human capital is costly:

$$\Phi_h(i_t^h, h_t) = \frac{\kappa_h}{2}\left(\frac{i_t^h}{h_t}\right)^2 h_t, \qquad \kappa_h > 0.$$

Second, adjusting the equity stock incurs a cost:

$$\Phi_G(G_{t+1}, G_t) = \frac{\kappa_G}{2}\left(\frac{G_{t+1}}{G_t} - 1\right)^2 G_t, \qquad \kappa_G > 0.$$

Third, adjusting the equity payout flow is costly:

$$\Phi_E(E_{t+1}, E_t) = \frac{\kappa_E}{2}\left(\frac{E_{t+1}}{E_t} - 1\right)^2 E_t, \qquad \kappa_E > 0.$$

The equity stock and payout adjustment costs together generate the high persistence of equity pay observed in the data: firms find it costly to deviate from their existing equity commitments, producing an autoregressive structure consistent with the empirical evidence.

Financing. Firms may finance their wage, adjustment, and investment costs using either internal cash flows or external financing. If the firm's pre-financing payout (d_t) falls below zero, the firm incurs an external financing cost consisting of a fixed and a proportional component:

$$\Lambda(d_t) = \eta_0\, \mathbf{1}\{d_t < 0\} + \eta_1\, (-d_t)\, \mathbf{1}\{d_t < 0\}.$$

Here, η_0 is the fixed issuance cost and η_1 governs the proportional cost. In addition, equity payout enters the pre-financing dividend with a dilution discount $\eta_2 < 0$, so the net financing benefit per unit of deferred equity is $(1 + \eta_2)E_{t+1}$. The parameter $\eta_2 < 0$ captures the cost of diluting existing shareholders' value when the firm issues equity to employees.

6.2 Firm Problem

Equity-Regime Firm. With equity pay, the firm's state is (z_t, h_t, G_t, E_t) where E_t is predetermined (chosen last period). The firm chooses h_{t+1} and G_{t+1}, which determines $E_{t+1} =$

$G_{t+1} - (1-\delta_e)G_t$. The pre-financing payout is:

$$d_t^E = z_t\, h_t^{\alpha} - w\, h_t + \underbrace{(1+\eta_2)\, E_{t+1}}_{\text{deferred equity pay}} - \underbrace{E_t}_{\text{equity payout}} - i_t^h - \Phi_h(i_t^h, h_t) - \Phi_G(G_{t+1}, G_t) - \Phi_E(E_{t+1}, E_t),$$

where $(1+\eta_2)E_{t+1}$ is the net financing benefit from deferring compensation via equity (reducing the current cash wage bill, discounted by the dilution cost η_2), and E_t is the payout of previously committed equity that vests in the current period. The value function is:

$$V^E(z_t, h_t, G_t, E_t) = \max_{h_{t+1}, G_{t+1}} \Big\{ d_t^E - \Lambda(d_t^E) + \beta\, \mathbb{E}_t\big[V^E(z_{t+1}, h_{t+1}, G_{t+1}, E_{t+1})\big] \Big\}.$$

Non-Equity Firm and Switching Decision. Without equity pay, the firm's state is (z_t, h_t) and it faces baseline mobility depreciation $\bar{\delta}_m$ (the $G = 0$ case). The pre-financing payout is:

$$d_t^{NE} = z_t\, h_t^{\alpha} - w\, h_t - i_t^h - \Phi_h(i_t^h, h_t).$$

Each period, the non-equity firm chooses between staying in the cash regime or irreversibly adopting equity pay by incurring a one-time fixed cost F:

$$V^{NE}(z_t, h_t) = \max\Big\{ V^{\text{stay}}(z_t, h_t),\ V^{\text{switch}}(z_t, h_t) \Big\},$$

where

$$V^{\text{stay}}(z_t, h_t) = \max_{h_{t+1}} \Big\{ d_t^{NE} - \Lambda(d_t^{NE}) + \beta\, \mathbb{E}_t\big[V^{NE}(z_{t+1}, h_{t+1})\big] \Big\},$$

$$V^{\text{switch}}(z_t, h_t) = \max_{h_{t+1},\, G_0} \Big\{ d_t^{NE} - F - \Lambda(d_t^{NE} - F) + \beta\, \mathbb{E}_t\big[V^E(z_{t+1}, h_{t+1}, G_0, E_0)\big] \Big\}.$$

The switching firm pays its non-equity dividend minus the adoption cost F in the current period, and enters the equity regime next period. At the time of switching the firm has no pre-existing equity stock ($G = 0$), so the accounting identity implies the entry condition $E_0 = G_0$.

The model generates the key empirical patterns as follows. The equity stock and payout adjustment costs produce the high persistence of equity pay documented in Section 4. The irreversible adoption decision with fixed cost F rationalizes the importance of initial values: once a firm adopts equity pay, its subsequent path is largely determined by the initial conditions at the time of adoption. The financing channel—whereby deferred equity pay $(1 + \eta_2)E_{t+1}$ reduces the cash wage bill and relaxes the external financing constraint—explains why financially constrained and high-growth firms are more likely to adopt equity pay. Finally, the retention mechanism through the equity stock captures the finding that high-equity-pay firms experience lower turnover and higher subsequent employment growth.

6.3 Calibration and Simulation

Parameters. Table 16 reports the parameter values used in the benchmark calibration. One model period corresponds to one year. The discount factor is $\beta = 0.94$, implying a risk-free rate of approximately 6%. The human capital share is $\alpha_h = 0.55$ and the per-unit cash wage is $w = 0.1$.

Physical depreciation of human capital is set to $\delta_h = 0.20$. The baseline mobility depreciation rate is $\delta_{m0} = 0.40$, capturing the high turnover rate firms face absent equity-based retention. The half-life parameter $G_{1/2} = 15$ implies that a firm must accumulate an equity stock of 15 to reduce its mobility depreciation by half (i.e., $\kappa = 1/G_{1/2}$). The equity stock depreciates at rate $\delta_e = 0.10$ due to vesting and forfeiture.

The adjustment cost parameters $\theta_h = 0.20$, $\theta_G = 0.20$, and $\theta_E = 0.30$ govern the convexity of human capital, equity stock, and equity payout adjustment costs, respectively. The higher adjustment cost for equity payout ($\theta_E > \theta_G$) generates the strong persistence of equity pay per employee observed in the data.

On the financing side, the fixed external financing cost is $\eta_0 = 0.08$ and the proportional cost is $\eta_1 = 0.028$, in line with estimates of equity issuance costs. The dilution discount is $\eta_2 = -0.07$, so each dollar of deferred equity compensation costs existing shareholders 7 cents in dilution. The one-time adoption cost $F = 10$ governs the fraction of firms that endogenously choose to adopt equity pay.

Productivity follows an AR(1) process in logs, $\log z_{t+1} = a + \rho_z \log z_t + \varepsilon_t$, with persistence $\rho_z = 0.90$ and innovation standard deviation $\sigma_z = 0.30$.

Simulation. We simulate a panel of $N = 2{,}000$ firms over $T = 5{,}000$ periods, discarding the first 1,000 periods as burn-in. Productivity z evolves on the discrete Markov chain, while human capital h, equity stock G, and equity payout E evolve continuously via interpolation of the policy functions. Each period, firms face a 3% exogenous exit probability, with exiting firms replaced by new entrants in the non-equity regime.

Model vs. Data Moments. Table 17 compares key moments from the simulated model to their data counterparts. The model generates substantial dispersion in equity pay per employee, with a coefficient of variation of E/h of 1.84 (compared to 2.70 in the data) and a Gini coefficient of 0.64 (vs. 0.72). The model also produces realistic dispersion in the ownership share G/V (CV of 0.63 vs. 0.76) and in market-to-book ratios V/h (CV of 1.25 vs. 1.60).

The model generates high persistence of equity pay, with an AR(1) coefficient for E/h of 0.91, somewhat above the data estimate of 0.73. The fraction of firms in the equity regime is 73%, close to the data value of 77%. The model understates the concentration of equity pay at the top of the distribution: the top 10% of firms account for 21% of total equity pay in the model, compared to 76% in the data.

6.4 Model Implications

We now examine the model's implications along two key dimensions: the persistence of equity pay per employee and the selection of firms into equity adoption.

6.4.1 Persistence of Equity Pay per Employee

A central feature of the data is the high persistence of equity pay at the firm level. As documented in Section 4, equity pay per high-skilled employee exhibits a first-order autoregressive coefficient above 0.7, and firms sorted into quintiles by initial equity pay maintain their relative rankings for many years. The model generates this pattern through three reinforcing channels.

First, productivity z is itself persistent ($\rho_z = 0.90$), so firms with high productivity today are likely to remain productive tomorrow, sustaining their demand for equity pay. Second, the adjustment costs on the equity stock and equity payout (Φ_G and Φ_E) penalize deviations from current levels, causing firms to smooth equity grants over time rather than adjusting abruptly to shocks. The payout adjustment cost Φ_E is particularly important: because it is specified as a percentage deviation from the current payout level, firms anchor new grants to past grants. Third, human capital h adjusts gradually due to its own adjustment cost and depreciation dynamics, so the denominator in E/h is stable, further amplifying the persistence of per-employee equity pay.

Figure 2 illustrates this persistence by sorting simulated firms into quintiles based on their initial equity pay per employee E/h and tracking the quintile averages over time. The quintile groups remain persistently separated: cross-sectional differences in equity pay dissipate only slowly, with top-quintile firms maintaining substantially higher equity pay than bottom-quintile firms even after many periods. The model produces an AR(1) coefficient for E/h of 0.91, compared to 0.73 in the data.

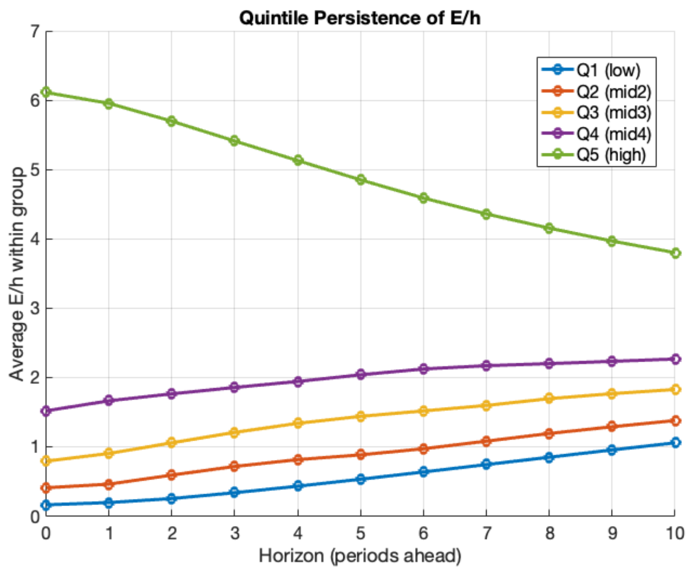


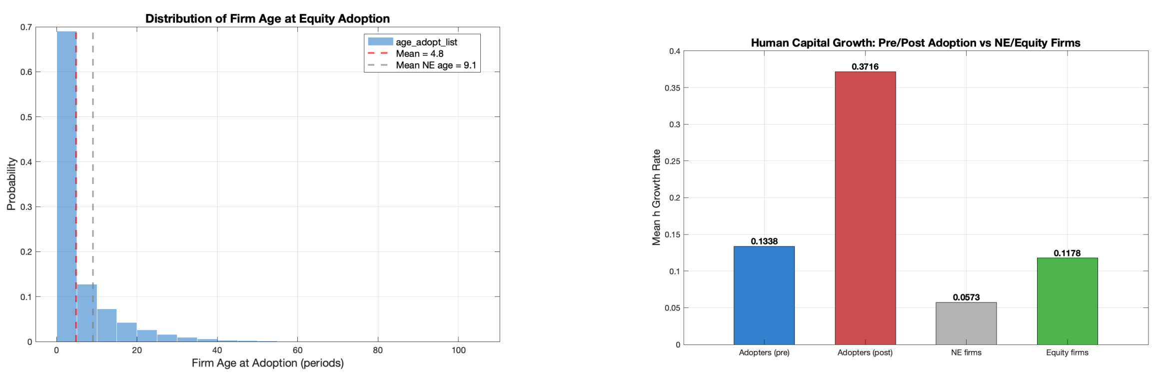
Figure 2: **Quintile Persistence of Equity Pay per Employee.** Firms are sorted into quintiles by initial E/h and the quintile averages are tracked over time. The persistent separation of quintile groups illustrates the high persistence of equity pay generated by the model.

6.4.2 Selection into Equity Adoption

The model predicts that equity adoption is concentrated among younger, faster-growing firms. The switching condition $V^{\text{switch}}(z_t, h_t) \geq V^{\text{stay}}(z_t, h_t)$ partitions the (z, h) state space into adopters and non-adopters. Firms adopt equity pay when their productivity z is high relative to their accumulated human capital h. In this region of the state space, desired investment $I_h = h_{t+1} - (1 - \delta_h - \delta_m)h_t$ is large, generating a high return to both the retention channel (protecting the investment in human capital from turnover) and the financing channel (freeing up cash to fund investment). This characterizes younger firms that have not yet reached their steady-state level of human capital.

Figure 3 documents two key features of the selection into equity adoption. Panel A shows the distribution of firm age at the time of equity adoption. Adopters are concentrated at young ages: firms tend to switch to equity pay early in their life cycle, when productivity is high but human capital has not yet reached its steady-state level. Panel B plots the growth rate of human capital before and after adoption. Firms that adopt equity pay exhibit faster pre-switch h growth, reflecting their high desired investment and the large benefit from reducing turnover and relaxing financing constraints.

Adoption is irreversible, which generates path dependence in the cross-section. Firms that adopt early—because they draw high initial productivity or face a favorable peer environment—remain equity-paying permanently and accumulate more human capital along a persistently higher growth trajectory. Late or never adopters follow lower h paths, even if their productivity later converges to that of early adopters. This mechanism rationalizes the empirical finding that initial values are a dominant driver of cross-sectional heterogeneity in equity pay (Section 4).



(a) Age at Adoption

(b) Pre/Post-Adoption h Growth

Figure 3: **Selection into Equity Adoption.** Panel A plots the distribution of firm age at the time of equity adoption. Adopters are concentrated at young ages, when productivity is high but human capital has not yet reached steady state. Panel B plots human capital growth rates before and after adoption. Adopters exhibit faster pre-switch h growth, reflecting their high desired investment and the large benefit from retention and financing channels.

6.4.3 Active Grant Management

In the data, firms actively manage equity grants in response to stock price movements: they tend to increase shares granted following stock price declines and reduce grants after price increases (Section 5). The model produces this pattern through the interaction of slow-moving equity stocks and fast-moving firm values.

The equity share $s_t = G_t/V_t^E$ captures the fraction of firm value committed to employee equity. When productivity z rises, firm value V^E jumps immediately, but the equity stock G adjusts only gradually due to the adjustment cost Φ_G. As a result, the equity share $s = G/V^E$ drops on impact following a positive productivity shock. The firm must then actively issue new grants—raising G over subsequent periods—to restore its target compensation mix. Conversely, when z falls, V^E drops and s rises mechanically. The firm may let G depreciate at rate δ_e rather than issue new grants, allowing the equity share to gradually revert.

This generates *active but sluggish* grant management: firm value responds instantly to productivity shocks, while the equity stock adjusts gradually. Figure 4 illustrates this asymmetric adjustment speed using an event study around positive productivity shocks. Firm value V^E jumps on impact, G adjusts upward gradually, and the equity share $s = G/V^E$ drops initially before partially recovering as the firm issues new grants. The AR(1) coefficient of the equity share is 0.92, reflecting the high persistence of G relative to the volatility of V^E.

Grant sizes ($E' = G' - (1 - \delta_e)G$) inherit this persistence: because G is slow-moving, the incremental grants needed to maintain the equity stock are themselves positively autocorrelated. Higher-z firms grow G faster to offset the dilution of the equity share caused by rising firm value.

6.4.4 Human Capital Investment, Retention, and Financing

The model predicts that equity pay facilitates human capital investment through two complementary channels: retention and financing.

Retention Channel. Unvested equity acts as "golden handcuffs": employees forfeit their accumulated equity stock if they leave, so mobility depreciation $\delta_m(G)$ decreases in the equity stock. Lower turnover means less depreciation of human capital, allowing equity-regime firms to maintain a higher level of h for a given level of gross investment I_h. Figure 5 plots next-period human capital

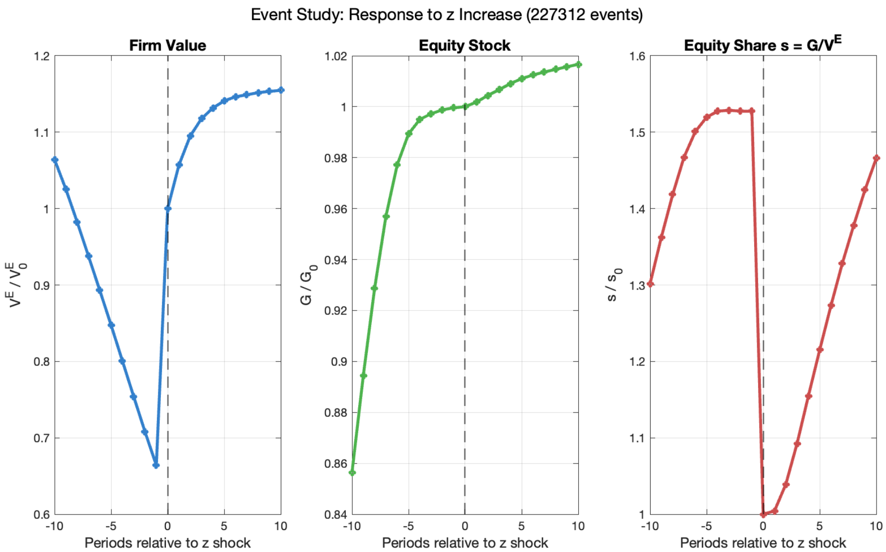


Figure 4: **Impulse Response: Productivity Shock and Equity Shares.** Event study around positive productivity shocks (z increases by ≥ 1 grid step). Left: firm value V^E jumps immediately. Center: equity stock G adjusts upward gradually. Right: equity share $s = G/V^E$ drops on impact, then partially recovers as the firm issues new grants.

h' conditional on current h for equity and non-equity firms. Equity firms maintain higher h' across the state space, even though their net investment $h' - h$ may be lower at high levels of h. The retention benefit from equity reduces the need to invest simply to replace departing workers.

Financing Channel. Equity pay also relaxes financial constraints by substituting deferred equity for current cash wages. Recall the pre-financing dividend:

$$d_t^E = z_t h_t^\alpha - w h_t + (1 + \eta_2) E_{t+1} - E_t - i_t^h - \Phi_h - \Phi_G - \Phi_E.$$

The term $(1 + \eta_2)E_{t+1}$ boosts the pre-financing payout, reducing the probability that $d_t^E < 0$ and thereby lowering the firm's exposure to external financing costs (η_0, η_1). This operates through intertemporal substitution: the firm promises future equity ($+E_{t+1}$) to offset cash wages today, while the cost of that promise ($-E_t$) is deferred to the next period when the equity vests.

Figure 6 shows that equity-paying firms experience substantially less cash-flow stress (lower fraction of periods with $d^{\text{pre}} < 0$) than non-equity firms. This financing benefit is particularly valuable for firms with high desired investment in human capital. Figure 7 confirms the complementarity between equity pay and investment: among equity-paying firms, E'/h and I_h/h are positively correlated. Firms investing more in human capital also promise more equity per worker, consistent with the financing channel.

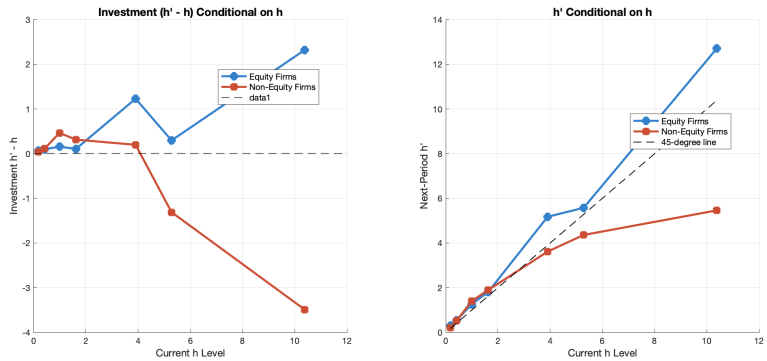


Figure 5: **Retention: h' Conditional on h.** Left: net investment $h' - h$ for equity (E) and non-equity (NE) firms. Right: next-period human capital h' conditional on current h. Equity firms maintain higher h' due to lower turnover depreciation, even when net investment is lower.

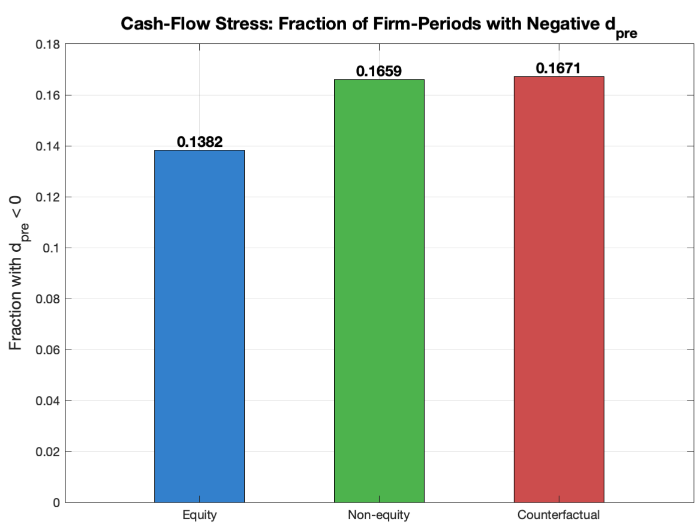


Figure 6: **Cash-Flow Stress.** Fraction of firm-periods with $d^{\text{pre}} < 0$ for equity firms, non-equity firms, and the all-cash counterfactual economy. Equity firms face the least cash-flow stress due to the financing benefit of deferred equity pay.

7 What Drives the Rise of Equity Pay Inequality?

Equity pay inequality has risen substantially since the 1990s: the ratio of the 90th to the 25th percentile of equity pay per employee has increased markedly over the sample period. In this

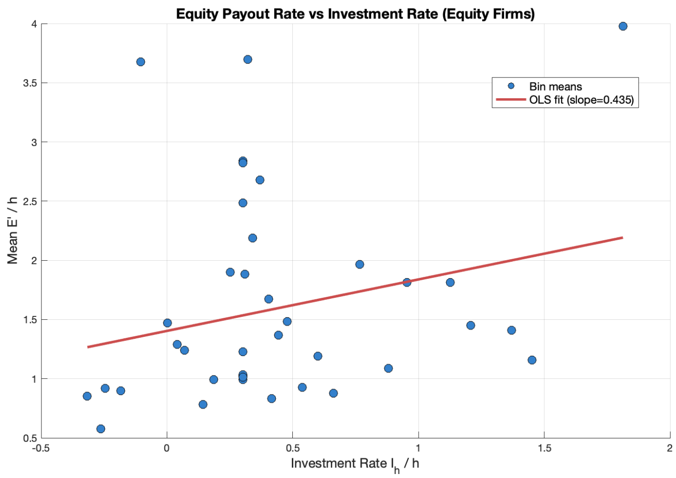


Figure 7: **Equity Pay and Investment Are Complements.** Binscatter of equity payout per employee E'/h against investment rate I_h/h among equity-paying firms. The positive slope confirms that firms investing more in human capital also promise more equity per worker.

section, we use the model to decompose this rise into the contributions of specific structural changes in the economic environment.

7.1 Decomposition Framework

We compare two steady states—one calibrated to 1990s parameters and one to 2010s parameters—and decompose the change in the p_{90}/p_{25} ratio of equity pay per employee (E/h) using Shapley values. The Shapley decomposition assigns each parameter an average marginal contribution to the total change in inequality, computed over all possible orderings of parameter changes. This requires solving and simulating the model under all $2^4 = 16$ combinations of the four parameters at their 1990s and 2010s values.

Table 1 reports the four parameters that are varied and their sources.

The adoption cost F declined from 14 to 8, reflecting a secular reduction in the regulatory, legal, and administrative barriers to offering equity compensation. Several forces drove this decline. First, SEC Rule 701, expanded in 1999, raised the threshold before private companies had to register equity grants with the SEC from \$1 million to \$5 million (later indexed), directly reducing the regulatory fixed cost of offering equity to non-executive employees. Second, equity plan administration costs fell sharply as firms shifted from dedicated in-house teams to low-cost SaaS platforms (e.g., Carta, Shareworks, E*Trade) that automated grant tracking, vesting schedules, tax with-holding, and SEC reporting. The NASPP/Deloitte Equity Administration Survey (NASPP and Deloitte, 2023) documents rising outsourcing rates, declining staff-per-participant ratios, and standardization of plan designs over this period. Third, the proliferation of standardized equity plan templates, boilerplate SEC filings (Form S-8), and specialized compensation consultants commoditized the legal setup costs that had required bespoke work in the 1990s. Consistent with declining F, the data show rising adoption rates among smaller firms (who benefit most from lower fixed costs), diffusion of equity pay beyond tech into healthcare, finance, retail, and manufacturing, and shorter time-to-first-grant for successive IPO cohorts.[19]

The dilution cost η_2 moved from -0.07 to -0.03, consistent with increasing shareholder tolerance of employee dilution documented in ISS burn-rate studies and Meridian compensation surveys. The human capital share α_h rose from 0.50 to 0.65, reflecting the well-documented shift toward intangible-intensive production. Productivity volatility σ_z increased from 0.30 to 0.40, consistent with evidence of rising firm-level volatility.

Table 1: Parameter Changes: 1990s vs. 2010s

Parameter	1990s	2010s	Sources
F (adoption cost)	14	8	NASPP and Deloitte (2023); SEC Rule 701
η_2 (dilution cost)	-0.07	-0.03	ISS Corporate Solutions (2022); Meridian Compensation Partners (2020)
α_h (human capital share)	0.50	0.65	Falato, Kadyrzhanova, Sim, and Steri (2022); Xiaolan (2014b)
σ_z (productivity vol.)	0.30	0.40	Hartman-Glaser, Lustig, and Xiaolan (2019b); Xiaolan (2014b)

7.2 Results

Figure 8 presents the Shapley decomposition of the change in $\log(p_{90}/p_{25})$ of E/h. Each bar shows a parameter's average marginal contribution to the total model-implied increase in inequality, with percentage labels indicating its share of the total change.

Figure 9 compares the model-implied percentiles of equity pay under 1990s and 2010s parameters with the data. The left panel shows that the model captures the direction of changes at both the

[19] Some components of adoption cost increased after 2006—notably accounting compliance costs following FASB 123R, which required expensing of stock options. However, the net effect of all changes appears to be a decline, as the administrative, legal, and regulatory components fell by more than accounting costs rose.

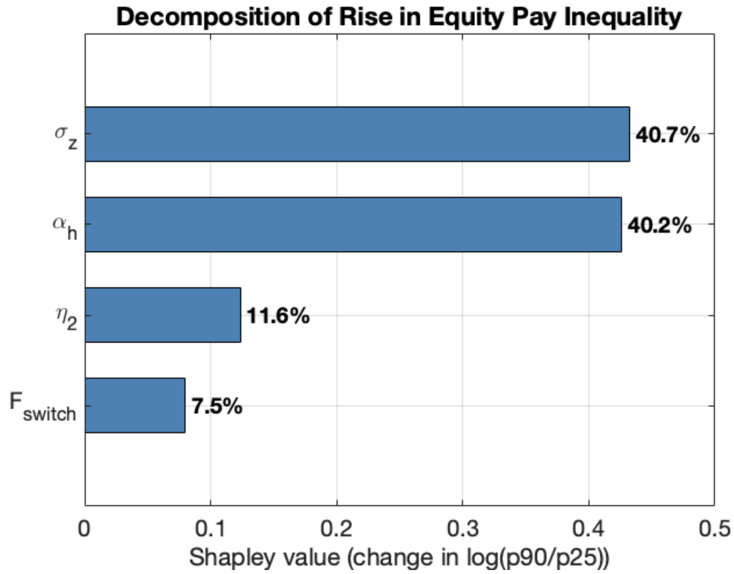


Figure 8: **Shapley Decomposition of the Rise in Equity Pay Inequality.** Horizontal bars show each parameter's Shapley contribution to $\Delta \log(p_{90}/p_{25})$ of equity pay per employee (E/h) between the 1990s and 2010s steady states. Percentage labels indicate each parameter's share of the total model-implied increase.

25th and 90th percentiles, while the right panel plots the p_{90}/p_{25} ratio in the model and the data. The model accounts for a substantial fraction of the observed increase in the interpercentile ratio.

The model also produces a rise in the equity adoption rate consistent with the data. Figure 10 plots the fraction of firms in the equity regime under 1990s and 2010s parameters alongside the data. The lower adoption cost and reduced dilution penalty in the 2010s calibration induce more firms to adopt equity pay, matching the upward trend observed empirically.

8 Conclusion

Equity pay is rising unequally across firms. Using a hand-collected sample of equity-based compensation at the firm level, we present the first evidence on the evolution and dispersion in equity pay over time and between firms. Equity pay below C-suite experienced more inequality than the pay in inequality among C-suite. More than 60% of the equity pay inequality is driven by its lagged values over a 10-year horizon. We show that financial constraints and peer effects are significant factors for the initial value difference at the time of IPO, but this difference is largely explained by unobservable firm-level fixed effect. Surprisingly, equity pay provides a considerable amount of

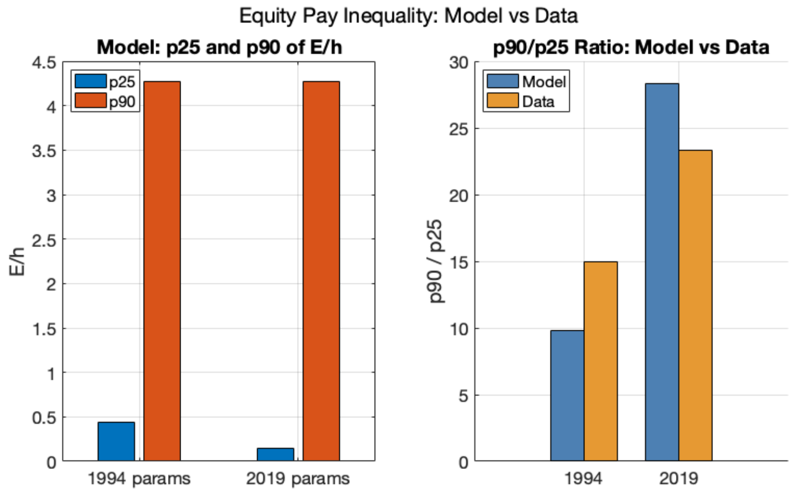


Figure 9: **Percentile Comparison: Model vs. Data.** Left: model-implied p_{25} and p_{90} of E/h under 1990s and 2010s parameters. Right: p_{90}/p_{25} ratio in the model vs. the data.

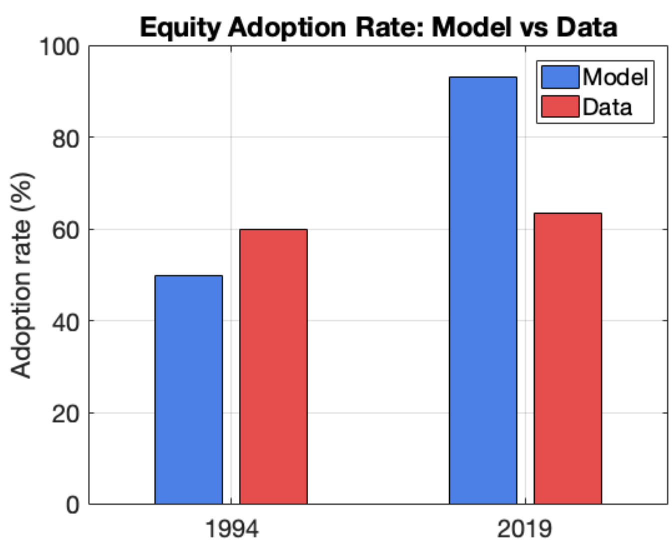


Figure 10: **Equity Adoption Rate: Model vs. Data.** Fraction of firms in the equity regime under 1990s and 2010s model parameters, compared with the fraction of firms with positive equity pay in the data.

insurance to employees. Companies actively adjust equity-based compensation to counterbalance changes in stock prices, although this adjustment is less pronounced compared to the compensation of CEOs.

To rationalize these patterns, we develop a dynamic model in which firms irreversibly adopt equity pay and accumulate a stock of unvested equity that operates through two channels: a financing channel that substitutes deferred equity for cash wages, and a retention channel in which unvested equity acts as "golden handcuffs" that reduce turnover. Adjustment costs and the irreversible adoption decision generate the high persistence and the dominant role of initial values observed in the data. Using the model to decompose the rise in equity-pay inequality between the 1990s and the 2010s, we find that rising human capital intensity and increasing productivity volatility jointly explain the majority of the change, alongside contributions from declining adoption costs and lower dilution costs.

Our results indicate that below the C-suite level, equity pay is a decision related to both compensation and capital structure. On one hand, firms manage equity-based compensation to either align with their peers or offer some insurance to employees, resembling standard features in compensation contracts. On the other hand, equity pay is rather persistent, which is similar to established findings in the capital structure literature. This observed inertia could either reflect first-order frictions in awarding equity pay to employees or it may indicate sub-optimal behavior of firms' compensation policy. As equity pay becomes more prevalent and substantial in compensation packages, our results could also have meaningful implications on the dynamics of income and wealth inequality.

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9 Figures

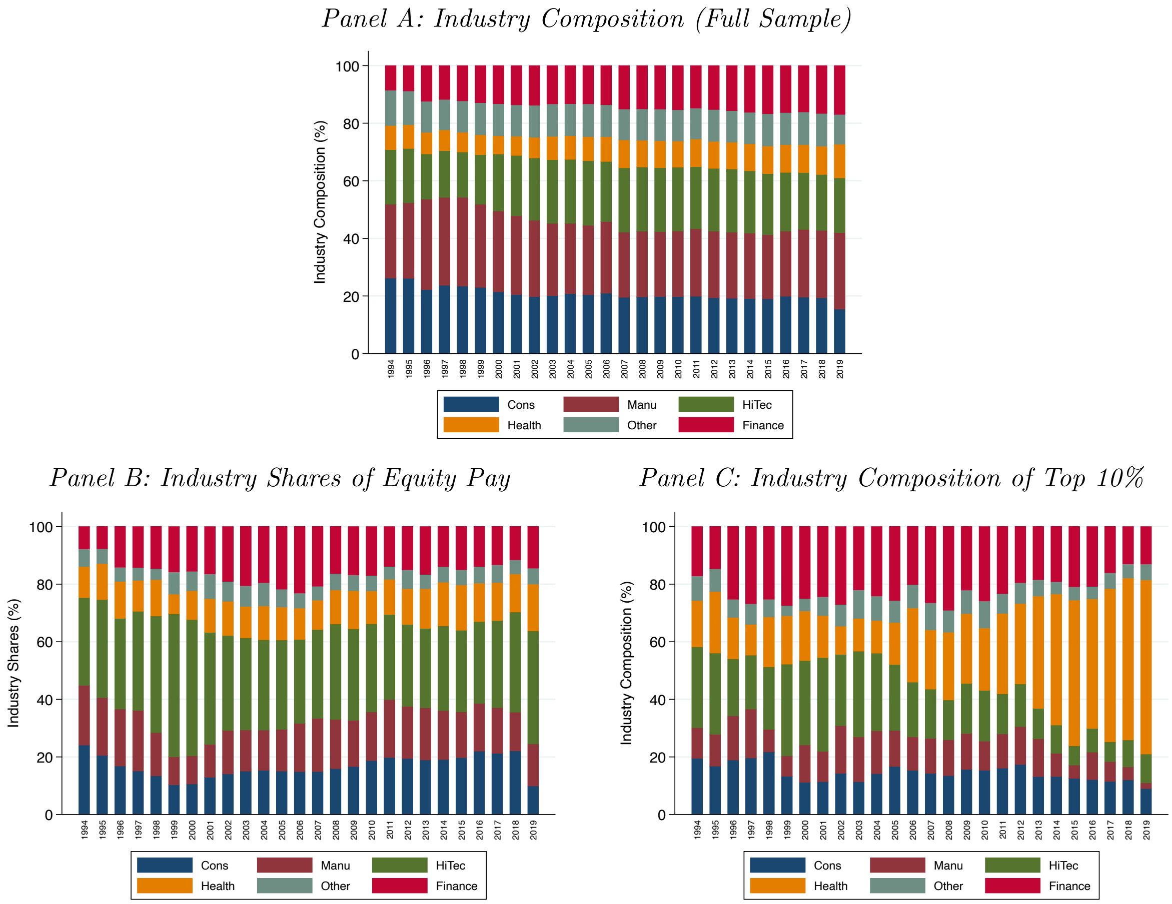

Figure 11: **Industry Composition and Shares.** This figure presents industry composition and shares of our sample. Panel A plots the industry composition of our S&P 1500/Execcomp-Based sample. We count the number of firms for each industry to compute the industry composition. Panel B plots the shares of total equity pay for each industry. To compute the share of total equity pay, we take the sum of the value of granted shares for each industry and compare these shares to the total value of equity pay. Panel C plots the industry composition of the top 10% equity payers. We first select the set of firms from our sample whose equity pay is above 90th percentiles each year. Then, we count the number of firms for each industry within the sample to compute the industry composition. Equity pay is defined as the value of granted shares per high-skilled employee. Industry classification (Consumer (Cons), Manufacturing (Manu), High Tech (HiTec), Health, Other, and Finance) is based on Xiaolan (2019).

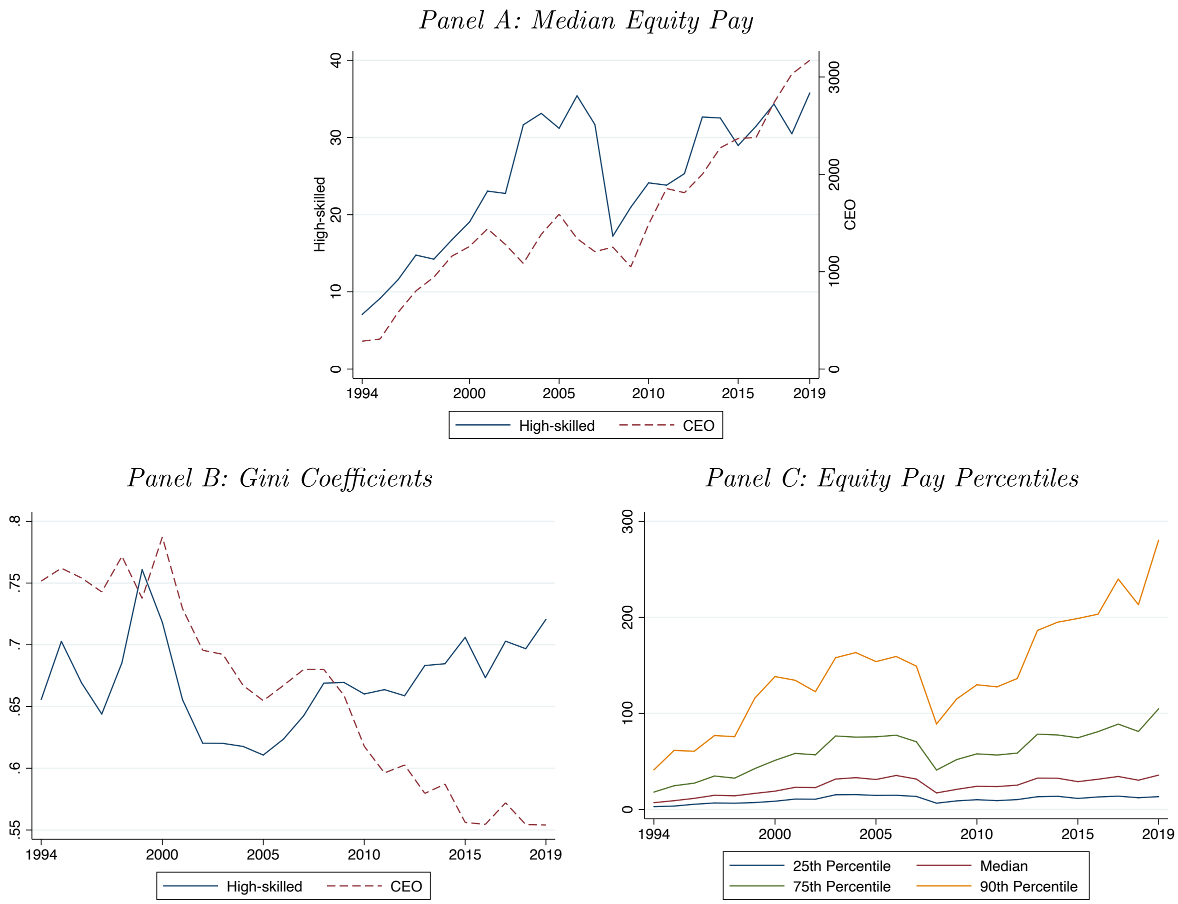

Figure 12: **Equity Pay - Level and Inequality.** This figure plots the time-series of descriptive statistics of equity pay. Panel A plots the median equity pay for high-skilled worker and for CEOs where the units are in $1,000. Panel B plots the time-series of Gini coefficients of CEO and high-skilled equity pay throughout our sample period. Panel C plots the 25th, 50th, 75th, and 90th percentiles of equity pay for each year across our sample. The units are in $1,000. Equity pay is defined as the value of granted shares per high-skilled employee. Equity pay for high-skilled is defined as the value of granted shares per high-skilled employee. CEO's equity pay is defined as the value of shares granted to CEO.

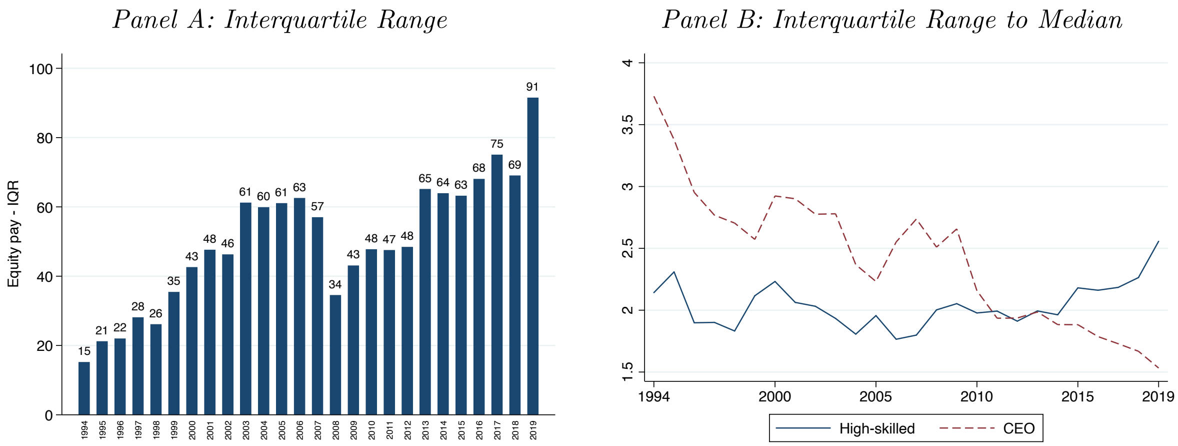

Figure 13: **Equity Pay - Interquartile Range.** This figure plots the time-series of descriptive statistics of equity pay. Panel A plots the interquartile range, the difference between 75th and 25th percentiles of equity pay for high-skilled employee each year across our sample where the units are in $1,000. Panel B plots the time-series of ratios of interquartile range over median for high-skilled and CEO's equity pay. Equity pay for high-skilled is defined as the value of granted shares per high-skilled employee. CEO's equity pay is defined as the value of shares granted to CEO.

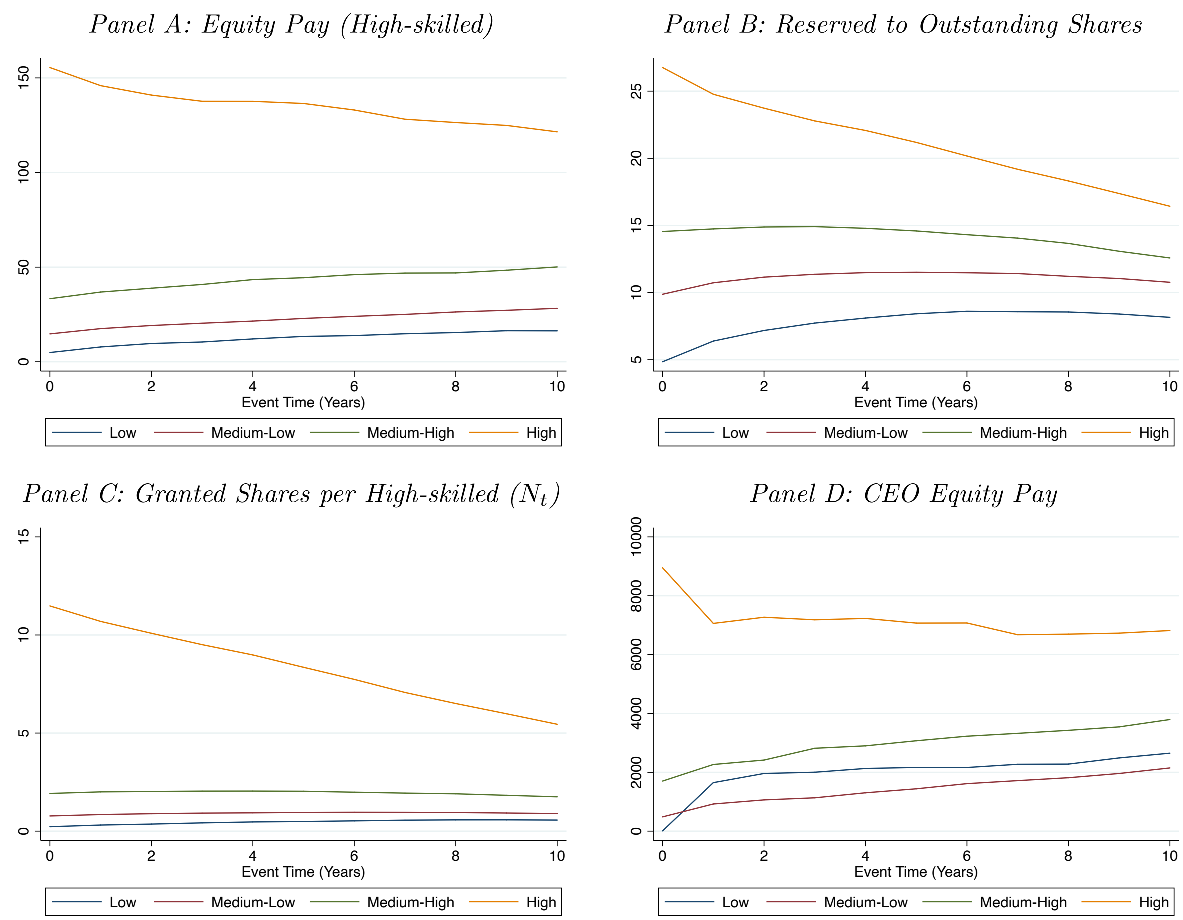

Figure 14: **Average Equity Pay of Portfolios in Event Time.** The figure plots the average equity pay of four portfolios in event time in a similar fashion of the analysis from Lemmon et al. (2008). Each year, we sort firms based on their variables of our interest (equity pay for high-skilled in Panel A, ratio of reserved to outstanding shares in Panel B, granted shares per high-skilled employee (N_t) in Panel C, and CEO's equity pay in Panel D) to construct four portfolios which we label each of them as *Low*, *Medium-Low*, *Medium-High*, and *High*. Then, we track each portfolio's equal-weighted average of the variable over the next ten years. For Panel A for example, in 2000, we sort firms based on their equity pay and then track each portfolio's average equity pay from 2001 to 2010. We repeat this process throughout our sample period (1994 - 2019). We then average the average equity pay of these four portfolios across the event time (1 - 10 years) to obtain the lines in the Panel A. Equity pay is defined as the value of granted shares per high-skilled employee. The units are in $1,000 in Panel A and D and percentage % terms in Panel B.

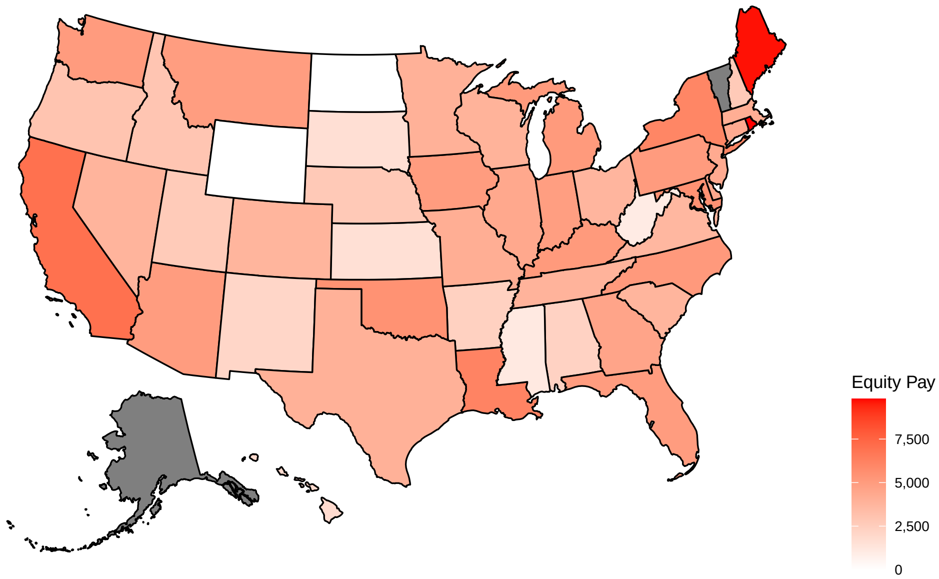

Figure 15: **Average Equity Pay by State in 2019**. The figure plots the average equity pay beyond the C-Suite in 2019 using firms headquarters' locations. Equity pay is defined as the value of granted shares per high-skilled employee. The units are in $1,000.

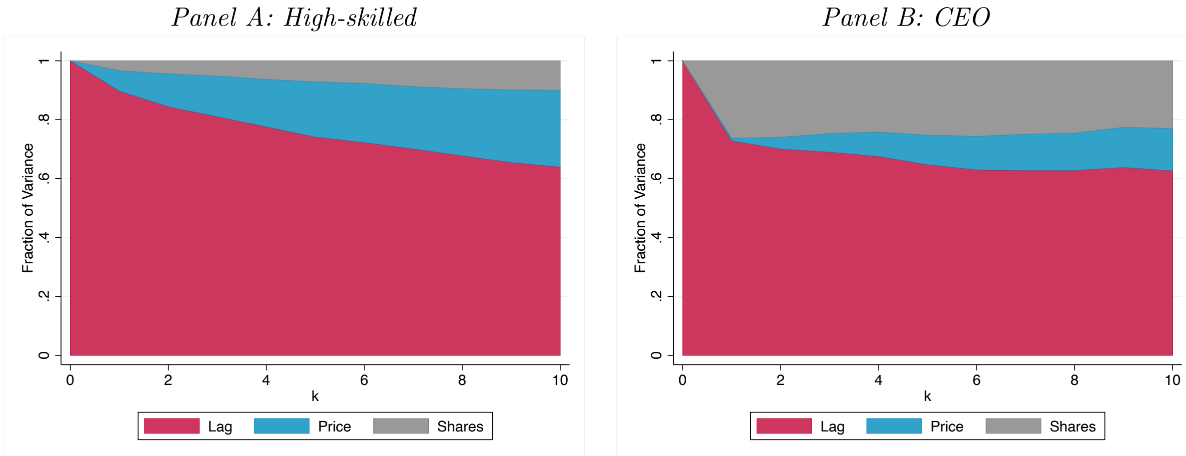

Figure 16: **Cross-sectional Variance Decomposition of Equity Pay.** The figure plots the following variance decomposition of equity pay over multiple horizons (k) from 1 to 10 years:

$$1 = \frac{cov\left[\ln\left(P_{t-k}N_{t-k}\right), \ln\left(P_t N_t\right)\right]}{Var\left[\ln\left(P_t N_t\right)\right]} + \frac{cov\left[\ln\left(\frac{P_t}{P_{t-k}}\right), \ln\left(P_t N_t\right)\right]}{Var\left[\ln\left(P_t N_t\right)\right]} + \frac{cov\left[\ln\left(\frac{N_t}{N_{t-k}}\right), \ln\left(P_t N_t\right)\right]}{Var\left[\ln\left(P_t N_t\right)\right]},$$

where we label each term, *Lag*, *Price*, and *Shares*, respectively. To estimate each term, we run the following cross-sectional regressions and plot each coefficients over k-horizon,

$$\begin{aligned}
\ln P_{it-k}N_{it-k} &= \alpha_t + \beta_{Lag,k} \times \ln P_{it}N_{it} + \epsilon_{it}, \\
\ln \frac{P_{it}}{P_{it-k}} &= \alpha_t + \beta_{Price,k} \times \ln P_{it}N_{it} + \epsilon_{it}, \\
\ln \frac{N_{it}}{N_{it-k}} &= \alpha_t + \beta_{Shares,k} \times \ln P_{it}N_{it} + \epsilon_{it}.
\end{aligned}$$

The figure plots the regression coefficients $\beta_{Lag,k}, \beta_{Price,k}, \beta_{Shares,k}$ for $k = 1...10$. Panel A plots the variance decomposition of the equity pay for high-skilled employee and Panel B repeats the analysis for CEO equity pay.

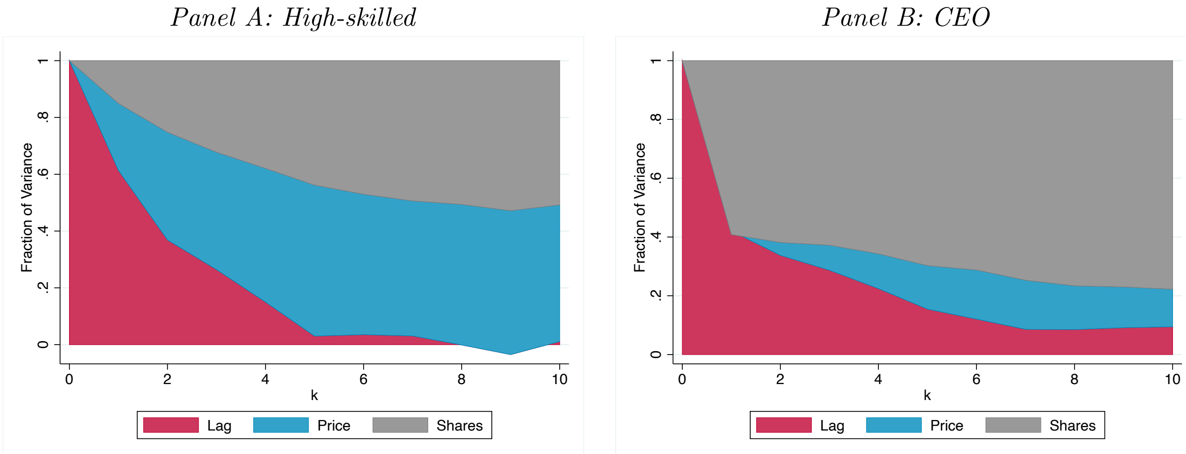

Figure 17: **Time-series Variance Decomposition of Equity Pay.** The figure plots the following variance decomposition of equity pay over multiple horizons (k) from 1 to 10 years:

$$1 = \frac{cov\left[\ln\left(P_{t-k}N_{t-k}\right), \ln\left(P_t N_t\right)\right]}{Var\left[\ln\left(P_t N_t\right)\right]} + \frac{cov\left[\ln\left(\frac{P_t}{P_{t-k}}\right), \ln\left(P_t N_t\right)\right]}{Var\left[\ln\left(P_t N_t\right)\right]} + \frac{cov\left[\ln\left(\frac{N_t}{N_{t-k}}\right), \ln\left(P_t N_t\right)\right]}{Var\left[\ln\left(P_t N_t\right)\right]},$$

where we label each term, *Lag*, *Price*, and *Shares*, respectively. To estimate each term, we run the following cross-sectional regressions and plot each coefficients over k-horizon,

$$\begin{aligned}
\ln P_{it-k}N_{it-k} &= \alpha_i + \beta_{Lag,k} \times \ln P_{it}N_{it} + \epsilon_{it}, \\
\ln \frac{P_{it}}{P_{it-k}} &= \alpha_i + \beta_{Price,k} \times \ln P_{it}N_{it} + \epsilon_{it}, \\
\ln \frac{N_{it}}{N_{it-k}} &= \alpha_i + \beta_{Shares,k} \times \ln P_{it}N_{it} + \epsilon_{it}.
\end{aligned}$$

The figure plots the regression coefficients $\beta_{Lag,k}, \beta_{Price,k}, \beta_{Shares,k}$ for $k = 1...10$. Panel A plots the variance decomposition of the equity pay for high-skilled employee and Panel B repeats the analysis for CEO equity pay.

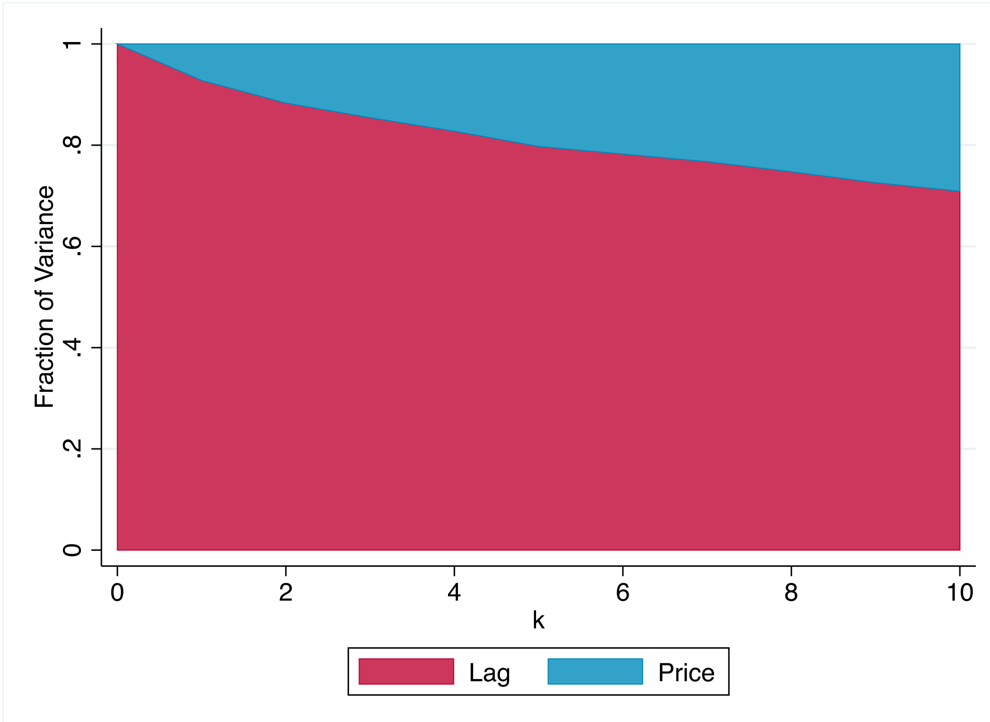

Figure 18: **Cross-sectional Variance Decomposition of Equity Pay with Initial N.** The figure repeats the analysis in Figure16 but fixing the number of granted shares per high-skilled employee with its initial value.

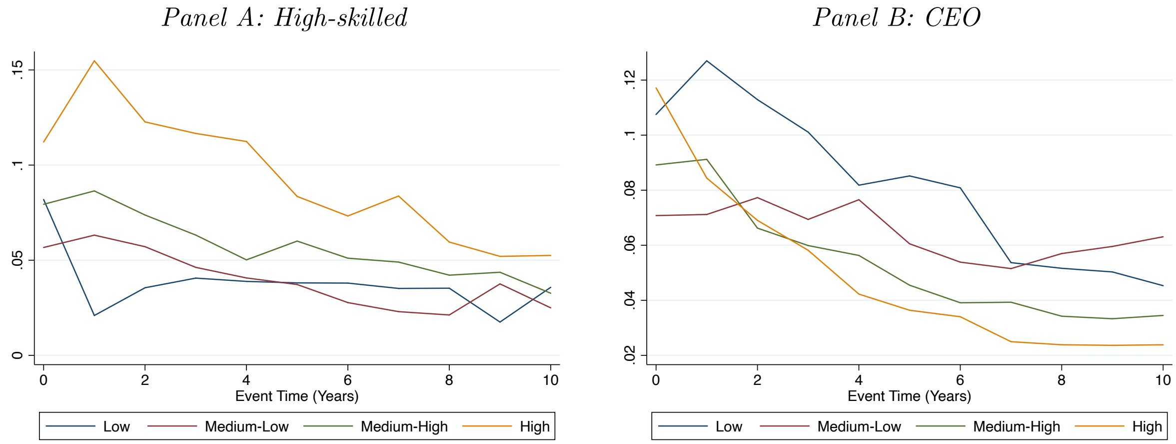

Figure 19: **Average Employment Growth of High vs Low Equity Payers.** The figure plots the average employment growth of four portfolios in event time in a similar fashion of the analysis from Lemmon et al. (2008). Each year, we sort firms based on their equity pay for high-skilled in Panel A and CEO equity pay in Panel B to construct four portfolios which we label each of them as *Low*, *Medium-Low*, *Medium-High*, and *High*. Then, we track each portfolio's equal-weighted average of the employment growth over the next ten years. For example, in 2000, we sort firms based on their equity pay and then track each portfolio's average employment growth from 2001 to 2010. We repeat this process throughout our sample period (1994 - 2019). We then average the average employment growth rates of these four portfolios across the event time (1 - 10 years) to obtain the lines in each figure.

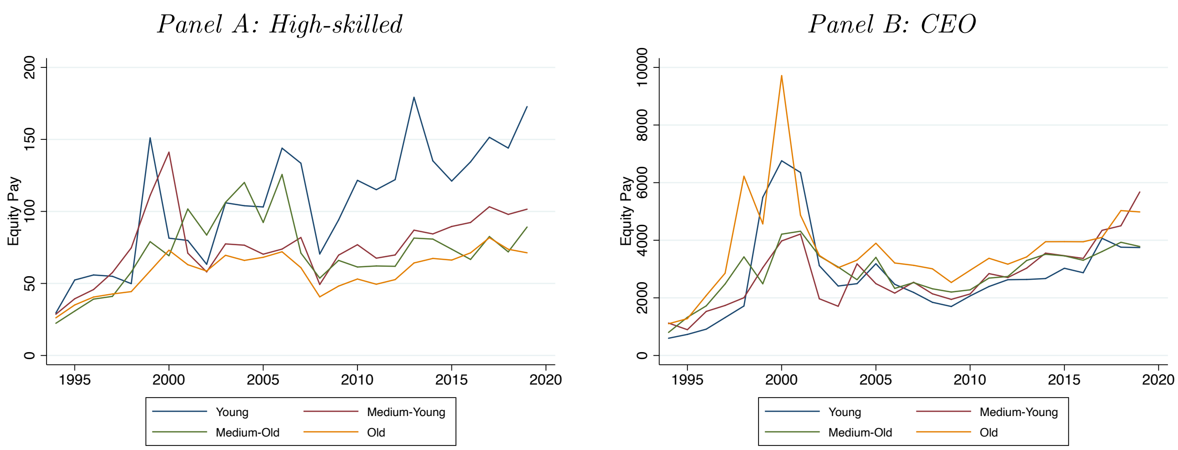

Figure 20: **Average Equity by IPO Age.** We sort firms by their IPO age (years since their IPO) into quartiles each year: Young, Medium-Young, Medium-Old, and Old. Then for each group, we plot the average equity pay for high-skilled in Panel A and CEO equity pay in Panel B. The units are in $1,000.

10 Tables

Table 2: **Summary Statistics**

This table reports the summary statistics of equity pay for high-skilled and CEO, and the ratio of reserved shares to total shares outstanding (*RS/SO*). Units for the equity pay are $1,000.

Panel A. Full Sample (1994 - 2019)

Variables	Mean	Std Dev	P10	P25	Median	P75	P90
Equity Pay (High Skilled)	64.714	173.223	3.543	9.039	23.207	59.108	141.153
Equity Pay (CEO)	3,110.677	8,068.270	0.000	150.000	1,268.971	3,691.800	7,575.985
RS/SO	0.133	0.098	0.040	0.070	0.113	0.170	0.245

Panel B1. Subsample (1994 - 2000)

Variables	Mean	Std Dev	P10	P25	Median	P75	P90
Equity Pay (High Skilled)	33.845	138.478	1.631	4.442	11.185	28.054	69.084
Equity Pay (CEO)	2,446.698	11,629.225	0.000	0.000	526.289	1,919.757	5,110.377
RS/SO	0.119	0.091	0.030	0.060	0.099	0.156	0.225

Panel B2. Subsample (2001 - 2007)

Variables	Mean	Std Dev	P10	P25	Median	P75	P90
Equity Pay (High Skilled)	67.899	153.960	6.121	13.466	30.622	71.086	150.221
Equity Pay (CEO)	3,175.029	7,606.988	0.000	89.445	1,181.537	3,490.272	7,896.145
RS/SO	0.157	0.102	0.059	0.092	0.137	0.196	0.274

Panel B3. Subsample (2008 - 2014)

Variables	Mean	Std Dev	P10	P25	Median	P75	P90
Equity Pay (High Skilled)	62.866	156.805	4.018	9.695	24.164	58.565	135.502
Equity Pay (CEO)	2,985.086	4,870.886	0.000	369.600	1,594.400	3,939.278	7,289.995
RS/SO	0.136	0.099	0.043	0.073	0.116	0.171	0.249

Panel B4. Subsample (2015 - 2019)

Variables	Mean	Std Dev	P10	P25	Median	P75	P90
Equity Pay (High Skilled)	95.785	233.814	5.046	12.744	31.965	84.616	221.808
Equity Pay (CEO)	4,157.386	6,312.066	0.000	839.900	2,699.879	5,529.449	9,672.298
RS/SO	0.119	0.091	0.034	0.059	0.099	0.153	0.224

Table 3: N_t **Dynamics: Firm Fixed Effects vs Initial Values vs AR(1)**

This table reports the dynamics of the granted shares per high-skilled employee (N_t). We regress N_t on firm fixed effects, its initial value, lagged value and price return in Column (1) - (4) and repeat the analyses where we replace the left-hand side with its log values in Column (5) - (8) as follows,

$$y_{it} = \alpha_i + \beta y_{i0} + \rho y_{it-1} + \gamma \cdot \left(\frac{P_{it-1}}{P_{it-2}} - 1 \right) + \epsilon_{it}, \quad y_{it} \in \{N_{it}, \ln N_{it}\},$$

where y_{i0} is the initial value of y and y is either the raw or log number of reserved shares. In parentheses, we report t-statistics based on two-way clustered standard errors by firm and year.

	Values				Log Values			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Initial value		0.346***				0.717***		
		(6.225)				(23.534)		
Lagged value			0.877***	0.882***			0.927***	0.929***
			(44.050)	(44.465)			(103.491)	(104.809)
$P_{t-1}/P_{t-2} - 1$				-0.709***				-0.143***
				(-6.389)				(-12.990)
Constant		2.236***	0.346***	0.351***		-0.028	-0.007	-0.005
		(7.313)	(6.341)	(6.193)		(-0.770)	(-0.609)	(-0.486)
Observations	51288	52243	43601	42403	51288	52243	43601	42403
R^2	0.625	0.284	0.833	0.833	0.795	0.569	0.889	0.891
Firm Fixed Effect	Yes	No	No	No	Yes	No	No	No

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: P_t **Dynamics: Firm Fixed Effects vs Initial Values vs AR(1)**

This table reports the dynamics of the stock price (P_t). We regress the stock price on firm fixed effects, its initial value, and lagged value in Column (1) - (3) and repeat the analysis where we replace the left-hand side with its log values in Column (4) - (6) as follows,

$$y_{it} = \alpha_i + \beta y_{i0} + \rho y_{it-1} + \epsilon_{it}, \quad y_{it} \in \{P_{it}, \ln P_{it}\},$$

where y_{i0} is the initial value of y and y is either the raw or log stock price. In parentheses, we report t-statistics based on two-way clustered standard errors by firm and year.

	Values			Log Values		
	(1)	(2)	(3)	(4)	(5)	(6)
Initial value		0.722^{***}			0.452^{***}	
		(2.883)			(8.383)	
Lagged value			0.913^{***}			0.919^{***}
			(14.944)			(55.145)
Constant		15.860	5.370		1.784^{***}	0.269^{***}
		(1.240)	(1.433)		(9.512)	(3.526)
Observations	50537	51456	43187	50537	51456	43187
R^2	0.455	0.328	0.802	0.628	0.223	0.819
Firm Fixed Effect	Yes	No	No	Yes	No	No

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: P_tN_t **Dynamics: Firm Fixed Effects vs Initial Values vs AR(1)**

This table reports the dynamics of equity pay (P_tN_t). We regress the equity pay on firm fixed effects, its initial value, and lagged value in Column (1) - (3) and repeat the analysis where we replace the left-hand side with its log values in Column (4) - (6) as follows

$$y_{it} = \alpha_i + \beta y_{i0} + \rho y_{it-1} + \epsilon_{it}, \quad y_{it} \in \{P_{it}N_{it}, \ln P_{it}N_{it}\},$$

where y_{i0} is the initial value of y and y is either the raw or log equity pay for high-skilled employee. Equity pay is defined as the value of granted shares per high-skilled employee. In parentheses, we report t-statistics based on two-way clustered standard errors by firm and year.

	Values			Log Values		
	(1)	(2)	(3)	(4)	(5)	(6)
Initial value		0.377^{**}			0.665^{***}	
		(2.653)			(12.836)	
Lagged value			0.726^{***}			0.868^{***}
			(8.219)			(65.232)
Constant		41.957^{***}	16.579^{***}		1.208^{***}	0.418^{***}
		(4.850)	(3.314)		(5.902)	(6.838)
Observations	51291	52247	43602	51291	52247	43602
R^2	0.630	0.247	0.583	0.705	0.424	0.789
Firm Fixed Effect	Yes	No	No	Yes	No	No

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: **CEO P_tN_t Dynamics: Firm Fixed Effects vs Initial Values vs AR(1)**

This table reports the dynamics of equity pay (P_tN_t) for CEOs. We regress the equity pay on firm fixed effects, its initial value, and lagged value in Column (1) - (3) and repeat the analysis where we replace the left-hand side with its log values in Column (4) - (6) as follows

$$y_{it} = \alpha_i + \beta y_{i0} + \rho y_{it-1} + \epsilon_{it}, \quad y_{it} \in \{P_{it}N_{it}^{CEO}, \ln P_{it}N_{it}^{CEO}\},$$

where y_{i0} is the initial value of y and y is either the raw or log equity pay for CEO. CEO equity pay is defined as the value of shares granted to CEOs. In parentheses, we report t-statistics based on two-way clustered standard errors by firm and year.

	Values			Log Values		
	(1)	(2)	(3)	(4)	(5)	(6)
Initial value		0.139***			0.636***	
		(3.394)			(20.511)	
Lagged value			0.311***			0.484***
			(5.381)			(33.123)
Constant		2745.928***	2315.323***		0.224	2.676***
		(14.354)	(9.642)		(0.873)	(29.296)
Observations	42215	42318	38926	42215	42318	38926
R^2	0.240	0.022	0.092	0.337	0.061	0.256
Firm Fixed Effect	Yes	No	No	Yes	No	No

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: **Initial Value Regressions: Equity Pay** $P_t N_t$

This table regresses the initial values of the equity pay on initial year × industry fixed effects, initial year × city fixed effects and firm characteristics as follows,

$$P_{ijt}N_{ijt} = \alpha_{jt} + \gamma X_{ijt} + \epsilon_{ijt},$$

where i is a firm subscript, j is either industry or city subscript and X_{ijt} is a set of firm characteristics. We also compute average equity pay of industry and city excluding its own value and replace fixed effects in column (2) and (4). We use 6 broad industries from Xiaolan (2019) (*Xiaolan 6*). Equity pay is defined as the value of granted shares per high-skilled employee. Initial value is the first positive equity pay of each firm where we allow pre-1994 values. In parentheses, we report t-statistics based on two-way clustered standard errors by firm and year.

	Equity Pay						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Industry Average Equity Pay		1.609***				1.335***	
		(15.408)				(16.233)	
City Average Equity Pay				0.683***			0.377***
				(5.894)			(4.901)
Cash-to-asset					303.657***	250.364***	308.739***
					(6.691)	(6.347)	(6.463)
Cashflow-to-asset					-14.227	34.418	6.699
					(-0.466)	(1.314)	(0.229)
Leverage					-7.467	1.739	-3.032
					(-0.583)	(0.139)	(-0.201)
Dividend payer					-23.755***	-12.634	-15.992
					(-2.867)	(-1.475)	(-1.579)
Log Asset					26.559***	10.652***	23.877***
					(6.128)	(3.200)	(4.767)
Return volatility					784.816**	534.648*	792.730**
					(2.436)	(1.963)	(2.253)
Observations	6746	6746	6746	5090	5922	5922	4610
R^2	0.162	0.099	0.325	0.042	0.086	0.123	0.094
Initial Year × Industry FE	Yes	No	No	No	No	No	No
City × Initial Year Fixed Effect	No	No	Yes	No	No	No	No

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: **Financial Constraints and Equity Pay: Difference-in-Differences.** This table reports difference-in-differences regressions of equity pay ($P_t N_t$) on treatment status following court decisions that allowed Delaware-incorporated firms to pledge patents as collateral (Mann, 2018). Treated: firms incorporated in Delaware. Post: from 2002. All regressions include year and state-of-incorporation fixed effects. t-statistics are in parentheses.

	Equity Pay ($P_t N_t$)					
	(1)	(2)	(3)	(4)	(5)	(6)
Treated × Post	-0.745	11.025*	-0.383	-0.061	11.448*	-0.039
	(-0.103)	(1.824)	(-0.110)	(-0.008)	(1.885)	(-0.011)
$P_{t-1}N_{t-1}$			0.517**			0.517**
			(2.411)			(2.409)
Treated × Pledged Patents × Post				-0.274***	-0.290***	-0.116*
				(-3.766)	(-3.567)	(-2.095)
Pledged Patents × Post				0.007	0.002	-0.010
				(0.211)	(0.068)	(-0.579)
Pledged Patents				-0.093**	-0.094***	-0.040
				(-2.701)	(-2.930)	(-1.337)
Observations	13779	34127	11461	13779	34127	11461
R^2	0.015	0.027	0.427	0.016	0.027	0.427
Sample Period	-5 ∼ +5	-10 ∼ +10	-5 ∼ +5	-5 ∼ +5	-10 ∼ +10	-5 ∼ +5
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Incorporated State Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: N_t **Dynamics: Firm Characteristics vs AR(1)**

This table reports the dynamics of the granted shares per high-skilled employee (N_t). We regress N_t on firm-level characteristics with and without its lag (N_{t-1}) as follows,

$$N_{it} = \alpha + \rho N_{it-1} + \beta \cdot \left(\frac{P_{it-1}}{P_{it-2}} - 1\right) + \gamma X_{it} + \epsilon_{it}.$$

In parentheses, we report t-statistics based on two-way clustered standard errors by firm and year.

	(1)	(2)	(3)	(4)
N_{t-1}	0.877***	0.872***	0.882***	
	(44.050)	(39.168)	(44.465)	
$P_{t-1}/P_{t-2} - 1$			-0.709***	
			(-6.389)	
Cash-to-asset		1.302***		14.842***
		(3.155)		(8.889)
Cashflow-to-asset		-2.170***		-4.000***
		(-6.947)		(-2.957)
Leverage		0.743***		3.302***
		(4.369)		(3.119)
Dividend payer		0.116**		-0.814**
		(2.289)		(-2.640)
Log Asset		-0.087***		-0.210*
		(-5.032)		(-1.779)
Return volatility		0.773		8.458***
		(1.275)		(3.623)
Constant	0.346***	0.589***	0.351***	1.794
	(6.341)	(3.808)	(6.193)	(1.466)
Observations	43601	39943	42403	45243
R^2	0.833	0.831	0.833	0.073

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: N_t**'s Growth Dynamics: Firm Characteristics vs AR(1)**

This table reports the dynamics of the growth rate of the granted shares per high-skilled employee (N_t). We regress the growth rate of N_t on firm-level characteristics with and without lagged price return,

$$\frac{N_{it}}{N_{it-1}} - 1 = \alpha + \beta \cdot \left(\frac{P_{it-1}}{P_{it-2}} - 1 \right) + \gamma X_{it} + \epsilon_{it}.$$

In parentheses, we report t-statistics based on two-way clustered standard errors by firm and year.

	(1)	(2)	(3)
$P_{t-1}/P_{t-2} - 1$		-0.368	-0.248
		(-1.415)	(-0.847)
Cash-to-asset	-1.074**		-1.046**
	(-2.630)		(-2.566)
Cashflow-to-asset	-0.486		-0.360
	(-0.816)		(-0.640)
Leverage	0.059		0.051
	(0.157)		(0.131)
Dividend payer	-0.172		-0.174
	(-0.658)		(-0.666)
Log Asset	0.048		0.050
	(1.209)		(1.248)
Return volatility	5.865***		5.704***
	(2.893)		(2.808)
Constant	-0.401	0.396***	-0.397
	(-1.218)	(4.735)	(-1.196)
Observations	39692	42143	39598
R^2	0.001	0.000	0.001

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: N_t**'s Change Dynamics: Firm Characteristics vs AR(1)**

This table reports the dynamics of the changes of the granted shares per high-skilled employee (N_t). We regress the growth rate of N_t on firm-level characteristics with and without lagged price return,

$$\Delta N_{it} = \alpha + \beta \cdot \left(\frac{P_{it-1}}{P_{it-2}} - 1 \right) + \gamma X_{it} + \epsilon_{it}.$$

In parentheses, we report t-statistics based on two-way clustered standard errors by firm and year.

	(1)	(2)	(3)
$P_{t-1}/P_{t-2} - 1$		-0.757***	-0.610***
		(-7.243)	(-5.798)
Cash-to-asset	-0.657**		-0.505*
	(-2.446)		(-1.936)
Cashflow-to-asset	-1.925***		-1.701***
	(-6.167)		(-7.187)
Leverage	0.410**		0.370**
	(2.292)		(2.281)
Dividend payer	0.260***		0.259***
	(4.056)		(4.083)
Log Asset	-0.067***		-0.063***
	(-2.934)		(-2.821)
Return volatility	-0.177		-0.619
	(-0.253)		(-0.931)
Constant	0.368*	-0.116***	0.388*
	(1.771)	(-3.032)	(1.855)
Observations	39943	42403	39848
R^2	0.004	0.004	0.007

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: **Cross-Sectional Variance Decomposition of Growth**

We apply the following decomposition to tie the growth rates of equity pay into *Price effect* and *Shares effect*:

$$1 = \underbrace{\frac{cov\left[\ln\left(\frac{P_t}{P_{t-k}}\right), \ln\left(\frac{P_t N_t}{P_{t-k}N_{t-k}}\right)\right]}{Var\left[\ln\left(\frac{P_t N_t}{P_{t-k}N_{t-k}}\right)\right]}}_{\text{Price Effect}} + \underbrace{\frac{cov\left[\ln\left(\frac{N_t}{N_{t-k}}\right), \ln\left(\frac{P_t N_t}{P_{t-k}N_{t-k}}\right)\right]}{Var\left[\ln\left(\frac{P_t N_t}{P_{t-k}N_{t-k}}\right)\right]}}_{\text{Shares Effect}},$$

where P_t is the stock price and N_t is the number of granted shares to high-skilled employee in year t. To estimate each term, we run the following cross-sectional regressions and plot each coefficients over k-horizon,

$$\ln\frac{P_{it}}{P_{it-k}} = \alpha_t + \beta_{Price,k} \times \ln\frac{P_{it}N_{it}}{P_{it-k}N_{it-k}} + \epsilon_{it},$$
$$\ln\frac{N_{it}}{N_{it-k}} = \alpha_t + \beta_{Shares,k} \times \ln\frac{P_{it}N_{it}}{P_{it-k}N_{it-k}} + \epsilon_{it}.$$

Panel A and B report the decomposition for equity pay beyond the C-suite, and Panel C and D report the decomposition for CEO equity pay.

Panel A. Price Effect

$k=1$	$k=2$	$k=3$	$k=4$	$k=5$
0.409	0.434	0.434	0.434	0.434

Panel B. Shares Effect

$k=1$	$k=2$	$k=3$	$k=4$	$k=5$
0.585	0.562	0.564	0.563	0.564

Panel C. Price Effect (CEO)

$k=1$	$k=2$	$k=3$	$k=4$	$k=5$
0.043	0.106	0.140	0.164	0.180

Panel D. Shares Effect (CEO)

$k=1$	$k=2$	$k=3$	$k=4$	$k=5$
0.957	0.894	0.860	0.836	0.820

Table 13: **Back-to-Beginning Regressions**

We sort firms into quartile portfolios depending on equity pay, N, and RS/SO ratio each year. We track the list of the firms of each portfolio for the next 9 years and estimate AR(1) regressions ($y_{it} = \alpha + \rho y_{it-1} + \epsilon_{it}$) using the 10-year of data. For example, in 2000, we sort firms based on the relevant variable, and then estimate AR(1) coefficients for each quartile of 2000 using 2000-2009 data. We repeat this procedure from 1995 - 2010. Then, we compute time-series averages of AR(1) coefficients for each quartile. Panel B repeats this process by adding one lag or price return as a control when running regressions ($y_{it} = \alpha + \rho y_{it-1} + \beta \cdot (P_{it-1}/P_{it-2}) + \epsilon_{it}$). In the parentheses, we report the standard deviations of the coefficients.

Panel A. AR(1) Regression

	Equity Pay	N	RS/SO
Low	0.800	0.801	0.731
	(0.126)	(0.150)	(0.051)
Medium-Low	0.807	0.829	0.666
	(0.103)	(0.099)	(0.047)
Medium-High	0.769	0.849	0.683
	(0.124)	(0.063)	(0.044)
High	0.729	0.854	0.738
	(0.154)	(0.062)	(0.045)

Panel B. Add one lag of price-return as a control

	Equity Pay		N	
	AR(1)	Ret_{t-1}	AR(1)	Ret_{t-1}
Low	0.800	-0.609	0.808	-0.053
	(0.128)	(1.353)	(0.152)	(0.042)
Medium-Low	0.812	-1.430	0.862	-0.135
	(0.107)	(1.272)	(0.080)	(0.042)
Medium-High	0.775	-2.307	0.850	-0.263
	(0.125)	(3.067)	(0.062)	(0.051)
High	0.733	-7.156	0.854	-1.201
	(0.157)	(11.982)	(0.062)	(0.673)

Table 14: **Back-to-Beginning Regressions (CEO)**

We sort firms into quartile portfolios depending on CEO's equity pay and the number of granted shares to CEOs. We track the list of the firms of each portfolio for the next 9 years and estimate AR(1) regressions ($y_{it} = \alpha + \rho y_{it-1} + \epsilon_{it}$) using the 10-year of data. For example, in 2000, we sort firms based on the relevant variable, and then estimate AR(1) coefficients for each quartile of 2000 using 2000-2009 data. We repeat this procedure from 1995 - 2010. Then, we compute time-series averages of AR(1) coefficients for each quartile. Panel B repeats this process by adding one lag or price return as a control when running regressions ($y_{it} = \alpha + \rho y_{it-1} + \beta \cdot (P_{it-1}/P_{it-2}) + \epsilon_{it}$). In the parentheses, we report the standard deviations of the coefficients.

Panel A. AR(1) Regression

	Equity Pay	N
Low	0.273	0.107
	(0.152)	(0.098)
Medium-Low	0.434	0.301
	(0.071)	(0.077)
Medium-High	0.362	0.252
	(0.110)	(0.098)
High	0.363	0.233
	(0.141)	(0.174)

Panel B. Add one lag of price-return as a control

	Equity Pay		N	
	AR(1)	Ret_{t-1}	AR(1)	Ret_{t-1}
Low	0.277	593.829	0.108	3.364
	(0.153)	(438.298)	(0.098)	(198.510)
Medium-Low	0.441	416.260	0.302	1.821
	(0.071)	(139.827)	(0.078)	(12.624)
Medium-High	0.362	806.379	0.247	-15.717
	(0.108)	(199.697)	(0.098)	(25.441)
High	0.366	2,666.242	0.233	63.166
	(0.140)	(1,328.874)	(0.176)	(303.307)

Table 15: **Equity Pay as Capital Structure**

This table studies the equity pay in terms of capital structure in a similar fashion of the analysis from Welch (2004). Panel A estimates the following regression,

$$\frac{P_{t+k}RS_{t+k}}{P_{t+k}S_{t+k}+D_{t+k}} = \alpha_0 + \alpha_1 \cdot \frac{P_t RS_t}{P_t S_t + D_t} + \alpha_2 \cdot \frac{P_{t+k}RS_t}{P_{t+k}S_t + D_t} + \epsilon_t,$$

where P_t is the stock price, RS_t is the number of reserved shares, S_t is the number of shares outstanding, and D_t is the book value of debt. Panel B estimates the following,

$$\frac{P_{t+k}RS_{t+k}}{P_{t+k}S_{t+k}+D_{t+k}} = \alpha_0 + \alpha_1 \cdot \frac{P_t RS_t}{P_t S_t + D_t} + \alpha_2 \cdot \frac{P_t RS_{t+k}}{P_t S_{t+k} + D_t} + \epsilon_t.$$

In parentheses, we report t-statistics based on two-way clustered standard errors by firm and year.

Panel A

	Welch (2004)	$k = 1$	$k = 2$	$k = 5$	$k = 10$
	(1)	(2)	(3)	(4)	(5)
α_1	0	0.175*	0.017	-0.045	-0.093
		(2.013)	(0.192)	(-0.657)	(-1.280)
α_2	1	0.397***	0.341***	0.085	0.003
		(4.581)	(4.154)	(1.272)	(0.051)
Observations		41864	36371	25532	14237
R^2		0.803	0.745	0.701	0.732

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Panel B

	$k = 1$	$k = 2$	$k = 5$	$k = 10$
	(1)	(2)	(3)	(4)
$\frac{P_t RS_t}{P_t S_t + D_t}$	0.100***	0.061***	0.036***	0.024**
	(4.429)	(5.039)	(4.160)	(2.116)
$\frac{P_t RS_{t+k}}{P_t S_{t+k} + D_t}$	0.877***	0.900***	0.899***	0.871***
	(34.081)	(68.537)	(92.052)	(39.269)
Observations	43153	36806	25879	14504
R^2	0.943	0.920	0.879	0.831

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 16: Model Parameters

Parameter	Symbol	Value	Description
Panel A: Preferences and Production			
Discount factor	β	0.94	Firm discount factor
Human capital share	α_h	0.55	Exponent in $y = z\, h^{\alpha_h}$
Baseline wage	w	0.1	Cash wage per unit of h
Panel B: Depreciation			
Physical depreciation	δ_h	0.20	Depreciation rate of human capital h
Mobility depreciation	δ_{m0}	0.40	Baseline turnover rate (at $G = 0$)
Half-life parameter	$G_{1/2}$	15	G at which δ_m falls to $\delta_{m0}/2$
Equity depreciation	δ_e	0.10	Depreciation rate of equity stock G
Panel C: Adjustment Costs			
h adjustment cost	θ_h	0.20	Scale in $\frac{1}{2}\theta_h \left(\frac{I_h}{h}\right)^2 h$
G adjustment cost	θ_G	0.20	Scale in $\frac{1}{2}\theta_G \left(\frac{G'}{G} - 1\right)^2 G$
E adjustment cost	θ_E	0.30	Scale in $\frac{1}{2}\theta_E \left(\frac{E'}{E} - 1\right)^2 E$
Panel D: Financial Frictions			
Fixed financing cost	η_0	0.08	Fixed cost when $d^{\text{pre}} < 0$
Proportional financing cost	η_1	0.028	Per-dollar cost when $d^{\text{pre}} < 0$
Dilution discount	η_2	-0.07	Dilution cost tied to equity payout E'
Adoption cost	F	10	One-time irreversible switching cost
Panel E: Productivity Process			
Persistence	ρ_z	0.90	AR(1) coefficient of $\log z$
Shock std. dev.	σ_z	0.30	Std. dev. of innovation to $\log z$
Drift	a	0.0441	Unconditional mean parameter
Grid points	N_z	7	Number of discrete productivity states

Table 17: Model vs. Data Moments

Variable	Symbol	Model	Data
Dispersion			
E/h CV	$\sigma_{E/h}/\mu_{E/h}$	1.84	2.70
G/V CV (ownership share)	$\sigma_{G/V}/\mu_{G/V}$	0.63	0.76
E/h Gini coefficient	Gini(E/h)	0.64	0.72
V/h CV (M/B proxy)	$\sigma_{V/h}/\mu_{V/h}$	1.25	1.60
Concentration			
Equity pay share (top 10% firms)	S_E^{p90}	0.21	0.76
Equity pay share (top 50% firms)	S_E^{p50}	0.58	0.97
Persistence			
E/h AR(1)	$\rho_{E/h}$	0.91	0.73
Adoption			
Fraction in equity regime	Pr(equity)	0.73	0.77

Appendices

A Data Description

Our sample is based on Execucomp, which uses the S&P 1500 to construct its sample. The S&P 1500 is in turn based on the S&P500, the S&P MidCap 400, and the S&P SmallCap 600. To avoid outliers, we drop firms whose total number of employees is less than 50 since high-skilled employees appear in the denominator of per-high-skilled-employee equity pay. We also drop firms for which the ratio of reserved to outstanding shares is greater than 1.

A.1 High-Skilled Ratio

To compute the ratio of high-skilled to total employees, we use the ONET database. ONET provides the ratio of high-skilled to total employee at the NAICS industry level for each year. We use a NAICS-SIC crosswalk to map SIC industry classifications. We take the median ratio for SIC3- and SIC2-level industry classifications every year. Then, we get the final estimates of industry-level high-skilled ratios by taking the time-series median at the SIC3- and SIC2-level. We merge our firm-level data first using SIC3-level data and then use SIC2-level data for firms that are not matched using SIC3-level data.

A.2 Executives' Equity Pay

We exclude executives' portion of the equity pay from our reserved shares data to provide illustrative estimates of equity pay for below the C-suite. We obtain the executives' equity pay using Execucomp data as the sum of options granted (OPTION_AWARDS_BLK_VALUE), grant date fair value of options granted (OPTION_AWARDS_FV), restricted stock grants (RSTKGRNT), grant date fair value of stock awarded (STOCK_AWARDS_FV), and LTIP payouts (LTIP) and compute the following for the comparison.

$$\frac{\text{Value of Granted Shares} - \text{Executives' Equity Pay}}{\text{No. High-skilled Employee} - \text{No. Executives}}.$$

We also compute average equity pay for executives as the ratio of executives' equity pay to the number of executives for a comparison of executives to high-skilled employee below the C-suite.

A.3 Annual Equity Grants at the Firm Level

We utilize firm-level data on shares reserved for compensation from firms' annual reports (10Ks). In practice, the process of authorizing new reserved shares is lumpy. Similar to a plan for capital expenditures, firms construct a plan for new share issuances (e.g., for compensation, warrants, secondary offerings). When this plan is revised significantly, the firm authorizes a new block of reserved shares, NRS_t. These newly authorized shares are then used to grant options and restricted stock compensation over the next *gp* years, where the granting period *gp* denotes the time between the shares being authorized and being allocated to compensation grants. It should be noted that firms also manage their stock of reserved shares, similar to the way firms manage their cash to ensure a sufficient supply to satisfy liquidity needs but no more than this, due to opportunity costs. They are required to reserve enough shares to satisfy compensation grants that are likely to be exercised or vested. On the other hand, firms avoid reserving too many shares because investors know that any new shares from employee compensation will result in the dilution of existing shares. Thus, firms strive to authorize new shares in a way that balances these tradeoffs.

Shares reserved for compensation is a stock variable, whereas we are interested in the annual flow of new equity grants. Intuitively, we can convert the stock of reserved shares into an annual flow by dividing the stock by the average time that a reserved share remains on the balance sheet before it is granted as compensation. Denote this average granting period as *gp*. We provide a formal derivation of our flow measure of equity-based compensation, *new share grants*, or, $N = RS/gp$ below, using a law of motion for reserved shares which accounts for authorization, exercise, and expiration. We then use the RiskMetrics data from 1996–2005 to estimate the weighted-average granting period as the ratio of compensation grants to reserved shares. During this period, the weighted-average granting period, *gp*, is 5.69 years.[20] To be conservative, we then use a weighted-average granting period of six years to estimate the annual flow of equity-based compensation grants from the end-of-year stock of reserved shares.[21]

We start with the following law of motion for the stock of reserved shares:

$$RS_{t+1} = RS_t + NRS_t - EXC_t - EXP_t, \tag{3}$$

where RS_t denotes reserved shares at the beginning of period t, and RS_{t+1} is the stock of reserved shares at the beginning of period $t+1$. As is standard for the law of motion of any stock, there is both "investment" in the stock as well as "depreciation." Here, investment, or growth in reserved shares, is denoted by NRS_t. That is, NRS_t denotes newly authorized reserved shares. All newly authorized reserved shares are voted on by the board of directors, and they should be reported to the SEC at least annually. However, comprehensive data on new share authorizations are not reliably available electronically. The stock of reserved shares also depreciates due to exercised stock options

[20] The median of the granting period across industries is 5.68 years.

[21] Our measure of inequality may additionally be conservative because we do not include capital gains or losses on share-based compensation that is granted but not vested, and share values have increased substantially, on average, over our sample (see Hall and Liebman (1998)).

and vested restricted stock (denoted EXC_t) and also due to expired options or retired restricted stock (denoted by EXP_t).

Assume that the average granting period of the initial stock of reserved shares at time t, RS_t, is gp_0. This means that, on average, any previously authorized share is expected to remain on the balance sheet in the stock of RS_t for gp_0 years before being granted. We allow for the granting period to differ for any given block of newly authorized shares, NRS_t, and we denote the average granting period for NRS_t by gp_t. What will be important for determining the fraction of the stock of reserved shares that represents the current flow of employee compensation grants is a weighted average of the granting period for all reserved shares on the balance sheet. For parsimony, we assume that all newly authorized shares are evenly granted over the next gp_t periods:

$$NRS_t = \sum_{k=t}^{t+gp_t} \text{Annual Grants(AG)}_k = gp_t \cdot AG_t. \tag{4}$$

For further simplification, we assume that

1) On average, employees exercise a fraction e of the total reserved shares[22]

$$EXC_t = e \cdot RS_t \ \forall 0 < e < 1. \tag{5}$$

2) On average, outstanding restricted stocks or stock options display a constant attrition rate c due to forfeiture, expiration, or

$$EXP_t = c \cdot RS_t \ \forall 0 < c < 1. \tag{6}$$

Using Equations (4), (5), and (6), we can rewrite the law of motion (3) as

$$\begin{aligned} RS_{t+1} &= (RS_t - EXC_t - EXP_t) + NRS_t \\ &= (1 - e - c)RS_t + gp_t \cdot AG_t. \end{aligned}$$

To correctly capture the annual share-based compensation granted to employees at time t (denoted by NG_t) for "new grants," we must include the following two components:

1. AG: annual grants from newly reserved shares, NRS_t
2. PG: annual grants from the stock of previously reserved shares, $\frac{RS_t}{gp_0}$

Note, we can rewrite the law of motion for RS_{t+1} as

$$RS_{t+1} = \underbrace{(gp_0 - e \cdot gp_0 - c \cdot gp_0)}_{\substack{\text{average remaining granting period} \\ \text{after exercising and expiration}}} \frac{RS_t}{gp_0} + gp_t \cdot AG_t.$$

[22]Employees exercise stock options, or their stock vests, after $e_0 \cdot gp_0$ periods. We assume that one outstanding stock option has the right to purchase one common share of the firm. This is consistent with common practice.

Dividing both sides by $\frac{RS_{t+1}}{\frac{(gp_0 - e \cdot gp_0 - c \cdot gp_0)\frac{RS_t}{gp_0} + gp_t \cdot AG_t}{AG_t + \frac{RS_t}{gp_0}}}$ and multiplying by $AG_t + \frac{RS_t}{gp_0}$, we obtain

$$\begin{aligned} NG_t = AG_t + \frac{RS_t}{gp_0} &= \frac{RS_{t+1}}{\frac{(gp_0 - e \cdot gp_0 - c \cdot gp_0)\frac{RS_t}{gp_0} + gp_t \cdot AG_t}{AG_t + \frac{RS_t}{gp_0}}} \\ &= \frac{RS_{t+1}}{\underbrace{(1-e-c)gp_0\omega_0 + gp_t\omega_1}_{\text{weighted average granting period}}}, \end{aligned} \tag{7}$$

where $\omega_0 = \frac{\frac{RS_t}{gp_0}}{AG_t + \frac{RS_t}{gp_0}}$ and $\omega_1 = \frac{AG_t}{AG_t + \frac{RS_t}{gp_0}}$.

Hence, the flow of share-based compensation at period t is $\frac{RS_{t+1}}{\overline{gp}}$, where $\overline{gp}$ denotes the average time that any existing or newly authorized reserved share remains on the balance sheet before being allocated to a compensation grant. Since $e, c \in (0, 1)$, the weighted average granting period should be a value between gp_0 and gp_t.

To match the theory to the data, we note that this derivation uses t to denote values at the beginning of each period, as is standard in macroeconomic notation. However, since accounting data are recorded at the end of each period, we use the end-of-period data to measure the deferred compensation flow for the annual period ending at the date of the accounting entry. That is, we use a fraction of the stock of reserved shares recorded at the end of year t to measure the flow of new grants during year t.

Our analysis is mainly focused on equity pay below the C-Suite. However, Figure **??** shows that the general pattern of median total firm equity across firms pay tracks the median of equity pay below the C-Suite across firms. Due to measurement error at the firm level in shares granted to executives we do not excluded executive equity pay when computing equity pay beyond the C-Suite. This is consistent with Eisfeldt et al. (2022), who report that within manufacturing broadly defined almost 80% of equity pay goes to workers below the C-Suite. Each C-Suite-level employee receives more equity pay, but there are far fewer C-Suite employees. For context, we also plot median C-Suite equity pay from Execucomp.

A.4 Industry-level Data: NBER-CES

To construct the industry-level data for wage comparisons, we merge our firm-level data with NBER-CES data. NBER-CES data is available at the SIC4-digit level. We compute the industry-level median of equity pay from our sample of the firm-level dataset each year and merge the two datasets using 4-digit SIC codes. The main objective of using this data is to obtain industry-level wage data. Following Dunne, Foster, Haltiwanger, and Troske (2004), we compute low and high-skilled wage data as,

$$\begin{aligned} \text{Low-skilled Wage} &= \frac{\text{Production Workers' Payroll}}{\text{No. Production Workers}}, \\ \text{High-skilled Wage} &= \frac{\text{Total Payroll} - \text{Production Workers' Payroll}}{\text{No. Total Employee} - \text{No. Production Workers}}. \end{aligned}$$

We define total pay for high-skilled employee as the sum of their wage and equity pay.

A.5 Firm Characteristics

We use CRSP to obtain stock returns and Compustat for accounting items. The following is a list of characteristics we use. Compustat item names appear in the parentheses.

- Cash-to-asset: Cash and short-term investments (CHE)/Book asset (AT)
- Cashflow-to-asset: (Book asset (AT) - Interest expense (XINT) - Tax (TXT) - Ordinary dividends (DVC))/Book asset (AT)
- Leverage: (Long-term debt (DLTT) + Current liabilities (DLC))/Book asset (AT)
- Dividend payers: A dummy variable that equals to 1 if the ordinary dividends (DVC) is positive and 0 otherwise
- Market-to-book ratio (Log): Market equity (PRCC_F × CSHO)-to-book equity. Book equity is book value of stockholders' equity (SEQ) plus balance sheet deferred taxes and investment tax credit (if available) (TXDITC), minus the book value of preferred stock. Depending on availability, we use the redemption (PSTKRV), liquidation (PSTKL), or par value (PSTK) (in that order)
- Capital expenditure (CAPX) to assets (AT)
- SG&A expense (XSGA) to sale (SALE)
- Log of market value (PRCC_F × CSHO)
- Stock return: Annualized stock return (CRSP item, RET) from a fiscal year $t-1$ to t.
- Volatility: Standard deviation of returns using monthly returns (CRSP item, RET) with a 60-month rolling window

B Supplementary Analyses

B.1 Robustness Checks

In Figure 21, we plot the alternative measures of median equity pay. Panel A plots equity pay for high-skilled, for executives, and for employees below the C-Suite. Panel B repeats the analysis in Panel A of Figure 12, where we weight the observations by the number of high-skilled employee when computing the time series of equity pay for high-skilled employee.

In Figure 22, we plot how equity pay contributes to inequality relative to the wage based on industry-level analysis.

In Figure 23 we repeat the main "Back to the Beginning" analyses (Figure 14) using firms that exist for at least 10 years from the portfolio formation period (i.e. survivors).

In Figure 24 we epeats the analysis in Figure 14 with a constant scaling. That is, we compute firm-level averages of number of high-skilled employee throughout our sample period and then use this value to compute the equity pay.

In Table 18, we repeat the analysis in Table 3 but replace N_t with the number of granted shares per total employee from per high-skilled employee.

In Table 19, we repeat the analysis in Table 5 but replace N_t with the number of granted shares per total employee from per high-skilled employee.

B.2 Additional Figures and Tables

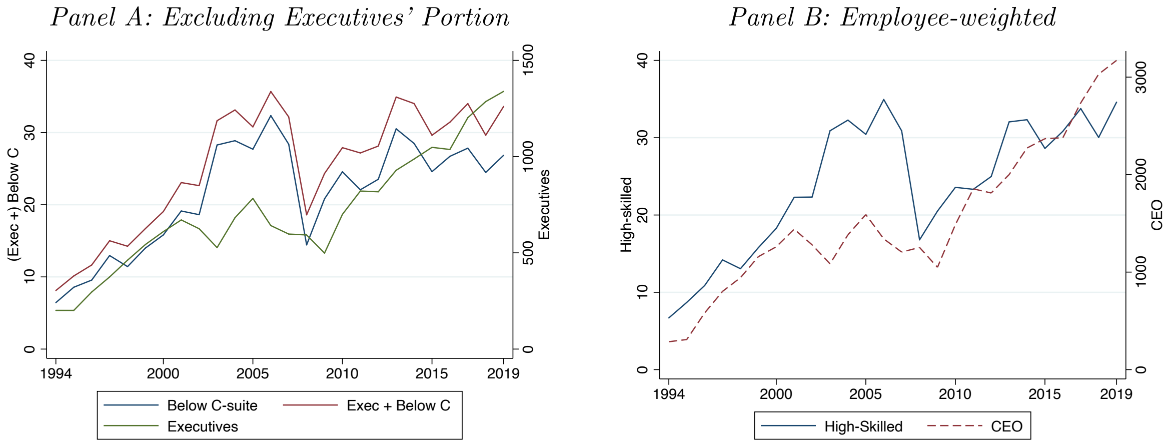

Figure 21: **Median Equity Pay - Alternative Measures.** The figure plots the alternative measures of median equity pay. Panel A plots equity pay for high-skilled, for executives, and for employees below the C-Suite. Panel B repeats the analysis in Panel A of Figure 12, where we weight the observations by the number of high-skilled employee when computing the time series of equity pay for high-skilled employee.

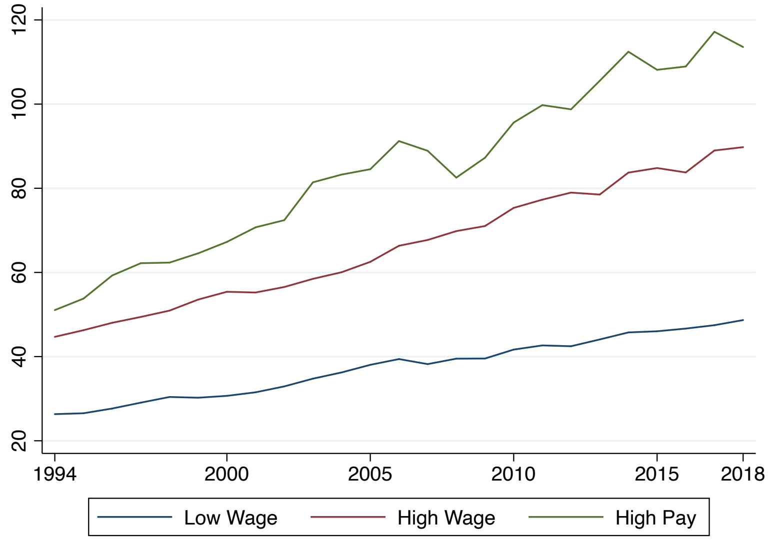

Figure 22: **How Equity Pay Contributes to Overall Income Inequality.**, The figure plots three time-series of medians: (1) wage for low-skilled employee, (2) wage for high-skilled employee, and (3) total pay for high-skilled employee where we define the total pay as the sum of wage and equity pay. We use NBER-CES Broad Manufacturing industry-level data from 1994 - 2018. We compute the industry(SIC4-digit)-level median of equity pay from our firm-level sample each year. We then plot the median values across industries for each item. The units are in $1,000.

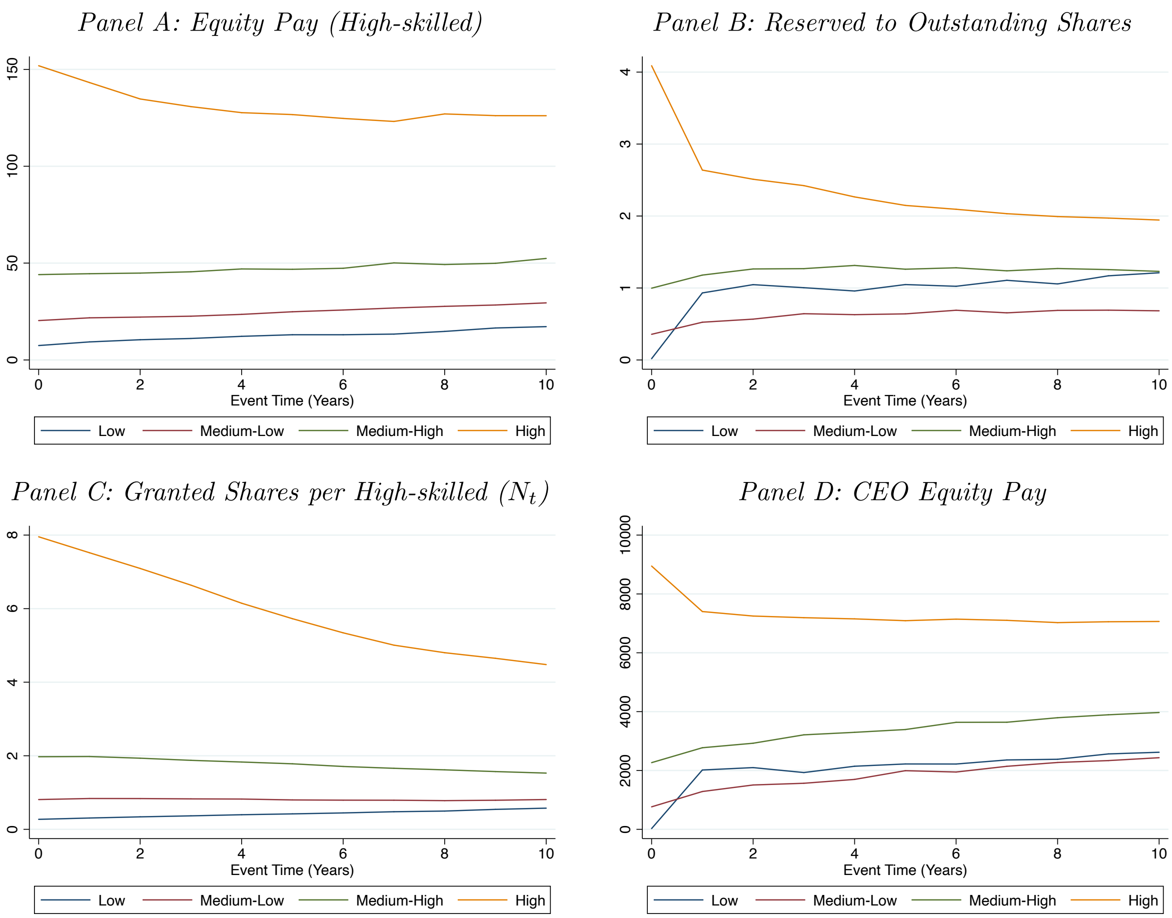

Figure 23: **Average Equity Pay of Portfolios in Event Time (Survivors).** The figure repeats the analysis in Figure 14 but for a subsample of firms required to exist for at least 10 years from the portfolio formation period.

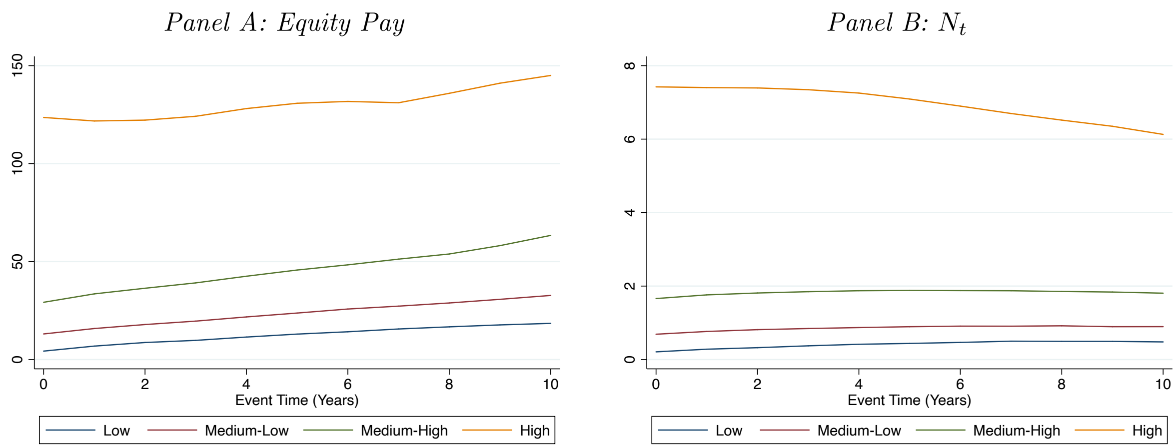

Figure 24: **Average Equity Pay of Portfolios in Event Time with a Constant Scaling** This figure repeats the analysis in Figure 14 with a constant scaling. That is, we compute firm-level averages of number of high-skilled employee throughout our sample period and then use this value to compute the N_t.

Table 18: N_t **Dynamics with Total Employee: Firm Fixed Effects vs Initial Values vs AR(1)**

This table reports the dynamics of the granted shares per *total* employee (N_t). We regress N_t on firm fixed effects, its initial value, lagged value and price return in Column (1) - (4) and repeat the analyses where we replace the left-hand side with its log values in Column (5) - (8). In parentheses, we report t-statistics based on two-way clustered standard errors by firm and year.

	Values				Log Values			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Initial value		0.357***				0.755***		
		(5.968)				(30.774)		
Lagged value			0.877***	0.884***			0.944***	0.946***
			(66.740)	(63.709)			(139.976)	(142.488)
$P_{t-1}/P_{t-2} - 1$				-0.261***				-0.144***
				(-6.672)				(-13.987)
Constant		0.744***	0.119***	0.118***		-0.340***	-0.082***	-0.077***
		(6.946)	(8.388)	(10.603)		(-9.309)	(-7.745)	(-10.515)
Observations	51604	52558	43875	42672	51604	52558	43875	42672
R^2	0.665	0.319	0.832	0.831	0.837	0.637	0.913	0.914
Firm Fixed Effect	Yes	No	No	No	Yes	No	No	No

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 19: $P_t N_t$ **Dynamics with Total Employee: Firm Fixed Effects vs Initial Values vs AR(1)**

This table reports the dynamics of equity pay ($P_t N_t$) where N_t is defined as the number of granted shares per *total* employee. We regress the equity pay on firm fixed effects, its initial value, and lagged value in Column (1) - (3) and repeat the analysis where we replace the left-hand side with its log values in Column (4) - (6). In parentheses, we report t-statistics based on two-way clustered standard errors by firm and year.

	Values			Log Values		
	(1)	(2)	(3)	(4)	(5)	(6)
Initial value		0.242**			0.701***	
		(2.325)			(16.401)	
Lagged value			0.603***			0.891***
			(3.541)			(79.848)
Constant		16.438***	7.924**		0.737***	0.207***
		(6.737)	(2.309)		(5.908)	(4.114)
Observations	51607	52562	43876	51607	52562	43876
R^2	0.559	0.185	0.492	0.756	0.498	0.823
Firm Fixed Effect	Yes	No	No	Yes	No	No

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$