Employee Pay Dispersion and Firm Performance

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Abstract:

This paper examines the effect of pay dispersion on firm performance. Specifically, I compare and contrast these effects of pay dispersion among rank-and-file employees with the effects among executives. Using a novel dataset from a large online job search platform that provides employee-level salary and satisfaction data from 2008 to 2015, I find that pay dispersion among rank-and-file employees negatively affects employee satisfaction and firm performance. Further, the negative effects are amplified among labor-intensive firms and firms that require cooperation among workers. IV estimates indicate that the observed effect is not caused by omitted variables. Evidence from this paper suggests that although pay dispersion positively motivates corporate executives in the form of executive tournaments (Kale, Reis, and Venkateswaran, 2009), lower-level employees respond negatively to pay inequality.

JEL classification code: G31; G32; J31; J33;
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1. Introduction

Existing theoretical studies have opposite predictions on the effects of pay dispersion on firm performance. On one hand, rank-order tournament theory predicts a positive relation between pay dispersion and employee effort (Lazear and Rosen, 1981; Milgrom and Roberts, 1992; Prendergast, 1999). Under this theory, agents compete for a promotion opportunity and the prize of the promotion is the pay gap between the current position and the promoted position. Prendergast (1999) shows that in a tournament setting, an agent's effort increases with the size of the prize. Therefore, a higher level of pay dispersion should lead to a better firm performance because it induces higher effort from tournament participants (employees).

On the other hand, social comparison theory and equity theory focus on pay equity and fairness, and predict a negative effect of pay dispersion on firm performance. Social comparison theory suggests that more pay dispersion leads to an increase in envy and dysfunctional behavior among employees. A series of papers by Akerlof (1982), Rabin (1993), and Akerlof and Yellen (1986, 1988, and 1990) emphasize the importance of reciprocity and show that workers reduce their effort once the wage they receive is deemed unfair. Similarly, Milgrom (1988) and Milgrom and Roberts (1990) highlight the idea that once the pay dispersion becomes too wide, workers have incentives to engage in rent-seeking activities rather than active production. Finally, Levine (1991) suggests that higher levels of pay dispersion decrease cohesiveness within the firm and reduce group productivity, especially when cooperation is needed.

Although these two theories appear to make conflicting predictions regarding the effects of pay dispersion, they may actually complement each other if they apply to different agents within the firm. As discussed in Milgrom and Roberts (1992), promotion-based incentives may apply more in cases where there is little or no information about the agents' absolute performance, while more equitable compensation should work better when the absolute performance can be directly observed. Therefore, rank-order tournament theory apply more to executives whose absolute performance is hard to observe, whereas social comparison theory and equity theory may be more applicable to rank-and-file employees because they often perform homogeneous tasks and their absolute performance can be easily observed. In support of the former argument, Kale, Reis, and Venkateswaran (2009) show that executive tournament incentives are positively related to firm performance. The tension between these two layers of the labor pool, executives and lower-level employees, is the focus of this article.

Due to a lack of employee-level compensation data, little research has examined how pay dispersion among rank-and-file employees affects firm performance. In this paper, I use a novel dataset from a large online job search platform to overcome this data challenge. This dataset includes self-reported salary and satisfaction data from more than four million employees from 2008 to 2015. After matching with Execucomp firms, my final sample includes 675 Execucomp firms from 2008 to 2015. Following prior literature, I use the Gini coefficient to measure the employee-level pay dispersion (Donaldson and Weymark, 1980; Bloom, 1999).

I start by estimating the effect of pay dispersion on employee satisfaction. If pay dispersion leads to an increase in envy and dysfunctional behavior among employees, it should be negatively related to employee satisfaction (e.g. Rabin, 1993). Using the employees' ratings to the categories *Overall Satisfaction*, *Corporate Culture*, and *Recommend to Friend* as proxies for employee satisfaction, estimation results suggest that pay dispersion has a negative and significant effect on employee satisfaction. These results hold after including various firm-level controls, as well as industry and year fixed effects.

I next examine whether pay dispersion affects firm performance. Using return on assets (ROA) and Tobin's Q as proxies for firm performance, I document a strong negative association between pay dispersion and firm performance. The economic magnitude is also sizable; a one standard deviation increase in pay dispersion is associated with an 8.13% decrease in ROA and a 4.75% decrease in Tobin's Q.

I next investigate cross-sectional variation in the impact of employee-level pay dispersion on firm performance. First, if the negative effect comes from a reduced employee effort, the effect should be stronger among more labor-intensive firms. Using sales per employee as a proxy for labor intensity, I show that the negative effect is stronger in the subsample of firms with above-median sales per employee. Second, Levine (1991) suggests that pay dispersion decreases group cohesiveness. Therefore, the negative effect should be stronger in jobs that require cooperation among workers. Using R&D expenditure as a proxy for cooperation need, I show the negative effect is stronger among firms with R&D expenditures.

It is possible that unobservable characteristics such as the composition of the labor force can affect both pay dispersion and firm performance. To ensure that my results are not driven by omitted variables, I conduct an instrumental variables (IV) analysis. Using the industry average Gini coefficient and local average Gini coefficient as instruments, estimation results from instrumental variable regressions continue to suggest a negative relationship between the predicted Gini and firm performance. In terms of economic magnitude, a one standard deviation increase in pay dispersion is associated with an 11.25% decrease in ROA and a 6.43% decrease in Tobin's Q.

Finally, I use alternative measures of pay dispersion to check the robustness of my results. The first measure, *Log (100-50)*, which equals to the log pay differential between the highest-paid employee and the median-paid employee, is constructed following the tournament literature (Kale, Reis, and Venkateswaran, 2009). Following Mueller, Ouimet, Simintzi (2017a), the second measure, *Log (90-10)*, equals to the log pay differential between the 90th-paid employee and the 10th-paid employee. Estimation results from both of these measures continue to suggest a negative and significant effect of pay dispersion on firm performance.

The paper links the rank-order tournament literature and the pay equality literature by simultaneously testing predictions from competing theories. Whereas prior studies focus on pay dispersion among corporate executives and find a positive effect on firm performance and risk taking (Kale, Reis, and Venkateswaran, 2009; Kini and Williams, 2012), I hypothesize and show that rank-and-file employees are negatively affected by pay equality. In this sense, my findings support Milgrom and Roberts (1992), who suggest that promotion-based incentives are more applicable when there is little or no information about the agents' absolute performance, while fair wage compensation works better when the absolute performance can be directly observed.

This paper also makes a direct contribution to the small but growing literature that focuses on employee-level pay inequality. It provides one of the first large-scale empirical studies on the effect of employee-level pay dispersion on firm performance. Prior studies on employee-level pay dispersion are usually conducted on a smaller sample or over a shorter sample period. So far, the literature has yielded mixed results. For example, Cowherd and Levine (1992) study employee-level compensation from 41 manufacturing firms in the U.S. and Europe in 1985 and find that the employee-level pay dispersion has a negative effect on product quality. Bingley and Eriksson (2001) examine 6,501 Danish private sector firms from 1992 to 1995 and find that salary dispersion among blue-collar workers has no effect on firm performance. Card, Mas, Moretti, and Saez (2012) examine the effect of pay dispersion among University of California employees and find inequality leads to lower job satisfaction and higher job search intentions. My study is closely related to

Mueller, Ouimet, Simintzi (2017b). They study 880 UK firms from 2004 to 2013 and find a positive effect of employee pay dispersion on firm performance.

Finally, the findings that pay inequality is negatively related to employee satisfaction and firm performance may have policy implications. For example, my results provide empirical evidence related to the SEC's rule mandating disclosure of CEO to median-paid employee pay ratio. Although policy makers tend to focus on the CEO to median-paid employee ratio and U.S. income inequality, my results suggest that other sources of pay equality are important. Specifically, the finding in this paper suggest that pay inequality among the employees themselves is an important factor in firm performance.

2. Literature Review:

2.1 Rank-order tournament theory

Rank-order tournament theory predicts that compared to a performance-based contract, a rank-order tournament can better incentivize agents when factors beyond their control can greatly affect their absolute performance (Lazear and Rosen, 1981; Prendergast, 1999). Since Lazear and Rosen (1981), an extent empirical literature has examined the effect of tournament incentives. The earliest empirical evidence comes from sports data because both the reward and the effort (points scored, passes completed, games won, and etc.) are directly observable. Ehrenberg and Bognanno (1990a,b) provide one of the first empirical studies on rank-order tournament theory by documenting that the performance of golf players in the 1984 and 1987 U.S. and European PGA tours is positively related to both the size and the allocation of the prize. Specifically, a one standard deviation increase in the tournament prize dispersion leads to a 1.9 to 3 fewer strokes. Becker and Huselid (1992) examine the effects of tournament incentive on professional drivers' performance and risk taking using data from 28 auto races from the 1990 NASCAR circuit. The authors find that the dispersion in prize has a significant positive influence on drivers' performance (adjusted finish time) and a weakly positive effect on risk taking (number of caution flags).

Studies on corporate executives yield similar results. Using executive-level compensation data over 200 public firms from 1980 to 1984, Main, O'Reilly, and Wade (1993) find a positive relationship between the variation in executive team salaries and return on asset (ROA). Bloom and Michel (2002) document a positive relation between executive-level pay dispersion and manager turnover among 460 ExecuComp firms from 1992 to 1997. Kale, Reis, and Venkateswaran (2009) study ExecuComp firms from 1993 to 2004 and document positive and significant effects of executive-level pay dispersion on firm performance measured in Tobin's Q and ROA.

2.2 Social Comparison and Equity Theory

Social comparison theory and equity theory suggest that people have a basic drive to compare themselves to others in the same social group (Festinger, 1954; Kulik and Ambrose, 1992). During the comparison, inequality leads to an increase in envy and dysfunctional behaviors such as higher risk taking and lower effort (Milgrom,1988; Milgrom and Roberts, 1990; Frank, 1985a,b). Using the Gini coefficient as a proxy for team-level salary dispersion, Bloom (1999) finds that the salary dispersion negatively and significantly affects both individual player's performance and the team's winning probability among 29 major league baseball (MLB) teams during the years from 1985 to 1993. Depken (2000) study MLB teams from 1985 to 1998 and uses intra-team Herfindahl index to measure salary dispersion. He also documents a negative relation between pay dispersion and a team's winning probability.

Evidence that supports social comparison theory and pay equity theory also comes from studying university professors. Pfeffer and Davis-Blake (1992) and Pfeffer and Langton (1993) study 17,000 university professors from 300 institutions in U.K. and U.S. during the years 1978-79 and 1983-84. Both studies document a positive relation between pay dispersion and professor turnover and a negative relation between pay dispersion and job satisfaction, research productivity, and collaboration across departments. Card, Mas, Moretti, and Saez (2012) examine the effect of pay dispersion among University of California employees and find inequality leads to lower job satisfaction and higher job search intentions.

3. Data, Variable Construction, Sample Selection

3.1 Sample Selection

Employee-level salary data and satisfaction data are provided by a large online job search platform under a nondisclosure agreement. The sample period starts in 2008 and ends in 2015. The original data contains 4,882,689 observations from 278,416 employers all over the world, among which 3,988,648 observations come from 214,092 U.S. employers. These employers consist of eight types: public companies, private companies, franchise, government, hospital, non-profit, school, and others. For the purpose of this study, I focus on public companies. I require each firm to have at least 20 position-level observations per year to properly calculate the Gini coefficient. To compare my results with prior studies, I further restrict my sample to Execucomp firms with executive-level compensation data. My final sample includes 675 Execucomp firms from 2008 to 2015.

3.2 Firm Performance

I supplement this novel dataset with accounting data from Compustat and stock return data from

CRSP. Following Kale, Reis, and Venkateswaran (2009), I use Tobin's Q and returns on assets (ROA) as my primary measures of firm performance. Tobin's Q is calculated as the ratio of the sum of market value of equity and the book value of debt to total assets. ROA is the ratio of net income to total assets. The mean and median value of Tobin'Q and ROA is 1.969 (1.601) and 0.048 (0.052), which are similar to those in Kale, Reis, and Venkateswaran (2009).

3.3 Measures of Employee-level Pay Dispersion

Following the macroeconomic literature that studies the effect of income disparity, I use the Gini coefficient as my main proxy for pay disparity among employees (Donaldson and Weymark, 1980; Bloom, 1999). Gini coefficient measures the inequality among values of a frequency distribution and equals:

$$1+\frac{1}{n}-\frac{2}{n^2\bar{y}}(y_1+2y_2+\cdots+ny_n)$$

where n is the number of employees, y is the compensation each employee receives, and $\bar{y}$ is the mean compensation.

For robustness, I use *Log (100-50)* and *Log (90-10)* as alternative proxies for pay inequality. The first proxy, *Log (100-50)*, resembles the pay dispersion used in the tournament literature (Kale, Reis, and Venkateswaran, 2009) and equals the log pay gap between the highest-paid employee and the median-paid employee. The second proxy, *Log (90-10)*, is used in Mueller, Ouimet, Simintzi (2017a) as a measure of pay dispersion at the country level. It equals to the log pay gap between the 90^{th}–paid employee and the 10^{th}-paid employee. Compared to these alternative measures, the Gini coefficient contains more information because it takes each employee's salary into the calculation. Table 1 presents summary statistics for the Gini coefficient by industry.

3.4 Control variables

I employ a number of firm-level control variables that are commonly used in the tournament literature. Specifically, I control for firm size, leverage, return volatility, and R&D expenditures. Appendix provides detailed definitions for all variables. Continuous variables are winsorized at their 1st and 99th percentiles. Dollar values are expressed in 2010 dollars. Table 2 reports the summary statistics for the main variables.

4. Results

4.1 Data Comparison

I start by comparing employee compensation data in my study with the data used in prior studies (e.g., Faleye, Reis, and Venkateswaran, 2013; Crawford, Nelson, Rountree, 2016). Panel A of Figure 1 plots the distribution of firm average employee compensation (*Mean_Novel*) in this study. The mean value is $78,168 and the median value is $77,022. Panel B plots the mean value of employee compensation calculated using Compustat and Execucomp variables. Specifically, the average employee compensation at the firm-level equals:

$$\text{Mean\_Compustat} = \frac{XLR - \sum_{1}^{n} TDC1}{EMP - n}$$

where *XLR* is the total staff compensation from Compustat, *TDC1* is the total compensation received by an executive from Execucomp, n is the number of executives from Execucomp, and *EMP* is the total number of employees from Compustat.[1] *Mean_Compustat* has a mean of $71,180 and a median of $57,260.

[1] Firms are not required to disclose total staff expense (*XLR*). Only 21.45% of Compustat firms report XLR from 1990 to 2016.

4.2 Employee Satisfaction

I start by examining the relation between pay dispersion and employee satisfaction. Extant literature has documented that employee satisfaction is significantly related to future employee turnover, performance, and strike (Cotton and Tuttle, 1986; Harter, Schmidt, Hayes, 2002; Card, Mas, Moretti, and Saez, 2012). Although tournament theory has no prediction on the effect of pay dispersion on tournament participants' satisfaction, equity and social comparison theory suggests that pay dispersion will negatively affect employee satisfaction (Akerlof and Yellen, 1990; McFarlin and Sweeney, 1992; Pfeffer and Langton, 1993). Empirically, I estimate the flowing panel regression model:

$$Satisfaction_{\mathrm{i,t}} = \beta_1 Gini_{\mathrm{i,t-1}} + \beta_2 X + \upsilon_i + \omega_t + \varepsilon_{i,t}$$

where *Satisfaction* is one of the employee satisfaction proxies. *Gini* the Gini coefficient of employee compensation. To alleviate the concerns that unobserved heterogeneity could simultaneously affect pay dispersion and employee satisfaction, I follow the tournament literature and lag the Gini coefficient by one year (e.g. Kini and Williams, 2012). *X* is a set of firm-level control variables. υ_i and ω_t denotes industry and year fixed effects.[2]

The first proxy is employee overall satisfaction. *Overall Satisfaction* is the mean value of employee response to overall satisfaction of the company, ranked from 1 to 5, over the fiscal year. Estimation results from column (1) of Table 3 suggest a negative and significant between Gini coefficient and *Overall Satisfaction*. In terms of economic magnitude, a one standard deviation increase in Gini is associated with a 7.9% decrease in *Overall Satisfaction.*

The second proxy is corporate culture. Culture is important because it serves as a "social control"

[2] Ideally, I would include firm and year fixed effects to control for unobservable firm characteristics. However, as pay dispersion changes slowly from year to year and my sample period is only six years, there is not enough time-series variation to make meaningful estimation.

and complements monetary incentives in regulating employees (O'Reilly, 1989; Guiso, Sapienza, and Zingales, 2015a,b). If pay dispersion makes employees feel unfair and decreases cohesiveness within the firm, employees may negatively rate corporate culture. *Culture* is the mean value of employee response to corporate culture rating of the company, ranked from 1 to 5, over the fiscal year. The coefficient estimates on Gini is negative and significant, suggesting that pay dispersion reduce employee's view of corporate culture. In terms of economic significance, a one standard deviation increase in Gini is associated with a 4.8% decrease in *Culture.*

Finally, I examine the effect of pay dispersion on whether the employee will recommend the company to a friend. The labor economics literature has documented that referrals from current employees are one of the major sources of employee hiring (Corcoran, Datcher, Duncan, 1980; Ioannides and Loury, 2004; Bayer, Ross, and Topa, 2008). If a high pay dispersion reduces the probability of future job referral, it will negatively affect future hiring and the operation of the firm. Column (3) of Table 3 estimates the effect of pay dispersion on job referral. *Recommend to Friend* is the mean value of employee response to whether she will recommend the company to a friend, ranked from 0 to 1, over the fiscal year. Estimation results from column (3) suggest that pay dispersion is negatively and significantly related to *Recommend to Friend*. In terms of economic significance, a one standard deviation increase in pay dispersion is associated with a 16.7% decrease in the probability of future job referral.

4.2 Firm Performance

The evidence above suggests that pay dispersion is negatively related to employee satisfaction measured in overall satisfaction, corporate culture, and job recommendation, indicating that pay dispersion has a real effect on how employees feel about the company. Both theoretical and empirical literature has documented employee satisfaction is significantly related to employee performance, retention, and future firm performance (e.g. Maslow, 1943; Hertzberg, 1959; McGregor, 1960; Zhou, Li, Zhou, and Su, 2008; Edmans, 2011; Guiso, Sapienza, and Zingales, 2015). Therefore, if pay dispersion negatively affects employee satisfaction, it should also have a negative effect on firm performance. To empirically test this prediction, I follow Kale, Reis, and Venkateswaran (2009) and use ROA and Tobin's Q as proxies for firm performance.

Table 4 presents estimation results of the analysis examining the effect of employee pay dispersion on firm performance. The dependent variable in column (1) is ROA. Consistent with the hypothesis, the coefficient on Gini is negative and significant at the 5% level. In terms of economic magnitude, the estimated coefficients imply that a one standard deviation increase in the Gini coefficient is associated with an 8.13% decrease in ROA. Column (2) shows a similar relation between the Gini coefficient and firm performance measured in Tobin's Q. In terms of economic significance, the estimated coefficients in column (2) imply that a one standard deviation increase in pay dispersion is associated with a 4.75% decrease in Tobin's Q. Control variables load similarly to those documented in the prior literature (Kale, Reis, and Venkateswaran, 2009).

4.3 Cross-sectional Evidence

In this section, I exploit two sources of cross-sectional variation in firm and industry characteristics to shed further light on the mechanisms underlying my results. I use labor intensity as the first source of cross-sectional variation. If the negative effect of pay dispersion on firm performance is through reduced employee effort, the effect should be stronger among labor-intensive firms. To investigate this cross section, I split the sample based on the median value of sales per employee. Consistent with the hypothesis, the evidence from Panel A of Table 5 suggest that while the coefficients on Gini are negative in both subsamples, the coefficients are only significant in the subsample of firms with above median sales to employee ratio. These results offer support for the hypothesis that pay dispersion affects firm performance through employee effort.

The second cross-sectional variation is motivated by Levine (1991), where he predicts that pay dispersion negatively affects team performance by reducing group cohesiveness. Therefore, the negative effect of pay dispersion should be stronger when cooperation among workers is needed. To test this cross section, I use R&D expenditures as a proxy for jobs that require cooperation because research usually requires collaboration among workers (e.g. Pfeffer and Langton, 1993). Panel B of Table 5 presents estimation results using firms with and without R&D expenditures. Pay dispersion is negatively associated with firm performance in both groups. However, consistent with the prediction, the negative effect of pay dispersion in stronger among R&D firms where cooperation among workers is more important. This evidence offers additional support for the hypothesis that pay dispersion negatively affect firm performance through reducing group cohesiveness.

Overall, the evidence above sheds further light on the mechanisms by documenting that the effect of pay dispersion varies cross-sectionally with labor intensity and cooperation needs. In addition, these tests alleviate the concerns that omitted variables are driving my results because any omitted variable jointly affects pay dispersion and firm performance must be likewise correlated with cross-sectional variation.

4.4 IV Estimation

The evidence above suggests a negative relation between employee pay dispersion and firm performance. However, omitted variables that are related to both pay dispersion and firm performance may drive the results. To ensure that my results are not driven by omitted variables, I conduct an instrumental variables (IV) estimation. Following Coles, Li, and Wang (2017), I use the industry average and local average Gini coefficient as instruments for the firm Gini coefficient. The economic rationale behind these instruments is from Murphy (1999), who documents that the level and structure of compensation varies by firm size and industry. Specifically, *Indu Gini* the industry average Gini coefficient calculated at the 2-digit SIC level. *Local Gini* is the state average Gini coefficient.

Table 6 presents estimation results using the instrumental variables. The dependent variable in column (1) is the Gini coefficient. Both the industry-average and local-average Gini coefficients load positive and significant, indicating that the instruments are relevant. In addition, the F-statistics are significant at the 1% level, supporting the joint relevance of the instruments in the first stage.

Columns (2) and (3) present estimation results using the predicted Gini coefficient. Consistent with prior results, predicted Gini coefficient is negatively related to ROA and Tobin's Q. These results suggest that omitted variables related to the employee pay dispersion and firm performance are not driving the results. In terms of economic significance, a one standard deviation increase in predicted Gini is associated with an 11.25% decrease in ROA and a 6.43% decrease in Tobin's Q. In both regressions, the Hansen J-statics is insignificant, suggesting that the instruments are valid and satisfy the exclusion restriction.

4.5 Alternative Measures

Finally, I use alternative measures of pay dispersion to check the robustness of the results. The first measure, *Log (100-50)*, is motivated by the tournament literature (Kale, Reis, and

Venkateswaran, 2009). It equals to the log pay gap between the highest-paid employee and the median-paid employee. Columns (1) and (2) of Table 7 present estimation results using *Log (100-50)* as a measure of pay dispersion. Estimation results suggest a negative and significant relation between pay dispersion and firm performance. In terms of economic significance, a one standard deviation increase in *Log* (100-50) is associated with a 14.2% decrease in ROA and 2.6% decrease in Tobin's Q.

The second measure, *Log (90-10),* is the log pay gap between the 90^{th}–paid employee and the 10^{th}–paid employee. Mueller, Ouimet, Simintzi (2017a) use this variable as a measure of pay dispersion at the country level. Columns (3) and (4) of Table 7 report estimation results. Consistent with prior findings, *Log (90-10)* continues to load negative and significant. In terms of economic significance, a one standard deviation increase in *Log* (90-10) is associated with an 11.3% decrease in ROA and 2.3% decrease in Tobin's Q.

5. Conclusion

Employees are important non-financial stakeholders (Titman and Wessels, 1988). Despite their importance, due to data limitations, little research examines how pay dispersion among employees affects firm performance. From a theoretical perspective, the effect of employee pay dispersion on firm performance is unclear. On the one hand, promotion-based tournament theory suggests that pay dispersion enhances tournament incentives. If employee effort increases with the tournament prize, a higher pay dispersion should be positively related to firm performance (Lazear and Rosen, 1982; Prendergast, 1999). On the other hand, equity and social comparison theory predicts a negative relation because pay inequality decreases team cohesiveness, leads to more rent-seeking activates, and reduces group productivity (Akerlof and Yellen, 1990; Milgrom, 1988; Milgrom and Roberts, 1990; Levine, 1991).

This paper uses a novel dataset with detailed employee-level salary and satisfaction data to shed some light on this issue. Using the Gini coefficient as a proxy for employee-level pay dispersion, I document a negative and significant relation between pay dispersion and employee satisfaction and firm performance. I also find that the negative relation between pay dispersion and firm performance is stronger among labor-intensive firms and when cooperation among workers is needed. The results are robust to using an instrumental variables analysis and alternative measures of pay dispersion.

The findings in this paper support predictions from equity theory and social comparison theory, which emphasize the role of equality and reciprocity in incentive design (Akerlof and Yellen, 1990; McFarlin and Sweeney, 1992; Pfeffer and Langton, 1993). In addition, the findings are consistent with Milgrom and Roberts (1992), who argue that promotion-based tournament incentives are more applicable when there is little or no information about the agents' absolute performance, while fair wage compensation works better when the absolute performance can be directly observed.

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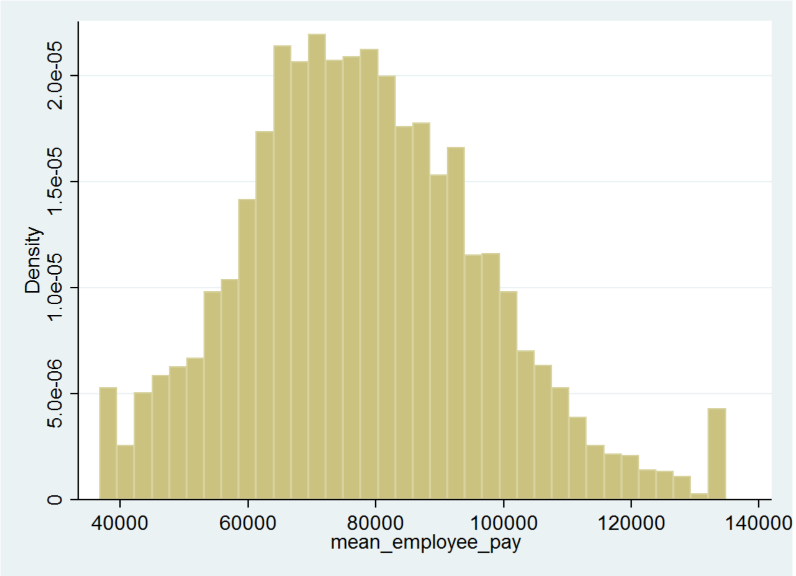
Appendix

Variable	Definitions
Performance variables:	
Q	(Market value of equity + book value of debt) / book value of total assets.
ROA	Net income over total assets.
Pay dispersion variables:	
Gini	Gini coefficient = $1 + (1/n) - (2/(n^2 Salary_{mean})) (S_1 + S_2 + \ldots + S_n)$, where n is the number of employees for firm i in year t; S is the total salary for each employee. $Salary_{mean}$ is the mean salary.
Log (90-10)	The natural logarithm of the pay gap between the total compensation of the 90^{th} employee and the 10^{th} employee.
Log (100-50)	The natural logarithm of the pay gap between the total compensation of the highest-paid employee and the median-paid employee.
Firm/CEO characteristics:	
Size	Natural log of total assets.
Leverage	The book value of long-term debt plus debt in current liabilities divided by book value of assets.
R&D	R&D expenditures divided by total assets.
Return vol	The variance of one-year daily stock returns.
Sales per employee	Sales over the number of employees.
Blue state	An indicator variable that equals one if the headquarter state is a Democratic state.
B2C industry	Following Lev, Petrovits, and Radhakrishnan (2010), *B2C industry* is an indicator variable that equals one if the firm belongs to the business-to-customer industry.
Satisfaction variables:	
Overall rating	The mean value of employee overall rating of the company, ranked from 1 to 5, over the fiscal year.
Culture	The mean value of corporate culture rating of the company, ranked from 1 to 5, over the fiscal year.
Recommend to friend	The mean value of employee response to whether she will recommend the company to a friend over the fiscal year.
Instrumental variables:	
State Gini	The average *Gini* among all firms in the headquarter state.
Indu Gini $_t$	The average *Gini* among all firms in the 2-digit SIC industry.

Figure 1: Distribution of Mean Employee Compensation

Panel A plots the distribution of the mean value of employee compensation among firms used in this study. Panel B plots the distribution of the mean value of employee compensation among Execucomp firms that report total staff expense (*XLR*).

Panel A: Employee compensation data in this study



Panel B: Employee compensation data from Compustat

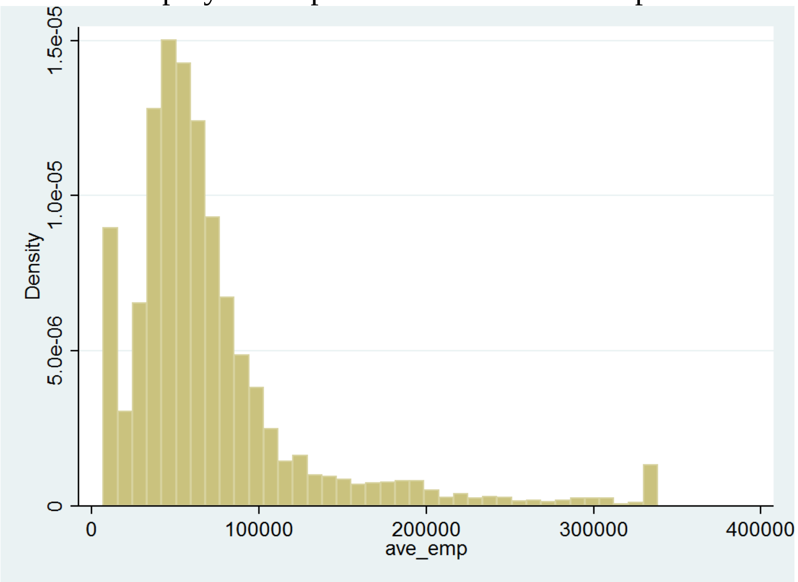


Table 1: Pay Dispersion and Employee Satisfaction by Industry

This table presents summary statistics for the Gini coefficient and employee satisfaction by Fama-French-12 industry. *Gini* is the Gini coefficient of the employee compensation among all employees over the fiscal year.

Fama French 12 Industry	Gini	
	Mean	Median
Finance	0.201	0.187
Telephone and Television Transmission	0.199	0.170
Other	0.188	0.166
Wholesale, Retail, and Some Services	0.188	0.165
Consumer Nondurables	0.180	0.162
Chemicals and Allied Products	0.175	0.157
Oil, Gas, and Coal Extraction and Products	0.165	0.144
Manufacturing	0.154	0.132
Healthcare, Medical Equipment, and Drugs	0.141	0.124
Consumer Durables	0.141	0.139
Utilities	0.137	0.132
Business Equipment	0.130	0.117

Table 2: Summary Statistics

This table presents summary statistics for the main variables used in the study. Continuous variables are winsorized at their 1st and 99th percentiles, and dollar values are expressed in 2010 dollars. Appendix provides definitions of all the variables.

	N	Mean	Std. Dev.	Median	Min	Max
Dependent variables:						
Overall satisfaction	3,795	3.137	0.454	3.135	2.078	4.143
Corporate culture	3,795	3.146	0.526	3.152	1.919	4.314
Recommend to friend	3,795	0.549	0.151	0.554	0.217	0.849
Q	3,795	1.969	1.077	1.601	0.831	6.387
ROA	3,795	0.048	0.087	0.052	-0.371	0.244
Pay dispersion variables:						
Gini	3,795	0.165	0.061	0.164	0.026	0.314
Log (100-50)	3,795	10.58	0.636	10.645	9.092	11.641
Log (90-10)	3,795	11.266	0.590	11.341	10.086	12.100
Control variables:						
Size	3,795	8.595	1.742	8.492	5.028	13.67
Leverage	3,795	0.222	0.188	0.189	0	0.804
Return vol	3,795	0.025	0.013	0.022	0.009	0.078
R&D	3,795	0.035	0.056	0	0	0.261

Table 3: Effect of Pay Dispersion on Employee Satisfaction

This table presents results from a multivariate regression of employee satisfaction on employee-level pay dispersion from 2008 to 2015. *Overall Rating* is the median value of employee overall rating of the company, ranked from 1 to 5, over the fiscal year. *Culture* is the median value of corporate culture rating of the company, ranked from 1 to 5, over the fiscal year. *Recommend to Friend* is the median value of employee response to whether she will recommend the company to a friend over the fiscal year. *Gini* is the Gini coefficient of the employee compensation among all employees over the fiscal year. Appendix provides definitions of all other variables. Continuous variables are winsorized at their 1st and 99th percentiles. Dollar values are expressed in 2010 dollars. Standard errors are clustered at the firm level. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Overall Rating (1)	Culture (2)	Recommend to Friend (3)
$Gini_{t-1}$	-1.416***	-1.053***	-0.558***
	(0.274)	(0.236)	(0.128)
$Size_t$	0.097***	0.063***	0.042***
	(0.016)	(0.013)	(0.007)
$Leverage_t$	-0.272***	-0.189**	-0.089**
	(0.104)	(0.082)	(0.042)
Return vol_t	-0.879	1.045	-0.265
	(1.717)	(1.320)	(0.850)
$R\&D_t$	0.706**	0.634**	0.241
	(0.356)	(0.303)	(0.155)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	3,208	3,208	3,208
Adj. R^2	0.203	0.833	0.206

Table 4: Effect of Pay Dispersion on Firm Performance

This table presents results from a multivariate regression of firm performance on employee-level pay dispersion from 2008 to 2015. The dependent variable in column (1) to (2) is *ROA* and *Q*. *ROA* equals net income over total assets. Q equals the Market value of equity plus book value of debt, divided by the book value of total assets. *Gini* is the Gini coefficient of the employee compensation among all employees over the fiscal year. All regressions include industry and year fixed effects. Appendix provides definitions of all other variables. Continuous variables are winsorized at their 1st and 99th percentiles. Dollar values are expressed in 2010 dollars. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	ROA	Q
	(1)	(2)
$Gini_{t-1}$	-0.078***	-1.872***
	(0.023)	(0.661)
$Size_{t}$	-0.001	-0.164***
	(0.002)	(0.035)
$Leverage_{t}$	-0.044**	0.370
	(0.021)	(0.311)
Return vol_{t}	-3.266***	-20.812***
	(0.383)	(4.128)
$R\&D_{t}$	-0.282***	4.461***
	(0.084)	(1.093)
Industry FE	Yes	Yes
Year FE	Yes	Yes
N	3,208	3,208
Adj. R^2	0.251	0.334

Table 5: Cross-sectional Variation

This table presents results from a multivariate regression of firm performance on employee-level pay dispersion from 2008 to 2015. The dependent variable in column (1) to (2) is *ROA* and *Q*. *ROA* equals net income over total assets. Q equals the Market value of equity plus book value of debt, divided by the book value of total assets. *Gini* is the Gini coefficient of the employee compensation among all employees over the fiscal year. *Sales to employee* is the ratio of total sales over the number of employees. All regressions include industry and year fixed effects. Appendix provides definitions of all other variables. Continuous variables are winsorized at their 1st and 99th percentiles. Dollar values are expressed in 2010 dollars. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Sales to employee

	ROA		Q	
	Above median	Below median	Above median	Below median
	(1)	(2)	(3)	(4)
$Gini_{t-1}$	-0.143**	-0.030	-1.943**	-0.985
	(0.070)	(0.032)	(0.939)	(0.847)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	1,604	1,604	1,604	1,604
Adj. R^2	0.183	0.284	0.304	0.350

Panel B: R&D

	ROA		Q	
	Positive	Zero	Positive	Zero
	(1)	(2)	(3)	(4)
$Gini_{t-1}$	-0.260***	-0.181***	-6.016***	-2.174***
	(0.059)	(0.043)	(0.879)	(0.727)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	1,209	1,200	1,209	1,200
Adj. R^2	0.144	0.345	0.298	0.408

Table 6: Instrumental Variable Estimation

This table presents results from a multivariate regression of firm performance on employee-level pay dispersion from 2008 to 2015 using instrumental variables. The dependent variable in column (1) is the Gini coefficient. The dependent variable in columns (2) and (3) is *ROA* and *Q*. *ROA* equals net income over total assets. Q equals the Market value of equity plus book value of debt, divided by the book value of total assets. *Gini* is the Gini coefficient of the employee compensation among all employees over the fiscal year. Predicted Gini is the predicted Gini coefficient from the first-stage regression. All regressions include industry and year fixed effects. Appendix provides definitions of all other variables. Continuous variables are winsorized at their 1st and 99th percentiles. Dollar values are expressed in 2010 dollars. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	First Stage	Second Stage	
	Gini	ROA	Q
	(1)	(2)	(3)
Predicted Gini $_{t-1}$		-0.108**	-2.536***
		(0.073)	(0.949)
Size $_{t}$	0.004**	-0.001	-0.146***
	(0.001)	(0.003)	(0.036)
Leverage $_{t}$	-0.001	-0.052**	0.271
	(0.011)	(0.022)	(0.296)
Return vol $_{t}$	0.382***	-3.150***	-17.632***
	(0.145)	(0.383)	(3.949)
R&D $_{t}$	-0.255	-0.257***	6.016***
	(0.032)	(0.099)	(1.595)
Indu Gini $_{t-1}$	0.853***		
	(0.031)		
Local Gini $_{t-1}$	0.239***		
	(0.061)		
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	3,208	3,208	3,208
Adj. R^2	0.607	0.230	0.360
First Stage F-Statistics	556.111***		
Hansen J statistics		0.684	0.538
P-value		(0.408)	(0.463)

Table 7: Alternative Measures of Pay Dispersion

This table presents results from a multivariate regression of firm performance on employee-level pay dispersion from 2008 to 2015. The dependent variable is ROA in columns (1) and (3), and Tobin's Q in columns (2) and (4). *ROA* equals net income over total assets. Q equals the Market value of equity plus book value of debt, divided by the book value of total assets. *Log (90-10)* is the natural logarithm of the pay gap between the total compensation of the 90th employee and the 10th employee. *Log (100-50)* is the natural logarithm of the pay gap between the total compensation of the highest-paid employee and the median-paid employee. Appendix provides definitions of all other variables. Continuous variables are winsorized at their 1st and 99th percentiles. Dollar values are expressed in 2010 dollars. Standard errors, adjusted for clustering at the firm level, are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	ROA (1)	Q (2)	ROA (3)	Q (4)
Log (90-10) $_{t-1}$	-0.012**	-0.086*		
	(0.005)	(0.050)		
Log (100-50) $_{t-1}$			-0.009**	-0.070*
			(0.004)	(0.043)
Size $_t$	0.001	-0.105***	0.000	-0.107***
	(0.002)	(0.028)	(0.002)	(0.028)
Leverage $_t$	-0.106***	-0.205	-0.106***	-0.206
	(0.023)	(0.249)	(0.023)	(0.248)
Return vol $_t$	-2.923***	-9.534***	-2.929***	-9.573***
	(0.589)	(2.452)	(0.591)	(2.458)
R&D $_t$	-0.406***	4.489***	-0.406***	4.487***
	(0.084)	(1.074)	(0.084)	(1.076)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	3,208	3,208	3,208	3,208
Adj. R^2	0.227	0.285	0.226	0.285