Impacts of Top Five Executives' Compensation on Employee Wages

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Submitted in partial fulfillment
of the requirements for the degree of

Master of Science in Management (Finance)

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Abstract

This paper studies the impacts of incentive compensation to the top five executives on employee wages. We employ pay-performance sensitivity (PPS) to measure executive incentive compensation. Using data for firms from Wharton Research Data Services over 1992 to 2017 period, we find that there exists a negative relation between executive incentive compensation and employee wages. In addition, we examine the impacts of executive incentive compensation on employee wages in different industries and find that the impacts are more severe in non-technology firms than in technology firms. Finally, we show that the executives with higher incentive compensation are more likely to suppress employee wages in financially distressed firms. Since the impacts of incentive compensation to top five executives on employee wages are similar to those to CEO, top executives appear to work together as a team, which supports executive compensation as team perspective. Furthermore, firm performance may not be promoted by granting high incentive compensation to executives.

Keywords: Executive incentive compensation, pay-performance sensitivity, average employee wages, income inequality, agency conflicts.

Acknowledgement

First and foremost, I would like to express my sincere appreciation to my supervisor, Dr. Unyong (Howard) Pyo, for his continuous guidance, encouragement and inspiration. The door to his office was always open whenever I have a question about my research. It is his patient instruction, instant response to my questions and careful revision for my writing that help me accomplish this thesis so smoothly. I could never be able to make such great progress without his support and suggestions.

It is also my pleasure to receive the valuable suggestions from my committee members, Dr. Zhongzhi (Lawrence) He and Dr. Jin Lei. They have provided indispensable and constructive comments during the research period. My thanks also go to my thesis external examiner, Dr. Kee-Hong Bae, who offers insightful ideas and feedback for this thesis.

Last but not least, I would like to thank my parents for their unfailing support in my life and education. Their endless love encourages me to face any challenge and fulfill my dream. Meanwhile, my appreciation goes to our Graduate Program Director, Carrie Kelly, as well as our Administrate Assistant, Valerie Desimone, for their help in the administrative aspect and my TA work.

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1. Introduction

As agency conflicts are one of the most examined issues among academics, financial economists have studied whether the corporate executives are paid for what they actually deserve. Managers are hired to work for the best interest of the shareholders. However, since shareholders cannot be informed of all the information, the managers may select the projects that will benefit themselves most. Jensen and Meckling (1976) argue that inherent agency conflicts between shareholders and managers with little or no ownership can lead managers to divert the firm's resources to benefit their own interests. Jensen and Murphy (1990) imply that executive incentives are weak by showing that a typical CEO receives only $3.25 for every $1,000 increase in firm value. As firms subsequently increase executive incentives, there are concerns on executives, who might utilize incentive compensation for their own benefits at the expense of other stakeholders (Sappington & Stiglitz, 2004).

Graefe-Anderson, Pyo, and Zhu (2018) study the impacts of CEO incentive compensation on employee wages and conclude that CEO incentive compensation does suppress employee wages. What kind of changes would emerge if we consider the incentive compensation to the top five executives? Moreover, the impacts of top five executives' compensation could reflect the way in which the top managers are compensated. In the literature, Li (2018) studies how the management team represented by the top five executives is compensated. Are they compensated as team perspective or individual perspective? If shareholders want to design the compensation as team perspective, the impacts of top managers' compensation should be similar to the impacts of CEO's compensation. In this case, the incentive compensation of top five executives should have negative impacts on employee wages as shown by CEO compensation. Therefore, this study could provide insights on how top management teams are compensated.

This study is to examine the impacts of the top five executive equity-based compensation (EBC) on employee wages. While there are numerous papers on executive compensation, there are few papers examining the relationship between employee wages and executive compensation, especially the compensation of the top five executives. Graefe-Anderson, Pyo, and Zhu (2018) show that the corporation's chief executive officer's (CEO) compensation policy has impacts on shareholders' wealth as well as on employee wages. Although Baum, Ford, and Zhao (2012) examine executive compensation by introducing a new pay-for-performance metric: the top five executives' share of core earnings, we adopt PPS to measure the equity-based compensation to the top five executives. Our sample covers the period from fiscal year 1992 to 2017 as available on the Execucomp dataset. In addition to the influence of executive compensation, we test the relationship between employee wages and other factors such as firm size, leverage ratio, market-to-book ratio and physical capital intensity.

In the literature, there are two competing theories regarding executive compensation. One is the optimal contracting theory implying that EBC will offer executives incentives to create value for the firm and to maximize shareholders' wealth. That is, when executives are granted EBC, their wealth is tied much closer to the shareholders' wealth and their interests are better aligned with shareholders' (Rajgopal & Shevlin, 2002). On the other hand, the rent extracting theory implies that EBC worsen the agency conflicts because EBC allows executives to extract more benefits than they deserve from the incentive contracts (Bebchuk & Fried, 2003).

To improve corporate governance and evaluate the performance of the executives who are granted incentive compensation, some firms increase board independence by including more independent board members and allow directors to play a better role in balancing CEO's power. Although incentive compensation policies are supposed to motivate mangers' activities, it may still be hard to remove agency conflicts, in which managers maximize their own wealth at the expense of shareholders' interest. Under such circumstance, the Sarbanes-Oxley Act of 2002 required all the listed firms to increase their board independence. Bhagat and Bolton (2013) find that there is a positive relationship between the greater board independence and operating performance with the sample during 2003-2007.They use return on asset, stock return and Tobin' Q to measure the firm's operating performance. They also show that EBC helps executives tie their wealth with the firm's performance, so the three variables are also measures for executives' performance.

The research question of this paper is to examine whether top five executives' incentive compensation suppresses employee wages because EBC might lead executives to pursue their own interest at the expense of employees' interest. There are some researchers, such as Pagano and Volpin (2005) and Bertrand and Mullainathan (2003), studying the relationship between employee wages and managerial powers. Chemmanur, Cheng and Zhang (2013) illustrate that leverage has a positive relationship with average employee pay. Recently, Graefe-Anderson, Pyo and Zhu (2018) examine the impact of EBC granted to CEO on employee wages and illustrate that CEOs with higher EBC are more likely to suppress employee wages. They also test the relationship between employee wages and CEO EBC, and show that CEOs are more likely to suppress employee wages for firms in a bad financial state than for firms in a good financial state.

We contribute to the existing literature by extending the study by Graefe-Anderson, Pyo and Zhu (2018) and Chemmanur et al. (2013). We focus on the relationship between employee wages and EBC to the top five executives, not only to CEO. Our results suggest that executive EBC has negative impacts on employee wages. The impacts from EBC to the top five executives are more severe in non-technology firms than in technology firms. This income disparity is more evident in financially distressed firms than in financially safe firms. Since the relation between compensation to the top five executives and employee wages follows the pattern of CEO compensation, it suggests that the top managers work together as a team and are compensated from the team perspective.

The remainder of our paper is developed as follows. Section 2 reviews the relevant literature in more details. Section 3 develops our hypotheses. Section 4 describes our data and the data selection procedures and the models designed to test the hypotheses and robustness. Section 5 presents the empirical results and findings. Section 6 concludes the study.

2. Literature Review

2.1 Agency Conflicts

Berle and Means (1932) argue that large corporations will develop into the separation of ownership and control, resulting in the forming of financial system with developed capital market. The separation of ownership and control is the cause of agency conflicts. Jensen and Meckling (1976) indicate that although managers are appointed to create value for the firm, the difference between managers' interests and shareholders' lead managers to pursue their own benefits at the cost of the firm's resources.

Jensen (1986) argues that agency conflicts between managers and shareholders are obvious in firms with large free cash flow. Managers always hope to enlarge firm size because the size growth is always associated with the growth of their compensation (Murphy, 1985). However, shareholders want to increase their wealth through managers' organization and investment management. Since these conflicts are more severe when there are large free cash flows, shareholders have to design incentive compensation plan to reduce managers' organization inefficiency.

John and Knyazeva (2005) examine the effects of corporate governance on agency conflicts, payout design, dividend policy and repurchase behavior. They argue that dividend payment has the effect of weakening agency conflicts caused by poor governance. Although repurchase and dividend payment are both included in the internal governance, repurchases are less effective in mitigating agency conflicts because of the treatment of the market to share repurchases and irregular payout to managers. Fama and Jensen (1983) hold the similar view to solve for the agency conflicts caused by the separation of ownership and control. They argue that such kind of agency conflicts can also be mitigated by improving the internal and external monitoring.

2.2 Structure of Executive Compensation

Researchers indicate that agency conflicts can be alleviated by implementing executives' compensation structure. Murphy (1999) categorizes executives' compensation into four types as the following: base salaries; stock options and restricted stocks; bonuses; the long-term incentive plans. Murphy (2012) also discusses the evolution of the structure of CEO pay in response to some factors, such as political factors, economic and so on. When facing political intervention, firms may increase executives' pay to adapt to the new circumstance.

Executive compensation floats in response to economics, firms' performance, political rules or some other conditions. Bebchuk and Grinstein (2005) suggest that during the period 1993-2003, pay to executives has grown much more than the increase of the firm size, performance and industry classification. During the period, the equity-based compensation paid by new economy firms and old economy firms has both increased, but non-equity-based compensation has not declined meanwhile. Their tests illustrate that the change in compensation can be explained by the arm's-length model and the managerial power model to some extent. Kaplan (2012) also finds that CEO compensation has increased significantly in the 1990s and then began to decrease since then.

The design of executives' compensation is a heated topic and has influence on firm performance. Li (2018) uses two multi-agent moral hazard models to investigate the regime of compensation design. Through testing the team model and individual model separately, he finds that the tam model is more robust for explaining the relationship between executive compensation and firm performance. His findings also indicate that managerial coordination is considered by shareholders in the compensation design. Hence, there is a need for a better understanding of the compensation design system and the factors that have influence on the compensation efficiency.

The optimal contracting approach is one of the popular approaches studying the executives' compensation. It argues that contracts are designed to motivate managers to work for the best interest of shareholders to alleviate the agency conflicts. However, this method has some limitations. Jensen and Murphy (1990b) argue that the executives' compensation structure is not powerful enough to motivate managers in practice due to the limitations on how generously managers can be paid.

Another approach to studying the design of executives' compensation is the managerial power approach. Bebchuk and Fried (2003) explain that under this approach, when the executives' compensation is designed to address the agency problem, it is also a part of the agency problem itself. That is, the executives have the managerial power to influence their compensation design and their rent extraction will cause the inefficiency of the optimal contracting approach aiming to solve for the agency problems. Although the managerial power approach seems contradictive to the optimal contracting approach, the proper executives' compensation scheme can be achieved by considering both of the two approaches.

Since the design of executives' compensation is important and complex, it deserves more attention from financial economists. There is literature studying the determinants of executives' compensation. Gabaix and Landier (2008) use an equilibrium model to examine the cause of the rise in executives' compensation. They find out that the market capitalization of large firms leads the compensation to increase. They also state that firm size can affect executives' pay positively. Similarly, Cheng, Venezia and Lou (2013) find that executive compensation changes in the same direction as the degree of international diversification, accounting earning performance, firm size and investment opportunities. On the other hand, the compensation level has a negative relationship with the degree of industrial diversification.

There is always debate about the level of executive compensation because the public outcries the managers being overpaid. Murphy (1986a) argues that managers are not overpaid because the designed compensation package does provide incentives for the managers to work for shareholders' interests and thus helps align the shareholders' interests with executives' interests. Furthermore, Jensen and Murphy (1990b) provide the information that CEO's pay level is actually decreasing despite the increasing salaries and bonuses. This phenomenon means that their stock-based compensation is decreasing. Since the stock ownership is the strongest incentive to motivate managers to work for the shareholders' wealth, this decreasing trend will make the top executives less devoted to creating wealth for firms. Accordingly, they argue that compensation level is important to make the compensation policy incentive and attractive.

On the other hand, Bebchuk and Fried (2004) state that the pay scheme is not efficient in motivating managers. They indicate that managerial influence has weaken executives' incentives and has affected firms' value. They also present the idea that executives' pay should be more transparent to the public to better implement the pay arrangements system. In sum, they argue that shareholders and board of directors should design and adopt effective pay policies to address the problems in executive compensation scheme.

2.3 Equity-Based Compensation

EBC is an important component in executive compensation package because it is efficient in aligning executives' interests with shareholders' interests (Jensen & Murphy, 1990a; Murphy, 1999). So EBC also has the effect of reducing agency conflicts. Jensen and Meckling (1976) argue that by granting managers more stock ownership, the managers are more committed to increasing firm's value. Similarly, Fama (1980) also proposes that an efficient managerial labor market helps to enhance managers' performance because the managers' pay level is decided by their performance.

The level of EBC package depends on several factors. Ofek and Yermack (2000) find that the change of stock package granted to managers depends on two forces by examining the compensation dataset from 1992 to 1995. One is from EBC through which the board tries to align the interests of shareholders with those of managers. The other force comes from the managers' diversifying risk by selling the stocks. That is, when managers already have large stock ownership, EBC loses its incentives functions because managers tend to sell the stocks to diversify risk.

In the literature, there are mixed reports on the relationship between the fraction of stocks granted to managers and the firm's market value. Morck, Shleifer and Vishny (1988) examine the relationship between the managers' stock fraction and Tobin's Q. They find that Tobin's Q increases when the fraction is between 0% and 5% and above 25%, then decreases when between 5% and 25%. Hermalin and Weisbach (1991) do the similar examination and get different findings.

They take into account the tenure of managers and find that the changing slope is positive when the fraction stays in the two intervals: 0% to 1% and 5% to 20%, and then becomes negative when the fraction is between 1% and 5% and bigger than 20%.

On the other hand, there are studies contradicting to the findings above. Lorderer and Martin (1997) test 867 domestic acquisitions and do not find the positive relationship between the firm performance and stock ownership granted to managers. They suggest that there may be severe problems in corporate resources when managers are granted large fraction of stocks.

There are studies examining the relationship between EBC level and other forces. Mehran (1995) suggests that EBC granted to executives increases when there are more outside directors and decreases when there are more outside shareholders. On the other hand, Laux and Laux (2009) test the reaction mechanism of EBC to the board committees and audit committees. They conclude that the separation of setting CEO pay and monitoring managers lead to high EBC.

2.4 Measures of Equity-Based Compensation

There are many different measures of executive compensation in the literature. Murphy (2012) measures EBC through two ways: pay-performance sensitivity (PPS) and pay-volatility sensitivity (PVS). We also use PPS and PVS to proxy for EBC to executives. According to Core and Guay (2002), PPS is defined as “Dollar change in the CEO’s wealth associated with a 1% change in the firm’s stock price”. PVS is defined as “Dollar change in the CEO’s wealth associated with a 0.01 change in the annualized standard deviation of stock returns”. Since we are studying the top five executives’ compensation, we modify the definitions as following. We define PPS as the total dollar changes in the top five executives’ wealth associated with a 1% change in the firm’s stock price. And PVS is defined as the total dollar changes in the top five executives’ wealth relative to a 0.01 change in the annualized standard deviation of stock returns.

Furthermore, Baum, Ford and Zhao (2012) introduce the top five executives' share of core earnings to proxy for the executive compensation. By examining S&P 500 companies from 1993 to 2007, they find that the top five executives' pay is related to firm performance and firm specific characteristics, such as book-to-market ratio and equity risk. They also suggest that the increasing of the total compensation of executives is mainly driven by the increasing in the restricted stocks and stock options. When they further examine the top five executives' share of core earnings, it is shown that managers receive a declining proportion of core earnings in each dollar of core earnings they create for the shareholders.

Studies examining the relationship between pay and performance report mixed findings. Conyon and Peck (1998) find that when outsiders have a main position in boards and compensation setting committees, the relation between pay and performance is stronger. Yermack (1996) takes into account the board size. He finds that firms tend to have higher PPS and a larger firm value with a smaller board.

However, some researchers report the competing findings. Jensen and Murphy (1990a) examine the pay-performance sensitivities by using the sample of 10,400 CEOs from 1,295 companies. The evidence shows that the relation between executive pay and firm performance is weak. The authors state that many factors lead to the weak relationship, such as firm size and political stress. Similarly, Parthasarathy, Menon and Bhattacherjee (2006) use net profit margin (NPM) and return on asset (ROA) to proxy for firm performance and test pay-performance sensitivities. They find that the firm performance has no relation with the total executive pay and the proportion of incentive pay to the total compensation.

There are also studies examining pay-volatility sensitivity (PVS). Rajgopal and Shevlin (2002) find that there is a positive relationship between CEO's incentive pay and the stock return volatility. Based on this, executives will be motivated to select the projects with high volatility in return because the high volatility will lead to more EBC to them. Coles, Daniel and Naveen (2006) also have similar findings by adopting a three-stage least-squares regression model to examine the impact of PVS. The results show that the higher PVS is associated with the riskier investment policy, which will lead to the lower PPS. Graefe-Anderson, Pyo and Zhu (2018) run a regression model using 34,248 firm-year observations to examine the impacts of EBC to CEO on the employee wages. They adapt PPS and PVS as two potential measures for the EBC and find that the coefficient of PVS is small and not significant. That is, PVS does not seem to affect employee wages.

2.5 EBC and Employee Wages Relative to Technology Firms

Chemmanur, Cheng and Zhang (2013) study the impacts of leverage on CEO compensation and average employee wages in technology and non-technology firms. They show that the leverage has greater impacts on both CEO pay and average employee wages in non-technology firms than in technology firms. Graef-Anderson, Pyo and Zhu (2018) divide their data into two subsets: technology and non-technology firms and examine the impacts of CEO compensation on employee wages separately. They conclude that CEOs in non-technology firms have greater impacts on employee wages.

2.6 EBC and Employee Wages Relative to Business Cycle

Business cycles lead to different financial states as well as different bankruptcy possibilities. That is, the bankruptcy possibility is low when firms are in good states, while the situation is contrary when in bad states. Chemmanur, Cheng and Zhang (2013) measure the bankruptcy probability using Z-score. They divide the dataset into two subsets: financially safe companies and financially distressed companies. The results show that in financially safe companies, the effect of firm leverage on average employee wages is significant, while the relationship is not significant in financially distressed companies.

In different financial states, EBC to executives and its impacts on employee wages are varied. Recently, Graefe-Anderson, Pyo and Zhu (2018) test the relationship of CEO EBC and employee wages during different business cycles. They use bankruptcy possibilities to measure the financial states and find that the EBC has greater negative effects on employee wages for the firms in a bad state than for firms in a good state. Accordingly, we expect that the impacts of EBC to CEO on employee wages are varied for firms in different business cycles.

3. Hypothesis Development

Since there is deviation of managers' interests from shareholders' interests, managers may work for their own wealth, not for the shareholders' wealth. When firms include EBC in executive compensation package, the agency conflicts can be alleviated because executives are motivated to increase firm performance. Therefore, executives will enhance firm performance to increase their own compensation. Since employee pay is a part of firm expenses, managers can reduce firm expenses and improve firm profits by suppressing employee wages. Increasing firm profits can boost stock price. Hence, executives will receive more compensation by suppressing employee wages.

However, there is a concern on employee wages. Employees may might lose incentives to maintain their productivity in response to suppressed wages. Since there are still debates about the positive relationship between EBC to executives and firm performance, the loss in productivity on a small scale might not affect the compensation package of the executives with high managerial power. Therefore, if there is no positive relationship between EBC and firm performance, executives may suppress employee wages to increase their own compensation.

Since we expect the negative relation between employee wages and executive compensation, there may also be relationship between the changes of employee wages in the current year based on the last year and the changes of EBC to executives in the current year over the last year. And we expect this relationship to be also negative.

Hence, we have our Hypothesis 1:

H1: Top five executives' compensation does suppress employee wages. That is, there is a negative relation between pay-performance sensitivities of the top five executives and employee wages. And such negative relation also exists in the changes of employee wages and the changes of PPS to the top five executives.

To test Hypothesis 1, we build the model by taking the average employee wages as the dependent variable and PPS as one of the main independent variables. In the literature, capital structure is found to have significant influence on employee pay. We also include leverage as one of the main control variables. Chemmanur et al. (2013) examine the relationship between firm leverage and average employee pay and find that the leverage has positive influence on employee pay. Similarly, Graefe-Anderson, Pyo and Zhu (2018) retain the consistent conclusion with Chemmanur et al. (2013) while using PPS as the main independent variable.

High firm leverage leads to high probability to go bankrupt. To be compensated for the additional risk-taking from the higher bankruptcy possibility, employees may ask for higher wages. We conjecture that this relationship still holds in the existent of EBC to the top five executives. Therefore, we have our Hypothesis 2:

H2: In the existent of EBC to the top five executives, firm leverage has positive relationship with average employee wages.

Researchers study the relationship between EBC to executives and employee wages, taking different industries into consideration. Anderson, Banker and Ravindran (2000) show that the components of compensation take different fraction in the total compensation for different industries. Chemmanur et al. (2013) test the relationship between leverage and employee wages for technology and nontechnology, respectively. They find that firm leverage is higher in nontechnology firms and the influence of leverage on employee wages is stronger in nontechnology firms.

Graefe-Anderson, Pyo and Zhu (2018) categorize firms into technology and nontechnology firms and examine the impact of PPS on employee wages in the two industries separately. Their results show that this impact is stronger for nontechnology firms than for technology firms. This leads to our Hypothesis 3:

H3: There is difference in the influence of PPS on average employee wages among technology and non-technology firms.

Researchers have investigated the business conditions specific to different business cycles. Yang (2005) argues that in bad states, agency conflicts are more serious due to shareholder rights. The situation is contrary when in good states. They also suggest that the debt structures are varied in good states or bad states.

Since the financial conditions of firms are different under different business cycles, the relation between EBC and employee wages may also be specific to the varied business cycles. Graefe-Anderson, Pyo and Zhu (2018) examine the impacts of EBC to CEO on employee wages under the different business cycles. They compute the Z-score to decide the financial states of firms and run the regression model separately. The results support their hypothesis. That is, the coefficients of PPS are different for firms in two financial states. The impacts of EBC on employee wages are greater for financially distressed firms. Therefore, we extend their test and set up Hypothesis 4:

H4: EBC to the top five executives have different effects on employee wages within the different business cycles.

4. Data and Methodology

4.1 Data

Our sample data covers from January 1992 to December 2017.We estimate pay-performance sensitivity (PPS) and pay-volatility sensitivity (PVS) to measure dollar incentives and volatility incentives derived from the executive's equity-based compensation, respectively. The compensation data to the top five executives are collected from Execucomp database. To calculate PPS and PVS, we obtain the data on stock returns from CRSP database. Since a common identifier in Execucomp and CRSP database is "CUSIP", we merge the two databases by "CUSIP" variable. Our calculation methods of executive compensation are changed in 2006 because the data reporting formats in Execucomp are changed since 2006. In addition, we use Black-Scholes-Merton model to calculate the option delta and vega. Delta is defined as the dollar change of executive EBC corresponding to a 1% change in stock price, while vega refers to the dollar change associated with a 1% change in the standard deviation of stock returns. We retrieve the monthly risk-free rates from historical data provided by the Federal Reserve website for "Treasury constant maturities". Consistent with the prior literature, we eliminate the finance and utility firms because those firms have different operating mechanisms and regulatory restrictions compared to the others.

We use "COPEROL" and "YEAR" variables to identify the cross-section and time series in our panel data set, respectively. We first calculate delta and vega of each executive for each company, and then sum up the delta and vega of the top five executives from each company to be PPS and PVS of the company, respectively. To avoid the huge numerical difference among the variables in the regression model, we take the natural log of PPS and PVS. After deleting the missing values of the natural log of PPS, we have 219,378 executive-year observations and 35,512 firm-year observations during the sample period. There are 301 unique firms that have non-missing data for our dependent and independent variables. In terms of the employee wages, we calculate average employee wage as “Staff expense” (XLR) divided by “Number of employees” (EMP), variables provided by COMPUSTAT database. We also take the natural log of the average employee wage for the regression model. Among the 2,810 unique firms, we have only 301 unique firms that report their employee wages. Since only 11% of the firms report their “Staff expenses” data, there will be a concern on the sample-selection bias. We conduct the Heckman two-step test to address the potential bias concern.

For the data on firm characteristics, we collect the following variables from COMPUSTAT during the period from fiscal year 1992 to 2017: “Total Assets” (AT), “Number of Common Shares Outstanding” (CSHO), “Close Price of the Company’s Stock for the Fiscal Year” (PRCC_F), “Total Debt in Current Liabilities” (DLC), “Total Long-term Debt” (DLTT), “Earnings Before Interest and Taxes” (EBIT), “Net Sales” (SALE) and “Retained Earnings” (RE).

We also include important control variables such as firm size, leverage ratio, average sales per employee, market-to-book ratio (MTB), physical capital intensity (PCI), and quit rates. We estimate the firm size using the natural log of market capitalization, which is computed as the number of common shares outstanding multiplied by a current market price per share. Based on the method used by Leary and Roberts (2010), we measure leverage as market leverage ratio, which is computed as the total debt (DLTT+DLC) divided by the sum of the total debt and market value of equity (CSHO*PRCC_F). The variable, average sales per employee, is calculated as the sales divided by the number of employees (SALE/EMP). Market-to-book ratio is defined as market value of assets to book value of assets (Coles, Daniel and Naveen, 2006). We use physical capital intensity to reflect the growth opportunities of the firm. Following Chemmanur et al. (2013), physical capital intensity is calculated as the gross property, plant and equipment scaled by total assets (PPEGT/AT). We collect quit rates from the database of Job Openings and Labor Turnover Survey (JOLTS) provided by the U.S. Bureau of Labor Statistics. To capture the industry effects in our regression models, we categorize firms into different industries by the Standard Industrial Classification codes and construct industry dummies.

Table 1 reports the summary statistics of the key variables used in the regression analysis. We present the statistics of PPS and PVS for both CEO and the top five executives. The dependent variable, average employee wage, has a mean of $56,339, a median of $51,571 and a standard deviation of $38,630. PPS of CEO has a mean of $701,436 and a median of $205,986. Graefe-Anderson, Pyo and Zhu (2018) examine PPS of CEO from 1992 to 2014. According to their statistics, PPS has a mean of $879,276 and a median of $205,999. The different results between their study and ours might reflect the different sample periods and the decline of CEO compensation. Meanwhile, PPS of the top five executives has a mean of $1,134,104 and a median of $472,720. The mean value indicates that the equity-based compensation of the top executives changes by $1,134,104 corresponding to per 1% change in the firm's stock price. PVS of the top five executives has a mean of $213,004, which means that the equity-based compensation of the top five executives changes by $213,004 when there is a 1% change in the annualized standard deviation of stock returns.

Table 2 presents the sample correlations of the key variables in the analysis of the impacts on employee wages. We observe that nearly all of the correlations are significant at 1% level, which suggests that the change in one variable is significantly related to the change in another variable. Moreover, "Wage" and "Average sales" have a strong relationship with a coefficient of 0.726. The absolute value of coefficients of the correlations of "PVS" and "Size", "Size" and "Avgsale" are between 0.3 and 0.5, which implies that the variables have a moderate degree of correlations. The absolute value of coefficients of the correlations of the other two variables are below 0.29, which indicates a weak relationship between the two.

4.2 Equity-Based Compensation to Executives

The two sensitivities, PPS and PVS, can capture incentives provided by executive EBC more precisely because EBC levels could be the results of EBC-related transactions or compensation-package changes in EBC (Graefe-Anderson, Pyo & Zhu, 2018). More specifically, the executive with low EBC but fewer transactions and the executive with high EBC but more transactions may have the same level of compensation. However, the two sensitivities (PPS and PVS) will remain different for different executives.

Core and Guay (2002) calculate the option values based on the Black-Scholes (1973) model for European call options modified by Merton (1973) to add dividend item. We follow the method of Core and Guay (2002).

$$\textit{Option value}=[Se^{-dT}N(Z) - Xe^{-rT}N\left(Z - \sigma\sqrt{T}\right)] \qquad (1)$$

where Z = $[\ln(\frac{S}{X})+T\ (r-d+\frac{\sigma^2}{2})]/\sigma\sqrt{T}$, N = cumulative probability function for normal distribution, S = price of the underlying stock, X = exercise price of the option, σ = expected volatility of stock return over the life of the option, r = risk-free interest rate, T = time to maturity of the option in years, d = expected dividend yield over the life of the option.

We first calculate delta for each executive per year and add up all deltas of the top five executives in each firm to obtain the total-PPS for each firm-year. For Delta of each executive, we add up the delta of all exercisable and unexercisable options and the delta of shareholdings. For vega of each executive, we sum up the vega of all exercisable and unexercisable options. And we sum up the vega of top five executives in each firm to obtain the total-PVS for each firm-year.

We estimate PPS as the following:

$$\left[\frac{\partial(Option\ value)}{\partial(Stock\ price)} + \#Shr.own\right] \times \left(\frac{Stock\ price}{100}\right)$$

$$=[e^{-dT}N(Z) \times \#Options + \#Shr.own] \times \left(\frac{Stock\ price}{100}\right) \quad (2)$$

PVS is estimated as:

$$\left[\frac{\partial(Option\ value)}{\partial(Stock\ volatility)}\right] \times 0.01 = e^{-dT}N'(Z) \times S\sqrt{T} \times 0.01 \times \#Options \quad (3)$$

where N'= normal density function.

4.3 Employee Wages, Capital Structure and Pay-Performance Sensitivity

To test, Hypothesis 1 and Hypothesis 2, we run an OLS model with year and industry dummy variables.

$$Wage_{i,t} = \alpha_0 + \alpha_1 PPS_{i,t} + \alpha_2 PVS_{i,t} + \alpha_3 Size_{i,t} + \alpha_4 Leverage_{i,t} + \alpha_5 Avgsale_{i,t} +$$
$$\alpha_6 MTB_{i,t} + \alpha_7 PCI_{i,t} + \alpha_8 Quits_{i,t} + Year_t + Ind_{i,t} + \epsilon_{i,t} \quad (4)$$

In this regression model, $Wage_{i,t}$ is calculated as the natural log of the average employee wage of firm i in the year t. $PPS_{i,t}$ is the natural log of the total PPS to the top five executives of firm i in the year t. $PVS_{i,t}$ is the natural log of the total PVS to the top five executives of firm i in the year t. We include year dummy variable and industry dummy variable. According to our Hypothesis 2, we expect the coefficient of Leverage α_4 to be positive. Since $Avgsale_{i,t}$ is used to gauge the productivity of employees, we expect α_5 to be positive. Berk, Stanton and Zechner

(2010) have the conclusion that more capital intensive companies tend to pay employees higher wages. Hence, we expect α_7 to be positive.

4.4 Heckman Two-Step Analysis

Since many firms do not report labor expenses, there could be a potential sample selection bias (Chemmanur et al., 2013). More specifically, if firms with high EBC to executives and high employee wages choose not to report labor expenses, our regression results will be biased and spurious. To overcome this concern, we conduct Heckman (1979) two-step analysis. Heckman (1979) proposes the two-step model to solve for the ordinary specification bias that arises from a missing data problem.

In the first step, our dependent variable, $Pro_{i,t}$, is one if the firm reports the data of labor expenses and zero otherwise. We run the Probit model to examine whether the data on employee pay is missing. We also include a dummy variable for firm's exchange listings to reflect the different reporting behaviors by firms in a specific exchange. The other variables remain the same as in Eq. (4). The first step model is:

$$Pro_{i,t} = \alpha_1 PPS_{i,t} + \alpha_2 Size_{i,t} + \alpha_3 Leverage_{i,t} + \alpha_4 Avgsale_{i,t} + \alpha_5 MTB_{i,t} + \alpha_6 PCI_{i,t} + Year_t + Ind_{i,t} + exchg_{i,t} + \varepsilon_{i,t} \quad (5)$$

In the second step, we select only the firms of which the data on employee wage is non-missing and run the OLS regression model to test the impacts of PPS on employee wages. The model is shown as in Eq. (6) below:

$$Wage_{i,t} = \beta_0 + \beta_1 PPS_{i,t} + \beta_2 Size_{i,t} + \beta_3 Leverage_{i,t} + \beta_4 Avgsale_{i,t} + \beta_5 MTB_{i,t} + \beta_6 PCI_{i,t} + \beta_7 Imr_{i,t} + Year_t + Ind_{i,t} + \varepsilon_{i,t} \quad (6)$$

In Eq. (6), $Imr_{i,t}$ is the inverse Mill's ratio, which is generated in the first step. Heckman (1979) and Tobin (1958) propose that the inverse Mill's ratio can make the parameters derived from the regression model unbiased. Other variables remain the same as in Eq. (5).

4.5 The Influence of PPS in Technology Firms versus Non-Technology Firms

In order to test Hypothesis 3, we study the impacts of PPS on employee wages in different industries. According to the Standard Industry Classification (SIC) code, we divide our data into two classes: technology firms and non-technology firms. Following Chemmanur et al. (2013), technology firms are those with primary SIC codes: 3570, 3571, 3572, 3576, 3577, 3661, 3674, 4812, 4813, 5045, 5961, 7370, 7372 and 7373. Non-technology firms include those firms with SIC codes less than 4000 and are not included as technology firms. Then we run the regression as below for the technology and non-technology firms separately. The other variables remain the same as in Eq. (4).

$$Wage_{i,t} = \gamma_0 + \gamma_1 PPS_{i,t} + \gamma_2 Size_{i,t} + \gamma_3 Leverage_{i,t} + \gamma_4 Avgsale_{i,t} + \gamma_5 MTB_{i,t} + \gamma_6 PCI_{i,t} + Year_t + Ind_{i,t} + \varepsilon_{i,t} \qquad (7)$$

To test the distinction between the coefficients of PPS in technology and non-technology firms, we create a dummy variable, $Tech_{i,t}$, which is one if the firm is a technology firm and zero otherwise. We also add the product of $Tech_{i,t}$ and $PPS_{i,t}$ to capture the difference between the coefficients of PPS in technology firms and non-technology firms. The coefficients of PPS in technology firms and non-technology firms are denoted as τ_{tech} and $\tau_{non-tech}$, respectively. After adding $Tech_{i,t}$ and the product of $Tech_{i,t}$ and $PPS_{i,t}$, we have the new model as below:

$$Wage_{i,t} = \tau_0 + \tau_1 PPS_{i,t} + \tau_2 Size_{i.t} + \tau_3 Leverage_{i,t} + \tau_4 Avgsale_{i,t} + \tau_5 MTB_{i,t} + \tau_6 PCI_{i,t} + \tau_7 Tech_{i,t} + \tau_8 (Tech \times PPS)_{i,t} + Year_t + \varepsilon_{i,t} \qquad (8)$$

If the term $(Tech \times PPS)_{i,t}$ is statistically significant, then we can say that τ_{tech} is significantly distinct from $\tau_{non-tech}$. The coefficient τ_8 is the difference between τ_{tech} and $\tau_{non-tech}$.

4.6 The Influence of PPS during Different Business Cycles

In order to test our Hypothesis 4, we divide the firms into two different business cycles according to bankruptcy probabilities. To measure the bankruptcy probability, we follow the method of Cole, Daniel and Naveen (2006) and Chemmanur et al. (2013) based on the method by Altman (1968). They calculate Z-score as:

Z-score=$1.2\,T_1 + 1.4T_2 + 3.3T_3 + 0.6T_4 + T_5$

where T_1=working capital/total assets, T_2=retained earnings/total assets, T_3=earnings before interest and taxes/total assets, T_4=market value of equity/book value of total liabilities, T_5=sales/total assets.

Based on Z-score, we divide all the firms into financially safe firms and financially distressed firms. Chemmanur et al. (2013) define the firms with Z-score above or equal to 2.99 to be financially safe firms, and those with Z-score below or equal to 1.8 to be financially distressed firms. We run the regression of model Eq. (7) for the financially safe and distressed firms separately.

As we conjecture that the influence of PPS is different in business cycles, we have a model below to capture the difference of the coefficients of PPS for firms in different business cycles.

$$Wage_{i,t} = \varphi_0 + \varphi_1 PPS_{i,t} + \varphi_2 Size_{i,t} + \varphi_3 Leverage_{i,t} + \varphi_4 Avgsale_{i,t} + \varphi_5 MTB_{i,t} + \varphi_6 PCI_{i,t} + \varphi_7 State_{i,t} + \varphi_8 (State \times PPS)_{i,t} + Year_t + \varepsilon_{i,t} \quad (9)$$

In Eq. (9), $State_{i,t}$ is a dummy variable, which is one if the firm is in a good state and zero otherwise. We adopt an interaction term of $State_{i,t}$ and $PPS_{i,t}$ to capture the difference between the coefficients of PPS for firms in different business cycles. If there is any difference, the coefficient of the product term, φ_8, will be statistically significant for the difference.

4.7 Robustness Tests

With the regard to endogeneity and alternative variable measures, we conduct robustness tests. As we discussed in the previous part, leverage ratio reflects the investment opportunities of the firm. That is, the firm's leverage ratio will be high if it makes more investment. According to Harris, Raviv (1991) and Parsons, Titman (2009), if a firm has a high leverage, it implies that the firm has a large amount of investment or tangible assets to manage. To ensure investments or assets to be well operated, firms need to pay employees high wages. Therefore, the positive relationship between employee wages and leverage creates the potential endogeneity problem. We deal with the endogeneity problem based on the method of Wooldridge (2002) by introducing a two-stage least square (2SLS) regression model.

For the first stage, we introduce an instrumental variable, which is related to leverage but not related to the employee wages. Since the tax benefit of debt is positively related to a firm's marginal tax rate, there is also a positive relation between the marginal tax rate and the firm's leverage ratio (Leary and Roberts, 2010). We could not find the literature suggesting that there is a direct relation between marginal tax rate and average employee wages. Following Givoly, Hayn, Ofer and Sarig (1992) and Chemmanur et al. (2013), we use marginal tax rates based on income before interest expenses as the instrument variable because it meets the requirements above. In the spirit of Chemmanur et al. (2013), we add the variable $(EBIT/AT)_{i,t}$ to proxy for the efficiency of a firm in generating profits from its assets. We also include $STD(EBIT/AT)_{i,t}$ to measure the volatility of the efficiency of a firm in generating returns from assets. The model of the first step is shown below:

$$Leverage_{i,t} = \theta_0 + PPS_{i,t} + \theta_2 Size_{i,t} + \theta_3 Avgsale_{i,t} + \theta_4 MTB_{i,t} + \theta_5 PCI_{i,t} + \theta_6 MTR_{i,t} + \theta_7 (EBIT/AT)_{i,t} + \theta_8 STD(EBIT/AT)_{i,t} + Year_t + \varepsilon_{i,t} \quad (10)$$

From the first step, we obtain the fitted value of leverage ratio and use it as an independent variable in the second step. The other variables remain the same as in Eq. (10). The model for the second step is shown as the following:

$$Wage_{i,t} = \alpha_0 + \alpha_1 PPS_{i,t} + \alpha_2 Size_{i,t} + \alpha_3 Leverage_{i,t} + \alpha_4 Avgsale_{i,t} + \alpha_5 MTB_{i,t} + \alpha_6 PCI_{i,t} + \alpha_7 (EBIT/AT)_{i,t} + \alpha_8 STD(EBIT/AT)_{i,t} + Year_t + \varepsilon_{i,t} \quad (11)$$

In addition, we introduce another measure for the executives' performance to further test the robustness. Consistent with Graefe-Anderson, Pyo and Zhu (2018), we adopt the excess return ($Exret_{i,t}$) and add a cross product term of PPS and the excess return in our model. The other variables remain the same as in Eq (4). The model is shown as the following:

$$Wage_{i,t} = \theta_0 + \theta_1 PPS_{i,t} + \theta_2 Size_{i,t} + \theta_3 Leverage_{i,t} + \theta_4 Avgsale_{i,t} + \theta_5 MTB_{i,t} + \theta_6 PCI_{i,t} + \theta_7 Exret_{i,t} + \theta_8 (Exret \times PPS)_{i,t} + Year_t + Ind_{i,t} + \varepsilon_{i,t} \quad (12)$$

4.8 The Relation between Changes in Executive Wealth and Changes in Employee Wages

Since we conjecture that there might be a relation between the changes in executive EBC and the changes in employee wages, we construct the model to test this relationship. The model is shown as the following:

$$\Delta Wage_{i,t} = \alpha_0 + \alpha_1 \Delta PPS_{i,t} + \alpha_2 \Delta PVS_{i,t} + \alpha_3 Size_{i,t} + \alpha_4 Leverage_{i,t} + \alpha_5 Avgsale_{i,t} + \alpha_6 MTB_{i,t} + \alpha_7 PCI_{i,t} + \alpha_8 Quits_{i,t} + Year_t + Ind_{i,t} + \epsilon_{i,t} \quad (13)$$

In this model, $\Delta Wage_{i,t}$ is computed as the employee wage in the year t minus the employee wage in the last year t-1 for firm i. $\Delta PPS_{i,t}$ is the difference between the total PPS in the year t and the total PPS in the last year t-1 for firm i. $\Delta PVS_{i,t}$ represents the difference between the total PVS in the year t and the total PVS in the last year t-1 for firm i. The other variables stay the same as in Eq. (4).

5. Results

We first provide the summary table for the compensation to workers during different sub-periods. We move on to estimate the relation between employee wages and compensation to executives in the existence of control variables. We continue to investigate the relation between PPS and employee wages in both technology and non-technology firms. Then we construct tables showing how different the relationship is during different business cycles. Finally, we provide the results of the relation between the changes in employee wages and the changes in executive compensation.

5.1 Income Disparity

We examine the income disparity during the following three sub-periods: 1992-2000, 2001-2007 and 2008-2017. Table 3 reports average annual staff expenses, total operating expenses and the ratio of average annual staff expense to the annual operating expense. We observe that the staff expenses increase from period 1 to period 2 and then go down from period 2 to period 3. The ratio of staff expenses to operating expenses declines during the three periods. We note that the staff expenses occupy a very high portion of the operating expenses.

Table 3 also reports PPS and the total compensation to CEO and to the top five executives. We find that the average annual compensation to the top five executives is about 26-60 times to the average employee wages. The situation is even worse when considering the average annual compensation to CEO, which is 61-100 times more than the average employee wages. This huge income disparity between employees and executives might discourage employees from promoting working efficiency and thus have a negative influence on firm performance. Kong (2017) states that high CEO Pay Slice (CPS) could have a negative impact on firm performance by demotivating employees and destroying team cooperation. It is reasonable to study the income disparity and firm performance by investigating how executive compensation affects employee wages.

5.2 Employee Wages Analysis

We exhibit the relation of employee wages and CEO compensation according to Graefe-Anderson, Pyo and Zhu (2018) as shown in Table 4. Then we conduct the multiple regression analysis for employee wages and PPS of top five executives, which is shown in Table 5. In Table 4, the first five columns show the relation of employee wages and PPS of CEO as well as the relation with leverage ratio, with the firm size, average sales per employee, market-to-book ratio, physical capital intensity and quits rate as the control variables. The last column shows the relation of employee wages and PVS of CEO. The significantly negative coefficients of PPS indicate the negative impacts of CEO PPS on employee wages, consistent with Graefe-Anderson, Pyo and Zhu (2018). From all the significantly positive coefficients of leverage ratio, we can conclude that higher leverage ratios lead to higher employee wages, concordant with Chemmanur et al. (2013) and Graefe-Anderson, Pyo and Zhu (2018).

Table 5 reports the relation between employee wages and total PPS to the top five executives in the existence of control variables. The first four columns show that all coefficients of PPS are significantly negative at 1% level. Since Column 1 shows PPS with the coefficient of -0.0184, we can compute the incremental wage changes relative to the changes in PPS. With Table 1 showing PPS with a median of \$472,720, we find that the level of the natural log of PPS increases by 1.5910 when we increase PPS by one standard deviation (\$1,847,619). As a result, the natural log of average employee wages decreases by 0.0293 (=0.0184×1.5910). Starting from the median value of employee wage as shown in Table 1, the natural log of employee wage declines from 10.8507 to 10.8214 (=10.8507-0.0293), which are translated from \$51,571 to \$50,081. Hence, the average employee wage decreases by $1,490 when the compensation to the top five executives increases by one standard deviation.

Regarding other control variables in Table 5, firm size, leverage, average sales per employee and physical capital intensity have significantly positive coefficients. The results indicate that firms with larger size pay more to employees, consistent with Brown and Medoff (1989). Employees are paid higher if they have higher sales because average sales per employee measures the employee productivity. Firms also pay their employees more if they increase leverage ratio to compensate additional risk-taking. These findings are consistent with Chemmanur et al. (2013).

Moreover, in Column 2 and Column 4-6, we find that the market-to-book ratio has significantly negative coefficients, which implies that firms with higher market-to-book ratios pay more to their employees. It appears that investors are less likely to invest in the firms with high market-to-book ratios. Therefore, the employee wages of such firms are suppressed when there is not enough financial support. In addition, Column 3, Column 4, and Column 6 show that physical capital intensity has significantly positive coefficients, consistent with Graefe-Anderson, Pyo and Zhu (2018). It suggests that employees are paid more when firms have more growth opportunities. In Column 5, we add quits rate as a control variable and observe a significantly negative coefficient, suggesting that employees get paid more if firms are more specialized (Chemmanur et al., 2013). While Graefe-Andersn, Pyo and Zhu (2018) find that the quits rate is not significant with PPS of CEO as a main variable. The difference might reflect the difference of the main variable and sample period. Compared to Column 4, PCI turns to be significantly negative in the existence of quits rate.

In Column 6 of Table 5, we use PVS as the proxy for EBC to executives instead of PPS.

We note that PVS has a coefficient of -0.0029, which is not significant. Since there is not significant relation between PVS and employee wages, we use PPS as the proxy for incentive compensation from now on.

5.3 Heckman Two-Step Analysis

Since many firms do not report staff expenses and the data on average employee wages of those firms are missing, we conduct a Heckman two-step analysis to address the concern on the potential sample selection bias. Panel A and Panel B of Table 6 present the first and second step results, respectively. In the first step, the coefficients of PPS in all the columns are significantly negative at 1% level. Firm size and leverage have significantly positive coefficients in each column. Average sales per employee has a negative coefficient and significant at 1% level in each column. In Column 2 and Column 4, market-to-book ratio has significantly negative coefficients. In Column 3 and Column 4, physical capital intensity has positive coefficients which are significant at 1% level. The results suggest that larger firms with higher leverage, lower average sales per employee, lower market-to-book ratio, and higher physical capital intensity have higher probability of reporting staff expenses. These results are consistent with Graefe-Anderson, Pyo and Zhu (2018).

In the second step, our data sample contains only the firms that report staff expenses. We add the inverse Mill's ratio derived from the first step as an additional variable in the regressions of second step. In all the columns, the coefficients of PPS are significantly negative ranging from -0.0025 to -0.0087. The coefficients of firm size, leverage and average sales per employee remain significantly positive in each column. Market-to-book ratio still has negative coefficients and significant at 1% level in Column 2 and Column 4. In addition, the significant coefficients of the inverse Mill's ratio suggest that the inverse Mill's ratio makes contribution to making the parameters unbiased. Therefore, we can conclude that the influence of PPS and leverage ratio on employee wages remains negative and positive, respectively, after controlling for sample selection bias. And this result is consistent with the results shown in Table 5.

From Table 5 and Table 6, we can have the conclusion that the executives with higher pay-performance sensitivity suppress employee wages. And higher leverage ratios can promote average employee wages. These conclusions are consistent with Graefe-Anderson, Pyo and Zhu (2018) as well as Chemmanur et al. (2013). Hence, our hypothesis 1 and hypothesis 2 are both supported.

5.4 Employee Wages Analysis in Technology and Non-Technology Firms

We further investigate the relation between employee wages and executive compensation in technology and non-technology firms. We run multiple regressions based on Eq. (8). Table 7 reports the results of OLS regression in technology and non-technology separately. Comparing Panel A and Panel B, we find that the coefficients of PPS in technology firms are negatively significant, while they are not significant in non-technology firms. Table 8 shows results of multiple regressions with the data combined both technology firms and non-technology firms. For technology firms with an indicator variable of 1, the product term of "Tech" and "PPS" is reduced to a term "PPS" with its coefficient of 0.0488 in column (1), which is added to a single term "PPS" with its coefficient of -0.0451. The ending result of coefficient of "PPS" becomes close to zero as 0.0037. PPS of technology firms appears to have no impacts on employee wages. On the other hand, for non-technology firms with an indicator variable 0, the product term with PPS becomes zero. The coefficient of PPS as -0.0451 stays intact. Hence, PPS of non-technology firms has significantly negative impacts on employee wages as shown in Graefe-Anderson et al. (2018). Moreover, the coefficients of firm size, leverage and average sales are all significantly positive in both technology and non-technology firms. In technology firms, market-to-book ratios have significantly negative coefficients, while they are non-significant in non-technology firms. We also note that physical capital intensity has more significant effect on employee wages in technology firms then in non-technology firms.

5.5 Employee Wages Analysis during Different Business Cycles

In order to test hypothesis 4, we divide our sample firms into financially safe firms and financially distressed firms according to Z-score. In Table 9, we find that PPS has a negative relation with employee wages in financially safe firms, but has no significant relation in financially distressed firms. Table 10 provides results of multiple regressions from the data combined both business states. For financially safe firms with an indicator variable of 1, the product term of "State" and "PPS" is reduced to a term "PPS" with its coefficient of 0.0618 in column (1), which is added to a single term "PPS" with its coefficient of -0.0402. The ending result of coefficient of "PPS" becomes positive as 0.0216. PPS of financially safe firms appears to have positive impacts on employee wages. On the other hand, for financially distressed firms with an indicator variable 0, the product term with PPS becomes zero. The coefficient of PPS as -0.0402 stays intact. Hence, PPS of financially distressed firms has significantly negative impacts on employee wages as shown in Graefe-Anderson et al. (2018). In addition, leverage has significant coefficients in financially distressed firms, but non-significant coefficients in financially safe firms. Market-to book ratio has more significant impacts on employee wages in financially safe firms compared to those in financially distressed firms.

5.6 Robustness Tests

We conduct the robustness tests using a two-stage least square model and an alternate variable method. Table 11 presents the results of the two-stage model. From Panel A of Table 11 for the first stage, we find that the marginal tax rate has significantly positive coefficients, consistent with Chemmanur et al. (2013). The partial F-statistics of marginal tax rates are 28.30, 28.59, 29.06 and 29.27, respectively. In the literature (Stock, Wright, and Yogo, 2002), the suggested critical F-value is 8.96 when the number of instruments is one. The instrument is considered to be strong if the first-stage partial F-statistic is above the critical value. The results suggest that the marginal tax rate is a strong instrumental variable. Panel B of Table 11 presents the results of the second stage. We employ the fitted value of leverage as an independent variable. The result shows that PPS coefficients maintain significantly negative, which is consistent with our previous findings in Table 5. The coefficients of leverage become negative after controlling for the potential endogeneity concern. Furthermore, the coefficients of firm size and average sales remain significantly positive as they are in Table 5. Hence, when we control for the potential endogeneity concern, executive incentive compensation maintains negative impacts on employee wages.

Table 12 reports the results of an alternate variable method for robustness of our findings. We use excess returns as an alternate measure for executives' performance and add the interaction term of PPS and excess returns. From Table 12, we find that the coefficients of excess returns are all non-significant in all the columns. When we add PPS in Column 4, the coefficient of PPS becomes significantly negative. Moreover, the product term of PPS and excess returns carries a non-significant coefficient. It suggests that PPS cannot be replaced by excess returns as a proxy for the incentive compensation of executives in our study.

5.7 Analysis of Changes in Employee Wages

In discussion above, we examine changes in employee wages relative to changes in PPS because we are interested in how much employee wages change given the changes in executive

PPS. Hence, it is important to analyze the relation between the two changes. We run multiple regressions based on Eq. (13). In Table 13, we find that the changes in PPS have a significantly positive relation with the changes in the average employee wages. More specifically, when there is a large increase in PPS, there is also a corresponding large increase in employee wages. Recall that when the change in PPS is positive, the corresponding change in employee wages is negative based on the analysis of levels. Further research is required for further investigation.

There might be endogeneity concerns between PPS and employee wages because employee wages might affect PPS as well. However, when we consider decision makers of compensation, the endogeneity concerns are reduced. While corporate executives determine compensation to both executives and employees, it is hard to imagine that employees have any power in determining executive compensation. Hence, it is natural to expect that PPS derived from executive compensation might have impacts on employee wages.

6. Conclusion

Executive compensation and income inequality within firms are one of interesting topics in corporate finance research. There are researchers examining how employee wage responds to several factors. This paper mainly contributes to the literature by investigating how employee wage is affected by the equity-based compensation to the top five executives in the existence of control variables. Our results suggest that the executive team still has the trend of suppressing employee wages, even though there is mutual monitoring among top managers.

We first conduct multiple regressions to examine the impacts of executive EBC on employee wages. We find that a negative relation between employee wages and executive compensation is statistically significant. When executives are granted more equity-based compensation, employees receive lower wages, which might lead to a lower productivity and less profit. However, shareholders' initial purpose of increasing equity-based compensation is to motivate executives for firm performance and reach the maximum value of firms. Therefore, it appears that the strategy of granting more EBC to executives might worsen the income inequality between executives and employees and deteriorate firm performance against maximum benefits for shareholders.

We move on to examine how the relation between executive EBC and employee wage changes in different industries and during different business cycles. We show that executive EBC has greater impacts on employee wages in non-technology firms than in technology firms, which is consistent with the previous literature. Since employees are more entrenched in non-technology firms than in technology firms (Berk, Stanton and Zechner, 2010), executives of the non-technology firms seem to show less concerns on losing their employees. On the other hand, for firms in a weak financial state, the impacts from executive compensation on employee wages are stronger than for those in a good financial state. For the financially distressed firms, it might be hard for managers to gain financial support in other ways except for squeezing employee wages.

Finally, we study the relation between changes in employee wages and changes in executive PPS to investigate the extent of impacts that executive EBC has on employee wages. We find a significantly positive relation between the two changes.

Our results show that the impacts of incentive compensation to top five executives on employee wages are similar to those of CEO compensation. Hence, our findings support the perspective that top executives work together as one body in general and they are compensated as team perspective. On the other hand, since equity-based compensation to executives has negative impacts on employee wages, shareholders might not increase firm values through granting executives more EBC. To promote morale and productivity of employees, it might be better to increase employee wages directly or grant equity to those employees who deliver excellent performance. There is much debate in the literature about how to promote firm value and relieve the income inequality as well as agency conflicts. Our study provides a new perspective for these concerns.

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Tables

Table 1: Descriptive statistics of key variables

Variable	n	Mean	Std. Dev.	Min	Q1	Median	Q3	Max
Wage	2,860	56,338.86	38,629.96	7,161.73	31,166.35	51,571.04	71,950.20	213,024.11
PPS (CEO)	2,860	701,435.58	2,069,810.17	0.00	86,603.53	205,985.85	572,313.62	38,418,652.54
PPS	2,860	1,134,103.72	1,847,618.99	8,560.51	187,686.30	472,720.06	1,229,150.3	11,727,599.67
PVS (CEO)	2,860	94,018.15	226,946.49	0.00	10.14	12,773.67	89,318.36	3,213,652.08
PVS	2,860	213,004.26	394,823.99	0.00	71.61	52,486.02	237,988.17	2,303,322.33
Size	2,860	21.47	1.64	17.58	20.35	21.35	22.65	25.30
Leverage	2,860	0.25	0.22	0.00	0.08	0.19	0.35	0.92
Avgsale	2,860	239,532.13	247,657.54	23,533.22	93,300.94	170,443.74	287,547.15	1,477,569.62
MTB	2,860	3.31	3.88	0.00	1.49	2.33	3.74	29.65
PCI	2,860	0.77	0.42	0.05	0.41	0.78	1.08	1.84

This table provides the descriptive statistics of the key variables. Wage is the average employee wages in the firm. PPS is the total Pay Performance Sensitivity of the top five executives; PVS is the total Pay Volatility Sensitivity of the top five executives of the firm; Size represents the firm size; Leverage is the firm market leverage ratio; Avgsale is the average sales per employee; MTB is market-to-book ratio of the firm; PCI is the physical capital intensity of the firm; All of the variables in our data sample ranges from fiscal year 1992 to 2017. The units of the data on Wage, PPS, PVS and Avgsale are one dollar.

Table 2: Sample correlations of key variables of multivariable analysis of Employee Wages

	Wage	PPS	PVS	Firm size	Leverage	Average sales	MTB	PCI
Wage	1							
PPS	**0.040**	1						
PVS	**-0.096**	**0.413**	1					
Firm size	**0.221**	**0.570**	**0.308**	1				
Leverage	**0.128**	**-0.285**	**-0.139**	**-0.171**	1			
Average sales	**0.726**	**0.078**	**-0.049**	**0.312**	**0.075**	1		
MTB	**-0.051**	**0.217**	**0.099**	**0.306**	**-0.244**	-0.014	1	
PCI	**-0.212**	**-0.060**	0.025	-0.027	**0.112**	**-0.129**	**-0.050**	**1**

This table shows Pearson correlations between the key variables of multivariate analysis of Employee wages. Wage is the natural log of average employee wages; PPS is the natural log of the total Pay Performance Sensitivity of the top five executives; PVS is the natural log of the total Pay Volatility Sensitivity of the top five executives of the firm; Size is the firm size; Leverage is the firm market leverage ratio; Average sales is the natural log of the average sales per employee; MTB is market-to-book ratio of the firm; PCI is the physical capital intensity of the firm; This data sample contains 35,512 firm-year observations from fiscal year 1992 to 2017; Boldface indicates significance at 1% level and boldface with * indicates significance at 10% level.

Table 3: Expenses to workers during different sub-periods

Compensation	Period 1 (1992-2000)	Period 2 (2001-2007)	Period 3 (2008-2017)
Staff Expenses	1,925,181,351	2,208,144,646	2,029,027,891
Operating Expenses	3,313,323,933	4,583,042,627	6,066,920,769
Ratio of Staff Expenses to Operating	0.58	0.48	0.33
TDC1--CEO	3,968,010	5,244,069	5,943,852
TDC2--CEO	3,576,109	5,501,672	7,468,717
PPS--CEO	1,408,134	1,271,301	759,834
TDC1--Top 5 Executives	1,856,860	2,410,678	3,754,691
TDC2--Top 5 Executives	1,511,852	2,424,094	4,311,489
PPS--Top 5 Executives	2,262,338	2,220,253	1,281,237
Average Employee Wage	58,347	54,731	71,161

This table shows the average annual compensation to CEO, top five executives and employees as well as the average annual staff expenses and operating expenses during the three time periods: from 1992 to 2000; from 2001 to 2007; from 2008 to 2017. TDC1 is the total compensation which is comprised of: salary, bonus, other annual, total value of restricted stock granted, total value of stock options granted (using Black-Scholes), long-term incentive payouts, and all other total. TDC2 is also the total compensation which is measured in another way. TDC2 is composed of the following: salary, bonus, other annual, total value of restricted stock granted, net value of stock options exercised, long-term incentive payouts, and all other total. PPS is the Pay Performance Sensitivity. All the data items are collected individually. The units of the data on Staff Expenses, Operating Expenses, TDC1, TDC2, PPS and Average Employee Wage are one dollar.

Table 4: Ordinary least square (OLS) regressions of Employee Wages (CEO)

Wage	(1)	(2)	(3)	(4)	(5)	(6)
PPS	-0.0170***	-0.0174***	-0.0171***	-0.0175***	-0.0137*	
	(0.0057)	(0.0057)	(0.0057)	(0.0057)	(0.0072)	
PVS						0.0002
						(0.0023)
Firm size	0.0240***	0.0281***	0.0232***	0.0271***	0.0198***	0.0197***
	(0.0053)	(0.0057)	(0.0055)	(0.0057)	(0.0074)	(0.0058)
Leverage	0.2860***	0.2695***	0.2653***	0.2497***	0.2817***	0.2696***
	(0.0365)	(0.0369)	(0.0364)	(0.0368)	(0.0452)	(0.0382)
Average sales	0.4462***	0.4451***	0.4572***	0.4561***	0.4854***	0.4773***
	(0.0129)	(0.0129)	(0.0129)	(0.0129)	(0.0162)	(0.0139)
MTB		-0.0058***		-0.0055***	-0.0054**	-
		(0.0020)		(0.0020)	（0.0026）	(0.0021)
PCI			0.1527***	0.1513***	0.1757***	0.1579***
			(0.0240)	(0.0240)	(0.0314)	(0.0253)
Quits					-0.2362***	
					(0.0313)	
Intercept	4.4343***	4.3932***	4.1625***	4.1257***	3.1701***	3.7655***
	(0.1664)	(0.1668)	(0.1705)	(0.1709)	(0.2631)	(0.1848)
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2,860	2,860	2,860	2,860	1,724	2,392
Adj. R^2	0.7743	0.7749	0.7777	0.7782	0.7835	0.7771

This table reports the coefficients and standard errors of the regressions in the OLS regression model of employee wage and CEO PPS. The dependent variable is the average employee wages. We take the natural log of the wages and label them as "Wage" in the table. PPS is the natural log of the total Pay Performance Sensitivity of CEO; PVS is the natural log of the total Pay Volatility Sensitivity of CEO of the firm. Quits rate is collected from 2001 to 2017. The other variables in the data sample range from fiscal year 1992 to 2017. Numbers in the parentheses are the standard errors. *, ** and *** indicate statistical significance at 10%, 5% and 1% level, respectively.

Table 5: Ordinary least square (OLS) regressions of Employee Wages

Wage	(1)	(2)	(3)	(4)	(5)	(6)
PPS	-0.0184***	-0.0183***	-0.0185***	-0.0184***	-0.0192*	
	(0.0066)	(0.0066)	(0.0066)	(0.0066)	(0.0113)	
PVS						-0.0029
						(0.0020)
Firm size	0.0261***	0.0293***	0.0253***	0.0283***	0.0127*	0.0269***
	(0.0058)	(0.0059)	(0.0058)	(0.0059)	(0.0104)	(0.0054)
Leverage	0.2982***	0.2852***	0.2755***	0.2634***	0.1572***	0.2891***
	(0.0348)	(0.0352)	(0.0347)	(0.0351)	(0.0586)	(0.0357)
Average sales	0.4491***	0.4484***	0.4597***	0.4590***	0.4230***	0.4736***
	(0.0125)	(0.0125)	(0.0125)	(0.0125)	(0.0177)	(0.0131)
MTB		-0.0049***		-0.0046**	-0.0067*	-0.0058***
		(0.0020)		(0.0020)	（0.0035）	(0.0020)
PCI			0.1551***	0.1540***	-0.1815***	0.1606***
			(0.0230)	(0.0230)	(0.0317)	(0.0239)
Quits					-0.2345***	
					(0.0164)	
Intercept	4.3604***	4.3211***	4.0913***	4.0564***	6.3987***	3.6484***
	(0.1596)	(0.1603)	(0.1633)	(0.1638)	(0.2893)	(0.1746)
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2,860	2,860	2,860	2,860	1,818	2,640
Adj. R^2	0.7769	0.7774	0.7804	0.7808	0.5676	0.7780

This table reports the coefficients and standard errors of the regressions in the OLS regression model of Employee Wage. The dependent variable is the average employee wages. We take the natural log of the wages and label them as "Wage" in the table. PPS is the natural log of the total Pay Performance Sensitivity of the top five executives; PVS is the natural log of the total Pay Volatility Sensitivity of the top five executives of the firm. Quits rate is collected from 2001 to 2017. The other variables in the data sample range from fiscal year 1992 to 2017. Numbers in the parentheses are the standard errors. *, ** and *** indicate statistical significance at 10%, 5% and 1% level, respectively.

Table 6: Heckman two step analysis of Employee Wages

Panel A: First step--Probit model of firms reporting data on employee wages.

Pro	(1)	(2)	(3)	(4)
PPS	-0.0423***	-0.0416***	-0.0284***	-0.0272***
	(0.0097)	(0.0097)	(0.0099)	(0.0101)
Firm size	0.1496***	0.1549***	0.1455***	0.1361***
	(0.0094)	(0.0095)	(0.0095)	(0.0101)
Leverage	0.3048***	0.2791***	0.2456***	0.1942***
	(0.0634)	(0.0644)	（0.0642）	(0.0669)
Average sales	-0.2354***	-0.2354***	-0.2199***	-0.2210***
	(0.0174)	(0.0175）	(0.0178)	(0.0180)
MTB		-0.0104***		-0.0092**
		(0.0036)		(0.0036)
PCI			0.5743***	0.5619***
			(0.0380)	(0.0384)
Exchange Dummy	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes
Industry Dummy	Yes	Yes	Yes	Yes
Obs.	30,856	30,856	30,856	30,856

Panel B: Second step--Regression of employee wages in firms with data on staff expenses.

Wage	(1)	(2)	(3)	(4)
PPS	-0.0025**	-0.0033**	-0.0077*	-0.0087**
	(0.0091)	(0.0091)	(0.0085)	(0.0085)
Firm size	0.0225*	0.0305**	-0.0322***	-0.0264**
	(0.0137)	(0.0142)	(0.0106)	(0.0111)
Leverage	0.3466***	0.3189***	0.2164***	0.2031***
	(0.0538)	(0.0529)	(0.0494)	(0.0493)
Average sales	0.3602***	0.3597***	0.4483***	0.4468***
	(0.0240)	(0.0239)	(0.0200)	(0.0200)
MTB		-0.0106***		-0.0059***
		(0.0029)		(0.0028)
PCI			-0.0184	-0.0153
			(0.0461)	(0.0462)
Inverse Mill's ratio	1.2456**	1.2846**	-1.5333***	-1.4719***
	(0.6100)	(0.6031)	(0.4087)	(0.4100)
Intercept	4.4954***	4.3616***	6.0584***	5.9494***
	(0.3286)	(0.3991)	(0.3375)	(0.3441)
Year Dummy	Yes	Yes	Yes	Yes
Industry Dummy	Yes	Yes	Yes	Yes
Obs.	2,860	2,860	2,860	2,860
Adj. R^2	0.6767	0.6778	0.6794	0.6803

This table reports the coefficients and standard errors obtained from Heckman two-step analysis model of average Employee wages. In the first step, we employ a probit model of whether the firm reports the data on employee wages. The dependent variable in the first step is denoted as "pro". It is one if the employee wage data is not missing and zero otherwise. In the second step, we run an OLS regression model of employee wages. The dependent variable in the second step is the natural log of the average employee wages. The inverse Mill's ratio derived from the first step is added in the second step model. PPS is the natural log of the total Pay Performance Sensitivity of the top five executives. All the variables in the first and second steps range from fiscal year 1992 and 2017. Numbers in the parentheses are the standard errors. *, ** and *** indicate statistical significance at 10%, 5% and 1% level, respectively.

Table 7: PPS and Employee Wages: OLS regressions in technology and non-technology firms

Variables	A: Technology firms				B: Non-technology firms			
Wage	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
PPS	-0.0144**	-0.0139**	-0.0174***	-0.0170***	-0.0136	-0.0138	-0.0167	-0.0170
	(0.0067)	(0.0067)	(0.0064)	(0.0064)	(0.0171)	(0.0172)	（0.0172）	(0.0173)
Firm size	0.0222***	0.0256***	0.0177***	0.0203***	0.0363**	0.0368**	0.0339**	0.0345**
	(0.0060)	(0.0061)	(0.0058)	(0.0059)	(0.0143)	(0.0147)	(0.0144)	(0.0148)
Leverage	0.2278***	0.2162***	0.1533***	0.1451***	0.6548***	0.6514***	0.6382***	0.6345***
	(0.0346)	(0.0349)	(0.0338)	(0.0341)	(0.0920)	(0.0942)	(0.0927)	(0.0950)
Average sales	0.4808***	0.4785***	0.5111***	0.5091***	0.3459***	0.3467***	0.3509***	0.3517***
	(0.0128)	(0.0128)	(0.0125)	(0.0126)	(0.0315)	(0.0318)	(0.0317)	(0.0320)
MTB		-0.0052***		-0.0039***		-0.0001		-0.0001
		(0.0020)		(0.0019)		(0.0048)		(0.0047)
PCI			0.3120***	0.2994***			-0.0738	-0.0739
			(0.0238)	(0.0239)			（0.0536）	(0.0536)
Intercept	4.0868***	4.0592***	3.5607***	3.5443***	5.7320***	5.7181***	5.8539***	5.8392***
	(0.1688)	(0.1689)	(0.1676)	(0.1677)	(0.4880)	(0.4949)	(0.4957)	(0.5023)
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2,021	2,021	2,021	2,021	839	839	839	839
Adj. R^2	0.8514	0.8518	0.8624	0.8627	0.4210	0.4203	0.4216	0.4209

This table reports the coefficients and standard errors of the regressors in the OLS regression model of average employee wage in technology and non-technology firm, respectively. The dependent variable is the natural log of the average employee wages. PPS is the natural log of the total Pay Performance Sensitivity of the top five executives. All the variables in data sample range from fiscal year 1992 to 2017. Numbers in the parentheses are the standard errors. *, ** and *** indicate statistical significance at 10% 5% and 1% level, respectively.

Table 8: Difference of coefficients of PPS for Employee Wages in technology and non-technology firms

Wage	(1)	(2)	(3)	(4)
PPS	-0.0451***	-0.0445***	-0.0568***	-0.0562***
	(0.0144)	(0.0144)	(0.0142)	(0.0142)
Technology	-0.4081**	-0.3991**	-0.5739***	-0.5653***
	(0.1963)	(0.1961)	(0.1935)	(0.1933)
Product of Tech and PPS	0.0488***	0.0481***	0.0611***	0.0603***
	(0.0150)	(0.0150)	(0.0148)	(0.0148)
Firm size	0.0233***	0.0281***	0.0266***	0.0320***
	(0.0080)	(0.0082)	(0.0078)	(0.0081)
Leverage	0.2509***	0.2291***	0.3094***	0.2857***
	(0.0458)	(0.0465)	(0.0453)	(0.0461)
Average sales	0.6396***	0.6364***	0.6231***	0.6194***
	(0.0124)	(0.0125)	(0.0123)	(0.0124)
MTB		-0.0068**		-0.0076***
		(0.0027)		(0.0027)
PCI			-0.2398***	-0.2417***
			(0.0236)	(0.0236)
Intercept	2.9150***	2.8715***	3.3788***	3.3340***
	(0.2343)	(0.2347)	(0.2347)	(0.2349)
Year Dummy	Yes	Yes	Yes	Yes
Industry Dummy	No	No	No	No
Obs.	2,860	2,860	2,860	2,860
Adj.R^2	0.5481	0.5489	0.5638	0.5649

This table reports the difference of the coefficients of PPS on employee wages in different industries. Technology is a dummy variable, which is one if the firm is a technology firm, and zero otherwise. We add the product of dummy variable "Technology" and PPS as one of the variables. The dependent variable is the natural log of the average employee wages. PPS is the natural log of the total Pay Performance Sensitivity of the top five executives. All the variables in the data sample range from fiscal year 1992 to 2017. Numbers in the parentheses are the standard errors. *, ** and *** indicate statistical significance at 10%, 5% and 1% level, respectively.

Table 9: PPS and Employee Wages over business cycles

Variables	*A: Financially Safe Firms*			*B: Financially Distressed Firms*		
Wage	(1)	(2)	(3)	(1)	(2)	(3)
PPS	-0.0266***	-0.0313***	-0.0308***	-0.0119	-0.0147	-0.0152
	(0.0083)	(0.0083)	(0.0083)	(0.0145)	(0.0144)	(0.0144)
Firm size	0.0451***	0.0409***	0.0436***	0.0092	0.0120	0.0153
	(0.0080)	(0.0077)	(0.0079)	(0.0140)	(0.0138)	(0.0140)
Leverage	0.1287	0.0345	0.0259	0.2940***	0.2888***	0.2763***
	(0.0911)	(0.0923)	(0.0925)	(0.0591)	(0.0579)	(0.0589)
Average sales	0.4630***	0.4811***	0.4810***	0.3455***	0.3490***	0.3486***
	(0.0157)	(0.0159)	(0.0159)	(0.0255)	(0.0253)	(0.0253)
MTB	-0.0038*		-0.0034***	-0.0070		-0.0056
	(0.0023)		(0.0023)	(0.0047)		(0.0047)
PCI		0.1725***	0.1709***		0.1592***	0.1545***
		(0.0326)	(0.0326)		(0.0448)	(0.0449)
Intercept	3.9087***	3.6606***	3.6188***	5.8295***	5.5812***	5.5442***
	(0.2179)	(0.2214)	(0.2231)	(0.3432)	(0.3492)	(0.3505)
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Obj.	1,662	1,662	1,662	728	728	728
Adj. R^2	0.8023	0.8054	0.8055	0.7487	0.7525	0.7526

This table reports the coefficients and standard errors of the regressors in the OLS regression model of average employee wage within different business cycles. The dependent variable is the natural log of the average employee wages. PPS is the natural log of the total Pay Performance Sensitivity of the top five executives. All the variables in data sample range from fiscal year 1992 to 2017. Numbers in the parentheses are the standard errors. *, ** and *** indicate statistical significance at 10% 5% and 1% level, respectively.

Table 10: Difference of coefficients of PPS for Employee Wages over business cycles

Wage	(1)	(2)	(3)
PPS	-0.0402***	-0.0470***	-0.0486***
	(0.0147)	(0.0145)	(0.0145)
State	-0.9759***	-1.0821***	-1.1101***
	(0.2128)	(0.2098)	(0.2097)
Product of State and PPS	0.0618***	0.0717***	0.0740***
	(0.0163)	(0.0161)	(0.0161)
Firm size	0.0197**	0.0151*	0.0216**
	(0.0091)	(0.0087)	(0.0090)
Leverage	0.0127	0.1073*	0.0866
	(0.0583)	(0.0574)	(0.0579)
Average sales	0.5814***	0.5645***	0.5605***
	(0.0129)	(0.0128)	(0.0129)
MTB	-0.0071**		-0.0080***
	(0.0030)		(0.0029)
PCI		-0.2449***	-0.2475***
		(0.0272)	(0.0272)
Intercept	4.0094***	4.5404***	4.5024***
	(0.2396)	(0.2416)	(0.2417)
Year Dummy	Yes	Yes	Yes
Industry Dummy	No	No	No
Obs.	2,390	2,390	2,390
Adj. R^2	0.5328	0.5472	0.5485

This table reports the difference of the coefficients of PPS on employee wages over business cycles. State is a dummy variable, which is one if the firm is in a good state, and zero otherwise. The dependent variable is the natural log of the average employee wages; PPS is the natural log of the total Pay Performance Sensitivity of the top five executives; Product of State and PPS is the product of dummy variable and PPS; All the variables in the data sample range from fiscal year 1992 to 2017. Numbers in the parentheses are the standard errors. *, ** and *** indicate statistical significance at 10%, 5% and 1% level, respectively.

Table 11: Instrumental variable regressions of Employee Wages: Two-stage least square regression analysis

Panel A: First stage--Leverage is the dependent variable.

Leverage	(1)	(2)	(3)	(4)
PPS	-0.0381***	-0.0382***	-0.0368***	-0.0369***
	(0.0035)	(0.0034)	(0.0034)	(0.0034)
MTR	0.5373***	0.4414***	0.5250***	0.4324***
	(0.0999)	(0.1010)	(0.0992)	(0.1003)
Firm size	0.0043	0.0085***	0.0034	0.0075**
	(0.0032)	(0.0032)	(0.0031)	(0.0032)
Average sales	0.0153***	0.0131***	0.0193***	0.0170***
	(0.0046)	(0.0046)	(0.0046)	(0.0046)
MTB		-0.0058***		-0.0056***
		(0.0011)		(0.0011)
PCI			0.0585***	0.0572***
			(0.0093)	(0.0093)
EBIT/AT	-1.1375***	-1.0507***	-1.1215***	-1.0378***
	(0.0573)	(0.0578)	(0.0554)	(0.0575)
Std. (EBIT/AT)	-0.0321	-0.0282	-0.0284	-0.0246
	(0.0253)	(0.0251)	(0.0251)	(0.0250)
Intercept	0.4221***	0.4030***	0.3355***	0.3189***
	(0.0692)	(0.0690)	(0.0700)	(0.0698)
Year Dummy	Yes	Yes	Yes	Yes
Industry Dummy	No	No	No	No
Obs.	2,691	2,691	2,691	2,691
Adj. R^2	0.2334	0.2413	0.2443	0.2516
Partial F-test of MTR F-statistic	28.30	28.59	29.06	29.27
P value of partial F-test	<.0001	<.0001	<.0001	<.0001

Panel B: Second stage--Average Employee Wage is the dependent variable.				
Wage	(1)	(2)	(3)	(4)
PPS	-0.0353*	-0.0542*	-0.0367*	-0.0557**
	(0.0215)	(0.0279)	(0.0208)	(0.0271)
Leverage	-1.1691**	-1.6581**	-1.0867**	-1.5925**
	(0.5109)	(0.6848)	(0.5098)	(0.6849)
Firm size	0.0346***	0.0482***	0.0378***	0.0511***
	(0.0093)	(0.0123)	(0.0089)	(0.0117)
Average sales	0.5965***	0.5979***	0.5809***	0.5842***
	(0.0146)	(0.0151)	(0.0156)	(0.0175)
MTB		-0.0158***		-0.0160***
		(0.0055)		(0.0054)
PCI			-0.2113***	-0.1855***
			(0.0394)	(0.0481)
EBIT/AT	-3.0765***	-3.3948***	-3.0406***	-3.3678***
	(0.5382)	(0.6639)	(0.5296)	(0.6561)
Std. (EBIT/AT)	-0.0578	-0.0627	-0.0687	-0.0723
	(0.0721)	(0.0785)	(0.0699)	(0.0764)
Intercept	3.9871***	4.1410***	4.2650***	4.3872***
	(0.3227)	(0.3834)	(0.2852)	(0.3345)
Year Dummy	Yes	Yes	Yes	Yes
Industry Dummy	No	No	No	No
Obs.	2,519	2,519	2,519	2,519
Adj. R^2	0.5383	0.4981	0.5597	0.5173

This table reports the coefficients and standard errors obtained from 2LSL robustness test. In the first stage, we use marginal tax rate based on income before interest expense has been deducted (MTRB) as the instrumental variable. And the dependent variable is leverage which is measured as market leverage. In the second stage, we include the fitted value of leverage derived from the first stage as an independent variable. The dependent variable is the natural log of average employee wages. PPS is the natural log of the total Pay Performance Sensitivity of the top five executives. The data for the variables in the first and second stages range from fiscal year 1992 and 2017. Numbers in the parentheses are the standard errors. *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Table 12: Interaction effect of PPS and excess return in the OLS regressions of Employee Wages

Wage	(1)	(2)	(3)	(4)
PPS				-0.0137*
				(0.0083)
Firm size	0.0192***	0.0230***	0.0187***	0.0310***
	(0.0049)	(0.0050)	(0.0048)	(0.0059)
Leverage	0.3192***	0.3059***	0.2958***	0.2623***
	(0.0347)	(0.0350)	(0.0345)	(0.0356)
Average sales	0.4549***	0.4542***	0.4670***	0.4677***
	(0.0125)	(0.0125)	(0.0125)	(0.0125)
MTB		-0.0056***		-0.0053***
		(0.0020)		(0.0019)
PCI			0.1687***	0.1691***
			(0.0231)	(0.0231)
Excess return	0.0419	0.1057	0.0233	-0.1272
	(0.2167)	(0.2176)	(0.2147)	(0.3815)
PPS× Excess return				0.0229
				(0.0278)
Intercept	4.2125***	4.1700***	3.9050***	3.8383***
	(0.1603)	(0.1608)	(0.1642)	(0.1783)
Year Dummy	Yes	Yes	Yes	Yes
Industry Dummy	Yes	Yes	Yes	Yes
Obs.	2,829	2,829	2,829	2,829
Adj. R^2	0.7809	0.7815	0.7850	0.7860

This table reports the coefficients and standard errors of the regressors in the OLS regression model of average employee wages with examining the robustness of PPS using excess return as alternate variable. The dependent variable is the natural log the average employee wages; PPS is the natural log of the total Pay Performance Sensitivity of the top five executives. We add a cross product term of PPS and excess return, which can capture the interaction effect of the two variables. All the variables in the data sample range from the fiscal year 1992 to 2017. Numbers in the parentheses are the standard errors. *, ** and *** indicate statistical significance at 10%, 5% and 1% level, respectively.

Table 13: OLS Regression of differences of Employee Wages and differences in PPS

Diff_wage	(1)	(2)	(3)	(4)	(5)
Diff_PPS	0.0099**	0.0098**	0.0099**	0.0098**	0.0168***
	(0.0048)	(0.0048)	(0.0048)	(0.0048)	(0.0060)
Firm size	-0.0044*	-0.0048*	-0.0044*	-0.0048*	-0.0030
	(0.0026)	(0.0027)	(0.0026)	(0.0027)	(0.0035)
Leverage	0.0078	0.0094	0.0074	0.0089	-0.0045
	(0.0181)	(0.0182)	(0.0181)	(0.0183)	(0.0221)
Average sales	0.0394***	0.0395***	0.0396***	0.0398***	0.0415***
	(0.0068)	(0.0068)	(0.0068)	(0.0068)	(0.0083)
MTB		0.0006		0.0006	0.0007
		(0.0011)		(0.0011)	(0.0013)
PCI			0.0034	0.0036	0.0216
			(0.0125)	(0.0125)	(0.0159)
Quits					0.0121
					(0.0158)
Intercept	-0.3208***	-0.3157***	-0.3268***	-0.3220***	-0.4496***
	(0.0859)	(0.0863)	(0.0888)	(0.0891)	(0.1340)
Year Dummy	Yes	Yes	Yes	Yes	Yes
Industry Dummy	Yes	Yes	Yes	Yes	Yes
Obs.	2,559	2,559	2,559	2,559	1,720
Adj. R^2	0.0157	0.0160	0.0154	0.0151	0.0265

This table reports the coefficients and standard errors of the regressors in the OLS regression model of the changes of PPS and the changes of employee wages. The dependent variable is the difference between the natural log of average employee wages in this year and that in the last year. Diff_PPS is the difference between the natural log of PPS in this year and that in the last year. The other variables remain the same as in Table 5. The data sample for all the variables ranges from fiscal year 1993 to 2017. Numbers in the parentheses are the standard errors. *, ** and *** indicate statistical significance at 10%, 5% and 1% level, respectively.