CEO-to-worker Pay Disparity and the Cost of Debt

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ABSTRACT

Prior research on intra-firm pay disparity suggests intra-firm pay disparity at various hierarchy levels affects firm performance and executive-level pay disparity is related to investment risk in the credit and the equity market. However, none of the studies examine the relationship between CEO-to-worker pay disparity and credit investment risk. The purpose of this study is to investigate the association between CEO-to-worker pay disparity on credit investors' risk assessments. Large CEO-to-worker pay disparity could suggest CEO rent extraction which increases credit risk or effective labor cost management that decreases credit risk. Overall results in this study indicate increased CEO-to-worker pay disparity is associated with a lower cost of debt (a higher probability of credit rating upgrades). This association weakens as the growth rate of average employee pay increases and is more pronounced for labor-intensive firms than for capital-intensive firms, suggesting credit investors incorporate the information about the effectiveness of labor cost management in CEO-to-worker pay disparity in their risk assessments. In addition, the negative relationship between the change in CEO-to-worker pay disparity and the change in the cost of debt is less salient when CEO compensation increases rapidly. Further analysis shows the association is attenuated by increased excessive CEO compensation. The findings indicate credit investors also consider the risk arising from CEO rent extraction when they evaluate CEO-to-worker pay disparity.

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GENERAL AUDIENCE ABSTRACT

Prior research on pay disparity suggests pay disparity affects firm performance and investment risk in the credit and the equity market. However, none of the studies examine the relationship between CEO-to-worker pay disparity and credit investment risk. The purpose of this study is to investigate the association between CEO-to-worker pay disparity on credit investors' risk assessments. Large CEO-to-worker pay disparity could suggest CEOs' self-interest maximization which increases credit risk. It could also suggest effectively controlled employee pay that decreases credit risk. Overall results in this study indicate increased CEO-to-worker pay disparity is associated with a lower cost of debt. This association weakens as the growth rate of average employee pay increases and is more pronounced for labor-intensive firms than for capital-intensive firms, suggesting credit investors incorporate the information about the effectiveness of labor cost management in CEO-to-worker pay disparity in their risk assessments. In addition, the negative relationship between the change in CEO-to-worker pay disparity and the change in the cost of debt is less salient when CEO compensation increases rapidly. Further analysis shows the association is attenuated by increased excessive CEO compensation. The findings indicate credit investors also consider the risk arising from CEO rent extraction when they evaluate CEO-to-worker pay disparity.

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER ONE

INTRODUCTION

Peter Drucker, frequently referred to as "the father of modern management", called for a limit on internal pay disparity as early as 1977, but the pay gap between CEO and rank-and-file employees has grown more than eight-fold in large public companies over the ensuing decades (AFL-CIO, 2014). The fast-growing CEO-to-worker pay disparity has led to an extant body of research on CEO-to-worker pay disparity (CWPD) and intra-firm pay disparity on a broader basis (e.g. Faleye et al., 2013; Shin et al., 2015; Eriksson, 1999; Henderson and Fredrickson, 2001). The Securities and Exchange Commission (SEC) has also taken action regarding CEO-to-worker pay disparity by approving a rule that requires public firms to disclose the ratio of their CEOs compensation to the median compensation of their employees (Item 402 of Regulation S-K)[1] which will come into effect in 2017. The purpose of the pay ratio disclosure rule is to give shareholders additional information facilitating the assessment of a firm's CEO compensation level in order to enhance shareholder engagement in executive compensation decisions. Prior research finds the level of CEO compensation and the gap between CEO compensation and other executives' compensation are related to investors' risk assessments (e.g., Ashbaugh-Skaife et al., 2006; Chen et al., 2013; Liu and Jiraporn, 2010). If CWPD facilitates the evaluation of CEO compensation, then it should be incorporated into creditors' assessments of investment risk. However, the informativeness of CEO-to-worker pay disparity for CEO compensation assessments may be diminished by business and workforce characteristics that affect rank-and-file employee pay and intra-firm pay disparity. Moreover, the current ex-

[1] 17 CFR 229.402. Section 953(b) of the Dodd-Frank Wall Street Reform and Consumer Protection Act directs the Securities and Exchange Commission to amend Item 402 of Regulation S-K to require disclosure of the median of the annual total compensation of all employees of a registrant (excluding the chief executive officer), the annual total compensation of that registrants chief executive officer, and the ratio of the median of the annual total compensation of all employees to the annual total compensation of the chief executive officer.

ecutive compensation disclosure regulations already require public companies to provide clear, concise and understandable disclosure about compensation paid to high-ranking executives. It is unclear whether the disclosure of CWPD would provide any additional useful information regarding CEO compensation. The purpose of the study is to investigate whether and how credit investors incorporate CWPD into their risk assessments. I am interested in the credit market because ninety percent of credit investors are institutional investors (Jiang, 2008) who are arguably more sophisticated and have access to public and private information such as information about CEO compensation and rank-and-file employee pay. Moreover, prior research find credit rating agencies, the major information intermediaries in the credit market, are able to efficiently process and incorporate both public and private complex information into credit ratings (Ashbaugh-Skaife et al., 2006; Kuang and Qin, 2013; Verwijmeren and Derwall, 2010) which are widely used by credit investors when assessing creidt risk. Insofar as CWPD facilitates the evaluation of credit risk, rating agencies and credit investors should take it into account when they assess credit risk.

Compensation is employed as a means to align the interests of investors and executives. According to the agency theory, compensation plans should be designed in a manner to provide executives with sufficient incentives to maximize investors' interest (Jensen and Meckling, 1976; Sundaram and Yermack, 2007). However, several studies find executives can utilize their managerial power and influence on boards of directors to extract additional compensation unrelated to investor wealth (Bebchuk et al., 2002; Morse et al., 2011), undermining the effectiveness of compensation incentives in interest alignment. A large pay gap between a firm's CEO and the rank-and-file employees, therefore, is viewed as a red flag that the CEO is extracting private benefits through their compensation plans (labeled as the "rent extraction" perspective).

An implied assumption underlying the "rent extraction" perspective is rank-and-file employee pay is always maintained approximately at the optimal level and the optimal pay gap between CEOs and rank-and-file employees is similar across firms. Therefore, rank-and-file employee pay in CEO-to-worker pay disparity serves as a "benchmark" that facilitates investors' evaluation of CEO compensation and detection of CEO rent extraction. Nevertheless, similar to CEOs, rank-and-file employees also seek to maximize their own interests. In fact, a firm has multiple stakeholders (i.e., investors, managers, employees, customers, etc.) who have divergent interests but share the common goal of self-interest maximization (Hill and Jones, 1992). An extant body of research in labor economics show employees could maintain their pay at levels higher than the optimal level by increase thing costs of pay adjustment through, for example, withdrawing effort, quitting, and increasing the costs of hiring and training new entrants (e.g., Akerlof and Yellen, 1990; Shapiro and Stiglitz, 1984; Weiss, 1980; Stiglitz, 1974). Consequently, firms bearing high pay adjustment costs do not always adjust employee pay in response to business condition changes (e.g., demands fluctuations) even when current pay levels are higher than the optimal level. This is consistent with Anderson et al. (2003a) and Banker et al. (2013) who document managers are less likely to cut selling, general and administrative costs for demand declines if their firms bear high labor-related adjustment costs. Therefore, large CEO-to-worker pay disparity could also suggests a firm's ability to manage pay adjustment costs and to control rank-and-file employee pay (labeled as the "labor cost management" perspective).

In this study, I examine the "rent extraction" perspective and the "labor cost management" perspective by investigating whether and how sophisticated credit market participants incorporate CEO-to-worker pay disparity into their risk assessments. The "rent extraction" perspective predicts a positive relationship between CEO-to-worker pay disparity and the cost of debt because CEO rent extraction and the resulting activities increase credit risk in at least three ways. First, CEOs' extracting personal benefits inevitably harms other stakeholders' interests, including credit investors. Second, executive compensation is a common mechanism to align executives' interests with investors' interests in order to reduce agency costs. CEOs who can freely extract extra compensation unrelated to firm performance impair the effectiveness of the mechanism. In this way, they increase agency costs and credit risk. Finally, monitoring is an important means to resolve the agency conflicts between executives and investors, but prior studies find CEOs whose goal is to maximize their own interests seek to impair boards of directors' and investors' ability to monitor and discipline them (e.g., Cohen et al., 2012; Lisic et al., 2015). Prior studies also find CEOs who aim at increasing their own benefits tend to reduce accounting disclosures (e.g., Hope and Thomas, 2008) or even manage earnings to increase their compensation (e.g., Holthausen et al., 1995). Since accounting disclosures is one of the widely adopted monitoring mechanisms and creditors rely on accounting information to evaluate the probability of default and enforce covenants (Anderson et al., 2004), low quality accounting disclosures further increase creditors' monitoring costs and thus credit risk.

On the contrary, low rank-and-file employee pay resulting from effective labor cost management could decrease credit risk. This is because rank-and-file employee pay is one of the major cost items for most firms; firms that effectively manage their pay adjustment costs can adjust their wage obligations by adjusting employee pay levels when necessary. A low share of fixed to total costs decrease these firms' earnings volatility (Lev, 1983) and also cash flow volatility (Finger, 1994), both of which are positively associated with credit risk (Fisher, 1959; West, 1973). This is consistent with Chen et al. (2012) and Favilukis et al. (2015) that show low operating flexibility arising from labor obligations results in a higher cost of debt. Favilukis and Lin (2015) and Favilukis and Lin (2016) also document downward rigid employee pay makes firms riskier. Since effective labor cost management reduce the risk arising from high fixed labor obligations, creditors should charge lower cost of debt financing.

To test the two conflicting predictions, I use credit ratings (Francis et al., 2005; Jiang, 2008) as my main proxy for the cost of debt. CEO-to-worker pay disparity is defined as the ratio of CEO compensation to average rank-and-file employee pay. Consistent with larger CWPD indicating more effective labor cost management, I find increases in CWPD are associated with a higher probability of a credit rating upgrade (a lower cost of debt). Specifically, I find every 1 percent increase in CWPD could result in a 0.11 percent change in the probability of credit rating downgrades or upgrades. I also find the positive relationship between the change in CWPD and the change in credit ratings monotonically weakens as the growth rate of average employee pay increases. In addition, the association is more pronounced for labor-intensive firms than for capital-intensive firms. The findings suggest creditors take into account the information about the risk arising from employee pay obligations in CWPD into their risk assessments. On the other hand, I find the positive relationship between the change in CWPD and the change in credit ratings is attenuated when CEO compensation increases rapidly. It suggests rating agencies consider rapid increases in CEO compensation as an indicator of CEO rent extraction that increases credit risk. Further analyses confirm the observed positive association between the change CWPD and the change in credit ratings is less pronounced for firms whose CEOs receive increased excessive compensation. However, the attenuation disappears when average employee pay increases at a high rate. It seems the concern about the risk related to employee pay obligations dominate the concern about the risk arising from CEO rent extraction in the presence of rapid employee pay increases.

This study contributes to several lines of literature. First, the study adds to the broad research on the economic consequences of pay disparity. Prior research on relative performance incentive scheme in accounting (e.g., Ashton, 1990; Choi et al., 2015; Libby and Lipe, 1992; Matsumura and Shin, 2006) and economics (e.g., Eriksson, 1999; Main et al., 1993) find pay disparity between different levels of rank-and-file employees and executives are related to employee effort and firm performance. A number of studies examine the effect of pay disparity on investors risk assessments but only focus on executive-level pay disparity (Chen et al., 2013; Liu and Jiraporn, 2010). My study extends both lines of research by investigating whether pay disparity between CEOs and rank-and-file employees is relevant to investors risk assessments in the credit market. By doing so, my study also contributes to the debates about the usefulness of the proposed pay ratio disclosure rule.

Second, prior literature on executive-level pay disparity and investors risk assessments generally find pay disparity between CEOs and the other executives is positively associated with credit or equity risk because investors interpret large executive-level pay disparity as an indicator of high agency costs arising from unconstrained CEO power. In contrast, the results of this study suggest pay disparity between CEOs and rank-and-file employees is different from executive-level pay disparity in that it also provides information about rank-and-file employee pay.

Third, the study contributes to the research on the cost of debt and credit ratings. Prior research identifies various determinants of the cost of debt (credit ratings), including those related to compensation (Kuang and Qin, 2013; Lee, 2008). My study extends the studies on the determinants of the cost of debt by showing that CWPD is also a relevant determinant of the cost of debt.

The remainder of the paper is organized as follows. Chapter 2 reviews relevant literature and develops the hypotheses; Chapter 3 describes the research design; Chapter 4 discusses the sample; Chapter 5 analyses performed to examine the proposed hypotheses; finally, Chapter 6 provides a discussion of the findings, limitations, future research opportunities, and contributions, followed by references, appendices, and tables.

CHAPTER TWO

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Intra-firm Pay Disparity

Research on the distribution of labor earnings is motivated by the fact that labor earnings differ greatly across groups of workers who are different in various observed traits or observationally similar. The phenomena is observed for workers both within a firm and across firms. A variety of theories in labor economics are developed to explain intra-firm pay disparity. First, the scale-of-operations theory states the impact of an employee on a firm's overall performance increases with the employee's hierarchy level in the firm because his decisions affect the productivity of all resources under his control and the amount of the resources under his control increases as he is promoted to higher levels. Therefore, employees at higher hierarchy levels deserve higher compensation, thereby resulting in intra-firm pay disparity across ranks (Tuck, 1954). The learning, sorting and matching theory assumes the actual productivity levels of employees are initially unobservable, so employers offer compensation consistent with the expected productivity levels. As employers and employees gradually learn about individual employee's productivity, employees with higher (lower) productivity levels switch to positions offering higher (lower) compensation through sorting and matching, resulting in pay disparity within and across firms (Farber and Gibbons, 1996). The human capital theory also employs employee productivity as one of the main reasons for pay disparity and identifies one potential source of differences in productivity. It argues differences in wages across groups of works are attributable to differences in workers' productive capacities which are determined by occupational training costs (Mincer, 1958).

In contrast to the three approaches that focus on differences in productivity, the tournament theory analyzes intra-firm pay disparity as an internal compensation mechanisms resolving agency conflicts between employers and employees. Compensation based on employee productivity is one way to align employees' interests with employers' interests. However, in many instances, it is difficult or impossible for firms to measure employee productivity on a cardinal scale. Under these circumstances, an alternative is to rank employees on an ordinal performance scale and make promotion and compensation decisions based on relative performance (Lazear and Rosen, 1981). A main implication of the tournament theory is that employee effort increases with pay disparity across hierarchy ranks. If the reward spread is too small, employees are not incented to compete so that the incentive effect is diminished (Knoeber and Thurman, 1994). The tournament theory suggests intra-firm pay disparity is an incentive strategy.

The pervasive concern regarding increasing pay disparity, however, is rooted in the stream of research on bargaining behaviors in the pay setting processes. The central idea of these studies is profit-sharing is determined by a balance of various internal and external pressures (Christofides and Oswald, 1992; Blanchflower et al., 1996; McDonald and Solow, 1981). The theory suggests higher compensation is obtained by using stronger bargaining power to extract more profits. For executives, Bebchuk (2009) argue executives can use their managerial power and influence to extract additional compensation so as to increase their compensation to a level exceeding the optimal level. This can be achieved by influencing boards of directors (e.g., Cohen et al., 2012; Morse et al., 2011), making self-interesting investment decisions (Grinstein and Hribar, 2004), manipulating accounting earnings which are frequently used as a performance measure in executive compensation contracts (Holthausen et al., 1995), etc. On the contrary, rank-and-file employees also seek to extract personal benefits. For example, unionization is one common way adopted by employees to increase their bargaining power (e.g., Dunlop et al., 1944). Employees can also increase their bargaining power and require higher pay by increasing costs of hiring and training new employees (Lindbeck and Snower, 1988). Hill and Jones (1992) point out managers play an unique role in profit-sharing bargaining because they have the ultimate control over firms' resources. It is the task of managers to allocate firms' resources in a manner that balance the divergent interests of various stakeholders. Therefore, intra-firm pay disparity may indicate the ability of employees and executives at various hierarchy levels to extract personal benefits and the allocation of firm resources among the stakeholders.

2.2 CEO-to-worker Pay Disparity

CEO-to-worker pay disparity is a form of interclass intra-firm pay disparity. The observed CWPD may reflect the relative productivity of CEOs and rank-and-file employees. A CEO's marginal products of labor are likely to be much higher than an employees', especially in large firms, because a CEO's decisions about resource utilization and allocation could have impact on the entire firm while the impact of an employee's decision is limited to the line of function he works for (Baker and Hall, 2004; Rosen, 1990). Therefore, CWPD could be a fair reflection of differences in CEOs' and employees' marginal products of labor.

The observed CWPD may also be pay spreads necessary to provide tournament incentives. An implication of the tournament theory related to CWPD is that winners of promotion tournaments not only win promotions and higher pay but also the possibilities to further compete for higher pays and positions at higher levels. However, since CEOs are the highest-ranked officers in their firms, firms must provide an extra pay to compensate for lacking further promotion opportunities in order to retain talented CEOs (Rosen, 1986). The extra pay not only leads to large pay disparity between CEOs and rank-and-file employees, but also between CEOs and the other executives.

Finally, CWPD may be related to CEOs' or rank-and-file employees' behavior of extracting excessive personal benefits. In this sense, a CEO who is successful at maximizing his own interests by extracting additional compensation increases CWPD. A self-interest maximizing CEO could severely threaten other stakeholder' interests directly and indirectly. However, CWPD could also reflect a firm's ability to prevent rank-and-file employees from obtaining extra personal benefits which should be beneficial for other stakeholders. Meanwhile, a firm that can effectively control rank-and-file employee pay decreases CWPD.

Many of the prior research on intra-firm pay disparity mainly examines the economic consequences of within-class pay disparity, executive(manager)-level pay disparity in particular. These studies generally provide the empirical evidence supporting all of the theories discussed above to certain extent (e.g., Gabaix and Landier, 2008; Eriksson, 1999; Bebchuk et al., 2011; Chen et al., 2013). Recently, increasing attention has been drawn to CEO-to-worker pay disparity. For instance,Faleye et al. (2013) find CWPD depends on bargaining power of CEOs and rank-and-file employees and is positively associated with firm value and operating performance. They do not find rank-and-file employees perceive high CEO compensation as inequitable. Neither do they find CWPD negatively affect employee productivity. On the contrary, using unique data from Korea, Shin et al. (2015) document a significant negative relationship between CWPD and subsequent operating and stock return performance, but the negative effect of CWPD is mainly driven by deviations from expected CPWD. They also find CWPD is affected by firms' political characteristics such as executive bargaining power, which is consistent with Faleye et al. (2013). In addition, they find a substantial portion of cross-sectional variation in CWPD is explained by firms' economic characteristics such as firm size, growth opportunities, employee turnover and industry mean pay disparity. The findings suggest CWPD incorporates rich firm information that may be useful for investors. Crawford et al. (2016) connect CWPD to investors' decision-making. They show voting dissent on the remuneration of executives proposals (Say on Pay) is increasing in the level of CWPD for a broad panel of U.S. banks. However, there is not research on the relationship between CWPD and credit risk assessments.

2.3 Credit Risk

A large body of research investigates the determinants of credit risk. Similar to the research on the role of earnings numbers in security price setting by equity investors (Ball and Brown, 1968), the research on the determinants of credit risk also began with financial information. Horrigan (1966), using bond ratings as the proxy for credit risk, find total assets and the subordination status of debt are important predictors of credit risk. Fisher (1959) and West (1973) use earnings volatility, the probability of loss, capital structure and debt marketability as predictors of credit risk. Since then, the number of potential financial predictors of credit risk continues to increase as more research is conducted (e.g., Pinches and Mingo, 1973; Boardman and McEnally, 1981). Altman and Katz (1976) start from as many as thirty financial variables and end up with fourteen predictors in their model. However, though many of the predictors chosen are intuitive, these studies tend to examine the predictive power of the chosen predictors statistically but do not explore the underlying reasons.

Unlike the statistical approach adopted by the above studies, some studies explore the determinants of credit risk from the perspective of agency cost of debt which focuses on divergence of interests between executives/equity investors and credit investors. One way to resolve divergence of interests for creditors is monitoring. Since credit investors use financial information in their estimates of default risk, high accounting disclosure quality should reduce creditors' monitoring cost. Consistent with the argument, Sengupta (1998) finds financial analysts' evaluation of a firm's disclosure quality is negatively associated with its cost of debt. Mechanisms that ensure disclosure quality, for example, internal control (Dhaliwal et al., 2011), independent audit (Pittman and Fortin, 2004; Mansi et al., 2004; Li et al., 2010; Kim et al., 2011), board monitoring (Anderson et al., 2004), and analyst activity reducing information asymmetry (Mansi et al., 2011) are also found to be related to the cost of debt.

The effect of ownership on the cost of debt is also extensively investigated since ownership structure is the source of agency conflicts. Anderson et al. (2003b) show founding family ownership is related to a lower cost of debt financing because creditors believe ownership by founding families can better protect their interests. Borisova et al. (2015) find government ownership is associated with a higher cost of debt due to state-induced investment distortions, but a lower cost of debt during financial crises and for firms likely to be distressed as implicit government guarantees are consistent with credit investors' interests. Sanchez-Ballesta and Garcia-Meca (2011) examines ownership by banks, non-financial firms, states, institutional investors and boards of directors, and find ownership by boards of directors increases and ownership by states and banks decreases the cost of debt.

In addition, executive compensation is a common mechanism to reduce agency costs. Prior research find credit investors take executive compensation into account when evaluating credit risk. For example, Kuang and Qin (2013) show risk-taking incentives in executive compensation is negatively associated with credit ratings; Shaw et al. (2002) find equity-based compensation increases the cost of debt financing because equity-based compensation tends to align CEOs' interests with equity investors' rather than credit investors' interests. On the contrary, inside-debt in executive compensation is received positively by credit investors and reduces the cost of debt (Sundaram and Yermack, 2007; Kabir et al., 2013). Finally, Ashbaugh-Skaife et al. (2006) show multiple dimensions of corporate governance have comprehensive effects on firms' credit ratings.

Another stream of research investigates the impact of mirco- and marco- economic factors on the cost of debt. Valta (2012) find product market competition is positively related to the cost of debt because product market competition increases cash flow risk and the risk of losing investment opportunities due to weak financial status. Deng et al. (2007) and Reeb et al. (2001) show diversification reduces the cost of debt. Favilukis et al. (2015) document wage growth and labor share increases default risk.

2.4 CEO Rent Extraction, CEO-to-worker Pay Disparity and Credit Risk

The optimal CEO compensation level should minimizes agency costs which are the costs incurred to align the interests of executives and investors and his/her personal benefits and increase the compensation level to what exceeds the optimal level. Bebchuk (2009) proposes an influential theory that CEOs can use their managerial power and influence to determine their own compensation in a manner that maximize their own interests. The self-interest maximizing behavior is referred to as "rent" extraction where "rent" is the extra compensation extracted by the CEO. Therefore, CEO rent extraction increases CEO compensation and CEO-to-worker pay disparity.

Assuming total resources available in a firm is fixed, the CEO's rent extraction behaviors are likely to result in impaired interests of the other stakeholders, including credit investors, and thereby increasing the firm's credit risk. Nevertheless, direct competition for firm resources is only one of the reasons that CEO rent extraction increases credit risk. CEO self-interest maximization and the resulting actions could increase a firm's credit risk in at least another two ways. First, compensation is one of the cornerstone mechanisms facilitating interest alignments between investors and executives. CEOs' ability to determine their own compensation and rent-seeking behaviors jeopardize the effectiveness of the mechanism. For example, Morse et al. (2011) document powerful CEOs can induce boards to shift the weight on performance measures toward the better performing measures. Grinstein and Hribar (2004) also document powerful CEOs receive larger bonuses for completing merger and acquisition transactions unrelated to deal performance. The consequence is CEO compensation is not tied to firm performance as it should be and the incentive to improve firm performance is weakened. This increases firm credit risk because a firm's financial performance determines its ability to honor debt obligations. Second, monitoring by investors and boards of directors is an important mechanism constraining CEO self-interest maximizing actions through, for instance, restricting risky investment projects (Adams et al., 2005; Bargeron et al., 2010; Richardson, 2006), and enhancing the integrity of financial reporting (Anderson et al., 2004). Consequently, rent-extracting CEOs often seek to impair investors' and boards' ability to effectively monitor and discipline their behaviors. Lisic et al. (2015) find rent-extracting CEOs can impair audit committee effectiveness in preventing internal control weaknesses. Holthausen et al. (1995) document CEOs manipulate accounting earnings to increase their annual bonuses. Both board monitoring and financial reporting are important for creditors to protect their interests because they rely on to evaluate firms default risk and enforce accounting-based covenants (Anderson et al., 2004).

The above analyses suggest CWPD should be positively associated with the cost of debt if CWPD reflects CEOs' undertaking rent-extracting activities to increase their own compensation because such activities increase agency costs and thus credit risk (the "rent extraction" perspective). The prediction is consistent with prior studies documenting a positive relationship between executive-level pay disparity and the cost of capital (Chen et al., 2013; Liu and Jiraporn, 2010).

2.5 Labor Cost Management, CEO-to-worker Pay Disparity and Credit Risk

The classic economic theory depicts the labor market with supply and demand where wages increase as demand increases and decreases as supply increases. Firms should hire employees until marginal products of labor equal to wages paid where marginal products of labor is determined by firms production function which in turn relates to a variety of internal and external economic factors. The theory implies firms should adjust wages paid in response to changes in labor-market and product-market. Nevertheless, firms do not appear to manage their labor costs in a manner suggested by the classic economic theory even when unemployment is high and firms can cut employee pay.

Multiple theories in labor economics have been developed to explain the observed wage "stickiness". First of all, employees can choose the level of effort they are willing to exert. Pay lower than employees' expectation can result in low employee productivity for two reasons. Shapiro and Stiglitz (1984) argue higher pay raises the cost of job loss, thereby preventing employees from shirking. Akerlof and Yellen (1990) propose the fair wage-effort hypothesis which suggests employees withdraw their effort if they perceive their pay as unfair. Therefore, firms cannot reduce employee pay without suffering from low employee productivity. In addition to withdrawing effort, employees could quit when they are unsatisfactory with their pay (Weiss, 1980). What is worse is the more productive employees are often among the first to quit because they tend to have better outside opportunities. Firms have to trade off between the consequence of losing productive employees and the benefit of lower pay when they make pay adjustment decisions. Moreover, substantial costs may be incurred to hire and train new employees to replace employees left or dismissed (Stiglitz, 1974). Current employees are able to further increase the costs by harassing or not cooperating with new entrants.

The phenomena of wage "stickiness" is consistent with Anderson et al. (2003a) who show managers are reluctant to adjust committed resources when firms must incur a large amount of adjustment costs to reduce or restore committed resources. Therefore, the costs of pay adjustment discussed above give current employees a great deal of bargaining power in setting their own pay and reduce managers' willingness to cut employee pay unless they can control the the costs (Lindbeck and Snower, 1988). Anderson et al. (2003a) argue the costs of adjusting committed labor resources are likely to be higher for labor-intensive firms [2] and thus hypothesizes a firm's degree of cost stickiness increases with its labor-intensity. Consistent with the hypothesis, they find costs are stickier at labor-intensive firms. Using employment protection legislation (EPL) in 19 OECD countries as the proxy for labor-related adjustment costs, Banker et al. (2013) find the degree of cost stickiness at the firm level is higher for firms in the countries with stricter EPL, providing further support that firms consider adjustment costs when making resource adjustment decisions and are reluctant to reduce labor resource commitments when adjustment costs are high. Ceteris Paribus, firms that bear high pay adjustment costs have to maintain higher-than-optimal employee pay levels than their peers that can effectively manage pay adjustment costs and control employee pay, which reduces pay disparity between CEOs

[2] Firms that use more employees to support a given volume of sales (Anderson et al., 2003a)

and rank-and-file employees in these firms.

High employee pay levels that cannot be adjusted costlessly could increase credit risk. Lev (1983) documents the share of fixed to total cost is positively related to earnings volatility because of the lumpiness of fixed costs relative to demand fluctuations. Consequently, firms bearing high fixed labor obligations are more likely to have more volatile earnings which have long been established as a factor that increases credit risk (Fisher, 1959; West, 1973). Volatile earnings are likely to be correlated with volatile cash flows because earnings are a significant predictor of future cash flow (Finger, 1994). Minton and Schrand (1999) show cash flow volatility also increases the cost of debt due to increased credit risk. The evidences suggest credit investors should charge higher required returns from firms that cannot effectively control their rank-and-file employee pay for higher credit risk due to more volatile earnings and cash flows. The argument predicts CWPD should be negatively associated with the cost of debt (the "labor cost management" perspective). The prediction is consistent with prior studies that show downward pay stickiness or cost stickiness on a broader basis increases investment risk (Gorodnichenko and Weber, 2013; Favilukis and Lin, 2016, 2015). It is also consistent with the argument that labor obligations increase credit risk (Favilukis et al., 2015).

Given the opposing predictions made by the "rent extraction" perspective and the "labor cost management" perspective, I state my first hypothesis in the null form:

Hypothesis 1 *CEO-to-worker pay disparity is not associated with the cost of debt.*

2.6 Variation in the Association between CEO-to-worker Pay Disparity and the Cost of Debt

Investigation of H1 captures the average relationship between CWPD and the cost of debt regardless of firm characteristics that may affect the relative importance of labor cost management or the risk of CEO rent extraction. Next, I make two hypotheses regarding the cross-sectional variations of the relationship.

Labor and capital assets are two major factors of production. Labor-intensive firms are firms where labor accounts for a larger weight between the two and thus the ability to control labor resource commitments by adjusting rank-and-file employee pay has an important impact on the profitability and sustainability of labor-intensive firms. On the contrary, capital-intensive rely more on capital assets to generate revenues. For capital-intensive firms, costs associated with capital assets rather than labor are the major cost items, which means the ability to adjust labor costs is likely to be less critical for them. Based on this argument, I hypothesize that creditors would reward labor-intensive firms more than capital-intensive firms for effectively controlling their rank-and-file employee pay. In other words, the association between CWPD and the cost of debt, regardless of being positive or negative on average, should be more (less) negative (positive) for labor-intensive firms than for capital-intensive firms.

Hypothesis 2 *The association between CEO-to-worker pay disparity and the cost of debt should be more (less) negative (positive) for labor-intensive firms than for capital-intensive firms.*

CEOs' rent-seeking activities are unobservable to investors. Investors have to estimate the risk of CEO rent extraction utilizing public and private information suggesting CEOs' intentions, opportunities to extract personal benefits and outcomes of rent-seeking activities. One direct and obvious indicator of CEO rent extraction is that a CEO receives increased compensation unrelated to firm performance and unexplained by other economic firm characteristics which increases CWPD. Increased excessive CEO compensation indicates a CEO not only intends to, has the opportunity to, but also has achieved the goal of extracting additional personal benefits. Consequently, creditors are likely to place more weight on the risk arising from CEO rent extraction and charge a higher cost of debt financing to compensate for the risk. This means, the association between CWPD and the cost of debt, regardless of being positive or negative on average, should be more (less) positive (negative) when a firm's CWPD is associated with excessive CEO compensation.

Hypothesis 3 *The association between CEO-to-worker pay disparity and the cost of debt should be more (less) positive (negative) when CEO-to-worker pay disparity is associated with excessive CEO compensation.*

CHAPTER THREE

RESEARCH DESIGN AND SAMPLE SELECTION

3.1 CEO-to-worker Pay Disparity Measure

I define CEO-to-worker pay disparity as the ratio of CEO compensation to average rank-and-file employee pay[3]. As average employee pay data is not publicly available, I use the industry mean wage rate to proxy for a firm's average employee pay. This is because firms in the same industry conduct similar business, and thus offer reasonably identical jobs targeting at employees with similar skills. When the number of firms are large, the labor market approximates a competitive labor market where all firms and employees accept the same market-equilibrium pay (Gottheil, 2013). When the number of firms are small, oligopsony competition could result in differentiated pay levels scattered around the industry mean wage rate, but the resulting measurement errors are unlikely to be correlated with the industry mean wage rate, so they do not cause inconsistent estimation but inflate standard errors (Greene, 2003). In the study, I use the industry mean wage rates provided by the Bureau of Labor Statistics. The Occupational Employment Statistics (OES) program of the Bureau of Labor Statistics [4] produces annual industry mean wage rate estimates for more than 450 industries at the 4-digit North American Industry Classification System (NAICS) level through a mail survey of over 1.2 million non-farm establishments. The wage rate estimates include salaries and incentive compensation. The wide coverage and detailed industry breakdown make this source an excellent proxy for average employee pay across industries and firms. It is widely used in a variety of academic studies(e.g., Berman et al., 1994; Dunn and Holtz-Eakin, 2000).

As an alternative, I also construct a firm-level average employee pay measure. Approxi-

[3]The SEC requires public firms to disclose the ratio of their CEO compensation to the median compensation of their employees.

[4]The OES data from 1997 to 2014 is available at https://www.bls.gov/oes/tables.htm.

mately 10 percent of the public firms voluntarily report their total labor costs (Compustat data item staff expense-XLR), which include salaries, wages, pension costs, profit sharing and incentive compensation, payroll taxes, and other employee benefits. Following prior literature (e.g., Chemmanur et al., 2013; Faleye et al., 2013), I compute the firm-level average employee pay as the total labor costs less the total compensation of the top five highest-paid executives, divided by the number of employees. This measure of average employee pay should suffer from less measurement error, but the availability of data limits the sample size.

CEO compensation data is obtained from Execucomp. Bell and Van Reenen (2012) document that the composition of compensation packages is very different across a firm's organizational hierarchy. Though Execucomp provides information about CEO compensation components, there is a lack of public information about the composition of rank-and-file employees' pay. In order to facilitate comparability of CEO compensation to average employee pay, I examine three forms of CEO compensation. First, I examine total compensation which is the sum of cash compensation and long-term compensation, including payouts from long-term incentive plans, the value of restricted stock granted, the value of stock options granted, and all other long-term payments. This metric captures the commonly discussed pay disparity between CEOs and rank-and-file employees. Second, I examine short-term cash compensation, which is the sum of the base salaries and the annual cash bonuses. This metric should be the most appropriate measure of CEO compensation for firms with employee annual bonus programs. Lastly, the base salary is examined since rank-and-file employee pay mostly consists of base salaries.

3.2 The Cost of Debt Measure

S&P Long-term Issuer Credit Ratings serve as my primary measure of the cost of debt (e.g. Francis et al., 2005). A credit rating reflects professional rating agencies' *ex ante* assessment of a firms default risk. This measure is appropriate for my research question because rating agencies consider both executive compensation (Mann, 2005) and the impact of labor costs on financial and business risk when assigning credit ratings (Services, 2014). If CWPD is related to either executive compensation or labor cost management, rating agencies should incorporate it into their credit risk assessments. In addition, credit ratings are found to affect the *ex post* cost of debt measures (Asquith et al., 2005), so it is necessary to begin my analyses with an examination of the association between credit ratings and CWPD. The rating designations are converted to a ordinal scale (i.e., AAA=21, AA+=20, etc.) and a binary scale (i.e., upgrade or downgrade) for analysis as described in Appendix A.

3.3 Model Specification

I use Equation (1) to investigate the relationship between CWPD and credit ratings:

$$\begin{aligned}\Delta Rate_{i,t+1} = {} & \beta_0 + \beta_1 \Delta logCWPD_{i,t} + \beta_2 \Delta CFO_{i,t} + \beta_3 \Delta ROA_{i,t} + \beta_4 \Delta INTCOV_{i,t} \\ & + \beta_5 \Delta Loss_{i,t} + \beta_6 \Delta Asset_{i,t} + \beta_7 \Delta Leverage_{i,t} + \beta_8 \Delta Subord_{i,t} + \beta_9 \Delta CAPINT_{i,t} \\ & + \beta_{10} StdROA_{i,t} + \sum_{i=1}^{t} \lambda_t Year + \varepsilon_{i,t}\end{aligned} \tag{1}$$

Rating agencies evaluate firms' business risk at country, industry and firm levels, financial risk and other related factors when assigning credit ratings. However, there lacks consensus on what metrics credit rating agencies use in assigning ratings (Jiang, 2008). Given many of the risk factors are time-invariant, I use a change specification to control for omitted correlated variables. In particular, prior research documents unionization, industry homogeneity, and a few dimensions of corporate governance are related to CWPD (Faleye et al., 2013; Shin et al., 2015). Since they are mostly "sticky", a change specification should substantially mitigate the effects of these variables on credit ratings. The change specification also relieves autocorrelation in the error terms. In addition, the change specification is suitable for modeling the process that rating agencies modify credit ratings based on new information about CWPD. The first difference of the credit rating, Δ Rate, is measured as the change in the credit rating of firm *i* from *t* to *t+1*. The independent variable of interest, Δ *logCWPD*, is the change in the natural logarithm of CWPD for firm *i* from *t-1* to *t*. CWPD is log-transformed so that β_1 can be interpreted as the effect of an one percent change in *logCWPD*. *logCWPD* also more intuitively represents the pay gap between CEOs and rank-and-file employees.

A series of firm-specific explanatory variables are included in Equation (1) based on prior research [5]. First, prior research find firms with better performance is less likely to default. I include operating cash flows scaled by lagged total assets (*CFO*), return on assets (*ROA*), the

[5] Ahmed et al. (2002); Ashbaugh-Skaife et al. (2006); Horrigan (1966); Jiang (2008); Kaplan and Urwitz (1979); Lamy and Thompson (1988); Ziebart and Reiter (1992).

times-to-interests-earned ratio (*INTCOV*) and an indicator variable for loss (*Loss*) as controls for firm performance. The risk of default is also related to a firm's assets, earnings volatility and capital structure. I include total assets (*Asset*), leverage (*Leverage*), the standard deviation of return on assets (*StdROA*), the existence of subordinated debts (*Subord*) and capital intensity (*CAPINT*). Since the dependent variable in Equation (1) is the change of credit ratings, I also measure each of the control variables in changes. I expect the performance variables to be positively associated with credit ratings except for *Loss* and the risk variables to be negatively associated with credit ratings except for *Asset* and *CAPINT*. Year indicators are included in Equation (1) to control for time varying factors related to credit ratings.

Though credit rating adjustments are significant economic events, researchers find credit rating downgrades often have greater impact than credit rating upgrades (e.g., Ederington and Goh, 1998). Therefore, the next set of analyses examine the impact of CWPD on the probability of a credit rating downgrade and a credit rating upgrade separately by using a logistic regression as specified in Equation (2) and (3), respectively. The use of logistic regression facilitates the estimation of the economic magnitude of the results (Ashbaugh-Skaife et al., 2006) while retaining a majority of the information provided by an ordinal dependent variable since the vast majority of rating changes in my sample are one-level upgrades or downgrades. In Equation (2), *Downgrade* is an indicator variable that takes the value of one if credit ratings are downgraded from *t* to *t+1* and zero otherwise. In Equation (3), *Upgrade* is an indicator variable indicating credit rating upgrades from *t* to *t+1*. The independent variable of interest and the control variables are the same as those in Equation (1).

$$\begin{aligned}\Delta Downgrade_{i,t+1} = {} & \beta_0 + \beta_1 \Delta logCWPD_{i,t} + \beta_2 \Delta CFO_{i,t} + \beta_3 \Delta ROA_{i,t} + \beta_4 \Delta INTCOV_{i,t} \\ & + \beta_5 \Delta Loss_{i,t} + \beta_6 \Delta Asset_{i,t} + \beta_7 \Delta Leverage_{i,t} + \beta_8 \Delta Subord_{i,t} \\ & + \beta_9 \Delta CAPINT_{i,t} + \beta_{10} StdROA_{i,t} + \sum_{i=1}^{t} \lambda_t Year + \varepsilon_{i,t}\end{aligned} \tag{2}$$

$$\begin{aligned}\Delta Upgrade_{i,t+1} = {} & \beta_0 + \beta_1 \Delta logCWPD_{i,t} + \beta_2 \Delta CFO_{i,t} + \beta_3 \Delta ROA_{i,t} + \beta_4 \Delta INTCOV_{i,t} \\ & + \beta_5 \Delta Loss_{i,t} + \beta_6 \Delta Asset_{i,t} + \beta_7 \Delta Leverage_{i,t} + \beta_8 \Delta Subord_{i,t} \\ & + \beta_9 \Delta CAPINT_{i,t} + \beta_{10} StdROA_{i,t} + \sum_{i=1}^{t} \lambda_t Year + \varepsilon_{i,t}\end{aligned} \tag{3}$$

CHAPTER FOUR

SAMPLE SELECTION AND DESCRIPTIVE STATISTICS

I begin my sample with all firm-year observations with CEO compensation data on Execucomp. The initial sample consists of 39,077 observations from 1992 to 2014. Of those, 8,431 observations from two industries, public utilities (two-digit SIC code 49) and financial service (two-digit SIC codes between 60 and 67), are excluded because they have different operating characteristics and different debt financing activities than industrial firms. This leaves 30,646 observations for further consideration.

4.1 Industry Mean Wage Rate Sample

Of the 30,646 observations in the initial sample, 9,338 observations are removed for not being matched into one of the industries in the OES program, either because the industry is not surveyed [6] or the year of the observation is before the year 1997 when the OES estimates became available [7]. Among the remaining observations, 10,977 do not have S&P credit ratings and another 979 do not have information for the control variables. The resulting sample has 9,352 firm-year observations (1,980 unique firms) during the period 1997 through 2014 with available data to estimate Equation (1) to (3). A summary of the sample selection process is presented in Panel A of Table 1. The industry distribution of the sample is compared with the industry distribution of the Execucomp population in Panel B of Table 1. I find the industry distribution of the sample is similar to that of the Execucomp population. Panel C of Table 1 reports the summary statistics of the computed CWPD across industries before logarithm

[6] The OES program does not survey the following industries: NAICS 111-Crop Production, NAICS 112-Animal Production, NAICS 1131-Timber Tract Operations, NAICS 1132-Forest Nurseries and Gathering of Forest Products, NAICS 114-Fishing, Hunting, and Tapping, NAICS 1153-Support Activities for Forestry, and NAICS 814-Private Households.

[7] The OES estimates of national employment data by industry are available from the year 1988 to 1995, but each industry was surveyed once every three years during the time period. The survey was suspended in the year 1996.

transformation. CWPD is left-skewed, with a mean of 116.87 and a median of 67.43. The highest pay disparity is found in the retail industry (mean 201.21 and median 123.39), and the lowest mean pay disparity is found in the wholse sale industry (80.97) and the lowest median pay disparity in the services (51.79) industry.

[Insert Table 1 about here]

Table 2 reports the descriptive statistics of the variables in Equation (1) to (3). Panel A presents the summary statistics of the test variables. Panel B shows the summary statistics of the dependent variables followed by the summary statistics of the control variables in Panel C. In Panel A, *logTotalCWPD* increases more than the *logCashCWPD* or *logSalaryCWPD* on average during the sample period, suggesting that the increasing CWPD is largely driven by noncash compensation. Panel B shows a majority of the observations in my sample do not have credit rating changes. Only 14.74 percent of the observations receive a credit rating downgrade, and 10.43 percent receive a credit rating upgrade during the sample period. Panel C shows the sample firms have decreased operating cash flows, leverage and earnings volatility, but increased total assets and capital intensity. Most of the firms not experiencing losses in the past five years continue to be profitable in the current year. In addition, most firms not holding subordinated debts in the last year do not have subordinated debt in the current year either.

[Insert Table 2 about here]

Table 3 presents the pairwise Pearson correlation coefficients between the variables. I find the change in credit rating is positively correlated with the change in the three forms of CWPD. The correlation coefficients between the change in credit rating and the other variables are generally consistent with my expectation. Finally, the highest correlation coefficient between the independent variables is 0.6, so my results are not likely to be biased by multicollinearity.[8]

[Insert Table 3 about here]

[8]Variance-inflation-factors (VIFs) are also examined in all the regression analyses. All the VIFs are smaller than 10, which further confirms the results are not likely to be biased by multicollinearity (e.g. Hair et al., 2006).

4.2 Firm-level Average Employee Pay Sample

In order to compute firm-level average employee pay, 28,011 observations in the initial sample are removed for not having labor cost data and an additional 30 for not having employee headcount information. Credit rating information is unavailable for an additional 1,151 observations. Lastly, 70 observations are removed for missing the control variables in Equation (1) to (3). The final sample thus consists of 1,383 firm-year observations of 183 firms with all necessary data to calculate the variables in Equation (1) and Equation (2) from 1992 to 2014. A summary of the sample selection process is presented in Panel A of Table 4. In Panel B of Table 4, the industry distribution of the sample is compared with the industry distribution of the Execucomp population. The industry distribution of the sample are reasonably similar to that of the Execucomp population except the transportation industry is relatively overrepresented (24.73 vs. 3.47 percent). In Section 4.5, the main analysis is performed excluding the transportation industry to alleviate the concern that the results are driven by firms in the transportation industry. Panel C of Table 4 reports the summary statistics of the computed CWPD before the logarithm transformation across industries. CWPD is positively skewed across all industries, with a mean of 135.21 and a median of 61.79. The firms operating in the retail industries have the highest CWPD (mean 361.88, median 198.25). The firms in the wholesale and the transportation industries have the smallest mean and median pay disparity, respectively.

[Insert Table 4 about here]

Table 5 reports the descriptive statistics of $\Delta logCWPD$ based on the firm-level average employee pay measure and the correlation between $logCWPD$ ($\Delta logCWPD$) computed using the industry mean wage rate and the firm-level average employee pay measure. The correlation coefficients are all above 0.5 except for the one for $logSalaryCWPD$, suggesting the two CWPD measures are generally consistent.

[Insert Table 5 about here]

CHAPTER FIVE

RESULTS

To empirically test the association between CEO-to-worker pay disparity and the cost of debt, I estimate Equation (1) as an ordered logistic regression and Equation (2) and (3) as logistic regressions. Reported p-values are based on robust standard errors (White, 1980) to control for heteroscedasticity. To further control for potential serial correlation, error terms are clustered at the firm level for Equation (1) and both the firm and the year levels for Equation (2) (Baetschmann et al., 2015).

5.1 Using the Industry Mean Wage Rate

Panel A of Table 6 reports the univariate comparison of the credit ratings of the firms whose CWPD is above the sample median with those below the sample median. The univariate comparison shows firms with larger CWPD generally have higher credit ratings, which suggests a negative association between CWPD and the cost of debt. Since the univariate comparison does not control for factors related to both CWPD and credit ratings, I employ multivariate analysis as specified in Equation (1) to control for the effects of the correlated variables. The results of estimating Equation (1) are presented in Panel B of Table 6. The variable of interest is $\Delta logCWPD$. Model (1) incorporates $\Delta logTotalCWPD$; model (2) examines $\Delta logCashCWPD$; and model (3) investigates $\Delta logSalaryCWPD$. I find increased $logTotalCWPD$ ($logCashCWPD$) is associated with a higher probability of rating upgrades even after controlling for commonly known factors related to credit ratings ($p<0.001$, <0.001, two-tailed test) and thus a lower cost of debt, which rejects the null H1. However, the relationship between $\Delta logSalaryCWPD$ and $\Delta Rate$ is not statistically significant. This is due to the lack of variation in $\Delta logSalaryCWPD$.

[Insert Table 6 about here]

Table 7 provides the results of estimating Equation (2). In Column(1), the negative coefficient on $\Delta logTotalCWPD$ (p-value<0.001, two-tailed t test) suggests increased CWPD is associated with a lower probability of credit rating downgrades. Model (2) and Model (3), which include $\Delta logCashCWPD$ and $\Delta logSalaryCWPD$, respectively, show similar results, though $\Delta logSalaryCWPD$ does not reach statistical significant at 0.1 significance level. The relationship between $\Delta logCWPD$ and credit rating upgrades (Equation (3)) is reported in Table 8. The coefficients of $\Delta logTotalCWPD$ and $\Delta logCashCWPD$ are positive and statistically (p-value=0.019, 0.084, two-tailed t test), meaning increased CWPD is associated with a higher probability of credit rating upgrades. To assess the economic magnitude, I calculate the change in predicted probabilities of downgrades when $\Delta logCWPD$ changes from the first quartile to the third quartile, holding all other variables at their means. The results indicate increasing $\Delta logTotalCWPD$ ($\Delta logCashCWPD$) from the first quartile to the third quartile decreases a firms probability of a rating downgrade from 13.02 (12.80) percent to 12.00 (12.21) percent, which is equivalent to a 0.11 (0.14) percent decrease in the probability of rating downgrades for a 1 percent increase in $TotalCWPD$ ($CashCWPD$). In contrast, increasing $\Delta logTotalCWPD$ ($\Delta logCashCWPD$) from the first quartile to the third quartile increases a firms probability of rating upgrade from 8.49 (8.66) percent to 9.18(9.01) percent, or a 0.11 (0.09) percent increase for a 1 percent increase in $TotalCWPD$ ($CashCWPD$).

[Insert Table 7 about here]

[Insert Table 8 about here]

Overall, the findings suggest larger CWPD is related to a higher probability of credit rating upgrades (i.e., a lower cost of debt). The results reject the null H1.

The above analyses assume the relationship between $\Delta logCWPD$ and $\Delta Rate$ is monotonic. However, the "labor cost management" perspective suggests fast growth of average employee pay increases the cost of debt, but sharp decreases in average employee pay could trigger high pay adjustment costs which could also increase credit risk. On the other hand, though increases in CEO compensation may suggest CEO rent extraction according to the "rent extraction" perspective, decreases in CEO compensation could indicate CEO incompetency based on the efficient contracting theories (Tuck, 1954; Farber and Gibbons, 1996; Mincer, 1958).

The nonlinear effects of the changes in average employee pay or CEO compensation suggest the relationship between the change in CWPD and the change in the cost of debt may be non-monotonic. Therefore, the next set of tests investigate potential non-linearity in the relationship between $\Delta logCWPD$ and $\Delta Rate$. Since it is difficult to determine the functional form as $\Delta logCWPD$ reflects the integrated effects of the change in CEO compensation and the change in average employee pay, I first rearrange Equation (1) to Equation (4):

$$\begin{aligned}\Delta Rate_{i,t+1} &= \beta_0 + \beta_1 \Delta logCWPD_{i,t} + \sum Control_{i,t} + \varepsilon_{i,t} \\ &= \beta_0 + \beta_1[(logCEOComp_t - logEmpPay_t) \\ &\quad - (logCEOComp_{t-1} - logEmpPay_{t-1})] + \sum Control_{i,t} + \varepsilon_{i,t} \\ &= \beta_0 + \beta_1(logr_1 - logr_2) + \sum Control_i, t + \varepsilon_{i,t}\end{aligned} \tag{4}$$

where $CEOComp$ is CEO compensation, EmpPay is average employee pay, r_1 is the growth rate of CEO compensation from *t-1* to *t* and r_2 is the growth rate of average employee pay from *t-1* to *t*. Equation (4) suggests the change in CWPD is determined by r_1 and r_2. In order to examine the potential non-linear relationship between $\Delta logCWPD$ and $\Delta Rate$, I partition the sample into quartiles based on r_1 and r_2, respectively, and form nine groups of observations combining the observations with low, medium or high r_1 and those with low, medium or high r_2 [9] and then estimate Equation (1) for each of the nine groups. Allison (1999) states comparing ordered logit coefficients across groups is problematic when the unobserved variation differs across groups. Following Williams (2009), I estimate Equation (1) as a heterogeneous choice model to correct for heteroscedasticity of error variances.

The results of the test are reported in Table 9. In Panel A, for each of the three levels of changes in CEO compensation, the positive association between $\Delta TotalCWPD$ and $\Delta Rate$ is always the weakest when average employee pay increases at a high rate except when CEO compensation increases slowly or decreases. For instance, when CEO compensation increases

[9] (r_1 in the 1st quartile and 2nd quartile,r_2 in the 1st quartile and 2nd quartile),(r_1 in the 1st quartile and 2nd quartile,r_2 in the 2nd quartile and 3rd quartile),(r_1 in the 1st quartile and 2nd quartile,r_2 in the 3rd quartile and 4th quartile),(r_1 in the 2nd quartile and 3rd quartile,r_2 in the 1st quartile and 2nd quartile),(r_1 in the 2nd quartile and 3rd quartile,r_2 in the 2nd quartile and 3rd quartile),(r_1 in the 2nd quartile and 3rd quartile,r_2 in the 3rd quartile and 4th quartile),(r_1 in the 3rd quartile and 4th quartile,r_2 in the 1st quartile and 2nd quartile),(r_1 in the 3rd quartile and 4th quartile,r_2 in the 2nd quartile and 3rd quartile),(r_1 in the 3rd quartile and 4th quartile,r_2 in the 3rd quartile and 4th quartile)

moderately, the coefficient on $\Delta TotalCWPD$ is 0.267 when average employee pay increases quickly, significantly lower than the coefficient of 0.878 when average employee pay increases slowly or decreases (p value =0.09, two-tailed). The results indicate credit investors monotonically react unfavorably to fast increases in average employee pay, which is consistent with the "labor cost management" perspective. Similar patterns are also observed with $\Delta logCashCWPD$ in Panel B and $\Delta logSalaryCWPD$ in Panel C, though the statistical significance levels vary.

For each of the three levels of changes in average employee pay, the positive relationship between $\Delta Rate$ and $\Delta logTotalCWPD$ is most salient when CEO compensation increases at a moderate rate. For example, when average employee pay increases slowly or decreases, the coefficient on $\Delta logTotalCWPD$ is 0.878 when CEO compensation increases moderately, which is significantly larger than the coefficient of 0.061 when CEO compensation increases slowly (p value =0.020, two-tailed) and the coefficient of 0.242 when CEO compensation witnesses a sharp increase. The results suggest rating agencies are concerned about rapid CEO compensation increases. Interestingly, they also view slow increases or decreases in CEO compensation unfavorably. The former is consistent with rapid increases in CEO compensation suggesting CEO rent extraction. The latter, however, is consistent with the efficient contracting theories which indicate CEO compensation levels reflect CEO competency. Furthermore, the pattern disappears when average employee pay increases at a high rate. It seems the concern about the risk arising from ineffective labor cost management dominate the concern about the risk from CEO rent extraction in the presence of rapid increases in average employee pay.

[Insert Table 9 about here]

My next set of analyses test H2 and H3 which investigate the cross-sectional variations in the relationship between CWPD and the cost of debt on firm characteristics that may affect the relative importance of labor cost management and the risk of CEO rent extraction.

H2 predicts the negative association between $\Delta logCWPD$ and $\Delta Rate$ should be more pronounced for labor-intensive firms than capital-intensive firms. To test H2, the sample is partitioned into labor-intensive firms and capital-intensive firms. Labor (capital) intensity is typically measured with the capital-to-labor ratio in the literature (e.g., MacKay and Phillips, 2005), which is the ratio of the net value of the property, plant, and equipment to the number of employees. I classify a firm as a capital-intensive firm if the capital-to-labor ratio is in the top quartile and a labor-intensive firm if the capital-to-labor ratio is in the bottom quartile [10]. I then include in Equation (1) a dummy variable indicating a firm is a labor-intensive firm and interact it with $\Delta logCWPD$ (Equation (5)). A positive coefficient on the interaction term would provide support to H2.

$$\begin{aligned}\Delta Rate_{i,t+1} = & \beta_0 + \beta_1 \Delta logCWPD_{i,t} + \beta_2 LaborIntensity_{i,t} \\ & + \beta_3 \Delta logCWPD_{i,t} * LaborIntensity_{i,t} + \beta_4 \Delta CFO_{i,t} + \beta_5 \Delta ROA_{i,t} + \beta_6 \Delta INTCOV_{i,t} \\ & + \beta_7 \Delta Loss_{i,t} + \beta_8 \Delta Asset_{i,t} + \beta_9 \Delta Leverage_{i,t} + \beta_{10} \Delta Subord_{i,t} + \beta_{11} \Delta CAPINT_{i,t} \\ & + \beta_{12} StdROA_{i,t} + \sum_{i=1}^{t} \lambda_t Year + \varepsilon_{i,t}\end{aligned} \tag{5}$$

The results of testing H2 are presented in Table 10. Consistent with H2, the results suggest the relationship between $\Delta logTotalCWPD$ ($\Delta logCashCWPD$) and $\Delta Rate$ is stronger for labor-intensive firms than for capital-intensive firms (p-value=0.029/0.024, one-tailed test), indicating CWPD is associated the effective control of average employee pay. As effective labor cost management is more important for labor-intensive firms, credit investors reward them more for effective control of average employee pay.

[Insert Table 10 about here]

H3 predicts the positive relationship between $\Delta logCWPD$ and $\Delta Rate$ is less salient when CEO compensation is likely to be excessive, based on the "rent extraction" perspective. To test H3, I follow prior research (Core et al., 1999) and measure excessive CEO compensation as the unexplained CEO compensation from estimating Equation (6):

$$\begin{aligned}logCEOComp_{i,t} = & \beta_0 + \beta_1 Sales_{i,t} + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 StockRet_{i,t} + \beta_5 StdROA_{i,t} \\ & + \beta_6 StdRet_{i,t} + \sum_{i=1}^{n} \gamma_n Ind + \sum_{i=1}^{t} \lambda_t Year + \varepsilon_{i,t}\end{aligned} \tag{6}$$

where $Sales$ is sales revenue, MTB is market-to-book ratio, ROA is return on assets, $StockRet$ is stock return, $StdROA$ is the standard deviation of return on assets in the past five years and

[10] Alternative classification (e.g., top tercile vs. bottom tercile) yields similar results.

StdRet is the standard deviation of stock return in the past five years. I classify a firm's change in CWPD as being related to increases in excessive CEO compensation if the estimated unexplained CEO compensation increases from the prior year. Therefore, I include an indicator variable for increased unexplained CEO compensation and interact it with $\Delta logCWPD$ (Equation (7)).

$$\begin{aligned}\Delta Rate_{i,t+1} = &\beta_0 + \beta_1 \Delta logCWPD_{i,t} + \beta_2 ExcessCEOComp_{i,t} \\ &+ \beta_3 \Delta logCWPD_{i,t} * ExcessCEOComp_{i,t} + \beta_4 \Delta CFO_{i,t} + \beta_5 \Delta ROA_{i,t} \\ &+ \beta_6 \Delta INTCOV_{i,t} + \beta_7 \Delta Loss_{i,t} + \beta_8 \Delta Asset_{i,t} + \beta_9 \Delta Leverage_{i,t} + \beta_{10} \Delta Subord_{i,t} \\ &+ \beta_{11} \Delta CAPINT_{i,t} + \beta_{12} StdROA_{i,t} + \sum_{i=1}^{t} \lambda_t Year + \varepsilon_{i,t}\end{aligned} \tag{7}$$

The results of testing H3 are presented in Table 11. Column (1) and Column (2) of Table 11 shows increases in unexplained CEO compensation is negatively related to the probability of credit rating upgrades, suggesting rating agencies assign lower credit ratings to firms paying their CEOs excessively high compensation. Consistent with H3, the coefficient on the interaction term between $\Delta logTotalCWPD$ and *ExcessCEOComp* is negative, which means the positive relationship between $\Delta logCWPD$ and $\Delta Rate$ is weakened for firms whose changes in CWPD are associated with increases in unexplained CEO compensation (p-value$<$0.01, one-tailed test). However, the interaction terms between $\Delta logCashCWPD$ ($\Delta logSalaryCWPD$) and *ExcessCEOComp* is not significantly negative. This is consistent with credit investors being more concerned about CEOs excessive long-term compensation.

[Insert Table 11 about here]

In summary, the findings are consistent with the idea that CWPD is associated with the effectiveness of labor cost management and credit rating agencies incorporate the information when assigning credit ratings. CWPD could also be related to CEO rent extraction which increases credit risk. Furthermore, credit rating agencies can distinguish between the two causes of increased CWPD and adjust credit ratings accordingly.

5.2 Using the Firm-level Average Employee Pay Measure

Up to this point, all analyses use CWPD computed based on industry mean wage rates. While the wide firm coverage of the wage rates allows a large sample analysis, it also decreases the power of the tests due to reduced variation in average employee pay across firms and potential measurement errors. In this section, I examine the relationship between CWPD and the cost of debt using the firm-level average employee pay measure for a sample of firms voluntarily reporting total labor expenses and employee headcounts.

Recall that the firm-level average employee pay measure is computed for a sample of firms voluntarily reporting total labor expenses and employee headcounts. Using a non-randomly selected sample creates a potential omitted variable problem. Therefore, I employ a Heckman (1979) two-stage analysis to address this concern. In the first stage, a probit selection model (Equation 8)) predicting whether a firm reports labor expenses or employee headcounts is estimated. In the second stage, I estimate Equation (1) as an ordered probit model including the calculated inverse Mills ratio from the first-stage regression.

The predictors in the first-stage probit model are based on Chemmanur et al. (2013). To successfully control for endogeneity, Lennox et al. (2011) emphasize the importance of including exclusion restrictions that appear with a nonzero coefficient in the first-stage regression but does not appear in the second-stage regression. The exclusions in Equation (8) are the dummies for firms' listing exchange because the firms on different exchanges have different reporting behaviors (Chemmanur et al., 2013), but the listing exchange is not likely to affect the dependent variable in the second-stage regression, the change in credit rating. The definitions of the other variables are provided in Appendix B.

$$\begin{aligned} Report_{i,t+1} = &\beta_0 + \beta_1 Asset_{i,t} + \beta_2 MTB_{i,t} + \beta_3 Leverage_{i,t} + \beta_4 CAPINT_{i,t} \\ &+ \beta_5 AveSale_{i,t} + \sum_{i=1}^{m} \mu_m Exchange + \sum_{i=1}^{n} \gamma_n Ind + \sum_{i=1}^{t} \lambda_t Year + \varepsilon_{i,t} \end{aligned} \quad (8)$$

The result of the selection model is reported in Table 12 which suggests larger firms with higher leverage and physical capital intensity but lower market-to-book ratio and sales per employee are more likely to report labor expenses and employee headcounts, which is similar to the finding of Chemmanur et al. (2013). The exchange dummies are jointly significant, suggesting the exclusion restrictions control for the endogeneity caused by potential omitted variables.

[Insert Table 12 about here]

Panel A of Table 13 reports the univariate analysis comparing the credit ratings of the firms whose CWPD are above or below the sample median. Consistent with the results in 4.1, I find firms with larger CWPD generally have higher credit ratings.

Second-stage results are reported in Panel B of Table 13. The inverse Mills ratios are significant in all of the three models, indicating the unobserved factors that make reporting labor expenses and employee headcounts more likely are associated with credit rating changes. The variable of interest is $\Delta logCWPD$. The coefficients on $\Delta logTotalCWPD$, $\Delta logCashCWPD$ and $\Delta logSalaryCWPD$ are all positive and statistically significant. Similar to the findings in section 4.1, the results suggest increased CWPD is associated with a higher probability of rating upgrades.

[Insert Table 13 about here]

The relationship between $\Delta logCWPD$ and rating downgrades and upgrades are reported in Table 14 and Table 15, respectively. I find consistent evidence that $\Delta logCWPD$ is associated with a lower probability of credit rating downgrades. The coefficient estimates indicate an inter-quartile change in $\Delta logTotalCWPD$($\Delta logCashCWPD$/$\Delta logSalaryCWPD$) could decrease the probability of credit rating downgrades by 2.00 (2.16/10.77) percentage points, or a 0.21 (0.51/3.55) percent change in the probability of credit rating downgrades for 1 percent change in TotalCWPD (CashCWPD/SalaryCWPD). On the contrary, $\Delta logTotalCWPD$ is positively associated with the probability of rating upgrades. Specifically, an inter-quartile change of $\Delta logTotalCWPD$ could increase the probability of credit rating upgrades from 7.09 percent to 10.87 percent, which is equivalent to a 0.71 percent change in the probability of credit rating upgrades for a 1 percent change in TotalCWPD. $\Delta logCashCWPD$ and $\Delta logSalaryCWPD$ are also positively correlated with the probability of rating upgrades, but the correlations are not statistically significant at 10 percent level. The estimated magnitudes of the relationship between $\Delta logCWPD$ and $\Delta Rate$ are generally larger than those estimated in section 4.1. This is consistent with the use of firm-level average employee pay measure increases variations in average employee pay.

[Insert Table 14 about here]

[Insert Table 15 about here]

I also examine the potential non-linear relationship between $\Delta CWPD$ and $\Delta Rate$. Since the analyses in section 4.1 suggest the relationship between average employee pay and credit ratings is monotonic, I partition the sample into quartiles based on the growth rate of CEO compensation (r_1) and into two quantiles based on the growth rate of average employee pay (r_2), respectively. In this way, six groups of observations are formed [11]. I then estimate Equation (1) for each of the six groups.

Table 16 presents the test results. In Panel A, the relationship between $\Delta Rate$ and $\Delta logTotalCWPD$ is always stronger when average employee pay grows relatively slowly or decreases, though the difference does reach statistical significance at 10 percent level if CEO compensation also increases slowly or decreases. In Panel B, the positive relationship between $\Delta Rate$ and $\Delta logCashCWPD$ is also more salient when average employee pay increases at a lower rate, but the difference is not statistically significant at 10 percent level if CEO compensation increases dramatically. The pattern is less clear in Panel C, but the positive relationship between $\Delta Rate$ and $\Delta logSalaryCWPD$ is still significantly weaker when average employee pay increases at a higher rate and CEO compensation also increases rapidly. The results are consistent with credit rating agencies take into account the risk arising from increases of average employee pay in their risk assessments.

As for CEO compensation, when average employee pay increases at a lower rate, the relationship between $\Delta Rate$ and $\Delta logCWPD$ is the strongest when CEO compensation changes moderately, but the pattern does not exist when average employee pay increases at a higher

[11] (r_1 in the 1st quartile and 2nd quartile,r_2 in the 1st quantile),(r_1 in the 2nd quartile and 3rd quartile,r_2 in the 1st quantile),(r_1 in the 3rd quartile and 4th quartile,r_2 in the 1st quantile),(r_1 in the 1st quartile and 2nd quartile,r_2 in the 2nd quantile),(r_1 in the 2nd quartile and 3rd quartile,r_2 in the 2nd quantile),and (r_1 in the 3rd quartile and 4th quartile,r_2 in the 2nd quantile)

rate. This is probably because the effect of changes in average employee pay dominates the relationship between $\Delta Rate$ and $\Delta logTotalCWPD$ when it increases fast. The same pattern is observed with $\Delta logCashCWPD$ in Panel B but not $\Delta logSalaryCWPD$ in Panel C. In fact, the relationship between $\Delta Rate$ and $\Delta logSalaryyCWPD$ is always negative and becomes more negative as CEO salaries increase faster. This suggests credit investors are more concerned about increases in non-performance related CEO compensation.

[Insert Table 16 about here]

The relationship between $\Delta logCWPD$ and $\Delta Rate$ conditional on labor intensity and CEO compensation excessiveness are reported in Table 17 and Table 18, respectively. Table 17 shows the positive relationship between $\Delta logCWPD$ and the $\Delta Rate$ is more pronounced for labor-intensive firms than for capital-intensive firms (p-value=0.010, 0.085, <0.001, one-tailed test). The results provide support to H2. In Table 18, the association between $\Delta logCashCWPD$ and $\Delta Rate$ is found to be less positive when excessive CEO compensation increases (p-value=0.09, one-tailed test), but I do not find significant differences with $\Delta logTotalCWPD$ or $\Delta logSalaryCWPD$.

[Insert Table 17 about here]

[Insert Table 18 about here]

In summary, the analyses using the firm-level average employee pay measure mirror the analyses in section 4.1 based on industry mean wage rates. Specifically, I find increases in CWPD are associated with a higher probability of credit rating upgrades, or a lower cost of debt. I also find the relation weakens when average employee pay increases at a higher rate and is more salient when CEO compensation increases moderately than when CEO compensation increases rapidly or slowly. In addition, the relationship between the change in CWPD and the change in credit ratings is stronger for labor-intensive firms than for capital-intensive firms but weaker when excessive CEO compensation increases. Taking together, the results suggest CWPD is associated with labor cost management and credit rating agencies incorporate the information into their rating assignments. The results also indicate CWPD could suggest CEO rent extraction which is also considered by rating agencies in their risk assessments.

5.3 CEO-to-worker Pay Disparity and the Realized Interest Rate

In section 4.1 and section 4.2, I use credit ratings as the primary measure of the cost of debt. In this section I examine the association between CEO-to-worker pay disparity and the cost of debt utilizing the realzied interest rate as an alternative measure of the cost of debt. The use of the actual interest rate may suffer from potential measurement error, but the measurement error in the dependent variable does not bias the coefficient estimates unless the measurement error is systematically correlated with measurement errors of the test variables, CWPD. Nevertheless, it may inflate the residual variance and so bias against finding results (Greene, 2003).

As the *ex post* interest rate becomes the measure of the cost of debt, Equation (1) is augmented into Equation (9):

$$\begin{aligned}\Delta IntRate_{i,t+1} = {} & \beta_0 + \beta_1 \Delta logCWPD_{i,t} + \beta_2 \Delta CFO_{i,t} + \beta_3 \Delta ROA_{i,t} + \beta_4 \Delta INTCOV_{i,t} \\ & + \beta_5 \Delta Loss_{i,t} + \beta_6 \Delta Asset_{i,t} + \beta_7 \Delta Leverage_{i,t} + \beta_8 \Delta Subord_{i,t} + \beta_9 \Delta CAPINT_{i,t} \\ & + \beta_{10} \Delta StdROA_{i,t} + \sum_{i=1}^{t} \lambda_t Year + \varepsilon_{i,t}\end{aligned} \tag{9}$$

The dependent variable, $\Delta IntRat_{i,t+1}$, is the change in the realized interest rate of firm *i* from *t* to *t+1*. All the control variables are the same as those included in Equation (1). Because the credit rating is an important factor affecting the realized interest rate, it is necessary to utilize a two-stage regression procedure following Mansi et al. (2004, 2011) to estimate Equation (9). Specifically, in order to disentangle the effects of CWPD on credit ratings and interest rates, Equation (1) is estimated in the first stage using the ordinary least square (OLS) procedure. The residuals are then passed onto Equation (9) to represent the orthogonal rating information, $OrthRate_{i,t}$, which controls for the effects of credit ratings on interest rates.

Panel A of Table 19 presents the results of estimating Equation (9) using the industry mean wage rate as the average employee measure and Panel B reports the results using the firm-level average employee pay measure. The negative association between $\Delta logSalaryCWPD$ and $\Delta IntRate$ is consistent with the findings utilizing credit ratings as the cost of debt measure. However, neither $\Delta logTotalCWPD$ nor $\Delta logCashCWPD$ are found to be associated with a lower interest rate. Though the results are statistically weaker due to the potential measurement error, they are economically significant. For example, the coefficient on $\Delta logSalaryCWPD$ in Panel A indicates an one standard deviation increase in $\Delta logSalaryCWPD$ could decrease the interest rate by 14 basis points.

[Insert Table 19 about here]

5.4 CEO-to-worker Pay Disparity and the Cost of Equity

The previous analyses suggest credit investors incorporate information about the effectiveness of labor cost management and CEO rent extraction embedded in CWPD into their risk assessments. Prior literature (Chen et al., 2013, 2011) suggests effective labor cost management and CEO rent extraction are also relevant to equity investors risk assessments. In this section, I examines whether equity investors also take into account CWPD when determining required returns.

I employ Equation (9) to examine the associaiton between CWPD and the cost of equity.

$$\begin{aligned}\Delta CoE_{i,t+1} = &\alpha_0 + \alpha_1 logCWPD_{i,t} + \alpha_2 \Delta\beta_{i,t} + \alpha_3 Idiorisk_{i,t} + \alpha_4 Mktcap_{i,t} + \alpha_5 \Delta MTB_{i,t} \\ &+ \alpha_6 \Delta Leverage_{i,t} + \alpha_7 \Delta AnalystDisp_{i,t} + \alpha_8 \Delta AnaError_{i,t} + \alpha_9 \Delta LTGrowth_{i,t} \\ &+ \sum_{i=1}^{t} \lambda_t Year + \varepsilon_{i,t}\end{aligned} \quad (10)$$

where $\Delta CoE_{i,t+1}$ is the change of the cost of equity from t to $t+1$. The literature has long recognized that realized returns offer a noisy proxy of the cost of equity capital (Elton, 1999; Fama and French, 1997; Stambaugh, 2003). Therefore, I use a second approach identified in the literature, the implied cost of capital, which is derived as the internal rate of return that equates the market value of equity and forecasts of future earnings, as the cost of equity proxy. Following the implied cost of capital literature, the *ex ante* cost of equity capital is measured as the mean expected return implied in current stock prices and analysts earnings forecasts using four implied cost of equity models introduced by Claus and Thomas (2001), Gebhardt et al. (2001), Easton and Monahan (2005), and Ohlson and Juettner-Nauroth (2005). Appendix C provides a detailed description of the cost of equity capital estimates.

The control variables in Equation (9) are defined as follows. β is the market beta estimated from daily stock returns over the fiscal year on the contemporaneous CRSP value-weighted market returns. I correct for the potential bias from nonsynchronous trading following Scholes and Williams (1977). *Idiorisk* is the idiosyncratic risk, which is the annualized standard deviation of the residuals from the market model; it is also corrected for nonsynchronous trading bias. *Mktcap*, *MTB* ,and *Leverage* control for the three factors known to affect a firms cost of equity: size, market-to-book ratio, and book leverage (Fama and French, 1997). Finally, I include *AnalystDisp*, *AnaError*, and *LTGrowth* in the regression model to control for analyst forecast dispersion, analyst forecast error, and long-term growth rate, following Easton and Monahan (2005) who show that the earnings forecast accuracy and consensus long-term growth forecast are related to the reliability of the implied cost of equity proxies.

Prior to testing the association between CWPD and the cost of equity, I present the descriptive statistics of the implied cost of equity capital estimates from the four models in Table 20. Panel A of Table 20 shows the highest cost of equity capital estimate is derived from the Easton and Monahan (2005) model, with a mean of 0.11 and a median of 0.09. The lowest estimates are provided by the Gebhardt et al. (2001) model, with a mean (median) of 0.07 (0.07). Panel B of Table 20 presents the pairwise Pearson correlations between the four cost of equity capital estimates. The highest correlation coefficient is between the cost of equity capital estimated following Ohlson and Juettner-Nauroth (2005) and Easton and Monahan (2005), with a value of 0.99. The lowest correlation coefficient is between the cost of equity capital estimate from Claus and Thomas (2001) and Gebhardt et al. (2001), with a value of 0.52. Overall, the implied cost of equity estimates from different models are generally consistent and are comparable to earlier studies (e.g., Dhaliwal et al., 2015).

[Insert Table 20 about here]

Table 21 reports the results of estimating Equation (9) using the industry mean wage rate as the average employee pay proxy in Panel A and the firm-level average employee pay measure in Panel B. In Panel A, model (1) examines the relationship between $\Delta logTotalCWPD$ and $\Delta Rate$. The negative coefficient on $\Delta logTotalCWPD$ is statistically significant (p=0.007, two-tailed), indicating increased CWPD is associated with a lower cost of equity. Similar results are found with models (2) and (3) which examine $\Delta logCashCWPD$ (p=0.016,, two-tailed) and

$\Delta logSalaryCWPD$ (p=0.060, two-tailed), respectively. The results indicate equity investors, similar to credit investors, also view larger CWPD favorably and reduce required returns for increases in CWPD. In Panel B, though $\Delta logTotalCWPD$ is still negatively correlated with ΔCoE, the results are generally statistically weaker. The less consistent results deserve further investigation in future study.

[Insert Table 21 about here]

5.5 Robustness Tests

5.5.1 Excluding the Transportation Sector

As discussed in 4.2, firms operating in the transportation industry are overrepresented in the firm-level average employee pay sample. As a robustness test, I estimate Equation (1) on the firm-level average employee pay sample excluding the firms in the transportation sectors. The results reported in Table 22 are very similar to those including the transportation sector with both $\Delta logTotalCWPD$ and $\Delta logCashCWPD$ being associated with a higher probability of credit rating upgrades, which means my results are not driven by firms operating in the transportation industry.

[Insert Table 22 about here]

5.5.2 Correcting for the Rare Event Bias

King and Zeng (2001) point out logistic regression can underestimate the probability of rare events (e.g., <5 percent). Leitgb (2013) survey three methods to address the bias arising from rare events. The first method is the exact logistic regression which only works when the sample size is very small (<200). The second method is the bias correction method proposed by King and Zeng (2001), but Leitgb (2013) find the correction method could overcorrect when the sample size is very small (<200). The last method is the penalized maximum likelihood estimation proposed by Firth (1993). Leitgb (2013) show the method produces unbiased estimates even when the events are very rare and the sample size is very small.

The percentage of firm-year observations in my sample experiencing credit rating downgrades (upgrades) is 14.74 (10.43). Though the probability of credit rating changes are reasonable, it is possible logistic regression may underestimate the association between CWPD and credit rating downgrades (upgrades). In order to correct for the potential rare event bias, I re-estimate Equation (2) and (3) using the penalized likelihood method proposed by Firth (1993). The results are presented in Table 23 to Table 26. I find the coefficient estimates using the penalized likelihood method are very similar to those using logistic regression, so the small probability of credit rating downgrades (upgrades) in my sample does not seem to substantially bias the coefficient estimates.

[Insert Table 23 about here]

[Insert Table 24 about here]

[Insert Table 25 about here]

[Insert Table 26 about here]

5.5.3 Using a Level Model Specification

The third set of robustness tests employ an alternative model specification. In the previous sections, I use a first difference specification to control for the effects of the potential unobservable time-invariant factors. In this section, I use a level specification including firm fixed effects and year indicators (Equation (11)). Table 27 and Table 28 present the results. Consistent with the results using the first-difference specification, I find $\Delta logCWPD$ is positively related to $\Delta Rate$ and the relationship is statistically significant regardless of whether the industry mean wage rate or the firm-level average employee pay is used as the proxy for average employee pay. The magnitudes of the impact are also similar to those estimated from the first-difference specification.

$$\begin{aligned} Rate_{i,t+1} = {} & \beta_0 + \beta_1 logCWPD_{i,t} + \beta_2 CFO_{i,t} + \beta_3 ROA_{i,t} + \beta_4 INTCOV_{i,t} \\ & + \beta_5 Loss_{i,t} + \beta_6 Asset_{i,t} + \beta_7 Leverage_{i,t} + \beta_8 Subord_{i,t} + \beta_9 CAPINT_{i,t} \\ & + \beta_{10} StdROA_{i,t} + \sum_{i=1}^{t} \lambda_t Year + \sum_{i=1}^{t} \gamma_t Firm + \varepsilon_{i,t} \end{aligned} \tag{11}$$

[Insert Table 27 about here]

[Insert Table 28 about here]

5.5.4 Using Industry-adjusted CEO-to-worker Pay Disparity

CEO compensation includes a sizable industry component as it is typically determined through competitive benchmarking based on industry peers (Murphy, 1999). Rank-and-file employee compensation, determined by the competitive labor market, also demonstrates significant industry characteristics. Though the change specification in the primary analyses effectively mitigates time invariant industry components in CEO and employee compensation, I use industry-adjusted CWPD measure and re-estimate Equation (1). The results reported in Table 27 to Table 30 are consistent with the results using unadjusted CWPD.

[Insert Table 29 about here]

[Insert Table 30 about here]

CHAPTER SIX

DISCUSSION AND CONCLUSION

This research examines the relationship between CEO-to-worker pay disparity and the cost of debt. In the primary analyses, I find increased CWPD is associated with a higher probability of credit rating upgrades (i.e., a lower cost of debt). I also find the positive relationship between the change in CWPD and the change in credit ratings monotonically weakens as the growth rate of average employee pay increases. However, compared with fast and slow increases in CEO compensation, the positive relationship between the change in CWPD and the change in credit ratings is strongest when CEO compensation increases at a moderate rate, but the pattern disappears if average employee pay increases rapidly. In addition, the positive relationship between the change in CWPD and the change in credit ratings is more salient for labor-intensive firms than for capital-intensive firms and less pronounced for firms whose changes in CWPD are more likely to be driven by increases in excessive CEO compensation. These findings are consistent with the "labor cost management" perspective which states larger CWPD suggests effective labor cost management that reduces credit risk and rating agencies incorporate the information about the effectiveness of labor cost management in CWPD into their rating assignments. These findings also suggest rating agencies consider changes in CWPD driven by rapid CEO compensation increases as an indicator of CEO rent extraction that increases credit risk. Furthermore, it seems the concern about the risk of ineffective labor cost management dominates the concern about the risk arising from CEO rent extraction when average employee pay increases rapidly.

In additional analyses, I show the change in CWPD is negatively associated with the change in the realized interest rate, suggesting CWPD is related to not only *ex ante* measure of the cost of debt but also *ex post* measure of the cost of debt. I also extend my research to the equity market and investigate the association between CWPD and the cost of equity. The change in CWPD is found to be negatively related to the change in the cost of equity. The finding is consistent with prior literature that documents that labor costs are related to systematic risk and thus affect the cost of equity (Chen et al., 2011).

I acknowledge several caveats related to this research and propose potential future research to address the issues. First, Abowd and Bognanno (1995) find significant intercountry variations in CEO compensation levels and components. Freeman (2007) also document wage-setting institutions differ across countries. A majority of the sample firms in this study are U.S. firms. It could be worthwhile investigating the role of CEO-to-worker pay disparity in investors' risk assessments in other countries. Moreover, firms with international operations employ employees overseas who are subject to local wage-setting institutions. It could be interesting to examine if the relationship between CWPD and the cost of debt documented in the study vary for firms with and without substantial international operations. Second, I find relatively less consistent results regarding the relationship between CWPD and the cost of equity. Prior research documents CEO rent extraction, labor cost management and credit rating changes are all related to equity investors' risk assessments (Chen et al., 2013, 2011; Ederington and Goh, 1998; Black et al., 2006). Future studies could systematically investigate the association between CWPD and the cost of equity. Third, as with other studies on the relationship between the cost of debt and firm characteristics, this study could be subject to erogeneity bias as ratings and CEO-to-worker pay disparity may be determined simultaneously by unobservable factors. Though I try to mitigate the problem by including control variables, employing a first-difference and fixed effects specification, other methods such as instrumental variables and simultaneous equation systems could be used to better address the issue.

This study contributes to the literature in three ways. First, it contributes to the large body of research on the economic consequences of pay disparity by showing the pay disparity between CEOs and rank-and-file employees is relevant to creditors' risk assessments. Second, it adds to the literature on the association between intra-firm pay disparity and investment risk by documenting larger CEO-to-worker pay disparity is associated with lower investment risk which is distinctly different from executive-level pay disparity that is positively correlated with investment risk. Finally, the study is related to the research on the cost of debt and credit ratings. It documents CWPD is incorporated into creditors' risk assessments. The findings of the study should be of interest to academics and practitioners and relevant to the debates about the pay ratio disclosure rule.

REFERENCE

Abowd, J. M., M. Bognanno, 1995. International differences in executive and managerial compensation. Differences and changes in wage structures. University of Chicago Press.

Adams, R. B., H. Almeida, D. Ferreira, 2005. Powerful CEOs and their impact on corporate performance. *Review of Financial Studies*, 18(4), 1403–1432.

AFL-CIO, 2014. Executive paywatch. Report.

Ahmed, A. S., B. K. Billings, R. M. Morton, M. Stanford-Harris, 2002. The role of accounting conservatism in mitigating bondholder-shareholder conflicts over dividend policy and in reducing debt costs. *The Accounting Review*, 77(4), 867–890.

Akerlof, G. A., J. L. Yellen, 1990. The fair wage-effort hypothesis and unemployment. *The Quarterly Journal of Economics*, 255–283.

Allison, P. D., 1999. Comparing logit and probit coefficients across groups. *Sociological Methods and Research*, 28(2), 186–208.

Altman, E., S. Katz, 1976. Statistical bond rating classification using financial and accounting data. Proceedings of the conference on topical research in accounting. New York University Press.

Anderson, M. C., R. D. Banker, S. N. Janakiraman, 2003a. Are selling, general, and administrative costs sticky? *Journal of Accounting Research*, 41(1), 47–63.

Anderson, R. C., S. A. Mansi, D. M. Reeb, 2003b. Founding family ownership and the agency cost of debt. *Journal of Financial Economics*, 68(2), 263–285.

Anderson, R. C., S. A. Mansi, D. M. Reeb, 2004. Board characteristics, accounting report integrity, and the cost of debt. *Journal of Accounting and Economics*, 37(3), 315–342.

Ashbaugh-Skaife, H., D. W. Collins, R. LaFond, 2006. The effects of corporate governance on firms credit ratings. *Journal of Accounting and Economics*, 42(1), 203–243.

Ashton, R. H., 1990. Pressure and performance in accounting decision settings: Paradoxical effects of incentives, feedback, and justification. *Journal of Accounting Research*, 148–180.

Asquith, P., A. Beatty, J. Weber, 2005. Performance pricing in bank debt contracts. *Journal of Accounting and Economics*, 40(1), 101–128.

Baetschmann, G., K. E. Staub, R. Winkelmann, 2015. Consistent estimation of the fixed effects ordered logit model. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 178(3), 685–703.

Baker, G. P., B. J. Hall, 2004. Ceo incentives and firm size. *Journal of Labor Economics*, 22(4), 32.

Ball, R., P. Brown, 1968. An empirical evaluation of accounting income numbers. *Journal of Accounting Research*, 159–178.

Banker, R. D., D. Byzalov, L. T. Chen, 2013. Employment protection legislation, adjustment costs and cross-country differences in cost behavior. *Journal of Accounting and Economics*, 55(1), 111–127.

Bargeron, L. L., K. M. Lehn, C. J. Zutter, 2010. Sarbanes-Oxley and corporate risk-taking. *Journal of Accounting and Economics*, 49(1), 34–52.

Bebchuk, L. A., 2009. Pay without Performance: The Unfulfilled Promise of Executive Compensation. Harvard University Press.

Bebchuk, L. A., K. M. Cremers, U. C. Peyer, 2011. The ceo pay slice. *Journal of Financial Economics*, 102(1), 199–221.

Bebchuk, L. A., J. M. Fried, D. I. Walker, 2002. Managerial power and rent extraction in the design of executive compensation. Working paper, National Bureau of Economic Research.

Bell, B., J. Van Reenen, 2012. Firm perofrmance and wages: Evidence from across the corporate hierarchy. Working paper, London School of Economics.

Berman, E., J. Bound, Z. Griliches, 1994. Changes in the demand for skilled labor within us manufacturing: Evidence from the annual survey of manufacturers. *The Quarterly Journal of Economics*, 109(2), 367–397.

Black, B. S., H. Jang, W. Kim, 2006. Predicting firms' corporate governance choices: Evidence from korea. *Journal of Corporate Finance*, 12(3), 660–691.

Blanchflower, D., A. J. Oswald, P. Sanfey, 1996. Wages, profits, and rent-sharing. *The Quarterly Journal of Economics*, 111(1), 227–251.

Boardman, C. M., R. W. McEnally, 1981. Factors affecting seasoned corporate bond prices. *Journal of Financial and Quantitative Analysis*, 16(02), 207–226.

Borisova, G., V. Fotak, K. Holland, W. L. Megginson, 2015. Government ownership and the cost of debt: Evidence from government investments in publicly traded firms. *Journal of Financial Economics*, 118(1), 168–191.

Chemmanur, T. J., Y. Cheng, T. Zhang, 2013. Human capital, capital structure, and employee pay: An empirical analysis. *Journal of Financial Economics*, 110(2), 478–502.

Chen, H. J., M. Kacperczyk, H. Ortiz-Molina, 2011. Labor unions, operating flexibility, and the cost of equity. *Journal of Financial and Quantitative Analysis*, 46(01), 25–58.

Chen, H. J., M. Kacperczyk, H. Ortiz-Molina, 2012. Do nonfinancial stakeholders affect the pricing of risky debt? evidence from unionized workers. *Review of Finance*, 16(2), 347–383.

Chen, Z., Y. Huang, K. J. Wei, 2013. Executive pay disparity and the cost of equity capital. *Journal of Financial and Quantitative Analysis*, 48(03), 849–885.

Choi, J., A. H. Newman, I. D. Tafkov, 2015. A marathon, a series of sprints, or both? tournament horizon and dynamic task complexity in multi-period settings. *The Accounting Review*.

Christofides, L. N., A. J. Oswald, 1992. Real wage determination and rent-sharing in collective bargaining agreements. *The Quarterly Journal of Economics*, 107(3), 985–1002.

Claus, J., J. Thomas, 2001. Equity premia as low as three percent? evidence from analysts' earnings forecasts for domestic and international stock markets. *Journal of Finance*, 56(5), 1629–1666.

Cohen, L., A. Frazzini, C. J. Malloy, 2012. Hiring cheerleaders: Board appointments of independent directors. *Management Science*, 58(6), 1039–1058.

Core, J. E., R. W. Holthausen, D. F. Larcker, 1999. Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics*, 51(3), 371–406.

Crawford, S., K. Nelson, B. Rountree, 2016. Mind the gap: Ceo-employee pay ratios and shareholder say on pay votes. Working paper, University of Houston and Rice University.

Deng, S. E., E. Elyasiani, C. X. Mao, 2007. Diversification and the cost of debt of bank holding companies. *Journal of Banking and Finance*, 31(8), 2453–2473.

Dhaliwal, D., C. Hogan, R. Trezevant, M. Wilkins, 2011. Internal control disclosures, monitoring, and the cost of debt. *The Accounting Review*, 86(4), 1131–1156.

Dhaliwal, D., J. S. Judd, M. Serfling, S. Shaikh, 2015. Customer concentration risk and the cost of equity capital. *Journal of Accounting and Economics*.

Dunlop, J. T., M. L. Fledderus, M. van Kleeck, 1944. Wage determination under trade unions. *Science and Society*, 8(4), 362–364.

Dunn, T., D. Holtz-Eakin, 2000. Financial capital, human capital, and the transition to self-employment: Evidence from intergenerational links. *Journal of Labor Economics*, 18(2), 282–305.

Easton, P. D., S. J. Monahan, 2005. An evaluation of accounting-based measures of expected returns. *The Accounting Review*, 80(2), 501–538.

Ederington, L. H., J. C. Goh, 1998. Bond rating agencies and stock analysts: Who knows what when? *Journal of Financial and Quantitative Analysis*, 33(04), 569–585.

Elton, E. J., 1999. Presidential address: expected return, realized return, and asset pricing tests. *Journal of Finance*, 54(4), 1199–1220.

Eriksson, T., 1999. Executive compensation and tournament theory: empirical tests on danish data. *Journal of Labor Economics*, 17(2), 262–280.

Faleye, O., E. Reis, A. Venkateswaran, 2013. The determinants and effects of ceoemployee pay ratios. *Journal of Banking and Finance*, 37(8), 3258–3272.

Fama, E. F., K. R. French, 1997. Industry costs of equity. *Journal of Financial Economics*, 43(2), 153–193.

Farber, H. S., R. Gibbons, 1996. Learning and wage dynamics. *The Quarterly Journal of Economics*, 111(4), 1007–1047.

Favilukis, J., X. Lin, 2015. Wage rigidity: A quantitative solution to several asset pricing puzzles. *Review of Financial Studies*, hhv041.

Favilukis, J., X. Lin, 2016. Does wage rigidity make firms riskier? evidence from long-horizon return predictability. *Journal of Monetary Economics*, 78, 80–95.

Favilukis, J., X. Lin, X. Zhao, 2015. The elephant in the room: the impact of labor obligations on credit risk.

Finger, C. A., 1994. The ability of earnings to predict future earnings and cash flow. *Journal of Accounting Research*, 210–223.

Firth, D., 1993. Bias reduction of maximum likelihood estimates. *Biometrika*, 80(1), 27–38.

Fisher, L., 1959. Determinants of risk premiums on corporate bonds. *Journal of Political Economy*, 67(3), 217–237.

Francis, J., R. LaFond, P. Olsson, K. Schipper, 2005. The market pricing of accruals quality. *Journal of Accounting and Economics*, 39(2), 295–327.

Freeman, R. B., 2007. Labor market institutions around the world. *NBER Working Paper*.

Gabaix, X., A. Landier, 2008. Why has CEO pay increased so much? *The Quarterly Journal of Economics*, 123(1), 49–100.

Gebhardt, W. R., C. Lee, B. Swaminathan, 2001. Toward an implied cost of capital. *Journal of Accounting Research*, 39(1), 135–176.

Gorodnichenko, Y., M. Weber, 2013. Are sticky prices costly? evidence from the stock market.

Gottheil, F., 2013. Principles of macroeconomics. Nelson Education.

Greene, W., 2003. Econometric Analysis. Prentice Hall, New Jersey.

Grinstein, Y., P. Hribar, 2004. CEO compensation and incentives: Evidence from M&A bonuses. *Journal of Financial Economics*, 73(1), 119–143.

Hair, J. F., W. C. Black, B. J. Babin, R. E. Anderson, R. L. Tatham, 2006. Multivariate data analysis, vol. 6. Pearson Prentice Hall Upper Saddle River, NJ.

Heckman, J., 1979. Sample selection bias as a specification error. *Econometrica*.

Henderson, A. D., J. W. Fredrickson, 2001. Top management team coordination needs and the ceo pay gap: A competitive test of economic and behavioral views. *Academy of Management Journal*, 44(1), 96–117.

Hill, C. W., T. M. Jones, 1992. Stakeholderagency theory. *Journal of Management Studies*, 29(2), 131–154.

Holthausen, R. W., D. F. Larcker, R. G. Sloan, 1995. Annual bonus schemes and the manipulation of earnings. *Journal of Accounting and Economics*, 19(1), 29–74.

Hope, O., W. B. Thomas, 2008. Managerial empire building and firm disclosure. *Journal of Accounting Research*, 46(3), 591–626.

Horrigan, J. O., 1966. The determination of long-term credit standing with financial ratios. *Journal of Accounting Research*, 44–62.

Jensen, M. C., W. H. Meckling, 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305–360.

Jiang, J., 2008. Beating earnings benchmarks and the cost of debt. *The Accounting Review*, 83(2), 377–416.

Kabir, R., H. Li, Y. V. Veld-Merkoulova, 2013. Executive compensation and the cost of debt. *Journal of Banking and Finance*, 37(8), 2893–2907.

Kaplan, R. S., G. Urwitz, 1979. Statistical models of bond ratings: A methodological inquiry. *Journal of Business*, 231–261.

Kim, J., D. A. Simunic, M. T. Stein, C. H. Yi, 2011. Voluntary audits and the cost of debt capital for privately held firms: Korean evidence. *Contemporary Accounting Research*, 28(2), 585–615.

King, G., L. Zeng, 2001. Logistic regression in rare events data. *Political analysis*, 137–163.

Knoeber, C. R., W. N. Thurman, 1994. Testing the theory of tournaments: An empirical analysis of broiler production. *Journal of Labor Economics*, 12(2), 155–179.

Kuang, Y. F., B. Qin, 2013. Credit ratings and ceo risktaking incentives. *Contemporary Accounting Research*, 30(4), 1524–1559.

Lamy, R. E., G. R. Thompson, 1988. Risk premia and the pricing of primary issue bonds. *Journal of Banking and Finance*, 12(4), 585–601.

Lazear, E. P., S. Rosen, 1981. Rank-order tournaments as optimum labor contracts. *Journal of Political Economy*, 841–864.

Lee, Y.-J., 2008. The effects of employee stock options on credit ratings. *The Accounting Review*, 83(5), 1273–1314.

Leitgb, H., 2013. The problem of rare events in maximum likelihood logistic regression-assessing potential remedies. *European Survey Research Association, Lisbon, Portugal.*

Lennox, C. S., J. R. Francis, Z. Wang, 2011. Selection models in accounting research. *The Accounting Review*, 87(2), 589–616.

Lev, B., 1983. Some economic determinants of time-series properties of earnings. *Journal of Accounting and Economics*, 5, 31–48.

Li, C., Y. Xie, J. Zhou, 2010. National level, city level auditor industry specialization and cost of debt. *Accounting Horizons*, 24(3), 395–417.

Libby, R., M. G. Lipe, 1992. Incentives, effort, and the cognitive processes involved in accounting-related judgments. *Journal of Accounting Research*, 249–273.

Lindbeck, A., D. J. Snower, 1988. Cooperation, harassment, and involuntary unemployment: an insider-outsider approach. *The American Economic Review*, 167–188.

Lisic, L. L., T. L. Neal, I. X. Zhang, Y. Zhang, 2015. Ceo power, internal control quality, and audit committee effectiveness in substance versus in form. *Contemporary Accounting Research*.

Liu, Y., P. Jiraporn, 2010. The effect of ceo power on bond ratings and yields. *Journal of Empirical Finance*, 17(4), 744–762.

MacKay, P., G. M. Phillips, 2005. How does industry affect firm financial structure? *Review of Financial Studies*, 18(4), 1433–1466.

Main, B. G., C. A. O'Reilly III, J. Wade, 1993. Top executive pay: Tournament or teamwork? *Journal of Labor Economics*, 606–628.

Mann, C., 2005. CEO compensation and credit risk. Report, Moodys Investors Service.

Mansi, S. A., W. F. Maxwell, D. P. Miller, 2004. Does auditor quality and tenure matter to investors? evidence from the bond market. *Journal of Accounting Research*, 42(4), 755–793.

Mansi, S. A., W. F. Maxwell, D. P. Miller, 2011. Analyst forecast characteristics and the cost of debt. *Review of Accounting Studies*, 16(1), 116–142.

Matsumura, E. M., J. Y. Shin, 2006. An empirical analysis of an incentive plan with relative performance measures: Evidence from a postal service. *The Accounting Review*, 81(3), 533–566.

McDonald, I. M., R. M. Solow, 1981. Wage bargaining and employment. *American Economic Review*, 71(5), 896–908.

Mincer, J., 1958. Investment in human capital and personal income distribution. *Journal of Political Economy*, 66(4), 281–302.

Minton, B. A., C. Schrand, 1999. The impact of cash flow volatility on discretionary investment and the costs of debt and equity financing. *Journal of Financial Economics*, 54(3), 423–460.

Morse, A., V. Nanda, A. Seru, 2011. Are incentive contracts rigged by powerful CEOs? *Journal* *of Finance*, 66(5), 1779–1821.

Murphy, K. J., 1999. Executive compensation. *Handbook of Labor Economics*, 3, 2485–2563.

Ohlson, J. A., B. E. Juettner-Nauroth, 2005. Expected EPS and EPS growth as determinantsof value. *Review of Accounting Studies*, 10(2-3), 349–365.

Pinches, G. E., K. A. Mingo, 1973. A multivariate analysis of industrial bond ratings. *The Journal of Finance*, 28(1), 1–18.

Pittman, J. A., S. Fortin, 2004. Auditor choice and the cost of debt capital for newly public firms. *Journal of Accounting and Economics*, 37(1), 113–136.

Reeb, D. M., S. A. Mansi, J. M. Allee, 2001. Firm internationalization and the cost of debt financing: Evidence from non-provisional publicly traded debt. *Journal of Financial and Quantitative Analysis*, 36(03), 395–414.

Richardson, S., 2006. Over-investment of free cash flow. *Review of Accounting Studies*, 11(2-3), 159–189.

Rosen, S., 1986. Prizes and incentives in elimination tournaments. *American Economic Review*, 701–715.

Rosen, S., 1990. Contracts and the market for executives.

Sanchez-Ballesta, J. P., E. Garcia-Meca, 2011. Ownership structure and the cost of debt. *European Accounting Review*, 20(2), 389–416.

Scholes, M., J. Williams, 1977. Estimating betas from nonsynchronous data. *Journal of Financial Economics*, 5(3), 309–327.

Sengupta, P., 1998. Corporate disclosure quality and the cost of debt. *The Accounting Review*, 459–474.

Services, S. P. R., 2014. Key credit factors for the health care services industry. Report.

Shapiro, C., J. E. Stiglitz, 1984. Equilibrium unemployment as a worker discipline device. *American Economic Review*, 74(3), 433–444.

Shaw, J. D., N. Gupta, J. E. Delery, 2002. Pay dispersion and workforce performance: Moderating effects of incentives and interdependence. *Strategic Management Journal*, 23(6), 491–512.

Shin, J. Y., S.-C. Kang, J.-H. Hyun, B.-J. Kim, 2015. Determinants and performance effects of executive pay multiples: evidence from korea. *ILR Review*, 68(1), 53–78.

Stambaugh, R. F., 2003. Liquidity risk and expected stock returns. *Journal of Political Economy*, 111(3).

Stiglitz, J. E., 1974. Alternative theories of wage determination and unemployment in ldc's: The labor turnover model. *The Quarterly Journal of Economics*, 194–227.

Sundaram, R. K., D. L. Yermack, 2007. Pay me later: Inside debt and its role in managerial compensation. *Journal of Finance*, 62(4), 1551–1588.

Tuck, R. H., 1954. An essay on the economic theory of rank. Basil Blackwell.

Valta, P., 2012. Competition and the cost of debt. *Journal of Financial Economics*, 105(3), 661–682.

Verwijmeren, P., J. Derwall, 2010. Employee well-being, firm leverage, and bankruptcy risk. *Journal of Banking and Finance*, 34(5), 956–964.

Weiss, A., 1980. Job queues and layoffs in labor markets with flexible wages. *Journal of Political Economy*, 526–538.

West, R. R., 1973. Bond ratings, bond yields and financial regulation: some findings. *Journal of Law and Economics*, 16(1), 159–168.

White, H., 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 48(4), 817–838.

Williams, R., 2009. Using heterogeneous choice models to compare logit and probit coefficients across groups. *Sociological Methods and Research*, 37(4), 531–559.

Ziebart, D. A., S. A. Reiter, 1992. Bond ratings, bond yields and financial information. *Contemporary Accounting Research*, 9(1), 252–282.

Appendix A

Table A: Credit Rating Classification

S&P Issuer Long-term Rating	**Assigned Score**	**Rating Definition**	**Grade**
AAA	21	The obligor's capacity to meet its financial commitment on the obligation is extremely strong.	Investment
AA+	20	The obligor's capacity to meet its financial commitment on the obligation is very strong.	Investment
AA	19		Investment
AA-	18		Investment
A+	17	The obligation is somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than obligations in higher-rated categories. However,the obligor's capacity to meet its financial commitment on the obligation is still strong.	Investment
A	16		Investment
A-	15		Investment
BBB+	14	The obligation exhibits adequate protection parameters. However, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of the obligor to meet its financial commitment on the obligation.	Investment
BBB	13		Investment
BBB-	12		Investment
BB+	11	The obligation is less vulnerable to nonpayment than other speculative issues. However, it faces major ongoing uncertainties or exposure to adverse business, financial, or economic conditions which could lead to the obligor's inadequate capacity to meet its financial commitment on the obligation.	Investment
BB	10		Non-investment
BB-	9		Non-investment
B+	8	The obligation is more vulnerable to nonpayment than obligations rated 'BB', but the obligor currently has the capacity to meet its financial commitment on the obligation. Adverse business, financial, or economic conditions will likely impair the obligor's capacity or willingness to meet its financial commitment on the obligation.	Non-investment
B	7		Non-investment
B-	6		Non-investment
			Non-investment
B-	6		
CCC+	5	The obligation is currently vulnerable to nonpayment, and is dependent	Non-investment
CCC	4		Non-investment

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Table A – continued from previous page

S&P Issuer Long-term Rating	**Assigned Score**	**Rating Definition**	**Grade**
CCC-	3	upon favorable business, financial, and economic conditions for the obligor to meet its financial commitment on the obligation. In the event of adverse business, financial, or economic conditions, the obligor is not likely to have the capacity to meet its financial commitment on the obligation.	Non-investment
CC	2	The obligation is currently highly vulnerable to nonpayment. The 'CC' rating is used when a default has not yet occurred, but Standard & Poor's expects default to be a virtual certainty, regardless of the anticipated time to default.	Non-investment
C	1	The obligation is currently highly vulnerable to nonpayment, and the obligation is expected to have lower relative seniority or lower ultimate recovery compared to obligations that are rated higher.	Non-investment
D	1	The obligation is in default or in breach of an imputed promise.	Non-investment

Appendix B Variable Definitions

Table B: Variable Definitions

Variable	**Source**	**Definition**
$\Delta logTotalCWPD$	Exeucomp &OES	The change of the natural logarithm of the ratio of CEO total compensation to the average industry wage rate from *t-1* to *t*.
	Exeucomp &Compustat	The change of the natural logarithm of the ratio of CEO total compensation to firm-level average employee pay from *t-1* to *t*.
$\Delta logCashCWPD$	Exeucomp &OES	The change of the natural logarithm of the ratio of CEO Cash compensation to the average industry wage rate from *t-1* to *t*.
	Exeucomp &Compustat	The change of the natural logarithm of the ratio of CEO Cash compensation to firm-level average employee pay from *t-1* to *t*.
$\Delta logSalaryCWPD$	Exeucomp &OES	The change of the natural logarithm of the ratio of CEO base salaries to the average industry wage rate from *t-1* to *t*.
	Exeucomp &Compustat	The change of the natural logarithm of the ratio of CEO base salaries to firm-level average employee pay from *t-1* to *t*.
$\Delta Rate$	Compustat	The change of Standard&Poor Issuer Long-term Credit Rating from *t* to *t+1*.
$Upgrade$	Compustat	An indicator variable that equals one if the observation receives a credit rating upgrade and zero otherwise.
$Downgrade$	Compustat	An indicator variable that equals one if the observation receives a credit rating downgrade and zero otherwise.
ΔCFO	Compustat	The change of the cash flows from operating activities scaled by the average total assets at the beginning and at the end of year *t* from *t-1* to *t*.
ΔROA	Compustat	The change of the income before extraordinary items divided by the average of the total assets at the beginning and the end of the year *t* from *t-1* to *t*.
$\Delta INTCOV$	Compustat	The change of the operating income before depreciation divided by interest expenses from *t-1* to *t*
$Loss$	Compustat	An indicator variable that equals one if the net income is negative and zero otherwise.
$\Delta Leverage$	Compustat	The change of the leverage from *t-1* to *t*. The leverage is calculated as the average of the sum of long-term debt and the debt in current liabilities at the beginning and the end of year *t* divided by the average of the total assets at the beginning and the end of year *t*.
$Subord$	Compustat	An indicator variable that equals one if the subordinated long-term debt is nonzero and zero

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Table B – continued from previous page

Variable	Source	Definition
Subord		otherwise
$\Delta CAPINT$	Compustat	The change of the total property, plant and equipment divided by lagged total assets from *t-1* to *t*.
$\Delta StdROA$	Compustat	The change of the earnings volatility from *t-1* to *t*. The earnings volatility is calculated as the standard deviation of the income before extraordinary items in the past five years.
LaborIntensity	Compustat	An indicator variable that equals one if the capital-to -labor ratio is in the top quartile and zero otherwise. The capital-to-labor ratio is defined as the ratio of net value of the property,plant and equipment to the number of employees.
ExcessCEOComp	Compustat	An indicator variable that equals one if the unexplained CEO compensation from estimating Equation (6) increases and zero otherwise.
Report	Compustat	An indicator variable that equals one if the observation reports both the staff expenses and the number of employees in Compustat and zero otherwise.
Asset	Compustat	The natural logarithm of the total assets.
MTB	Compustat	The market-to-book ratio.
Leverage	Compustat	The average of the sum of long-term debt and the debt in current liabilities at the beginning and the end of year *t* divided by the average of the total assets at the beginning and the end of year *t*.
CAPINT	Compustat	The total property, plant and equipment divided by lagged total assets.
AveSale	Compustat	Sales per employee.
ΔCoE	Compustat &CRSP	The change of the cost of equity from *t-1* to *t*. The cost of equity is calculated as the mean of the implied cost of equity estimated from OJN(2005), Easton (2004), CT(2001), and GLS (2001) models as described in Appendix C.
$\Delta\beta$	CRSP	The change of the market β from *t-1* to *t*. The market β is estimated from daily stock returns over the fiscal year on the contemporaneous CRSP value-weighted market returns.
$\Delta Idiorisk$	CRSP	The change of the idiosyncratic risk from *t-1* to *t*. The idiosyncratic risk is the annualized standard deviation of the residuals from the market model.
$\Delta Mktcap$	Compustat	The change of the natural logarithm of the market capitalization from *t-1* to *t*.
ΔMTB	Compustat	The change of the market-to-book ratio from *t-1* to *t*.
$\Delta AnalystDispersion$	IBES	The change of the standard deviation of analysts

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Table B – continued from previous page

Variable	**Source**	**Definition**
$\Delta AnalystDispersion$		forecasts from *t-1* to *t*.
$\Delta Error$	IBES	The change of the difference between the mean analyst forecast and the actual EPS from *t-1* to *t*.
$\Delta IntRate$	Compustat	The change of the interest rate from *t* to *t+1*. The interest rate is calculated as the interest expense divided by the average of the long-term debt and the debt in the current liabilities at the beginning and the end of year *t*.

Appendix C Cost of Equity Measures

C.1 Ohlson and Juettner-Nauroth (2005)(OJN)

$$CoE_{OJN} = A + \sqrt{A^2 + \frac{E_t(EPS_{t+1})}{P_t} * (g_2 - g_{lt})} \quad \text{(C1)}$$

where $A = 0.5 * (g_{lt} + \frac{DPS_{t+1}}{P_t})$; EPS_{t+1} is the mean forecasted earnings per share (EPS) for the year *t+1*; P_t is the stock price at the end of the year *t*; DPS_{t+1} is the dividend per share for the year *t+1* proxied by current years dividend per share; g_2 is the average of the short-term earnings growth rate implied in the forecasted EPS for the year *t+1* and *t+2*; g_1 and the analysts forecasted long-term growth rate; g_{lt} is the long-term earnings growth rate which equals the yield on 10-year treasury bills minus 3 percent.

C.2 Easton (2004) (Easton)

$$P_t = \frac{E_t(EPS_{t+1})}{CoE_{Easton}} + \frac{E_t(EPS_{t+1}) * E_t(g_{st} - CoE_{Easton} * (1 - POUT))}{{CoE_{Easton}}^2} \quad \text{(C2)}$$

All variables are the same as defined above. I solve for CoE_{Easton} that equates the right- and left-hand sides of the equation within a difference of 10^{-9}.

C.3 Gebhardt et al. (2001) (GLS)

$$P_t = B_t + \sum i = 1^{T-1} \frac{(RoE_{t+i} - CoE_{GLS}) * B_{t+i-1}}{(1 + CoE_{GLS})^i} + \frac{(RoE_{t+T} - CoE_{GLS}) * B_{t+T-1}}{((1 + CoE_{GLS})^T - CoE_{GLS}} \quad \text{(C3)}$$

RoE is the return on equity. I use IBES analysts forecasts to proxy for the firms forecasted earnings for the year *t+1*, *t+2* and *t+3*. Thereafter, I assume *RoE* declines linearly to the historical, 10-year, industry median RoE from the 4th year to the Tth year. The industry is defined as the 48 industries defined by Fama and French (1997). The book value of equity (B) is estimated assuming $B_(t+1) = B_t + EPS_(t+1) - DPS_(t+1)$. DPS_{t+1} is proxied by the current dividend per share. T is 12. I solve for CoE_{GLS} that equates the right- and left-hand sides of equation within a difference of 10^{-9}.

C.4 Claus and Thomas (2001) (CT)

$$P_t = B_t + \sum i = 1^{T-1} \frac{EPS_{t+1} - CoE_{CT} * B_{t+i-1}}{(1 + CoE_{CT})^i} + \frac{(EPS_{t+5} - CoE_{CT} * B_{t+4}) * (1 + g_{lt})}{(CoE_{CT} - g_{lt}) * (1 + CoE_{CT})^5} \quad \text{(C4)}$$

I use IBES analysts forecasts to proxy for the firms forecasted earnings for the year *t+1*, *t+2* and *t+3*. Thereafter, I derive the earnings forecasts for the year *t+4* and *t+5* from earnings forecasts for the 3rd year and the long-term earnings growth rate which is calculated as the yield on 10-year Treasury bonds minus 3 percent. The other variables are the same as defined above. I solve for CoE_{CT} that equates the right- and left-hand sides of Equation within a difference of 10^{-9}.

Table 1: Sample Composition and Industry Distribution

Panel A Sample Composition

Execucomp		39,077
Less:	Public utility and financial service firms	(8,431)
		30,646
Execucomp population		30,646
Less:	Industry average wage rate missing	(9,338)
	Credit rating missing	(10,977)
	Control variables missing	(979)
Final sample		9,352

Panel B Industry Distribution

	Sample		**Population**	
	N of Obs	**Percent**	**N of Obs**	**Percent**
Agriculture	5	0.05	104	0.34
Mining	790	8.45	1,627	5.31
Construction	234	2.50	481	1.57
Manufacturing	5,243	56.05	16,375	53.43
Transportation	420	4.49	1,063	3.47
Communication	391	4.18	953	3.11
Wholesale	356	3.81	1,155	3.77
Retail	858	9.18	3,194	10.42
Services	1,055	11.28	5,495	17.93
Public Admin	0	0.00	199	0.65
Total	9,352	100.00	30,646	100.00

Panel C CEO-to-worker Pay Disparity across Industries

	Mean	**Std. Dev.**	**P25**	**Median**	**P75**
Agriculture	101.96	81.02	35.68	81.27	117.36
Mining	118.60	147.79	34.54	69.31	147.24
Construction	159.84	173.43	50.71	103.16	190.36
Manufacturing	106.88	123.68	31.19	66.12	135.77
Transportation	84.72	93.45	25.88	52.16	105.26
Communication	209.46	231.35	35.79	114.82	307.17
Wholesale	80.97	96.92	32.11	56.88	94.65
Retail	191.81	201.21	51.02	123.39	244.48
Services	109.29	147.68	22.50	51.79	115.35
Total	116.87	145.33	31.06	67.43	142.10

This table describes the sample selection process in Panel A, the industry distribution of the sample firms in Panel B and the descriptive statistics of CEO-to-worker pay disparity across industries in Panel C. Industry is defined at the two-digit Standard Industrial Classification (SIC) level.

Table 2: Descriptive Statistics

N=7,372	Mean	Std. Dev.	P25	Median	P75
Panel A Test Variables					
Δ *logTotalCWPD*	0.0155	0.7340	−0.2815	0.0242	0.3317
Δ*logCashCWPD*	−0.0372	0.4870	−0.1657	0.0000	0.1296
Δ*logSalaryCWPD*	0.0048	0.2482	−0.0314	0.0060	0.0597
Panel B Dependent Variables					
Δ*Rate*	−0.1229	0.9421	0.0000	0.0000	0.0000
Downgrade	0.1474	0.3546	0.0000	0.0000	0.0000
Upgrade	0.1043	0.3057	0.0000	0.0000	0.0000
Panel C Control Variables					
Δ*CFO*	−0.0018	0.0713	−0.0309	−0.0009	0.0276
Δ*ROA*	−0.0025	0.0890	−0.0218	0.0005	0.0177
Δ*INTCOV*	−0.5454	45.1248	−1.5666	0.1577	1.7043
Δ*Loss*	0.0138	0.4188	0.0000	0.0000	0.0000
Δ*Asset*	0.0676	0.2147	−0.0192	0.0374	0.1220
Δ*Leverage*	−0.0113	0.2009	−0.0781	−0.0149	0.0507
Δ*Subord*	−0.0028	0.1931	0.0000	0.0000	0.0000
Δ*CAPINT*	0.0004	0.0987	−0.0216	0.0048	0.0312
Δ*StdROA*	−0.0035	0.1435	−0.0056	−0.0002	0.0042

The table reports the descriptive statistics of the variables in Equation (1) to (3). Δ*TotallogCWPD* is the change of the natural logarithm of the pay disparity between CEO total compensation and average employee pay from *t-1* to *t*; Δ*logCashCWPD* is the change of the natural logarithm of the pay disparity between CEO cash compensation and average employee pay from *t-1* to *t*; Δ*logSalaryCWPD* is the change of the natural logarithm of the pay disparity between CEO base salaries and average employee pay from $t-1$ to *t*; Δ*Rate* is the change of credit ratings from *t-1* to *t*; *Downgrade* is an indicator variable that equals one if an observation receives a credit rating downgrade in *t* and zero otherwise; *Upgrade* is an indicator variable that equals one if an observation receives a credit rating upgrade in *t* and zero otherwise; Δ*CFO* is the change of cash flows from operating activities scaled by average total assets at the beginning and at the end of the period from *t-1* to *t*; Δ*ROA* is the change of return on assets from *t-1* to *t*; Δ*INTCOV* is the change of operating income before depreciation divided by interest expenses from *t-1* to *t*; *Loss* is an indicator variable that equals one if an observation has a loss in *t* and zero otherwise; Δ*Asset* is the change of the natural logarithm of total assets from *t-1* to *t*; Δ*Leverage* is the change of leverage from *t-1* to *t*; *Subord* is an indicator variable that equals one if an observation has subordinated loans and zero otherwise; Δ*CAPINT* is the change of physical capital intensity from *t-1* to *t*; Δ*StdROA* is the change of earnings volatility from *t-1* to *t*.

Table 3: Pairwise Pearson Correlation Table

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
$\Delta logTotalCWPD$															
$\Delta logCashCWPD$	0.36														
$\Delta logSalaryCWPD$	0.26	0.46													
$\Delta Rate$	0.09	0.07	0.10												
$\Delta Downgrade$	−0.11	−0.12	−0.09	−0.60											
$\Delta Upgrade$	0.10	0.10	0.06	0.43	−0.15										
ΔCFO	0.08	0.08	−0.01	0.11	−0.10	0.12									
ΔROA	0.20	0.20	0.01	0.01	−0.07	0.02	0.12								
$\Delta INTCOV$	−0.01	−0.01	−0.02	0.02	0.01	0.04	0.03	0.05							
$\Delta Loss$	−0.08	−0.08	0.08	−0.02	0.06	−0.03	−0.13	−0.41	−0.04						
$\Delta Asset$	0.08	0.08	0.07	0.05	−0.06	−0.04	0.10	0.11	−0.06	−0.04					
$\Delta Leverage$	0.12	−0.05	0.01	−0.07	0.13	−0.05	−0.01	0.03	−0.05	0.02	−0.16				
$\Delta Subord$	−0.03	0.01	−0.10	0.03	0.01	−0.03	0.01	0.01	−0.01	0.01	0.08	−0.06			
$\Delta CAPINT$	−0.11	−0.23	0.04	−0.02	0.04	0.01	−0.08	−0.23	0.07	0.14	−0.55	0.06	−0.05		
$\Delta StdROA$	0.06	−0.01	0.02	0.01	0.03	0.02	0.01	−0.02	−0.01	0.07	−0.07	0.06	0.02	0.00	

Table 4: Sample Composition and Industry Distribution -Firm-level Average Employee Pay Sample

Panel A Sample Composition		
Execucomp		39,077
Less:	Public utility and financial service firms	(8,431)
		30,646
Execucomp population		30,646
Less:	Staff expense missing	(28,011)
	Employee headcount missing	(30)
	Credit rating missing	(1,151)
	Control variables missing	(71)
Final sample		(1,383)

Panel B Industry Distribution

	Sample		**Population**	
	N of Obs	**Percent**	**N of Obs**	**Percent**
Agriculture	0	0.00	104	0.34
Mining	71	5.13	1,627	5.31
Construction	1	0.07	481	1.57
Manufacturing	520	37.60	16,375	53.43
Transportation	342	24.73	1,063	3.47
Communication	61	4.41	953	3.11
Wholesale	17	1.24	1,155	3.77
Retail	123	8.89	3,194	10.42
Services	248	17.93	5,495	17.93
Public Admin	0	0.00	199	0.65
Total	1,383	100.00	30,646	100.00

Panel C CEO-to-worker Pay Disparity across Industries

	Mean	**Std. Dev.**	**P25**	**Median**	**P75**
Mining	205.55	390.80	29.21	77.56	160.80
Construction	83.19	40.01	76.97	64.84	83.44
Manufacturing	93.74	206.83	33.30	61.28	124.54
Transportation	59.36	65.79	18.21	5.42	78.20
Communication	72.99	79.26	29.69	51.68	86.94
Wholesale	78.04	149.68	17.10	29.60	61.61
Retail	361.88	499.20	92.00	198.25	359.69
Services	117.75	231.03	28.16	63.65	133.49
Total	135.21	282.19	28.78	61.79	141.39

This table describes the sample selection process for the sample using firm-level average employee pay measure in Panel A, the industry distribution of the sample firms in Panel B, and the descriptive statistics of CEO-to-worker pay disparity across industries in Panel C. Industry is defined at the two-digit Standard Industrial Classification (SIC) level.

Table 5: Descriptive Statistics of CEO-to-worker Pay Disparity Based on Firm-level Average Employee Pay

Panel A	**Mean**	**Std. Dev.**	**P25**	**Median**	**P75**
$\Delta\, logTotalCWPD$	0.0611	0.7730	-0.2111	0.0519	0.3500
$\Delta\, logTotalCWPD$	-0.0072	0.4598	-0.1314	0.0124	0.1639
$\Delta\, logTotalCWPD$	0.0003	0.2542	-0.0582	0.0073	0.0798

Panel B	$logTotalCWPD$	$logCashCWPD$	$logSalaryCWPD$
$logTotalCWPD$	**0.65**		
$logCashCWPD$	0.53	**0.70**	
$logSalaryCWPD$	0.36	0.23	**0.29**

Panel C	$\Delta logTotalCWPD$	$\Delta logCashCWPD$	$\Delta logSalaryCWPD$
$\Delta logTotalCWPD$	**0.96**		
$\Delta logCashCWPD$	0.36	**0.88**	
$\Delta logSalaryCWPD$	0.21	0.29	**0.59**

This table reports the descriptive statistics of $\Delta logCWPD$ based on firm-level average employee pay measure in Panel A, the correlation between CEO-to-worker pay disparity based on the industry average wage rate and CEO-to-worker pay disparity based on firm-level average employee pay in Panel B and the correlation between the changes of the two CEO-to-worker pay disparity measures in Panel C.

Table 6: Credit Rating and CEO-to-worker Pay Disparity

Panel A Univariate Analysis

Variable	Group	N	Rating	t-value
TotalCWPD	High	3,686	13.174	32.774***
	Low	3,686	10.815	
CashCWPD	High	3,686	12.841	23.028***
	Low	3,686	11.130	
SalaryCWPD	High	3,686	12,901	24.820***
	Low	3,686	11.068	

Panel B Multivariate Analysis

Variable	Predicted	(1)	(2)	(3)
$\Delta logTotalCWPD$	?	0.149***		
		(0.040)		
$\Delta logCashCWPD$	?		0.161***	
			(0.059)	
$\Delta logSalaryCWPD$	?			0.082
				(0.112)
ΔCFO	+	2.737***	2.795***	2.882***
		(0.499)	(0.516)	(0.508)
ΔROA	+	2.414***	2.394***	2.439***
		(0.538)	(0.517)	(0.521)
$\Delta INTCOV$	+	0.001***	0.001***	0.001***
		(0.000)	(0.000)	(0.000)
$\Delta Loss$	-	−0.459***	−0.475***	−0.480***
		(0.119)	(0.116)	(0.116)
$\Delta Asset$	+	0.566***	0.556***	0.561***
		(0.220)	(0.228)	(0.230)
$\Delta Leverage$	-	−1.526***	−1.527***	−1.519***
		(0.201)	(0.224)	(0.226)
$\Delta Subord$	-	−0.309**	−0.324**	−0.327***
		(0.144)	(0.129)	(0.132)
$\Delta CAPINT$	+	0.325	0.319	0.294
		(0.379)	(0.380)	(0.381)
$\Delta StdROA$	-	−0.042	−0.040	−0.048
		(0.075)	(0.074)	(0.075)
Year indicator		Yes	Yes	Yes
Observations		7,372	7,372	7,372
Pseudo R^2		5.11	5.07	4.62

This table provides the results on the relation between credit ratings and CEO-to-worker pay disparity and the control variables. Panel A presents the results of the univariate analysis. Panel B reports the results of the multivariate analysis with the change in credit ratings as the dependent variable. Year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 7: Rating Downgrade and CEO-to-worker Pay Disparity

Variable	Predicted	(1)	(2)	(3)
$\Delta logTotalCWPD$	?	−0.152***		
		(0.069)		
$\Delta logCashCWPD$	?		−0.180**	
			(0.069)	
$\Delta logSalaryCWPD$	?			−0.048
				(0.135)
ΔCFO	-	−2.254***	−2.314***	−2.409***
		(0.708)	(0.731)	(0.735)
ΔROA	-	−2.410***	−2.367***	−2.403***
		(0.657)	(0.666)	(0.632)
$\Delta INTCOV$	-	−0.001**	−0.001**	−0.001**
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	+	0.462***	0.486***	0.488***
		(0.131)	(0.127)	(0.128)
$\Delta Asset$	-	−1.101***	−1.085***	−1.10 ***
		(0.290)	(0.308)	(0.318)
$\Delta Leverage$	+	1.587***	1.590***	1.578***
		(0.224)	(0.254)	(0.257)
$\Delta Subord$	+	0.321*	0.349**	0.355**
		(0.166)	(0.142)	(0.147)
$\Delta CAPINT$	-	−0.172	−0.193	−0.151
		(0.524)	(0.528)	(0.524)
$\Delta StdROA$	+	0.400	0.433	0.456
		(0.923)	(0.996)	(1.068)
Intercept		−2.015***	−2.019***	−2.022***
		(0.024)	(0.026)	(0.025)
Year indicator		Yes	Yes	Yes
Observations		7,372	7,372	7,372
Pseudo R^2		8.02	7.96	7.83

This table provides the results on the relation between rating downgrades and CEO-to-worker pay disparity and control variables. Control variables and year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level and year-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 8: Rating Upgrade and CEO-to-worker Pay Disparity

Variable	Predicted	(1)	(2)	(3)
$\Delta logTotalCWPD$	?	0.139**		
		(0.075)		
$\Delta logCashCWPD$	?		0.149*	
			(0.076)	
$\Delta logSalaryCWPD$	?			0.190
				(0.200)
ΔCFO	+	3.707***	3.783***	3.825***
		(0.509)	(0.493)	(0.488)
ΔROA	+	1.298**	1.321*	1.388**
		(0.798)	(0.725)	(0.727)
$\Delta INTCOV$	+	0.001*	0.001*	0.001*
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	-	−0.461***	−0.456***	−0.468***
		(0.130)	(0.124)	(0.122)
$\Delta Asset$	+	−0.078	−0.072	−0.083
		(0.275)	(0.271)	(0.270)
$\Delta Leverage$	-	−1.305***	−1.301***	−1.293***
		(0.326)	(0.320)	(0.322)
$\Delta Subord$	-	−0.355*	−0.347*	−0.352*
		(0.185)	(0.179)	(0.177)
$\Delta CAPINT$	+	0.372	0.387	0.344
		(0.541)	(0.548)	(0.550)
$\Delta StdROA$	-	−2.412**	−2.543**	−2.461**
		(1.086)	(1.054)	(1.024)
$Intercept$		−2.326***	−2.319***	−2.322***
		(0.024)	(0.024)	(0.024)
Year indicator		Yes	Yes	Yes
Observations		7,372	7,372	7,372
Pseudo R^2		6.52	7.96	6.45

This table provides the results on the relation between rating upgrades and CEO-to-worker pay disparity and control variables. Control variables and year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level and year-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 9: Nonlinear Relationship between Credit Ratings and CEO-to-worker Pay Disparity

EmpPay(r_1) **CEOComp(r_2)**	**Low**	**Medium**	**High**	**Low vs. Medium**	**Low vs. High**
Panel A Total Compensation					
Low	0.061	0.004	0.078	0.69	0.34
Sd. Error	(0.108)	(0.124)	(0.096)		
N	1,815	1,847	1,843		
PseudoR^2	6.13	6.34	5.21		
Medium	0.878***	0.825**	0.267*	0.92	**0.09**
Sd. Error	(0.331)	(0.423)	(0.144)		
N	1,927	1,906	1,732		
PseudoR^2	7.13	5.86	5.19		
High	0.242**	0.259*	0.013	0.93	**0.09**
Sd. Error	(0.086)	(0.148)	(0.106)		
N	1,873	1,836	1,769		
PseudoR^2	6.81	5.65	5.59		
Low vs. Medium	**0.02**	**0.06**	0.28		
Low vs. Mediaum	**0.06**	0.21	0.16		
Panel B Cash Compensation					
EmpPay(r_1) CEOComp(r_2)	Low	Medium	High	Low vs. Medium	Low vs. High
Low	0.058	0.159	0.232	0.66	0.45
Sd. Error	(0.190)	(0.124)	(0.134)		
N	1,852	1,947	1,795		
PseudoR^2	6.82	6.09	5.70		
Medium	0.931**	0.380	0.194	0.13	**0.07**
Sd. Error	(0.114)	(0.345)	(0.401)		
N	1,973	1,885	1,689		
PseudoR^2	6.45	6.07	5.68		
High	0.110	-0.107	-0.220	0.70	**0.02**
Sd. Error	(0.070)	(0.260)	(0.117)		
N	1,793	1,697	1,773		
PseudoR^2	6.37	5.67	4.30		
Low vs. Medium	$<$**0.01**	0.55	0.93		
Low vs. Mediaum	$<$**0.01**	0.26	0.32		
Panel C Salary					
EmpPay(r_1) CEOComp(r_2)	Low	Medium	High	Low vs. Medium	Low vs. High
Low	0.154	-0.330	0.078	0.30	0.83
Sd. Error	(0.281)	(0.371)	(0.229)		
N	1,931	1,896	1,703		
PseudoR^2	6.16	6.11	5.90		
Medium	1.200	5.078	-0.688	0.19	0.26
Sd. Error	(0.814)	(2.809)	(1.461)		

Continued on next page

Table 9 – continued from previous page

EmpPay(r_1) / CEOComp(r_2)	Low	Medium	High	Low vs. Medium	Low vs. High
Panel C Salary					
N	1,604	1,614	1,456		
PseudoR^2	6.29	6.06	5.35		
High	-0.244	-0.386	-0.335	0.84	0.86
Sd. Error	(0.286)	(0.659)	(0.552)		
N	1,709	1,744	1,861		
PseudoR^2	7.51	5.74	5.01		
Low vs. Medium	0.23	**0.06**	0.22		
Low vs. Mediaum	**0.09**	**0.06**	0.65		

This table provides the results on the non-linear relation between credit ratings and CEO-to-worker pay disparity. Control variables and year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 10: Labor Intensity, Credit Rating and CEO-to-worker Pay Disparity

Variable	Predicted	(1)	(2)	(3)
$\Delta logCWPD$	?	0.208***		
		(0.068)		
$\Delta logCWPD$	?		0.281**	
			(0.123)	
$\Delta logCWPD$	?			0.076
				(0.207)
$LaborIntensity$	?	0.041	0.027	0.012
		(0.083)	(0.083)	(0.083)
$\Delta logCWPD$	+	0.182**		
$*LaborIntensity$		(0.096)		
$\Delta logCWPD$	+		0.345**	
$*LaborIntensity$			(0.175)	
$\Delta logCWPD$	+			0.156
$*LaborIntensity$				(0.305)
ΔCFO	+	2.879***	3.032***	3.089***
		(0.589)	(0.595)	(0.595)
ΔROA	+	2.192***	2.221*	2.220***
		(0.628)	(0.619)	(0.616)
$\Delta INTCOV$	+	0.001	0.001	0.001
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	-	−0.671***	−0.679***	−0.682***
		(0.107)	(0.107)	(0.107)
$\Delta Asset$	+	0.516***	0.488***	0.509***
		(0.216)	(0.213)	(0.215)
$\Delta Leverage$	-	−1.412***	−1.373***	−1.382***
		(0.253)	(0.253)	(0.252)
$\Delta Subord$	-	−0.285	−0.316*	−0.320*
		(0.163)	(0.162)	(0.162)
$\Delta CAPINT$	+	0.122	0.084	0.114
		(0.463)	(0.463)	(0.464)
$\Delta StdROA$	-	−0.062	−0.078	−0.082
		(0.116)	(0.117)	(0.116)
Year indicator		Yes	Yes	Yes
Observations		3,686	3,686	3,686
Pseudo R^2		5.16	5.18	5.08

This table provides the results on the relation between credit ratings and CEO-to-worker pay disparity conditional on labor intensity. Control variables and year indicator variables are included but the coefficient estimates are suppressed. The p-value for $\Delta logCWPD * LaborIntensity$ is based on one-tailed t tests. All the other p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 11: CEO Compensation, Credit Rating and CEO-to-worker Pay Disparity

Variable	**Predicted**	**(1)**	**(2)**	**(3)**
$\Delta logTotalCWPD$	?	0.132**		
		(0.052)		
$\Delta logCashCWPD$	?		0.112*	
			(0.065)	
$\Delta logSalaryCWPD$	?			0.062
				(0.117)
$ExcessiveCEOComp$	?	0.062	0.056	0.076
		(0.083)	(0.747)	(0.083)
$\Delta logTotalCWPD$	+	−0.023***		
$*ExcessiveCEOComp$		(0.010)		
$\Delta logCashCWPD$	+		−0.012	
$*ExcessiveCEOComp$			(0.019)	
$\Delta logSalaryCWPD$	+			0.026
$*ExcessiveCEOComp$				(0.024)
ΔCFO	+	2.745***	2.671***	2.736***
		(0.423)	(0.443)	(0.439)
ΔROA	+	2.262***	2.743*	2.783***
		(0.474)	(0.419)	(0.493)
$\Delta INTCOV$	+	0.001***	0.001***	0.001***
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	-	−0.443***	−0.439***	−0.446***
		(0.084)	(0.089)	(0.089)
$\Delta Asset$	+	0.607***	0.603***	0.618***
		(0.159)	(0.169)	(0.170)
$\Delta Leverage$	-	−1.517***	−1.655***	−1.661***
		(0.174)	(0.178)	(0.178)
$\Delta Subord$	-	−0.297**	−0.327**	−0.330**
		(0.133)	(0.138)	(0.138)
$\Delta CAPINT$	+	0.442	0.444	0.446
		(0.343)	(0.388)	(0.390)
$\Delta StdROA$	-	−0.312	−0.149	−0.150
		(0.316)	(0.307)	(0.305)
Year indicator		Yes	Yes	Yes
Observations		7,372	7,372	7,372
Pseudo R^2		5.20	5.45	5.44

This table provides the results on the relation between credit ratings and CEO-to-worker pay disparity conditional on CEO compensation. Control variables and year indicator variables are included but the coefficient estimates are suppressed. The p-value for $\Delta logCWPD * ExcessiveCEOComp$ is based on one-tailed t tests. All the other p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 12: Heckman First-stage Regression

Variable	Coefficient
Asset	0.131***
	(0.052)
MTB	−0.002***
	(0.001)
Leverage	0.021***
	(0.006)
CAPINT	0.401***
	(0.010)
AveSale	−0.001
	(0.001)
Exchange dummies	Jointly significant
Year indicator	Yes
Industry indicator	Yes
Observations	148,762
Pseudo R^2	15.84

This table provides the results of the Heckman first-stage regression (Equation (8)). Year indicator variables and industry indicator variables are included but the coefficient estimates are suppressed. The p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 13: Credit Rating and CEO-to-worker Pay Disparity
-Firm-level Average Employee Pay Sample

Panel A Univariate Analysis				
Variable	**Group**	**N**	**Rating**	**t-value**
TotalCWPD	High	600	12.990	1.237
	Low	600	12.703	
CashCWPD	High	600	13.810	8.579***
	Low	600	11.880	
SalaryCWPD	High	600	13.368	4.560***
	Low	600	12.320	

Panel B Multivariate Analysis				
Variable	**Predicted**	**(1)**	**(2)**	**(3)**
$\Delta logTotalCWPD$	?	0.285***		
		(0.040)		
$\Delta logCashCWPD$	?		0.402*	
			(0.059)	
$\Delta logSalaryCWPD$	?			0.729***
				(0.313)
ΔCFO	+	4.731***	4.689***	5.030***
		(1.046)	(1.040)	(1.042)
ΔROA	+	0.547	1.038	1.135
		(1.141)	(0.994)	(1.037)
$\Delta INTCOV$	+	−0.001	−0.001	−0.001
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	-	−0.103	−0.049	−0.109
		(0.249)	(0.241)	(0.244)
$\Delta Asset$	+	−0.504	−0.720	−0.805
		(0.471)	(0.517)	(0.513)
$\Delta Leverage$	-	−1.980***	−1.879***	−1.861***
		(0.605)	(0.615)	(0.604)
$\Delta Subord$	-	−0.465	−0.627	−0.599
		(0.529)	(0.529)	(0.524)
$\Delta CAPINT$	+	−0.338	−0.617	−0.593
		(0.820)	(0.850)	(0.865)
$\Delta StdROA$	-	0.691	−0.480	−0.397
		(3.013)	(3.290)	(3.138)
IMR	?	−0.260*	−0.234*	−0.245*
		(0.155)	(0.156)	(0.157)
Year indicator		Yes	Yes	Yes
Observations		1,200	1,200	1,200
Pseudo R^2		5.36	5.44	5.61

This table provides the results on the relation between credit ratings and CEO-to-worker pay disparity and control variables. Panel A presents the results of the univariate analysis. Panel B reports the results of the multivariate analysis with the change in credit rating as the dependent variable. Year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 14: Rating Downgrade and CEO-to-worker Pay Disparity
-Firm-level Average Employee Pay Sample

Variable	**Predicted**	**(1)**	**(2)**	**(3)**
$\Delta logTotalCWPD$	?	−0.349***		
		(0.103)		
$\Delta logCashCWPD$	?		−0.718***	
			(0.207)	
$\Delta logSalaryCWPD$	?			−1.219***
				(0.368)
ΔCFO	-	−3.068***	−2.950**	−3.409**
		(1.418)	(1.380)	(1.375)
ΔROA	-	−1.423	−1.622**	−1.620**
		(0.899)	(0.764)	(0.720)
$\Delta INTCOV$	-	0.003	0.003	0.003
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	+	0.205	0.153	0.243
		(0.337)	(0.326)	(0.324)
$\Delta Asset$	-	−0.560	−0.202	−0.041
		(0.744)	(0.723)	(0.748)
$\Delta Leverage$	+	1.949***	1.875***	1.823***
		(0.547)	(0.559)	(0.543)
$\Delta Subord$	+	0.214	0.522	0.501
		(0.544)	(0.561)	(0.578)
$\Delta CAPINT$	-	0.145	0.376	0.440
		(1.059)	(1.043)	(1.095)
$\Delta StdROA$	+	−2.167	−0.022	−0.060
		(3.385)	(3.329)	(3.295)
IMR	+	0.248	0.195	0.221
		(0.245)	(0.247)	(0.242)
$Intercept$		−3.445***	−3.504***	−3.519***
		(1.030)	(1.030)	(1.032)
Year indicator		Yes	Yes	Yes
Observations		1,200	1,200	1,200
Pseudo R^2		10.69	10.69	10.53

This table provides the results on the relation between rating downgrade and CEO-to-worker pay disparity and control variables. Control variables and year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level and year level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 15: Rating Upgrade and CEO-to-worker Pay Disparity
-Firm-level Average Employee Pay Sample

Variable	Predicted	(1)	(2)	(3)
$\Delta logTotalCWPD$	?	0.221*		
		(0.140)		
$\Delta logCashCWPD$	?		0.070	
			(0.306)	
$\Delta logSalaryCWPD$	?			0.197
				(0.535)
ΔCFO	+	6.363***	6.486***	0.515***
		(1.979)	(1.959)	(1.988)
ΔROA	+	−0.971	−0.768	−0.759
		(1.044)	(1.016)	(1.027)
$\Delta INTCOV$	+	0.025*	0.026*	0.026*
		(0.015)	(0.015)	(0.015)
$\Delta Loss$	-	−0.122	−0.113	−0.127
		(0.281)	(0.279)	(0.283)
$\Delta Asset$	+	−1.483**	−1.386**	−1.411**
		(0.635)	(0.642)	(0.640)
$\Delta Leverage$	-	−1.525	−1.419	−1.421
		(0.934)	(0.947)	(0.959)
$\Delta Subord$	-	−0.440	−0.491	−0.483
		(0.802)	(0.817)	(0.810)
$\Delta CAPINT$	+	−0.550	−0.585	−0.576
		(0.479)	(0.500)	(0.504)
$\Delta StdROA$	-	2.437	2.600	2.609
		(2.685)	(2.877)	(2.851)
$Intercept$		−0.895*	−0.849	−0.849
		(0.518)	(0.518)	(0.518)
Year indicator		Yes	Yes	Yes
Observations		1,200	1,200	1,200
Pseudo R^2		10.57	10.36	10.38

This table provides the results on the relation between rating upgrade and CEO-to-worker pay disparity and control variables. Control variables and year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level and year level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 16: Nonlinear Relationship between Credit Ratings and CEO-to-worker Pay Disparity -Firm-level Average Employee Pay Sample

EmpPay(r_1) **CEOComp(r_2)**	**Low**	**High**	**High vs. Low**
Panel A Total Compensation			
Low	0.189	-0.125	0.681
Sd. Error	(0.618)	(0.451)	
N	279	283	
PseudoR^2	15.59	10.30	
Medium	3.369***	-1.535	**0.02**
Sd. Error	(1.051)	(1.798)	
N	308	283	
PseudoR^2	14.25	11.72	
High	0.151	-1.533**	**0.01**
Sd. Error	(0.194)	(0.519)	
N	302	288	
PseudoR^2	10.97	12.86	
Low vs. Medium	<**0.01**	0.45	
Low vs. Mediaum	<**0.01**	0.98	
Panel B Cash Compensation			
Low	0.995***	0.141	**0.10**
Sd. Error	(0.333)	(0.401)	
N	279	281	
PseudoR^2	15.34	9.87	
Medium	1.275***	-1.022	**0.03**
Sd. Error	(0.441)	(0.936)	
N	307	282	
PseudoR^2	14.67	11.83	
High	0.230	-0.119	0.96
Sd. Error	(0.149)	(0.779)	
N	300	288	
PseudoR^2	11.26	10.55	
Low vs. Medium	0.61	0.25	
Low vs. Mediaum	**0.03**	0.46	
Panel C Salary			
Low	-0.204	-1.053	0.61
Sd. Error	(1.373)	(0.939)	
N	287	283	
PseudoR^2	11.50	9.56	
Medium	-0.254	-0.770	0.90
Sd. Error	(1.857)	(3.802)	
N	244	264	

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Table 16 – continued from previous page

EmpPay(r_1) **CEOComp(r_2)**	**Low**	**High**	**High vs. Low**
PseudoR^2	15.03	12.50	
Panel C Salary			
High	-0.548	-2.791***	**0.05**
Sd. Error	(0.790)	(0.823)	
N	290	286	
PseudoR^2	12.95	12.16	
Low vs. Medium	0.98	0.94	
Low vs. Medium	0.88	0.60	

This table provides the results on the non-linear relation between credit ratings and CEO-to-worker pay disparity. Control variables and year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 17: Labor Intensity, Credit Rating and CEO-to-worker Pay Disparity -Firm-level Average Employee Pay Sample

Variable	**Predicted**	**(1)**	**(2)**	**(3)**
$\Delta logCWPD$	?	0.118		
		(0.143)		
$\Delta logCWPD$	?		0.629*	
			(0.373)	
$\Delta logCWPD$	?			1.850***
				(0.515)
$LaborIntensity$	?	−0.022	−0.023	−0.010
		(0.179)	(0.177)	(0.179)
$\Delta logCWPD$	+	0.237*		
$*LaborIntensity$		(0.210)		
$\Delta logCWPD$	+		0.605*	
$*LaborIntensity$			(0.448)	
$\Delta logCWPD$	+			2.316***
$*LaborIntensity$				(0.676)
ΔCFO	+	5.450***	5.376***	5.743***
		(1.326)	(1.251)	(1.383)
ΔROA	+	−0.438	−0.268	−0.357
		(1.715)	(1.605)	(1.731)
$\Delta INTCOV$	+	−0.002**	−0.002**	−0.002
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	-	−0.284	−0.304	−0.377
		(0.320)	(0.318)	(0.324)
$\Delta Asset$	+	−0.140	−0.413	−0.506
		(0.720)	(0.726)	(0.726)
$\Delta Leverage$	-	−2.144***	−2.096***	−2.255***
		(0.720)	(0.726)	(0.726)
$\Delta Subord$	-	−0.760	−0.924	−1.031
		(0.626)	(0.601)	(0.629)
$\Delta CAPINT$	+	0.576	0.379	0.473
		(0.921)	(0.975)	(1.023)
$\Delta StdROA$	-	4.451	0.980	−1.682
		(8.296)	(8.618)	(7.880)
IMR	?	−0.230*	−0.181	−0.219
		(0.216)	(0.216)	(0.219)
Year indicator		Yes	Yes	Yes
Observations		600	600	600
Pseudo R^2		7.90	7.94	8.63

This table provides the results on the relation between credit ratings and CEO-to-worker pay disparity conditional on labor intensity. Control variables and year indicator variables are included but the coefficient estimates are suppressed. The p-value for $\Delta logCWPD * LaborIntensity$ is based on one-tailed t tests. All the other p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 18: CEO Compensation, Credit Rating and CEO-to-worker Pay Disparity -Firm-level Average Employee Pay Sample

Variable	Predicted	(1)	(2)	(3)
$\Delta logTotalCWPD$	?	0.227		
		(0.181)		
$\Delta logCashCWPD$	?		0.546**	
			(0.265)	
$\Delta logSalaryCWPD$	?			0.734
				(0.474)
$ExcessiveCEOComp$	?	−0.155		
		(0.261)		
$\Delta logTotalCWPD$	+		−0.343*	
$*ExcessiveCEOComp$			(0.302)	
$\Delta logCashCWPD$	+			
$*ExcessiveCEOComp$			(0.019)	
$\Delta logSalaryCWPD$	+			−0.065
$*ExcessiveCEOComp$				(0.612)
ΔCFO	+	4.674***	4.452***	4.756***
		(1.024)	(1.009)	(1.021)
ΔROA	+	0.592	0.938	0.981
		(1.123)	(0.982)	(1.021)
$\Delta INTCOV$	+	−0.001	−0.001	−0.001
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	-	−0.091	−0.011	−0.078
		(0.244)	(0.240)	(0.245)
$\Delta Asset$	+	−0.370	−0.308	−0.397
		(0.475)	(0.440)	(0.444)
$\Delta Leverage$	-	−2.026***	−2.061***	−1.996***
		(0.593)	(0.613)	(0.598)
$\Delta Subord$	-	−0.428	−0.495	−0.436
		(0.520)	(0.525)	(0.520)
$\Delta CAPINT$	+	−0.131	−0.248	−0.175
		(0.810)	(0.810)	(0.810)
$\Delta StdROA$	-	0.746	0.409	0.708
		(2.877)	(2.828)	(2.856)
ΔIMR	-	−0.226*	−0.221*	−0.230*
		(0.152)	(0.153)	(0.154)
Year indicator		Yes	Yes	Yes
Observations		1,200	1,200	1,200
Pseudo R^2		5.80	5.73	5.72

This table provides the results on the relation between credit ratings and CEO-to-worker pay disparity conditional on CEO compensation. Control variables and year indicator variables are included but the coefficient estimates are suppressed. The p-value for $\Delta logCWPD * ExcessiveCEOComp$ is based on one-tailed t tests. All the other p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 19: CEO-to-worker Pay Disparity and the Realized Interest Rate

Variable	**(1)**	**(2)**	**(3)**
Panel A			
$\Delta logTotalCWPD$	-0.001		
	(0.001)		
$\Delta logCashCWPD$		-0.001	
		(0.001)	
$\Delta logSalaryCWPD$			-0.002**
			(0.001)
ΔCFO	-0.001	-0.001	-0.001
	(0.006)	(0.006)	(0.006)
ΔROA	-0.006	-0.006	-0.006
	(0.005)	(0.005)	(0.005)
$\Delta INTCOV$	-0.001*	-0.001*	-0.001*
	(0.001)	(0.001)	(0.001)
$\Delta Loss$	0.001*	0.001*	0.001*
	(0.001)	(0.001)	(0.001)
$\Delta Leverage$	0.011***	0.011***	0.011***
	(0.002)	(0.002)	(0.002)
$\Delta Subord$	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)
$\Delta CAPINT$	-0.001	-0.001	-0.001
	(0.004)	(0.004)	(0.004)
$\Delta StdROA$	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
$\Delta OrthRate$	-0.001***	-0.001***	-0.001***
	(0.001)	(0.001)	(0.001)
$\Delta Intercept$	-0.003***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)
	(0.003)	(0.003)	(0.001)
Year Indicators	Yes	Yes	Yes
Observations	7,310	7,310	7,310
Adjusted R^2	5.14	5.14	5.16
Panel B			
$\Delta logTotalCWPD$	-0.001		
	(0.001)		
$\Delta logCashCWPD$		-0.001	
		(0.001)	
$\Delta logSalaryCWPD$			-0.003**
			(0.002)
ΔCFO	-0.002	-0.001	-0.001
	(0.002)	(0.001)	(0.001)
ΔROA	-0.010	-0.010	-0.011

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Table 19 – continued from previous page

Variable	**(1)**	**(2)**	**(3)**
Panel B			
	(0.014)	(0.014)	(0.014)
$\Delta INTCOV$	-0.001***	-0.001***	-0.001***
	(0.001)	(0.001)	(0.001)
$\Delta Loss$	0.004 *	0.004 *	0.004*
	(0.003)	(0.002)	(0.002)
$\Delta Asset$	-0.005*	-0.006*	-0.007**
	(0.004)	(0.004)	(0.003)
$\Delta Leverage$	0.006	0.006	0.005
	(0.005)	(0.005)	(0.005)
$\Delta Subord$	0.004	0.004	0.002
	(0.007)	(0.007)	(0.003)
$\Delta CAPINT$	-0.001	-0.001	-0.001
	(0.008)	(0.008)	(0.008)
$\Delta StdROA$	0.007*	0.074*	0.082*
	(0.041)	(0.040)	(0.044)
$\Delta OrthRate$	-0.002**	-0.002**	-0.002**
	(0.001)	(0.001)	(0.001)
$\Delta Intercept$	-0.002	-0.003	-0.005***
	(0.003)	(0.003)	(0.001)
Year Indicators	Yes	Yes	Yes
Observations	1,190	1,190	1,190
Adjusted R^2	17.56	17.30	17.84

This table provides the results on the relation between the interest rate and CEO-to-worker pay disparity and control variables. Panel A presents the results using the industry average wage rate as the proxy for average employee pay. Panel B presents the results based on firm-level average employee pay measure. Year indicator variables are included in the regression but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at both firm-level and year-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 20: Implied Cost of Equity

Panel A

Model	**Mean**	**(Std.Dev.)**	**(P25)**	**(Median)**	**P75**
OJN(2005)	0.09	0.06	0.05	0.07	0.11
Easton(2004)	0.11	0.06	0.07	0.09	0.13
GT(2001)	0.09	0.08	0.05	0.06	0.09
GLS(2001)	0.07	0.03	0.05	0.07	0.09

Panel B

	OJN(2005)	Easton(2004)	GT(2001)	GLS(2001)
OJN(2005)				
Easton(2004)	0.99			
GT(2001)	0.79	0.81		
GLS(2001)	0.59	0.76	0.52	

This table provides the summary statistics of the cost of equity measures estimated from the four implied cost of equity models described in Appendix C (Easton and Monahan (2005), Ohlson and Juettner-Nauroth (2005), Gebhardt et al. (2001) and Claus and Thomas (2001).

Table 21: CEO-to-worker Pay Disparity and the Cost of Equity

Variable	(1)	(2)	(3)
Panel A			
$\Delta logTotalCWPD$	-0.005***		
	(0.002)		
$\Delta logCashCWPD$		-0.007***	
		(0.003)	
$\Delta logSalaryCWPD$			-0.007*
			(0.004)
$\Delta\beta$	0.004*	0.004***	0.004*
	(0.002)	(0.001)	(0.002)
$\Delta Idiorisk$	0.451*	0.435	0.442*
	(0.274)	(0.277)	(0.274)
$\Delta Mktcap$	-0.057***	-0.057***	-0.058***
	(0.003)	(0.003)	(0.005)
ΔMTB	0.001**	0.001**	0.001**
	(0.001)	(0.001)	(0.001)
$\Delta Leverage$	-0.012***	-0.012***	-0.011***
	(0.004)	(0.004)	(0.004)
$\Delta Anadispersion$	0.113***	0.114***	0.113***
	(0.010)	(0.010)	(0.010)
$\Delta Error$	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)
$\Delta Intercept$	-0.003***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)
Year indicators	Yes	Yes	Yes
Observations	4,395	4,395	4,395
Adjusted R^2	36.43	36.17	35.98
Panel B			
$\Delta logTotalCWPD$	-0.004*		
	(0.003)		
$\Delta logCashCWPD$		-0.004	
		(0.006)	
$\Delta logSalaryCWPD$			0.003
			(0.008)
$\Delta\beta$	0.002	0.002	0.002
	(0.003)	(0.003)	(0.003)
$\Delta Idiorisk$	0.102	0.107	0.094
	(0.407)	(0.399)	(0.398)
$\Delta Mktcap$	-0.060***	-0.061***	-0.062***
	(0.014)	(0.014)	(0.014)
ΔMTB	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)

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Table 21 – continued from previous page

Variable	**(1)**	**(2)**	**(3)**
Panel B			
$\Delta Leverage$	0.009	0.008	0.008
	(0.010)	(0.009)	(0.010)
$\Delta Anadispersion$	0.103***	0.119***	0.119***
	(0.037)	(0.038)	(0.038)
$\Delta Error$	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)
$\Delta Intercept$	-0.010***	-0.004	0.003
	(0.003)	(0.006)	(0.008)
Year indicators	Yes	Yes	Yes
Observations	735	735	735
Adjusted R^2	39.40	41.20	41.10

This table provides the results on the relation between the cost of equity and CEO-to-worker pay disparity and control variables. Year indicator variables are included in the regression but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at both firm-level and year-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 22: Credit Rating and CEO-to-worker Pay Disparity
-Firm-level Average Employee Pay Sample (Excluding the Transportation Sector)

Variable	Predicted	(1)	(2)	(3)
$\Delta logTotalCWPD$	?	0.294***		
		(0.115)		
$\Delta logCashCWPD$	?		0.421*	
			(0.265)	
$\Delta logSalaryCWPD$	?			0.910***
				(0.356)
ΔCFO	+	4.921***	4.801***	5.195***
		(1.348)	(1.339)	(1.362)
ΔROA	+	1.693	1.890	2.074*
		(1.185)	(1.188)	(1.169)
$\Delta INTCOV$	+	0.001	0.001	0.001
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	-	0.161	0.147	0.097
		(0.277)	(0.268)	(0.266)
$\Delta Asset$	+	0.117	0.272	0.408
		(0.496)	(0.595)	(0.592)
$\Delta Leverage$	-	−2.016***	−1.837***	−1.826***
		(0.649)	(0.660)	(0.647)
$\Delta Subord$	-	−0.857	−1.050	−0.994
		(0.672)	(0.655)	(0.660)
$\Delta CAPINT$	+	0.542	0.657	0.686
		(0.896)	(1.021)	(1.066)
$\Delta StdROA$	-	−1.273	−3.290	−3.563
		(6.318)	(6.296)	(5.691)
Year indicator		Yes	Yes	Yes
Observations		875	875	875

This table provides the results on the relation between the cost of debt and the CEO-to-worker pay disparity and control variables excluding the transportation industry. Year indicator variables are included in the regression but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at both firm-level and year-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 23: Rating Downgrade and CEO-to-worker Pay Disparity
(Correcting for the Rare Event Bias)

Variable	Predicted	(1)	(2)	(3)
$\Delta logTotalCWPD$	?	−0.152***		
		(0.045)		
$\Delta logCashCWPD$	?		−0.178**	
			(0.070)	
$\Delta logSalaryCWPD$	?			−0.048
				(0.135)
ΔCFO	-	−2.239***	2.299***	−2.393***
		(0.488)	(0.488)	(0.486)
ΔROA	-	−2.451***	−2.414***	−2.451***
		(0.471)	(0.480)	(0.471)
$\Delta INTCOV$	-	−0.001*	−0.001**	−0.001**
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	+	0.462***	0.487***	0.489***
		(0.093)	(0.093)	(0.093)
$\Delta Asset$	-	−1.095***	−1.078***	−1.093***
		(0.270)	(0.206)	(0.207)
$\Delta Leverage$	+	1.587***	1.579***	1.567***
		(0.207)	(0.167)	(0.167)
$\Delta Subord$	+	0.319*	0.347**	0.353**
		(0.179)	(0.177)	(0.178)
$\Delta CAPINT$	-	−0.180	−0.202	−0.159
		(0.411)	(0.409)	(0.410)
$\Delta StdROA$	+	0.008	0.012	0.024
		(0.210)	(0.213)	(0.212)
$Intercept$		−2.006	−2.010	−2.012
		(0.169)	(0.169)	(0.169)
Year indicator		Yes	Yes	Yes
Observations		7,372	7,372	7,372

This table provides the results on the relation between rating downgrade and CEO-to-worker pay disparity and control variables using the penalized likelihood method to estimate Equation (2). Control variables and year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 24: Rating Upgrade and CEO-to-worker Pay Disparity
(Correcting for the Rare Event Bias)

Variable	**Predicted**	**(1)**	**(2)**	**(3)**
$\Delta logTotalCWPD$	?	0.139**		
		(0.056)		
$\Delta logCashCWPD$	?		0.149*	
			(0.089)	
$\Delta logSalaryCWPD$	?			0.190
				(0.165)
ΔCFO	+	3.700***	3.761***	3.804***
		(0.570)	(0.567)	(0.567)
ΔROA	+	1.266**	1.305***	1.373***
		(0.507)	(0.484)	(0.483)
$\Delta INTCOV$	+	0.001*	0.001*	0.001*
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	-	−0.448***	−0.464***	−0.466***
		(0.108)	(0.106)	(0.106)
$\Delta Asset$	+	0.079	0.067	0.078
		(0.217)	(0.213)	(0.214)
$\Delta Leverage$	-	−1.332***	−1.293***	−1.285***
		(0.225)	(0.223)	(0.224)
$\Delta Subord$	-	−0.342*	−0.348*	−0.353*
		(0.202)	(0.200)	(0.207)
$\Delta CAPINT$	+	0.261	0.376	0.334
		(0.467)	(0.463)	(0.464)
$\Delta StdROA$	-	0.188	−2.530**	−2.438**
		(0.761)	(1.090)	(1.089)
$Intercept$		−2.317	−2.300	−2.302
		(0.195)	(0.195)	(0.195)
Year indicator		Yes	Yes	Yes
Observations		7,372	7,372	7,372

This table provides the results on the relation between rating upgrade and CEO-to-worker pay disparity and control variables using the penalized likelihood method to estimate Equation (3). Control variables and year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 25: Rating Downgrade and CEO-to-worker Pay Disparity
-Firm-level Average Employee Pay Sample (Correcting for the Rare Event Bias)

Variable	Predicted	(1)	(2)	(3)
$\Delta logTotalCWPD$	?	−0.334***		
		(0.111)		
$\Delta logCashCWPD$	?		−0.697***	
			(0.193)	
$\Delta logSalaryCWPD$	?			−1.178***
				(0.334)
ΔCFO	-	−2.980**	−2.872**	−3.310**
		(0.1492)	(1.467)	(1.458)
ΔROA	-	−1.360	−1.346	−1.348**
		(1.196)	(1.259)	(1.253)
$\Delta INTCOV$	-	0.001	0.001	0.001
		(0.002)	(0.003)	(0.002)
$\Delta Loss$	+	0.198	0.157	0.244
		(0.236)	(0.245)	(0.234)
$\Delta Asset$	-	−0.542	−0.207	−0.046
		(0.593)	(0.573)	(0.576)
$\Delta Leverage$	+	1.857***	1.780***	1.721***
		(0.399)	(0.397)	(0.393)
$\Delta Subord$	+	0.210	0.514	0.495
		(0.540)	(0.533)	(0.530)
$\Delta CAPINT$	-	0.048	0.236	0.300
		(1.167)	(1.130)	(1.126)
$\Delta StdROA$	+	−2.211	0.317	0.377
		(3.740)	(3.934)	(4.005)
IMR	+	0.237	0.186	0.214
		(0.214)	(0.247)	(0.219)
$Intercept$		−3.034***	−3.504***	−3.104***
		(0.863)	(1.030)	(0.862)
Year indicator		Yes	Yes	Yes
Observations		1,200	1,200	1,200

This table provides the results on the relation between rating downgrade and CEO-to-worker pay disparity and control variables using the penalized likelihood method to estimate Equation (2). Control variables and year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 26: Rating Upgrade and CEO-to-worker Pay Disparity
-Firm-level Average Employee Pay Sample (Correcting for the Rare Even Bias)

Variable	Predicted	(1)	(2)	(3)
$\Delta logTotalCWPD$	?	0.238*		
		(0.137)		
$\Delta logCashCWPD$	?		0.085	
			(0.233)	
$\Delta logSalaryCWPD$	?			0.242
				(0.407)
ΔCFO	+	6.425***	6.583***	6.606***
		(1.898)	(1.891)	(1.889)
ΔROA	+	−0.711	−0.461	−0.462
		(0.945)	(0.960)	(0.957)
$\Delta INTCOV$	+	0.001	0.001	0.001
		(0.006)	(0.007)	(0.007)
$\Delta Loss$	-	−0.133	−0.123	−0.139
		(0.269)	(0.273)	(0.272)
$\Delta Asset$	+	−1.455**	−1.386**	−1.379**
		(0.632)	(0.641)	(0.642)
$\Delta Leverage$	-	−1.455**	−1.348**	−1.354**
		(0.611)	(0.602)	(0.605)
$\Delta Subord$	-	−0.461	−1.348**	−0.515
		(0.547)	(0.602)	(0.545)
$\Delta CAPINT$	+	−0.618	−0.679	−0.665
		(1.274)	(1.281)	(1.279)
$\Delta StdROA$	-	2.645	2.918	2.933
		(2.923)	(3.012)	(3.007)
IMR	-	−0.214	−0.224	−0.227
		(0.248)	(0.247)	(0.247)
$Intercept$		−0.815*	−0.762	−0.763
		(0.469)	(0.467)	(0.467)
Year indicator		Yes	Yes	Yes
Observations		1,200	1,200	1,200

This table provides the results on the relation between rating upgrade and CEO-to-worker pay disparity and control variables using the penalized likelihood method to estimate Equation (3). Control variables and year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 27: Credit Rating and CEO-to-worker Pay Disparity (Level Specification)

Variable	Predicted	(1)	(2)	(3)
$\Delta logTotalCWPD$	?	0.152***		
		(0.035)		
$\Delta logCashCWPD$	?		0.106*	
			(0.061)	
$\Delta logSalaryCWPD$	?			0.225**
				(0.109)
ΔCFO	+	3.255***	3.370***	3.379***
		(0.408)	(0.403)	(0.401)
ΔROA	+	2.810***	2.850***	2.893***
		(0.424)	(0.421)	(0.420)
$\Delta INTCOV$	+	0.001***	0.001*	0.001*
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	-	−0.546***	−0.549***	−0.544***
		(0.077)	(0.076)	(0.074)
$\Delta Asset$	+	0.892***	0.912***	0.899***
		(0.103)	(0.102)	(0.104)
$\Delta Leverage$	-	−1.090***	−1.098***	−1.099***
		(0.131)	(0.133)	(0.133)
$\Delta Subord$	-	−0.350**	−0.357***	−0.359***
		(0.120)	(0.118)	(0.234)
$\Delta CAPINT$	+	0.566**	0.533**	0.529**
		(0.230)	(0.232)	(0.234)
$\Delta StdROA$	-	−1.554**	−1.439**	−1.570***
		(0.649)	(0.638)	(0.591)
$Intercept$	-	5.694***	5.883***	5.695***
		(1.003)	(1.020)	(1.026)
Year indicator		Yes	Yes	Yes
Firm fixed effect		Yes	Yes	Yes
Observations		7,372	7,372	7,372
Pseudo R^2		52.83	53.04	53.41

This table provides the results on the relation between credit ratings and CEO-to-worker pay disparity and control variables using a level specification. Year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 28: Credit Rating and CEO-to-worker Pay Disparity (Level Specification) -Firm-level Average Employee Pay Sample

Variable	Predicted	(1)	(2)	(3)
$\Delta logTotalCWPD$	?	0.233**		
		(0.091)		
$\Delta logCashCWPD$	?		0.300*	
			(0.174)	
$\Delta logSalaryCWPD$	?			0.603**
				(0.286)
ΔCFO	+	7.246***	7.215***	7.066***
		(1.547)	(1.434)	(1.434)
ΔROA	+	2.916*	3.070**	3.080**
		(1.551)	(1.482)	(1.431)
$\Delta INTCOV$	+	0.032**	0.032**	0.032**
		(0.014)	(0.014)	(0.013)
$\Delta Loss$	-	−0.780***	−0.755***	−0.766***
		(0.247)	(0.240)	(0.232)
$\Delta Asset$	+	1.164***	1.171***	1.145***
		(0.402)	(0.392)	(0.380)
$\Delta Leverage$	-	−1.352***	−1.394***	−1.499***
		(0.361)	(0.392)	(0.353)
$\Delta Subord$	-	−0.643*	−0.643*	−0.640*
		(0.396)	(0.403)	(0.422)
$\Delta CAPINT$	+	1.917**	1.831**	1.903**
		(0.785)	(0.795)	(0.792)
$\Delta StdROA$	-	2.453**	2.249**	1.956**
		(0.990)	(0.947)	(0.978)
$Intercept$	-	1.654	1.653	1.153
		(3.815)	(3.765)	(3.858)
Year indicator		Yes	Yes	Yes
Firm fixed effect		Yes	Yes	Yes
Observations		1,200	1,200	1,200
Pseudo R^2		49.78	51.55	51.33

This table provides the results on the relation between credit ratings and CEO-to-worker pay disparity and control variables using a level specification. Year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 29: Credit Rating and Industry-adjusted CEO-to-worker Pay Disparity

Variable	Predicted	(1)	(2)	(3)
$\Delta logTotalCWPD$	?	0.147***		
		(0.038)		
$\Delta logCashCWPD$	?		0.176***	
			(0.059)	
$\Delta logSalaryCWPD$	?			0.137
				(0.119)
ΔCFO	+	2.758***	2.800***	2.881***
		(0.428)	(0.431)	(0.431)
ΔROA	+	2.430***	2.405***	2.438***
		(0.475)	(0.459)	(0.466)
$\Delta INTCOV$	+	0.001***	0.001***	0.001***
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	-	−0.460***	−0.476***	−0.479***
		(0.083)	(0.082)	(0.083)
$\Delta Asset$	+	0.571***	0.557***	0.556***
		(0.165)	(0.162)	(0.164)
$\Delta Leverage$	-	−1.526***	−1.527***	−1.517***
		(0.181)	(0.181)	(0.182)
$\Delta Subord$	-	−0.311**	−0.324**	−0.327**
		(0.134)	(0.133)	(0.133)
$\Delta CAPINT$	+	0.327	0.325	0.290
		(0.357)	(0.357)	(0.358)
$\Delta StdROA$	-	−0.045	−0.041	−0.049
		(0.082)	(0.081)	(0.081)
Year indicator		Yes	Yes	Yes
Observations		7,372	7,372	7,372
Pseudo R^2		5.06	5.04	4.97

This table provides the results on the relation between credit ratings and CEO-to-worker pay disparity and control variables using industry-adjusted CEO-to-worker pay disparity. Year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 30: Credit Rating and Industry-adjusted CEO-to-worker Pay Disparity -Firm-level Average Employee Pay Sample

Variable	Predicted	(1)	(2)	(3)
$\Delta logTotalCWPD$	?	0.264***		
		(0.091)		
$\Delta logCashCWPD$	?		0.463**	
			(0.218)	
$\Delta logSalaryCWPD$	?			0.763**
				(0.297)
ΔCFO	+	4.865***	4.861***	5.094***
		(1.041)	(1.034)	(1.042)
ΔROA	+	0.580	1.018	1.092
		(1.132)	(1.002)	(1.046)
$\Delta INTCOV$	+	−0.001	−0.001	−0.001
		(0.001)	(0.001)	(0.001)
$\Delta Loss$	-	−0.116	−0.051	−0.111
		(0.247)	(0.242)	(0.248)
$\Delta Asset$	+	−0.520	−0.770	−0.823
		(0.476)	(0.537)	(0.536)
$\Delta Leverage$	-	−1.946***	−1.862***	−1.834***
		(0.624)	(0.624)	(0.623)
$\Delta Subord$	-	−0.482	−0.611	−0.615
		(0.537)	(0.539)	(0.521)
$\Delta CAPINT$	+	−0.369	−0.648	−0.573
		(0.819)	(0.856)	(0.859)
$\Delta StdROA$	-	0.683	−0.431	−0.216
		(3.008)	(3.291)	(3.164)
IMR	?	−0.267*	−0.235*	−0.247*
		(0.154)	(0.156)	(0.155)
Year indicator		Yes	Yes	Yes
Observations		1,200	1,200	1,200
Pseudo R^2		5.52	5.47	5.50

This table provides the results on the relation between credit ratings and CEO-to-worker pay disparity and control variables using industry-adjusted CEO-to-worker pay disparity. Year indicator variables are included but the coefficient estimates are suppressed. All p-values are based on two-tailed t tests. Standard errors reported in the parentheses are clustered at firm-level. All variables are defined in Appendix B. *,** and *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.