

## **How Employee Salary and Benefits Affects Stock Price Crash Risk**

**Ching-Yu Chen<sup>1</sup>, Chung-Hsien Hung<sup>1</sup>, I-Yun Chen<sup>1</sup>, and Yuan Chang<sup>1</sup>**

### **Abstract**

Based on a sample of 1,675 nonfinancial listed firms in Taiwan Stock Exchange (TWSE) and Taipei Exchange (TPEX) over the period 2014 to 2023, this study examines whether employee salary and benefits are associated with stock price crash risk. With the growing emphasis on CSR and ESG, firm's employee salary and benefits, which represents key elements of the social and governance dimensions, has increasingly been recognized as an important determinant of firm stability and market valuation. Using multiple regression analyses and alternative stock price crash risk measures, and incorporating the Taiwan High Compensation 100 Index together with firm-level salary and benefits structure variables, this study empirically investigates the relationship between salary policies and downside risk. The results indicate that firms placing greater emphasis on employee salary and benefits are less likely to experience extreme negative stock returns, and this finding remains robust across alternative model specifications and return benchmarks. The evidence suggests that well-designed salary and benefits systems enhance employee productivity and loyalty while strengthening corporate governance and information transparency, thereby stabilizing investor confidence and reducing stock price crash risk.

**JEL classification numbers:** G14, J28.

**Keywords:** Employee Salary and Benefits, Stock Price Crash Risk.

---

<sup>1</sup> Department of Finance, National Changhua University of Education, Taiwan.

## 1. Introduction

With the intensification of global climate change and the growing awareness of social responsibility, Corporate Social Responsibility (CSR) has become an important indicator for investors in evaluating firm value and sustainability. Firms can no longer focus solely on profit maximization but are increasingly expected to assume environmental and social responsibilities in pursuit of sustainable development. The concept of CSR was first articulated by Bowen (1953) and has gradually evolved into the ESG framework, which provides more quantifiable and evaluable dimensions of corporate responsibility. Governments around the world have also progressively introduced Environmental, Social, and Governance (ESG)-related regulations, reflecting the increasing emphasis placed on sustainable corporate practices.

In practice, many large multinational firms, such as Apple Inc., have established comprehensive strategies across the ESG dimensions. These initiatives not only help reduce firm risk but also strengthen brand reputation and attract investors and consumers who place significant weight on ESG considerations. In Taiwan, several ESG-related investment indices and funds have been introduced since 2014, among which the Taiwan High Compensation 100 Index represents an important initiative encouraging firms to enhance employee salary and benefits. The index is jointly compiled by the Taiwan Stock Exchange (TWSE) and the Research Affiliates Fundamental Index (RAFI), using listed common stocks as the investment universe and selecting 100 firms with superior employee salary/compensation and financial performance through a three-stage screening process that includes liquidity screening, high-salary and profitability selection, and fundamental weighting. This development reflects both policy orientation and growing market recognition of the importance of CSR implementation.

In the implementation of CSR, employees constitute one of the most important stakeholder groups for any firm. The level of employee salary and benefits, their relative standing compared with industry peers, and their long-term growth not only reflect the firm's recognition of employee value but also represent a strategic human capital investment that can enhance organizational performance. A substantial body of research grounded in efficiency wage theory argues that compensation exceeding market benchmarks can improve productivity, reduce shirking incentives, and strengthen workforce commitment (Shapiro and Stiglitz, 1984; Akerlof and Yellen, 1990). Empirical evidence further indicates that higher compensation is associated with improved operating performance and stronger employee outcomes, including lower turnover and higher labor efficiency (Krueger and Summers, 1988; Cappelli and Chauvin, 1991).

Recent studies in the finance and management literature also suggest that employee-oriented compensation policies can contribute to firm value and long-term sustainability. Edmans (2011) shows that firms with superior employee treatment exhibit higher long-run stock returns, while Edmans, Pu, Zhang and Li (2024) document that investment in human capital can generate both productivity gains and

enhanced stakeholder trust. Consistent with these arguments, competitive employee salary and benefits can attract high-quality talent, reinforce organizational loyalty, and strengthen corporate reputation, thereby improving operational stability and reducing the likelihood of adverse labor-related shocks. As firms expand their commitment to employee salary and benefits, they are therefore more likely to experience improvements in organizational efficiency and long-term performance. From the perspective of social exchange theory, the relationship between employees and the firm can be viewed as a reciprocal exchange relationship in which favorable treatment by the firm is met with stronger employee commitment and effort. When firms provide higher employee salary and benefits, employees are more likely to reciprocate through enhanced loyalty, productivity, and organizational citizenship behavior, thereby improving organizational performance and stability (Cropanzano and Mitchell, 2005). Such positive exchange dynamics also contribute to the formation of a supportive organizational culture and a strong employer brand, strengthening the firm's competitiveness in both labor and capital markets. Complementary evidence in the finance and management literature indicates that firms with superior employee treatment tend to experience improved long-run performance and stronger stakeholder trust (Edmans, 2011; Edmans, Pu, Zhang and Li, 2024).

Corporate reputation has also become an increasingly important factor in assessing market risk. A favorable reputation enhances investor confidence and supports capital market stability, whereas reputational deterioration can expose firms to multiple risks, including litigation, declining sales, and weakened financial flexibility (Roberts and Dowling, 2002; Eccles, Ioannou and Serafeim, 2014). With the growing diffusion of ESG principles, the linkage between reputation and ESG performance has become even more pronounced. Empirical evidence suggests that firms with weaker ESG performance are more likely to be excluded by institutional investors, thereby affecting capital inflows and long-term development prospects (Friede, Busch and Bassen, 2015). Collectively, these arguments imply that sustained investment in employee salary and benefits can enhance both reputational capital and organizational resilience, contributing to improved market valuation and reduced exposure to downside risk.

Beyond ESG-related considerations, investors have increasingly focused on stock price crash risk, which refers to the likelihood that a firm's stock price will experience a sudden and extreme decline following the concentrated release of accumulated negative information. Prior research shows that information asymmetry, financial opacity, and earnings management are key drivers of crash risk, as the withholding of unfavorable information can lead to abrupt price corrections once such information is eventually disclosed (Jin and Myers, 2006; Hutton, Marcus and Tehranian, 2009; Kim, Li and Zhang, 2011). When firms fail to disclose adverse information in a timely and transparent manner, investor confidence may deteriorate rapidly, triggering panic selling and severe price declines.

Within this context, the adoption of CSR and ESG-oriented practices can reduce

crash risk by improving governance quality, strengthening transparency, and enhancing stakeholder trust. Employee salary and benefits, which constitute core components of the social and governance dimensions of ESG, are therefore likely to play an important role in shaping firm stability and market evaluations. When firms implement well-designed employee salary and benefits policies, they signal commitment to stakeholder welfare and reinforce reputational capital and disclosure credibility, both of which have been shown to mitigate firm-specific risk exposures (Eccles, Ioannou and Serafeim, 2014; Lins, Servaes and Tamayo, 2017).

Conversely, the deterioration of employee treatment can trigger significant operational disruptions and reputational damage that are rapidly reflected in capital markets. Labor disputes arising from dissatisfaction with employee salary and benefits have repeatedly been associated with heightened market volatility. For example, strike actions involving EVA Airways Co. in several recent episodes generated substantial operational uncertainty and were accompanied by notable short-term declines in the firm's stock price as investors reassessed operational risk and expected cash flow disruptions. Similarly, the widely reported series of employee suicide incidents at Foxconn, which were linked to intense working conditions and relatively low compensation, generated significant global scrutiny and reputational pressure on Hon Hai Technology Group, with the firm's share price experiencing successive downward adjustments during periods of intensified media coverage. These cases illustrate how adverse employee-related events can serve as catalysts for sudden negative revisions in investor expectations, thereby increasing the likelihood of extreme downside movements in stock prices.

Although a substantial body of research has examined how employee compensation and labor-related benefits influence economic outcomes such as productivity, financial performance, and employee turnover (e.g., Bloom and Van Reenen, 2011; Heywood and Wei, 2006; Akerlof, 1982; Shapiro and Stiglitz, 1984; Edmans, 2011), empirical evidence linking employee compensation policies to stock price crash risk remains relatively limited. Accordingly, this study focuses on the role of employee salary and benefits in shaping stock price crash risk. Drawing on theoretical arguments that stakeholder-oriented policies enhance information transparency, organizational stability, and long-term performance (Edmans, 2011; Eccles, Ioannou and Serafeim, 2014; Lins, Servaes and Tamayo, 2017), this study investigates whether improvements in employee salary and benefits reduce the vulnerability of firm equity prices to severe negative corrections. Specifically, the empirical analysis is conducted using comprehensive data for non-financial listed firms in Taiwan over the 2014~2023. The central objective is to examine whether firms that strengthen employee salary and benefits are better able to mitigate adverse stock price reactions during periods of market turbulence, thereby lowering the likelihood of firm-specific stock price crashes. By providing systematic evidence from the Taiwanese capital market, this study contributes to the emerging literature on stakeholder-oriented corporate policies and financial market downside risk, complementing prior studies that document the importance of labor-related practices for firm valuation, operating performance, and long-run shareholder

outcomes (Edmans, 2011; Ghaly, Dang and Stathopoulos, 2017; Flammer and Luo, 2017).

The potential contributions of this study are as follows. First, it extends the existing literature by broadening the scope of inquiry into the effects of employee salary and benefits on both financial and nonfinancial aspects of firm performance. This study emphasizes that employee salary and benefits influence stock price crash risk not only through traditional channels such as productivity and profitability but also by shaping a firm's social legitimacy, mediating the reporting and propagation of employee-related incidents, and affecting compliance with regulatory changes and the attendant litigation risk arising from stakeholder scrutiny (Eccles, Ioannou and Serafeim, 2014; Edmans, Pu, Zhang and Li, 2024; Lins, Servaes and Tamayo, 2017). Such considerations have received relatively limited attention in the Taiwanese context, and this research addresses this gap by providing systematic evidence on how employee-oriented policies can affect firm-specific downside risk.

Second, prior literature on the determinants of stock price crash risk has primarily focused on firm financial characteristics, corporate governance, information disclosure, ownership structure, board composition, and firm policies (Kim, Li and Zhang, 2011; Hutton, Marcus and Tehranian, 2009; Jin and Myers, 2006). While these factors are important in explaining downside risk, relatively little attention has been given to employees, one of the firm's most critical stakeholder groups. When employee rights and benefits are impaired beyond a certain threshold, negative repercussions may arise for firm reputation, social legitimacy, and the likelihood of adverse media coverage, which in turn can propagate through financial markets and exacerbate stock price declines (Edmans, 2011; Eccles, Ioannou and Serafeim, 2014; Lins, Servaes and Tamayo, 2017). This study therefore expands the analysis of stock price crash risk determinants by explicitly considering the role of maintaining employee salary and benefits, highlighting the mechanisms through which employee-oriented policies may mitigate firm-specific downside risk.

Third, this study employs multiple measures of employee salary and benefits, including a firm's inclusion in the Taiwan High Compensation 100 Index and the actual level of employee compensation, while adjusting for industry-specific differences. In addition, the analysis incorporates a range of disclosure-based variables capturing the extent to which firms report employee salary and benefits information, thereby constructing a comprehensive annual assessment of employee compensation policies across firms. To capture stock price crash risk, this study utilizes raw returns as well as various abnormal return measures to derive return skewness and value-at-risk-based indicators, providing a robust and multi-dimensional evaluation of firm-specific downside risk (Kim, Li and Li, 2014; Hutton, Marcus and Tehranian, 2009; Jin and Myers, 2006). By integrating detailed employee-oriented data with established financial risk metrics, the study offers a rigorous framework for examining how employee salary and benefits relate to the probability of extreme negative stock price movements.

The structure of the study is organized as follows. The next section reviews the relevant literature and develops the checking hypotheses. The third section introduces the variables, econometric models, firm sample, and data sources. The fourth section presents the empirical results and provides discussion. The final section concludes the study and offers practical recommendations.

## **2. Literature Review and Hypothesis Development**

### **2.1 Regulatory Frameworks and Guidelines**

One prominent recent development began with amendments to the Securities and Exchange Act passed by Taiwan's Legislative Yuan in 2024, which were supported by the FSC's Securities and Futures Bureau. The revised Article 14 explicitly encourages listed firms to amend their corporate charters to allocate a specified portion of annual earnings to adjust employee compensation or distribute rewards to frontline employees. Although this provision does not include punitive measures, the FSC has emphasized its role in encouraging firms to fulfill social responsibilities by factoring employee treatment into governance practices and corporate disclosures. The FSC also requires firms to report employee average salary and related information in public disclosure platforms, which aims to promote transparency and encourage investor monitoring of employee compensation policies. This regulatory change reflects an effort to use governance and disclosure mechanisms to stimulate improvements in employee salary and benefits among publicly traded firms.

Earlier, in 2020 the FSC introduced requirements for expanded employee salary disclosure in financial reports and public information systems, instructing listed firms not only to disclose total employee salary and average compensation but also the median salary of full-time non-managerial employees. By increasing salary transparency beyond simple averages, this measure was intended to create a more accurate picture of employee compensation structures, strengthen accountability, and support CSR goals by ensuring that meaningful employee compensation information is available to investors and stakeholders.

In 2018, the FSC also indicated that it would work with the Taiwan Stock Exchange and Taipei Exchange to consider publicizing the list of firms with relatively low average salaries. This was part of broader discussions at the time about addressing low wage concerns and encouraging firms to improve employee compensation and benefits levels. The FSC's reporting and legislative engagement during this period served to spotlight employee salary practices as an element of corporate responsibility and market competitiveness. Beyond salary disclosure and governance rules, Taiwan's financial regulators have supported initiatives to encourage employee welfare trust arrangements. Under the FSC's Trust 2.0 program introduced in the early 2020s, the FSC encouraged financial holding firms and related entities to expand employee welfare trust mechanisms (including employee stock ownership trusts and savings trusts) as a tool to enhance employee benefits and long-term wealth accumulation. The FSC has coordinated with

industry associations to incorporate employee welfare trust practices into corporate governance evaluations, signaling that employee benefit structures can be a factor in overall governance quality assessments.

To encourage large publicly listed firms in Taiwan to allocate more resources toward sustaining and improving employee salary and benefits, the government introduced two key indices: the Taiwan High Compensation (HC) 100 Index and the Taiwan RAFI® EMP 99 Index. The Taiwan HC 100 Index, launched in 2014, tracks high-compensation firms by selecting the top 100 listed firms based on average employee salary and benefits, profitability, and liquidity. The EMP 99 Index, established in 2010, highlights firms' contributions to employment creation by ranking firms based on net income per employee and total workforce, ensuring liquidity and market representativeness. Both indices provide complementary perspectives on firm performance. The Taiwan HC 100 Index emphasizes compensation levels and financial stability, reflecting a firm's capacity to attract and retain talent, while the EMP 99 Index underscores firms' labor market support, highlighting social responsibility and broader economic impact. By offering investors benchmarks that capture these dimensions, the indices serve as valuable tools for CSR- and ESG-conscious investment decisions. They enhance the visibility of firms that prioritize employee salary and benefits in financial markets and, from an academic perspective, provide a clear framework to identify firms that demonstrate a relative commitment to employee compensation and benefits.

## **2.2 Existing Research on Employee Salary and Benefits**

In contemporary firm management, employee salary and benefits constitute a vital strategic resource. They provide basic livelihood security for employees while functioning as a central mechanism to enhance employee motivation, organizational performance, and long-term commitment (Bloom and Van Reenen, 2011; Heywood and Wei, 2006). Firms that design compensation and benefits systems that exceed market norms can foster higher employee engagement, reduce turnover, and strengthen the alignment between individual efforts and firm objectives (Gibbons and Waldman, 1999; Lazear, 2000). This, in turn, translates into measurable economic outcomes, including productivity gains, lower recruitment and training costs, and improved operational efficiency (Gerhart and Milkovich, 1990; Milkovich and Newman, 2008).

Efficiency wage theory suggests that paying employees above-market wages can generate multiple economic benefits. Employees are incentivized to exert higher effort and commitment, which improves labor productivity and reduces shirking behaviors (Yellen, 1984; Shapiro and Stiglitz, 1984). Empirical evidence supports that firms offering generous employee salary and benefits experience lower turnover rates, enabling firms to save on hiring and training costs while maintaining institutional knowledge and human capital quality (Sturman, 2003; Hom, Mitchell, Lee and Griffeth, 2012). Furthermore, compensation policies that include performance bonuses, profit-sharing, or equity-based incentives can align employee

goals with firm objectives, facilitating innovation, efficiency, and long-term profitability (Core and Guay, 2001; Edmans, 2011).

Research also indicates that employee salary and benefits positively influence firm operational performance across multiple dimensions. Bloom and Van Reenen (2007) find that structured incentive schemes improve firm productivity, while Ichniowski, Shaw and Prennushi (1997) demonstrate that human resource practices, including high compensation, significantly enhance manufacturing output and quality. Similarly, Delaney and Huselid (1996) show that firms with comprehensive compensation and benefits packages achieve superior financial performance metrics such as return on assets, profit margins, and sales growth. These findings highlight that employee-oriented policies not only improve workforce satisfaction and loyalty but also generate tangible economic returns for the firm.

Beyond direct financial outcomes, employee salary and benefits contribute to broader economic consequences by shaping human capital accumulation and firm adaptability. Higher compensation facilitates skill development and retention of experienced employees, which enhances a firm's capacity for innovation and operational resilience (Cappelli and Chauvin, 1991; Pfeffer, 1998). Moreover, well-structured compensation packages can improve organizational culture and reduce workplace conflicts, lowering the risk of labor disputes and associated economic disruptions (Batt, 2002; Huselid, 1995). Collectively, these studies suggest that investing in employee salary and benefits is a strategic lever that produces sustained financial and operational advantages, while reinforcing the firm's capacity to manage human capital effectively and achieve long-term growth objectives.

### **2.3 Determinants of Stock Price Crash Risk**

Stock price crash risk is influenced by a wide range of firm-specific and market-level factors. Prior research has identified corporate diversification, fund manager behavior, board effectiveness, financial transparency, and audit disclosure quality as key determinants of crash risk. Diversified operations may increase the complexity of internal information flows, exacerbating information asymmetry and managerial discretion over earnings, thereby amplifying the likelihood of stock price crashes (Qu, Su, Gan and Shi, 2021). Fund managers' herding behavior may further exacerbate this risk, particularly for small or opaque firms, leading to pronounced market reactions (Lo, 2019). Board effectiveness and monitoring capacity are also closely linked to risk control, with evidence suggesting that overextended or inattentive boards are associated with higher incidences of abrupt negative firm-specific events (Zhu and Xu, 2021).

The quality of financial reporting constitutes another critical determinant of crash risk. Hutton, Marcus and Tehranian (2009) document that lower transparency in financial statements diminishes external investors' ability to accurately assess firm conditions, allowing negative information to accumulate and trigger severe market reactions upon eventual disclosure. Consistently, Cai (2024) finds that firms with lower cash flow transparency exhibit a significantly higher probability of

experiencing future stock price crashes. Audit disclosure complexity is also a contributing factor. Chang, Xie, Chen and Chi (2021) indicate that overly complex or ambiguous reporting of key audit matters can impair investors' comprehension of firm financial conditions and risk exposures, increasing the likelihood of subsequent crash events.

Information opacity has increasingly emerged as a primary driver of stock price crash risk. When firms delay or withhold the disclosure of material negative information, market confidence erodes, potentially leading to panic selling and extreme price volatility. Historical episodes in Taiwan illustrate this mechanism. For example, the 2014 Ting Hsin International Group "gutter oil" scandal caused Wei Chuan Foods Co.,'s stock to fall by nearly 40% within seven trading days, triggering intense regulatory scrutiny and social concern over food safety. Similarly, in 2010, multiple employee suicides at the Foxconn's Shenzhen facilities drew global attention to labor conditions, severely damaging the firm's reputation and prompting managerial review, which not only affected investor confidence but also indirectly contributed to declines in stock prices.

Political changes and accounting misconduct also represent significant sources of crash risk. Yu and Mai (2020) demonstrate that political instability can disrupt firm-government linkages, increase policy uncertainty, and elevate the cost of negative news disclosure, prompting firms to delay or conceal unfavorable information and thereby amplifying market reactions to adverse events. Firms that lose policy support or face discontinuities in regulatory oversight encounter heightened operational uncertainty, further eroding investor confidence. Accounting fraud exacerbates these effects by undermining the reliability of corporate disclosures. Richardson, Obaydin and Liu (2022) show that financial misrepresentation intensifies information asymmetry and exacerbates principal-agent conflicts between management and shareholders, leading investors to adopt more pessimistic expectations regarding firm stability, which significantly increases stock price crash risk.

#### **2.4 Employee Salary and Benefits and Stock Price Crash Risk**

Employee salary and benefits have increasingly drawn attention as potential determinants of stock price crash risk. A well-structured compensation system and comprehensive employee benefits constitute a central component of CSR and ESG. Such measures not only stabilize internal operations and reduce the likelihood of labor disputes but also enhance a firm's market reputation and competitive position. In times of crisis, firms demonstrating high social responsibility are better able to sustain investor confidence and mitigate the impact of external pressures on stock prices. Moreover, compensation policies within the ESG framework signal a firm's long-term commitment to employees and broader society, further consolidating corporate image (Eccles, Ioannou and Serafeim, 2014; Lins, Servaes and Tamayo, 2017).

Recent empirical evidence suggests that investors increasingly focus on the effects of firm reputation and adverse news on stock price volatility. Firms with strong CSR performance tend to exhibit higher transparency and lower crash risk (Yu, 2020). Conversely, firms with inadequate disclosure or weak crisis response experience rapid declines in market trust, amplifying crash risk. These findings highlight that, beyond traditional financial determinants, governance quality and social responsibility are significant predictors of market outcomes. Firms prioritizing employee rights and welfare display greater resilience and competitiveness. By offering competitive employee salary and benefits and fostering a positive work environment, firms not only enhance employee satisfaction and productivity but also strengthen external confidence in firm stability and sustainability. As core elements of the social and governance dimensions, compensation and benefits reduce internal crisis risks and effectively lower the probability of stock price crashes triggered by negative news or market shocks (Richardson, Obaydin and Liu, 2022; Friede, Busch and Bassen, 2015).

Integrating employee-focused policies into a firm's ESG framework provides a feasible path for mitigating stock price crash risk. Compensation and benefits serve as instruments for enhancing internal cohesion while signaling social responsibility, thereby cultivating a more robust market image, cushioning the effects of market volatility, and supporting sustainable long-term value growth (Bloom and Van Reenen, 2011; Heywood and Wei, 2006). Firms that invest in employee salary and benefits are better positioned to reduce operational pressures arising from labor disputes or high turnover, reinforcing internal stability. A stable internal environment serves as a foundation for coping with market fluctuations and limits the transmission of internal shocks to broader market performance.

From a market perspective, compensation and benefits policies also communicate governance capacity and social responsibility, which are critical for establishing trust with external stakeholders and investors. Firms that prioritize employee salary and benefits are generally perceived as having stronger long-term growth potential and operational stability, allowing them to maintain investor confidence and reduce stock price volatility during periods of market stress. In contrast, firms neglecting employee salary and benefits may experience diminished productivity due to internal conflicts and heightened market concerns regarding operational risks, thereby increasing the likelihood of stock price crashes. Overall, these considerations suggest a potentially significant negative relationship between employee salary and benefits and stock price crash risk. Based on the above arguments, the checking hypothesis is:

*Hypothesis 1: Firms with higher employee salary and benefits are associated with lower stock price crash risk.*

### **3. Variables, Econometric Model, and Sample Data**

#### **3.1 Research Variable**

##### **3.1.1 Explained Variable—Stock Price Crash Risk**

In measuring stock price crash risk, this study takes into account the daily price limit rule in the Taiwan stock market, which imposes a 10% cap on daily price movements. When daily stock returns are used to compute crash risk, such price limits may constrain the extent to which firm-specific information or events are reflected in stock price fluctuations. Accordingly, this study employs weekly stock returns to construct various measures of stock price crash risk. Consistent with Kim, Li and Li (2014), four crash risk measures are considered. First, the skewness of weekly stock returns for a given firm in a given year is calculated. The skewness coefficient is widely employed as a proxy for stock price crash risk because it captures the asymmetry of return distributions and the likelihood of extreme negative returns. The opacity-based model of Jin and Myers (2006) predicts that managerial bad-news hoarding leads to clustered disclosure of adverse information, producing sudden price collapses that manifest empirically as pronounced negative skewness. Consistent with this theoretical framework, empirical studies such as Hutton, Marcus and Tehranian (2009) and Kim, Li and Zhang (2011) adopt skewness-based measures as central indicators of firm-level crash risk and interpret them as reflecting the firm's information disclosure environment. This study uses the Pearson coefficient of skewness based on approximately fifty-two weekly stock returns within each firm-year and then multiplies the value by negative one. A larger value indicates a higher level of stock price crash risk for the firm in that year.

Second, Value at Risk (VaR) measures provide a complementary perspective by quantifying the magnitude of downside tail losses at different confidence levels. This study considers the 90% value at risk of weekly stock returns for a given firm year, which corresponds to the return at the 10% percentile of the approximately fifty-two weekly returns during the year and is multiplied by negative one. A larger value implies that stock returns become more negative under adverse conditions and thus indicates a higher level of stock price crash risk in that year. Third, the 95% value at risk of weekly stock returns is examined. This measure is defined as the return at the 5% percentile of the weekly return distribution within the year and is also multiplied by negative one. As with the previous measure, a larger value reflects lower returns in unfavorable states and therefore a higher degree of stock price crash risk. Fourth, the 99% value at risk of weekly stock returns is employed. This measure corresponds to the return at the 1% percentile of the approximately fifty-two weekly returns in a given year and is multiplied by negative one. A larger value indicates that stock returns are substantially lower in extreme downside scenarios and thus reflects a higher level of stock price crash risk for the firm in that year. Duffie and Pan (1997) and Jorion (2007) emphasizes that higher confidence levels correspond to increasingly severe and less frequent adverse outcomes. Accordingly, 90%, 95%, and 99% VaR capture progressively more extreme downside scenarios. The joint use of skewness and multi-level VaR measures

therefore offers a more comprehensive characterization of crash risk.

The use of raw returns reflects the total downside risk borne by investors, including both systematic and idiosyncratic components, which is particularly relevant when assessing the overall economic consequences of extreme price declines. Studies focusing on the market-wide transmission of information shocks argue that excess returns, defined relative to market benchmarks, isolate firm-specific negative tail events by removing systematic market movements, thereby providing a cleaner measure of idiosyncratic crash risk (Chen, Hong and Stein, 2001). Building on this approach, firm-level crash risk research commonly computes skewness-based or tail-loss measures using market-adjusted or excess returns to capture the firm-specific accumulation and sudden release of bad news (Hutton, Marcus and Tehranian, 2009; Kim, Li and Zhang, 2011).

Therefore, in addition to weekly gross returns, we consider weekly excess returns relative to the Taiwan Stock Exchange (TWSE) weighted stock price index and weekly excess returns relative to the MSCI Taiwan Index. Accordingly, a total of 12 stock price crash risk variables are used. These include return skewness based on gross returns (*skewg*), return skewness based on excess returns relative to the TWSE weighted stock price index (*skewex*), return skewness based on excess returns relative to the MSCI Taiwan Index (*skewms*), the 90% value at risk based on gross returns (*var90g*), the 90% value at risk based on excess returns relative to the TWSE weighted stock price index (*var90ex*), the 90% value at risk based on excess returns relative to the MSCI Taiwan Index (*var90ms*), the 95% value at risk based on gross returns (*var95g*), the 95% value at risk based on excess returns relative to the TWSE weighted stock price index (*var95ex*), the 95% value at risk based on excess returns relative to the MSCI Taiwan Index (*var95ms*), the 99% value at risk based on gross returns (*var99g*), the 99% value at risk based on excess returns relative to the TWSE weighted stock price index (*var99ex*), and the 99% value at risk based on excess returns relative to the MSCI Taiwan Index (*var99ms*).

### **3.1.2 Main Explanatory Variable: Employee Salary and Benefits**

In line with government policies that encourage firms to raise employee compensation, the Taiwan Stock Exchange has collaborated with Research Affiliates (LLC) to jointly compile the Taiwan High Compensation 100 Index, with constituent firms being periodically reviewed, selected, included, or excluded. The primary quantitative screening criteria for index inclusion include average employee compensation, firm's net income, book value per share, and total employee compensation, and wage increases are explicitly incorporated as a key factor in constituent selection.

The Taiwan High Compensation 100 Index is constructed using domestically listed firms on the Taiwan Stock Exchange as the sampling universe. The selection process first applies a liquidity screen that excludes the 20% of stocks with the lowest average daily trading volume over the most recent year. From the remaining firms, the top one third based on the three-year average of employee average

compensation is selected. Additional screening criteria are then applied, including positive average net income over the past three years, a book value per share of at least \$10 NTD in the most recent year, total employee compensation, and the growth rate of average employee compensation. Based on these criteria, the top 100 firms are ultimately chosen as the constituent firms of the Taiwan High Compensation 100 Index.<sup>2</sup>

Based on the annual constituent lists of the Taiwan High Compensation (HC) 100 Index, this study constructs three variables to capture employee salary and benefits for the firms in the sample. First, a dummy variable that indicates whether a firm is included in the Taiwan HC 100 Index in a given year (*highd*), is used to identify whether a firm in a specific year places relatively greater emphasis on employee compensation and benefits. The variable *highd* equals 1 if a firm is selected as a constituent of the Taiwan HC 100 Index in that year and 0 otherwise. Second, the cumulative number of years in which a firm is classified as relatively emphasizing employee compensation and benefits, denoted as *highcumu*, is defined as the total number of years during the sample period from 2014 to 2023 in which the firm is included in the Taiwan HC 100 Index. For example, if a firm has been selected as a constituent for two years by 2017, specifically in 2014 and 2016, the values of *highcumu* for the years 2014 through 2017 are 1, 1, 2, and 2, respectively. Third, a dummy variable that captures whether a firm is continuously included in the Taiwan HC 100 Index during the sample period (*highcont*), is constructed to reflect whether the firm consistently emphasizes employee compensation and benefits. If a firm is selected as a constituent of the Taiwan HC 100 Index in every year from 2014 to 2023, the value of *highcont* equals 1 for each year in the sample period. If the firm fails to be included in any year during the period, the value of *highcont* equals 0 for all years in the sample period.

In addition, this study considers 6 additional variables to capture salary and benefits. These variables include the total amount of employee salary and benefits (*salaryt*), measured as the natural logarithm, the average employee salary and benefits per employee (*salaryper*), defined as total employee salary and benefits divided by the number of employees and measured as the natural logarithm, the ratio of average employee salary and benefits per employee to the average compensation of managers (*sperdmper*), the industry adjusted total employee salary and benefits (*salarytid*), measured as the natural logarithm, the industry adjusted average employee salary and benefits per employee (*salaryperid*), measured as the natural logarithm, and the industry adjusted ratio of average employee salary and benefits per employee to the average compensation of managers (*sperdmperid*). Larger values of these nine variables indicate a greater degree to which a firm emphasizes employee compensation and benefits.

---

<sup>2</sup> In Taiwan's financial market, some institutional investors adopt the Taiwan High Salary 100 Index as a benchmark for passive investment strategies. By allocating capital to listed firms that offer relatively high compensation and demonstrate a willingness to raise employee pay, such investments not only generate favorable long-term investment returns but also create demonstration effects that encourage firms to place greater emphasis on employee compensation while pursuing profitability.

### 3.1.3 Control Variable

Building on prior studies such as Kim, Li and Zhang (2011), Kim, Li and Li (2014), Kim and Zhang (2014), Kim and Zhang (2016), and Kim, Wang and Zhang (2016), this study incorporates the following variables as controls that affect firm level stock price crash risk. Return on assets (*roa*) captures firm profitability. Higher profitability implies more favorable subjective market assessments of a firm's stock and is therefore associated with lower crash risk. Return on assets is calculated as after-tax net income divided by total assets. Volatility of return on assets (*roavar*) reflects operating risk. Greater volatility in return on assets indicates higher exposure of operating performance to macroeconomic conditions and market fluctuations, which in turn implies higher stock price volatility and higher crash risk. The volatility of return on assets is computed as the variance of return on assets over the current year and the preceding four years. The market to book ratio (*mtb*) measures growth opportunities. A higher market to book ratio implies that the market assigns greater growth prospects to the firm and is thus associated with a lower tendency for stock price crashes. The market to book ratio is calculated as the market value per share of common equity divided by the book value per share. Sales growth rate (*salesgr*) captures firm growth potential. Firms with higher sales growth are expected to gain larger future market shares and enjoy stronger competitive advantages within their industries, which lowers stock price crash risk. Sales growth rate is defined as the current-year net sales minus prior-year net sales divided by prior-year net sales. Cash holdings ratio (*cashr*) measure financial slack. Firms holding more cash possess greater resources to absorb adverse shocks, which reduces stock price crash risk. Cash holdings ratio is defined as the cash divided by total assets.

A dummy for previous-year loss (*loss*), captures whether firm performance in the preceding year is negative. If a firm reports a loss in the prior year, the market may question its future profitability, investor confidence may deteriorate, and stock price crash risk is therefore higher. Previous-year stock return (*pvret*) reflects past stock market performance. Given the presence of momentum in financial markets, whereby investors tend to buy past winners and sell past losers, higher stock returns in the prior year are associated with lower crash risk in the subsequent year. Stock turnover (*turnover*) captures investor attention. Higher trading volume indicates that investors pay closer attention to the firm's operating performance and stock market outcomes. Such firms tend to respond more sensitively to information, which increases stock price crash risk. Stock turnover is defined as the natural logarithm of the firm's annual trading value. A dummy variable for whether a firm's financial statements are audited by a big-four accounting firm (*big4*), which equals 1 if audited by a big-four accounting firm and 0 otherwise, captures audit quality. Due to the reputation effects of big-four accounting firms in financial markets, firms audited by big-four auditors are expected to exhibit higher financial reporting quality and greater information transparency, which implies lower stock price crash risk.

Directors' shareholdings ratio (*dirhold*) measures the extent to which board members control firm equity. A higher level of directors' shareholdings is generally viewed as aligning the interests of directors with those of the firm and providing stronger monitoring incentives, which helps mitigate agency problems and enhance corporate governance quality, thereby reducing negative market expectations about firm value and lowering stock price crash risk. This variable is defined as the proportion of shares held by directors relative to the total number of shares outstanding. Directors' shareholdings pledge ratio (*pledge*) captures the proportion of directors' shareholdings that are pledged to financial institutions. When directors pledge their shares, they may face margin call pressure, which can induce selling pressure and increase information opacity. Such conditions weaken market confidence in corporate governance and raise stock price crash risk. This variable is defined as the ratio of shares pledged by directors to their total shareholdings. Blockholder shareholdings ratio (*blockhold*) reflects ownership concentration. When large shareholders hold higher ownership stakes, corporate disclosure of major information is more likely to favor the interests of controlling shareholders rather than minority shareholders. This increases the likelihood of abrupt disclosure of bad news and abnormal stock price declines, thereby elevating stock price crash risk. Blockholder shareholdings ratio is defined as the number of shares held by large shareholders divided by the total number of shares outstanding in a given year. The proportion of independent directors (*indr*) captures board independence. A higher proportion of independent directors implies a more independent board that is better able to monitor managerial decisions and provide advisory functions, which improves managerial decision quality and reduces stock price crash risk. This variable is defined as the number of independent directors divided by the total number of board members. CEO duality (*duality*) is a dummy variable that measures the concentration of leadership power. When the board chairperson concurrently serves as the CEO, board monitoring effectiveness may be weakened, leading to governance risks, insufficient information disclosure, and diminished risk control capacity, which in turn increases stock price crash risk. Directors' and officers' liability insurance coverage (*doli*) captures the amount of liability insurance purchased by the firm for its directors and the management. Although such insurance can reduce the personal financial risk faced by directors and managers arising from managerial negligence, excessively high coverage may induce moral hazard and weaken monitoring incentives. This can result in poorer corporate governance and greater information asymmetry, thereby increasing stock price crash risk. This variable is measured as the natural logarithm of the total directors and officers liability insurance coverage amount disclosed by the firm. In summary, the dependent variable, key explanatory variable, and control variables, along with their corresponding abbreviations and concise definitions, are reported in Table 1.

**Table 1: Abbreviations and Definitions of Variable**

Variable	Abbreviation	Definition
<b>Explained Variable-Stock Price Crash Risk</b>		
Return skewness based on gross returns	<i>skewg</i>	Pearson coefficient of skewness of weekly gross returns and then multiplies (-1)
Return skewness based on excess returns relative to the TWSE weighted stock price index	<i>skewex</i>	Pearson coefficient of skewness of weekly excess returns and then multiplies (-1), where the excess returns is gross returns minus the return of TWSE weighted stock price index
Return skewness based on excess returns relative to the MSCI Taiwan Index	<i>skewms</i>	Pearson coefficient of skewness of weekly excess returns and then multiplies (-1), where the excess returns is gross returns minus the return of MSCI Taiwan Index
The 90% value at risk return based on gross returns	<i>var90g</i>	The gross return at the 10% percentile of the weekly returns during the year and then multiplies (-1)
The 90% value at risk return based on excess returns relative to the TWSE weighted stock price index	<i>var90ex</i>	The excess return at the 10% percentile of the weekly returns during the year and then multiplies (-1), where the excess returns is gross returns minus the return of TWSE weighted stock price index
The 90% value at risk return based on excess returns relative to the MSCI Taiwan Index	<i>var90ms</i>	The excess return at the 10% percentile of the weekly returns during the year and then multiplies (-1), where the excess returns is gross returns minus the return of MSCI Taiwan Index
The 95% value at risk return based on gross returns	<i>var95g</i>	The gross return at the 5% percentile of the weekly returns during the year and then multiplies (-1)
The 95% value at risk return based on excess returns relative to the TWSE weighted stock price index	<i>var95ex</i>	The excess return at the 5% percentile of the weekly returns during the year and then multiplies (-1), where the excess returns is gross returns minus the return of TWSE weighted stock price index
The 95% value at risk return based on excess returns relative to the MSCI Taiwan Index	<i>var95ms</i>	The excess return at the 5% percentile of the weekly returns during the year and then multiplies (-1), where the excess returns is gross returns minus the return of MSCI Taiwan Index
The 99% value at risk return based on gross returns	<i>var99g</i>	The gross return at the 1% percentile of the weekly returns during the year and then multiplies (-1)
The 99% value at risk return based on excess returns relative to the TWSE weighted stock price index	<i>var99ex</i>	The excess return at the 1% percentile of the weekly returns during the year and then multiplies (-1), where the excess returns is gross returns minus the return of TWSE weighted stock price index
The 99% value at risk return based on excess returns relative to the MSCI Taiwan Index	<i>var99ms</i>	The excess return at the 1% percentile of the weekly returns during the year and then multiplies (-1), where the excess returns is gross returns minus the return of MSCI Taiwan Index
<b>Explanatory Variable-Employee Salary and Benefit</b>		
Dummy for inclusion in Taiwan High Salary 100 Index	<i>highd</i>	Equal to 1 if a firm is selected as a constituent of the Taiwan HC 100 Index and 0 otherwise
The cumulative number of years in inclusion in Taiwan High Salary 100 Index	<i>highcumu</i>	The total number of years for a firm that is selected as a constituent of the Taiwan HC 100 Index during the sample period from 2014 to 2023

Dummy for continuous inclusion in Taiwan High Salary 100 Index	<i>highcont</i>	If a firm is selected as a constituent of the Taiwan HC 100 Index in every year from 2014 to 2023, the value of <i>highcont</i> is equals 1 for each year in the sample period. If a firm fails to be included in any year during the period, the value of <i>highcont</i> equals 0 for all years in the sample period
Total amount of employee salary and benefits	<i>salaryt</i>	Total amount of employee salary and benefits (measured as the natural logarithm)
The average of salary and benefits per employee	<i>salaryper</i>	Total amount of employee salary and benefits divided by the number of employee (measured as the natural logarithm)
The ratio of average salary and benefits per employee to the average compensation of managers	<i>sperdmper</i>	The ratio of average employee salary and benefits to average managerial compensation
Industry-adjusted of total amount of salary and benefits	<i>salarytid</i>	Industry-adjusted total amount of employee salary and benefits (measured as the natural logarithm)
Industry-adjusted of the average of salary and benefits per employee	<i>salaryperid</i>	Industry-adjusted of the total amount of employee salary and benefits divided by the number of employee (measured as the natural logarithm)
Industry-adjusted of the ratio of average salary and benefits per employee to the average compensation of managers	<i>sperdmperid</i>	Industry-adjusted of the ratio of average employee salary and benefits to average managerial compensation
<b>Control Variable</b>		
Return on assets	<i>roa</i>	After-tax net income divided by total assets
Volatility of return on assets	<i>roavar</i>	The variance of return on assets over the current year and the preceding four years
Market to book ratio	<i>mtb</i>	Market value per share divided by book value per share
Sales growth rate	<i>salesgr</i>	Current-year net sales minus prior-year net sales divided by prior-year net sales
Cash holdings ratio	<i>cashr</i>	Cash divided by total assets
Previous-year loss	<i>loss</i>	Equal to 1 if a firm reports a loss in the prior year, and 0 otherwise
Previous-year stock return	<i>pvret</i>	Previous-year stock return
Turnover	<i>turnover</i>	The natural logarithm of annual trading value
Audited by a big-four accounting firm	<i>big4</i>	Equals 1 if firm's financial statements is audited by a big-four accounting firm, and 0 otherwise
Directors' shareholdings ratio	<i>dirhold</i>	The number of shares held by all directors divided by the number of shares outstanding
Directors' shareholdings pledge ratio	<i>pledge</i>	The number of shares pledged by all directors divided by the number of shares hold by all directors
Blockholders' shareholdings ratio	<i>blockhold</i>	The number of shares held by block shareholders divided by the number of shares outstanding
Independent director ratio	<i>indr</i>	The number of independent directors divided by the total number of directors
CEO duality	<i>duality</i>	Equal to 1 if a firm's board chair is also the CEO, and 0 otherwise
D&O insurance coverage	<i>doli</i>	The natural logarithm of the total directors' and officers' liability insurance coverage amount

Note: This table reports the abbreviations and definitions of the variables. Variable definitions are based on the Taiwan Economic Journal (TEJ) database and the authors' own specifications.

### 3.2 Econometric Model

This study examines whether a firm's employee salary and benefits policies influence its stock price crash risk. The empirical analysis is conducted using the following regression specification:

$$\begin{aligned} \text{CRASH}_{i,t} = & \beta_0 + \beta_1 \text{SALARY}_{i,t} + \beta_2 \text{roa}_{i,t} + \beta_3 \text{roavar}_{i,t} + \beta_4 \text{mtb}_{i,t} + \beta_5 \text{salesgr}_{i,t} \\ & + \beta_6 \text{cashr}_{i,t} + \beta_7 \text{pvret}_{i,t} + \beta_8 \text{turnover}_{i,t} + \beta_9 \text{big4}_{i,t} + \beta_{10} \text{blockhold}_{i,t} + \beta_{11} \text{loss}_{i,t} \\ & + \beta_{12} \text{indr}_{i,t} + \beta_{13} \text{dirhold}_{i,t} + \beta_{14} \text{pledge}_{i,t} + \beta_{15} \text{duality}_{i,t} + \beta_{16} \text{doli}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where the subscripts  $i$  and  $t$  denote firm  $i$  in year  $t$ , respectively. **CRASH** represents a vector of firm-level stock price crash risk measures. This vector includes the skewness of returns computed using raw stock returns (*skewg*), the skewness of excess returns relative to the TWSE weighted stock price index (*skewex*), and the skewness of excess returns relative to the MSCI Taiwan Index (*skewms*), value-at-risk return based on raw returns at the 90 percent confidence level (*var90g*), value-at-risk return based on excess returns relative to the TWSE weighted stock price index at the 90 percent level (*var90ex*), value-at-risk return based on excess returns relative to the MSCI Taiwan Index at the 90 percent level (*var90ms*), value-at-risk return based on raw returns at the 95 percent confidence level (*var95g*), value-at-risk return based on excess returns relative to the TWSE weighted stock price index at the 95 percent level (*var95ex*), value-at-risk return based on excess returns relative to the MSCI Taiwan Index at the 95 percent level (*var95ms*), value-at-risk return based on raw returns at the 99 percent confidence level (*var99g*), value-at-risk return based on excess returns relative to the TWSE weighted stock price index at the 99 percent level (*var99ex*), value-at-risk return based on excess returns relative to the MSCI Taiwan Index at the 99 percent level (*var99ms*). **SALARY** denotes a vector of firm-level employee salary and benefits measures, including a dummy variable indicating whether the firm is included in the Taiwan HC 100 Index in a given year (*highd*), the cumulative number of years in which the firm has been included in the Taiwan HC 100 Index (*highcumu*), a dummy variable indicating whether the firm is continuously included in the Taiwan HC 100 Index throughout the sample period (*highcont*), the total amount of employee salary and benefits (*salary*), the average salary and benefits per employee (*salaryper*), and the ratio of average salary and benefits to average managers' compensation (*sperdmper*), industry-adjusted total employee salary and benefits (*salarytid*), industry-adjusted average employee salary and benefits (*salaryperid*), and the industry-adjusted ratio of average employee salary and benefits to average executive compensation (*sperdmperid*). The remaining variables in the regression specification serve as control variables and include return on assets (*roa*), the volatility of return on assets (*roavar*), the market-to-book ratio (*mtb*), growth rate of net sales (*salesgr*), the cash holding ratio (*cashr*), previous-year stock returns (*pvret*), stock turnover (*turnover*), a dummy variable indicating whether the firm's financial statements are audited by a big four accounting firm (*big4*), blockholder shareholdings (*blockhold*), a dummy variable indicating whether the firm reported a loss in the prior period (*loss*), the

proportion of independent directors (*indr*), directors' shareholdings (*dirhold*), directors' shareholdings pledge ratio (*pledge*), a dummy variable indicating whether the board chairperson concurrently serves as CEO (*duality*), and the coverage amount of directors' and officers' liability insurance (*doli*).

Regression equation (1) is pooled Ordinary Least Squares (OLS) estimated. A negative and statistically significant estimate of  $\beta_1$  indicates that firms with more generous employee salary and benefits policies are associated with lower stock price crash risk. Such empirical evidence provides support for Hypothesis 1.

### 3.3 Sample Firms and Data Sources

The sample consists of non-financial firms listed on the Taiwan Stock Exchange (TWSE) and the Taipei Exchange (TPEX, formerly known as the GreTai Securities Market) and includes a total of 1,722 firms. Financial institutions, including firms in the banking, bill finance, securities, insurance, and financial holding companies, are excluded from the sample because their accounting items, reporting systems, and regulatory and supervisory frameworks differ substantially from those of non-financial firms. The sample period spans from 2014 to 2023 and covers ten years with an annual data frequency.

Data on employee salary and benefits, stock returns, firm financial characteristics, and corporate governance variables are primarily obtained from the Taiwan Economic Journal (TEJ) database and the Market Observation Post System of the Taiwan Stock Exchange (<https://mops.twse.com.tw/mops>). Information on the constituents of the Taiwan HC 100 Index for each year is collected from the Taiwan Index Company website (<https://taiwanindex.com.tw/indexes/HC100>).

## 4. Empirical Results

### 4.1 Descriptive Statistics and Correlation Analysis

Table 2 reports the descriptive statistics of all variables. Panel A reports the results for the full sample. Panel B reports the subsample of firms relatively more emphasizing employee salary and benefits (firms included in the Taiwan HC 100 Index, *highd* = 1), whereas Panel C reports the subsample of firms relatively less emphasizing employee salary and benefits (firms not included in the Taiwan HC 100 Index, *highd* = 0). Panel D reports the differences in the mean of each variable between the two groups. Comparing Panels B and C reveals that nearly all stock price crash risk measures exhibit significantly lower mean for firms included in the Taiwan High-Pay 100 Index than for firms not included in the index. For example, for the first crash risk proxy, the return skewness based on gross returns (*skewg*), the mean equals 0.2533 for firms included in the Taiwan HC 100 Index and 0.6645 for firms not included in the index, yielding a difference of  $-0.4112$ . This evidence indicates that firms not included in the Taiwan HC 100 Index exhibit relatively greater negative return skewness and therefore higher stock price crash risk. The remaining crash risk measures show similar patterns, consistently suggesting that firms placing greater emphasis on employee salary and benefits tend to experience

lower stock price crash risk.

From an economic perspective, firms that emphasize employee salary and benefits are less likely to experience severe labor disputes, employee dissatisfaction, or workplace incidents that could trigger public criticism and reputational damage, which in turn may lead to abnormal stock price declines in capital markets. Well-documented labor-related controversies, such as a sequence of employee suicide incidents associated with major manufacturing suppliers, illustrate how negative labor events can rapidly translate into investor concern and market value losses. Firms that invest more heavily in employee welfare can therefore reduce operational and reputational risks, stabilize stakeholder relationships, and mitigate the likelihood that undisclosed negative information accumulates and is released suddenly, resulting in stock price crashes. This interpretation is consistent with the bad-news-hoarding framework of Jin and Myers (2006), who argue that opaque information environments increase crash risk, and with Edmans (2011), who shows that firms with superior employee treatment exhibit stronger long-run stock performance and lower downside risk. In addition, stakeholder-oriented policies that improve employee relations can reduce litigation risk, operational disruptions, and reputational shocks, thereby contributing to more stable firm valuation outcomes (Krüger, 2015; Edmans, 2011).

Examining the mean differences of the fourth through the ninth employee salary and benefits variables reported in Panel D reveals that all differences are positive and statistically significant at the 1% level across the two subsamples. These results indicate that firms included in the Taiwan HC 100 Index exhibit, on average, higher total employee salary and benefits, higher employee salary and benefits per employee, and a larger ratio of employee salary and benefits per employee relative to average managerial compensation. These three measures continue to display the same pattern even after industry adjustment, corresponding to the seventh through the ninth salary and benefits variables. Overall, the findings suggest that using a firm's inclusion in the Taiwan HC 100 Index as a proxy for whether the firm places greater emphasis on employee salary and benefits is empirically consistent, as this classification is reflected uniformly across alternative measures of employee salary and benefits.

In addition, comparisons of the control variables between the two subsamples indicate that firms included in the Taiwan HC 100 Index tend to exhibit higher return on assets and greater variability in return on assets, but lower sales growth rates and lower cash holding ratios. Firms included in the Taiwan HC 100 Index also show higher lagged stock returns and significantly larger annual trading volumes. Their financial statements are more likely to be audited by Big Four accounting firms, while ownership concentration among large shareholders is significantly lower. These firms are less likely to report losses in the prior period, display significantly lower proportions of independent directors, and exhibit significantly lower director shareholdings as well as lower directors' shareholdings pledge ratios.

Moreover, these firms are less likely to be the chairperson concurrently serves as the CEO, and they tend to maintain higher levels of D&O insurance coverage.

Table 3 reports the Pearson correlation matrix between the dependent variables (stock price crash risk measures) and the main explanatory variables (employee salary and benefits measures). Examining the correlation coefficients beginning from row 13 with respect to the various crash risk variables shows that, except for a small number of significantly positive correlations, the vast majority of coefficients are significantly negative. This pattern indicates that most of the evidence suggests that firms placing greater emphasis on employee salary and benefits tend to exhibit lower stock price crash risk, which is consistent with the hypotheses proposed in this study.

Together with the findings in Table 2, firms that allocate greater resources to employee salary and benefits are more likely to foster higher employee satisfaction, stronger organizational commitment, and improved internal information transparency, thereby reducing incentives for managerial bad-news hoarding and the likelihood of abrupt negative price corrections. In practice, firms that treat employees more favorably are also less likely to experience severe labor disputes or reputational crises that could trigger abnormal market downturns, as illustrated by well-known cases of labor-related public backlash in global supply chains. Prior research provides consistent empirical support for this interpretation. For example, Edmans (2011) shows that firms with superior employee satisfaction generate more favorable long-run stock performance, suggesting that employee-related investments constitute value-enhancing intangible capital. Similarly, Kim, Li and Li (2014) document that stronger CSR engagement, including stakeholder-oriented policies, is associated with significantly lower future stock price crash risk. These findings collectively support the argument that stronger emphasis on employee salary and benefits contributes to enhanced stakeholder relations and improved information environments, which in turn mitigates crash risk in financial markets.

Table 2: Summary Statistics

Variable	Panel A. Full Sample					Panel B. Firms relatively more emphasizing employee salary and benefits (firms included in the Taiwan HC 100 Index, <i>highd</i> = 1)					Panel C. Firms relatively less emphasizing employee salary and benefits (firms not included in the Taiwan HC 100 Index, <i>highd</i> = 0)					Panel D. Dif. in Means
	# of obs.	Mean	St. Dev.	Min.	Max.	# of obs.	Mean	St. Dev.	Min.	Max.	# of obs.	Mean	St. Dev.	Min.	Max.	
<i>skewg</i>	15,709	0.6436	1.0469	-1.6359	4.0987	800.00	0.2533	0.8086	-1.6359	4.0987	14,909	0.6645	1.0541	-1.6359	4.0987	-0.4112***
<i>var90g</i>	15,726	4.5190	2.2555	0.8875	11.521	800.00	3.9935	1.8360	0.8875	11.521	14,926	4.5472	2.2724	0.8875	11.521	-0.5537***
<i>var95g</i>	15,726	6.2210	3.0153	1.2635	15.246	800.00	5.4157	2.4160	1.2635	15.246	14,926	6.2641	3.0381	1.2635	15.246	-0.8484***
<i>var99g</i>	15,726	9.6708	4.7795	1.8906	24.580	800.00	8.2731	3.7857	1.8906	22.618	14,926	9.7457	4.8157	1.8906	24.580	-1.4726***
<i>skewex</i>	14,961	0.8254	0.9199	-1.1076	3.7664	800.00	0.5319	0.8003	-1.1076	3.7664	14,161	0.8420	0.9234	-1.1076	3.7664	-0.3101***
<i>var90ex</i>	14,988	4.3555	1.7748	1.6640	10.403	800.00	3.5683	1.4600	1.6640	10.403	14,188	4.3999	1.7807	1.6640	10.403	-0.8316***
<i>var95ex</i>	15,011	5.6681	2.4124	1.8502	13.932	800.00	4.6517	1.8916	1.8502	13.932	14,211	5.7253	2.4259	1.8502	13.932	-1.0737***
<i>var99ex</i>	14,988	8.3324	3.7880	2.8658	22.318	800.00	6.7913	2.9151	2.8658	21.482	14,188	8.4193	3.8129	2.8658	22.318	-1.6280***
<i>skewms</i>	14,960	0.6763	0.8981	-1.2260	3.5793	800.00	0.4618	0.7749	-1.2260	3.5793	14,160	0.6884	0.9030	-1.2260	3.5793	-0.2266***
<i>var90ms</i>	14,988	4.6898	1.8313	1.8220	10.811	800.00	3.7671	1.4715	1.8220	10.811	14,188	4.7418	1.8358	1.8220	10.811	-0.9747***
<i>var95ms</i>	14,988	6.1766	2.4467	2.4076	14.416	800.00	4.9365	1.8947	2.4076	14.393	14,188	6.2465	2.4556	2.4076	14.416	-1.3101***
<i>var99ms</i>	14,988	8.9932	3.8526	3.1791	22.882	800.00	7.1450	2.9113	3.1791	22.546	14,188	9.0974	3.8728	3.1791	22.882	-1.9524***
<i>highd</i>	16,750	0.0478	0.2133	0.0000	1.0000	800.00	1.0000	0.0000	1.0000	1.0000	15,950	0.0000	0.0000	0.0000	0.0000	1.0000
<i>highcumu</i>	16,750	0.2638	1.2393	0.0000	10.000	800.00	4.7488	2.7943	1.0000	10.000	15,950	0.0388	0.4026	0.0000	9.0000	4.7099***
<i>highcont</i>	16,750	0.0281	0.1651	0.0000	1.0000	800.00	0.5875	0.4926	0.0000	1.0000	15,950	0.0000	0.0000	0.0000	0.0000	0.5875***
<i>salaryt</i>	15,613	19.076	1.4802	0.0000	26.006	764.00	21.538	1.5084	0.0000	26.006	14,849	18.949	1.3633	0.0000	24.169	2.5889***
<i>salaryper</i>	15,590	13.619	0.4284	10.156	16.640	763.00	14.206	0.3481	13.140	15.464	14,827	13.589	0.4100	10.156	16.640	0.6170***
<i>sperdmper</i>	15,840	4.6003	4.2089	0.0000	103.61	800.00	7.6254	6.8855	0.0000	56.290	15,040	4.4394	3.9530	0.0000	103.61	3.1860***
<i>salarytid</i>	15,613	0.0000	1.4011	-19.429	6.4046	764.00	2.1498	1.4502	-19.429	6.1032	14,849	-0.1106	1.3061	-19.153	6.4046	2.2604***
<i>salaryperid</i>	15,590	0.0000	0.3782	-3.3367	2.8620	763.00	0.4804	0.3062	-0.3557	1.7517	14,827	-0.0247	0.3649	-3.3367	2.8620	0.5051***
<i>sperdmperid</i>	15,840	0.0000	4.1256	-6.4625	98.195	800.00	2.8084	6.6811	-4.8120	51.145	15,040	-0.1494	3.8875	-6.4625	98.195	2.9577***
<i>roa</i>	16,290	7.6632	9.9545	-26.684	36.390	800.00	11.373	8.3069	-21.140	36.390	15,490	7.4716	9.9952	-26.684	36.390	3.9012***
<i>roavar</i>	15,914	42.249	99.099	0.2129	757.83	800.00	24.435	74.408	0.2129	757.83	15,114	43.192	100.15	0.2129	757.83	-18.757***

<i>mtb</i>	15,727	2.1191	2.5227	0.1300	87.140	800.00	2.1660	1.8109	0.4000	24.080	14,927	2.1166	2.5553	0.1300	87.140	0.0495
<i>salesgr</i>	16,152	8.6093	55.788	-81.800	403.37	800.00	4.2651	28.492	-81.800	403.37	15,352	8.8357	56.843	-81.800	403.37	-4.5706***
<i>cashr</i>	16,411	13.696	13.274	0.1860	65.381	800.00	10.825	11.158	0.1860	59.506	15,611	13.843	13.357	0.1860	65.381	-3.0173***
<i>pvret</i>	16,750	14.882	51.225	-96.976	952.08	800.00	17.756	46.792	-56.353	368.61	15,950	14.738	51.434	-96.976	952.08	3.0173*
<i>turnover</i>	16,750	16.494	5.9393	0.0000	25.030	800.00	20.540	1.4231	16.455	25.030	15,950	16.291	6.0067	0.0000	25.010	4.2486***
<i>big4</i>	16,516	0.8877	0.3157	0.0000	1.0000	800.00	0.9988	0.0354	0.0000	1.0000	15,716	0.8821	0.3225	0.0000	1.0000	0.1167***
<i>blockhold</i>	15,859	23.294	12.739	0.0000	86.370	800.00	20.650	9.8418	0.6800	64.010	15,059	23.435	12.860	0.0000	86.370	-2.7854***
<i>loss</i>	16,238	0.1957	0.3967	0.0000	1.0000	800.00	0.0200	0.1401	0.0000	1.0000	15,438	0.2048	0.4035	0.0000	1.0000	-0.1848***
<i>indr</i>	15,859	34.067	12.511	0.0000	80.000	800.00	32.748	11.779	0.0000	62.500	15,059	34.137	12.545	0.0000	80.000	-1.3889***
<i>dirhold</i>	15,859	22.667	15.283	2.3350	69.105	800.00	17.946	15.861	2.3350	69.105	15,059	22.918	15.211	2.3350	69.105	-4.9720***
<i>pledge</i>	15,859	6.9926	15.141	0.0000	77.285	800.00	6.3915	12.709	0.0000	77.285	15,059	7.0245	15.259	0.0000	77.285	-0.6330
<i>duality</i>	15,859	0.3548	0.4785	0.0000	1.0000	800.00	0.2300	0.4211	0.0000	1.0000	15,059	0.3614	0.4804	0.0000	1.0000	-0.1314***
<i>doli</i>	14,903	10.335	3.9169	0.0000	16.157	783.00	12.574	2.5418	0.0000	16.157	14,120	10.211	3.9423	0.0000	15.599	2.3625***

Notes: This table reports the descriptive statistics of all variables, including the number of observations, mean, standard deviation, minimum, and maximum values. Panel B presents the subsample of firms relatively more emphasizing employee compensation and benefits (firms included in the Taiwan HC 100 Index, *highd* = 1), while Panel C reports the subsample of firms relatively less emphasizing employee compensation and benefits (firms not included in the Taiwan HC 100 Index, *highd* = 0). Panel D shows the difference in means of each variable between the two groups (the former minus the latter). \*, \*\*, and \*\*\* denote statistical significance of the mean-difference t-tests at the 10%, 5%, and 1% levels, respectively. The sample period spans 2014~2023.

Table 3: Correlation Matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
<i>skewg</i>	1.0000																				
<i>var90g</i>	0.0445*	1.0000																			
<i>var95g</i>	0.0045	0.9295*	1.0000																		
<i>var99g</i>	-0.1173*	0.7865*	0.8635*	1.0000																	
<i>skewex</i>	0.8017*	0.1368*	0.1284*	-0.5640*	1.0000																
<i>var90ex</i>	0.1204*	0.8407*	0.8251*	-0.0122	0.1520*	1.0000															
<i>var95ex</i>	0.0918*	0.8397*	0.8606*	0.006	0.1178*	0.9239*	1.0000														
<i>var99ex</i>	0.0300*	0.7459*	0.7898*	0.0465*	0.0174*	0.8087*	0.8722*	1.0000													
<i>skewms</i>	0.7921*	0.1622*	0.1537*	-0.5602*	0.9476*	0.1883*	0.1578*	-0.6022*	1.0000												
<i>var90ms</i>	0.1133*	0.8409*	0.8315*	-0.0163*	0.1647*	0.9466*	0.9019*	-0.0858*	0.1869*	1.0000											
<i>var95ms</i>	0.0845*	0.8315*	0.8542*	0.0008	0.1227*	0.9067*	0.9469*	-0.0792*	0.1357*	0.9237*	1.0000										
<i>var99ms</i>	0.0122	0.7485*	0.7921*	0.0547*	0.0292*	0.7986*	0.8556*	-0.0428*	0.0277*	0.7977*	0.8711*	1.0000									
<i>highd</i>	-0.0864*	-0.0539*	-0.0618*	0.0204*	-0.0758*	-0.1053*	-0.1000*	0.0200*	-0.0568*	-0.1196*	-0.1204*	0.007	1.0000								
<i>highcumu</i>	-0.0809*	-0.0576*	-0.0589*	0.0132*	-0.0709*	-0.0921*	-0.0880*	0.0202*	-0.0578*	-0.1031*	-0.1020*	0.0049	0.8105*	1.0000							
<i>highcont</i>	-0.0741*	-0.0539*	-0.0596*	0.0128	-0.0674*	-0.0975*	-0.0931*	0.0146*	-0.0518*	-0.1068*	-0.1105*	0.0043	0.7587*	0.7179*	1.0000						
<i>salaryt</i>	-0.1535*	-0.0872*	-0.0957*	0.0311*	-0.1205*	-0.1985*	-0.1892*	0.0253*	-0.1102*	-0.2019*	-0.2014*	0.0141*	0.3773*	0.3660*	0.3199*	1.0000					
<i>salaryper</i>	-0.0474*	0.0468*	0.0436*	-0.0606*	-0.0332*	-0.0315*	-0.0269*	-0.0850*	-0.0385*	-0.0271*	-0.0182*	-0.0883*	0.3107*	0.3070*	0.2626*	0.2066*	1.0000				
<i>sperdmper</i>	-0.0864*	-0.0305*	-0.0338*	0.0048	-0.0786*	-0.0906*	-0.0805*	-0.0022	-0.0729*	-0.0969*	-0.0918*	-0.0066	0.1658*	0.1691*	0.1314*	0.4134*	-0.0105	1.0000			
<i>salarytid</i>	-0.1535*	-0.1319*	-0.1370*	0.0341*	-0.1272*	-0.2269*	-0.2154*	0.0363*	-0.1187*	-0.2299*	-0.2281*	0.0299*	0.3481*	0.3341*	0.2996*	0.9466*	0.1758*	0.4050*	1.0000		
<i>salaryperid</i>	-0.0531*	-0.0169*	-0.0181*	-0.0425*	-0.0471*	-0.0781*	-0.0686*	-0.0479*	-0.0417*	-0.0796*	-0.0749*	-0.0487*	0.2881*	0.2688*	0.2443*	0.1926*	0.8829*	-0.0274*	0.2037*	1.0000	
<i>sperdmperid</i>	-0.0845*	-0.0665*	-0.0686*	0.0052	-0.0846*	-0.1153*	-0.1042*	0.007	-0.0778*	-0.1224*	-0.1175*	0.0038	0.1570*	0.1574*	0.1246*	0.3913*	-0.0258*	0.9802*	0.4125*	-0.0281*	1.0000

Notes: This table reports the Pearson correlation coefficients among the variables over the sample period 2014~2023. \* indicates statistical significance at the 10% level.

## 4.2 Baseline Regression Results

Consistent with the recommendations of Kim, Li and Zhang (2011), the regression specifications employ several alternative proxies for stock price crash risk, including the return skewness and the return measures associated with the 90%, 95%, and 99% Value at Risk (VaR). Employee salary and benefits are measured using multiple variables, including the dummy for inclusion in Taiwan HC 100 Index (*highd*), the cumulative number of years of inclusion in Taiwan HC 100 Index (*highcumu*), the dummy for continuous inclusion in Taiwan HC 100 Index (*highcont*), the total amount of employee salary and benefits (*salaryt*), the average employee salary and benefits per employee (*salaryper*), the ratio of employee salary and benefits per employee to the compensation per managers (*sperdmper*), the industry-adjusted total amount of employee salary and benefits (*salarytid*), the industry-adjusted average employee salary and benefits per employee (*salaryperid*), and the industry-adjusted ratio of employee salary and benefits per employee to the compensation per managers (*sperdmperid*). All estimation models incorporate a comprehensive set of control variables, including financial performance indicators such as return on asset and its variance, growth opportunities, market valuation measures, governance characteristics, ownership structure, information disclosure quality, and proxies related to agency problems. All regressions are estimated using the pooled OLS method.

An examination of the estimated coefficients of the employee salary and benefits variables reported in Table 4 indicates that all coefficients are negative and statistically significant at the 1% level. These results suggest that, regardless of the proxy used to capture employee salary and benefits policies, firms that place greater emphasis on employee salary and benefits exhibit lower stock price crash risk, as reflected in lower return skewness that imply reduced left-tail risk. More specifically, firms included in the Taiwan HC 100 Index, as well as those continuously included in the index, experience lower stock price crash risk. In addition, firms with a longer history of inclusion in the index exhibit a greater reduction in crash risk. Higher total employee salary and benefits, higher average employee salary and benefits per employee, and a higher ratio of employee salary and benefits per employee to the compensation per managers are all associated with lower stock price crash risk. The industry-adjusted measures of employee salary and benefits display a consistent pattern, indicating a similar decline in firm crash risk. Overall, the findings indicate that improvements in employee salary and benefits policies not only enhance employee productivity and support more stable operations but also strengthen a firm's reputation and stakeholder relationship management. Research in finance and management supports this perspective: for example, Chan, Yang and Wang (2025) find that higher median employee pay is positively and significantly associated with firm value, with workforce stability acting as a key underlying channel through which employee pay affects firm performance, consistent with stakeholder theory rather than labor leverage theory. Similarly, Edmans, Pu, Zhang and Li (2024) document that employee satisfaction, closely

related to effective compensation and benefits, is associated with superior long-run stock returns, reflecting that market recognize the value of human capital and its effects on productivity and operational success. Firms with stronger employee salary and benefits practices also tend to build better stakeholder relationships and reputational capital. Research by Bae, Kang and Wang (2011) shows that firms treating their employees fairly tend to maintain lower leverage, consistent with a reputation-enhancing commitment to stakeholders including employees, which can indirectly strengthen stakeholder relationship management. Financial markets appear to interpret stronger employee salary and benefits policies as supportive of overall firm operations, thereby substantially reducing the likelihood of a stock price crash. While the relationship between employee welfare and crash risk may vary by context, recent research by Liu, Jiang and Tong (2025) demonstrates that employee stock ownership plans (a form of employee-aligned compensation) significantly reduce stock price crash risk, partly through enhanced productivity and reduced agency costs, underscoring the stabilizing impact of employee-centric compensation policies.

Tables 5~7 report the regression estimation results examining whether employee salary and benefits affect stock price crash risk, where crash risk is measured by the return levels associated with the 90%, 95%, and 99% Value at Risk (VaR), respectively. Across these three tables, the estimated coefficients of the nine main explanatory variables, namely the employee salary and benefits measures, are consistently negative and statistically significant. These findings indicate that firms with stronger employee salary and benefits performance tend to exhibit lower stock price crash risk, which is reflected in relatively better return even under extremely adverse return realizations within a specific year. More specifically, firms included in the Taiwan HC 100 Index, as well as firms that are continuously included in the index during the sample period, are associated with more favorable VaR return outcomes. In addition, a longer duration of inclusion in the Taiwan HC 100 Index corresponds to higher VaR return levels under extreme downside scenarios. Higher total employee salary and benefits, greater average employee salary and benefits per employee, and a larger ratio of average employee salary and benefits per employee to the average compensation of managers are also associated with more favorable VaR return outcomes under extreme negative conditions. The same patterns persist when the employee salary and benefits variables are adjusted for industry effects. This finding is consistent with prior research, which suggests that investments in employee compensation enhance productivity, organizational stability, and long-term firm value (Edmans, 2011), which reduces the likelihood of sudden negative performance shocks that could trigger extreme price declines. In addition, the information-hoarding framework developed by Jin and Myers (2006) predicts that crash risk arises when managers accumulate undisclosed bad news, and empirical studies show that stronger governance and more transparent information environments mitigate such risks (Hutton, Marcus and Tehranian, 2009). Employee-oriented compensation systems may function as part of a broader stakeholder-oriented governance structure that promotes internal transparency and

information sharing, thereby limiting the buildup of concealed adverse information. Consistent with this perspective, firm-level evidence indicates that governance and disclosure quality are negatively related to crash risk (Kim, Li and Zhang, 2011). Taken together, these arguments imply that more generous employee salary and benefits policies operate not only as human capital investments but also as governance-related mechanisms that reduce the probability of extreme negative stock price movements.

This study further employs excess returns relative to the TWSE Index to construct the measures of stock price crash risk, including return skewness (*skewex*) and 95% VaR-based return measures (*var95ex*), and re-estimates the regressions. Tables 8~9 report the estimation results on how employee salary and benefits affect stock price crash risk. The empirical findings remain consistent with the earlier results, indicating that better employee salary and benefits are associated with lower stock price crash risk.

**Table 4: OLS Regression Estimates of the Effects of Employee Salary and Benefits on Stock Price Crash Risk (*skewg*)**

Explanatory Variables	Explained Variable (Return skewness based on gross returns: <i>skewg</i> )								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>highd</i>	-0.192***								
	(-5.05)								
<i>highcumu</i>		-0.0331***							
		(-5.02)							
<i>highcont</i>			-0.223***						
			(-4.58)						
<i>salaryt</i>				-0.0666***					
				(-9.84)					
<i>salaryper</i>					-0.0518**				
					(-2.40)				
<i>sperdmper</i>						-0.0124***			
						(-5.96)			
<i>salarytid</i>							-0.0703***		
							(-10.20)		
<i>salaryperid</i>								-0.0774***	
								(-3.27)	
<i>sperdmperid</i>									-0.0120***
									(-5.72)
<i>roa</i>	0.000944	0.000917	0.000881	0.00378***	0.000914	0.00224**	0.00339***	0.000983	0.00207*
	(0.89)	(0.87)	(0.83)	(3.32)	(0.83)	(2.07)	(3.01)	(0.89)	(1.92)
<i>roavar</i>	0.000335***	0.000331***	0.000327***	0.000248***	0.000346***	0.000329***	0.000251***	0.000350***	0.000327***
	(3.69)	(3.65)	(3.61)	(2.59)	(3.63)	(3.60)	(2.63)	(3.66)	(3.59)
<i>mtb</i>	0.0177***	0.0178***	0.0178***	0.0224***	0.0214***	0.0180***	0.0220***	0.0215***	0.0176***
	(4.84)	(4.88)	(4.87)	(5.51)	(5.23)	(4.93)	(5.41)	(5.27)	(4.82)
<i>salesgr</i>	0.000616***	0.000618***	0.000621***	0.000467***	0.000610***	0.000599***	0.000531***	0.000611***	0.000620***
	(3.97)	(3.98)	(4.00)	(2.91)	(3.78)	(3.85)	(3.31)	(3.79)	(3.99)
<i>cashr</i>	0.00344***	0.00338***	0.00344***	0.00273***	0.00325***	0.00340***	0.00265***	0.00321***	0.00334***
	(4.93)	(4.85)	(4.93)	(3.82)	(4.53)	(4.88)	(3.71)	(4.48)	(4.79)
<i>loss</i>	0.264***	0.265***	0.267***	0.252***	0.263***	0.269***	0.248***	0.262***	0.268***
	(10.79)	(10.85)	(10.89)	(10.06)	(10.41)	(10.99)	(9.90)	(10.38)	(10.94)

<i>pvret</i>	-0.00146***	-0.00147***	-0.00146***	-0.00157***	-0.00146***	-0.00145***	-0.00159***	-0.00147***	-0.00146***
	(-8.95)	(-8.97)	(-8.94)	(-9.38)	(-8.66)	(-8.90)	(-9.49)	(-8.74)	(-8.93)
<i>turnover</i>	-0.0207***	-0.0208***	-0.0214***	-0.0149***	-0.0215***	-0.0206***	-0.0156***	-0.0214***	-0.0207***
	(-6.88)	(-6.90)	(-7.13)	(-4.77)	(-7.01)	(-6.88)	(-5.02)	(-6.99)	(-6.93)
<i>big4</i>	-0.0517*	-0.0524**	-0.0539**	-0.0244	-0.0498*	-0.0514*	-0.0252	-0.0481*	-0.0531**
	(-1.95)	(-1.97)	(-2.03)	(-0.89)	(-1.83)	(-1.94)	(-0.92)	(-1.77)	(-2.00)
<i>blockhold</i>	0.00402***	0.00402***	0.00404***	0.00337***	0.00393***	0.00386***	0.00361***	0.00397***	0.00398***
	(5.63)	(5.63)	(5.65)	(4.59)	(5.34)	(5.41)	(4.93)	(5.40)	(5.57)
<i>indr</i>	0.00669***	0.00684***	0.00681***	0.00613***	0.00672***	0.00685***	0.00590***	0.00651***	0.00677***
	(9.25)	(9.47)	(9.43)	(8.13)	(8.89)	(9.50)	(7.82)	(8.61)	(9.38)
<i>dirhold</i>	0.00539***	0.00543***	0.00536***	0.00525***	0.00553***	0.00521***	0.00533***	0.00554***	0.00527***
	(9.00)	(9.06)	(8.94)	(8.56)	(8.97)	(8.69)	(8.70)	(8.99)	(8.80)
<i>pledge</i>	-0.00143***	-0.00139**	-0.00139**	-0.00133**	-0.00145**	-0.00141**	-0.00131**	-0.00142**	-0.00139**
	(-2.62)	(-2.54)	(-2.54)	(-2.38)	(-2.57)	(-2.57)	(-2.34)	(-2.52)	(-2.54)
<i>duality</i>	0.0424**	0.0426**	0.0420**	0.0283	0.0462**	0.0434**	0.0302*	0.0451**	0.0429**
	(2.42)	(2.43)	(2.39)	(1.57)	(2.56)	(2.48)	(1.68)	(2.50)	(2.45)
<i>doli</i>	-0.00975***	-0.00979***	-0.0101***	-0.00659***	-0.0102***	-0.0101***	-0.00711***	-0.0103***	-0.0103***
	(-4.24)	(-4.26)	(-4.43)	(-2.71)	(-4.19)	(-4.42)	(-2.94)	(-4.28)	(-4.53)
constant	0.575***	0.571***	0.586***	1.708***	1.282***	0.614***	0.460***	0.580***	0.565***
	(7.56)	(7.49)	(7.72)	(12.55)	(4.39)	(8.11)	(5.85)	(7.43)	(7.43)
No. of observation	14,797	14,797	14,797	14,205	14,192	14,738	14,205	14,192	14,738
Adjusted R <sup>2</sup>	0.060	0.060	0.060	0.063	0.057	0.060	0.063	0.057	0.060
Model Significance (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: This table reports the ordinary least squares (OLS) regression results examining the effect of firms' employee salary and benefits on stock price crash risk, measured by return skewness based on gross returns (skewg). Specifications (1)~(9) employ alternative measures of employee salary and benefits, including the dummy for inclusion in Taiwan HC 100 Index (highd), the cumulative number of years in inclusion in Taiwan HC 100 Index (highcumu), the dummy for continuous inclusion in Taiwan HC 100 Index (highcont), total amount of employee salary and benefits (salaryt), the average of employee salary and benefits per employee (salaryper), the ratio of average employee salary and benefits per employee to the average compensation of managers (sperdmper), industry-adjusted of total amount of employee salary and benefits (salarytid), industry-adjusted of the average of employee salary and benefits per employee (salaryperid), industry-adjusted of the ratio of average employee salary and benefits per employee to the average compensation of managers (sperdmperid). Control variables include return on assets (roa), volatility of return on assets (roavar), market to book ratio (mtb), sales growth rate (salesgr), cash holdings ratio (cashr), dummy for previous-year loss (loss), previous-year stock return (pvret), stock annual turnover (turnover), dummy for audited by a big-four accounting firm (big4), directors' shareholdings ratio (dirhold), directors' shareholdings pledge ratio (pledge), blockholder shareholdings ratio (blockhold), independent director ratio (indr), CEO duality (duality), and D&O insurance coverage (doli). The sample period covers 2014~2023. Reported in parentheses are the t-statistics. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

**Table 5: OLS Regression Estimates of the Effects of Employee Salary and Benefits on Stock Price Crash Risk (*var90g*)**

Explanatory Variables	Explained Variable (The 90% value at risk return based on gross returns: <i>var90g</i> )								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>highd</i>	-0.511*** (-6.94)								
<i>highcumu</i>		-0.0981*** (-7.70)							
<i>highcont</i>			-0.593*** (-6.30)						
<i>salaryt</i>				-0.0873*** (-6.70)					
<i>salaryper</i>					-0.00933 (-0.22)				
<i>sperdmper</i>						-0.00833** (-2.06)			
<i>salarytid</i>							-0.156*** (-11.77)		
<i>salaryperid</i>								-0.224*** (-4.94)	
<i>sperdmperid</i>									-0.0220*** (-5.39)
<i>roa</i>	-0.0199*** (-9.73)	-0.0199*** (-9.74)	-0.0201*** (-9.82)	-0.0174*** (-7.95)	-0.0216*** (-10.18)	-0.0195*** (-9.30)	-0.0154*** (-7.15)	-0.0206*** (-9.75)	-0.0183*** (-8.74)
<i>roavar</i>	0.00354*** (20.14)	0.00353*** (20.10)	0.00352*** (20.03)	0.00354*** (19.22)	0.00366*** (19.94)	0.00358*** (20.20)	0.00346*** (18.88)	0.00369*** (20.12)	0.00356*** (20.10)
<i>mtb</i>	0.110*** (15.63)	0.111*** (15.72)	0.111*** (15.67)	0.127*** (16.21)	0.124*** (15.80)	0.110*** (15.43)	0.128*** (16.38)	0.128*** (16.25)	0.110*** (15.52)
<i>salesgr</i>	0.000810*** (2.69)	0.000814*** (2.71)	0.000822*** (2.73)	0.000573* (1.85)	0.000731** (2.36)	0.000810*** (2.68)	0.000613** (1.99)	0.000817*** (2.64)	0.000807*** (2.67)
<i>cashr</i>	0.0168*** (12.43)	0.0166*** (12.29)	0.0168*** (12.43)	0.0156*** (11.36)	0.0162*** (11.80)	0.0171*** (12.60)	0.0150*** (10.95)	0.0162*** (11.82)	0.0168*** (12.43)
<i>loss</i>	1.097***	1.098***	1.103***	1.097***	1.114***	1.115***	1.073***	1.095***	1.109***

	(23.15)	(23.20)	(23.29)	(22.72)	(22.98)	(23.45)	(22.28)	(22.62)	(23.33)
<i>pvret</i>	0.0125***	0.0125***	0.0125***	0.0125***	0.0126***	0.0125***	0.0123***	0.0126***	0.0125***
	(39.52)	(39.48)	(39.52)	(38.55)	(38.98)	(39.44)	(38.22)	(39.00)	(39.37)
<i>turnover</i>	0.106***	0.107***	0.105***	0.111***	0.101***	0.103***	0.116***	0.104***	0.105***
	(18.34)	(18.43)	(18.10)	(18.54)	(17.31)	(17.76)	(19.61)	(17.81)	(18.12)
<i>big4</i>	0.0829	0.0827	0.0768	0.140***	0.103**	0.0657	0.165***	0.117**	0.0699
	(1.61)	(1.61)	(1.49)	(2.67)	(1.97)	(1.28)	(3.15)	(2.24)	(1.36)
<i>blockhold</i>	-0.0170***	-0.0170***	-0.0170***	-0.0185***	-0.0176***	-0.0169***	-0.0186***	-0.0179***	-0.0169***
	(-12.32)	(-12.33)	(-12.29)	(-13.11)	(-12.47)	(-12.19)	(-13.25)	(-12.69)	(-12.17)
<i>indr</i>	0.0105***	0.0109***	0.0108***	0.00986***	0.0105***	0.0110***	0.00891***	0.0101***	0.0108***
	(7.53)	(7.82)	(7.76)	(6.81)	(7.22)	(7.87)	(6.15)	(6.96)	(7.74)
<i>dirhold</i>	-0.00361***	-0.00355***	-0.00369***	-0.00373***	-0.00326***	-0.00343***	-0.00388***	-0.00351***	-0.00368***
	(-3.11)	(-3.06)	(-3.18)	(-3.16)	(-2.76)	(-2.94)	(-3.30)	(-2.97)	(-3.16)
<i>pledge</i>	-0.00365***	-0.00356***	-0.00353***	-0.00350***	-0.00365***	-0.00353***	-0.00335***	-0.00358***	-0.00355***
	(-3.45)	(-3.36)	(-3.34)	(-3.24)	(-3.38)	(-3.33)	(-3.11)	(-3.31)	(-3.35)
<i>duality</i>	0.230***	0.230***	0.229***	0.207***	0.232***	0.240***	0.195***	0.227***	0.236***
	(6.78)	(6.78)	(6.74)	(5.96)	(6.69)	(7.04)	(5.63)	(6.55)	(6.93)
<i>doli</i>	0.0128***	0.0131***	0.0117***	0.0159***	0.0101**	0.0100**	0.0188***	0.0123***	0.0109**
	(2.87)	(2.94)	(2.64)	(3.39)	(2.16)	(2.26)	(4.06)	(2.67)	(2.45)
<i>constant</i>	1.586***	1.564***	1.617***	3.091***	1.773***	1.666***	1.324***	1.577***	1.587***
	(10.79)	(10.63)	(11.02)	(11.81)	(3.16)	(11.35)	(8.79)	(10.54)	(10.78)
No. of observation	14,800	14,800	14,800	14,208	14,195	14,741	14,208	14,195	14,741
Adjusted $R^2$	0.257	0.258	0.257	0.259	0.257	0.255	0.264	0.258	0.256
Model Significance ( $p$ -value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: This table reports the ordinary least squares (OLS) regression results examining the effect of firms' employee salary and benefits on stock price crash risk, measured by the 90% value at risk return based on gross returns (var90g). Similarly, specifications (1)~(9) employ alternative measures of employee salary and benefits. Control variables are same as before. The sample period covers 2014~2023. Reported in parentheses are the t-statistics. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

**Table 6: OLS Regression Estimates of the Effects of Employee Salary and Benefits on Stock Price Crash Risk (*var95g*)**

Explanatory Variables	Explained Variable (The 95% value at risk return based on gross returns: <i>var95g</i> )								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>highd</i>	-0.776*** (-7.83)								
<i>highcumu</i>		-0.131*** (-7.63)							
<i>highcont</i>			-0.877*** (-6.92)						
<i>salaryt</i>				-0.134*** (-7.63)					
<i>salaryper</i>					-0.0430 (-0.77)				
<i>sperdmper</i>						-0.0115** (-2.12)			
<i>salarytid</i>							-0.216*** (-12.18)		
<i>salaryperid</i>								-0.306*** (-5.02)	
<i>sperdmperid</i>									-0.0289*** (-5.27)
<i>roa</i>	-0.0280*** (-10.19)	-0.0282*** (-10.24)	-0.0283*** (-10.29)	-0.0243*** (-8.25)	-0.0304*** (-10.70)	-0.0277*** (-9.81)	-0.0221*** (-7.62)	-0.0293*** (-10.32)	-0.0261*** (-9.28)
<i>roavar</i>	0.00465*** (19.69)	0.00464*** (19.63)	0.00462*** (19.55)	0.00464*** (18.79)	0.00484*** (19.60)	0.00472*** (19.80)	0.00456*** (18.49)	0.00488*** (19.77)	0.00469*** (19.70)
<i>mtb</i>	0.147*** (15.42)	0.147*** (15.48)	0.147*** (15.45)	0.172*** (16.38)	0.169*** (15.97)	0.145*** (15.19)	0.173*** (16.51)	0.173*** (16.36)	0.146*** (15.27)
<i>salesgr</i>	0.00138*** (3.42)	0.00139*** (3.44)	0.00140*** (3.46)	0.00110*** (2.64)	0.00136*** (3.26)	0.00137*** (3.37)	0.00118*** (2.84)	0.00146*** (3.50)	0.00137*** (3.37)
<i>cashr</i>	0.0227*** (12.50)	0.0225*** (12.38)	0.0227*** (12.50)	0.0209*** (11.29)	0.0218*** (11.80)	0.0232*** (12.74)	0.0201*** (10.91)	0.0218*** (11.81)	0.0229*** (12.58)
<i>loss</i>	1.414*** (22.19)	1.420*** (22.28)	1.424*** (22.34)	1.405*** (21.65)	1.429*** (21.91)	1.437*** (22.47)	1.375*** (21.24)	1.406*** (21.60)	1.429*** (22.36)

<i>pvret</i>	0.0161***	0.0161***	0.0161***	0.0160***	0.0162***	0.0161***	0.0158***	0.0162***	0.0161***
	(37.83)	(37.80)	(37.84)	(36.76)	(37.26)	(37.79)	(36.46)	(37.26)	(37.72)
<i>turnover</i>	0.139***	0.139***	0.136***	0.146***	0.131***	0.134***	0.152***	0.134***	0.137***
	(17.85)	(17.80)	(17.55)	(18.08)	(16.67)	(17.18)	(19.01)	(17.11)	(17.53)
<i>big4</i>	0.0732	0.0698	0.0636	0.159**	0.104	0.0459	0.187***	0.122*	0.0510
	(1.06)	(1.01)	(0.92)	(2.25)	(1.48)	(0.66)	(2.67)	(1.73)	(0.74)
<i>blockhold</i>	-0.0210***	-0.0210***	-0.0209***	-0.0232***	-0.0219***	-0.0209***	-0.0232***	-0.0222***	-0.0208***
	(-11.28)	(-11.28)	(-11.24)	(-12.22)	(-11.53)	(-11.17)	(-12.29)	(-11.71)	(-11.14)
<i>indr</i>	0.0147***	0.0153***	0.0152***	0.0141***	0.0151***	0.0155***	0.0129***	0.0145***	0.0153***
	(7.84)	(8.17)	(8.10)	(7.24)	(7.74)	(8.24)	(6.61)	(7.45)	(8.11)
<i>dirhold</i>	-0.00313**	-0.00298*	-0.00323**	-0.00342**	-0.00275*	-0.00278*	-0.00356**	-0.00303*	-0.00309**
	(-2.01)	(-1.91)	(-2.07)	(-2.15)	(-1.72)	(-1.77)	(-2.25)	(-1.90)	(-1.98)
<i>pledge</i>	-0.00496***	-0.00479***	-0.00477***	-0.00461***	-0.00484***	-0.00483***	-0.00442***	-0.00475***	-0.00485***
	(-3.48)	(-3.36)	(-3.35)	(-3.17)	(-3.33)	(-3.38)	(-3.06)	(-3.27)	(-3.39)
<i>duality</i>	0.308***	0.309***	0.307***	0.272***	0.310***	0.321***	0.258***	0.303***	0.316***
	(6.75)	(6.78)	(6.72)	(5.82)	(6.65)	(7.02)	(5.55)	(6.51)	(6.91)
<i>doli</i>	0.0211***	0.0208***	0.0194***	0.0248***	0.0166***	0.0167***	0.0281***	0.0191***	0.0178***
	(3.52)	(3.48)	(3.24)	(3.95)	(2.64)	(2.80)	(4.51)	(3.07)	(2.98)
constant	2.281***	2.268***	2.329***	4.606***	2.959***	2.400***	1.945***	2.297***	2.296***
	(11.54)	(11.46)	(11.80)	(13.09)	(3.92)	(12.15)	(9.60)	(11.42)	(11.59)
No. of observation	14,800	14,800	14,800	14,208	14,195	14,741	14,208	14,195	14,741
Adjusted $R^2$	0.248	0.247	0.247	0.250	0.247	0.245	0.255	0.248	0.246
Model Significance ( $p$ -value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: This table reports the ordinary least squares (OLS) regression results examining the effect of firms' employee salary and benefits on stock price crash risk, measured by the 95% value at risk return based on gross returns (var95g). Similarly, specifications (1)~(9) employ alternative measures of employee salary and benefits. Control variables are same as before. The sample period covers 2014~2023. Reported in parentheses are the t-statistics. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

**Table 7: OLS Regression Estimates of the Effects of Employee Salary and Benefits on Stock Price Crash Risk (*var99g*)**

Explanatory Variables	Explained Variable (The 99% value at risk return based on gross returns: <i>var99g</i> )								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>highd</i>	-1.345*** (-8.37)								
<i>highcumu</i>		-0.209*** (-7.50)							
<i>highcont</i>			-1.542*** (-7.51)						
<i>salaryt</i>				-0.272*** (-9.56)					
<i>salaryper</i>					-0.230** (-2.53)				
<i>sperdmper</i>						-0.0269*** (-3.04)			
<i>salarytid</i>							-0.364*** (-12.57)		
<i>salaryperid</i>								-0.567*** (-5.71)	
<i>sperdmperid</i>									-0.0481*** (-5.40)
<i>roa</i>	-0.0528*** (-11.83)	-0.0531*** (-11.91)	-0.0532*** (-11.93)	-0.0448*** (-9.36)	-0.0566*** (-12.22)	-0.0518*** (-11.29)	-0.0434*** (-9.19)	-0.0553*** (-11.97)	-0.0499*** (-10.94)
<i>roavar</i>	0.00627*** (16.38)	0.00625*** (16.31)	0.00622*** (16.23)	0.00625*** (15.56)	0.00667*** (16.61)	0.00629*** (16.27)	0.00617*** (15.39)	0.00672*** (16.74)	0.00626*** (16.19)
<i>mtb</i>	0.224*** (14.53)	0.225*** (14.56)	0.225*** (14.57)	0.268*** (15.69)	0.265*** (15.37)	0.223*** (14.38)	0.268*** (15.73)	0.268*** (15.63)	0.223*** (14.42)
<i>salesgr</i>	0.00244*** (3.72)	0.00246*** (3.75)	0.00247*** (3.77)	0.00203*** (3.00)	0.00264*** (3.89)	0.00236*** (3.58)	0.00224*** (3.32)	0.00273*** (4.03)	0.00238*** (3.61)
<i>cashr</i>	0.0294*** (9.98)	0.0291*** (9.88)	0.0294*** (9.98)	0.0265*** (8.80)	0.0285*** (9.47)	0.0301*** (10.19)	0.0255*** (8.51)	0.0284*** (9.43)	0.0297*** (10.04)
<i>loss</i>	2.126*** (20.57)	2.139*** (20.69)	2.143*** (20.73)	2.099*** (19.90)	2.132*** (20.09)	2.162*** (20.82)	2.060*** (19.56)	2.106*** (19.89)	2.151*** (20.72)

<i>pvret</i>	0.0232***	0.0232***	0.0232***	0.0229***	0.0233***	0.0233***	0.0226***	0.0233***	0.0232***
	(33.55)	(33.53)	(33.56)	(32.37)	(33.01)	(33.56)	(32.13)	(32.96)	(33.50)
<i>turnover</i>	0.205***	0.204***	0.201***	0.221***	0.195***	0.196***	0.226***	0.198***	0.199***
	(16.22)	(16.07)	(15.90)	(16.90)	(15.17)	(15.47)	(17.41)	(15.48)	(15.72)
<i>big4</i>	0.0510	0.0417	0.0346	0.222*	0.120	0.0113	0.250**	0.143	0.0160
	(0.45)	(0.37)	(0.31)	(1.94)	(1.05)	(0.10)	(2.18)	(1.24)	(0.14)
<i>blockhold</i>	-0.0250***	-0.0250***	-0.0249***	-0.0288***	-0.0266***	-0.0249***	-0.0283***	-0.0267***	-0.0247***
	(-8.28)	(-8.27)	(-8.25)	(-9.33)	(-8.59)	(-8.22)	(-9.22)	(-8.66)	(-8.16)
<i>indr</i>	0.0229***	0.0240***	0.0237***	0.0215***	0.0238***	0.0241***	0.0198***	0.0225***	0.0237***
	(7.50)	(7.86)	(7.77)	(6.80)	(7.50)	(7.89)	(6.26)	(7.10)	(7.77)
<i>dirhold</i>	0.000290	0.000613	0.0000974	0.0000134	0.00113	0.000705	0.0000351	0.000902	0.000377
	(0.11)	(0.24)	(0.04)	(0.01)	(0.44)	(0.28)	(0.01)	(0.35)	(0.15)
<i>pledge</i>	-0.00618***	-0.00586**	-0.00587**	-0.00548**	-0.00596**	-0.00580**	-0.00524**	-0.00577**	-0.00581**
	(-2.68)	(-2.54)	(-2.54)	(-2.32)	(-2.52)	(-2.50)	(-2.23)	(-2.44)	(-2.50)
<i>duality</i>	0.512***	0.516***	0.510***	0.450***	0.526***	0.529***	0.441***	0.516***	0.522***
	(6.92)	(6.97)	(6.88)	(5.93)	(6.93)	(7.12)	(5.82)	(6.80)	(7.03)
<i>doli</i>	0.0443***	0.0431***	0.0414***	0.0533***	0.0392***	0.0373***	0.0556***	0.0410***	0.0384***
	(4.56)	(4.44)	(4.27)	(5.22)	(3.84)	(3.85)	(5.48)	(4.05)	(3.97)
<b>constant</b>	<b>3.629***</b>	<b>3.627***</b>	<b>3.710***</b>	<b>8.296***</b>	<b>6.796***</b>	<b>3.871***</b>	<b>3.038***</b>	<b>3.611***</b>	<b>3.693***</b>
	(11.32)	(11.29)	(11.59)	(14.50)	(5.54)	(12.07)	(9.22)	(11.03)	(11.48)
No. of observation	14,800	14,800	14,800	14,208	14,195	14,741	14,208	14,195	14,741
Adjusted $R^2$	0.212	0.211	0.211	0.216	0.211	0.208	0.219	0.212	0.209
Model Significance ( $p$ -value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: This table reports the ordinary least squares (OLS) regression results examining the effect of firms' employee salary and benefits on stock price crash risk, measured by the 99% value at risk return based on gross returns (*var99g*). Similarly, specifications (1)~(9) employ alternative measures of employee salary and benefits. Control variables are same as before. The sample period covers 2014~2023. Reported in parentheses are the  $t$ -statistics. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

**Table 8: OLS Regression Estimates of the Effects of Employee Salary and Benefits on Stock Price Crash Risk (*skewex* v.s. *var95ex*)**

Panel A Explanatory Variables	Explained Variable (Return skewness based on excess returns relative to the TWSE weighted stock price index: <i>skewex</i> )								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>highd</i>	-0.331*** (-9.60)								
<i>highcumu</i>		-0.0553*** (-9.27)							
<i>highcont</i>			-0.353*** (-8.05)						
<i>salaryt</i>				-0.105*** (-16.72)					
<i>salaryper</i>					-0.121*** (-6.11)				
<i>sperdmper</i>						-0.0173*** (-9.21)			
<i>salarytid</i>							-0.104*** (-16.31)		
<i>salaryperid</i>								-0.130*** (-6.06)	
<i>sperdmperid</i>									-0.0179*** (-9.42)
<b>CONTROLS</b>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
constant	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
Panel B Explanatory Variables	Explained Variable (The 95% value at risk return based on excess returns relative to the TWSE weighted stock price index: <i>var95ex</i> )								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>highd</i>	-0.955*** (-12.30)								
<i>highcumu</i>		-0.148*** (-10.97)							
<i>highcont</i>			-1.057*** (-10.68)						
<i>salaryt</i>				-0.252*** (-18.09)					
<i>salaryper</i>					-0.326*** (-7.42)				

<i>sperdmper</i>						-0.0220***			
						(-5.15)			
<i>salarytid</i>							-0.287***		
							(-20.53)		
<i>salaryperid</i>								-0.454***	
								(-9.49)	
<i>sperdmperid</i>									-0.0311***
									(-7.21)
<b>CONTROLS</b>	yes	yes	yes	yes	yes	yes	yes	yes	yes
constant	yes	yes	yes	yes	yes	yes	yes	yes	yes

Notes: This table reports the ordinary least squares (OLS) regression results examining the effect of firms' employee salary and benefits on stock price crash risk, measured by the return skewness based on excess returns relative to the TWSE weighted stock price index (*skewex*) (Panel A) and the 95% value at risk return based on excess returns relative to the TWSE weighted stock price index (*var95ex*) (Panel B), respectively. Similarly as before, specifications (1)~(9) employ alternative measures of employee salary and benefits. Control variables are same as before. The estimated coefficients of intercepts, control variables, and overall model estimation statistics are omitted for brevity. The sample period covers 2014~2023. Reported in parentheses are the *t*-statistics. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

**Table 9: OLS Regression Estimates of the Effects of Employee Salary and Benefits on Stock Price Crash Risk (*skewms* v.s. *var95ms*)**

Panel A Explanatory Variables	Explained Variable (Return skewness based on excess returns relative to the MSCI Taiwan Index: <i>skewms</i> )								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>highd</i>	-0.251*** (-7.49)								
<i>highcumu</i>		-0.0458*** (-7.89)							
<i>highcont</i>			-0.270*** (-6.32)						
<i>salaryt</i>				-0.0930*** (-15.12)					
<i>salaryper</i>					-0.131*** (-6.83)				
<i>sperdmper</i>						-0.0154*** (-8.40)			
<i>salarytid</i>							-0.0936*** (-15.12)		
<i>salaryperid</i>								-0.117*** (-5.59)	
<i>sperdmperid</i>									-0.0158*** (-8.53)
<b>CONTROLS</b>	yes	yes	yes	yes	yes	yes	yes	yes	yes
constant	yes	yes	yes	yes	yes	yes	yes	yes	yes
Panel B Explanatory Variables	Explained Variable (The 95% value at risk return based on excess returns relative to the MSCI Taiwan Index: <i>var95ms</i> )								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>highd</i>	-1.288*** (-16.43)								
<i>highcumu</i>		-0.191*** (-14.08)							
<i>highcont</i>			-1.410*** (-14.12)						
<i>salaryt</i>				-0.325*** (-22.98)					
<i>salaryper</i>					-0.349*** (-7.84)				

<i>sperdmper</i>						-0.0343***			
						(-7.94)			
<i>salarytid</i>							-0.354***		
							(-24.98)		
<i>salaryperid</i>								-0.553***	
								(-11.43)	
<i>sperdmperid</i>									-0.0439***
									(-10.07)
<b>CONTROLS</b>	yes	yes	yes	yes	yes	yes	yes	yes	yes
constant	yes	yes	yes	yes	yes	yes	yes	yes	yes

Notes: This table reports the ordinary least squares (OLS) regression results examining the effect of firms' employee salary and benefits on stock price crash risk, measured by the return skewness based on excess returns relative to the MSCI Taiwan Index (*skewms*) (Panel A) and the 95% value at risk return based on excess returns relative to the MSCI Taiwan Index (*var95ms*) (Panel B), respectively. Similarly as before, specifications (1)~(9) employ alternative measures of employee salary and benefits. Control variables are same as before. The estimated coefficients of intercepts, control variables, and overall model estimation statistics are omitted for brevity. The sample period covers 2014~2023. Reported in parentheses are the *t*-statistics. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

### 4.3 Additional Tests

The firm sample spans 33 industries as classified by the TWSE, covering a 10-year period from 2014 to 2023. Across these different industries and years, firms may experience substantial variation in stock price crash risk. Prior research has documented that industry-specific characteristics and temporal factors can significantly influence the likelihood of extreme negative returns (Kim, Li and Li, 2014; Chen, Hong and Stein, 2001; Hutton, Marcus and Tehranian, 2009). To address this concern, this study re-estimated the regressions in Table 10 by incorporating 32 industry dummy variables and 9 year dummy variables into the regression specification. The results reported in Table 10 continue to show that firms placing greater emphasis on employee salary and benefits exhibit lower stock price crash risk. Therefore, even after controlling for the potential confounding effects of industry and year on crash risk, the core empirical findings remain robust and consistent with the earlier results. This evidence reinforces the notion that employee-oriented policies are associated with a lower probability of extreme negative stock returns.

In the baseline regression specification, the dependent variable, stock price crash risk, and the explanatory variable, employee salary and benefits, are measured contemporaneously. Such a design may raise concerns regarding the so-called contemporaneous correlation fallacy, whereby the dependent variable could plausibly exert a reverse effect on the independent variable (Richardson, Tuna and Wysocki, 2010). In the present context, it is possible that firms, in response to specific negative events or changes in macroeconomic policies or regulations, may experience adverse stock price movements, prompting an increase in employee salary and benefits as a countermeasure. Alternatively, firms with stronger overall financial conditions may exhibit lower stock price crash risk and simultaneously have greater capacity to provide higher employee salary and benefits (Jiang, Lee and Yue, 2010; Kim, Li and Li, 2014). Under these circumstances, the observed level of stock price crash risk could inversely explain the magnitude of employee salary and benefits, implying a potential reverse causal relationship between crash risk and employee compensation policies. To mitigate this concern, this study re-estimates the models by lagging the main explanatory variable and other control variables by one period relative to the stock price crash risk measures (*skewex* and *var95ex*). The estimation results reported in Table 11 remain consistent with the previous findings, indicating that firms with higher employee salary and benefits in the prior year are associated with lower stock price crash risk in the subsequent year. Finally, this study uses several disclosure variables as alternative measures of employee salary and benefits. Prior research suggests that greater transparency in employee compensation and benefits can enhance a firm's reputation and build public trust (Dhaliwal, Li, Tsang and Yang, 2011; Chih, Chih and Chen, 2010; Chen, Feldmann and Tang, 2015). Specifically, disclosure on parental leave (*parentdis*), disability information (*disabledis*), occupational safety and health certification (*ocsafedis*), GRI employee health and safety (*empsafedis*), and GRI employee diversity (*diversitydis*) are employed as substitutes for the main explanatory variable. The results in Table 12 show that firms with stronger disclosure practices have lower stock price crash risk, even after controlling for other relevant factors. This finding provides additional evidence that transparent employee-oriented policies not only improve stakeholder perceptions but also have a tangible effect in mitigating extreme negative stock returns.

**Table 10: OLS Regression Estimates of the Effects of Employee Salary and Benefits on Stock Price Crash Risk (Controlling for Industry and Year Fixed Effects)**

Panel A Explanatory Variables	Explained Variable (Return skewness based on excess returns relative to the TWSE weighted stock price index: <i>skewex</i> )								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>highd</i>	-0.312*** (-9.00)								
<i>highcumu</i>		-0.0541*** (-9.06)							
<i>highcont</i>			-0.325*** (-7.42)						
<i>salaryt</i>				-0.104*** (-16.19)					
<i>salaryper</i>					-0.109*** (-5.12)				
<i>sperdmper</i>						-0.0170*** (-9.09)			
<i>salarytid</i>							-0.104*** (-16.23)		
<i>salaryperid</i>								-0.115*** (-5.37)	
<i>sperdmperid</i>									-0.0174*** (-9.23)
<b>Industry Dummies</b>	yes	yes	yes	yes	yes	yes	yes	yes	yes
<b>Year Dummies</b>	yes	yes	yes	yes	yes	yes	yes	yes	yes
<b>CONTROLS</b>	yes	yes	yes	yes	yes	yes	yes	yes	yes
constant	yes	yes	yes	yes	yes	yes	yes	yes	yes
Panel B Explanatory Variables	Explained Variable (The 95% value at risk return based on excess returns relative to the TWSE weighted stock price index: <i>var95ex</i> )								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>highd</i>	-0.972*** (-13.01)								
<i>highcumu</i>		-0.149*** (-11.57)							
<i>highcont</i>			-1.074*** (-11.35)						

<i>salaryt</i>				-0.268***					
				(-19.96)					
<i>salaryper</i>					-0.324***				
					(-7.16)				
<i>sperdmper</i>						-0.0263***			
						(-6.47)			
<i>salarytid</i>							-0.278***		
							(-20.60)		
<i>salaryperid</i>								-0.358***	
								(-7.90)	
<i>sperdmperid</i>									-0.0268***
									(-6.56)
<b>Industry Dummies</b>	yes	yes	yes	yes	yes	yes	yes	yes	yes
<b>Year Dummies</b>	yes	yes	yes	yes	yes	yes	yes	yes	yes
<b>CONTROLS</b>	yes	yes	yes	yes	yes	yes	yes	yes	yes
constant	yes	yes	yes	yes	yes	yes	yes	yes	yes

Notes: By incorporating 32 industry dummies and 9 year dummies into regression specifications, this table reports the OLS regression results examining the effect of firms' employee salary and benefits on stock price crash risk, measured by the return skewness based on excess returns relative to the TWSE weighted stock price index (*skewex*) (Panel A) and the 95% value at risk return based on excess returns relative to the TWSE weighted stock price index (*var95ex*) (Panel B), respectively. Similarly as before, specifications (1)~(9) employ alternative measures of employee salary and benefits. Control variables are same as before. The estimated coefficients on the intercepts, control variables, industry and year dummies, as well as the overall model estimation statistics, are omitted for brevity. The sample period covers 2014~2023. Reported in parentheses are the *t*-statistics. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

**Table 11: Dynamic Regression Estimates of the Effects of Employee Salary and Benefits on Stock Price Crash Risk**

Panel A Explanatory Variables	Explained Variable (The 99% value at risk return based on excess returns relative to the MSCI Taiwan Index: <i>skewex</i> )								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>highd</i> <sub><i>t-1</i></sub>	-0.102*** (-2.88)								
<i>highcumu</i> <sub><i>t-1</i></sub>		-0.0208*** (-3.10)							
<i>highcont</i>			-0.134*** (-2.94)						
<i>salaryt</i> <sub><i>t-1 t-1</i></sub>				-0.0272*** (-4.29)					
<i>salaryper</i> <sub><i>t-1</i></sub>					-0.0373* (-1.83)				
<i>spdmper</i> <sub><i>t-1</i></sub>						-0.00824*** (-4.18)			
<i>salarytid</i> <sub><i>t-1</i></sub>							-0.0355*** (-5.49)		
<i>salaryperid</i> <sub><i>t-1</i></sub>								-0.0707*** (-3.17)	
<i>spdmperid</i> <sub><i>t-1</i></sub>									-0.00931*** (-4.67)
<b>CONTROLS</b> <sub><i>t-1</i></sub>	yes	yes	yes	yes	yes	yes	yes	yes	yes
constant	yes	yes	yes	yes	yes	yes	yes	yes	yes
Panel B Explanatory Variables	Explained Variable (The 95% value at risk return based on excess returns relative to the TWSE weighted stock price index: <i>var95ex</i> )								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>highd</i> <sub><i>t-1</i></sub>	-0.616*** (-7.24)								
<i>highcumu</i> <sub><i>t-1</i></sub>		-0.0986*** (-6.13)							
<i>highcont</i>			-0.731*** (-6.73)						
<i>salaryt</i> <sub><i>t-1 t-1</i></sub>				-0.131*** (-8.74)					
<i>salaryper</i> <sub><i>t-1</i></sub>					-0.233*** (-4.84)				
<i>spdmper</i> <sub><i>t-1</i></sub>						-0.0109** (-2.31)			
<i>salarytid</i> <sub><i>t-1</i></sub>							-0.180*** (-11.79)		
<i>salaryperid</i> <sub><i>t-1</i></sub>								-0.333*** (-6.31)	
<i>spdmperid</i> <sub><i>t-1</i></sub>									-0.0188*** (-3.94)
<b>CONTROLS</b> <sub><i>t-1</i></sub>	yes	yes	yes	yes	yes	yes	yes	yes	yes
constant	yes	yes	yes	yes	yes	yes	yes	yes	yes

Notes: This table reports the dynamic regression results examining the effect of firms' employee salary and benefits on stock price crash risk, measured by the return skewness based on excess returns relative to the TWSE weighted stock price index (*skewex*) (Panel A) and the 95% value at risk return based on excess returns relative to the TWSE weighted stock price index (*var95ex*) (Panel B), respectively. Specifications (1)~(9) employ alternative measures of lagged-one-period employee salary and benefits (with lowercase *t-1*). Control variables are same as before, and are also specified as one-period lag. The estimated coefficients on the intercepts, control variables, as well as the overall model estimation statistics, are omitted for brevity. The sample period covers 2014~2023. Reported in parentheses are the *t*-statistics. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

**Table 12: OLS Regression Estimates of the Effects of Employee Benefits Information Disclosure on Stock Price Crash Risk**

Explanatory Variables	Panel A. Explained Variable (Return skewness based on excess returns relative to the TWSE weighted stock price index: <i>skewex</i> )					Panel B. Explained Variable (The 95% value at risk return based on excess returns relative to the TWSE weighted stock price index: <i>var95ex</i> )				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
<i>parentdis</i>	-0.192*** (-13.73)					-0.419*** (-13.64)				
<i>disabledis</i>		-0.214*** (-9.04)					-0.736*** (-14.18)			
<i>ocsafedis</i>			-0.0776*** (-6.58)					-0.156*** (-6.01)		
<i>empsafedis</i>				-0.0313*** (-10.93)					-0.0506*** (-8.01)	
<i>diversitydis</i>					-0.0294*** (-6.44)					-0.0247** (-2.45)
<i>roa</i>	-0.00175 (-1.63)	-0.00219** (-2.03)	-0.00238** (-2.20)	-0.00243** (-2.26)	-0.00254** (-2.36)	-0.0318*** (-13.48)	-0.0320*** (-13.57)	-0.0334*** (-14.07)	-0.0336*** (-14.22)	-0.0341*** (-14.39)
<i>roavar</i>	0.000340*** (3.61)	0.000353*** (3.73)	0.000357*** (3.78)	0.000358*** (3.79)	0.000362*** (3.82)	0.00414*** (19.95)	0.00414*** (19.97)	0.00418*** (20.03)	0.00419*** (20.09)	0.00421*** (20.12)
<i>mtb</i>	0.00528 (1.49)	0.00354 (1.00)	0.00221 (0.62)	0.00454 (1.28)	0.00369 (1.04)	0.159*** (20.35)	0.156*** (20.05)	0.152*** (19.38)	0.156*** (19.88)	0.154*** (19.53)
<i>salesgr</i>	0.000283* (1.83)	0.000336** (2.17)	0.000338** (2.17)	0.000332** (2.14)	0.000373** (2.40)	0.00117*** (3.44)	0.00122*** (3.60)	0.00129*** (3.77)	0.00130*** (3.81)	0.00137*** (4.01)
<i>cashr</i>	0.00470*** (6.50)	0.00476*** (6.54)	0.00494*** (6.78)	0.00478*** (6.58)	0.00499*** (6.86)	0.0189*** (11.87)	0.0184*** (11.61)	0.0195*** (12.20)	0.0193*** (12.11)	0.0199*** (12.44)
<i>loss</i>	0.221*** (8.95)	0.230*** (9.30)	0.231*** (9.34)	0.221*** (8.93)	0.231*** (9.31)	1.412*** (25.96)	1.425*** (26.23)	1.437*** (26.26)	1.421*** (25.98)	1.442*** (26.32)
<i>pvret</i>	-0.00156*** (-9.02)	-0.00146*** (-8.42)	-0.00139*** (-8.03)	-0.00146*** (-8.41)	-0.00137*** (-7.88)	0.0109*** (28.62)	0.0110*** (28.90)	0.0112*** (29.45)	0.0112*** (29.24)	0.0113*** (29.57)
<i>turnover</i>	0.0931*** (16.88)	0.0843*** (15.38)	0.0812*** (14.82)	0.0867*** (15.83)	0.0811*** (14.79)	0.304*** (27.73)	0.299*** (27.54)	0.280*** (25.74)	0.286*** (26.18)	0.273*** (25.04)
<i>big4</i>	-0.0356 (-1.31)	-0.0444 (-1.63)	-0.0470* (-1.72)	-0.0518* (-1.90)	-0.0490* (-1.79)	-0.208*** (-3.47)	-0.224*** (-3.74)	-0.235*** (-3.89)	-0.242*** (-4.02)	-0.238*** (-3.94)
<i>blockhold</i>	0.00261***	0.00237***	0.00193**	0.00244***	0.00232***	0.0121***	0.0121***	0.0109***	0.0117***	0.0114***

	(3.48)	(3.15)	(2.56)	(3.24)	(3.07)	(7.42)	(7.41)	(6.60)	(7.11)	(6.91)
<i>indr</i>	0.00466***	0.00434***	0.00498***	0.00545***	0.00504***	0.0129***	0.0113***	0.0135***	0.0143***	0.0136***
	(5.17)	(4.78)	(5.50)	(6.03)	(5.56)	(6.47)	(5.70)	(6.77)	(7.15)	(6.77)
<i>dirhold</i>	0.00620***	0.00632***	0.00588***	0.00622***	0.00606***	0.0163***	0.0174***	0.0158***	0.0163***	0.0159***
	(9.87)	(9.99)	(9.33)	(9.88)	(9.58)	(11.95)	(12.67)	(11.48)	(11.82)	(11.49)
<i>pledge</i>	-0.00255***	-0.00250***	-0.00248***	-0.00243***	-0.00245***	-0.00444***	-0.00441***	-0.00429***	-0.00419***	-0.00423***
	(-4.67)	(-4.55)	(-4.50)	(-4.43)	(-4.46)	(-3.67)	(-3.66)	(-3.53)	(-3.45)	(-3.47)
<i>duality</i>	0.0532***	0.0571***	0.0581***	0.0532***	0.0609***	0.258***	0.257***	0.271***	0.265***	0.282***
	(2.97)	(3.18)	(3.22)	(2.96)	(3.39)	(6.54)	(6.51)	(6.82)	(6.69)	(7.09)
<i>doli</i>	-0.00937***	-0.0124***	-0.0130***	-0.0113***	-0.0130***	-0.00192	-0.00574	-0.0106*	-0.00844	-0.0130**
	(-3.21)	(-4.27)	(-4.45)	(-3.86)	(-4.45)	(-0.30)	(-0.90)	(-1.65)	(-1.31)	(-2.02)
<b>constant</b>	-0.934***	-0.936***	-0.879***	-1.020***	-0.905***	-1.339***	-1.587***	-1.273***	-1.441***	-1.185***
	(-8.05)	(-7.96)	(-7.48)	(-8.64)	(-7.65)	(-5.63)	(-6.62)	(-5.29)	(-5.94)	(-4.88)
No. of observation	11,828	11,828	11,828	11,828	11,828	11,867	11,867	11,867	11,867	11,867
Adjusted R <sup>2</sup>	0.060	0.051	0.048	0.054	0.048	0.306	0.307	0.297	0.299	0.295
Model Significance ( <i>p</i> -value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: This table reports the ordinary least squares (OLS) regression results examining the effects of employee benefits information disclosure on stock price crash risk, measured by the return skewness based on excess returns relative to the TWSE weighted stock price index (*skewex*) (Panel A) and the 95% value at risk return based on excess returns relative to the TWSE weighted stock price index (*var95ex*) (Panel B). Similarly, specifications (1)~(5) employ alternative measures of employee benefits information disclosure, including, disclosure on parental leave (*parentdis*), disclosure on disability information (*disabledis*), certification of occupational safety and health management system (*ocsafedis*), disclosure on GRI employee health and safety (*empsafedis*), and disclosure on GRI employee diversity (*diversitydis*). Control variables are same as before. The sample period covers 2014~2023. Reported in parentheses are the *t*-statistics. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

## 5. Conclusion and Suggestions

### 5.1 Research Conclusion and Implications

Using a sample of 1,675 listed nonfinancial firms in Taiwan over the period 2014 to 2023, this study examines how employee salary and benefits influence firms' downside risk in the stock market, namely stock price crash risk. Taiwan represents a rapidly evolving economy characterized by significant industrial transformation, strong growth of high-technology sectors, and rapid financial market development. In such an environment, balancing profitability with employee salary and benefits has become a critical dimension of CSR. Employee compensation policies affect workforce productivity, loyalty, and long-term human capital quality, and in an increasingly CSR and ESG-oriented global marketplace they also shape a firm's position in global supply chains and its competitive strength, ultimately feeding back into financial market performance. Insufficient attention to employee rights and human capital practices may weaken organizational legitimacy, elevate compliance and litigation risks, and increase vulnerability to adverse shocks or regulatory changes, all of which can heighten stock price crash risk.

Although prior research has extensively examined the relationship between compensation policies and employee productivity or firm performance, relatively little attention has been paid to their implications for the likelihood of extreme negative stock returns. At the same time, the literature on crash risk has largely focused on financial reporting opacity, the concealment of adverse information, board structure, and ownership characteristics, while rarely considering employee salary and benefits as a potential determinant. This study therefore fills an important gap by investigating whether employee salary and benefits constitute a significant factor influencing crash risk. To conduct the analysis, this study employs multiple measures of employee salary and benefits and adopts return skewness and VaR-based indicators to capture stock price crash risk, while controlling for a wide range of firm characteristics identified in prior research. Multiple regression results consistently indicate that nearly all measures of employee salary and benefits are negatively and significantly associated with various crash risk indicators, suggesting that firms offering higher employee salary and benefits exhibit lower downside risk of stock market performance. These findings are consistent with the view that stronger employee-oriented policies enhance productivity, strengthen reputation and organizational legitimacy, and reduce the likelihood of employee-related incidents, compliance problems, litigation exposure, and negative media coverage, thereby mitigating the probability of extreme downward movements in stock prices.

The empirical findings carry several implications for investors. The evidence that higher employee salary and benefits are associated with lower stock price crash risk suggests that compensation-related human capital policies contain valuable information for downside risk assessment and portfolio construction. Investors concerned with tail risk or long-horizon portfolio stability may therefore incorporate employee-oriented indicators into screening and asset allocation decisions,

particularly within ESG-oriented investment strategies. Firms that demonstrate sustained commitment to employee salary and benefits may be viewed as possessing stronger organizational resilience, lower exposure to reputational or regulatory shocks, and a reduced probability of extreme negative returns, thereby serving as relatively defensive holdings in diversified portfolios.

The results also provide policy-relevant insights for securities regulators and market supervisory authorities such as the Financial Supervisory Commission and the Taiwan Stock Exchange. Since transparency regarding employee salary and benefits appears to be linked to lower crash risk, regulatory frameworks that encourage or standardize disclosure of employee-related information may improve market efficiency and investor protection. Enhanced disclosure requirements, ESG reporting guidelines, or incentive-based programs promoting human capital transparency could reduce information asymmetry and help market participants better evaluate firm-specific downside risk. Such policy initiatives may contribute to overall market stability by encouraging firms to adopt compensation practices that strengthen long-term organizational sustainability.

Finally, the findings offer managerial implications for senior executives. Investment in employee salary and benefits should not be viewed solely as a cost consideration but rather as a strategic human capital investment that can reduce financial market risk exposure. Firms that maintain competitive compensation structures may enhance employee productivity, loyalty, and internal monitoring, while simultaneously strengthening corporate reputation and organizational legitimacy. These mechanisms can lower the likelihood of adverse events, compliance failures, or negative information accumulation that often precede stock price crashes. Consequently, integrating employee salary and benefits policies into long-term risk management and corporate sustainability strategies may generate both operational and financial benefits, reinforcing firm value and stock market performance stability.

## **5.2 Research Limitation and Extensions**

Several limitations in research design, sample scope, and methodological application remain, providing directions for future investigation. First, the sample focuses on medium and large firms listed in the TWSE and TPEX, which are characterized by greater information disclosure and sounder governance structures. Small and medium-sized enterprises, which constitute a large portion of the Taiwanese capital markets, may exhibit substantially different compensation systems, capital structures, and stock price variability. Future research could incorporate surveys, interviews, or case studies to obtain compensation data for smaller firms and assess the external validity of employee salary and benefits in mitigating crash risk.

Second, the study excludes the financial sector due to its unique regulatory environment, financial reporting standard, and risk measurement and management practices. Banks, insurance companies, and securities firms, however, hold

substantial capital weight in the Taiwanese financial market, and their human resource structures may also influence stock price crash risk. Subsequent studies could conduct industry-specific analyses to examine whether the mechanisms identified here generalize to the financial sector and to enhance the cross-industry applicability of the findings. Third, the current classification of high-salary firms based on inclusion in the Taiwan HC 100 Index may be overly simplistic. Future research could adopt other continuous and alternative dimensions and measures of employee compensation and to examine the marginal effects of various compensation policies on crash risk.

Fourth, the potential nonlinearity and mediating mechanisms of high-salary structures are not fully explored. While linear regression models are primarily employed, preliminary evidence suggests that relationships between high pay and firm value may be nonlinear (Chen, 2025), particularly in the case of pay gaps between employees and executives. Future studies could apply threshold regression or polynomial regression specification to identify policy-relevant compensation thresholds, and introduce mediating variables such as employee turnover, firm reputation, or internal control quality to construct a more comprehensive framework of influence.

Finally, the extent to which a firm emphasizes employee salary and benefits may give rise to concerns regarding endogeneity and self-selection bias. Firms with stronger financial conditions, superior governance arrangements, or specific ownership and board structures may exhibit substantial differences in employee salary and benefits, while these same characteristics may simultaneously exert a significant influence on the firm's downside stock price risk. Similarly, firms with more favorable financial and governance conditions are more likely to possess the capacity to provide higher employee salary and benefits, yet these underlying conditions are also closely related to the likelihood of stock price crashes. To address these concerns, future research may employ two-stage least squares instrumental variable estimation (Angrist and Krueger, 2001; Harjoto and Jo, 2015; Nguyen, Agbola and Choi, 2019) and propensity score matching (Rosenbaum and Rubin, 1983; 1985a,b) to mitigate potential endogeneity and self-selection issues and to strengthen the causal interpretation of the empirical findings.

**ACKNOWLEDGEMENTS.** The authors gratefully acknowledge the constructive comments and suggestions provided by the anonymous reviewers, which have substantially improved and strengthened this manuscript. The authors also acknowledge the research data support from the library of the National Changhua University of Education (NCUE) and the Taiwan Economic Journal (TEJ) database.

## Reference

- [1] Akerlof, G. A. (1982), "Labor Contracts as Partial Gift Exchange", *Quarterly Journal of Economics*, 97(4), pp. 543-569.
- [2] Akerlof, G. A. and J. L. Yellen (1990), "The Fair Wage-Effort Hypothesis and Unemployment", *Quarterly Journal of Economics*, 105(2), pp. 255-283.
- [3] Angrist, J. and A. B. Krueger (2001), "Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments", *Journal of Economic Perspectives*, 15(4), pp. 69-85.
- [4] Bae, K. H., J. K. Kang. and J. Wang (2011), "Employee Treatment and Firm Leverage: A Test of the Stakeholder Theory of Capital Structure", *Journal of Financial Economics*, 100(1), pp. 130-153.
- [5] Batt, R. (2002), "Managing Customer Services: Human Resource Practices, Quit Rates, and Sales Growth", *Academy of Management Journal*, 45(3), pp. 587-597.
- [6] Bloom, N. and J. Van Reenen (2011), "Chapter 19-Human Resource Management and Productivity", *Handbook of Labor Economics*, 4(B), pp. 1697-1767.
- [7] Bloom, N. and J. Van Reenen (2007), "Measuring and Explaining Management Practices across Firms and Countries", *Quarterly Journal of Economics*, 122(4), pp. 1351-1408.
- [8] Bowen, H. R. (1953), *Social Responsibilities of the Businessman*, New York: Harper & Row.
- [9] Cai, W. Z. (2024), *Operating Cash Flow Opacity and Stock Price Crash Risk-Considering the Moderating of Audit Quality*, master thesis, Providence University.
- [10] Cappelli, P. and K. Chauvin (1991), "An Interplant Test of the Efficiency Wage Hypothesis", *Quarterly Journal of Economics*, 106(3), pp. 769-787.
- [11] Chan, K., K. Yang. and Y. Wang (2025), "The Effects of Employee Pay on Firm Value", *Review of Quantitative Finance and Accounting*, forthcoming.
- [12] Chang, Y. T., A. X. Xie., M. H. Chen. and W. C. Chi (2021), "Textual Complexity of Key Audit Matters (KAM) and Future Stock Price Crash Risk", *Review of Accounting and Auditing Studies*, 11(1), pp. 1-31.
- [13] Chen, J. T. (2025), "The Non-linear Relationships among Employee Compensation, Executive-Employee Pay Gap, and Employee Work Engagement", *Taipei Economic Inquiry*, 61(2), pp. 185-233.
- [14] Chen, J., H. Hong, and J. C. Stein (2001), "Forecasting Crashes: Trading Volume, Past Returns, and Conditional Skewness in Stock Prices", *Journal of Financial Economics*, 61(3), pp. 345-381.
- [15] Chen, J., R. Feldmann. and Y. Tang (2015), "The Effect of Mandatory IFRS Adoption on Accounting Conservatism", *Accounting Review*, 90(6), pp. 2383-2415.

- [16] Chen, L., A. Feldmann. and O. Tang (2015), "The Relationship between Disclosures of Corporate Social Performance and Financial Performance: Evidences from GRI reports in Manufacturing Industry", *International Journal of Production Economics*, 170(B), pp. 445-456,
- [17] Chih, H. L., H. H. Chih. and T. Y. Chen (2010), "On the Determinants of Corporate Social Responsibility: International Evidence on the Financial Industry", *Journal of Business Ethics*, 93(1), pp. 115-135.
- [18] Core, J. E. and W. R. Guay (2001), "Stock Option Plans for Non-Executive Employees", *Journal of Financial Economics*, 61(2), pp. 253-287.
- [19] Cropanzano, R. and M. S. Mitchell (2005), "Social Exchange Theory: An Interdisciplinary Review", *Journal of Management*, 31, pp. 874-900.
- [20] Dhaliwal, D. S., O. Z. Li., A. Tsang. and Y. G. Yang (2011), "Voluntary Nonfinancial Disclosure and the Cost of Equity Capital: The Initiation of Corporate Social Responsibility Reporting", *Accounting Review*, 86(1), pp. 59-100.
- [21] Delaney, J. T. and M. A. Huselid (1996), "The Impact of Human Resource Management Practices on Perceptions of Organizational Performance", *Academy of Management Journal*, 39(4), pp. 949-969.
- [22] Duffie, D. and J. Pan (1997), "An Overview of Value at Risk", *Journal of Derivatives*, 4(3), pp. 7-49.
- [23] Eccles, R. G., I. Ioannou. and G. Serafeim (2014), "The Impact of Corporate Sustainability on Organizational Processes and Performance", *Management Science*, 60(11), pp. 2835-2857.
- [24] Edmans, A. (2011), "Does the Stock Market Fully Value Intangibles? Employee Satisfaction and Equity Prices", *Journal of Financial Economics*, 101(3), pp. 621-640.
- [25] Edmans, A., D. Pu., C. Zhang. and L. Li (2024), "Employee Satisfaction, Labor Market Flexibility, and Stock Returns Around the World", *Management Science*, 70(7), pp. 4357-4380.
- [26] Flammer, C. and J. Luo (2017), "Corporate Social Responsibility as an Employee Governance Tool: Evidence from a Quasi-Experiment", *Strategic Management Journal*, 38(2), pp. 163-183.
- [27] Friede, G., T. Busch. and A. Bassen (2015), "ESG and Financial Performance: Aggregated Evidence from More than 2000 Empirical Studies", *Journal of Sustainable Finance and Investment*, 5, pp. 210-233.
- [28] Gerhart, B., and G. T. Milkovich (1990), "Organizational Differences in Managerial Compensation and Financial Performance", *Academy of Management Journal*, 33(4), pp. 663-691.
- [29] Ghaly, M., V. A. Dang. and K. Stathopoulos (2017), "Cash Holdings and Labor Heterogeneity: The Role of Skilled Labor", *Review of Financial Studies*, 30(10), pp. 3636-3668.
- [30] Gibbons, R. and M. Waldman (1999), "Chapter 36 - Careers in Organizations: Theory and Evidence", *Handbook of Labor Economics*, 3B, pp. 2373-2437.

- [31] Harjoto, M. A. and H. Jo (2015), "Legal vs. Normative CSR: Differential Impact on Analyst Dispersion, Stock Return Volatility, Cost of Capital, and Firm Value", *Journal of Business Ethics*, 128(1), pp.1-20.
- [32] Heywood, J. S. and X. Wei (2006), "Performance Pay and Job Satisfaction", *Journal of Industrial Relations*, 48(4), pp. 523-540.
- [33] Hom, P. W., T. R. Mitchell, T. W. Lee. and R. W. Griffeth (2012), "Reviewing Employee Turnover: Focusing on Proximal Withdrawal States and an Expanded Criterion", *Psychological Bulletin*, 138(5), pp. 831-858.
- [34] Huselid, M. A. (1995), "The Impact of Human Resource Management Practices on Turnover, Productivity, and Corporate Financial Performance", *Academy of Management Journal*, 38(3), pp. 635-672.
- [35] Hutton, A. P., A. J. Marcus. and H. Tehranian (2009), "Opaque Financial Reports, R<sup>2</sup>, and Crash Risk", *Journal of Financial Economics*, 94(1), pp. 67-86.
- [36] Ichniowski, C., K. Shaw. and G. Prennushi (1997), "The Effects of Human Resource Management Practices on Productivity: A Study of Steel Finishing Lines", *American Economic Review*, 87(3), pp. 291-313.
- [37] Jiang, G., C. M. C. Lee. and H. Yue (2010), "Tunneling through Intercorporate Loans: The China Experience", *Journal of Financial Economics*, 98(1), pp. 1-20.
- [38] Jin, L. and S. C. Myers (2006), "R<sup>2</sup> around the World: New Theory and New Tests", *Journal of Financial Economics*, 79(2), pp. 257-292.
- [39] Jorion, P. (2007), *Value at Risk: The New Benchmark for Managing Financial Risk*, 3<sup>rd</sup> ed., McGraw-Hill.
- [40] Kim, J. B., Y. Li. and L. Zhang (2011), "Corporate Tax Avoidance and Stock Price Crash Risk: Firm-Level Analysis", *Journal of Financial Economics*, 100(3), pp. 639-662.
- [41] Kim, J. B., Z. Wang. and L. Zhang (2016), "CEO Overconfidence and Stock Price Crash Risk", *Contemporary Accounting Research*, 33(4), pp. 1720-1749.
- [42] Kim, J. B. and L. Zhang (2014), "Financial Reporting Opacity and Expected Crash Risk: Evidence from Implied Volatility Smirks", *Contemporary Accounting Research*, 31(3), pp. 851-875.
- [43] Kim, J. B. and L. Zhang (2016), "Accounting Conservatism and Stock Price Crash Risk: Firm-Level Evidence", *Contemporary Accounting Research*, 33(1), pp. 412-441.
- [44] Kim, Y., H. Li. and S. Li (2014), "Corporate Social Responsibility and Stock Price Crash Risk", *Journal of Banking and Finance*, 43, pp. 1-13.
- [45] Krüger, P. (2015), "Corporate Goodness and Shareholder Wealth", *Journal of Financial Economics*, 115(2), pp. 304-329.
- [46] Krueger, A. B. and L. H. Summers (1988), "Efficiency Wages and the Inter-Industry Wage Structure", *Econometrica*, 56(2), pp. 259-293.
- [47] Lazear, E. P. (2000), "Performance Pay and Productivity", *American Economic Review*, 90(5), pp. 1346-1361.

- [48] Lins, K. V., H. Servaes. and A. Tamayo (2017), "Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis", *Journal of Finance*, 72(4), pp. 1785-1824.
- [49] Liu, M., X. Jiang. X. Tong (2025), "Employee Stock Ownership Plans and Market Stability: A Longitudinal Analysis of Stock Price Crash Risk in China", *Risks*, 13(12), 234.
- [50] Milkovich, G. T. and J. M. Newman (2008), *Compensation*, 9th ed., McGraw-Hill.
- [51] Nguyen, V. H., F. W. Agbola. and B. Choi (2019), "Does Corporate Social Responsibility Reduce Information Asymmetry? Empirical evidence from Australia", *Australian Journal of Management*, 44(2), pp.188-211.
- [52] Lo, C. S. (2019), "Fund Manager Herding and Stock Price Crash", *Commerce and Management Quarterly*, 20(4), pp. 371-401.
- [53] Pfeffer, J. (1998), *The Human Equation: Building Profits by Putting People First*. Harvard Business School Press.
- [54] Qu, W. B., D. Su., W. W. Gan. and T. Shi (2021), "Complexity of Diversification, Ownership and Risk of Stock Price Crash: Path Research Based on Information Opacity and Earnings Management", *Journal of Scientific and Technological Management of Land and Resources*, 38(6), pp. 78-88.
- [55] Richardson, G., I. Obaydin. and C. Liu (2022), "The Effect of Accounting Fraud on Future Stock Price Crash Risk", *Economic Modelling*, 117, 106072.
- [56] Richardson, S., I. Tuna. and P. D. Wysocki (2010), "Accounting Anomalies and Fundamental Analysis: A Review of Recent Research Advances", *Journal of Accounting and Economics*, 50(2–3), pp. 410-454.
- [57] Roberts, P. W. and G. R. Dowling (2002), "Corporate Reputation and Sustained Superior Financial Performance", *Strategic Management Journal*, 23(12), pp. 1077–1093.
- [58] Rosenbaum, P. and D. Rubin (1983), "The Central Role of the Propensity Score in Observational Studies for Causal Effects", *Biometrika*, 70(1), pp.41-55.
- [59] Rosenbaum, P. and D. Rubin (1985a), "Constructing a Control Group Using Multivariate Matched Sampling Methods that Incorporate the Propensity", *American Statistician*, 39(1), pp.33-38.
- [60] Rosenbaum, P. and D. Rubin (1985b), "The Bias Due to Incomplete Matching", *Biometrics*, 41(1), pp.103-116.
- [61] Shapiro, C. and J. E. Stiglitz (1984), "Equilibrium Unemployment as a Worker Discipline Device", *American Economic Review*, 74(3), pp. 433-444.
- [62] Sturman, M. C. (2003), "Searching for the Inverted U-Shaped Relationship Between Time and Performance: Meta-Analyses of the Experience/Performance, Tenure/Performance, and Age/Performance Relationships", *Journal of Management*, 29(5), pp. 609-640.
- [63] Yellen, J. L. (1984), "Efficiency Wage Models of Unemployment", *American Economic Review*, 74(2), pp. 200-205.

- [64] Yu, H. Y. (2020), Empirical Study on the Relationship between Corporate Social Responsibility Performance and Crash Risk, master thesis, Department of Finance, National Chung Hsing University.
- [65] Yu, J. W. and D. Mai (2020), "Political Turnover and Stock Crash Risk: Evidence from China", *Pacific-Basin Finance Journal*, 61, 101324.
- [66] Zhu, X. Y. and F. Xu (2019), "Busy Boards, D&O Insurance and Risk of Stock Price Collapse: Reputation Theory or Busyness Effect", *South China Finance*, 5, pp. 44-55.