Journal of Derivatives and Quantitative Studies: 선물연구

Do employee owners deter firms from withholding bad news? Evidence from Korea

Shin Hyejeong and Heejin Park
School of Business, Pusan National University, Busan, South Korea

Received 18 December 2025
Revised 15 January 2026
Accepted 2 February 2026

Abstract

Stock price crashes, often triggered by the hoarding and sudden release of bad news, pose severe risks to investors and market stability. While prior research has investigated various governance mechanisms that constrain managerial bad-news hoarding, the role of employee share ownership (ESO) remains underexplored. This gap is particularly pronounced in Korea, where ESO is organized through employee associations under distinctive institutional rules, such as short mandatory lock-up periods and a unique division between mandatory allotments for Korea Composite Stock Price Index (KOSPI) firms and voluntary adoption for Korea Securities Dealers Automated Quotation (KOSDAQ) firms. Using a large sample of 16,929 firm-year observations from 2011 to 2020, we examine whether ESO mitigates future stock price crash risk. We find that ESO is negatively associated with crash risk, but this effect is more pronounced in KOSDAQ firms, where employee participation is voluntary. Additional analyses reveal that the mitigating effect of ESO is stronger in firms operating in volatile industries, in firms with high information opacity and in firms with less concentrated controlling ownership. These results are robust to alternative model specifications and propensity score matching. Our findings highlight that ESO operates as an internal governance mechanism that curbs managerial incentives to hoard bad news and enhances transparency. By linking the unique Korean ESO system to crash risk outcomes, this study extends the ESO literature beyond disclosure quality and contributes to a broader understanding of how employee ownership can mitigate extreme downside risks in capital markets.

Keywords Employee stock ownership, Stock price crash risk, Agency problem, Rent seeking

Paper type Research article

1. Introduction

Stock price crash risk has received growing scholarly and regulatory attention because extreme downside events threaten not only individual investors but also broader market stability. Prior research, grounded in the agency framework of Jin and Myers (2006), emphasizes that crashes often arise from managers' deliberate hoarding of bad news until it accumulates and is released in a concentrated form (Hutton *et al.*, 2009). In this framework, opacity and information asymmetry amplify the likelihood of sudden price collapses, whereas mechanisms that enhance transparency and accountability reduce crash risk. Consequently, a wide range of governance mechanisms—both internal and external—have been studied as determinants of crash risk, including managerial compensation, board oversight, internal controls, institutional monitoring, product-market competition, and stock liquidity. Yet, despite the growing body of work on these factors, the role of employee share ownership (ESO) remains largely unexplored.

The existing literature portrays ESO in ambivalent terms. On the one hand, ESO may entrench management by aligning employees with executives, as employees tend to prioritize

JEL Classification — G32, G34, L20

Funding: This work was supported by a Humanities and Social-Science Research Promotion of Pusan National University (2023).

Journal of Derivatives and Quantitative Studies: 선물연구
Emerald Publishing Limited
e-ISSN: 2713-6647
p-ISSN: 1229-988X
DOI 10.1108/JDQS-12-2025-0089

wages and benefits over equity value and may side with managers in corporate control contests (Faleye *et al*., 2006; Park, 2017). Such dynamics can strengthen managerial discretion and exacerbate opacity. On the other hand, a substantial body of work emphasizes the positive impact of ESO on enhancing productivity, reducing agency costs, and improving disclosure (Jones and Kato, 1995; Bova *et al*., 2015; Blasi *et al*., 2016). These contrasting views underscore the need to examine ESO not only in terms of performance outcomes but also in relation to extreme risk events such as stock price crashes.

We argue that ESO can mitigate crash risk through three complementary channels that directly address the problem of bad-news hoarding. First, ESO expands the pool of informed insiders and strengthens internal monitoring and whistleblowing incentives. Employee–owners, who are closely involved in daily operations and directly exposed to downside losses, have stronger incentives to detect and escalate concerns about concealed problems, raising the expected cost of hoarding to managers. Second, ESO reduces information asymmetry and alleviates rent extraction pressures. By aligning employees' interests with long-term firm value rather than short-term wage gains, ESO lessens managers' need to maintain opacity during labor negotiations, thereby reducing one of the root causes of crash risk. Third, voluntary ESO schemes, which often require employees to invest their own funds, act as credible signals of insider confidence and create reputational pressure on managers to maintain transparency. These mechanisms, supported by prior evidence linking ESO to disclosure quality and transparency (Bova *et al*., 2015; Li *et al*., 2019), suggest that ESO can function as an internal governance device that constrains managerial incentives to conceal adverse information and, ultimately, reduces the probability of stock price crashes.

The Korean setting provides a distinctive institutional context in which to test these theoretical predictions. ESO in Korea is organized through employee associations rather than external trustees, giving employees collective voting rights and meaningful influence in corporate governance. Moreover, Korean schemes typically impose short lock-up periods of approximately one year, during which employees are prohibited from selling their shares, thereby reinforcing incentives for near-term monitoring and disclosure. Importantly, the regulatory framework differentiates between mandatory ESO in KOSPI-listed firms, where 20% of new equity issues must be allocated to employees, and voluntary ESO in KOSDAQ-listed firms, where employees must proactively request new share allotments. This heterogeneity creates quasi-experimental variation in employee incentives and managerial responses, offering a unique opportunity to assess when ESO is most effective in mitigating crash risk. Using a dataset of 16,929 firm-years from 2011 to 2020, we conduct firm-year fixed-effect regression analyses. Our findings reveal a negative association between ESO and future stock price crash risk, specifically for firms listed on the KOSDAQ market, which are subject to a voluntary preferential allocation of new shares. Our findings support the argument that ESO mitigates employees' ability to extract above-market rents (Bova, 2013; Jones and Kato, 1995). More broadly, our results suggest that ESO plays a governance role when employees voluntarily purchase shares in their firm.

Additional tests conducted to enhance the analytical depth of our study show that ESO reduces stock price crash risk only in volatile industries and those with high information opacity. This indicates that ESO effectively reduces stock price crash risk when information asymmetry is severe. Interestingly, the effectiveness of ESO diminishes when the largest shareholders exert significant influence over management, suggesting that the impact of ESO depends on the dynamics of the firm's ownership structure.

This study makes a significant contribution to the literature on employee share ownership (ESO), disclosure, and stock price crash risk in several important ways. First, we extend prior research that links ESO to disclosure quality (e.g. Bova *et al*., 2015) by shifting the focus from average levels of transparency to the distributional consequences of information hoarding. While it is well established that greater transparency reduces information asymmetry, relatively little is known about how ESO affects the nonlinear downside tail of stock returns. Building on the theoretical framework of Jin and Myers (2006), who highlight bad-news

hoarding as the fundamental driver of crash risk, we theorize and test how ESO constrains managerial incentives to conceal adverse information. By doing so, we move beyond the general "ESO-disclosure" narrative and demonstrate ESO's role in mitigating the extreme realization of hidden risks.

Second, our study leverages the unique institutional design of ESO in Korea, which allows us to develop sharper theoretical predictions. Korean ESO schemes are characterized by short lock-up periods (approximately one year) and, in the case of KOSDAQ-listed firms, voluntary participation by employees. These features strengthen employees' monitoring and whistleblowing incentives in the short term, since they cannot exit during the lock-up but will directly bear the losses from any sudden disclosure of hoarded bad news. At the same time, the contrast between mandatory ESO in KOSPI firms and voluntary ESO in KOSDAQ firms provides quasi-experimental variation in the strength of employee incentives and managerial responses. This institutional heterogeneity enables us to theorize and empirically identify contexts in which ESO is more effective in constraining bad-news hoarding, thereby offering a theoretical contribution that goes beyond single-country description.

Third, by documenting that ESO reduces crash risk, particularly in settings with high information opacity, volatile industries, and weaker controlling shareholder dominance, our findings highlight ESO as an alternative governance mechanism that can substitute for weak external monitoring. This insight resonates with and extends the literature on corporate governance and crash risk (Hutton *et al*., 2009; Kim *et al*., 2011), underscoring that the benefits of ESO are not uniform but contingent on the surrounding governance environment.

Taken together, these contributions reposition our study's novelty from a narrow disclosure-quality story to a theory-driven analysis of how ESO affects bad-news hoarding and the extreme downside distribution of stock returns, while exploiting the Korean institutional context to derive and test predictions that are of broader relevance to the governance and crash-risk literature.

The remainder of this paper is organized as follows: Section 2 reviews the relevant literature, explains the unique characteristics of ESO in Korea, and develops our hypotheses. Section 3 describes the study's data and research design. Section 4 presents the main results. Section 5 provides robustness checks and additional analysis. Finally, Section 6 concludes the article.

2. Literature review and hypothesis

2.1 Literature review on stock price crash risk

Stock price crash risk has been widely attributed to managers' incentives to withhold firm-specific bad news until it accumulates and is released abruptly, generating extreme negative stock returns (Jin and Myers, 2006; Hutton *et al*., 2009). In this framework, opaque information environments facilitate bad-news hoarding, whereas governance mechanisms that enhance transparency and constrain managerial discretion mitigate crash risk.

A large body of research documents that both internal and external governance mechanisms shape managers' disclosure incentives and, in turn, crash risk. Prior studies show that internal governance arrangements—such as executive equity incentives, board oversight, audit committee effectiveness, and internal control quality—affect the extent of information opacity and are systematically related to crash risk (e.g. Kim *et al*., 2011; Andreou *et al*., 2016). External monitoring mechanisms, including institutional investor oversight, product market competition, and stock liquidity, similarly discipline managers and reduce the likelihood of extreme price collapses (Callen and Fang, 2013; Chang *et al*., 2017). Taken together, this literature establishes that crash risk fundamentally reflects the effectiveness of governance mechanisms in limiting managers' ability to conceal adverse information.

Employee share ownership (ESO) represents a distinct internal governance mechanism that has received relatively little attention in the crash risk literature. Unlike traditional governance devices that operate through boards, investors, or markets, ESO directly reshapes internal

information flows by extending ownership to employees who are closely involved in day-to-day operations. The literature offers competing views on the governance role of ESO. One strand emphasizes its potential to entrench management by aligning employees with executives, thereby weakening external discipline and exacerbating agency problems (Faleye *et al*., 2006; Park, 2017). In contrast, a growing body of evidence highlights ESO's role in improving information transparency and reducing information asymmetry. Studies show that employee ownership is associated with richer voluntary disclosure, improved stock liquidity, and stronger internal monitoring, suggesting that employees with equity stakes have greater incentives to demand timely and accurate information (Bova *et al*., 2015; Jung and Choi, 2021).

Synthesizing these findings, prior research suggests that ESO can influence crash risk through several related channels. First, by expanding the set of informed insiders, ESO strengthens internal monitoring and increases the expected cost to managers of withholding bad news. Second, ESO can mitigate information asymmetry arising from stakeholder conflicts, as employees' interests shift toward long-term firm value rather than short-term wage extraction. Third, when employee participation is voluntary, ESO may serve as a credible signal of insider confidence, creating reputational pressure for managers to maintain transparent disclosure. These channels imply that ESO can function as an internal governance mechanism that directly constrains managerial incentives to hoard bad news, thereby reducing the likelihood of stock price crashes.

2.2 Institutional background on ESO in Korea

While the objectives of ESO introduced in Korea in 1958 are similar to those in other countries, the organization and operation of the scheme differ significantly. In Korea, employees usually purchase shares themselves with minimal company contribution (Cin and Smith, 2002). This contrasts with practices in other countries where companies may provide shares at no cost, such as performance-based compensation in the UK or matching shares through retirement plans. In Korea, employees can sell their shares after a one-year lock-up period, whereas in other countries, disposal rights are often tied to retirement [1].

The ESO association in Korea is self-organized, legally mandated entity within the firm differs from the external trustee administration seen in the US and UK The internalized approach in Korea gives employees substantial voting rights and incentives to engage in management and influence decision-making processes. With insider knowledge of the company's performance, governance, and future cash flows, ESO associations are better positioned to monitor and enhance firm value, justifying the rationale for ESO.

Additionally, Korea has a preferential allocation rule for ESO when firms issue new shares through a public offering. Article 38 of the Basic Labor Welfare Act stipulates that KOSPI-listed firms must reserve 20% of new shares for ESO association members [2]. In contrast, KOSDAQ-listed firms can voluntarily allocate up to 20%. This distinction enables different market types to interpret the same ESO ratio differently in relation to future firm performance (Jang and Yoon, 2023).

2.3 Hypothesis development

Drawing on the crash risk and governance literature, we argue that employee share ownership is expected to reduce the risk of future stock price crashes. By extending ownership to employees who possess firm-specific operational knowledge, ESO reshapes managers' disclosure incentives in ways that directly affect bad-news hoarding behavior.

First, ESO strengthens internal monitoring by expanding the set of informed insiders. Employees are uniquely positioned to observe early signals of operational and financial problems, and their equity exposure increases the expected personal cost of remaining silent when adverse information is concealed. Unlike external monitors, employee-owners face direct downside risk if accumulated bad news is released abruptly, which raises the likelihood

that concerns are escalated internally and disclosed in a timely manner. As a result, ESO increases the expected cost to managers of withholding unfavorable information.

Second, ESO can reduce information asymmetry arising from stakeholder conflicts between managers and employees. In the absence of employee ownership, managers may prefer to maintain opaque information environments to limit rent extraction pressures during labor negotiations. When employees hold equity stakes, however, their interests shift toward long-term firm value rather than short-term wage gains. This alignment weakens managers' incentives to strategically withhold information and reduces the accumulation of undisclosed bad news. Consistent with this channel, prior studies document that firms with employee ownership exhibit more transparent disclosure environments (Bova *et al*., 2015), and greater transparency has been shown to mitigate stock price crash risk (Hutton *et al*., 2009).

Third, the governance effect of ESO is likely to be stronger when employee participation is voluntary. Voluntary ESO requires employees to invest their own funds, which serves as a credible signal of insider confidence and intensifies reputational pressure on managers to honor that confidence through transparent disclosure. In contrast, mandatory ESO participation may reflect regulatory compliance rather than genuine employee engagement, resulting in weaker monitoring incentives. This distinction is particularly salient in the Korean setting, where voluntary ESO participation is concentrated among KOSDAQ-listed firms. Taken together, these arguments lead to the following hypotheses:

H1. Employee share ownership is negatively associated with the risk of future stock price crashes.

H2. The negative association between employee share ownership and future stock price crash risk is more pronounced for firms listed on the KOSDAQ market, where employee participation is voluntary.

3. Research design

3.1 Sample selection

The initial data includes firms listed on the KOSPI and KOSDAQ markets during the 2011–2020 period [3], [4]. To measure the variables, we exclude firms in the financial industry and those with insufficient data on stock prices, trading volumes, and accounting. We obtain financial and employee ownership data from the Fn-guide. After this selection process, we obtain a final sample of 16,929 firm-year observations. In our final sample, we obtain 6,536 observations listed on KOSPI and 10,393 observations listed on KOSDAQ. Appendix A1 summarizes the composition of the sample.

Table 1 reports the sample distributions of ESO by year. Columns (1) and (2) report the total number of firms in the sample and the number of firms with employee ownership, respectively. Column (3) provides the percentage of firms with employee ownership in the sample. Column (4) shows the average ESO of firms in the sample. The proportion of firms with ESO remains stable over the years, from 35.1% to 36.6%, and the average ESO is around 1%, with the highest of 1.214 in 2011 and the lowest of 0.975 in 2016.

3.2 Measurement of variables

3.2.1 Dependent variable: stock price crash risk. Following previous studies (Callen and Fang, 2015; Hutton *et al*., 2009; Kim *et al*., 2019), we employ three measures of firm-specific crash risk based on Jin and Myers' (2006) market model for each firm-year observation. We estimate firm-specific weekly returns using the following market and industry index model regression for each firm and year (Hutton *et al*., 2009):

$$r_{i,t} = \beta_0 + \beta_1 r_{m,t-1} + \beta_2 r_{m,t} + \beta_3 r_{m,t+1} + \beta_4 r_{k,t-1} + \beta_5 r_{k,t} + \beta_6 r_{k,t+1} + \varepsilon_{i,t} \quad (1)$$

Table 1. Summary statistics of ESO by year

	No. of firms Count	No. of firms with nonzero ESO Count	% of firms with nonzero ESO Ratio (%)	% of ESO in firms' equity market value (nonzero ESO only) Mean (%)
2011	1,515	554	0.366	1.214
2012	1,534	554	0.361	1.172
2013	1,549	543	0.351	1.035
2014	1,581	556	0.352	0.990
2015	1,643	577	0.351	0.992
2016	1,718	605	0.352	1.111
2017	1,776	637	0.359	0.975
2018	1,821	660	0.362	1.070
2019	1,873	664	0.355	1.075
2020	1,919	695	0.362	1.140
Total	16,929	6,045	0.357	1.077

where $r_{i,t}$ is the return on stock i in week t, $r_{m,t}$ is the return on the value-weighted market index in week t, and $r_{k,t}$ is the return on the value-weighted industry index based on the two-digit Korean Standard Industrial Classification Code in week t. By including the lead and lag terms for the value-weighted market index returns, and those for the industry index returns in Equation (1), we correct for nonsynchronous trading (Dimson, 1979). We denote $W_{i,\tau} = \ln(1 + \varepsilon_{i,\tau})$, the firm-specific weekly return for firm j in week t, measured by the natural logarithm of one plus the residual return from Equation (1).

The first measure of stock price crash risk *NCSKEW* is the negative conditional skewness of firm-specific weekly returns over the fiscal year. *NCSKEW* is computed by taking the negative of the third moment of firm-specific weekly returns for each year and normalizing it by the standard deviation of firm-specific returns raised to the third power. *NCSKEW* is calculated as

$$NCSKEW_{i,t} = -\left[n(n-1)^{\frac{3}{2}}\sum W_{i,\tau}^{3}\right] \Big/ \left[(n-1)(n-2)\sum\left(W_{i,\tau}^{2}\right)^{\frac{3}{2}}\right] \tag{2}$$

where n is the number of firm-specific weekly returns for firm j during year A higher value of *NCSKEW* indicates higher crash risk.

The second measure, *DUVOL*, is the down-to-up volatility of negative versus positive returns. To calculate *DUVOL*, for each firm i over the fiscal year, firm-specific weekly returns are separated into two groups: "down" weeks when the returns are below the annual mean, and "up" weeks when the returns are above the annual mean. Then, the standard deviation of each group is calculated separately. As such, *DUVOL* is the natural logarithm of the ratio of the standard deviation on the "down" weeks to the standard deviation on the "up" weeks. *DUVOL* is calculated as

$$DUVOL_{i,t} = LOG\left[(n_u - 1)\sum_{Down} W_{i,t}^{2} \Big/ (n_d - 1)\sum_{Up} W_{i,t}^{2}\right] \tag{3}$$

where, n_u and n_d are the number of up and down weeks in year t, respectively. A higher value of *DUVOL* indicates greater crash risk.

The third measure, *VCRASH*, suggested by Bradshaw *et al*. (2010) and Zhu (2016) is the absolute value of the difference between minimum firm-specific weekly return and its mean

value over the fiscal year, divided by its standard deviation for the year. *VCRASH* measures the probability of extremely negative returns and is calculated as

$$VCRASH_t = \left| \frac{\min(W_{i,t}) - mean(W_{i,t})}{\sum W_{i,t}^2} \right| \quad (4)$$

3.2.2 Empirical model. To investigate whether ESO is associated with future stock price crash risk, we estimate the following regression model:

$$CRASH_{i,t+1} = \alpha_0 + \alpha_1 ESO_{i,t} + \sum_{k=2} \alpha_k (kth\ ControlVariables_{i,t}) + \sum Firm + \sum Year + \varepsilon_{i,t} \quad (4)$$

where the dependent variable $CARSH_{t+1}$ is proxied by $NCSKEW_{t+1}$, $DUVOL_{t+1}$, or $VCRASH_{t+1}$ as defined above. To mitigate the concern of reverse causality, we use the dependent variable in year t+1, which is a one-year lead from the independent and control variables. Accordingly, we test whether a firm's ESO in year *t* can predict stock price crash risk in year *t+1*. Our variable of interest, ESO_t, is the percentage of ESO calculated by dividing the amount by the shares outstanding in year *t*.

The set of control variables include $CRASH_t$, $dTURN_t$, $SIZE_t$, MB_t, LEV_t, ROE_t, $SIGMA_t$, RET_t, $ADACC_t$, and HHI_t based on previous studies (Chen *et al*., 2001; Cho *et al*., 2023; Hutton *et al*., 2009). All linear variables are winsorized at the top and bottom 1% to mitigate the impact of outliers. We use firm-year fixed effects to address potential endogeneity concerns and heteroskedasticity-robust standard errors to account for firms' potential dependence over time. Detailed variable definitions are provided in Appendix A2.

4. Empirical results

4.1 Descriptive statistics

Panel A of Table 2 reports the descriptive statistics of all variables in the research model for the full sample. The mean values of $NCSKEW_{t+1}$, $DUVOL_{t+1}$, and $VCRASH_{t+1}$ are −0.411, −0.250, and 2.350, respectively, consistent with prior studies (Zhu, 2016; Cho *et al*., 2023). The mean value of ESO is 0.357%. Panel B shows the results of the mean difference tests (*t*-test) conducted between the groups; firms with and without ESO and firms in KOSPI- and KOSDAQ-listed firms. Columns (1) and (2) present the mean values of the variables for firms with and without ESO. Column (3) indicates that the differences between the mean values for most of the variables are significant, except for MB_t and HHI_t. In particular, the mean values of $NCSKEW_{t+1}$ and $DUVOL_{t+1}$ of firms without ESO are lower than those for firms with ESO. The mean values of ROE_t and RET_t are less negative for firms with ESO, and the mean value of $ADACC_t$ is lower for firms with ESO, implying that earning quality is higher for firms with ESO. Columns (4) and (5) show the mean values of the variables for KOSPI- and KOSDAQ-listed firms. These mean values differ significantly, except for HHI_t. Specifically, the mean values of $NCSKEW_{t+1}$, $DUVOL_{t+1}$ and $VCARSH_{t+1}$ for KOSDAQ-listed firms are statistically lower than those for KOSPI-listed firms. The mean value of ESO_t for firms listed on KOSPI is 0.500%, whereas that for firms listed on KOSDAQ is 0.267%. Combined with the results in Panel A of Table 1, we observe that KOSPI-listed firms have not only a higher proportion of firms adopting ESO but also a higher ratio of ESO compared to KOSDAQ.

4.2 Main regression analysis for H1

Hypothesis 1 predicts that ESO is negatively associated with future stock price crash risk. Table 3 presents the coefficient estimates for Equation (4) in firm-year fixed effect

Table 2. Descriptive statistics

Panel A

	Full sample (N = 16,929) Mean	SD	Q1	Median	Q3
$NCSKEW_{t+1}$	−0.411	0.781	−0.846	−0.359	0.062
$DUVOL_{t+1}$	−0.250	0.488	−0.574	−0.259	0.065
$VCRASH_{t+1}$	2.350	0.611	1.917	2.233	2.650
ESO_t	0.357	1.023	0.000	0.000	0.043
$dTURN_t$	0.000	0.028	−0.005	0.000	0.005
$NCSKEW_t$	−0.387	0.766	−0.814	−0.336	0.074
$DUVOL_t$	−0.236	0.482	−0.558	−0.243	0.079
$VCRASH_t$	2.350	0.603	1.921	2.236	2.647
$SIZE_t$	11.774	1.348	10.856	11.550	12.421
MB_t	1.665	1.795	0.651	1.085	1.938
LEV_t	1.097	1.217	0.345	0.738	1.392
ROE_t	−0.022	0.277	−0.033	0.041	0.096
$SIGMA_t$	0.056	0.027	0.036	0.050	0.068
RET_t	−0.192	0.211	−0.232	−0.122	−0.065
$ADACC_t$	0.066	0.075	0.018	0.042	0.084
HHI_t	0.172	0.117	0.086	0.123	0.244

Panel B

	Firms without ESO (N = 10,884)	Firms with ESO (N = 6,045)	Diff. (1)–(2)	KOSPI (N = 6,536)	KOSDAQ (N = 10,393)	Diff. (4)–(5)
$NCSKEW_{t+1}$	−0.427	−0.382	−0.045***	−0.355	−0.446	0.091***
$DUVOL_{t+1}$	−0.259	−0.235	−0.024***	−0.215	−0.273	0.058***
$VCRASH_{t+1}$	2.348	2.354	−0.006***	2.369	2.338	0.031***
ESO_t		1.077		0.500	0.267	0.233***
$dTURN$	0.001	0.000	0.001***	0.001	0.000	0.001***
$NCSKEW_t$	−0.406	−0.354	−0.053***	−0.330	−0.424	0.094***
$DUVOL_t$	−0.245	−0.218	−0.027***	−0.199	−0.259	0.061***
$VCRASH_t$	2.348	2.353	−0.005***	2.374	2.335	0.039***
$SIZE_t$	11.631	12.030	−0.399***	12.412	11.372	1.040***
MB_t	1.672	1.652	0.020***	1.226	1.941	−0.714***
LEV_t	1.040	1.197	−0.157***	1.309	0.963	0.345***
ROE_t	−0.026	−0.015	−0.011***	−0.002	−0.035	0.033***
$SIGMA_t$	0.057	0.053	0.004***	0.048	0.060	−0.012***
RET_t	−0.205	−0.169	−0.036***	−0.149	−0.220	0.070***
$ADACC_t$	0.068	0.062	0.006***	0.051	0.075	−0.024***
HHI_t	0.172	0.170	0.002***	0.172	0.171	0.000***

Note(s): The sample consists of 16,929 firm-years listed in Korean stock market between 2011 and 2020. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. *p*-values are two-sided. See Appendix A2 for variable definitions

specification to test H1. Across all columns, the coefficients of ESO_t are negative and significant at the 5% level, which is consistent with H1. On average, firms adopting ESO are associated with a 0.027 decrease in $NCSKEW_{t+1}$, 0.013 decrease in $DUVOL_{t+1}$, and 0.021 decrease in $VCRASH_{t+1}$. Given that the mean values of $NCSKEW_{t+1}$, $DUVOL_{t+1}$, and $VCARSH_{t+1}$ are −0.411, −0.250, and 2.350, respectively, the economic significance of the mitigating the effect of ESO on future crash risk is nontrivial.

The findings are consistent with the view of the proponents of ESO: ESO benefits the firm by playing an effective governance role in mitigating managers' information withholding. In particular, given the one-year lock-up period for employee owners in Korea, managers with

Table 3. Testing for Hypothesis 1

	$NCSKEW_{t+1}$ (1)	$DUVOL_{t+1}$ (2)	$VCRASH_{t+1}$ (3)
ESO_t	*−0.027*	*−0.013*	*−0.021*
	*(−2.545)***	*(−2.027)***	*(−2.438)***
$dTURN_t$	0.337	0.272	0.266
	(1.335)	(1.743)*	(1.372)
$CRASH_t$	−0.087	−0.095	−0.109
	(−9.996)***	(−11.110)***	(−13.229)***
$SIZE_t$	0.193	0.114	0.084
	(9.584)***	(9.295)***	(5.314)***
MB_t	0.023	0.014	0.022
	(2.801)***	(2.870)***	(3.134)***
LEV_t	0.008	−0.001	0.007
	(0.711)	(−0.177)	(0.817)
ROE_t	−0.111	−0.081	−0.135
	(−3.072)***	(−3.690)***	(−4.726)***
$SIGMA_t$	0.772	−0.076	−0.719
	(0.719)	(−0.118)	(−0.883)
RET_t	0.065	−0.020	−0.040
	(0.488)	(−0.248)	(−0.396)
$ADACC_t$	0.171	0.098	0.056
	(1.603)	(1.474)	(0.694)
HHI_t	0.463	0.303	0.521
	(1.641)	(1.706)*	(2.298)**
Constant	−2.696	−1.591	1.513
	(−11.627)***	(−11.248)***	(8.239)***
Year fixed	Yes	Yes	Yes
Firm fixed	Yes	Yes	Yes
F-value	43.612	46.225	31.133
Adj. R^2	0.067	0.067	0.040
N	16,929	16,929	16,929

Note(s): The sample consists of 16,929 firm-years listed in Korean stock market between 2011 and 2020. For brevity, we do not report the coefficients of the industry and year dummy variables. The numbers in parentheses are t-statistics based on heteroskedastic robust standard errors. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-tailed), respectively. See Appendix A2 for variable definitions

greater ESO would have greater incentive to keep information transparent and communicate clearly and in a timely manner (Bova *et al*., 2015; Bova *et al*., 2016).

Results of control variables are generally consistent with our predictions and findings of prior studies. In particular, the current stock price crash risk, $CRASH_t$, is negatively related to the future stock price crash risk, consistent with prior literature (Hutton *et al*., 2009; Jin and Myers, 2006). The coefficients on $SIZE_t$ and MB_t are positive and highly significant, which is consistent with previous studies (Chen *et al*., 2001; Kim *et al*., 2011; Kim *et al*., 2014). This finding suggests that large and growing firms are more likely to experience crash events. Consistent with Hutton *et al*. (2009) and in line with previous studies, ROE_t are negatively related with future stock crash risk.

4.3 Endogeneity concerns

To control for the potential omitted variable bias, we employ a two-stage least squares regression (2SLS) approach. Based on prior studies (Pendleton, 2005; Paterson and Welbourn, 2020; Pierce *et al*., 2001; Bova *et al*., 2015), we adopt employee tenure and compensation as instrumental variables in our 2SLS analyses. Table 4 presents the 2SLS regression results [5]. In the first stage result presented in column (1), both $TENURE_t$ and $PAYROLL_t$ show

Table 4. Robustness test 1 for Hypothesis 1: two-stage least square regression

	First stage	Second stage		
	$ESOP_t$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$VCRASH_{t+1}$
	(1)	(2)	(3)	(4)
$\widehat{ESOP_t}$		*−1.594*	*−1.155*	*−1.597*
		*(−3.112)***	*(−3.692)***	*(−4.085)***
dTURN	−0.552	−0.536	−0.363	−0.612
	(−2.510)**	(−1.413)	(−1.563)	(−2.042)**
$CRASH_t$	0.004	−0.080	−0.088	−0.103
	(0.585)	(−8.846)***	(−9.998)***	(−12.454)***
$SIZE_t$	0.037	0.260	0.163	0.153
	(1.679)*	(9.141)***	(9.285)***	(6.804)***
MB_t	−0.017	−0.004	−0.006	−0.006
	(−2.394)**	(−0.364)	(−0.815)	(−0.623)
LEV_t	−0.027	−0.034	−0.032	−0.035
	(−1.764)*	(−1.909)*	(−2.874)***	(−2.652)***
ROE_t	−0.098	−0.268	−0.196	−0.294
	(−2.507)**	(−4.496)***	(−5.307)***	(−6.148)***
$SIGMA_t$	1.825	3.902	2.200	2.341
	(2.052)**	(2.746)***	(2.566)**	(2.218)**
RET_t	0.241	0.476	0.280	0.368
	(2.439)**	(2.606)***	(2.541)**	(2.708)***
$ADACC_t$	0.064	0.269	0.169	0.156
	(0.687)	(2.389)**	(2.425)**	(1.828)*
HHI_t	0.399	1.085	0.755	1.146
	(0.999)	(3.120)***	(3.484)***	(4.187)***
$TENURE_t$	0.010			
	(2.505)**			
$PAYROLL_t$	−0.051			
	(−1.858)*			
Constant	−0.066	−2.790	−1.661	1.400
	(−0.263)	(−12.167)***	(−11.860)***	(7.705)***
Firm fixed	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes
F-value	5.759	43.95	46.914	31.525
Adj. R^2	0.018	0.067	0.069	0.043
N	16,929	16,929	16,929	16,929

Note(s): The sample consists of 16,929 firm-years listed in Korean stock market between 2011 and 2020. For brevity, we do not report the coefficients of the industry and year dummy variables. The numbers in parentheses are t-statistics based on heteroskedastic robust standard errors. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-tailed), respectively. See Appendix A2 for variable definitions

significant and expected associations with ESO_t. That is, longer tenure is likely to enhance participation in the stock ownership program (Pierce *et al*., 2001). Using the fitted value of ESO ($\widehat{ESO_t}$) from the first-stage regression, we perform a second-stage analysis on the relationship between ESO and future stock price crashes and the results are displayed in Columns (2) to (4). The coefficients for $\widehat{ESO_t}$ is negative for all three measures of crash risk measures and statistically significant at the 1% level. Theses 2SLS results align with our primary findings, supporting Hypothesis 1.

Next, to control for potential sample selection bias, we conduct propensity score matching (PSM) analyses. Table 5 shows the PSM results. In Panel A, we find no significant differences between the two groups, indicating the successful mitigation of sample selection bias. Using this matched sample, we re-estimate the regression model and report the outcomes in Panel B of Table 4. ESO_t exhibits a significantly negative coefficient for $NCSKEW_{t+1}$, $DUVOL_{t+1}$, and

Table 5. Robustness test 2 for Hypothesis 1: PSM

Panel A: *T*-test for control variables with matched samples

	ESO = 0 (N = 2,693) (1)	ESO >0 (N = 2,693) (2)	Diff (3) = (1)–(2)	T-value
$dTURN_t$	0.000	0.000	0.000	0.231
$NCSKEW_t$	−0.410	−0.389	−0.021	−0.976
$DUVOL_t$	−0.245	−0.230	−0.014	−1.103
$VCRASH_t$	2.348	2.344	0.004	0.245
$SIZE_t$	11.748	11.753	−0.005	−0.154
MB_t	1.665	1.712	−0.046	−0.938
LEV_t	1.091	1.057	0.034	1.072
ROE_t	−0.018	−0.019	0.000	0.055
$SIGM_t$ A	0.056	0.056	0.000	0.358
RET_t	−0.193	−0.190	−0.002	−0.392
$ADACC_t$	0.066	0.066	−0.001	−0.392
HHI_t	0.173	0.170	0.003	0.857

Panel B: Association between ESO and future stock price crash risk with PSM samples

	$NCSKEW_{t+1}$ (1)	$DUVOL_{t+1}$ (2)	$VCRASH_{t+1}$ (3)
ESO_t	*−0.047*	*−0.021*	*−0.041*
	*(−2.729)***	*(−2.039)***	*(−3.338)****
$dTURN_t$	−0.371	−0.225	−0.691
	(−0.751)	(−0.743)	(−1.709)*
$CRASH_t$	−0.094	−0.114	−0.114
	(−5.394)***	(-6.921)***	(−6.426)***
$SIZE_t$	0.186	0.097	0.078
	(4.693)***	(4.121)***	(2.281)**
MB_t	0.024	0.019	0.025
	(1.597)	(2.045)**	(1.833)*
LEV_t	0.026	0.016	0.019
	(0.996)	(0.977)	(1.017)
ROE_t	−0.139	−0.084	−0.159
	(−1.935)*	(−1.938)*	(−2.546)**
$SIGMA_t$	0.259	−0.606	−1.308
	(0.128)	(-0.475)	(−0.838)
RET_t	−0.075	−0.163	−0.186
	(−0.291)	(−1.007)	(−0.931)
$ADACC_t$	0.399	0.167	0.22
	(1.906)*	(1.284)	(1.271)
HHI_t	1.502	0.870	1.511
	(2.862)***	(2.623)***	(3.862)***
Constant	−2.782	−1.500	1.439
	(−6.182)***	(−5.608)***	(3.737)***
Year-fixed	Yes	Yes	Yes
Firm-fixed	Yes	Yes	Yes
F-value	15.033	15.128	10.881
Adj. R^2	0.075	0.073	0.050
N	5,386	5,386	5,386

Note(s): We derive propensity scores by conducting a logit regression using all the control variables included in Equation (4) with year and industry dummies. Subsequently, we use one-to-one matching, resulting in a matched sample of 5,386 observations of 2,693 firms without ESO and 2,693 of firms with ESO. The numbers in parentheses are t-statistics based on heteroskedastic robust standard errors.*, ** and *** denote significance at the 10%, 5% and 1% levels (two-tailed), respectively. See Appendix A2 for variable definitions

$VCRASH_{t+1}$, consistent with the finding in Table 2. However, it is worth noting that the results regarding the control variables differ somewhat from the main analyses. In particular, $CARSH_t$ and $SIZE_t$ remain statistically significant, whereas the other variables lose their statistical significance. Taken together, the results obtained through the PSM approach confirm that our findings on the effect of employee stock on alleviating stock price crash risk are not driven by sample selection bias.

4.4 Regression analysis for H2

Our second hypothesis is the pronounced association with ESO and stock price crash risk. To test Hypothesis 2, we partition the sample into KOSPI and KOSDAQ-listed firms and conduct separate regression analyses for each group. Columns (1)–(3) of the Table 6 show the regression results for KOSPI-listed firms, where the coefficient of ESO_t is insignificant for all three measures of $CRASH_{t+1}$. In contrast, columns (4) and (6) present the results for KOSDAQ-listed firms, where the coefficient of ESO_t is statistically significant and negative across all crash risk measures. These findings suggest that the results in Table 3 are primarily

Table 6. Testing for Hypothesis 2

	KOSPI			KOSDAQ		
	$NCSKEW_{t+1}$ (1)	$DUVOL_{t+1}$ (2)	$VCRASH_{t+1}$ (3)	$NCSKEW_{t+1}$ (4)	$DUVOL_{t+1}$ (5)	$VCRASH_{t+1}$ (6)
ESO_t	*−0.011*	*−0.003*	*−0.016*	*−0.048*	*−0.025*	*−0.025*
	(−0.797)	*(−0.386)*	*(−1.419)*	*(−2.878)***	*(−2.443)**	*(−1.968)**
$dTURN_t$	0.644	0.458	0.451	0.272	0.226	0.220
	(1.128)	(1.260)	(1.095)	(0.968)	(1.310)	(1.001)
$CRASH_t$	−0.080	−0.091	−0.100	−0.091	−0.097	−0.114
	(−5.536)***	(−6.654)***	(−7.772)***	(−8.305)***	(−8.899)***	(−10.574)***
$SIZE_t$	0.239	0.141	0.134	0.177	0.108	0.062
	(7.304)***	(7.023)***	(4.932)***	(6.851)***	(6.895)***	(3.112)***
MB_t	0.022	0.014	0.027	0.024	0.013	0.021
	(1.331)	(1.388)	(2.036)**	(2.456)**	(2.282)**	(2.594)***
LEV_t	0.002	−0.016	0.002	0.016	0.013	0.013
	(0.138)	(−1.443)	(0.132)	(1.016)	(1.235)	(1.161)
ROE_t	−0.092	−0.084	−0.116	−0.120	−0.081	−0.142
	(−1.512)	(−2.217)**	(−2.450)**	(−2.677)***	(−2.964)***	(−3.950)***
$SIGMA_t$	1.167	−0.572	−0.661	0.283	0.097	−0.829
	(0.681)	(−0.549)	(−0.503)	(0.205)	(0.118)	(−0.787)
RET_t	0.106	−0.087	0.007	0.016	0.007	−0.072
	(0.478)	(−0.636)	(0.042)	(0.096)	(0.068)	(−0.561)
$ADACC_t$	0.315	0.234	0.108	0.111	0.039	0.029
	(1.403)	(1.764)*	(0.681)	(0.922)	(0.511)	(0.304)
HHI_t	−0.004	−0.025	0.149	0.864	0.574	0.822
	(−0.009)	(−0.097)	(0.438)	(2.253)**	(2.361)**	(2.744)***
Constant	−3.091	−1.756	0.952	−2.517	−1.555	1.739
	(−7.298)***	(−6.683)***	(2.753)***	(−8.765)***	(−8.912)***	(7.858)***
Year-fixed	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed	Yes	Yes	Yes	Yes	Yes	Yes
F-value	28.326	30.856	20.636	28.326	30.856	20.636
Adj. R^2	0.067	0.068	0.042	0.067	0.068	0.042
N	6,536	6,536	6,536	10,393	10,393	10,393

Note(s): The sample consists of 16,929 firm-years listed in Korean stock market between 2011 and 2020. For brevity, we do not report the coefficients of the industry and year dummy variables. The numbers in parentheses are t-statistics based on heteroskedastic robust standard errors.*, ** and *** denote significance at the 10%, 5% and 1% levels (two-tailed), respectively. See Appendix A2 for variable definitions

driven by KOSDAQ-listed firms and that proactive ESO can enhance the timeliness of information disclosure, thereby deterring crashes. In summary, voluntary ESO is more effective in improving information timeliness, supporting Hypothesis 2.

5. Additional analysis

5.1 The impact of industry volatility

Kim and Patel (2020) suggest that the industry environment partially impacts ESO outcomes, indicating industry characteristics, such as industry sales volatility are likely to be associated with market returns or idiosyncratic risk (Carline *et al*., 2023; Peters and Wagner, 2014). Therefore, we analyze whether the impact of ESO varies with industry volatility, measured by the standard deviation of industry-level sales growth over the past three fiscal years (VOL_t). Table 7 shows for KOSPI-listed firms, ESO_t is insignificant, but the interaction term $ESO_t \times VOL_t$, has a significantly negative coefficient. This suggests that ESO reduces crash risk of KOSPI-listed firms in volatile industries. For KOSDAQ-listed sample, ESO_t has a negative coefficient, while the interaction term is insignificant. These results suggest that industry volatility does not impact the association between ESO and crash risk in KOSDAQ-listed firms, but it does in KOSPI-listed ones. We interpret these findings to mean that for KOSPI-listed firms, where new share allotments to employees are mandatory, ESO effectively reduces stock price crash risks in a specific context (i.e. industry volatility). In contrast, in KOSDAQ-listed firms, ESOs reduce crash risk in general circumstances, regardless of industry volatility.

5.2 The impact of accounting information opacity

Hutton *et al*. (2009) claim that the risk of a stock price crash increases with higher accounting information opacity. Given that ESO diminishes managers' incentives to conceal news, we expect the influence of ESO on stock price crash risk to be more pronounced in firms with high information opacity. To investigate whether the effect of ESO varies with accounting information opacity, we partition the samples into two groups: firms with low opacity (LOW) and firms with high opacity (HIGH), based on the median value of accounting information

Table 7. The impact of industry volatility

	KOSPI			KOSDAQ		
	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$VCRASH_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$VCRASH_{t+1}$
	(1)	(2)	(3)	(4)	(5)	(6)
ESO_t	*0.002*	*0.005*	*−0.008*	*−0.053*	*−0.026*	*−0.027*
	(0.112)	*(0.498)*	*(−0.609)*	*(−2.817)***	*(−2.198)***	*(−1.756)**
VOL_t	−0.023	−0.004	−0.046	0.008	0.012	0.067
	(−0.314)	(−0.077)	(−0.750)	(0.117)	(0.274)	(1.133)
$ESO_t \times VOL_t$	*−0.057*	*−0.035*	*−0.036*	0.036	0.004	0.010
	*(−2.034)***	*(−2.183)***	*(−1.822)**	(0.754)	(0.103)	(0.187)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-fixed	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed	Yes	Yes	Yes	Yes	Yes	Yes
F-value	17.381	17.772	12.842	25.859	28.067	18.769
Adj. R^2	0.070	0.069	0.041	0.067	0.068	0.042
N	6,536	6,536	6,536	10,393	10,393	10,393

Note(s): The sample consists of 6,536 firm-years listed in KOSPI and 10,393 firm-years listed in KOSDAQ between 2011 and 2020. For brevity, we do not report the coefficients of control variables, industry and year dummy variables. The numbers in parentheses are t-statistics based on heteroskedastic robust standard errors. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-tailed), respectively. See Appendix A2 for variable definitions

opacity. Table 8 presents the results for KOSDAQ-listed firms [6]. The coefficient of ESO_t achieves statistical significance for $NCSKEW_{t+1}$ and $DUVOL_{t+1}$ in high opacity firms. This suggests that ESO helps mitigate stock price crash risk, particularly in firms where accounting information opacity is high.

5.3 The impact of the largest shareholder's ownership

We examine the role of ESO in mitigating the agency problem between the largest and minor shareholders, a key source of information asymmetry (Amstrong *et al*., 2010; Boubaker *et al*., 2014; Khlif *et al*., 2017). When the largest shareholders possess a level of ownership that grants them substantial control over management decisions, the impact of ESO may be less pronounced. Conversely, if the interests of the largest shareholders align with employee shareholders, ESO's impact is accentuated, particularly in firms with significantly larger shareholders' ownership. Lee (2018) demonstrates that stock price crash risk decreases with increasing largest shareholder ownership. Lee *et al*. (2021) suggest that incentives to disclose firm-specific information vary with the largest shareholder's ownership, identifying a critical point at 39%.[7] To explore this relationship, we segment the samples into firms with high (HIGH) and low percentages of largest shareholder ownership (LOW). A firm is classified as HIGH when the largest shareholder's ownership exceeds 40%, as LOW when it is below 40%, considering ownership below 40% as typical [8]. Table 9 presents the regression results for KOSDAQ firms [9]. The coefficient of ESO_t exhibits a significantly negative for $NCSKEW_{t+1}$ and $DUVOL_{t+1}$. These results suggest that ESO effectively reduces crash risk when the largest shareholders do not exert significant control over management decisions. This aligns with prior findings (Lee, 2018; Lee *et al*., 2021) that high largest shareholder ownership increases information transparency, while low ownership decreases it. Thus, ESO can reduce information asymmetry in less transparent environments.

6. Conclusion

We investigate the impact of employee share ownership (ESO) on future stock price crash risk in Korean firms and find robust evidence of a significant negative association. The mitigating effect of ESO is particularly pronounced in settings where employee participation is voluntary, consistent with the view that ESO constrains employees' incentives to extract above-market rents. Additional analyses show that the effect of ESO is stronger in firms operating in volatile

Table 8. The impact of accounting information opacity (KOSDAQ only)

	$NCSKEW_{t+1}$ LOW (1)	$NCSKEW_{t+1}$ HIGH (2)	$DUVOL_{t+1}$ LOW (3)	$DUVOL_{t+1}$ HIGH (4)	$VCRASH_{t+1}$ LOW (5)	$VCRASH_{t+1}$ HIGH (6)
ESO_t	*0.025*	*−0.086*	*0.022*	*−0.054*	*0.014*	*−0.041*
	(0.352)	*(−1.866)**	*(0.644)*	*(−2.234)***	*(0.327)*	*(−1.390)*
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-fixed	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed	Yes	Yes	Yes	Yes	Yes	Yes
F-value	15.953	13.047	17.412	16.515	14.496	9.412
Adj. R^2	0.106	0.097	0.109	0.106	0.083	0.067
N	3,178	3,178	3,178	3,178	3,178	3,178

Note(s): The sample consists of 3,178 firm-years listed in KOSDAQ between 2011 and 2020. For brevity, we do not report the coefficients of the industry and year dummy variables. The numbers in parentheses are t-statistics based on heteroskedastic robust standard errors. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-tailed), respectively. See Appendix A2 for variable definitions

Table 9. The impact of largest shareholder's ownership (KOSDAQ only)

	$NCSKEW_{t+1}$ HIGH (1)	$NCSKEW_{t+1}$ LOW (2)	$DUVOL_{t+1}$ HIGH (3)	$DUVOL_{t+1}$ LOW (4)	$VCRASH_{t+1}$ HIGH (5)	$VCRASH_{t+1}$ LOW (6)
ESO_t	*−0.019*	*−0.055*	*−0.007*	*−0.029*	*−0.01*	*−0.025*
	(−0.651)	*(−2.503)***	*(−0.334)*	*(−2.333)***	*(−0.417)*	*(−1.556)*
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-fixed	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed	Yes	Yes	Yes	Yes	Yes	Yes
F-value	14.897	15.613	14.538	18.885	11.045	12.168
Adj. R^2	0.085	0.063	0.085	0.069	0.052	0.044
N	4,370	6,017	4,370	6,017	4,370	6,017

Note(s): The sample consists of 10,387 firm-years listed in KOSDAQ market between 2011 and 2020. For brevity, we do not report the coefficients of the industry and year dummy variables. The numbers in parentheses are t-statistics based on heteroskedastic robust standard errors. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-tailed), respectively. See Appendix A2 for variable definitions

industries and in firms characterized by high accounting information opacity, suggesting that ESO is especially effective in reducing information asymmetry in weaker information environments. We also find that the governance role of ESO diminishes when controlling shareholders exert substantial influence over managerial decision-making, highlighting that the effectiveness of ESO is contingent on the firm's ownership structure.

This study contributes to the literature by identifying ESO as an internal governance mechanism that mitigates stock price crash risk, thereby extending prior work that has primarily focused on disclosure quality and average transparency outcomes. By exploiting the distinctive institutional features of the Korean ESO system, our analysis offers insights that go beyond the Anglo-American context and deepens our understanding of how employee ownership shapes information environments and extreme downside risk in capital markets. These findings provide relevant implications for both regulators and practitioners concerned with the design of governance mechanisms that enhance transparency and limit managerial opportunism.

At the same time, our study is subject to several limitations. Our analysis focuses on a single institutional setting and a specific form of employee ownership, which may limit the generalizability of the results to other countries or ownership arrangements. Future research could extend our framework by examining ESO designs across different institutional environments, exploring alternative ownership models, or analyzing longer-term outcomes beyond stock price crash risk. Such extensions would further clarify the conditions under which employee ownership serves as an effective governance mechanism and help refine its role in corporate governance design.

Notes

1. Although the Korean Government provides tax benefits to encourage long-term holdings, the impact has been limited, resulting in shorter holding periods for ESO compared to other countries (Hong and Jang, 2020).
2. Under the regulation, KOSPI-listed firms are mandated to allocate 20% of the new shares to ESO associations when they issue new shares to the public (e.g. initial public offerings and seasoned equity offerings). However, if employees do not subscribe to the offering, ESO may be less than 20%.
3. Our research period starts from 2011 because listed firms in Korea were required to adopt the International Financial Accounting Standards in 2011. The change in accounting standards affects the earnings quality and key financial ratios (Lantto and Sahlstrom, 2009). To mitigate the impact of accounting changes, we initiate the research period from 2011.

4. Our hypothesis is to examine the impact of ESO on future stock price crash risk. To calculate the future stock price crash risk for the year at t+1, we require one- and two-years ahead stock return data (from April at t+1 to March at t+2). Therefore, we restrict our research period to 2020, since the stock return for 2022 is the most recently available.
5. Overidentification tests based on the Hansen J-statistic do not reject the null hypothesis of instrument exogeneity.
6. Unreported table, we find that ESO_i is insignificant for KOSPI-listed firms.
7. The study by Lee *et al*. (2021), investigating the relation between the largest shareholder's ownership and synchronicity, find that the stock price crash risk reduces both for firms with largest shareholders' ownership over and less 39%. However, they interpret that the stock price crash risk of firms with ownership over 39% decreases, and information transparency increases, as the largest shareholders' ownership increases. Moreover, the reduction of stock price crash risk of firms with less than 39% of ownership comes from manager's private incentives to lower the investors' expectation. Consequently, they suggest that the incentives of lower stock price crash risk might be different according to the largest shareholders' ownership level.
8. The mean of the largest shareholders' ownership of all listed firms over 2019–2021 is 39.4% (Financial Supervisory Service 22.7.4), and the mean of the largest shareholders' ownership of our sample is about 40%.
9. Unreported table, we find that ESO_i is insignificant for KOSPI-listed firms.

Supplementary material

The supplementary material for this article can be found online.

References

Amstrong, C.S., Guay, W.R. and Weber, J.P. (2010), "The role of information and financial reporting, corporate governance and debt contracting", *Journal of Accounting and Economics*, Vol. 50 Nos 2-3, pp. 179-234.

Andreou, P.C., Antoniou, C., Horton, J. and Louca, C. (2016), "Corporate governance and firm-specific stock price crashes", *European Financial Management*, Vol. 22 No. 5, pp. 916-956, doi: 10.1111/eufm.12084.

Blasi, J., Freeman, R. and Kruse, D. (2016), "Do broad-based employee ownership, profit sharing and stock options help the best firms do even better?", *British Journal of Industrial Relations*, Vol. 54 No. 1, pp. 55-82, doi: 10.1111/bjir.12135.

Boubaker, S., Mansali, H. and Rjiba, H. (2014), "Large controlling shareholders and stock price synchronicity", *Journal of Banking and Finance*, Vol. 40, pp. 80-96, doi: 10.1016/j.jbankfin.2013.11.022.

Bova, F. (2013), "Labor unions and management's incentive to withhold firm-specific information", *Journal of Labor Economics*, Vol. 31 No. 4, pp. 787-828.

Bova, F., Dou, Y. and Hope, O.K. (2015), "Employee ownership and firm disclosure", *Contemporary Accounting Research*, Vol. 32 No. 2, pp. 639-673, doi: 10.1111/1911-3846.12084.

Bova, F., Kolev, K., Thomas, J.K. and Zhang, X.F. (2016), "Non-executive employee ownership and corporate risk", *The Accounting Review*, Vol. 91 No. 1, pp. 115-145, doi: 10.2308/accr-50860.

Bradshaw, M., Hutton, A., Marcus, A. and Tehranian, H. (2010), "Opacity, crash risk, and the option smirk curve", Working Paper, Boston College.

Callen, J.L. and Fang, X. (2013), "Institutional investor stability and crash risk: monitoring versus short-termism?", *Journal of Banking and Finance*, Vol. 37 No. 8, pp. 3047-3063, doi: 10.1016/j.jbankfin.2013.02.018.

Callen, J.L. and Fang, X. (2015), "Religion and stock price crash risk", *Journal of Financial and Quantitative Analysis*, Vol. 50 Nos 1-2, pp. 169-195, doi: 10.1017/s0022109015000046.

Carline, N.F., Pryshchepa, O. and Wang, B. (2023), "CEO compensation incentives and playing it safe: evidence from FAS 123R", *Journal of Financial and Quantitative Analysis*, Vol. 58 No. 7, pp. 2993-3029, doi: 10.1017/s0022109023000017.

Chang, X., Chen, Y. and Zolotoy, L. (2017), "Stock liquidity and stock price crash risk", *Journal of Financial and Quantitative Analysis*, Vol. 52 No. 4, pp. 1605-1637, doi: 10.1017/s0022109017000473.

Chen, J., Hong, H. and Stein, J.C. (2001), "Forecasting crashes: trading volume, past returns and conditional skewness in stock prices", *Journal of Financial Economics*, Vol. 61 No. 3, pp. 345-381, doi: 10.1016/s0304-405x(01)00066-6.

Cho, M., Kim, H.D. and Kim, Y. (2023), "Audit committee accounting financial expertise and stock price crash risk", *International Review of Financial Analysis*, Vol. 90, 102848, doi: 10.1016/j.irfa.2023.102848.

Cin, B.C. and Smith, S.C. (2002), "Employee stock ownership and participation in South Korea: incidence, productivity effects, and prospects", *Review of Development Economics*, Vol. 6 No. 2, pp. 263-283, doi: 10.1111/1467-9361.00153.

Dimson, E. (1979), "Risk measurement when shares are subject to infrequent trading", *Journal of Financial Economics*, Vol. 7 No. 2, pp. 197-226, doi: 10.1016/0304-405x(79)90013-8.

Faleye, O., Mehrotra, V. and Morck, R. (2006), "When labor has a voice in corporate governance", *Journal of Financial and Quantitative Analysis*, Vol. 41 No. 3, pp. 489-510, doi: 10.1017/s0022109000002519.

Hong, B. and Jang, W. (2020), "Special tax treatment for employee stock ownership association members", Korea Institute of Public Finance Report.

Hutton, A.P., Marcus, A.J. and Tehranian, H. (2009), "Opaque financial reports, R^2, and crash risk", *Journal of Financial Economics*, Vol. 94 No. 1, pp. 67-86, doi: 10.1016/j.jfineco.2008.10.003.

Jang, J. and Yoon, S. (2023), "The 20% preferential allotment rule and employee stock ownership in Korea", *Korean Journal of Labor Economics*, Vol. 46 No. 2, pp. 87-112.

Jin, L. and Myers, S.C. (2006), "R^2 around the world: new theory and new tests", *Journal of Financial Economics*, Vol. 79 No. 2, pp. 257-292, doi: 10.1016/j.jfineco.2004.11.003.

Jones, D.C. and Kato, T. (1995), "The productivity effects of employee stock-ownership plans and bonuses: evidence from Japanese panel data", *The American Economic Review*, Vol. 85 No. 3, pp. 391-414.

Jung, H. and Choi, S. (2021), "The effects of employee stock ownership on stock liquidity: evidence from the Korean market", *The North American Journal of Economics and Finance*, Vol. 58, 101468, doi: 10.1016/j.najef.2021.101468.

Khlif, H., Ahmed, K. and Souissi, M. (2017), "Ownership structure and voluntary disclosure: a synthesis of empirical studies", *Australian Journal of Management*, Vol. 42 No. 3, pp. 376-403, doi: 10.1177/0312896216641475.

Kim, K.Y. and Patel, P.C. (2020), "Broad-based employee ownership and labour productivity during the 2008 recession: evidence from public firms in Europe", *British Journal of Industrial Relations*, Vol. 58 No. 2, pp. 396-423, doi: 10.1111/bjir.12508.

Kim, J.B., Li, Y. and Zhang, L. (2011), "CFOs versus CEOs: equity incentives and crashes", *Journal of Financial Economics*, Vol. 101 No. 3, pp. 713-730, doi: 10.1016/j.jfineco.2011.03.013.

Kim, Y., Li, H. and Li, S. (2014), "Corporate social responsibility and stock price crash risk", *Journal of Banking and Finance*, Vol. 43, pp. 1-13, doi: 10.1016/j.jbankfin.2014.02.013.

Kim, C., Wang, K. and Zhang, L. (2019), "Readability of 10-K reports and stock price crash risk", *Contemporary Accounting Research*, Vol. 36 No. 2, pp. 1184-1216, doi: 10.1111/1911-3846.12452.

Lantto, A.M. and Sahlström, P. (2009), "Impact of international financial reporting standard adoption on key financial ratios", *Accounting and Finance*, Vol. 49 No. 2, pp. 341-361, doi: 10.1111/j.1467-629x.2008.00283.x.

Lee, S. (2018), "Largest shareholder's ownership and stock price crash risk", *Journal of Taxation and Accounting*, Vol. 19 No. 1, pp. 115-141, doi: 10.35850/kjta.19.1.04.

Lee, Y., Lee, E., Chae, J. and Choe, M. (2021), "The ownership of the largest shareholder and stock price synchronicity", *Journal of Money and Finance*, Vol. 35 No. 2, pp. 35-74, doi: 10.21023/jmf.35.2.2.

Li, Y., Sun, B. and Yu, S. (2019), "Employee stock ownership plans and stock price crash risk", *Frontiers of Business Research in China*, Vol. 13 No. 1, p. 14, doi: 10.1186/s11782-019-0061-2.

Park, H. (2017), "Company stock in defined contribution plans: evidence from proxy voting", *Financial Management*, Vol. 46 No. 1, pp. 155-202, doi: 10.1111/fima.12147.

Paterson, T.A. and Welbourne, T.M. (2020), "I am therefore I own: implications of organization-based identity for employee stock ownership", *Human Resource Management*, Vol. 59 No. 2, pp. 175-183, doi: 10.1002/hrm.21985.

Pendleton, A. (2005), "Seller or keepers? Stock retention in stock option plans", *Human Resource Management*, Vol. 44 No. 3, pp. 319-336, doi: 10.1002/hrm.20073.

Peters, F.S. and Wagner, A.F. (2014), "The executive turnover risk premium", *The Journal of Finance*, Vol. 69 No. 4, pp. 1529-1563, doi: 10.1111/jofi.12166.

Pierce, J.L., Kostova, T. and Dirks, K.T. (2001), "Toward a theory of psychological ownership in organizations", *Academy of Management Review*, Vol. 26 No. 2, pp. 298-310, doi: 10.2307/259124.

Zhu, W. (2016), "Accruals and price crashes", *Review of Accounting Studies*, Vol. 21 No. 2, pp. 349-399, doi: 10.1007/s11142-016-9355-1.

Further reading

Cin, B.C. and Smith, S.C. (2021), "Employee ownership and productivity: evidence from Korea", *Journal of Comparative Economics*, Vol. 49 No. 4, pp. 836-850.

Dyck, A., Morse, A. and Zingales, L. (2010), "Who blows the whistle on corporate fraud?", *The Journal of Finance*, Vol. 65 No. 6, pp. 2213-2253, doi: 10.1111/j.1540-6261.2010.01614.x.

Giroud, X. and Mueller, H.M. (2010), "Does corporate governance matter in competitive industries?", *Journal of Financial Economics*, Vol. 95 No. 3, pp. 312-331, doi: 10.1016/j.jfineco.2009.10.008.

Hamm, S.J.W., Li, E.X. and Ng, J. (2012), "Management earnings guidance and stock price crash risk", *Contemporary Accounting Research*, Vol. 29 No. 1, pp. 41-71.

Hargava, R., Faircloth, S. and Zeng, H. (2017), "Takeover protection and stock price crash risk: evidence from state antitakeover laws", *Journal of Business Research*, Vol. 70, pp. 177-184, doi: 10.1016/j.jbusres.2016.08.021.

Hilary, G. (2006), "Organized labor and information asymmetry in the financial markets", *Review of Accounting Studies*, Vol. 11 No. 4, pp. 525-548, doi: 10.1007/s11142-006-9015-y.

Jensen, M.C. and Meckling, W.H. (1979), "Rights and production functions: an application to labor-managed firms and codetermination", *Journal of Business*, Vol. 52 No. 4, pp. 469-506, doi: 10.1086/296060.

Kim, J.B. and Zhang, L. (2016), "Accounting conservatism and stock price crash risk: firm-level evidence", *Contemporary Accounting Research*, Vol. 33 No. 1, pp. 412-441, doi: 10.1111/1911-3846.12112.

Rauh, J.D. (2006), "Investment and financing constraints: evidence from the funding of corporate pension plans", *The Journal of Finance*, Vol. 61 No. 1, pp. 33-71, doi: 10.1111/j.1540-6261.2006.00829.x.

Scott, T. (1994), "Incentives and disincentives for financial disclosure: voluntary disclosure of defined benefit pension plan information from Canadian firms", *The Accounting Review*, Vol. 69 No. 1, pp. 26-43, doi: 10.2308/tar-9410256359.

Wang, Y. (2023), "Employee-friendly treatment, internal controls, and stock price crash risk", *International Journal of Emerging Markets*, Vol. 18 No. 7, pp. 1452-1474.

Zuo, G. (2022), "Employee relations and stock price crash risk", *Journal of Corporate Finance*, Vol. 72, 102140.

Journal of Derivatives and Quantitative Studies: 선물연구

Corresponding author
Heejin Park can be contacted at: dioripic@pusan.ac.kr