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Does Corporate Governance Affect Labor Investment Efficiency?

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Abstract: This study examined the effect of corporate governance on labor investment efficiency, using 5178 firm-year samples from companies listed on the Korean stock market over the period from 2011 to 2019. In addition, the relationship between corporate governance and labor investment efficiency according to whether the company belongs to a chaebol group was examined. Corporate governance was measured using KCGS's corporate governance ratings. This study tried to verify whether labor investment inefficiency due to information asymmetry is improved by excellent corporate governance. The results show that in the case of the entire sample, the relationship between corporate governance and labor investment efficiency was significant in the positive (+) direction. That is, it is an empirical result indicating that a company with a sound governance structure is making effective labor investment. The samples were divided into overinvestment samples and underinvestment samples, and the relationship between corporate governance and labor investment efficiency was analyzed separately in the two samples. According to the results, the positive relationship between corporate governance and labor investment efficiency was significant only in the case of underinvestment samples. In addition, the positive relationship between corporate governance and labor investment efficiency was more statistically significant in the case of companies belonging to a chaebol group. This study provided implications for authorities, shareholders, and investors, etc., in that it suggests the role of corporate governance as a mechanism to alleviate the agency problem between managers and investors.

Keywords: corporate governance; labor investment efficiency; chaebol

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1. Introduction

This study examines the relationship between corporate governance and labor investment efficiency. In addition, we investigate a unequal relationship between corporate governance and labor investment efficiency depending on whether or not it belongs to a chaebol (large family-owned business conglomerates). Since the 1990s, many countries around the world have put a lot of effort into corporate governance issues. The improved corporate governance mechanisms created through these efforts had a positive impact on corporate values and policies [1]. Better governance can improve the interests of managers and shareholders, thus lessening information asymmetry and agency costs, eventually improving investment efficiency [2]. Better corporate governance refers to the balance of interests of a company's stakeholders (shareholders, consumers, managers, creditors, employees, suppliers, etc.), and a company with good governance is expected to show a significant positive relationship with labor investment efficiency.

The agency theory argues that managers are strongly motivated to act opportunistically for their interests, rather than those of shareholders, due to the mismatch of interests between shareholders and managers [3]. The most salient among agency problems is that managers build managerial empires, either by increasing the size of firms beyond

optimal levels or maintaining underutilized resources, in order to increase personal benefits from prestige, power, and rewards [4]. Additionally, managers may not make enough effort in a situation where they could do more [5]. Previous studies that addressed agency problems and corporate investments looked at mergers and acquisitions [6,7] and capital investments [8,9]. Like capital investment, labor investment is one of the most important corporate decisions that determine a firm's sustainability. Firms must allocate their human resources efficiently to achieve a sustainable performance [10]. Nevertheless, the impact of capital investment on corporate sustainability was mainly investigated. In light of this, this study focuses on labor investment efficiently in terms of corporate sustainability.

Labor investment is an essential element to maximizing corporate value. In a company, manpower determines the production volume of products, is in charge of R&D work that determines the competitiveness of the company, or performs sales and internal management of the company. Hiring enough manpower is essential for expanding the company's sales and maintaining or increasing its market share, but employing too much manpower can worsen the profitability of the company by entailing an increase in labor costs. Therefore, a company must have an appropriate level of manpower [11].

Previous studies presented evidence indicating that corporate governance affects the decision-making of many managers, including regarding workers' wages, hiring, and firing. For example, Bertrand and Mullainathan (2003) [12] reported that well-established managers are more likely to pay higher wages to workers and avoid reducing unproductive workers in order to enjoy personal gains, such as securing employee loyalty. Cronqvist et al. (2009) [13] reported that managers with stronger control pay higher wages to workers, and that this trend is more pronounced when workers are closer to managers in the hierarchy and are less associated with unions that are more prone to conflicts. This means that managers have preferred labor policies, and that corporate governance plays an important role in the labor market. Therefore, this study conducted its analysis taking note of corporate governance as a mechanism to monitor the efficiency of labor investment.

Labor investment efficiency is likely to be affected by information asymmetry between managers and investors. This study verifies the relevance of corporate governance as a mechanism to regulate such asymmetry. According to Jung et al.'s (2014) [14] study that examined accounting quality and labor investment efficiency, good accounting quality appears to increase labor investment efficiency. Since companies with excellent corporate governance have high accounting quality, it is projected that companies with excellent corporate governance will make more efficient labor investments than companies with poor corporate governance.

The results show that, in the case of the entire sample, the relationship between corporate governance and labor investment efficiency was significant in the positive (+) direction. This means that the better the corporate governance, the more efficient the labor investment. That is, it is an empirical result indicating that a company with a sound governance structure is making effective labor investment. The samples were divided into overinvestment samples and underinvestment samples, and the relationship between corporate governance and labor investment efficiency was analyzed separately in the two different samples. According to the results, the positive relationship between corporate governance and labor investment efficiency was significant only in the case of underinvestment samples. It can be inferred that the empirical result indicating that corporate governance and labor investment efficiency have a positive relationship was due to underinvestment. According to the results of analysis conducted with samples divided according to whether the company belongs to a chaebol group or not, the positive relationship between corporate governance and labor investment efficiency was more statistically significant in the case of companies belonging to a chaebol.

This study provides several additional contributions in relation to previous studies of labor investment efficiency. First, the understanding of labor investment efficiency is broadened by demonstrating the relationship between corporate governance and labor investment efficiency. Because it is important to ascertain the role of corporate governance

in labor investment efficiency, our empirical results provide useful insights and implications for managers in planning effective labor policies. Second, this study provides evidence that labor investment efficiency can be unequal, depending on whether the company belongs to a chaebol. This provides a difference in firm characteristics as a determinant of labor investment efficiency. Third, we provide implications for authorities, shareholders, and investors, etc., in that the study suggests the role of corporate governance as a mechanism to alleviate the agency problem between managers and investors. This study provides a strong incentive for governments to implement timely legislation to improve corporate governance.

This study is as follows. Section 2 reviews the theoretical background and develops hypotheses, and Section 3 presents the research design. In addition, Section 4 reports the empirical results, and Section 5 concludes the study.

2. Literature Review and Development of Hypotheses

2.1. Corporate Governance

The Korea Corporate Governance Service (KCGS) evaluates the corporate governance of listed companies in South Korea and publishes their ratings. The standard system for evaluation of governance consists of the evaluation of five subordinate governance categories (protection of shareholder rights, board of directors, disclosure, auditing body, and distribution of business profits). The protection of shareholder rights consists of convenience in exercising shareholder rights, ownership structure, and transactions with specially related parties. The board consists of the composition, operation, evaluation, and compensation of the board of directors. The disclosure section consists of company briefing sessions, predictive information, outside directors, and website disclosures. The auditing body consists of the audit committee, the non-audit service of external auditors, the protective regulations for whistleblowers, and the transparency of transactions with affiliates. Lastly, distribution of business profits is composed of price-dividend yield, dividend payout ratio, and implementation of interim or quarterly dividends.

Governance evaluation by the KCGS has been implemented since the IMF financial crisis, and the standard system was drawn up based on the governance principles of the OECD. In 1999, the Corporate Governance Improvement Committee drafted the Corporate Governance Best Practices in accordance with the current situation in South Korea, and efforts have been made to establish a governance system at the level of advanced countries for public companies and financial institutions. The improved corporate governance mechanism developed through these efforts had a positive impact on corporate values and policies [1]. Better governance can improve the interests of managers and shareholders, thus lessening information asymmetry and agency costs, eventually improving investment efficiency [2].

Corporate governance is an area on which empirical studies are actively conducted not only in the field of accounting but also in the field of financial management. Prior studies related to corporate governance mostly examined the relationships between corporate governance and company values/business performance, or the association between corporate governance and earnings quality [15]. However, few studies examined the relationship between corporate governance and labor investment efficiency. Therefore, this study examines the relationship between corporate governance and labor investment efficiency.

2.2. Labor Investment Efficiency

Labor investment efficiency is defined as the difference between the actual employment growth rate and the expected employment growth rate. According to this method, the greater the extent to which the actual employment growth rate of a firm deviates from the appropriate level, the lower the labor investment efficiency [14]. An efficient investment is made when a firm chooses an investment that brings about a positive net present value in the absence of market friction [9]. Investment inefficiency arises from an imperfect capital market. Previous studies were conducted centering on the causes of investment

inefficiency and factors that can control it in the presence of information asymmetry. Those studies have been conducted centering on agency costs as a cause of investment inefficiency and the quality of profits and mechanisms, such as corporate governance, as monitoring devices to control investment inefficiency. According to Biddle and Hilary's (2006) [8] study examining the relationship between investment efficiency and accounting quality, excellent accounting quality reduces information asymmetry between managers and external suppliers of capital.

In the past, studies related to labor investment were conducted by approaching the concept of investment efficiency through a model to measure labor investment efficiency. However, since labor investment efficiency is an indicator of overemployment and underemployment, this study approaches the aspects of overemployment and underemployment, rather than the concept of investment efficiency, to analyze labor investment efficiency. Jung et al. (2014) [14] examined the quality of financial reporting and labor investment efficiency. According to the results of the analysis, the higher the quality of financial reporting, the better the labor investment efficiency, indicating that accounting quality acts as a mechanism for improvement of labor investment efficiency. Ghaly et al. (2015) [16] tested the effects of institutional investors' investment behavior on labor investment efficiency. As a result of the analysis, it was found that long-term investors are performing more effective monitoring, which reduces agency problems in labor investment choices.

Kang and Cho (2017) [11] analyzed whether the quality of accounting information and the intensity of competition, which play the role of corporate governance inside and outside the company, respectively, improve the efficiency of labor investment or not. As a result of the analysis, it was found that the quality of accounting information and the intensity of competition improved labor investment efficiency. Both the quality of accounting information and the intensity of competition are interpreted as improving labor investment efficiency by suppressing managers's opportunistic decision-making incentives, and alleviating information asymmetry between managers and external investors.

Fu and Lee (2017) [17] examined the effect of managers's ability and the quality of profits on labor investment decision-making, and analyzed the combined effect of managers's ability and the quality of profits on labor investment decision-making. According to the results of the analysis, first, managers's ability and labor investment efficiency had a positive (+) relationship. That is, according to the viewpoint of efficient contracts, as the managers's ability increases, efforts will be made to maximize shareholder wealth by maintaining an appropriate level of employment of employees. Second, the higher the quality of profit, the higher the labor investment efficiency. The excellent quality of profits is interpreted as alleviating the moral hazard and adverse selection problems due to managers's information superiority, and improving labor investment efficiency in terms of employment and dismissal.

Yoo and Cho (2018) [18] analyzed the effect of managers's characteristics on labor investment efficiency. As a result of the analysis, it was found that the better the managers's ability, the higher the labor investment efficiency of the company. It is interpreted that if the manager's ability is excellent, prudent labor investment will be made, leading to efficient labor investment. In addition, it was found that the higher the manager's overconfidence propensity, the lower the efficiency of labor investment. This is interpreted as indicating that future business performance is viewed optimistically due to the manager's overconfidence propensity, leading to various optimistic investments so that labor investment efficiency is reduced.

Mo and Lee (2019) [19] reported that an increase in labor investment efficiency is attributed to a reduction in a firm's over-firing problem. They document that the positive influence of unaffiliated analysts on labor investment efficiency holds when firms have high cash holdings. Le and Tran (2021) [2] found that board reforms are positively associated with labor investment efficiency because they benefit firms in reducing over-hiring, under-hiring, and over-firing.

When the results of previous studies examined above are put together, it can be seen that labor investment efficiency can be increased by means that can reduce information asymmetry. Therefore, it is expected that the inefficient distortion of corporate resource allocation due to information asymmetry can be alleviated by corporate governance. Therefore, a hypothesis was established as follows:

Hypothesis 1 (H1). *Corporate governance and labor investment efficiency will have a positive (+) relationship.*

Meanwhile, large family-owned business conglomerates that exist in Asian countries have complicated transactions between affiliated firms, and they have the problem of using them to achieve their private purposes [20]. Bae et al. (2002) [21] reported evidence that firms belonging to chaebol groups in Korea expediently transfer wealth through internal transactions between firms. However, the internal transactions of chaebol groups do not only have negative effects; rather, these can increase the firm's value in certain cases [20]. A particular case is propping. Propping describes when a subsidiary is in trouble, and the parent company supports them, benefitting more than a company that is not part of the chaebol group [20]. Bae et al. (2008) [22] showed that subsidiaries belonging to chaebol groups in Korea increase their reported earnings and their corporate value through propping.

There are two evaluations of the Korean chaebol system. One is a positive evaluation that it played a leading role in driving the economy in the past. The other is that it hinders the efficiency of firm operations with a closed corporate governance structure centered on large shareholders, and damages ordinary minority shareholders through selfish management favoring specific households. It is also argued that the monopolistic position of the large group of firms hampers balanced development of the national economy [20]. Particularly, companies belonging to a chaebol have a much more complex ownership and governance structure than non-chaebol companies, so that experts from outside firms are often unable to grasp the facts, even if they are always monitored. Korean chaebols are connected by complicated personal and family relationships and are engaged in numerous types of businesses [20].

Based on the above, information asymmetry can be different depending on whether a company belongs to a chaebol group, so the relationship between corporate governance and labor investment efficiency is likely to be different. If the information asymmetry of companies belonging to a chaebol group is large, the relationship between corporate governance and labor investment efficiency will be greater than that of companies belonging to non-chaebol groups. On the other hand, if information asymmetry is small, the relationship between the two will be smaller than that of companies belonging to non-chaebol groups. Therefore, the following null hypothesis is established in relation to the effect of a chaebol group on the relationship between corporate governance and labor investment efficiency.

Hypothesis 2 (H2). *The relationship between corporate governance and labor investment efficiency will differ depending on whether the company belongs to a chaebol group.*

3. Research Design and Data

3.1. Empirical Models

In this study, the regression model for examining the effect of corporate governance on labor investment efficiency is shown in Equation (1). For corporate governance, a variable of interest, the corporate governance evaluation grade from KCGS is used, and labor investment efficiency, a dependent variable, is measured using the model of Pinnuck and Lillis (2007) [23].

$$\begin{aligned} \mathrm{LEI}_{it+1} = {} & \beta_0 + \beta_1 \mathrm{GOV}_{it} + \beta_2 \mathrm{MB}_{it} + \beta_3 \mathrm{SIZE}_{it} + \beta_4 \mathrm{QUICK}_{it} + \beta_5 \mathrm{LEV}_{it} + \beta_6 \mathrm{TA}_{it} \\ & + \beta_7 ROA_{it} + \beta_8 \mathrm{LOSSDUM}_{it} + \beta_9 \mathrm{STD_OCF}_{it} + \beta_{10} \mathrm{STD_SALES}_{it} \\ & + \sum \mathrm{YD} + \sum \mathrm{ID} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

Labor investment efficiency is defined as the absolute value of the residual estimated by Pinnuck and Lillis's (2007) [23] methodology, multiplied by −1. The closer the residual is to 0, the more appropriate the investment is, and the farther the residual is from 0, the more inefficient the investment is. In this study, the absolute value of the residual multiplied by −1 is used because labor investment efficiency is defined as a dependent variable for analysis. That is, the larger the value, the more efficient the investment is. In Equation (1), GOV_{it} is the corporate governance grade, which is the variable of interest in this study, and the prediction sign of β_1 is in the positive (+) direction.

Control variables include MB_{it}, $SIZE_{it}$, $QUICK_{it}$, LEV_{it}, TA_{it}, ROA_{it}, $LOSSDUM_{it}$, STD_OCF_{it}, and STD_SALES_{it}, which influence labor investment efficiency. MB_{it} is the market value of equity divided by the book value of equity, and $SIZE_{it}$ is the firm size, which is measured by taking the natural logarithm of the total assets. $QUICK_{it}$ is defined as the value of cash and short-term investment assets divided by current liabilities. LEV_{it} is a company's leverage ratio, and represents leverage or capital structure. TA_{it} is the ratio of tangible assets, which is the value of tangible assets divided by total assets. ROA_{it} stands for profitability, and is a value of the current net income divided by total assets. $LOSSDUM_{it}$ is a loss dummy variable, which takes a value of 1 if a firm reports a loss (net income < 0), and 0 otherwise. STD_OCF_{it} means the standard deviation of the value of operating cash flow in the cash flow statement for 5 years from period t − 4 to period t divided by the average total assets. STD_SALES_{it} means the standard deviation of sales for 5 years from period t − 4 to period t, divided by average total assets. Finally, YD and IND are included to control the effects of year and industry on labor investment efficiency.

3.2. Measurement of Variables

Labor Investment Efficiency

In this study, labor investment efficiency was measured using Pinnuck and Lillis's (2007) [23] methodology. If a firm's actual employment of labor exceeds (or is under) an appropriate level, it is regarded as excessive (or insufficient) labor investment, which is defined as inefficient labor investment. When the value of the residual estimated by the formula below is 0, the labor investment is appropriate. Value of the residual larger than 0 means overinvestment in labor, and value of the residual larger than 0 means underinvestment in labor.

$$\begin{aligned} LG_{it} = {} & \beta_0 + \beta_1 SG_{it-1} + \beta_2 SG_{it} + \beta_3 \triangle ROA_{it} + \beta_4 \triangle ROA_{it-1} + \beta_5 ROA_{it} + \beta_6 RET_{it} \\ & + \beta_7 MV_{it-1} + \beta_8 \triangle MV_{it-1} + \beta_9 QUICK_{it-1} + \beta_{10} \triangle QUICK_{it} + \beta_{11} LEV_{it-1} \\ & + \beta_{12} LOSSBIN1_{it-1} + \beta_{13} LOSSBIN2_{it-1} + \beta_{14} LOSSBIN3_{it-1} \\ & + \beta_{15} LOSSBIN4_{it-1} + \beta_{16} LOSSBIN5_{it-1} + \sum YD + \sum ID + \varepsilon_{i,t} \end{aligned} \quad (2)$$

where LG_{it} is the increase (or decrease) rate of workers for fiscal year t of firm i; SG_{it-1} is the percentage change in sales for fiscal year t − 1 of firm i; SG_{it} is the percentage change in sales for fiscal year t of firm i; $\triangle ROA_{it}$ is the change in net income scaled by beginning of year total assets for fiscal year t of firm i; $\triangle ROA_{it-1}$ is the change in net income scaled by beginning of year total assets for fiscal year t − 1 of firm i; ROA_{it} is the level of net income scaled by beginning of year total assets for fiscal year t of firm i; RET_{it} is the annual share return for fiscal year t of firm i; MV_{it-1} is the natural logarithm of market value of equity for fiscal year t − 1 of firm i; $\triangle MV_{it-1}$ is the natural logarithm of the change of MV for fiscal year t − 1 of firm i; $QUICK_{it-1}$ is the ratio of cash and equivalents plus short term investments to current liabilities for fiscal year t − 1 of firm i; $\triangle QUICK_{it-1}$ is the change of QUICK for fiscal year t-1 of firm i; LEV_{it-1} is the ratio of total debt to total assets for fiscal year t − 1 of firm i; $LOSSBIN1_{it-1}$ is a dummy variable, which takes the value of 1 for observation in the interval −0.005 and 0.00 of ROA for fiscal year t − 1 of firm i, and 0 otherwise; $LOSSBIN2_{it-1}$ is a dummy variable, which takes the value of 1 for observations in the interval −0.010 and −0.005 of ROA for fiscal year t − 1 of firm i, and 0 otherwise; $LOSSBIN3_{it-1}$ is a dummy variable, which takes the value of 1 for observations in the interval −0.015 and −0.010 of ROA for fiscal year t − 1 of firm i, and 0 otherwise;

$LOSSBIN4_{it-1}$ is a dummy variable, which takes the value of 1 for observations in the interval −0.020 and −0.015 of ROA for fiscal year t − 1 of firm i, and 0 otherwise; and $LOSSBIN5_{it-1}$ is a dummy variable, which takes the value of 1 for observations in the interval −0.020 and −0.015 of ROA for fiscal year t − 1 of firm i, and 0 otherwise.

3.3. Samples and Data

In this study, companies listed on the stock market from 2011 to 2019 were selected as samples to analyze the effect of corporate governance on labor investment efficiency. Information on financial data was collected from the FN Data-Guide database. In order to secure the homogeneity of samples of companies, financial business was excluded from the samples because financial business has different components of financial statements, and even the same account title has different meanings from other types of business. In order to exclude the effect of the settling day, companies that do not settle accounts at the end of December are excluded. Since companies with a different settling day are concentrated in certain industries, industrial characteristics according to settling days may affect the results of analysis. Finally, in order to remove the effect of extreme values on the empirical results, observed values of individual variables smaller than the value 1% higher than the bottom value or larger than the value 99% of the top value were regarded as outliers and adjusted (winsorized) at 1% and 99%. The final sample consists of 5178 firm-year observations.

Table 1 shows the distribution of the samples by year. Although the number of listed companies is increasing year by year, variations by period are not.

Table 1. Sample distribution by year.

Year	Number	Percentage (%)	Cumulative Percentage (%)
2011	564	10.89	10.89
2012	545	10.53	21.42
2013	589	11.38	32.79
2014	579	11.18	43.97
2015	599	11.57	55.54
2016	593	11.45	66.99
2017	610	11.78	78.78
2018	636	12.28	91.06
2019	463	8.94	100
Total	5178	100	100

Table 2 shows the distribution of the samples by industry. The ratios of coke and chemicals (10.97%) and professional service industries (9.48%) were large, and the ratios of the construction industry (1.49%) and the non-metal industry (2.78%) were small.

Table 2. Sample distribution by industry.

Industry	Number	Percentage (%)	Cumulative Percentage (%)
Food and Beverage	266	5.14	5.14
Fiber, Clothes, and Leathers	199	3.84	8.98
Timber, Pulp, and Furniture	208	4.02	13.00
Cokes and Chemical	568	10.97	23.97

Table 2. *Cont.*

Industry	Number	Percentage (%)	Cumulative Percentage (%)
Medical Manufacturing	288	5.56	29.53
Rubber and Plastic	177	3.42	32.95
Non-Metallic	144	2.78	35.73
Metallic	424	8.19	43.92
PC and Medical	326	6.30	50.21
Machine and Electronic	347	6.70	56.91
Other Transportation	382	7.38	64.29
Construction	77	1.49	65.78
Retail and Whole Sales	205	3.96	69.74
Transportation Services	436	8.42	78.16
Publishing and Broadcasting	171	3.30	81.46
Professional Services	491	9.48	90.94
Other	469	9.06	100
Total	5178	100	100

4. Empirical Results

4.1. Descriptive Statistics

Table 3 shows the descriptive statistics of major variables. The mean and median of LEI, which represents labor investment efficiency, were −0.479 and −0.201, respectively. The mean of corporate governance (GOV) was 6.674. The mean and median of market value to book value ratio (MB) were 1.204 and 0.848, respectively. The mean (median) of company size (SIZE) was 27.169 (26.946), and the mean (median) of cash and short-term investment assets (QUICK) was 0.370 (0.081). The mean (median) of the leverage ratio (LEV) was 0.469 (0.474). The ratio of tangible assets (TA) was 0.343 on average, and the profitability was 2.5% on average. The loss dummy (LOSSDUM) was 0.229 on average, indicating that approximately 22% of the entire sample were loss firms. The mean (median) of standard deviation of operating cash flow volatility (STD_OCF) was 0.049 (0.042). The mean (median) of standard deviation of sales (STD_SALES) was 0.210 (0.138).

Table 3. Descriptive statistics (N = 5178).

Variable	Mean	Std.	Min	Median	Max
LEI	–0.479	0.597	–2.534	–0.201	0.000
GOV	6.674	1.215	5.000	7.000	10.000
MB	1.204	1.134	0.182	0.848	6.853
SIZE	27.169	1.634	22.685	26.946	33.496
QUICK	0.370	0.789	0.000	0.081	5.176
LEV	0.469	0.202	0.027	0.474	1.845
TA	0.343	0.181	0.000	0.345	0.958
ROA	0.025	0.098	–2.306	0.027	1.824
LOSSDUM	0.229	0.421	0.000	0.000	1.000
STD_OCF	0.049	0.034	0.001	0.042	0.367
STD_SALES	0.210	0.231	0.002	0.138	3.992

Note: See Abbreviations for variable definitions.

4.2. Pearson Correlations

Table 4 shows the results of Pearson correlation analysis of major variables. Labor investment efficiency (LEI) shows a significant negative (−) relationship with the ratio of book value to market value (MB), firm size (SIZE), proportion of tangible assets (TA), profitability (ROA), and sales volatility (STD_SALES). This means that the higher the ratio of book value to market value, firm size, proportion of tangible assets, profitability, and sales volatility, the lower labor investment efficiency. Meanwhile, labor investment efficiency (LEI) shows a significant positive (+) relationship with corporate governance (GOV) and cash flow volatility (STD_OCF). This means that the better the corporate governance and the higher the cash flow volatility, the better the labor investment efficiency. This analysis is the result of not controlling the effects of other variables on labor investment efficiency. Therefore, this study performs regression analysis by including various control variables that affect labor investment efficiency, reported in previous studies, in the research model.

Table 4. Pearson correlations (N = 5178).

Variable	GOV	MB	SIZE	QUICK	LEV	TA	ROA	LOSSDUM	STD_OCF	STD_SALES
LEI	0.046	–0.095	–0.026	–0.011	–0.008	–0.038	–0.076	0.010	0.009	0.037
	0.001	<0.001	0.050	0.394	0.552	0.005	<0.001	0.447	0.488	0.006
GOV		0.383	0.434	0.090	0.005	0.176	0.093	–0.139	0.092	0.138
		<0.001	<0.001	<0.001	0.716	<0.001	<0.001	<0.001	<0.001	<0.001
MB			0.765	0.296	–0.004	0.334	0.210	–0.210	0.214	0.241
			<0.001	<0.001	0.786	<0.001	<0.001	<0.001	<0.001	<0.001
SIZE				0.276	0.240	0.437	0.118	–0.139	0.265	0.286
				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
QUICK					–0.012	0.507	0.043	–0.038	0.423	0.325
					0.364	<0.001	0.001	0.004	<0.001	<0.001
LEV						0.062	–0.149	0.261	0.053	0.086
						<0.001	<0.001	<0.001	<0.001	<0.001
TA							0.018	–0.007	0.440	0.336
							0.176	0.583	<0.001	<0.001
ROA								–0.301	0.013	–0.001
								<0.001	0.349	0.915
LOSSDUM									–0.005	–0.002
									0.698	0.900
STD_OCF										0.825
										<0.001

Notes: This table presents Pearson correlations. See Abbreviations for variable definitions.

4.3. Multivariate Results

4.3.1. Corporate Governance and Labor Investment Efficiency

Table 5 shows the results of analyzing the relationship between corporate governance and labor investment efficiency for the full sample. In the results, the F value is statistically significant, so the research model is suitable. The variance inflation factor (VIF) of the independent variable used in the regression analysis in this study was 2 or lower, indicating that it did not exceed 10. Therefore, the problem of multicollinearity is judged to be insignificant. The regression coefficients of Model 1 and Model 2, which indicate the correlation between corporate governance and labor investment efficiency, were 0.019 and 0.121, respectively, which were significant at 1% and 1% levels, respectively, in the positive (+) direction. This is interpreted as indicating that the better the corporate governance, the higher the labor investment efficiency. That is, it means that excellent corporate governance can monitor the discretionary judgment of managers over labor costs.

Table 5. The relationship between corporate governance and labor investment efficiency (full sample).

$$LEI_{it+1} = \beta_0+\beta_1GOV_{it}+\beta_2MB_{it}+\beta_3SIZE_{it}+\beta_4QUICK_{it}+\beta_5LEV_{it}+\beta_6TA_{it}+\beta_7ROA_{it}+\beta_8LOSSDUM_{it}+\beta_9STD_OCF_{it}+\beta_{10}STD_SALES_{it}+\sum YD+\sum ID+\varepsilon_{i,t}$$

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	*t*-Value	Coefficient	*t*-Value
Intercept	−1.308	−11.450 ***	−0.704	−4.890 ***
GOV	0.019	3.570 ***	0.121	6.420 ***
MB	−0.023	−3.980 ***	−0.035	−5.270 ***
SIZE	0.017	2.650 **	0.012	1.580
QUICK	−0.026	−3.040 ***	−0.024	−2.470 **
LEV	−0.182	−5.060 ***	−0.198	−4.840 ***
TA	−0.020	−0.540	−0.036	−0.871
ROA	−0.294	−4.690 ***	−0.347	−4.980 ***
LOSSDUM	−0.037	−2.440 **	−0.024	−1.390
STD_OCF	−0.164	−0.890	−0.381	−1.870 *
STD_SALES	0.194	7.410 ***	0.072	2.460 **
YD	Included		Included	
ID	Included		Included	
F-value	148.60 ***		107.97 ***	
Adj.R^2	43.01%		33.73%	

Note: This table reports the relationship between corporate governance and labor investment efficiency for the full sample. ***, **, and * represent significance at the 0.01, 0.05, and 0.1 level, respectively. See Abbreviations for variable definitions.

Table 6 shows the results of analyzing the relationship between corporate governance and labor investment efficiency for the overinvestment sample. In the results, the F value is statistically significant, so the research model is suitable. The regression coefficients of Model 1 and Model 2, which show the relationship between corporate governance and labor investment efficiency, are 0.001 and 0.001, and show no statistical significance.

Table 6. The relationship between corporate governance and labor investment efficiency (overinvestment sample).

$$LEI_{it+1} = \beta_0+\beta_1GOV_{it}+\beta_2MB_{it}+\beta_3SIZE_{it}+\beta_4QUICK_{it}+\beta_5LEV_{it}+\beta_6TA_{it}+\beta_7ROA_{it}+\beta_8LOSSDUM_{it}+\beta_9STD_OCF_{it}+\beta_{10}STD_SALES_{it}+\sum YD+\sum ID+\varepsilon_{i,t}$$

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	*t*-Value	Coefficient	*t*-Value
Intercept	−0.792	−8.270 ***	−0.784	−8.500 ***
GOV	0.001	0.002	0.001	0.170
MB	0.015	5.190 ***	0.014	4.660 ***
SIZE	−0.003	−1.070	−0.001	−0.250
QUICK	−0.012	−2.360 **	−0.015	−3.060 ***
LEV	−0.170	−9.230 ***	−0.172	−9.500 ***
TA	0.032	1.720 *	0.030	1.570
ROA	0.096	2.570 ***	0.098	2.750 ***
LOSSDUM	−0.066	−8.850 ***	−0.070	−9.470 ***
STD_OCF	−0.039	−0.400	−0.135	−1.420
STD_SALES	0.017	1.190	0.016	1.110
YD	Included		Included	
ID	Included		Included	
F-value	17.19 ***		18.90 ***	
Adj.R^2	11.51%		12.04%	

Note: This table reports the relationship between corporate governance and labor investment efficiency for the overinvestment sample. ***, **, and * represent significance at the 0.01, 0.05, and 0.1 level, respectively. See Abbreviations for variable definitions.

Table 7 shows the results of analyzing the relationship between corporate governance and labor investment efficiency for the underinvestment sample. In the results, the F value is statistically significant, so the research model is suitable. The regression coefficients of Model 1 and Model 2, which show the relationship between corporate governance and labor investment efficiency, are 0.023 and 0.201, which are significant in positive (+) directions at the 5% and 1% levels, respectively. In summary, when the entire sample is divided into an overinvestment and an underinvestment sample, statistical significance is found only in the underinvestment sample. Therefore, it is inferred that the significance of H1 results is due to the underinvestment sample.

Table 7. The relationship between corporate governance and labor investment efficiency (underinvestment sample).

$$LEI_{it+1} = \beta_0 + \beta_1 GOV_{it} + \beta_2 MB_{it} + \beta_3 SIZE_{it} + \beta_4 QUICK_{it} + \beta_5 LEV_{it} + \beta_6 TA_{it} + \beta_7 ROA_{it} + \beta_8 LOSSDUM_{it} + \beta_9 STD_OCF_{it} + \beta_{10} STD_SALES_{it} + \sum YD + \sum ID + \varepsilon_{i,t}$$

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	***t*-Value**	**Coefficient**	***t*-Value**
Intercept	−1.569	−6.350 ***	−0.584	−1.910 **
GOV	0.023	1.970 **	0.201	4.960 ***
MB	−0.037	−2.750 ***	−0.039	−2.530 **
SIZE	0.044	2.920 ***	0.016	0.910
QUICK	−0.041	−2.580 **	−0.035	−1.960 **
LEV	−0.547	−6.600 ***	−0.642	−7.020 ***
TA	−0.153	−1.950 **	−0.139	−1.600 *
ROA	−0.183	−1.480	−0.284	−2.110 **
LOSSDUM	0.033	0.920	0.066	1.640 *
STD_OCF	0.194	0.500	0.047	0.110
STD_SALES	0.358	6.620 ***	0.110	1.900 *
YD	Included		Included	
ID	Included		Included	
F-value	39.95 ***		27.82 ***	
Adj.R^2	35.40%		25.27%	

Note: This table reports the relationship between corporate governance and labor investment efficiency for the underinvestment sample. ***, **, and * represent significance at the 0.01, 0.05, and 0.1 level, respectively. See Abbreviations for variable definitions.

4.3.2. Chaebol, Corporate Governance, and Labor Investment Efficiency

Table 8 shows the results that verified the effect of whether the relevant firm belongs to a chaebol or not on the relationship between corporate governance and labor investment efficiency for the full sample. In the results, the F value is statistically significant, so the research model is suitable. The results show that in the case of companies belonging to a chaebol group, the better the corporate governance, the higher the labor investment efficiency. On the other hand, there was no statistical significance in the case of companies not belonging to the chaebol group. This indicates that a chaebol group has large information asymmetry, due to its complex governance structure and the large disparity between ownership and control. Therefore, this suggests that the information asymmetry between managers and investors can be reduced by establishing a sound governance structure, which can increase labor investment efficiency.

Table 8. The effect of a chaebol group on the relationship between corporate governance and labor investment efficiency (full sample).

$$LEI_{it+1} = \beta_0 + \beta_1 GOV_{it} + \beta_2 MB_{it} + \beta_3 SIZE_{it} + \beta_4 QUICK_{it} + \beta_5 LEV_{it} + \beta_6 TA_{it} + \beta_7 ROA_{it} + \beta_8 LOSSDUM_{it} + \beta_9 STD_OCF_{it} + \beta_{10} STD_SALES_{it} + \sum YD + \sum ID + \varepsilon_{i,t}$$

Panel A: Chaebol

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	*t*-Value	Coefficient	*t*-Value
Intercept	−1.661	−6.710 ***	−1.364	−5.170 ***
GOV	0.022	2.430 **	0.107	3.590 ***
MB	−0.009	−0.730	−0.010	−0.800
SIZE	0.007	0.740	0.001	0.040
QUICK	−0.046	−1.920 *	−0.046	−1.940 *
LEV	−0.252	−2.770 ***	−0.241	−2.650 ***
TA	−0.090	−1.100	−0.087	−1.070
ROA	−0.774	−3.450 ***	−0.752	−3.360 ***
LOSSDUM	−0.058	−1.610	−0.060	−1.640 *
STD_OCF	−0.049	−0.100	−0.061	−0.130
STD_SALES	0.241	3.730 ***	0.243	3.770 ***
YD	Included		Included	
ID	Included		Included	
F-value	41.58 ***		42.25 ***	
Adj.R^2	42.26%		42.66%	

Panel B: Non-Chaebol

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	*t*-Value	Coefficient	*t*-Value
Intercept	−1.217	−6.490 ***	−1.284	−6.550 ***
GOV	0.005	0.710	−0.027	−1.130
MB	−0.041	−5.790 ***	−0.040	−5.590 ***
SIZE	−0.003	−0.450	0.001	0.110
QUICK	−0.026	−2.530 **	−0.026	−2.490 **
LEV	−0.205	−4.500 ***	−0.212	−4.640 ***
TA	0.030	0.620	0.030	0.610
ROA	−0.483	−6.480 ***	−0.483	−6.470 ***
LOSSDUM	−0.043	−2.200 **	−0.044	−2.280 **
STD_OCF	−0.083	−0.350	−0.079	−0.330
STD_SALES	0.173	5.100 ***	0.172	5.060 ***
YD	Included		Included	
ID	Included		Included	
F-value	73.58 ***		73.63 ***	
Adj.R^2	32.55%		32.56%	

Note: This table reports the effect of a chaebol group on the relationship between corporate governance and labor investment efficiency. ***, **, and * represent significance at the 0.01, 0.05, and 0.1 level, respectively. See Abbreviations for variable definitions.

Table 9 shows the results that verified the effect of whether the relevant firm belongs to a chaebol or not on the relationship between corporate governance and labor investment efficiency for the overinvestment sample. The empirical analysis results were not statistically significant.

Table 9. The effect of a chaebol group on the relationship between corporate governance and labor investment efficiency (overinvestment sample).

$$LEI_{it+1} = \beta_0 + \beta_1 GOV_{it} + \beta_2 MB_{it} + \beta_3 SIZE_{it} + \beta_4 QUICK_{it} + \beta_5 LEV_{it} + \beta_6 TA_{it} + \beta_7 ROA_{it} + \beta_8 LOSSDUM_{it} + \beta_9 STD_OCF_{it} + \beta_{10} STD_SALES_{it} + \sum YD + \sum ID + \varepsilon_{i,t}$$

Panel A: Chaebol

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	***t*-Value**	**Coefficient**	***t*-Value**
Intercept	−0.595	−3.120 ***	−0.538	−2.790 ***
GOV	0.004	0.690	0.023	0.910
MB	0.004	0.650	0.003	0.540
SIZE	−0.015	−3.570 ***	−0.017	−4.140 ***
QUICK	−0.022	−1.790 *	−0.022	−1.770 *
LEV	−0.104	−2.640 ***	−0.100	−2.540 **
TA	0.025	0.700	0.025	0.700
ROA	−0.102	−0.890	−0.101	−0.880
LOSSDUM	−0.046	−3.050 ***	−0.046	−3.090 ***
STD_OCF	−0.036	−0.180	−0.047	−0.240
STD_SALES	0.044	1.660 *	0.045	1.700 *
YD	Included		Included	
ID	Included		Included	
F-value	3.62 ***		3.76 ***	
Adj.R^2	7.16%		7.52%	

Panel B: Non-Chaebol

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	***t*-Value**	**Coefficient**	***t*-Value**
Intercept	−0.633	−5.180 ***	−0.644	−5.170 ***
GOV	−0.003	−0.860	−0.007	−0.600
MB	−0.005	−1.260	−0.004	−1.200
SIZE	0.012	3.490 ***	0.012	3.410 ***
QUICK	−0.013	−2.240 **	−0.013	−2.260 **
LEV	−0.217	−10.130 ***	−0.217	−10.120 ***
TA	0.048	2.070 **	0.048	2.060 **
ROA	0.149	3.650 ***	0.149	3.630 ***
LOSSDUM	−0.071	−8.110 ***	−0.071	−8.080 ***
STD_OCF	0.046	0.400	0.044	0.380
STD_SALES	0.009	0.510	0.009	0.530
YD	Included		Included	
ID	Included		Included	
F-value	15.27 ***		15.25 ***	
Adj.R^2	12.94%		12.92%	

Note: This table reports the effect of a chaebol group on the relationship between corporate governance and labor investment efficiency. ***, **, and * represent significance at the 0.01, 0.05, and 0.1 level, respectively. See Abbreviations for variable definitions.

Table 10 shows the results that verified the effect of whether the relevant firm belongs to a chaebol or not on the relationship between corporate governance and labor investment efficiency for the underinvestment sample. The results show that in the case of companies belonging to a chaebol group, the better the corporate governance, the higher the labor investment efficiency. On the other hand, there was no statistical significance in the case of companies not belonging to a chaebol group.

Table 10. The effect of a chaebol group on the relationship between corporate governance and labor investment efficiency (underinvestment sample).

$$LEI_{it+1} = \beta_0 + \beta_1 GOV_{it} + \beta_2 MB_{it} + \beta_3 SIZE_{it} + \beta_4 QUICK_{it} + \beta_5 LEV_{it} + \beta_6 TA_{it} + \beta_7 ROA_{it} + \beta_8 LOSSDUM_{it} + \beta_9 STD_OCF_{it} + \beta_{10} STD_SALES_{it} + \sum YD + \sum ID + \varepsilon_{i,t}$$

Panel A: Chaebol

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	*t*-Value	Coefficient	*t*-Value
Intercept	−2.645	−5.530 ***	−2.062	−3.940 ***
GOV	0.026	2.030 **	0.183	2.880 ***
MB	−0.022	−0.910	−0.021	−0.900
SIZE	0.047	2.430 **	0.030	1.540
QUICK	−0.065	−1.710 *	−0.070	−1.760 *
LEV	−0.634	−3.510 ***	−0.626	−3.500 ***
TA	−0.235	−1.510	−0.217	−1.400
ROA	−0.461	−1.210	−0.426	−1.140
LOSSDUM	−0.039	−0.510	−0.039	−0.510
STD_OCF	0.500	−0.520	0.517	0.540
STD_SALES	0.473	3.450 ***	0.459	3.370 ***
YD	Included		Included	
ID	Included		Included	
F-value	9.45 ***		9.87 ***	
Adj.R^2	28.24%		29.23%	

Panel B: Non-Chaebol

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	*t*-Value	Coefficient	*t*-Value
Intercept	−0.899	−2.240 **	−1.144	−2.680 ***
GOV	−0.009	−0.600	−0.090	−1.370
MB	−0.038	−2.730 ***	−0.036	−2.570 **
SIZE	−0.005	−0.300	0.003	0.180
QUICK	−0.037	−1.860 *	−0.036	−1.850 *
LEV	−0.727	−6.960 ***	−0.741	−7.100 ***
TA	−0.011	−0.100	−0.006	−0.060
ROA	−0.530	−3.590 ***	−0.532	−3.610 ***
LOSSDUM	−0.005	−0.100	−0.001	−0.030
STD_OCF	0.185	0.380	0.199	0.410
STD_SALES	0.255	3.710 ***	0.254	3.710 ***
YD	Included		Included	
ID	Included		Included	
F-value	21.32 ***		21.46 ***	
Adj.R^2	27.19%		27.33%	

Note: This table reports the effect of a chaebol group on the relationship between corporate governance and labor investment efficiency. ***, **, and * represent significance at the 0.01, 0.05, and 0.1 level, respectively. See Abbreviations for variable definitions.

4.4. Additional Analysis

4.4.1. Profit and Loss Firms

In terms of the relevance of accounting information, the effect is different depending on whether the firm reports a profit or a loss. So, in previous studies, profit and loss firms are examined separately [24–26]. Table 11 provides the results of retesting H1 by dividing the sample into profit and loss firms. The results show that statistical significance appears only in profit firms. This suggests that the relationship between corporate governance and labor investment efficiency may be different depending on profitability.

Table 11. The effect of loss or profit on the relationship between corporate governance and labor investment efficiency.

$$LEI_{it+1} = \beta_0 + \beta_1 GOV_{it} + \beta_2 MB_{it} + \beta_3 SIZE_{it} + \beta_4 QUICK_{it} + \beta_5 LEV_{it} + \beta_6 TA_{it} + \beta_7 ROA_{it} + \beta_8 LOSSDUM_{it} + \beta_9 STD_OCF_{it} + \beta_{10} STD_SALES_{it} + \sum YD + \sum ID + \varepsilon_{i,t}$$

Panel A: Profit firm (net income > 0)

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	***t*-Value**	**Coefficient**	***t*-Value**
Intercept	−1.427	−10.710 ***	−1.368	−10.050 ***
GOV	0.015	2.190 **	0.025	1.740 *
Controls	Included		Included	
YD	Included		Included	
ID	Included		Included	
F-value	106.83 ***		106.61 ***	
Adj.R^2	39.05%		39.00%	

Panel B: Loss firm (net income < 0)

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	***t*-Value**	**Coefficient**	***t*-Value**
Intercept	−1.371	−5.240 ***	−1.272	−4.300 ***
GOV	−0.010	−0.830	0.017	0.380
Controls	Included		Included	
YD	Included		Included	
ID	Included		Included	
F-value	17.00 ***		16.97 ***	
Adj.R^2	24.50%		24.47%	

Note: This table reports the effect of loss or profit on the relationship between corporate governance and labor investment efficiency. ***, **, and * represent significance at the 0.01, 0.05, and 0.1 level, respectively. See Abbreviations for variable definitions.

4.4.2. Firm Size

Table 12 is the result of re-testing H1 on the relationship between corporate governance and labor investment efficiency by dividing groups based on firm size. Previous studies report that corporate governance is different depending on the firm size [27]. So, based on the median, the companies were divided into large and small groups. In the case of a large group, corporate governance and labor investment efficiency showed a positive relationship. On the other hand, in the case of a small group, there was no statistical significance. This means that information asymmetry differs due to the firm size. This suggests that the establishment of a sound governance structure can reduce information asymmetry between managers and investors, which can increase labor investment efficiency.

Table 12. The effect of firm size on the relationship between corporate governance and labor investment efficiency.

$$LEI_{it+1} = \beta_0 + \beta_1 GOV_{it} + \beta_2 MB_{it} + \beta_3 SIZE_{it} + \beta_4 QUICK_{it} + \beta_5 LEV_{it} + \beta_6 TA_{it} + \beta_7 ROA_{it} + \beta_8 LOSSDUM_{it} + \beta_9 STD_OCF_{it} + \beta_{10} STD_SALES_{it} + \sum YD + \sum ID + \varepsilon_{i,t}$$

Panel A: firm size > median

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	***t*-Value**	**Coefficient**	***t*-Value**
Intercept	−143.991	−8.330 ***	−145.532	−6.550 ***
GOV	1.967	3.010 **	4.242	2.070 **
Controls	Included		Included	

Table 12. *Cont.*

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	***t*-Value**	**Coefficient**	***t*-Value**
YD	Included		Included	
ID	Included		Included	
F-value	101.88 ***		73.44 ***	
Adj.R^2	50.58%		41.34%	
Panel B: firm size < median				
Variables	**Model 1 = Continuous variable (GOV)**		**Model 2 = Dummy variable (GOV)**	
	Coefficient	***t*-Value**	**Coefficient**	***t*-Value**
Intercept	−131.522	−4.080 ***	−117.599	−3.280 ***
GOV	0.221	0.300	−0.888	−0.270
Controls	Included		Included	
YD	Included		Included	
ID	Included		Included	
F-value	70.17 ***		57.01 ***	
Adj.R^2	41.28%		35.21%	

Note: This table reports the effect of firm size on the relationship between corporate governance and labor investment efficiency. *** and ** represent significance at the 0.01 and 0.05 level, respectively. See Abbreviations for variable definitions.

4.5. Robustness Analysis

4.5.1. Controlling for Firm Characteristic and Time Characteristic: Fixed-Effect Model

A fixed-effect model based on panel data analysis was used to alleviate heteroscedasticity that may appear in cross-sectional data and series correlation between time series data. Table 13 shows the results of the test for whether the application of the fixed-effect model is appropriate. As a result of the test, the null hypothesis is rejected, so it is appropriate to use a fixed-effect model. Table 14 shows the results of regression analysis using the fixed-effect model. As a result of the analysis, the hypothesis was supported, even after controlling for company and time characteristics.

Table 13. The test for model's goodness of fit.

Model	LM Test		Hausman Test		F Test	
	g Statistics	***p*-Value**	**m Statistics**	***p*-Value**	**F Value**	***p*-Value**
	1980.26 ***	0.000	74.85 ***	0.000	37.58 ***	0.000

Note: This table reports the test results for Model's goodness of fit. *** represents significance at the 0.01 level.

Table 14. The relationship between corporate governance and labor investment efficiency (full sample): fixed-effect model.

$$LEI_{it+1} = \beta_0 + \beta_1 GOV_{it} + \beta_2 MB_{it} + \beta_3 SIZE_{it} + \beta_4 QUICK_{it} + \beta_5 LEV_{it} + \beta_6 TA_{it} + \beta_7 ROA_{it} + \beta_8 LOSSDUM_{it} + \beta_9 STD_OCF_{it} + \beta_{10} STD_SALES_{it} + \eta_{it} + \lambda_{it} + \varepsilon_{i,t}$$

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	***t*-Value**	**Coefficient**	***t*-Value**
Intercept	−0.461	−2.130 **	−0.274	−1.220 ***
GOV	0.307	4.690 ***	0.080	4.050 ***
Controls	Included		Included	
F-value	15.51 ***		14.98 ***	
Adj.R^2	3.71%		3.59%	

Note: This table reports the relationship between corporate governance and labor investment efficiency for the full sample using a fixed-effect model. *** and ** represent significance at the 0.01 and 0.05 level, respectively. See Abbreviations for variable definitions.

4.5.2. Controlling for First-Order Autocorrelation: Prais–Winsten Test

In general, when time series data are used in a regression model, the assumption that there should be no correlation between error terms is highly likely to be violated. Thus, autocorrelation exists in the error term. If autocorrelation exists, a problem arises in estimating the standard error of the estimation coefficient. In Table 15, the Durbin–Watson test was performed to detect autocorrelation, and in Table 16, the empirical results of controlling autocorrelation are presented. As a result of the Durbin–Watson test, there was a positive correlation. As a result of empirical analysis controlling autocorrelation, the hypothesis was supported.

Table 15. The test for first-order autocorrelation.

Model	Durbin–Watson Test	
	Durbin-Watson Statistic	***p*-Value**
	1.088	<0.0001

This table reports the test results for the Durbin–Watson test. Durbin–Watson statistic is close to 0, indicating a positive autocorrelation.

Table 16. The relationship between corporate governance and labor investment efficiency (full sample): Prais–Winsten test.

$$LEI_{it+1} = \beta_0 + \beta_1 GOV_{it} + \beta_2 MB_{it} + \beta_3 SIZE_{it} + \beta_4 QUICK_{it} + \beta_5 LEV_{it} + \beta_6 TA_{it} + \beta_7 ROA_{it} + \beta_8 LOSSDUM_{it} + \beta_9 STD_OCF_{it} + \beta_{10} STD_SALES_{it} + \eta_{it} + \lambda_{it} + \varepsilon_{i,t}$$

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	***t*-Value**	**Coefficient**	***t*-Value**
Intercept	0.115	0.710	0.165	0.940
GOV	0.012	2.120 **	0.024	1.780 *
Controls	Included		Included	
F-value	17.70		11.45	
Adj.R^2	4.55%		3.25%	

Note: This table reports the relationship between corporate governance and labor investment efficiency for the full sample using the Prais–Winsten test. ** and * represent significance at the 0.05 and 0.1 level, respectively. See Abbreviations for variable definitions.

4.5.3. Controlling for Heteroscedasticity

If heteroscedasticity exists in the error term, the standard error estimate of the estimation coefficient will not be correct. Table 17 presents the test results for the existence of heteroscedasticity. As a result of the test, it can be said that heteroscedasticity exists because the null hypothesis is rejected. Table 18 presents the results of empirical analysis controlling for heteroscedasticity. As a result of empirical analysis, the hypothesis was supported even after controlling for heteroscedasticity.

Table 17. The test for heteroscedasticity.

Model	Breusch–Pagan Test		White Test	
	χ^2	***p*-Value**	χ^2	***p*-Value**
	122.45 ***	0.000	339.54 ***	0.000

Note: This table reports the test results for heteroscedasticity. *** represents significance at the 0.01 level.

Table 18. The relationship between corporate governance and labor investment efficiency (full sample): controlling for heteroscedasticity.

$$LEI_{it+1} = \beta_0 + \beta_1 GOV_{it} + \beta_2 MB_{it} + \beta_3 SIZE_{it} + \beta_4 QUICK_{it} + \beta_5 LEV_{it} + \beta_6 TA_{it} + \beta_7 ROA_{it} + \beta_8 LOSSDUM_{it} + \beta_9 STD_OCF_{it} + \beta_{10} STD_SALES_{it} + \eta_{it} + \lambda_{it} + \varepsilon_{i,t}$$

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	*t*-Value	Coefficient	*t*-Value
Intercept	0.261	1.760 *	−0.274	−1.220 ***
GOV	0.004	1.870 *	0.080	4.050 ***
Controls	Included		Included	
Prob > F	0.000		0.000	
R^2	5.65%		10.62%	

Note: This table reports the relationship between corporate governance and labor investment efficiency for the full sample, controlling for heteroscedasticity. *** and * represent significance at the 0.01 and 0.1 level, respectively. See Abbreviations for variable definitions.

4.5.4. Controlling for Endogeneity: System GMM

Hypotheses were tested through the system GMM to control for endogeneity. A GMM using the lagged value of the difference as an additional variable after differentiating the dependent variable is called a system GMM. System GMM is known to be a more efficient estimator than differential GMM because it uses additional instrumental variables. Table 19 shows the results of empirical analysis using GMM. As a result of the analysis, the hypothesis was supported even after controlling for endogeneity.

Table 19. The relationship between corporate governance and labor investment efficiency (full sample).

$$LEI_{it+1} = \beta_0 + \beta_1 LEI_{it} + \beta_2 GOV_{it} + \beta_3 MB_{it} + \beta_4 SIZE_{it} + \beta_5 QUICK_{it} + \beta_6 LEV_{it} + \beta_7 TA_{it} + \beta_8 ROA_{it} + \beta_9 LOSSDUM_{it} + \beta_{10} STD_OCF_{it} + \beta_{11} STD_SALES_{it} + \eta_{it} + \lambda_{it} + \varepsilon_{i,t}$$

Variables	Model 1 = Continuous Variable (GOV)		Model 2 = Dummy Variable (GOV)	
	Coefficient	z-Value	Coefficient	z-Value
Intercept	−10.610	−10.040 ***	−10.003	−9.440 ***
LEI	−0.170	−12.880 ***	−0.167	−12.660 ***
GOV	0.066	6.930 ***	0.161	5.380 ***
Controls	Included		Included	
wald χ^2	555.63 ***		535.75 ***	
Sargan test	1301.37 ***		1313.42 ***	

Note: This table reports the relationship between corporate governance and labor investment efficiency for the full sample, controlling for endogeneity. *** represents significance at the 0.01 level. See Abbreviations for variable definitions.

5. Conclusions

This study investigated the effect of corporate governance on labor investment efficiency using 5178 firm-year samples from companies listed on the stock market over the period from 2011 to 2019. In addition, the relationship between corporate governance and labor investment efficiency according to whether the company belongs to a chaebol group was examined. Corporate governance was measured using KCGS's corporate governance ratings, and labor investment efficiency was measured by applying Pinnuck and Lillis's (2007) [23] model.

The causes of labor investment inefficiency are information asymmetry and adverse selection, due to the incompleteness of the capital market that makes managers make labor investment decisions that involve overinvestment or underinvestment. Many efforts have been made in previous studies to identify the causes of labor investment inefficiency and mechanisms to alleviate labor investment inefficiency. Labor investment inefficiency can be improved by improving the quality of accounting information [11,14] and managers's ability [17,18]. This study tried to verify whether labor investment inefficiency due to information asymmetry is improved by excellent corporate governance.

The results of analysis in this study are as follows. First, in the case of the entire sample, the relationship between corporate governance and labor investment efficiency was significant in the positive (+) direction. This means that the better the corporate governance, the more efficient the labor investment. That is, there is an empirical result indicating that a company with a sound governance structure is making effective labor investment. The samples were divided into overinvestment samples and underinvestment samples, and the relationship between corporate governance and labor investment efficiency was analyzed separately with the two different samples. According to the results, the positive relationship between corporate governance and labor investment efficiency was significant only in the case of underinvestment samples. It can be inferred that the empirical result indicating that corporate governance and labor investment efficiency have a positive relationship was due to underinvestment. According to the results of analysis conducted with samples divided according to whether the company belongs to a chaebol group or not, the positive relationship between corporate governance and labor investment efficiency was more statistically significant in the case of companies belonging to a chaebol group.

In this study, it was found that for the period after the introduction of K-IFRS, corporate governance played the role of a determinant of labor investment efficiency and a mechanism for efficient capital management. It was shown that the establishment of a sound corporate governance can affect managers's decision-making on labor cost management to improve labor investment efficiency. The limitations of this study are that there may be a problem of omitted variables affecting labor investment efficiency and labor investment efficiency measurement errors. Future studies that consider the relationship between cost stickiness and labor investment efficiency, and studies on labor investment efficiency according to characteristics by company and characteristics by industry are expected.

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Abbreviations

Dependent Variables	
LEI	labor investment efficiency, the absolute value of the residual estimated by Pinnuck and Lillis's (2007) model;
Explanatory Variables	
GOV	corporate governance evaluation grade from KCGS;
CHAEBOL	an indicator variable that if a firm belongs to a large family-owned business conglomerate (chaebol group) it takes the value of 1, and 0 otherwise;
Control variables	
MB	the market value of equity divided by the book value of equity;

SIZE	the natural log of total assets for fiscal year *t* of firm *i*;
QUICK	the value of cash and short-term investment assets divided by current liabilities;
LEV	leverage, total debts divided by total assets;
TA	the ratio of tangible assets, which is the value of tangible assets divided by total assets;
ROA	the value of the current net income divided by total assets;
LOSSDUM	a loss dummy variable, which takes a value of 1 if a firm reports a loss (net income < 0), and 0 otherwise;
STD_OCF	the standard deviation of the value of operating cash flow in the cash flow statement for 5 years from period t − 4 to period t divided by the average total assets;
STD_SALES	the standard deviation of sales for 5 years from period t − 4 to period t divided by average total assets free cash flow/total assets;
YD	year dummy;
ID	industry dummy.

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