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A Study on Earnings Management of Zero-leverage Firms from the Perspective of Financial Constraints

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ABSTRACT

Purpose: This study verifies the debt covenant hypothesis by exploring the earnings management of zero-leverage firms that are not constrained by debt covenants. Furthermore, this study investigates whether the earnings management of zero-leverage firms varies depending on financial constraints, whether a consecutive zero-leverage period is associated with the level of earnings management, and whether this association varies depending on financial constraints.

Design/methodology/approach: Using a sample of 5,669 firm-year data of listed firms in the securities market in South Korea from 2011 to 2019, this study conducts multiple regression analysis to examine the earnings management of zero-leverage firms from the perspective of financial constraints. In the analysis, two types of earnings management behaviors (i.e., accrual-based and real activities earnings management) are considered.

Findings: The findings of this study show that zero-leverage firms are less likely to manage earnings than leveraged firms. Moreover, the longer the zero-leverage period, the lower the level of earnings management. However, these findings disappear when the analysis is conducted for firms with financial constraints. They indicate that a zero-leverage policy or a consecutive zero-leverage period is related to earnings management and that this relation varies depending on financial constraints.

Research limitations/implications: This study provides insight into the attributes of zero-leverage firms by analyzing their earnings management. The findings of this study provide compelling evidence that zero-leverage firms are not homogeneous and are significantly distinct according to their status with or without financial constraints. **Originality/value:** This is the first study to test the debt covenant hypothesis by investigating the earnings management of zero-leverage firms. This study also extends the literature by examining the financing decisions that maintain zero leverage for a long period.

Keywords: Zero-leverage, Leverage, Financial constraints, Debt covenants, Earnings management

I. Introduction

According to the traditional theory of capital structure, firms can maximize their value by implementing an optimal capital structure through debt financing, as they can benefit from tax-deductible interest payments in the presence of corporate taxes (Modigliani and Miller, 1963). However, unlike this theory, numerous firms have been reported to have given up the tax benefits of debt and starkly avoided debt financing.¹⁾

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In the United States, an average of 10% of listed non-financial firms had zero debt from 1962 to 2009, whereas 22% had a book

These zero-leverage firms, which are not restrained by debt covenants, seem to be suitable for testing the debt covenant hypothesis. This hypothesis states that firms that are close to violating debt covenants make accounting choices to reduce the likelihood of default (Watts and Zimmerman, 1986). In this regard, zero-leverage firms are expected to less likely engage in earnings management compared with leveraged firms because there is no risk of violating debt covenants. However, considering financial constraints, such anticipation of earnings management for zero-leverage firms may not be valid.

Zero-leverage firms are not homogeneous and can be classified into two groups, namely, firms with and without financial constraints (Dang, 2013). Zero-leverage firms without financial constraints strategically avoid using debt to maintain financial flexibility and mitigate investment distortions. By contrast, zero-leverage firms with financial constraints inevitably have no debt owing to limited access to debt markets. For financially constrained zero-leverage firms, there would be no incentives to manage earnings under the debt covenant hypothesis, but they are likely to manage earnings to improve the chances of obtaining external finance in the future. Therefore, the extent of earnings management of zero-leverage firms is expected to vary depending on financial constraints.

This study analyzes the earnings management of zero-leverage firms in consideration of financial constraints using 5,669 firm-year data of listed firms in the securities market in South Korea from 2011 to 2019. In the analysis, two types of earnings management behaviors (i.e., accrual-based and real activities earnings management) are considered. The result of analyzing the total sample indicates that zero-leverage firms engage less in earnings management than leverage firms. However, a different result is derived when the total sample is divided into groups of firms with and without financial constraints. For the group without financial constraints, zero-leverage firms engage less

in earnings management than leveraged firms, in accordance with the result mentioned above. For the group with financial constraints, zero-leverage firms and leveraged firms show insignificant differences in their level of earnings management. This study also examines the relation between a consecutive zeroleverage period and earnings management and whether this relation varies depending on financial constraints. As firms that strategically maintain a zero-leverage policy for a longer time can be unlevered based on higher levels of internal funds and financial flexibility. they are expected to have lower incentives to manage earnings. However, for firms with financial constraints, the incentives to manage earnings would not be weakened because they have difficulties obtaining external finance for a long period. Therefore, an empirical question is whether firms with a longer zero-leverage period are less likely to engage in earnings management, even when they are financially constrained.

Results show that a longer period for zero leverage leads to a decrease in the level of earnings management. However, a different result is derived when the total sample is divided into a group of firms with financial constraints and one without. For the latter, a longer period for zero leverage leads to a decrease in the level of earnings management, in accordance with the aforementioned result. For the former, a consecutive zero-leverage period is irrelevant to the level of earnings management.

This study contributes to the literature in several ways. First, this is the first study to test the debt covenant hypothesis by investigating the earnings management of zero-leverage firms. The effect of debt financing on earnings management can be verified precisely by examining zero-leverage firms that are not constrained by debt covenants. The findings of this study show that debt restrictions can motivate firms' earnings management behavior, thereby supporting the debt covenant hypothesis. Second, this study provides insight into the attributes of zero-leverage firms by analyzing their earnings management. The findings of this study provide compelling evidence that zero-leverage firms are not homogeneous and are significantly distinct according

leverage ratio of less than 5% (Strebulaev and Yang, 2013). In South Korea, an average of 9.5% of listed non-financial firms had zero debt from 2000 to 2012, whereas 22% had a book leverage ratio of less than 5% (Hwang and Lee, 2016).

to their status with or without financial constraints; accordingly, financial constraints should be considered when understanding the attributes of zero-leverage firms. Lastly, this study extends the literature by examining the financing decisions that maintain zero leverage for a long period. The findings show that a consecutive zero-leverage period attributable to firms' strategic decisions is related to the level of earnings management, but this relation varies depending on financial constraints. This study has important implications for managers, auditors, regulators, and capital market participants who are interested in zero-leverage firms.

The remainder of this paper is organized as follows. Section 2 describes the relevant literature and outlines the hypotheses. Section 3 introduces the study's research method and model used to test the hypotheses. Section 4 presents the empirical results. Finally, Section 5 concludes the study.

II. Literature Review and Hypothesis Development

A. Literature Review

1. Zero-leverage firms

According to Modigliani and Miller's (1963) capital structure theory, firms can maximize their value by implementing an optimal capital structure through debt financing, which has the benefits of tax savings resulting from interest deductions from taxable earnings. However, Graham (2000) finds that firms tend to use debt conservatively rather than at optimal debt levels in consideration of tax benefits. He also reveals that under-levered firms are large, profitable, liquid, in stable industries, and face low ex-ante costs of distress. Focusing on extreme debt conservatism, Strebulaev and Yang (2013) report that an average of 10% of listed non-financial firms in the United States had no debt and 22% had a book leverage ratio of less than 5% from 1962 to 2009. They find

that zero-leverage firms tend to have higher marketto-book ratios and higher cash balances, be more profitable, and pay more taxes and dividends. Dang (2012) analyzes listed firms in the United Kingdom from 1980 to 2007 and reported that approximately 12% of them had zero debt. Moreover, he notes that zero-leverage firms are inconsistent with each other and can be classified into two groups according to their dividend-paying status. That is, for firms in the group that pay dividends, the zero-leverage policy is driven by strategic considerations to maintain financial flexibility and mitigate investment distortions. Meanwhile, for firms in the group that do not pay dividends, zero-leverage is a consequence of limited access to debt markets for firms facing high levels of financial constraints. Byoun and Xu (2013) find that zero-leverage firms face significant borrowing constraints and that their dividend policies reflect the efforts to retain the accessibility of equity financing. They suggest that small zero-leverage firms with limited access to credit markets pay high dividends for good reputations in equity markets, whereas their large counterparts pay high dividends to reduce the agency costs of free cash flow. Takami (2016) explores whether the holding of zero leverage is a common phenomenon among Japanese firms and finds that less than 5% of public manufacturing firms in Japan had zero debt from 1999 to 2009. Based on panel data on 822 Japanese firms, he suggests that financial constraints and bank shareholdings are factors that inhibit firms from holding zero leverage. Hwang and Lee (2016) analyze a sample of listed non-financial firms in Korea from 2000 to 2012. They document that an average of 9.5% of firms having zero debt and 22% having a book leverage ratio of less than 5%. They find that zero-leverage firms are smaller, with more cash flow, lesser tangible assets, lower financial distress, and a higher dividend payout ratio compared with levered firms. Additionally, they find that the firm value of zero-leverage firms is higher than that of levered firms and that zeroleverage policy for at least three consecutive years increases firm value.

Recently, Saona et al. (2020) examine the determinants

of zero-leverage at the firm and country levels using a comprehensive sample of firms in 47 countries from 1996 to 2014. As for the firm-level determinants, they find that zero-leverage firms tend to be small, have a low level of tangible assets and depreciation, have a low proportion of growth opportunities and insider ownership, have a strong liquidity position, and be profitable. With regard to the country-level factors, they find that good governance indicators or economic recession increase the probability of having no debt in the capital structure. By investigating the performance of portfolios of debt-free firms, Zaher (2010) finds that the portfolios of these firms generate higher returns over long and short periods compared with those of their leverage counterparts. The findings show that investors tend to reward firms with no debt and penalize those with a high level of debt. Lee and Moon (2011) also find that zero-leverage firms perform better over the long run, indicating that the persistent lack of debt in the capital structure appears to be an important determinant of stock returns. As described above, existing literature mainly focuses on the determinants of zero-leverage firms and their performance in the stock market. This study extends prior studies by exploring a new dimension of zeroleverage firms such as the quality of financial reporting.

2. Earnings management in the context of the debt covenant hypothesis

Watts and Zimmerman's (1986) debt covenant hypothesis states that firms with a higher debt ratio are more likely to select income-increasing accounting procedures to avoid being close to debt covenant constraints. The debt covenant hypothesis has been tested in numerous prior studies, but the results are mixed. Based on a random sample of 83 firms, Press and Weintrop (1990) find that accounting choice is positively correlated with leverage as a measure of proximity to covenant constraints. Similarly, Ayres (1986), Bowen et al. (1981), Daley and Vigeland (1983), DeFond and Jiambalvo (1991), Dhaliwal (1980), Hagerman and Zmijewski (1979), and Zimmer (1986) provide evidence that supports the debt covenant hypothesis. By analyzing a sample of 94 firms that violated debt covenants, Defond and Jiambalvo (1994) find that the abnormal accruals of these firms are significantly positive in the year prior to violation, indicating that firms that are close to debt covenant violation engage in the positive manipulation of income. Sweeny (1994) examines the accounting choices of 130 firms that report debt covenant violations and find that those approaching violations of accountingbased restrictions in debt agreements are more likely to make income-increasing discretionary accounting changes compared with control firms. However, Healy and Palepu (1990) find no evidence of earnings management based on a sample of 126 firms that are close to violating debt constraints from 1981 to 1985. DeAngelo et al. (1994) investigates the accounting choices of 76 troubled firms and argue that firms' accounting choices primarily reflect the recognition of their financial difficulties rather than attempts to inflate earnings to avoid debt covenant violations.

In Korea, research on earnings management with respect to the debt covenant hypothesis has been conducted. Using a sample of 560 Korean listed firms from 1993 to 2002, Choi and Kim (2005) find that earnings management measured by discretionary accruals is more prevalent in firms with higher debt ratios. Choi (2008) examines 502 Korean listed firms from 1998 to 2006 and reveals a positive relation between the debt ratio and discretionary accruals, suggesting that firms have income-increasing incentives with debt ratios. However, Nah and Choi (2000) present an opposite result using a sample of 44 troubled firms listed in Korean stock markets from 1990 to 1996: debt ratio is negatively related to discretionary accruals. Existing literature provides inconsistent empirical evidence regarding the debt covenant hypothesis. In contrast to prior literature, this study provides compelling evidence on the relationship between debt financing and earnings management by analyzing the zero-leverage firms that are not constrained by debt covenants.

B. Hypothesis Development

The capital structure of firms affects management's attitudes toward accounting choices (Dhaliwal, 1980). According to the debt covenant hypothesis, firms with higher debt ratios are more likely to implement income-increasing accounting procedures to avoid being close to debt covenant violations (Watts and Zimmerman, 1986). Failure to comply with accounting covenants in debt agreements could result in an increase in interest rates on loans and/or demand for partial or full repayment (Beneish and Press, 1993). As firms with higher debt ratios are more constrained by their debt covenants, they are more likely to adopt accounting methods that increase earnings to reduce refinancing and restructuring costs. In this respect, zero-leverage firms in the absence of debt covenant restrictions are expected to have lower incentives to engage in earnings management compared with leveraged firms. The following hypothesis is thus formulated:

Hypothesis 1-1: Zero-leverage firms are less likely to manage earnings compared with leveraged firms.

The capital structure of firms is determined by not only its demand for capital but also its ability to obtain external financing (Dang, 2013). In capital markets with imperfect information, potential borrowers face credit rationing, and some of them have been denied loans (Stiglitz and Weiss, 1981). Accordingly, financial constraints are among the crucial factors in understanding the zero-leverage phenomenon. Zero-leverage can be a strategic decision made by a firm, but it can also be a consequence of financial constraints. In other words, zero-leverage firms without financial constraints can access debt markets but do not use debt for strategic purposes to mitigate underinvestment incentives and preserve financial flexibility. Meanwhile, zero-leverage firms with financial constraints inevitably have no debt because of their lack of access to external finance. Hence, they have incentives to make earnings look good in an attempt to be better evaluated in the capital market and increase funding opportunities in the future. In

summary, when there are financial constraints, zeroleverage firms are unlikely to engage in earnings management attributed to debt covenants, but, simultaneously, they are likely to manage earnings by considering future external financing. Therefore, the empirical question is whether financially constrained zero-leverage firms are less likely to manage earnings than their leveraged counterparts. To investigate whether the earnings management level of zero-leverage firms varies depending on financial constraints, the study proposes the following hypothesis:

Hypothesis 1-2: The earnings management level of zero-leverage firms varies depending on financial constraints.

A substantial number of firms has been reported to have maintained a zero-leverage policy in the long term (Strebulaev and Yang, 2013). Hwang and Lee (2016) find that the longer a firm maintains a zeroleverage policy, the higher its corporate value. They suggest that firms that follow a zero-leverage policy for at least three consecutive years are highly evaluated in the stock market because they are likely to use no debt for strategic purposes based on sufficient cash flows and high financial flexibility. If firms with a longer zero-leverage period have a higher level of cash holdings and financial flexibility, they would have lower incentives to manage earnings at the risk of detection. Therefore, the hypothesis is stated as follows:

Hypothesis 2-1: Firms with a longer zero-leverage period are less likely to manage earnings.

However, as noted above, for some firms, zero leverage may not be the result of a strategic financing decision but, rather, financial constraints. When firms face difficulties in obtaining external financing for a long period, they are more likely to have incentives to manage earnings because they need to be better assessed in the capital market to mitigate financial difficulties. In this case, the relation between a consecutive zero-leverage period and the level of earnings management may differ from what is expected in Hypothesis 2-1. To determine how a consecutive zeroleverage period is related to the level of earnings management in consideration of financial constraints, the study proposes the following hypothesis:

Hypothesis 2-2: The relation between a consecutive zero-leverage period and the level of earnings management varies depending on financial constraints.

III. Research Design

A. Data Collection

In this study, firms listed on the Korea Stock Exchange and satisfied the following conditions are selected as the sample:

- Firms listed in the stock market, except those in the financial industry, from 2011 and 2019
- Firms whose necessary financial data can be collected from the TS 2000 database
- 3) Firms without impaired capital

Firms in the financial industry are excluded in the process of selecting the final sample because they have different financial statement forms and accounting rules and thus cannot be compared with those in other industries. Firms with impaired capital are also excluded from the sample to prevent financial ratio distortion that might occur because of the aggravation of financial structure. Table 1 lists the sample selection procedures used in this study. Among 6,224 firm-year data of listed non-financial firms in securities markets, 337 that do not have

Table 1. Sample selection procedure

Procedures	No. of Firm
Observations with reporting data in TS2000	6 224
excluding firms in the financial industry	
Less:	
Observations without financial data	(-) 337
Observations with impaired capital	(-) 218
Final sample firm-years	5,669

financial data between 2011 and 2019 and 218 with impaired capital are excluded. These procedures result in the final sample of 5,669 firm-years.

B. Model Specification

This study develops the following Model 1 to investigate whether zero-leverage firms are less likely to manage earnings compared with leveraged firms. The main explanatory variables are dummy variables for zero-leverage firms (ZL) and almost zero-leverage firms (AZL). In this study, a firm is defined as a zeroleverage firm when the sum of its short-term financial liabilities (i.e., short-term debt financing and liquid long-term liabilities) and long-term financial liabilities (i.e., long-term debt financing and bonds) for the year is zero. A firm is defined as an almost zero-l everage firm when its book leverage ratio (i.e., the sum of short-term and long-term financial liabilities/ total assets) is 1% or less. There are two types of a level of earnings management, a dependent variable: earnings management through discretionary accruals (DA) and real activities (REM) (Dechow et al., 1995; Cohen. et al., 2008). To control for other factors that could influence earnings management, the following are included in the model: firm size (SIZE), debt ratio (LEV), return on assets (ROA), operating cash flow (OCF), sales growth (GROWTH), market-to-book value ratio (MTB), dummy variable of operating loss (LOSS), stock ownership ratio of the largest shareholder (OWN), and stock ownership ratio of foreign investors (FOR). In addition, year and industry dummies are added to control for the effects by year and industry. If the level of earnings management of zero-leverage firms is lower than that of leveraged firms, the coefficient (β_1) of ZL is expected to have a negative value.

To verify Hypothesis 1-2, the total sample is divided into two groups based on whether there are financial constraints: (1) a group of firms with financial constraints and (2) a group of firms without financial constraints. In this study, the status of firms with or without financial constraints is determined based on dividend policies in accordance with previous studies (Almeida et al., 2004; Fazzari et al., 1988; Byoun and Xu, 2012; Strebulaev and Yang, 2013). That is, firms that pay dividends are defined as firms without financial constraints, and those that do not pay dividends are defined as firms with financial constraints. Then, the regression Model 1 is estimated for each group. If the earnings management level of zero-leverage firms varies depending on financial constraints, it is expected that the coefficient β_1 of ZL in the group with financial constraints would show a significant difference from the coefficient β_1 of ZL in the group without financial constraints.

$$DA (REM) = \beta_0 + \beta_1 ZL (AZL) + \beta_2 SIZE + \beta_3 LEV + \beta_4 ROA + \beta_5 OCF + \beta_6 GROWTH + \beta_7 MTB. + \beta_8 LOSS + \beta_9 OWN + \beta_{10} FOR + \beta_{11} \Sigma YR + \beta_{12} \Sigma IND + \varepsilon (Model 1)$$

- DA: discretionary accruals estimated by the modified Jones model (Dechow et al., 1995)
- *REM*: the sum of the standardized three proxies of real earnings management (Cohen et al., 2008)
- *ZL*: dummy variable that equals 1 if the firm has no debt, and 0 otherwise
- AZL: dummy variable that equals 1 if the firm's book leverage ratio is 1% or lower, and 0 otherwise
- SIZE: log of total assets
- LEV: total liabilities divided by equity
- ROA: return on assets
- OCF: operating cash flows scaled by total assets
- GROWTH: change in sales divided by previous year's sales
- MTB: market-to-book value ratio
- LOSS: 1 if the operating income is negative, and 0 otherwise
- *OWN*: stock ownership ratio of the largest shareholder *FOR*: stock ownership ratio of foreign investors *YR*: year indicators
- IND: industry indicators
- *FD*: financial distress; 1 if a firm does not pay dividends, and 0 otherwise

Next, this study verifies Hypothesis 2-1 by estimating Model 2, in which the consecutive years that the firm maintains a zero-leverage policy (*CZL*) or almost zero-leverage policy (*CAZL*) is employed as the explanatory variable. If firms with a longer zero-leverage period are less likely to engage in earnings management, the coefficient (β_1) of *CZL* is expected to have a negative value.

To verify Hypothesis 2-2, the total sample is divided into groups of firms with and without financial constraints. Then, the regression Model 2 is estimated for each group. If the relation between a consecutive zero-leverage period and the level of earnings management varies depending on financial constraints, it is expected that the coefficient β_1 of *ZL* in the group with financial constraints would show a significant difference from the coefficient β_1 of *ZL* in the group without financial constraints.

$$DA (REM) = \beta_0 + \beta_1 CZL (CAZL) + \beta_2 SIZE + \beta_3$$
$$LEV + \beta_4 ROA + \beta_5 OCF + \beta_6 GROWTH$$
$$+ \beta_7 MTB + \beta_8 LOSS + \beta_9 OWN + \beta_{10}$$
$$FOR + \beta_{11} \sum YR + \beta_{12} \sum IND + \varepsilon$$
(Model 2)

- CZL: consecutive years that the firm remains a zero-leverage policy
- CAZL: consecutive years that the firm remains an almost zero-leverage policy

The level of earnings management through discretionary accruals (*DA*) is measured using Model 3 (Dechow et al., 1995).

$$\frac{TAC_{t}}{A_{t-1}} = a_{0} + a_{1} \frac{\triangle ADJREV_{t}}{A_{t-1}} + a_{2} \frac{PPE_{t}}{A_{t-1}} + \epsilon_{t}$$
(Model 3)

TAC: total accruals

- ADJREV: change in sales minus change in accounts receivable
- PPE: property, plant, and equipment
- A: total assets

The level of earnings management through real activities (REM) can be measured by applying the following variables: abnormal cash flows from operations (ACFO), abnormal production costs (APROD), and abnormal discretionary expenses (ADISEXP). Each variable can be estimated based on the residual values of Models 4-1, 4-2, and 4-3 (Roychowdhury, 2006). A lower value of abnormal cash flows from operations (ACFO) or abnormal discretionary expenses (ADISEXP) indicates that a firm is more likely to manage earnings through sales manipulation or cutting discretionary expenditures. Meanwhile, a higher value of abnormal production costs (APROD) implies that the firm is more likely to manage earnings through overproduction. NEG ACFO and NEG DISEXP are the results of multiplying abnormal cash flows from operations (ACFO) and abnormal discretionary expenses (ADISEXP) by a negative one. To compute a comprehensive measure of real activities earnings management, the study combines these three individual variables, NEG ACFO, APROD, and NEG DISEXP, as in Model 4-4 (Cohen et al., 2008).

$$\frac{CFO_t}{A_{t-1}} = a_0 + a_1 \frac{1}{A_{t-1}} + a_2 \frac{SALES_t}{A_{t-1}} + a_3 \frac{\triangle SALES_t}{A_{t-1}} + \epsilon_{it}$$
(Model 4-1)

$$\frac{PROD_{it}}{A_{t-1}} = a_0 + a_1 \frac{1}{A_{t-1}} + a_2 \frac{SALES_t}{A_{t-1}} + a_3 \frac{\triangle SALES_t}{A_{t-1}} + a_4 \frac{\triangle SALES_{t-1}}{A_{t-1}} + \epsilon_{it}$$
(Model 4-2)

$$\frac{DISEXP_{t}}{A_{t-1}} = \alpha_0 + \alpha_1 \frac{1}{A_{t-1}} + \alpha_2 \frac{SALES_{t}}{A_{t-1}} + \epsilon_{it}$$
(Model 4-3)

CFO: cash flows from operations *SALES*: sales

- *PROD*: production costs, defined as the sum of the cost of goods sold and the change in inventories
- DISEXP: discretionary expenses, defined as selling, general, and administrative expenses

A: total assets

$$REM = NEG_ACFO + APROD + NEG_ADISEXP$$

(Model 4-4)

- *REM*: the sum of the standardized three proxies of real activities earnings management (Cohen et al., 2008)
- NEG_ACFO: sales manipulation measured by the negative value of abnormal cash flows from operations
- APROD: overproduction measured by abnormal production costs
- NEG_DISEXP: reduction of other discretionary expenditures measured by the negative value of abnormal discretionary expenses

IV. Empirical Results

A. Descriptive Statistics

Table 2 presents the descriptive statistics of the variables used in the tests. To rule out the effects of outliers, this study winsorizes the top and bottom 1% of the observations for all continuous variables. The mean (median) value of accrual-based earnings management (DA) is -0.004 (-0.002), with the 1 and 99 percentiles being -0.246 and 0.249, respectively, showing a nearly symmetrical distribution. The mean value of real activities earnings management (REM) is -0.032 and the median value, 0.009, showing slightly skewed to the left. The 1 and 99 percentiles of real activities earnings management (REM) are -1.408 and 0.684, respectively, showing a wider range than that of accrual-based earnings management (DA). The mean value of the dummy variable for zero- leverage firms (ZL) is 0.096, which implies that the ratio of firms that have the sum of short- and long-term financial liabilities as 0 is approximately 9.6% among the listed firms in the stock market from 2011 to 2019. The mean value of dummy variable for almost zero-leverage firms (AZL) is 0.175, which indicates that firms with a book leverage ratio (i.e., the sum

Variables	Ν	Mean	Median	SD	MIN	MAX
DA	5,669	-0.004	-0.002	0.071	-0.246	0.249
REM	5,669	-0.032	0.009	0.316	-1.408	0.684
ZL	5,669	0.096	0.000	0.294	0.000	1.000
AZL	5,669	0.175	0.000	0.380	0.000	1.000
CZL	5,669	0.290	0.000	1.112	0.000	9.000
CAZL	5,669	0.584	0.000	1.628	0.000	9.000
SIZE	5,669	19.981	19.729	1.452	17.362	24.252
LEV	5,669	0.932	0.669	0.948	0.018	5.595
ROA	5,669	0.022	0.025	0.068	-0.296	0.212
OCF	5,669	0.045	0.041	0.065	-0.138	0.236
GROWTH	5,669	0.038	0.022	0.219	-0.608	1.142
MTB	5,669	1.283	0.906	1.186	0.235	7.135
LOSS	5,669	0.213	0.000	0.410	0.000	1.000
OWN	5,669	0.445	0.453	0.162	0.095	0.829
FOR	5,669	0.102	0.046	0.130	0.000	0.623

Table 2. Descriptive statistics

Definitions of variables

Definitions of valuated strength of the modified Jones model (Dechow et al., 1995) *REM*: the sum of the standardized three proxies of real earnings management (Cohen et al., 2008) *ZL*: dummy variable that equals 1 if the firm has no debt, and 0 otherwise

AZL: dummy variable that equals 1 if the firm's book leverage ratio is 1% or lower, and 0 otherwise CZL: consecutive years that the firm remains a zero-leverage policy

CAZL: consecutive years that the firm remains an almost zero-leverage policy

SIZE: log of total assets *LEV*: total liabilities divided by equity

ROA: return on assets

GCF: operating cash flows scaled by total assets *GROWTH*: change in sales divided by previous year's sales

MTB: market-to-book value ratio

LOSS: 1 if the operating income is negative, and 0 otherwise

OWN: stock ownership ratio of the largest shareholder

FOR: stock ownership ratio of foreign investors

of short- and long-term financial liabilities/total assets) of less than 1% constitute about 17.5% of the sample. The mean values of the consecutive years for which the firm maintains a zero-leverage policy (CZL) and an almost zero-leverage policy (CAZL) are 0.290 and 0.584, respectively. In addition, CZL and CAZL have a maximum value of 9, which means that firms remain zero-leveraged for up to nine years. For the control variables, the mean (median) values of firm size (SIZE) and debt ratio (LEV) are 19.981 (19.729) and 0.932 (0.669), respectively. The mean (median) values of return on assets (ROA) and operating cash flows (OCF) are 0.022 (0.025) and 0.045 (0.041), respectively. The mean (median) values of sales growth (GROWTH) and market-to-book value ratio (MTB) are 0.038 (0.022) and 1.283 (0.906), respectively. Lastly, the proportion

of equity held by the largest shareholder (OWN) is approximately 44.5 %, and by foreign investors, 10.2 %.

B. Descriptive Statistics

Table 3 presents the results of the correlation analysis of the variables. The dummy variables for zero-leverage firms (ZL) and almost zero-leverage firms (AZL) have a significantly negative correlation with real activities earnings management (REM), as hypothesized. However, ZL and AZL have a significantly positive correlation with accrual-based earnings management (DA). This result may be due to the failure to control for other variables that could affect accrualbased earnings management. In addition, the consecutive

Table 3. C	orrelation	matrix													
	DA	REM	ΤΖ	AZL	CZL	CAZL	SIZE	TEV	ROA	OCF	GROWTH	MTB	SSOT	NMO	FOR
	1.0000	0.1374	0.0462	0.0624	0.0322	0.0490	-0.0200	-0.1377	0.4787	-0.4687	0.1034	-0.0451	-0.3094	0.0646	-0.0396
DA		<.0001	0.0005	<.0001	0.0155	0.0002	0.1322	<.0001	<.0001	<.0001	<.0001	0.0007	<.0001	<.0001	0.0029
		1.0000	-0.1036	-0.1560	-0.0765	-0.1262	-0.0842	0.2213	-0.2209	-0.3601	-0.0690	-0.2711	0.1466	0.0663	-0.2317
KEM			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
12			1.0000	0.7056	0.8022	0.5818	-0.1210	-0.2326	0.1132	0.0405	-0.0253	0.0365	-0.0887	0.0427	0.1100
77				<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0023	0.0571	0.0060	<.0001	0.0013	<.0001
				1.0000	0.5660	0.7781	-0.1115	-0.3179	0.1819	0.0911	-0.0205	0.0570	-0.1357	0.0407	0.1603
ALL					<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.1222	<.0001	<.0001	0.0022	<.0001
in the second se					1.0000	0.6946	-0.0867	-0.1924	0.0720	0.0083	-0.0165	0.0301	-0.0746	0.0469	0.0945
CZF						<.0001	<.0001	<.0001	<.0001	0.5304	0.2151	0.0235	<.0001	0.0004	<.0001
						1.0000	-0.0609	-0.2594	0.1189	0.0373	-0.0171	0.0396	-0.1132	0.0390	0.1664
CAZL							<.0001	<.0001	<.0001	0.0050	0.1972	0.0029	<.0001	0.0033	<.0001
CUZE							1.0000	0.1459	0.1590	0.1659	0.0174	-0.0129	-0.1110	-0.0541	0.5094
NLE								<.0001	<.0001	<.0001	0.1911	0.3309	<.0001	<.0001	<.0001
1 617								1.0000	-0.3024	-0.1266	-0.0082	0.0299	0.2959	-0.1092	-0.1306
LEV									<.0001	<.0001	0.5375	0.0243	<.0001	<.0001	<.0001
7 O 4									1.0000	0.4676	0.1690	0.1012	-0.6732	0.1174	0.2440
KUA										<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
100										1.0000	0.0510	0.1399	-0.3293	0.0380	0.2730
0CL											0.0001	<.0001	<.0001	0.0043	<.0001
nunoau											1.0000	0.1235	-0.1717	0.0322	0.0181
												<.0001	<.0001	0.0155	0.1729
ATTD.												1.0000	-0.0371	-0.1287	0.1840
GIW													0.0052	<.0001	<.0001
2201													1.0000	-0.1455	-0.1567
CCUT														<.0001	<.0001
MAIO														1.0000	-0.1851
															<.0001
FOR															1.0000

Note: The variables are defined as in Table 2.

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years in which the firm maintains a zero-leverage policy (CZL) and an almost zero-leverage policy (CAZL) show a significantly negative correlation with real activities earnings management (REM). However, they show a significantly positive correlation with accrual-based earnings management (DA). As these correlations are derived when control variables are not considered, a multiple regression analysis is required to test the hypotheses.

C. Regression Results

Table 4 presents the results of the regression analysis applying Model 1 to verify Hypothesis 1-1 based on the total sample. Column A reports that the coefficient of the dummy variable for zeroleverage firms (*ZL*) is significantly negative at p <0.05, suggesting that zero-leverage firms show a lower level of accrual-based management than leveraged firms. Column B also reports a significantly negative coefficient of the dummy variable for zero-leverage firms (*ZL*) at p < 0.01, indicating that zero-leverage firms show a lower level of real activities earnings management than leveraged firms. The results support Hypothesis 1-1 that, in general, zero-leverage firms tend to engage in lower earnings management than leverage firms because they have no incentive to make accounting choices to avoid the violation of debt covenants.

Table 5 presents the results of the regression analysis in which the dummy variable for almost zero-leverage firms (AZL) is used as an explanatory variable instead of the dummy variable for zero- leverage firms (ZL) in Model 1. The results indicate that the coefficients of the dummy variable for almost zero-leverage firms (AZL) in Columns A and B are both significantly negative. This suggests that almost zero-leverage and zero-leverage firms engage in lower levels of earnings management than leveraged firms.

Table 6 presents the results of estimating Model 1 for each group after dividing the total sample into groups of firms with and without financial constraints. Panel A shows the results of the analysis of the group with financial constraints. The dummy variable for zero-leverage firms (ZL) has statistically insignificant

Variablas		Column A. DA			Column B. REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.046	7.05***	<.0001	0.099	1.58	0.114
ZL	-0.003	-2.00**	0.045	-0.050	-3.89***	<.0001
SIZE	-0.001	-3.55***	0.000	-0.008	-2.68***	0.007
LEV	0.003	5.77***	<.0001	0.047	10.79***	<.0001
ROA	0.953	121.27***	<.0001	-0.005	-0.06	0.951
CFO	-0.992	-151.67***	<.0001	-1.504	-23.62***	<.0001
GROWTH	0.003	1.76*	0.079	-0.035	-2.13**	0.033
MTB	-0.001	-2.90***	0.004	-0.045	-14.05***	<.0001
LOSS	-0.001	-0.78	0.435	-0.025	-2.12**	0.034
OWN	-0.006	-2.51**	0.012	0.127	5.50***	<.0001
FSH	0.003	0.94	0.349	-0.166	-4.69***	<.0001
YR		Included			Included	
IND		Included			Included	
adj_R ²		0.8557			0.2999	
Ν		5,669			5,669	

Table 4. Results of the regression analysis for the earnings management level of zero-leverage firms

Notes: The variables are listed in Table 2. *, **, and *** indicate significance levels at the 10, 5, and 1%, respectively, based on two-tailed tests.

Variablas		Column A. DA			Column B. REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.046	7.02***	<.0001	0.127	2.01**	0.045
AZL	-0.002	-1.75*	0.080	-0.051	-5.05***	<.0001
SIZE	-0.001	-3.53***	0.000	-0.009	-2.96***	0.003
LEV	0.003	5.61***	<.0001	0.045	10.14***	<.0001
ROA	0.953	121.02***	<.0001	0.014	0.18	0.856
CFO	-0.992	-151.65***	<.0001	-1.501	-23.59***	<.0001
GROWTH	0.003	1.76*	0.079	-0.037	-2.22**	0.027
MTB	-0.001	-2.88***	0.004	-0.045	-14.00***	<.0001
LOSS	-0.001	-0.77	0.440	-0.025	-2.10**	0.036
OWN	-0.006	-2.54**	0.011	0.127	5.52***	<.0001
FSH	0.003	0.94	0.345	-0.155	-4.37***	<.0001
YR		Included			Included	
IND		Included			Included	
adj_R ²		0.8557			0.3012	
Ν		5,669			5,669	

Table 5. Results of the regression analysis for the earnings management level of almost zero-leverage firms

Notes: The variables are defined as in Table 2. *, **, and *** indicate significance levels at the 10%, 5%, and 1%, respectively, based on two-tailed tests.

coefficient values for both accrual-based earnings management (DA) and real activities earnings management (REM), thus showing a different result from that of the analysis for the total sample presented in Table 5. However, in Panel B, which reports the results of the analysis of the group without financial constraints, the dummy variable for zero-leverage firms (ZL) has significantly negative coefficient values for both accrual-based earnings management (DA) and real activities earnings management (REM). This result is the same as that of the analysis for the total sample. In summary, only the group of zero-leverage firms without financial constraints show a lower level of earnings management than that of leveraged firms. When there are financial constraints, zero-leverage and leveraged firms show insignificant differences in their levels of earnings management. This implies that zero-leverage firms with financial constraints tend to manage earnings to improve their chances of obtaining external finance. Therefore, the results support Hypothesis 1-2 that the earnings management level of zero-leverage firms varies depending on financial constraints.

Table 7 presents the results of dividing the total sample into groups of firms with financial and without financial constraints and of the regression analyses based on Model 1, where the dummy variable for almost zero-leverage firms (AZL) is used as an explanatory variable instead of the dummy variable for zero-leverage firms (ZL). In Panel A of the group with financial constraints, the dummy variable for almost zero-leverage firms (AZL) show statistically insignificant coefficients for both accrual-based earnings management (DA) and real activities earnings management (REM). In Panel B of the group without financial constraints, the dummy variable for almost zero-leverage firms (AZL) show significant negative coefficients for both accrual-based earnings management (DA) and real activities earnings management (REM). Overall, the results remain qualitatively similar when the relaxed criteria for zero-leverage are applied. In other words, a lower level of earnings management for almost zero-leverage firms compared with leveraged firms could be observed only in the financially unconstrained group.

Table 8 presents the results of estimating Model

Table 6. Results of the regression analysis for the earnings management level of zero-leverage firms by dividing the total sample into two groups based on financial constraints

Variablas		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.056	3.43***	0.001	0.227	2.24**	0.025
ZL	-0.001	-0.19	0.851	-0.017	-0.71	0.480
SIZE	-0.001	-1.50	0.135	-0.011	-2.11**	0.035
LEV	0.003	3.31***	0.001	0.126	1.49	0.137
ROA	0.896	66.05***	<.0001	0.027	5.40***	<.0001
CFO	-0.976	-70.91***	<.0001	-1.383	-16.11***	<.0001
GROWTH	0.001	0.19	0.851	0.000	0.01	0.990
MTB	-0.003	-3.72***	0.000	-0.028	-5.74***	<.0001
LOSS	-0.005	-2.15**	0.032	0.008	0.52	0.604
OWN	-0.004	-0.81	0.415	-0.042	-1.29	0.199
FSH	-0.015	-1.25	0.211	-0.115	-1.58	0.114
YR		Included			Included	
IND		Included			Included	
adj_R ²		0.8667			0.2985	
N		1,549			1,549	

Panel A. FD = 1 (Group with financial constraints)

Panel B. FD = 0 (Group without financial constraints)

V		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.035	5.20***	<.0001	-0.069	-0.86	0.392
ZL	-0.004	-3.44***	0.001	-0.047	-3.15***	0.002
SIZE	-0.001	-2.33**	0.020	-0.004	-0.98	0.325
LEV	0.003	4.44***	<.0001	0.150	1.11	0.269
ROA	1.052	93.21***	<.0001	0.081	11.05***	<.0001
CFO	-1.020	-140.38***	<.0001	-1.518	-17.41***	<.0001
GROWTH	0.004	2.42**	0.015	-0.061	-2.74***	0.006
MTB	-0.001	-3.48***	0.001	-0.057	-12.79***	<.0001
LOSS	0.000	0.14	0.892	-0.034	-1.92*	0.055
OWN	-0.006	-2.22**	0.026	0.243	7.86***	<.0001
FSH	0.001	0.38	0.705	-0.126	-3.01***	0.003
YR		Included			Included	
IND		Included			Included	
adj_R ²		0.8489			0.2966	
Ν		4,120			4,120	

Notes: The variables are listed in Table 2. *, **, and *** indicate significance levels at the 10%, 5%, and 1%, respectively, based on two-tailed tests.

2 to verify Hypothesis 2-1. The coefficients of consecutive years for zero-leverage management

(CZL) are significantly negative for both accrual-based earnings management (DA) and real activities earnings

Variablas		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.055	3.41***	0.001	0.233	2.30**	0.022
AZL	0.000	-0.12	0.906	-0.019	-0.97	0.330
SIZE	-0.001	-1.49	0.137	-0.011	-2.15**	0.032
LEV	0.003	3.27***	0.001	0.130	1.53	0.125
ROA	0.896	65.90***	<.0001	0.026	5.24***	<.0001
CFO	-0.976	-70.89***	<.0001	-1.381	-16.08***	<.0001
GROWTH	0.001	0.20	0.845	-0.001	-0.02	0.981
MTB	-0.003	-3.71***	0.000	-0.028	-5.71***	<.0001
LOSS	-0.005	-2.15**	0.032	0.008	0.53	0.596
OWN	-0.004	-0.82	0.412	-0.042	-1.28	0.201
FSH	-0.015	-1.26	0.208	-0.114	-1.57	0.117
YR	Included				Included	
IND	Included				Included	
adj_R ²	0.8667				0.2987	
N	1,549				1,549	

Table 7. Results of the regression analysis for the earnings management level of almost zero-leverage firms by dividing the total sample into two groups based on financial constraints

Panel A. FD = 1

Panel B. FD = 0

Variablas		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.036	5.32***	<.0001	-0.041	-0.50	0.616
AZL	-0.003	-3.34***	0.001	-0.047	-3.88***	0.000
SIZE	-0.001	-2.39**	0.017	-0.005	-1.20	0.231
LEV	0.003	4.09***	<.0001	0.173	1.28	0.202
ROA	1.053	93.09***	<.0001	0.077	10.38***	<.0001
CFO	-1.020	-140.38***	<.0001	-1.518	-17.43***	<.0001
GROWTH	0.004	2.42**	0.016	-0.061	-2.76***	0.006
MTB	-0.001	-3.44***	0.001	-0.056	-12.76***	<.0001
LOSS	0.000	0.14	0.885	-0.034	-1.90*	0.057
OWN	-0.006	-2.28**	0.022	0.241	7.83***	<.0001
FSH	0.002	0.46	0.648	-0.117	-2.78***	0.005
YR		Included			Included	
IND		Included			Included	
adj_R ²		0.8489			0.2975	
Ν		4,120			4,120	

Notes: The variables are defined as in Table 2. *, **, and *** indicate significance levels at the 10%, 5%, and 1%, respectively, based on two-tailed tests.

management (*REM*) at p < 0.01. This result implies that a longer consecutive zero-leverage period leads

to a decrease in the level of earnings management, thereby supporting Hypothesis 2-1. It can be inferred

Variables		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.046	7.21***	<.0001	0.084	1.34	0.179
CZL	-0.001	-3.60***	0.000	-0.011	-3.36***	0.001
SIZE	-0.001	-3.69***	0.000	-0.008	-2.46**	0.014
LEV	0.952	121.43***	<.0001	-0.015	-0.20	0.842
ROA	0.003	5.66***	<.0001	0.048	11.01***	<.0001
CFO	-0.993	-151.80***	<.0001	-1.507	-23.65***	<.0001
GROWTH	0.003	1.75*	0.079	-0.034	-2.06**	0.040
MTB	-0.001	-2.92***	0.004	-0.045	-14.05***	<.0001
LOSS	-0.001	-0.85	0.394	-0.026	-2.20**	0.028
OWN	-0.006	-2.41**	0.016	0.127	5.48***	<.0001
FSH	0.004	1.10	0.273	-0.171	-4.85***	<.0001
YR		Included			Included	
IND		Included			Included	
adj_R ²		0.8559			0.2994	
N		5,669			5,669	

Table 8. Results of the regression analysis of the relation between a consecutive zero-leverage period and the level of earnings management

Notes: The variables are defined as in Table 2. *, **, and *** indicate significance levels at the 10%, 5%, and 1%, respectively, based on two-tailed tests.

that firms with a longer consecutive zero-leverage period are less likely to manage earnings, as they are more likely to adopt a zero-leverage policy for strategic purposes based on sufficient internal funds.

Table 9 presents the results of the regression analysis of Model 2, where the dummy variable for zero-leverage firms (*ZL*) is replaced by that for almost zero-leverage firms (*AZL*). Results indicate that the coefficient of the consecutive years that the firm remains an almost zero-leverage policy (*CAZL*) is significantly negative for two types of earnings management indicators: *DA* and *REM*. Overall, the results in Table 9 with the replaced variable are consistent with those in Table 8, supporting Hypothesis 2-1.

Table 10 presents the results of estimating Model 2 after dividing the total sample into groups of firms with and without financial constraints. Panel A presents the results of the analysis of the group with financial constraints; the results indicate that the coefficient of the consecutive years that the firm remains a zero-leverage policy (*CZL*) is statistically insignificant for two types of earnings management

indicators: DA and REM. Meanwhile, Panel B reports the results of the analysis of the group without financial constraints; the results indicate that the coefficient of the consecutive years that the firm remains a zero-leverage policy (CZL) is significantly negative for two types of earnings management indicators: DA and REM. This means that a negative relation between a consecutive zero-leverage period and the level of earnings management is observed only in the group of firms without financial constraints. In other words, firms with a longer zero-leverage period are less likely to manage earnings because they have a higher level of cash holdings/financial flexibility when they are financially unconstrained. However, for firms with financial constraints, the incentives to manage earnings are not weakened when they have difficulties obtaining external finance for a long period. Therefore, a consecutive zero-leverage period is irrelevant to the level of earnings management when firms are financially constrained. The results support Hypothesis 2-2 that the relation between a consecutive zero-leverage period and the level of

Variables		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.047	7.35***	<.0001	0.112	1.78*	0.075
CAZL	-0.001	-3.69***	0.000	-0.012	-5.04***	<.0001
SIZE	-0.001	-3.75***	0.000	-0.008	-2.73***	0.006
LEV	0.953	121.46***	<.0001	-0.006	-0.08	0.937
ROA	0.002	5.45***	<.0001	0.046	10.52***	<.0001
CFO	-0.993	-151.80***	<.0001	-1.514	-23.77***	<.0001
GROWTH	0.003	1.73*	0.083	-0.035	-2.13**	0.033
MTB	-0.001	-2.93***	0.003	-0.045	-14.10***	<.0001
LOSS	-0.001	-0.88	0.376	-0.027	-2.27**	0.023
OWN	-0.006	-2.44**	0.015	0.128	5.55***	<.0001
FSH	0.005	1.30	0.195	-0.154	-4.34***	<.0001
YR		Included			Included	
IND		Included			Included	
adj_R ²		0.8559			0.3012	
Ν		5,669			5,669	

Table 9. Results of the regression analysis of the relation between a consecutive almost zero-leverage period and the level of earnings management

Notes: The variables are defined as in Table 2. *, **, and *** indicate significance levels at the 10%, 5%, and 1%, respectively, based on two-tailed tests.

earnings management varies depending on financial constraints.

Table 11 presents the results of dividing the total sample into groups of firms with and without financial constraints and of the regression analyses based on Model 2, where the consecutive years for a zeroleverage policy (CZL) is replaced by the consecutive years for almost zero-leverage policy (CAZL). The results are found to be similar to those indicated in Table 10. As shown in Panel A, for the financially constrained group, the coefficients of the consecutive years for the almost zero-leverage policy (CAZL) are statistically insignificant. However, for the financially unconstrained group in Panel B, the coefficients of the consecutive years for the almost zero-leverage policy (CAZL) are negative and significant at p < 0.01. These results verify that a longer consecutive period in which firms maintain an almost zeroleverage policy leads to a decrease in the level of earnings management only when firms are not financially constrained and that such relation is not derived when they are financially constrained.

D. Additional Analysis

This study conducts an additional analysis to mitigate the concerns on the variables. The descriptive statistics show that for the variable of *CZL*, the mean (median) is 0.290 (0.000) with the minimum 0 and the maximum 9. It points out that there are a few companies with large *CZL* while most companies have very small values of *CZL*. The descriptive statistics for *CAZL* also indicate the potential outlier problem. Thus, this study conducts the robustness test to show that the results are not affected by the distribution of those variables. In an additional analysis, it uses modified *CZL* (*LOGCZL*) calculated by the log of 1 plus *CZL*. It also uses modified *CAZL* (*LOGCAZL*) calculated by the log of 1 plus *CAZL*.

Table 12 presents the results of the Model 2 analysis using the modified variables (*LOGCZL* and *LOGCAZL*). The coefficients of *LOGCZL* and *LOGCAZL* are still negative and statistically significant at p < 0.01. Overall, the results in Table 12 with the modified variables (*LOGCZL* and *LOGCAZL*) are consistent with

Table 10. Results of the regression analysis for the relation between a consecutive zero-leverage period and the level of earnings management by dividing the total sample into two groups based on financial constraints

V		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.058	3.59***	0.000	0.224	2.23**	0.026
CZL	-0.001	-1.20	0.231	-0.005	-0.71	0.478
SIZE	-0.001	-1.64	0.101	-0.011	-2.10**	0.036
LEV	0.003	3.23***	0.001	0.124	1.46	0.143
ROA	0.896	66.12***	<.0001	0.027	5.44***	<.0001
CFO	-0.976	-70.96***	<.0001	-1.385	-16.12***	<.0001
GROWTH	0.000	0.10	0.921	0.001	0.02	0.980
MTB	-0.003	-3.77***	0.000	-0.028	-5.77***	<.0001
LOSS	-0.005	-2.18**	0.029	0.008	0.51	0.614
OWN	-0.004	-0.70	0.487	-0.041	-1.25	0.210
FSH	-0.013	-1.11	0.269	-0.112	-1.54	0.124
YR		Included			Included	
IND		Included			Included	
adj_R ²		0.8668			0.2985	
Ν		1,549			1,549	

Panel A. FD = 1

Panel B. FD = 0

Variables		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.035	5.24***	<.0001	-0.085	-1.07	0.285
CZL	-0.001	-4.49***	<.0001	-0.009	-2.45**	0.014
SIZE	-0.001	-2.32**	0.020	-0.003	-0.77	0.439
LEV	0.003	4.40***	<.0001	0.128	0.94	0.346
ROA	1.050	93.26***	<.0001	0.082	11.29***	<.0001
CFO	-1.021	-140.54***	<.0001	-1.518	-17.39***	<.0001
GROWTH	0.005	2.46**	0.014	-0.060	-2.71***	0.007
MTB	-0.001	-3.37***	0.001	-0.056	-12.71***	<.0001
LOSS	0.000	0.03	0.979	-0.035	-1.99**	0.047
OWN	-0.006	-2.23**	0.026	0.241	7.80***	<.0001
FSH	0.001	0.37	0.712	-0.134	-3.20***	0.001
YR		Included			Included	
IND		Included			Included	
adj_R ²		0.8492			0.2960	
Ν		4,120			4,120	

Notes: The variables are defined as in Table 2. *, **, and *** indicate significance levels at the 10%, 5%, and 1%, respectively, based on two-tailed tests.

those in Table 8 and 9, supporting Hypothesis 2-1 that firms with a longer zero-leverage period are

less likely to manage earnings.

Table 13 presents the results of dividing the total

Table n. Results of the regression analysis for the relation between a consecutive almost zero-leverage period and the level of earnings management by dividing the total sample into two groups based on financial constraints

Variablas		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.057	3.49***	0.001	0.226	2.24**	0.026
CAZL	0.000	-0.53	0.595	-0.004	-0.71	0.477
SIZE	-0.001	-1.54	0.123	-0.011	-2.10**	0.036
LEV	0.003	3.26***	0.001	0.127	1.50	0.135
ROA	0.897	66.04***	<.0001	0.027	5.39***	<.0001
CFO	-0.976	-70.92***	<.0001	-1.384	-16.11***	<.0001
GROWTH	0.001	0.16	0.870	0.001	0.03	0.977
MTB	-0.003	-3.73***	0.000	-0.028	-5.75***	<.0001
LOSS	-0.005	-2.15**	0.032	0.008	0.53	0.600
OWN	-0.004	-0.77	0.440	-0.041	-1.26	0.208
FSH	-0.014	-1.19	0.233	-0.113	-1.54	0.123
YR		Included			Included	
IND		Included			Included	
adj_R ²		0.8667			0.2985	
N		1,549			1,549	

Panel A. FD = 1

Panel B. FD=0

Variablas		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.037	5.56***	<.0001	-0.053	-0.66	0.508
CAZL	-0.001	-5.08***	<.0001	-0.010	-3.87***	0.000
SIZE	-0.001	-2.49**	0.013	-0.004	-1.02	0.308
LEV	0.002	3.93***	<.0001	0.134	0.99	0.320
ROA	1.050	93.38***	<.0001	0.079	10.70***	<.0001
CFO	-1.022	-140.60***	<.0001	-1.530	-17.53***	<.0001
GROWTH	0.005	2.44**	0.015	-0.060	-2.73***	0.007
MTB	-0.001	-3.39***	0.001	-0.056	-12.72***	<.0001
LOSS	0.000	-0.06	0.956	-0.037	-2.07**	0.039
OWN	-0.006	-2.28**	0.023	0.241	7.81***	<.0001
FSH	0.003	0.73	0.467	-0.118	-2.80***	0.005
YR		Included			Included	
IND		Included			Included	
adj_R ²		0.8494			0.2975	
Ν		4,120			4,120	

Notes: The variables are defined as in Table 2. *, **, and *** indicate significance levels at the 10%, 5%, and 1%, respectively, based on two-tailed tests.

sample into groups of firms with and without financial constraints and of the regression analyses based on

Model 2, where *CZL* is replaced by *LOGCZL*. The coefficient of *LOGCZL* is statistically negative for

Table 12.	Results	of t	the robu	ustness	analysis	of	the	relation	between	а	consecutive	zero-	leverage	period	and	the
level of e	earnings	man	nagemen	nt												

anel A. LOGCZL						
Variablas		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.046	7.22***	<.0001	0.091	1.46	0.145
LOGCZL	-0.003	-3.29***	0.001	-0.035	-3.73***	0.000
Control		Included			Included	
adj_R ²		0.8559			0.2997	
Ν		5669			5669	
mel B. LOGCAZ	Ľ	DA			REM	
Variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.047	7.31***	<.0001	0.120	1.91*	0.057
LOGCAZL	-0.002	-3.34***	0.001	-0.037	-5.32***	<.0001
Control		Included			Included	
adj_R ²		0.8559			0.3015	
N		5669			5669	

Notes: The variables (except LOGCZL and LOGCAZL) are defined as in Table 2. LOGCZL=log of 1 plus CZL; LOGCAZL=log of 1 plus CAZL. * and *** indicate significance levels at the 10% and 1%, respectively, based on two-tailed tests.

Table 13. Results of the robustness analysis of the relation between a consecutive zero-leverage period and the level of earnings management by dividing the total sample into two groups based on financial constraints

Panel	А.	FD=1

Variables		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.058	3.56***	0.000	0.223	2.21**	0.027
LOGCZL	-0.003	-0.95	0.340	-0.011	-0.57	0.567
IND		Included			Included	
adj_R ²		0.8667			0.2984	
Ν		1549			1549	

Panel B. FD=0

Variables		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.035	5.28***	<.0001	-0.077	-0.96	0.335
LOGCZL	-0.004	-4.40***	<.0001	-0.031	-2.91***	0.004
IND		Included			Included	
adj_R ²		0.8492			0.2964	
Ν		4120			4120	

Notes: The variables (except LOGCZL and LOGCAZL) are defined as in Table 2. LOGCZL=log of 1 plus CZL; LOGCAZL=log of 1 plus CAZL. ** and *** indicate significance levels at the 10% and 5%, respectively, based on two-tailed tests.

Table 14. Results of the robustness analysis of the relation between a consecutive almost zero-leverage period and the level of earnings management by dividing the total sample into two groups based on financial constraints

Panel A. $FD=1$	Panel	Α.	FD=1
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Variables		DA			REM	
variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.056	3.47***	0.001	0.228	2.25**	0.025
LOGCAZL	-0.001	-0.43	0.667	-0.011	-0.77	0.442
IND		Included			Included	
adj_R ²		0.8667			0.2985	
Ν		1549			1549	
		DA			REM	
Variables	Coef.	t-stat	p-value	Coef.	t-stat	p-value
Intercept	0.037	5.57***	<.0001	-0.045	-0.56	0.579
LOGCAZL	-0.003	-4.87***	<.0001	-0.033	-4.17***	<.0001
IND		Included			Included	
adj_R ²		0.8493			0.2979	
Ν		4120			4120	

Notes: The variables (except LOGCZL and LOGCAZL) are defined as in Table 2. LOGCZL=log of 1 plus CZL; LOGCAZL=log of 1 plus CZL. ** and *** indicate significance levels at the 10% and 5%, respectively, based on two-tailed tests.

the financially unconstrained group in Panel B, whereas the coefficient of *LOGCZL* is insignificant for the financially constrained group in Panel A. The results in Table 13 still support Hypothesis 2-2 that the relation between a consecutive zero-leverage period and the level of earnings management varies dependin g on financial constraints.

Table 14 presents the results of dividing the total sample into groups of firms with and without financial constraints and of the regression analyses based on Model 2, where *CAZL* is replaced by *LOGCAZL*. The results are found to be similar to those indicated in Table 13, supporting Hypothesis 2-2.

V. Conclusions

According to the traditional theory of capital structure, firms can maximize their values through optimal debt and equity financing (Modigliani and Miller, 1963). Nevertheless, many firms follow a zeroleverage policy by starkly avoiding debt financing (Devos et al., 2010; Strebulaev and Yang, 2013). The debt covenant hypothesis in positive accounting theory states that firms tend to manage earnings to avoid debt covenant violations (Watts and Zimmerman, 1986). This study verifies the debt covenant hypothesis by exploring the earnings management of zero-leverage firms that are not constrained by debt covenants. Meanwhile, Dang (2013) argues that zero-leverage firms are not homogeneous and can be classified into financially constrained and unconstrained. Based on Dang's (2013) argument, this study investigates whether the earnings management of zero-leverage firms varies depending on financial constraints, whether a consecutive zero-leverage period is associated with the level of earnings management, and whether this association varies depending on financial constraints.

Using a sample of 5,669 firm-year observations of Korean listed firms covering 2011 to 2019, this

study finds that zero-leverage firms are less likely to manage earnings than leveraged firms. In the analysis conducted after dividing the total sample into groups of firms with and without financial constraints, it is found that for the former, the earnings management level of zero-leverage firms is lower than that of leveraged firms. However, such a difference in the level of earnings management between zero-leverage and leveraged firms does not exist for the latter. These results imply that the earnings management level of zero-leverage firms with financial constraints is as high as that of leveraged firms because they have the incentive to manage earnings to obtain opportunities for debt financing in the limited debt market. In further analyzing the full sample, the findings show that firms with a longer zero-leverage period exhibit a lower level of earnings management. This indicates that firms with a longer consecutive zero-leverage period engage in less earnings management, as they are likely to strategically adopt a zero-leverage policy based on sufficient internal funds. However, when dividing our sample into two groups, a consecutive zeroleverage period is irrelevant to the level of earnings management in firms without financial constraints. This suggests that for firms with financial constraints, the incentives to manage earnings are not weakened because they have difficulties obtaining external finance for a long period. The findings of this study indicate that financial constraints should be considered when understanding the earnings management of zero-leverage firms.

The limitation of this study is that the status of firms with or without financial constraints is measured solely by whether dividends are paid. Therefore, in future research, it will be interesting to investigate the various aspects of zero-leverage firms in consideration of other measures of financial constraints. Evidence from this study can help standard setters, regulators, and investors better understand the attributes of zero-leverage firms and their decisions on financial reporting.

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