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Effect of Leverage on Real Earnings Management: Evidence from Korea

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Abstract: This study examines how leverage affects real earnings management (REM) in non-financial firms listed on the Korea Composite Stock Price Index from 2010 to 2018 by employing total, short-term, and long-term debt ratios (i.e., leverage) as independent variables and four REM metrics as dependent variables. We find a significant positive relationship between leverage and REM in suspicious firms, whereas the effect of leverage is insignificant in non-suspicious firms. We also find that the positive relationship between both variables is stronger in the second half of the fiscal year, which shows the prevalence of the seasonality of REM, as managers collect high-frequency financial information during this period. These findings are consistent with those in the literature that managers increase firm leverage and REM activities to reduce their probability of being discovered, since financial statements in the interim quarters are not often audited. Our study complements the literature by introducing quarterly data to identify clearly REM activities and detect the strongest effect on the relationship between REM and leverage. Moreover, our results from the two-stage least square (2SLS) regression analysis are consistent with our previous findings.

Keywords: seasonality of real earnings management; leverage; abnormal cash flow from operations; abnormal SG&A expenses; abnormal production costs

1. Introduction

Earnings refer to a company's net income or profit for a certain period, such as a fiscal quarter or year. The present value of future earnings represents the theoretical value of a company's stock; thus, increased earnings denote growth in the company value. Schipper [1] defined earnings management (EM) as "a purposeful intervention in the external financial reporting process, to obtain some private gains". Firms resort to EM to avoid earnings reductions and losses, thereby maintaining the desirability of "consistent profitability."

Managers may choose between two techniques to conduct EM depending on their costs, the firm's objectives, and personal goals: (1) accrual-based earnings management (AEM), and (2) real earnings management (REM). Reflecting downward circumstances, AEM happens when managers select and change the accounting method or modify the transactions in the financial statements to achieve the desired earnings and the firm's objectives, while REM, considered the upward context, arises when managers assume actions that easily alter the period or adjust operations by deviating from normal business practices to meet or beat certain earnings thresholds [2–4]. In 2002, the Sarbanes–Oxley Act (SOX) and "business judgment rule" were introduced, provoking the increase of managers' preferences for REM activities because management arbitrary decisions are more difficult to detect while abnormal accruals are easy to perceive by auditors and regulators [5–7]. Graham et al. [7] show that managers prefer to manage earnings through REM (i.e., reducing expenses, increasing inventory, or delaying a new project) than AEM because the former is less scrutinized by auditors and regulators and, thus,

has a high probability of not being detected. Vakilifard and Mortazavi [3] show that when leverage is increasing, managers tend to engage in more REM activities than AEM because real manipulations are less subject to (1) extensive audits and controls, (2) external monitoring by society, media, and other political parties, and (3) pressure of debt covenant [3,8]. Moreover, there was a shift from AEM to REM after the adoption of the International Financial Reporting Standards (IFRS) because the implementation of international standards improved the accounting quality and the legal regime, and reduced the possibility to manipulate directly transactions in the financial statements [9]. Because of the many pros of REM, firms have recently tended to use REM instead of AEM.

Prior studies show a contradictory relationship between REM and leverage, providing evidence of both positive and negative association between the two variables. On the one hand, the positive relationship between debt and REM is grounded in the high default risk of the high-leverage companies, suggesting that firms might increase their real manipulation activities (1) to secure debt refinancing [2,10], (2) to prevent penalties arising from contraventions of debt covenants [11,12], and (3) to show stable and less volatile earnings to increase the confidence of future investors [13,14]. On the other hand, there is a negative association between leverage and REM, as lenders and institutional investors impose spending conditions and increase their scrutiny and control in firms, which reduce managers' opportunistic behavior and mitigate REM practices [15,16]. Furthermore, in the presence of low free cash flow caused by the engagement of REM practices, managers prioritize their debt payments and repayment and increase their prudency to invest in non-value maximizing projects, which reduce firms' leverage [17].

We empirically examine whether leverage motivates managers to engage in REM activities. Moreover, we try to detect managers' preferred quarter to conduct REM given firms' leverage levels, if any. We improve the accounting and finance literature by documenting the importance of incorporating the REM activities quarterly instead of annually. Most of the previous studies use annual data [14,18–21]. Managers are allowed to choose the firm's accounting method regulated by national and international laws, and generally, they demonstrate an opportunistic behavior to conserve their business position and reputation. Therefore, managers try to avoid losses when earnings are just above zero [13], using REM activities because they directly affect the current financial reports and their low regulatory scrutiny motivates CEOs to diversify firm and manager risks by giving price discounts to temporarily boost sales, overproducing or reducing discretionary expenditures [2]. As a consequence, a reason to engage in REM is to make earnings seem more predictable and less volatile because investors prefer stability and growth in a firm's income and expenses.

Earnings alterations in each quarter, called "real-time" adjustments, are difficult to detect in the annual financial report, because these modifications can be reversed in subsequent quarters or might experience a trade-off between REM activities in each quarter, suggesting that REM would be underestimated or misread in annual reports, giving the leeway to managers to engage in real manipulation initiatives. Given that this type of accounting analysis may be expensive to implement practically, auditors and regulators primarily review annual financial statements instead of quarterly reports. Therefore, accounting transparency might decrease in quarterly statements, provoking an increase in the firm's operational risk without an integrated perspective to secure financial companies' sustainability [22].

Quarterly data are commonly considered a source of high accuracy information and provide investors an idea of how the current year shapes up. They could be considered to determine short-term movements and offer a better determination of REM. They include more detailed information than annual reports and show high-transparency in the financial and operational results, thereby increasing the adjustment level of our statistical models. Conversely, annual data provide estimations and long-term forecasting. They suffer from bias in comparison to the more comprehensive data quarterly reports, which include a greater temptation for companies to cover up missteps. Compared with quarterly statements, less frequent formal disclosures in annual reports could result in less transparency and accountability of companies toward their shareholders.

We define firms whose net income scaled by total assets is greater than or equal to zero but less than 0.005 [2] as "suspicious" and "non-suspicious" for the others. By using Korean non-financial firms during the 2010–2018 period, we find a significant positive relationship between all REM metrics and leverage in suspicious companies, while leverage affects insignificantly real manipulation activities in non-suspicious firms. Furthermore, the second half of the fiscal year is the managers' preferred period to conduct REM, as directors have access to precise information about the performance of the firm during the last two quarters of the year. We also observe the highest effect of leverage on REM measures in the third quarter. This result implies that the greater probability of not getting detected is another incentive for managers to conduct REM during interim quarters because financial statements for interim quarters contain less consistency by accounts aggregation with less audit process. We conduct two-stage least square (2SLS) regression analysis, which provides a robustness check for our results and controls the endogeneity problem. We are able to conclude that high-leverage firms are more likely to manage real earnings than low-leverage companies. These findings suggest that regulators need to analyze quarterly statements as well as annuals and to be more careful of high-leverage firms in detecting window-dressing of the firm's performance. Specially, regulators might canalize their control efforts in quarterly data for firms close to the zero earnings benchmark to detect seasonality in real activities manipulation and increase the financial and accounting sustainability of firms.

The rest of the paper is composed as follows. Section 2 presents a literature review and describes the development of the hypotheses. Section 3 shows the empirical design. Section 4 defines the data collection procedure and presents empirical findings. Section 5 discusses the results, highlights the conclusions, and offers recommendations for future research.

2. Development of Hypotheses

Roychowdhury [2] shows that executives are motivated to manage real earnings activities to evade reporting annual losses by (1) providing price discounts to temporarily increase sales volume, (2) overproducing inventory to decrease the cost of goods sold (COGS), or (3) cutting discretionary expenses to improve reported margins. Her findings suggest that companies with high leverage ratios increase their REM to show good results to their lenders to reduce their debt covenant violations and secure refinancing of debt, which is consistent with [11,23–25]. Similarly, Chen et al. [12] assert that high default risk is associated with high-leverage firms. Kuo et al. [26] and Ho et al. [21] document a positive relationship between REM and leverage for the Chinese firms. The leverage-portfolio analysis performed by Anagnostopoulou and Tsekrekos [19] reveals that high debt levels coincide with high positive real earnings manipulation caused by the lower probability of getting detected as these actions can be easily "masked" in everyday transactions, concluding that market participants seem to underreact to REM.

In contrast, in an unfavorable market, firms are influenced negatively by the pricing of their leverage, motivating them to mitigate the effect of leverage [19] to meet or beat earnings targets [2,5,27]. Jelinek [15] and Wasimullah and Abbas [17] identify a negative association between leverage and REM, grounded in the reduction of managers' opportunistic behavior, which modifies their astute conduct into discipline because managers cannot waste financial resources in the presence of predefined payments and lender-imposed spending conditions. Therefore, executives increase their prudency to invest in non-value maximizing projects. Further, high-leverage firms show lenders' scrutiny and control, which could mitigate REM practices [16,28]. Equally, Januarsi et al. [29] mention that managers might be reluctant to offer discounts, cut discretionary spending, or reduce the production cost, as these efforts will be valuable only in the short term, contrary to the negative effect on future cash flows in the long-term.

Most of these REM studies use annual data to detect real earnings manipulation activities [14,18–21]. However, earnings alterations conducted in each quarter are difficult to recognize in the annual financial statements, as these modifications are subject to trade-off and/or reversal in each quarter, resulting in the underestimation or misjudgment of REM in the annual reports. As a consequence of bias,

managers might have incentives to engage in REM activities during interim quarters, because auditors and regulators primarily review annual financial statements instead of quarterly reports. In our study, we use quarterly data as they offer higher transparency regarding financial and operational results than annual data. Using quarterly data can lead to better detection of REM because they enable us to recognize specific corporate events, seasonal fluctuations, changes in trends, and short-term movements. Therefore, it would increase the likelihood of identification of earnings manipulations by up-to-date financial information, thereby increasing the adjustment level of our statistical models.

Interim financial reports are less consistent than annual financial statements due to the managers' assumptions of estimation and calculation of interim costs [30]. Moreover, there are difficulties to track an increase in specific costs or revenues because several companies aggregate accounts for interim reporting purposes, enhancing the likelihood to manipulate temporary gains or losses. These limitations, especially, the vast use of estimates in unaudited interim financial reports, might provide an opportunity and advantage for intra-period earnings manipulations. Cohen et al. [31] show that firms raise their advertising expenditures during the third month of a fiscal quarter and in the fourth fiscal quarter to meet earnings from the same quarter in the previous year. They suggest that managers, with access to high-frequency data on the firm's current-year performance, cannot wait until the end of the year to conduct REM activities. Further, before the end of the fourth quarter, managers have sufficient time to learn about the firm's current performance and alter advertising expenditures by real manipulations initiatives. They estimate REM by advertising expenses and advertising outlays, which limits the overview of REM to marketing expenditures.

In our models, we include four proxies for REM, using quarterly data from (1) cash flow from operations (CFO), (2) selling, general, and administrative (SG&A) expenses, (3) production costs, and (4) aggregation of the mentioned REM metrics, providing a comprehensive view of REM engagement in the non-financial firms. Thus, we propose the following hypotheses:

Hypothesis 1. *Leverage affects REM in suspicious firms.*

Hypothesis 2. *Leverage affects REM's seasonally in the quarter base of the fiscal year in suspicious firms.*

3. Empirical Design

3.1. Detecting REM

We introduce Roychowdhury's [2] model to measure manipulation in real earnings activities, given that it was the most frequent and convenient method used in previous REM studies [2,5,6,19,28]. We examine patterns in the individual and aggregate value of CFO, SG&A expenses, and production costs (sum of COGS and change in inventory) for firms close to the zero earnings benchmark to detect real activities manipulation to avoid losses. The test power could detect REM by introducing the suspect firm-years concept, whose net income scaled by total assets is greater than or equal to zero but less than 0.005. Therefore, we divided our full sample into suspicious and non-suspicious firms according to their real earnings manipulation activities.

3.1.1. Measurement 1: REM by CFO

When a firm engages in REM activities, we expect negative abnormal CFO provoked by the sales manipulation or unsustainable sales through increased price discounts or lenient credit terms. Thus, discounts and lenient credit terms will temporarily increase sales volumes; however, this effect is likely to disappear once the firm reverts to old prices, meaning lower cash flows in the current period. Roychowdhury [2] measured abnormal CFO (*ABN_CFO*) as the difference between the actual CFO and the normal CFO by estimated coefficients from the corresponding industry-year model

and the firm-year sales and lagged assets. Using this measurement, we estimated Equation (1) with quarterly information.

$$ABN\_CFO_{i,t} = \alpha_0 + \alpha_1 \frac{1}{A_{i,\ t-1}} + \alpha_2 \frac{S_{i,t}}{A_{i,\ t-1}} + \alpha_3 \frac{\Delta S_{i,t}}{A_{i,\ t-1}} + \varepsilon_{i,t}, \quad (1)$$

where $ABN\_CFO_{i,t}$ is the abnormal CFO for firm i in quarter t, measured by $ABN\_CFO_{i,t} = \frac{CFO_{i,\ t}}{A_{i,\ t-1}}$; $CFO_{i,\ t}$ is the CFO for firm i in quarter t; $A_{i,\ t-1}$ denotes the total assets of firm i in quarter t–1; $\Delta S_{i,t}$ is the change in sales for firm i in quarter t, measured by $\Delta S_{i,t} = \frac{S_{i,t} - S_{i,t-1}}{S_{i,t-1}}$; $S_{i,t}$ is the total sales for firm i in quarter t; $S_{i,t-1}$ is the total sales for firm i in quarter t−1; α_0 is the intercept term; and $\varepsilon_{i,t}$ is the error term.

3.1.2. Measurement 2: REM by SG&A Expenses

When a firm adopts real earnings manipulation activities, we expect negative abnormal SG&A expenses, given that managers often reduce discretionary expenditures to avoid reporting earnings losses or to prevent missing earnings in the future. Therefore, decreasing SG&A expenses will boost the current period earnings. Roychowdhury [2] measured abnormal discretionary expenses $\left(\frac{DISEXP_{i,\ t}}{A_{i,\ t-1}}\right)$ as the difference between actual DISEXP and the normal DISEXP employing estimated coefficients from the corresponding industry-year model and the firm-year sales and lagged assets. We adapted this measurement and estimated abnormal SG&A expenses (*ABN_SG&A*) in Equation (2) with quarterly information.

$$ABN\_SG\&A_{i,t} = \alpha_0 + \alpha_1 \left(\frac{1}{A_{i,\ t-1}}\right) + \alpha_4 \left(\frac{S_{i,t}}{A_{i,t-1}}\right) + \varepsilon_{i,t} \quad (2)$$

where $ABN\_SG\&A_{i,t}$ is the abnormal SG&A expenses for firm i in quarter t, measured by $ABN\_SG\&A_{i,t} = \frac{SG\&A_{i,t}}{A_{i,t-1}}$, and $SG\&A_{i,t}$ is the SG&A expenses for firm i in quarter t.

3.1.3. Measurement 3: REM by Production Costs

When a firm manages earnings by real activities, we expect positive abnormal production costs. Managers can increase production more than necessary to increase earnings. When managers produce more units, they can spread the fixed overhead costs over a larger number of units, thereby lowering fixed costs per unit. Therefore, the total cost per unit declines as long as the reduction in fixed costs per unit is not balanced out by an increase in marginal cost per unit. These decreases are reported in COGS, and the firm might reach higher operating margins, suggesting that overproduction (excess of inventory) lowers reported COGS. Roychowdhury [2] defines production cost as $PROD_t = COGS_t + \Delta\ INV_t$. Therefore, abnormal production cost (*ABN_PROD*) is measured by the difference between actual PROD and the normal PROD by estimated coefficients from the corresponding industry-year model and the firm-year sales and lagged assets. Using this measurement, we estimated Equation (3) with quarterly information.

$$ABN\_PROD_{i,t} = \alpha_0 + \alpha_1 \left(\frac{1}{A_{i,t-1}}\right) + \alpha_2 \left(\frac{S_{i,t}}{A_{i,t-1}}\right) + \alpha_3 \left(\frac{\Delta S_{i,t}}{A_{i,t-1}}\right) + \alpha_5 \left(\frac{\Delta S_{i,t-1}}{A_{i,t-1}}\right) + \varepsilon_{i,t} \quad (3)$$

where $ABN\_PROD_{i,t}$ is the abnormal production cost for firm i in quarter t, measured by $ABN\_PROD_{i,t} = \frac{PROD_{i,t}}{A_{i,t-1}}$; $PROD_{i,t}$ is the production cost for firm i in quarter t, measured by $PROD_{i,t} = COGS_{i,t} + \Delta\ INV_{i,t}$; $COGS_{i,t}$ is the cost of goods sold for firm i in quarter t; $\Delta\ INV_{i,t}$ is the change in inventory for firm i in quarter t, measured by $\Delta INV_{i,t} = \frac{INV_t - INV_{t-1}}{INV_{t-1}}$; $INV_{i,t}$ is the total inventory for firm i in quarter t; $INV_{i,t-1}$ is the total inventory for firm i in quarter t−1; and $\Delta S_{i,t-1}$ is the change in sales for firm i in quarter t–1, measured by $\Delta S_{i,t-1} = \frac{S_{i,t-1} - S_{i,t-2}}{S_{i,t-2}}$.

3.1.4. Measurement 4: Aggregate REM

Abnormal aggregate REM (*ABN_REM*) is measured by the aggregation of *ABN_CFO*, *ABN_SG&A*, and *ABN_PROD*. For understanding purposes, we report the inverted sign for the variables *ABN_CFO* and *ABN_SG&A*, given that both measures will show negative residuals when firms engage in REM activities. We estimated Equation (4) with quarterly information; therefore, high residuals correspond to high levels of real earnings manipulation, suggesting positive *ABN_REM* when a firm manages earnings through REM activities.

$$ABN\_REM_{i,t} = ABN\_CFO_{i,t} * (-1) + ABN\_SG\&A_{i,t} * (-1) + ABN\_PROD_{i,t} \quad (4)$$

where $ABN\_REM_{i,t}$ is the abnormal aggregate REM for firm i in quarter t.

3.2. Research Model

We used panel data regression models with fixed effects to investigate the relationship between REM and leverage in Korean non-financial firms since the results of the Hausman test revealed that error terms are not correlated with the constant, which captures the individual characteristics [32]. We adopted ABN_REM, ABN_CFO, ABN_SG&A, and ABN_PROD as the dependent variables, with total (TLev), short-term (StLev), and long-term (LtLev) debt ratios as the independent variables. Our models included the most frequent control variables from previous studies, which are asset tangibility, profitability, size, and firm liquidity [33]. Profitability includes return on assets (ROA) in the lagged form following prior studies methodologies [3,14,28]. ROA shows what earnings were generated from invested capital (assets). Therefore, to control earnings provided by ROA, we included this variable in lagged form, because REM activities only can be conducted during the current fiscal year and they might be reversed in the subsequent quarter or may experience a trade-off between REM initiatives in each quarter. Furthermore, we incorporated net interest payment as a new control variable, given that an increase in leverage might increase interest expense, which lowers net income.

In Equation (5), coefficient β_1 is the result of our first hypothesis. This coefficient measures the relationship between leverage and REM. If coefficient β_1 is positive, leverage will positively affect the real earning manipulation activities of suspicious firms.

$$\begin{aligned} ABN\_REM_{i,t} = \beta_0 \quad & + \beta_1 Lev_{i,t} + \beta_2 Tang_{\,i,t} + \beta_3 ROA_{\,i,t-1} + \beta_4 Size_{\,i,t} + \beta_5 Liq_{\,i,t} \\ & + \beta_6 NetIntPay_{\,i,t} + \sum_{j=1}^{n} \beta_j \, Industry_{i,t} + \sum_{k=11}^{f} \beta_k \, Quarter_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (5)$$

where $ABN\_REM_{i,t}$ is the abnormal aggregate REM for firm i in quarter t. It is composed of abnormal CFO $ABN\_CFO_{i,t}$, abnormal SG&A expenses $ABN\_SG\&A_{i,t}$, and abnormal production cost $ABN\_PROD_{i,t}$. $Lev_{i,t}$ is the debt ratio for firm i in quarter t. It is composed of total debt ratio $TLev_{i,t}$, short-term debt ratio $StLev_{i,t}$, and long-term debt ratio $LtLev_{i,t}$. $TLev_{i,t} = \left(\frac{Current\ liabilities + Non-current\ liabilities}{Total\ assets}\right)_{i,t}$ for firm i in quarter t, $StLev_{i,t} = \left(\frac{Current\ liabilities}{Total\ assets}\right)_{i,t}$ for firm i in quarter t, $LtLev_{i,t} = \left(\frac{Non-current\ liabilities}{Total\ assets}\right)_{i,t}$ for firm i in quarter t, $Tang_{i,t} = \left(\frac{Net\ fixed\ assets}{Total\ assets}\right)_{i,t}$ is the assets tangibility for firm i in quarter t, $ROA_{i,t-1} = \left(\frac{Net\ income}{Total\ assets}\right)_{i,t-1}$ is the proxy for firm profitability for firm i in quarter t−1, $Size_{i,t} = Log\ (Total\ assets)_{i,t}$ is the size for firm i in quarter t and is represented by natural logarithm of total assets, $Liq_{i,t} = \left(\frac{Current\ assets}{Current\ liabilities}\right)_{i,t}$ is the liquidity for firm i in quarter t, $NetIntPay_{i,t} = \left(\frac{Interest\ income - Interest\ expenses}{Total\ assets}\right)_{i,t}$ is the net interest payment for firm i in quarter t, $Industry_{i,t}$ is a dummy that represents a firm's industry (there are ten non-financial industries listed on KOSPI), $Quarter_{i,t}$ is a dummy that represents the quarter of information of firm i, and $\varepsilon_{i,t}$ is the error term for firm i in quarter t.

In Equation (6), coefficient β_1 is the result of our second hypothesis. This coefficient detects the preferred quarter (Q1, Q2, Q3, or Q4) to conduct REM. The continuous variables $ABN\_REM_{i,t}$,

$ABN\_CFO_{i,t}$, $ABN\_SG\&A_{i,t}$, and $ABN\_PROD_{i,t}$ are replaced by four multiplicative terms to detect the period of REM engagement. Therefore, we introduce the following terms in our model: $ABN\_REM_{i,t} \times 1_{quarter=q}$, $ABN\_CFO_{i,t} \times 1_{quarter=q}$, $ABN\_SG\&A_{i,t} \times 1_{quarter=q}$, and $ABN\_PROD_{i,t} \times 1_{quarter=q}$, where q = {1, 2, 3, and 4}.

$$\begin{aligned} ABN\_REM_{i,t} \times \quad & 1_{quarter=q} \\ & = \beta_0 + \beta_1 Lev_{i,t} + \beta_2 Tang_{\,i,t} + \beta_3 ROA_{\,i,t-1} + \beta_4 Size_{\,i,t} + \beta_5 Liq_{\,i,t} \\ & + \beta_6 NetIntPay_{\,i,t} + \sum_{j=1}^{n} \beta_j \, Industry_{i,t} + \sum_{k=11}^{f} \beta_k \, Quarter_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (6)$$

where $ABN\_REM_{i,t} \times 1_{quarter=q}$, where q = {1, 2, 3, and 4}. The indicator function $1_{quarter=q}$ takes the value of one if the abnormal aggregate REM for firm i in quarter t belongs to the qth *ABN_REM* quarter over the sample period, and zero otherwise. The remaining measures of REM have the same corresponding meanings.

4. Empirical Results

The initial sample consisted of non-financial firms listed on the Korean Composite Stock Price Index (KOSPI). The financial sector was excluded as those firms are considered financially different from industrial companies. Therefore, high leverage for financial companies probably does not have the same meaning for non-financial firms [34]. Financial statements of 231 Korean non-financial firms, with 7735 firm-quarter observations, during the 2010–2018 period had to be complete and available to include these firms in the sample. Firms must also have reported sales during three consecutive quarters. The last sample resulted in 6207 firm-quarter observations. Firm information was collected from KisValue version 3.2 [35] using the cash flow statement, income statement, and statement of financial position. Our findings can be generalized for firms with similar characteristics of our sample disaggregation depending on the national accounting and financial regulations, given that IFRS adoption has improved the comparability of financial statements among firms in Korea and international firms. Lee [36] provides evidence that the primary purpose of adopting IFRS in Korea is to increase transparency in accounting information. Table 1 describes the sample selection.

Table 1. Sample selection.

	Detail	No.
	Initial firm-quarter observations	7735
Less:	Firm-quarter observations with incomplete information	−801
Less:	Firm-quarter observations without three consecutive quarters of sales	−527
Less:	Firm-quarter observations with extreme values [37]	−200
	Final sample of firm-quarter observations	6207

4.1. Descriptive Statistics

The descriptive statistics for all the variables are given in Table 2. Firms were classified into suspicious and non-suspicious firms according to Roychowdhury's [2] definition. There were 682 suspicious firm-quarters in our sample. Using absolute values, the mean of all abnormal REM measures (ABN_CFO, ABN_SGA, ABN_PROD, and ABN_REM) was higher in suspicious firms than their mean values in non-suspicious firms, which was approximately zero. Similarly, the mean of leverage ratios in suspicious firms was higher than that in non-suspicious firms, implying that suspicious firms that conduct real earnings manipulation activities are considered high-leverage companies compared with non-suspicious firms, which serves as the first evidence of our first hypothesis.

Table 2. Descriptive statistics.

	Suspicious Firm-Quarters (N = 682)				Non-Suspicious Firm-Quarters (N = 5525)			
	Mean	**Std. Dev.**	**Min**	**Max**	**Mean**	**Std. Dev.**	**Min**	**Max**
Dependent variables								
ABN_REM	0.051	0.118	−1.089	0.581	−0.007	0.201	−1.531	1.034
ABN_CFO	−0.013	0.047	−0.253	0.175	0.002	0.061	−1.107	0.340
ABN_SG&A	−0.015	0.053	−0.179	0.574	0.002	0.089	−0.319	0.669
ABN_PROD	0.023	0.059	−0.551	0.268	−0.003	0.096	−0.812	0.389
Independent variables								
TLev	0.542	0.188	0.086	1.052	0.473	0.202	0.034	1.577
StLev	0.377	0.166	0.052	0.936	0.329	0.166	0.024	1.459
LtLev	0.165	0.122	0.000	0.648	0.144	0.124	0.000	1.124
Control variables								
Tang	0.325	0.209	0.000	0.949	0.336	0.195	0.000	0.954
ROA	0.004	0.036	−0.301	0.195	0.016	0.067	−2.264	0.813
Size	27.020	1.459	24.125	32.250	27.005	1.552	23.337	33.020
Liq	1.308	0.875	0.282	8.411	1.633	1.449	0.116	20.912
NetIntPay	0.007	0.007	0.000	0.041	0.007	0.009	0.000	0.120

Note: "Suspicious" is defined as firms whose net income scaled by total assets is greater than or equal to zero but less than 0.005. Dependent variables are (1) abnormal aggregate real earnings management (ABN_REM), (2) abnormal cash flow from operations (ABN_CFO), (3) abnormal selling, general, and administrative expenses (ABN_SG&A), and (4) abnormal production cost (ABN_PROD). Independent variables are (1) total debt ratio (TLev), (2) short-term debt ratio (StLev), and (3) long-term debt ratio (LtLev). Control variables are (1) asset tangibility (Tang), (2) return of assets (ROA), (3) size (Size), (4) firm liquidity (Liq), and (5) net interest payment (NetIntPay).

Table 3 shows the results of the t-test for equality of means for dependent and independent variables using independent samples. We performed this test to demonstrate that the mean of REM activities and leverage for suspicious firms was significantly different from those non-suspicious firms. The average of all dependent and independent variables was statistically different for suspicious and non-suspicious companies. Especially, the significant difference of ABN_REM, ABN_CFO, ABN_SG&A, and ABN_PROD between "suspicious" and "non-suspicious" firms, supports Schipper's argument that managers intervene intentionality in the financial reporting process to get private benefits.

Table 3. T-test for equality of means for suspicious and non-suspicious firms.

Variable	Suspicious Firms	Non-Suspicious Firms	Difference	t-Value
ABN_REM	0.051	−0.007	0.058	7.431 ***
ABN_CFO	−0.013	0.002	−0.015	−6.057 ***
ABN_SG&A	−0.015	0.002	−0.017	−5.049 ***
ABN_PROD	0.023	−0.003	0.026	6.900 ***
TLev	0.542	0.473	0.069	8.915 ***
StLev	0.377	0.329	0.048	7.475 ***
LtLev	0.165	0.144	0.021	4.421 ***

Note: *** indicates statistical significance at the 1% level.

Table 4 presents the average of the REM measures and debt ratios disaggregated by industry and classified by suspicious and non-suspicious firms. On one hand, for suspicious firms, the highest mean value for ABN_REM and ABN_CFO was evident in the construction industry, while the electricity and gas industry showed the highest mean value for ABN_SG&A and ABN_PROD. The lowest mean value for ABN_REM, ABN_SG&A, and ABN_PROD was exhibited by the communication sector, whereas the electricity and gas industry registered the lowest average value for ABN_CFO. On the other hand, for non-suspicious firms, the communication industry revealed the lowest average value for all REM measures, while the highest mean values for ABN_REM, ABN_CFO, ABN_SG&A, and ABN_PROD were shown by construction, textile and apparel, transport and storage, and construction industries, respectively.

Table 4. Mean per industry for suspicious and non-suspicious firms (in parenthesis).

Industry	ABN_REM	ABN_CFO	ABN_SG&A	ABN_PROD	TLev	StLev	LtLev	N
Electrical and Electronic Equip.	0.077 (0.033)	0.002 (0.009)	−0.035 (−0.023)	0.043 (0.020)	0.480 (0.415)	0.356 (0.304)	0.123 (0.111)	156 (1275)
Construction	0.111 (0.118)	−0.033 (−0.020)	−0.034 (−0.044)	0.044 (0.053)	0.684 (0.664)	0.507 (0.509)	0.178 (0.156)	150 (767)
Paper and Wood	0.054 (0.026)	−0.008 (0.006)	−0.019 (−0.016)	0.027 (0.016)	0.514 (0.447)	0.365 (0.307)	0.149 (0.140)	88 (486)
Food and Beverages	0.001 (−0.077)	−0.016 (0.003)	0.010 (0.034)	−0.004 (−0.040)	0.540 (0.471)	0.381 (0.348)	0.159 (0.123)	86 (918)
Transport and Storage	0.078 (0.091)	−0.004 (0.010)	−0.037 (−0.050)	0.036 (0.050)	0.615 (0.582)	0.340 (0.329)	0.276 (0.253)	73 (442)
Textile and Wearing Apparel	−0.081 (−0.153)	−0.031 (−0.022)	0.062 (0.088)	−0.051 (−0.085)	0.400 (0.382)	0.319 (0.294)	0.081 (0.088)	52 (647)
Non-metallic Mineral Prod.	0.035 (0.012)	−0.010 (0.009)	−0.011 (−0.017)	0.014 (0.005)	0.426 (0.432)	0.262 (0.280)	0.165 (0.152)	49 (546)
Medical and Precision Mach.	0.009 (−0.027)	−0.018 (−0.011)	0.006 (0.020)	−0.003 (−0.018)	0.388 (0.331)	0.310 (0.251)	0.079 (0.080)	13 (95)
Electricity and Gas	0.094 (0.074)	0.038 (0.017)	−0.056 (−0.039)	0.075 (0.052)	0.672 (0.523)	0.206 (0.259)	0.466 (0.264)	12 (222)
Communication	−0.359 (−0.529)	0.017 (0.026)	0.176 (0.249)	−0.166 (−0.248)	0.664 (0.458)	0.329 (0.237)	0.335 (0.221)	3 (127)
Total	0.051 (−0.007)	−0.013 (0.002)	−0.015 (0.002)	0.023 (−0.003)	0.542 (0.473)	0.377 (0.329)	0.165 (0.144)	682 (5525)

Note: The final sample consists of 6207 firm-quarter observations of non-financial firms listed on the Korean Composite Stock Price Index (KOSPI), divided into 682 and 5525 suspicious and non-suspicious firm-quarter observations, respectively. Numbers inside the parentheses are mean values for non-suspicious firms.

Low negative values for ABN_CFO and ABN_SG&A demonstrated high levels of real earnings manipulation activities, whereas high positive values of ABN_REM and ABN_PROD indicated high REM. Thus, the construction industry was more likely to conduct abnormal aggregate real earnings manipulation initiatives in suspicious and non-suspicious companies with average values of 0.111 and 0.118, respectively. Regarding leverage measurements, the highest mean of total debt ratio and short-term borrowings was observed in the construction industry for both suspicious and non-suspicious firms, while the highest average of long-term debt ratio was found in the electricity and gas industry with mean values of 0.466 and 0.264 for suspicious and non-suspicious companies, respectively. By contrast, the lowest mean for total and long-term leverage was evident in the medical and precision machines industry in both samples, whereas the lowest mean for short-term debt ratio was found in the electricity and gas and communication industries for suspicious and non-suspicious firms, respectively.

4.2. Correlation Analysis

Panel A of Table 5 shows that both ABN_REM and ABN_PROD had a significant positive correlation, at least at the 5% level with all leverage ratios. On the contrary, ABN_CFO showed a significant negative correlation with total and short-term borrowings, similar to the significant negative correlation between ABN_SG&A and total and long-term debt ratios. Panel B did not present any significance between REM measures and leverage ratios. In both panels, the correlation values themselves were not large enough for the multicollinearity problem to arise.

Table 5. Pearson Correlation Matrix.

Panel A	**ABN_REM**	**ABN_CFO**	**ABN_SG&A**	**ABN_PROD**	**TLev**	**StLev**	**LtLev**	**Tang**	**ROA**	**Size**	**Liq**	**NetIntPay**
ABN_REM	1											
ABN_CFO	−0.403 ***	1										
ABN_SG&A	−0.873 ***	−0.033	1									
ABN_PROD	0.900 ***	−0.029	−0.872 ***	1								
TLev	0.176 ***	−0.138 ***	−0.136 ***	0.124 ***	1							
StLev	0.129 ***	−0.159 ***	−0.067	0.075 **	0.768 ***	1						
LtLev	0.097 **	0.004	−0.119 ***	0.088 **	0.494 ***	−0.177 ***	1					
Tang	−0.068	0.226 ***	−0.043	0.006	−0.019	−0.220 ***	0.270 ***	1				
ROA	−0.009	0.081 **	−0.022	0.027	−0.217 ***	−0.200 ***	−0.063	0.084 **	1			
Size	0.143 ***	−0.084 **	−0.071	0.159 ***	0.357 ***	0.017	0.526 ***	0.052	−0.037	1		
Liq	−0.066	−0.004	0.077 **	−0.063	−0.591 ***	−0.526 ***	−0.194 ***	−0.294 ***	0.119 ***	−0.168 ***	1	
NetIntPay	0.093 **	−0.107 ***	−0.063	0.049	0.494 ***	0.370 ***	0.258 ***	0.043	−0.106 ***	0.169 ***	−0.307 ***	1
Panel B	**ABN_REM**	**ABN_CFO**	**ABN_SG&A**	**ABN_PROD**	**TLev**	**StLev**	**LtLev**	**Tang**	**ROA**	**Size**	**Liq**	**NetIntPay**
ABN_REM	1											
ABN_CFO	−0.439 ***	1										
ABN_SG&A	−0.906 ***	0.057 ***	1									
ABN_PROD	0.960 ***	−0.227 ***	−0.919 ***	1								
TLev	0.109	−0.106	−0.083	0.087	1							
StLev	0.107	−0.125	−0.119	0.099	0.790 ***	1						
LtLev	0.016	0.015	−0.009	0.038	0.572 ***	−0.051 ***	1					
Tang	−0.080 ***	0.189 ***	0.015	−0.030 **	0.088 ***	−0.172 ***	0.374 ***	1				
ROA	−0.107 ***	0.266 ***	−0.040 ***	−0.090 ***	−0.190 ***	−0.178 ***	−0.071 ***	0.022	1			
Size	−0.114* **	0.075 ***	0.092 ***	−0.100 ***	0.234 ***	−0.025	0.415 ***	0.106 ***	0.104 ***	1		
Liq	−0.091 ***	0.068 ***	0.057 ***	−0.096 ***	−0.594 ***	−0.523 ***	−0.268 ***	−0.216 ***	0.083 ***	−0.161 ***	1	
NetIntPay	0.065 ***	−0.133 ***	0.021	0.075 ***	0.578 ***	0.450 ***	0.340 ***	0.090 ***	−0.186 ***	0.047 ***	−0.317 ***	1

Note: Panels A and B show the Pearson correlation coefficients for suspicious and non-suspicious firms, respectively. *** and ** indicate statistical significance at the 1% and 5% levels, respectively.

4.3. Regression Analysis

4.3.1. Relationship between REM and Leverage

Table 6 shows the results of 24 multiple linear regressions to explain the relationship between leverage and real earnings manipulation activities measured by ABN_REM, ABN_CFO, ABN_SG&A, and ABN_PROD, employing a sample of 6207 firm-quarter observations of non-financial firms listed on KOSPI, divided into 682 (Panel A) and 5525 (Panel B) suspicious and non-suspicious firm-quarter observations, respectively.

Panel A confirmed the significant positive at least 5% level relationship between all leverage ratios and all REM measures in suspicious firms. The regression coefficient of total leverage indicated that when total borrowing rose by one unit, with the statement that other variables remain constant, the REM initiatives would increase by 0.113 (ABN_REM). Similar significant positive coefficients were estimated for short-term and long-term debt ratios for all REM measures. These results also implied that suspicious firms were more likely to conduct real earnings manipulation activities by price discounts, tolerant credit terms, cutting SG&A expenses, and overproduction. On the contrary, for non-suspicious firms (Panel B), the regression coefficients of all leverage measurements were not significant. There was not a significant relationship between debt ratios and real earnings manipulation activities in non-suspicious firms. We were able to conclude that the effect of leverage is significantly positive on real earnings manipulation activities in suspicious firms, while its influence is insignificant in non-suspicious firms.

Our control variables were significantly negative in the majority of the statistical models. The possibility to exercise managers' discretion over REM depends on the levels of current and non-current assets and liabilities. We found that higher asset tangibility mitigates the extent of real adjustments. We also identified a negative relationship between ROA and REM measures. These results imply that the lower firm's performance might increase the manager's incentive to engage in REM activities to signal the future firm value. Moreover, there was a significant negative relationship between size and REM measures, indicating that large firms restrain REM activities because most of them own corporate governance policies reduce the flexibility of real manipulations. We also showed the significant negative relationship between liquidity and REM measures. These findings indicate managers' abilities to engage in REM activities in the absence of firm liquidity. Jensen [38] mentions that higher interest expense might control managers' opportunistic behaviors. Therefore, there is a negative relationship between NetIntPay and REM measures because managers prioritize the interest and principal payments. A higher interest payment might limit managers from exercising their own discretion and reduce the possibility to engage in REM.

Previous studies of the effect of leverage on REM did not find strong results with annual data. By using annual financial statements from non-financial firms listed on Bursa Malaysia, Zamri et al. [28] showed a significant positive effect at the 10% level relationship between ABN_PROD and leverage, while the rest of the REM measures indicated an insignificant relationship with total debt. They suggested that REM would be underestimated or misread in annual reports. By using quarterly data, we clearly identified the significant positive at least 5% level relationship between all REM measures and leverage. These findings imply that the quarterly path offers a better determination of REM activities in the short- and medium-term, which improves the transparency and accuracy in the financial and operational results. By using annual data from non-financial firms listed on the Tehran Stock Exchange, Vakilifard and Mortazavi [3] showed that leverage had a significant positive effect on the aggregate REM. However, there was not a significant relationship between total debt and disaggregated REM measures. These results indicate that "real-time" adjustments are difficult to detect in annual financial reports and those earnings alterations can be reversed in subsequent quarters. Managers might be motivated to engage in REM activities during the interim quarters. Therefore, the findings' significance increased using quarterly data instead of annual data, which is consistent with our view of the seasonality of REM.

Table 6. Regression results.

Panel A: Suspicious Firms (*N* = 682)												
Variables	**ABN_REM**			**ABN_CFO (−1)**			**ABN_SG&A (−1)**			**ABN_PROD**		
TLev	0.113 ***			0.053 ***			0.020 ***			0.039 ***		
	(6.528)			(8.744)			(2.714)			(4.796)		
StLev		0.118 ***			0.052 ***			0.022 ***			0.044 ***	
		(6.295)			(7.946)			(2.799)			(4.970)	
LtLev			0.022 **			0.015 **			0.002 **			0.003 **
			(1.932)			(1.945)			(2.205)			(2.267)
Tang	−0.177 ***	−0.155 ***	−0.177 ***	−0.062 ***	−0.052 ***	−0.062 ***	−0.048 ***	−0.044 ***	−0.048 ***	−0.065 ***	−0.057 ***	−0.064 ***
	(−11.745)	(−10.134)	(−11.219)	(−11.827)	(−9.782)	(−11.398)	(−7.697)	(−6.945)	(−7.325)	(−9.239)	(−7.988)	(−8.727)
ROA	−0.357 ***	−0.368 ***	−0.383 ***	−0.212 ***	−0.217 ***	−0.224 ***	0.003	0.001	−0.002	−0.146 ***	−0.149 ***	−0.155 ***
	(−10.796)	(−11.175)	(−11.611)	(−18.217)	(−18.764)	(−19.247)	(0.197)	(0.075)	(−0.153)	(−9.419)	(−9.680)	(−10.068)
Size	−0.015 ***	−0.012 ***	−0.014 ***	−0.001 *	0.001	−0.001	−0.006 ***	−0.006 ***	−0.006 ***	−0.007 ***	−0.006 ***	−0.007 ***
	(−9.462)	(−7.569)	(−8.372)	(−1.725)	(0.703)	(−1.135)	(−9.741)	(−8.910)	(−8.918)	(−10.092)	(−8.646)	(−8.975)
Liq	−0.007 ***	−0.007 ***	−0.013 ***	−0.001	0.001	−0.003 ***	−0.003 ***	−0.003 ***	−0.004 ***	−0.003 ***	−0.003 ***	−0.005 ***
	(−3.490)	(−3.529)	(−7.737)	(−0.355)	(−0.627)	(−5.363)	(−4.065)	(−3.964)	(−6.265)	(−3.717)	(−3.568)	(−7.041)
NetIntPay	−0.155 ***	−0.760 ***	−0.166	0.042	−0.246 **	0.484	−0.092 ***	−0.085 ***	−0.735	−0.226	−0.107	0.131
	(−3.616)	(−2.583)	(−0.576)	(0.375)	(−2.405)	(4.821)	(−6.832)	(−6.907)	(−6.083)	(−1.511)	(−0.780)	(0.973)
Intercept	0.459 ***	0.381 ***	0.483 ***	0.020	−0.014	0.045 ***	0.209 ***	0.194 ***	0.213 ***	0.228 ***	0.199 ***	0.237 ***
	(10.766)	(8.482)	(10.741)	(1.326)	(−0.884)	(2.868)	(11.704)	(10.317)	(11.262)	(11.418)	(9.568)	(11.273)
Quarter-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2	0.372	0.372	0.370	0.151	0.149	0.141	0.316	0.316	0.316	0.396	0.396	0.394
F-Stat.	143.342 ***	143.137 ***	140.461 ***	45.785 ***	45.109 ***	42.075 ***	180.208 ***	180.232 ***	179.650 ***	158.493 ***	158.615 ***	156.842 ***
DW	1.930	1.931	1.916	1.935	1.931	1.918	1.942	1.943	1.938	1.932	1.934	1.923

Table 6. *Cont.*

Panel B: Non-Suspicious Firms (*N* = 5525)												
Variables	**ABN_REM**			**ABN_CFO (−1)**			**ABN_SG&A (−1)**			**ABN_PROD**		
TLev	0.043			0.031			0.015			0.003		
	(1.240)			(1.104)			(1.018)			(0.173)		
StLev		0.053			0.023			0.012			0.019	
		(1.442)			(1.499)			(0.766)			(1.067)	
LtLev			−0.008			0.015			0.006			−0.032
			(0.170)			(0.828)			(0.353)			(−1.507)
Tang	−0.032	−0.025	−0.031	−0.043 ***	−0.040 ***	−0.045 ***	0.013	0.014	0.012	0.002	0.004	0.006
	(−1.060)	(−0.827)	(1.008)	(−3.369)	(−3.085)	(−3.472)	(1.027)	(1.132)	(0.933)	(0.107)	(0.268)	(0.383)
ROA	0.121	0.112	0.094	−0.059	−0.070	−0.073	0.078	0.073	0.071	0.101 *	0.109 **	0.094 *
	(1.047)	(0.980)	(0.818)	(−1.192)	(−1.428)	(−1.482)	(1.609)	(1.521)	(1.482)	(1.812)	(1.969)	(1.704)
Size	0.004	0.006 *	0.005	0.004 ***	0.005 ***	0.004 ***	−0.002 *	−0.002	−0.002 *	0.003 *	0.003 *	0.004 **
	(1.384)	(1.812)	(1.552)	(3.120)	(3.702)	(2.929)	(−1.888)	(−1.597)	(−1.749)	(1.731)	(1.873)	(2.163)
Liq	0.007	0.008	0.003	0.001	−0.001	−0.003	0.005 *	0.005	0.003	0.002	0.005	0.003
	(1.070)	(1.230)	(0.482)	(0.198)	(−0.029)	(−1.166)	(1.776)	(1.620)	(1.420)	(0.698)	(1.389)	(1.029)
NetIntPay	0.323	0.365	0.688	−0.028	0.092	0.189	0.075	0.129	0.180	0.388	0.256	0.437
	(0.444)	(0.519)	(1.013)	(−0.092)	(0.315)	(0.668)	(0.253)	(0.449)	(0.652)	(1.106)	(0.753)	(1.337)
Intercept	−0.054	−0.107	−0.065	−0.101 ***	−0.128 ***	−0.095 **	0.083 **	0.073 *	0.088 **	−0.037	−0.054	−0.060
	(−0.603)	(−1.169)	(−0.719)	(−2.699)	(−3.339)	(−2.525)	(2.258)	(1.945)	(2.356)	(−0.860)	(−1.232)	(−1.369)
Quarter-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2	0.243	0.244	0.242	0.141	0.139	0.137	0.342	0.341	0.341	0.289	0.290	0.291
F-Stat.	10.505 ***	10.538 ***	10.416 ***	6.011 ***	5.898 ***	5.817 ***	16.792 ***	16.761 ***	16.730 ***	12.999 ***	13.069 ***	13.141 ***
DW	2.000	2.000	1.988	1.924	1.921	1.919	2.058	2.055	2.047	2.044	2.051	2.044

Note: The results indicate a significant positive relationship between leverage and REM in suspicious firms. Beta corresponds to unstandardized coefficients. Numbers inside the parentheses are t-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

4.3.2. The Seasonality of REM

In order to test the seasonality of REM activities, we ran our regression model using quarterly data. By using firm-quarter observations, we wanted to illustrate that the relationship between leverage and REM was stronger than the annual data findings. We could not find that managers prefer quarters to engage in REM activities using previous studies' findings with annual data [2,3,28], because real manipulations can be reversed in subsequent periods. Moreover, we were interested in identifying the quarter with the strongest effect in the relationship between leverage and REM activities. Therefore, we would be able to determine the seasonality of REM and provide empirical evidence for regulators to review quarterly and annual financial statements. We might expect the strongest relationship between leverage and REM in the fourth quarter since the managers' opportunistic behavior wants to meet or beat the earnings targets using detailed and complete information at the end of the year. Table 7 shows the results of 16 multiple linear regressions to explain the relationship between leverage and the four REM measures, employing a sample of 682 suspicious firm-quarter observations. F-statistics were significantly higher for all the models. The highest adjusted R-Square values of each REM measure were presented in the last quarter with adjustments of 47.1%, 26.3%, 51.7%, and 49.7% for *ABN_REM*, *ABN_CFO*, *ABN_SG&*A, and *ABN_PROD*, respectively.

All panels confirmed the significant positive relationship between the total leverage and the real earnings manipulation activities conducted by suspicious firms during the second half of the fiscal year. These results imply that firms tend to engage in REM in the second half of the year. This implication is especially true because managers have more information about the firm at the end of the year because economic and financial information about firm performance is more precise in the last quarter of the year.

Our third quarter findings were consistent because financial statements for interim quarters are often unaudited and they are less consistent than annual financial reports due to the use of several interim cost estimates and accounts aggregation for interim reporting purposes. In the third quarter, managerial discretion increases, and the likelihood of detailed disclosure decreases compared with annual financial statements. Therefore, managers are more likely to conduct REM in interim quarters than in the last quarter of the fiscal year because of its greater probability of not getting detected [39].

Furthermore, our results for the last quarter are also aligned with those of Cohen et al.'s [31] research, who used abnormal advertising activities to measure REM measure. They suggested that suspicious firms are more likely to increase their advertising expenditures in the fourth fiscal quarter to meet earnings benchmarks. We are able to conclude that leverage has a significant positive effect on real earnings manipulation activities in the suspicious firms during the second half of the year, while its influence is insignificant during the first two quarters of the fiscal year. Therefore, our second hypothesis is accepted for all REM measures, implying a significant positive relationship between total borrowings and REM activities in suspicious firms during the second half of the fiscal year. Similar significant positive coefficients are estimated for short-term and long-term debt ratios for all REM measures; therefore, we are not going to provide detailed results.

Table 7. Quarterly regression results—Suspicious firm-quarters (N = 682).

	Panel A: Abnormal Aggregate REM (ABN_REM)				Panel B: Abnormal Cash Flow from Operations (ABN_CFO (−1))				Panel C: Abnormal SG&A Expenses (ABN_SG&A (−1))				Panel D: Abnormal Production Costs (ABN_PROD)			
Variables	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
TLev	0.087	0.113	0.137 ***	0.103 ***	0.022	0.069	0.060 ***	0.047 ***	0.019	−0.011	0.028 *	0.028 **	0.037	0.038	0.048 ***	0.025 *
	(1.420)	(1.297)	(3.759)	(3.318)	(1.602)	(1.099)	(5.098)	(3.907)	(1.313)	(0.749)	(1.824)	(2.116)	(1.246)	(1.390)	(2.688)	(1.768)
Tang	−0.156 ***	−0.154 ***	−0.218 ***	−0.186 ***	−0.065 ***	−0.051 ***	−0.062 ***	−0.076 ***	−0.033 ***	−0.045 ***	−0.066 ***	−0.049 ***	−0.057 ***	−0.058 ***	−0.085 ***	−0.062 ***
	(−5.231)	(−5.164)	(−6.653)	(−6.939)	(−6.220)	(−5.227)	(−5.876)	(−7.347)	(−2.768)	(−3.549)	(−4.777)	(−4.360)	(−4.184)	(−4.162)	(−5.339)	(−5.102)
ROA	−0.533 ***	−0.136 ***	−0.527 ***	−0.320 ***	−0.381 ***	−0.042 **	−0.284 ***	−0.300 ***	−0.007	−0.020	−0.042	0.133 ***	−0.148 ***	−0.072 ***	−0.288 ***	−0.165 ***
	(−9.056)	(−2.650)	(−5.075)	(−4.138)	(−17.874)	(−2.444)	(−8.523)	(−9.885)	(−0.270)	(−0.897)	(0.961)	(4.068)	(−5.530)	(−3.015)	(−5.667)	(−4.707)
Size	−0.009 ***	−0.011 ***	−0.021 ***	−0.016 ***	0.002 *	−0.001	−0.003 ***	−0.002	−0.005 ***	−0.005 ***	−0.008 ***	−0.007 ***	−0.006 ***	−0.006 ***	−0.010 ***	−0.008 ***
	(−3.017)	(−3.421)	(−6.367)	(−5.993)	(1.779)	(−0.267)	(−2.587)	(−1.473)	(−4.118)	(−4.069)	(−5.979)	(−6.122)	(−4.045)	(−3.802)	(−6.168)	(−6.087)
Liq	−0.006	−0.009 **	−0.009 **	−0.002	−0.001	0.001	−0.001	0.001	−0.003 *	−0.005 ***	−0.004 **	−0.001	−0.002	−0.004 **	−0.004 **	−0.002
	(−1.572)	(−2.216)	(−2.374)	(−0.646)	(−0.999)	(0.471)	(−0.807)	(0.481)	(−1.728)	(−2.948)	(−2.350)	(−0.843)	(−1.405)	(−2.424)	(−2.261)	(−1.146)
NetIntPay	−0.700 ***	−0.585	−0.506	−0.124 **	−0.211	0.111	0.156	−0.015	−0.622 ***	−0.503 ***	−0.613 **	−0.028 ***	−0.493 *	−0.141	−0.060	−0.105
	(−2.682)	(−1.252)	(−0.728)	(2.003)	(−0.930)	(0.533)	(0.689)	(−0.068)	(−3.159)	(−3.330)	(−2.076)	(−4.346)	(−1.710)	(−0.467)	(−0.176)	(−0.413)
Intercept	0.323 ***	0.356 ***	0.646 ***	0.501 ***	−0.035	−0.015	0.069 **	0.042	0.170 ***	0.194 ***	0.269 ***	0.216 ***	0.182 ***	0.187 ***	0.302 ***	0.237 ***
	(3.814)	(4.192)	(7.004)	(6.693)	(−1.166)	(−0.554)	(2.344)	(1.450)	(4.903)	(5.405)	(6.992)	(6.899)	(4.730)	(4.731)	(6.766)	(6.956)
Quarter-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2	0.377	0.306	0.396	0.471	0.240	0.134	0.153	0.263	0.433	0.355	0.425	0.517	0.406	0.348	0.404	0.497
F-Stat.	36.769 ***	27.350 ***	40.497 ***	55.104 ***	20.510 ***	10.749 ***	12.341 ***	13.281 ***	48.304 ***	35.802 ***	47.634 ***	68.374 ***	41.472 ***	32.915 ***	41.902 ***	61.029 ***
DW	2.017	1.929	1.902	1.985	1.981	1.942	1.937	1.946	2.004	1.980	1.942	1.977	1.993	1.937	1.917	1.999

Note: N = 682 suspicious firm-quarter observations, divided into Q1 = 158, Q2 = 179, Q3 = 174, and Q4 = 171 suspicious firm-quarter observations. The results indicate a positive relationship between leverage and REM in suspicious firms during the last two quarters of the fiscal year. Beta corresponds to unstandardized coefficients. Numbers inside the parentheses are t-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

4.3.3. Two-Stage Least Square Regression Analysis

In the literature of finance and accounting, there is concern about the endogenous relationship among variables. Managers' abnormal operational or investment decisions are both influenced by debt ratios. Therefore, it affects REM. To address this concern, we employed Equations (7) and (8) to control the endogeneity problem by 2SLS regression analysis. The 2SLS model assumes that the dependent variable's error terms are correlated with the independent variables. Errors terms from Equation (5), however, were not normally distributed in our sample and the Pearson correlation matrix did not reveal high and significant (at the 5% level) coefficients between independent variables and REM residuals [40]. Nevertheless, to improve the robustness of our model, we used 2SLS regression analysis. In the first stage, we ran *ABN_REM* and total leverage, where we controlled for "*Size_Dummy*" and "*Size*". In the second stage, we ran our model using results from the first stage.

First stage:

$$Lev_{i,t} = \beta_0 + \beta_1 ABN\_REM_{i,t} + \beta_2 Size\_Dummy_{i,t} + \beta_3 Size_{i,t} + \varepsilon_{i,t} \quad (7)$$

Second stage:

$$\begin{aligned} ABN\_REM_{i,t} = \alpha_0 + \quad & \alpha_1 Lev_{i,t} + \alpha_2 Tang_{i,t} + \alpha_3 ROA_{i,t-1} + \alpha_4 Size_{i,t} + \alpha_5 Liq_{i,t} \\ & + \alpha_6 NetIntPay_{i,t} + \sum_{j=1}^{n} \alpha_j Industry_{i,t} + \sum_{k=11}^{f} \alpha_k Quarter_{i,t} + \varepsilon_{i,t}, \end{aligned} \quad (8)$$

where $Lev_{i,t}$ is the debt ratio for firm i in quarter t. It is composed of total debt ratio $TLev_{i,t}$, short-term debt ratio $StLev_{i,t}$, and long-term debt ratio $LtLev_{i,t}$, and *Size_Dummy* is an indicator variable with a value of 1 if total assets are equal to or above 2 trillion Korean Won (firms that have assets of over 2 trillion Korean Won are required by law to have an internal audit committee, which provides an internal control mechanism for monitoring management's activity), an 0 otherwise.

We obtained results in the second-stage regression (Table 8) that were consistent with our previous results, even though each coefficient of leverage, α_1, was larger than the coefficients presented in Table 6 for suspicious firms. These results aligned with the hypothesis that there is a positive relationship between debt ratios and REM activities.

Table 8. Regression results of the 2SLS model.

First-Stage Regression Results			
Variable	**TLev**	**StLev**	**LtLev**
ABN_REM	0.042 ***	0.016 **	0.038 ***
	(4.344)	(2.556)	(4.401)
Intercept	0.385 ***	0.367 ***	0.218 ***
	(9.913)	(8.775)	(3.486)
Adj. R2	0.026	0.021	0.026
F-Stat.	3.866 ***	3.309 ***	3.371 ***
Covariance ABN_REM	0.016	0.013	0.012
Second-Stage Regression Results			
Variables	**ABN_REM**		
TLev	0.132 ***		
	(8.138)		
StLev		0.136 **	
		(2.104)	
LtLev			0.121 **
			(2.018)

Table 8. *Cont.*

Second-Stage Regression Results			
Variables	**ABN_REM**		
Tang	−0.197 ***	−0.161 ***	−0.178 **
	(−3.060)	(−3.369)	(−2.027)
ROA	−0.369 **	−0.335 **	−0.386 ***
	(−2.047)	(−2.192)	(−2.609)
Size	−0.013 **	−0.015 ***	−0.013 ***
	(−2.384)	(−3.120)	(−2.888)
Liq	−0.011 **	−0.006 **	−0.067 ***
	(−2.070)	(−2.198)	(−3.766)
NetIntPay	−0.082 **	−0.101 ***	−0.049 **
	(−2.444)	(−3.092)	(−2.253)
Intercept	0.221 **	0.687 ***	0.487 ***
	(1.982)	(2.700)	(2.902)
Quarter-fixed effects	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes
Adj. R2	0.269	0.169	0.238
F-Stat.	10.505 ***	7.179 ***	9.792 ***
DW	1.859	1.878	2.068

Note: The results indicate a significant positive relationship between leverage and REM in suspicious firms, using 2SLS regression to control endogeneity. Beta corresponds to unstandardized coefficients. Numbers inside the parentheses are t-statistics. *** and ** indicate statistical significance at the 1% and 5% level, respectively.

5. Conclusions

This study analyzes the relationship between leverage and REM for suspicious and non-suspicious firms using a sample of 6207 firm-quarter observations during the 2010–2018 period of non-financial firms listed on KOSPI. Using abnormal aggregate REM, abnormal CFO, abnormal SG&A expenses, and abnormal production costs as proxies for REM, we find that the effect of all debt ratios is significantly positive on REM metrics in suspicious firms, while the leverage's effect is not significant in non-suspicious firms. These results imply that suspicious firms are more likely to conduct REM activities by providing price discounts, tolerant credit terms, cutting SG&A expenses, and overproduction, and managers are motivated to engage in "masked" everyday transactions to increase their personal wealth and reputation.

Moreover, by looking at intra-year data of REM activities, we find a significant positive relationship between debt ratios and REM for the last two quarters of the fiscal year. These results imply that the seasonality of REM prevails. Managers could have a preferred period to engage in REM activities. This implication would be true that managers own more financial information at the end of the year, thus making it uncomplicated to manipulate real earnings and not be detected during this time. Our findings are consistent with Jeter and Shivakumar's [39] and Cohen et al.'s [31] view that the financial statements of interim quarters are not often audited compared with annual financial statements.

There is apprehension related to the endogenous relationship between variables since managers' financial decisions are influenced by leverage, which affects REM activities. Therefore, we employ 2SLS regression analysis to provide robustness check for our findings and control the endogeneity problem. In the second-stage regression, we also find a positive relationship between debt ratios and REM, which is consistent with our previous results. Specially, we suggest that financial regulators need to pay attention to those with relatively high-leverage. These temporarily increased or decreased real activities are underestimated or reversed in subsequent quarters by different magnitudes and speeds, which reduces earnings sustainability or provokes a direct effect on firms' performance.

Our results have implications for managers and corporate decision-makers as REM initiatives are undertaken to generate positive firm earnings, which positively affects the company's status in the short-term because it reduces the firm's investment risk perception, avoids debt covenant violations,

and meets or beats the earnings targets. Our findings for suspicious firms and high-leverage firms are consistent with the debt hypothesis, financial distress theory, and avoidance of debt covenant contraventions because managers are motivated to manipulate real earnings by income-enhancing accounting procedures. To minimize the effect of REM, future investors and shareholders might implement a robust planning and financial-control system [41] to be able to recognize and anticipate the manager's strategies to conduct earnings manipulation activities during the fiscal year. Therefore, it is necessary to increase the audit frequency of the financial statements, which might reduce the asymmetry of information between the various economic agents. We also suggest that regulators increase their control effort in quarterly data as well as annual financial information because it might detect seasonality in real activities manipulations and increase the sustainable firm's performance.

However, there are certain limitations to our study. Our study employs total, short-term, and long-term debt as independent variables, while it is important to introduce the ratio of long-term to short-term debt to determine the preference for long-term borrowings over short-term borrowings in capital structure decisions. Furthermore, we do not include industry-adjusted leverage (difference between firm-specific leverage and the median leverage for the same quarter and industry) as an independent variable in the fixed effects model; however, it can be used in the random-effects model, given that Korean firms show the highest financial leverage mean compared to firms from ten Asian countries [42]. For future research, the authors suggest including a portfolio analysis according to the degree of real earnings manipulation activities and introducing cost stickiness as an independent variable to validate our findings in suspicious firms.

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