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EFFECT OF CORPORATE GOVERNANCE ON REAL ACTIVITY-BASED EARNINGS MANAGEMENT: EVIDENCE FROM KOREA

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Abstract. This paper aims to determine whether corporate governance affects manager's real operating or investment decision to control reported earnings. Through data analysis of firms listed on the Korean stock exchange, it was found that the aggregated measure of real activity-based earnings management decreases as the size of board is larger or as a greater proportion of external directors sit on the board. Those findings are almost the same, whether a corporate governance index composed by each BOD characteristics is employed, or problem caused by endogenous relationships among variables is controlled. The results provide the first empirical evidence that real activity-based earnings management is influenced by corporate governance structure. This focus on real activity-based earnings management suggests new avenues for research on corporate governance. The results offer some insights for policy makers interested in promoting legislation to ensure strong corporate governance in their nation.

Keywords: corporate governance, audit committee, performance, real activity based earnings management, Korean firms, earnings management.

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JEL Classification: M10, M14, M41, M48, G30, G32, G34.

1. Introduction

Corporate governance is a decision-making structure or process that monitors and controls firms and their managements in order to achieve firms' goals. The efficiency of this corporate governance depends on controlling agency problems that occur between managers and owners, shareholders, and creditors. However, managers have many incentives to control their reported earnings such as compensation, debt covenant, or avoiding loss, even though it may sacrifice shareholder's wealth. Managers could achieve target earnings by making accounting choices among Generally Accepted Accounting Principles (GAAP) and/or by making operating decisions in response to circumstances as they arise. Recent studies report that managers prefer to use real operating decisions, such

as delaying a new project or reducing expenses, to control earnings, rather than to use abnormal accruals (Graham *et al.* 2005). These preferences seem to have become more prevalent since the SOX Act came into force because management arbitrary decisions are more difficult to detect which are protected by 'business judgment rule' while abnormal accruals are easy to detect.

If corporate governance, in the form of such bodies as the board of directors or audit committee, is effective, then managers' discretionary accounting choices and arbitrary operational/investment decisions could both be reduced. Earlier studies show that earnings management through accounting accruals is influenced by corporate governance and identify some of the factors that are significant in constraining it. However, there is no study that examines the relationship between corporate governance and the management of earnings via real operating decisions (henceforth, real activity). The imposition of constraints on manager's real operating decisions or investment decisions by corporate governance entails that the control rights that shareholders and creditors confer on managers are effectively reduced, with the consequence that firms' future value will not be damaged by a manager's private interests.

This paper examines the role of corporate governance in the context of real activity-based earnings management. We focus on board characteristics and consider three kinds of real activity-based earnings management: aggressive sales promotions, overproduction, and cutting discretionary expenses at either the individual or aggregate level. In order to examine contextual analysis, we examine the relationships between corporate governance and real activity based earnings management when the committee operates inside a firm or when firms incur a loss. For the test of the robustness of our findings, a corporate governance index and control for endogenous variables are used. Both OLS and 2SLS regressions were employed to examine the associations between corporate governance and a firm's real activity-based earnings management.

The empirical results show that overall real activity-based earnings management is reduced when the board of directors is either independent or large. Overproducing or cutting discretionary expenses is reduced as the size of the board increases, and aggressive sales or overproducing is reduced as the number of outside directors on the board increases. In the case of firms that have an internal audit committee, these results are more pronounced at aggregate levels, whereas it seems that the corporate governance of firms that have made a loss does not influence manager's real operational decisions incrementally. The findings are the same when we use a corporate governance index and when we control for endogenous problems among variables. Finally, we find that strong corporate governance reduces real activity based earnings management.

The study reported herein differs from previous studies in that it examines the relationships between corporate governance and real activity-based earnings management, whereas previously, corporate governance has been examined exclusively with regard to accrual-based earnings management (Klien 2002; Xie *et al.* 2003). Given the relationship that identified, managers' private interests, which hitherto could have been pursued via real operations or investment, can be controlled effectively by corporate governance in a comprehensive manner. The results of the study reported herein suggest

that certain board characteristics, such as size or independence, effectively constrain managers' real activity-based earnings management. This focus on real activity-based earnings management suggests new avenues for research on corporate governance. The results offer some insights for policy makers interested in promoting legislation to ensure strong corporate governance in their nation. In addition, the results highlight the importance of strong corporate governance within a firm, because corporate governance can effectively control real activity-based earnings management, which in turn affects firm performance.

The remainder of the paper is organized as follows. In Section 2, we review the relevant literature and develop hypotheses. In Section 3, we describe the sample and present the empirical models. In Section 4, we present the empirical results. In Section 5, we provide a summary and make concluding remarks.

2. Review of the literature and development of hypothesis

2.1. Corporate governance

A board of directors is responsible for monitoring management effectively in order to maximize shareholder's interests and can dismiss managers if necessary (Fama, Jensen 1983; Weisbach 1988). Previous work on corporate governance structures has mainly examined such matters as earnings management, firm value, and management compensation (DeJorge, Laborda 2011; Sanchez-Marin *et al.* 2011). With respect to earnings management, studies have investigated, as measures of sound accounting practices, whether certain corporate governance structures improve the reliability of accounting reports (Ahmed, Duellman 2007; Kim, Bae 2007); the association of corporate governance structures with earnings management using abnormal accruals (Xie *et al.* 2003; Kim 2006); and the relationship of corporate governance structures with fraud (Beasley 1996; Beasley *et al.* 2000; Beasley, Salterio 2001; Uzun *et al.* 2004). Most of those studies examine the roles of corporate governance by focusing on factors such as the composition and/or characteristics of the board of directors or audit committee, and try to determine which factor effectively controls of conflicts of interest between owner and manager.

Previous studies that examined the relationship between the composition of the board and accounting frauds report that fraud is committed more frequently in financial statements when firms have less external directors than average; as the close relationship between the structure of the board and violations of accounting principles were found (Beasley 1996; Beasley *et al.* 2000; Beasley, Salterio 2001). Representative studies that examined relationships between the characteristics of the board and earnings management include a study by Klien (2002). This study shows that earnings management decreases when audit committee is operated 'independently', and that earnings management increases when the CEO is a member of the board. These results suggest that as the board becomes more independent from the CEO, it would be more effective in controlling accounting processes. A study by Xie *et al.* (2003) reconfirms the fact that the role of the board is important in preventing managers from manipulating the accounts.

In particular, the study reports that earnings management decreases when the proportion of external directors increases, when the size of the board increases, when the number of directors on the board who have long experience with the company increases, and when the number of board meetings increases. It also shows that earnings management decreases when the independence of the audit committee increases or the number of meetings of the audit committee increases. Studies that examined relationships between the characteristics of the audit committee and earnings management report somewhat different results. A study by Jeon *et al.* (2004) reports that there is no significant relationship between whether or not an audit committee is present and managers' earnings management. However, a study by Ko *et al.* (2007) reports that earnings management is reduced in firms once they have set up an audit committee. A study by S. C. Lee and K. T. Lee (2003) reports that the greater the proportion of external directors is in the audit committee, the less is the extent of earnings management. These previous studies all employ accrual-based earnings management, discretionary accruals, as a proxy of earnings management.

To summarize the results of previous studies, it suggests that the level of firms' accrual-based earnings management decreases if the proportion of external directors on the board is high and the board is very active or if there is an independent audit committee that operates actively.

2.2. Real activity-based earnings management

Most early studies on earnings management focus exclusively on accrual-based earnings management, which is usually a matter of accounting choice. 'Real activity-based earnings management' is defined as actions on the part of a firm's management personnel that deviate from normal business practices in an attempt to meet target earnings (Roychowdhury 2006). A few of empirical studies have been conducted on the actual practice of real activity-based earnings management, such as sales of fixed assets or investment to avoid negative earnings growth and violating a debt covenant (Bartov 1993; Herrmann, Inoue, Thomas 2003; Choi 2004). These practices result from managers' action who have the opportunity to manage the selling point of assets because a gain is recognized on the income statement at the time of sale as the difference between the net book value and the current market value. This study on real manipulation perspectives has recently received much more research interest, motivated by Graham *et al.* (2005), which provides survey results that CEOs have a preference for using real activities to manage earnings because accrual-based earnings management is likely to be detected by regulatory scrutiny and CEOs can diversify those risks[1] by using both accruals and real activities. Recent empirical evidences show that firms use multiple real activities to avoid reporting annual losses, such as giving price discounts to temporarily boost sales, overproducing to report a lower cost of goods sold, and reducing discretionary

[1] Using accruals-based earnings management alone is risky, because real activities can occur during the year and these cannot be adjusted at the end of the fiscal year. If reported earnings fall below the target and all attempts at accruals-based earnings management to meet it fail, managers have no options.

expenditures to improve earnings(Roychowdhury 2006; Kim *et al.* 2008). They report that real activities, such as price discounts, overproducing or reducing discretionary expenditures are found in firms that are suspected of trying to avoid losses where earnings are just above zero (called suspect firm-years). Other studies examine the consequences of real earnings management (Gunny 2005; Kang, Chun 2010) and the relationship between accrual- and real activity-based manipulations (Zang 2005; Cohen *et al.* 2008). Each study finds that high abnormal real-activity groups using portfolios show negative subsequent performances and that real activity- based manipulations are negatively associated with accrual-based one. Further study indicates that the trade off associations is linked to the litigation risks (Cohen *et al*. 2008) and tried to identify the incentive for real activity-based earnings management in capital markets, considering such factors as outstanding number of shares, external audit quality, bonus, and the number of analysts.

2.3. Hypothesis development

A board must provide active and independent oversight of the company on behalf of investors, and it should be operated independently and efficiently in order to mitigate the conflict of interests between owner and management. A board of directors consigns its decision-making rights to the managers, but final responsibility for providing financial reports with credibility and providing effective corporate governance lies with the directors. The former duty is about managers' accrual-based earnings management and the latter is about real activity-based earnings management. In particular, managers' abnormal real activities are performed in the course of the internal decision process and most of them have to be discussed or approved by the board.

Board members monitor management and their effectiveness in performing this task depends on the independence, professionalism, and activity of board members (Xie *et al.* 2003; Ben 2009). Empirical research has shown that both the size of the board and the number of board meetings affect accrual-based earnings management. Real activity-based earnings management could be also influenced by board characteristics, such as size, activity, and independence, either directly or indirectly, because a manager's operational or investment decisions are mostly approved by the board. Evidence for the effectiveness of board size is inconclusive. Some studies report that small boards are effective (Yermack 1996; Eisenberg *et al.* 1998), whereas others report a significant positive association between board size and performance (Dalton *et al.* 1999; Xie *et al*. 2003). Given the foregoing, we do not have any expectations as to the direction of the relationship between board size and real activity-based earnings management. Boards meet frequently when they have many issues to discuss and frequent board meetings are correlated positively with improved financial performance (Vafeas 1999; Xie *et al.* 2003). We therefore expect the incidence of real activity-based earnings management to be inversely related to the number of board meetings. To the extent that external directors monitor management more effectively than internal directors (Xie *et al.* 2003; Lee, S. C., Lee, K. T. 2003; Ko *et al.* 2007), we hypothesize that a company that has more external than internal directors on the board will be less likely to engage in real activity-based earnings management than a company that has more internal than external directors on the board. If the hypothesis turns out to be correct, it may be

because managers have the authority to make contracts as to the board's compensation or tenure and internal directors are likely to have a friendly relationship with managers than external directors. In sum, we examine empirically whether real activity-based earnings management is affected by certain characteristics of corporate governance, such as board size, activity, or independence. We also examine whether it decreases as external directors participate in board meetings actively and whether it changes as they are financial experts or not.

Introducing a system of external directors[2] or organizing an audit committee within a firm is a way of decentralizing a board's responsibility and of ensuring that the board discharges its responsibilities properly. We define the role of audit committee as being to oversee and monitor a firm's financial reporting and the managers' day-to-day activity, and view the audit committee as being first among equals in this monitoring process. The audit committee reports to a board of directors as a lower branch of the board; its role is to reduce information asymmetry between management and the board, so that the likelihood that accounting fraud will be perpetrated might be reduced (Beasley *et al.* 2000; Beasley, Salterio 2001). In addition, it has been found that managers' abnormal real activity is controlled directly or indirectly by the quality of external audits (Cohen *et al.* 2008). In order to determine the effectiveness of an audit committee, we analyze the associations between board structure and real activity based earnings management when an audit committee operates inside a firm in the robustness check section. We also examine these associations when firms incur a loss, because managers are likely to engage in earnings management, whether it is via abnormal accruals or abnormal real activity, in order to avoid a loss.

3. Research design

3.1. Model

Firstly, we examine whether board characteristics influence real activity-based earnings management using multivariate regressions and confirm the results using 2SLS regressions.

The characteristics of corporate governance that we consider are board size, activities, independence, external directors' activities, and external directors' professionalism. We use sales manipulation, overproduction, and the cutting of discretionary expenses as a proxy for real activity-based earnings management. In order to check robustness, we examine those associations when a firm operates an internal audit committee or incurs a loss. To make sure that our findings are robust, we consider endogenous relationships among variables.

We develop [Model 1] to examine these associations between the characteristics of corporate governance mentioned above and real activity-based earnings management after controlling for size, leverage, performance, ownership, and compensation.

[2] Outside directors are defined as gatekeepers who have a responsibility to prevent corporate misconduct from its management and they are not employees of the company.

[Model 1]

$$RM_{it} = a_0 + a_1 B\_SCALE_{it} + a_2 B\_MEET_{it} + a_3 OUTSIDE_{it} + a_4 O\_ACTIVITY_{it} + a_5 O\_EXPERT_{it} + a_6 COMMITTEE_{it} + a_7 SIZE_i + a_8 LEVERAGE_{it} + a_9 ROA_{it} + a_{10} OWNER_{it} + a_{11} COMPEN_{it} + a_{12} OWNER\_DUMMY_{it} + a_{13} IND\_Dummy + a_{14} YEAR\_Dummy + e_{it}, \quad (1)$$

where, RM_{it}: Individual (aggregated) abnormal real activity of firm i in year t (*Ab.OCF*, *Ab.PROD_cost*, *Ab.EXP,* and *RM_Proxy*). *Ab.OCF*: Abnormal cash flows from operations. *Ab.PROD_cost*: Abnormal production costs. *Ab.EXP*: Abnormal discretionary expenses (the sum of employee welfare, advertising, R&D expense, and education and training expenses). B_SCALE_{it}: Number of directors on board of firm i in year t (Log of the number of directors). B_MEET_{it}: Number of board meetings of firm i in year t (Log of the number of board meetings). $OUTSIDE_{it}$: Proportion of external directors of firm i in year t (External directors/Total board members). $O\_ACTIVITY_{it}$: Rate of participation in board meetings by external directors of firm i in year *t.,* O_EXPERT_{it}: Proportion of external directors as financial experts of firm i in year *t.* $COMMITTEE_{it}$: Indicator variable with a value of 1 if there is an audit committee within firm i in year t, 0 otherwise. $SIZE_{it}$*:* Natural log of total assets of firm i in year *t.* $LEVERAGE_{it}$: Debt ratio of firm i in year t (Total Debt_{it}/Total Assets $_{it\text{-}1}$). ROA_{it}: Return of assets of firm i in year t (Earnings before tax_{it}/ Total Assets $_{it\text{-}1}$). $LOSS_{it}$: Indicator variable with a value of 1 if the net income of firm i in year t is below zero, 0 otherwise. $OWNER_{it}$: Large shareholder's ownership of firm i in year *t.* $COMPEN_{it}$: Managements' compensation of firm i in year *t.* $OWNER\_DUMMY_{it}$: Indicator variable with a value of 1 if a manager of firm i in year t is an owner, 0 otherwise. *IND_Dummy*: Industry dummy variables. *YEAR_Dummy*: Year dummy variables.

We predict that board activities, independence, external directors' activities, or their professionalism, are each associated negatively with real activity-based earnings management and that none of them predicts a larger or smaller board. We anticipate that the relationships between the board characteristics and real activity-based earnings management will be more pronounced when a firm has an internal audit committee or reports a loss.

It is difficult to determine whether corporate governance is effective overall at controlling earnings management, because internal control factors interact each other. To overcome the difficulty, we make a corporate governance index (*CORP_INDEX*)[3] composed of the significant individual characteristics found in [Model 1] and examine the associations between corporate governance and real activity-based earnings management in [Model 2].

[3] We make a corporate governance index that includes the significant factors found in [Model 1–1]. We rank our sample into five groups based on each board size, activity, or independence, and assign 1 to 5 from lower to higher quintiles. Then we find their mean and get an equally weighted average score, which is the final corporate governance index. The results are consistent when we consider all components of the individual corporate governance variables used in the study.

[Model 2]

$$RM\_Proxy_{it} = a_0 + a_1 CORP\_INDEX_{it} + a_2 SIZE_{it} + a_3 LEVERAGE_{it} + a_4 ROA_{it} + a_5 OWNER_{it} + a_6 COMPEN_{it} + a_7 OWNER\_DUMMY_{it} + a_8 IND\_Dummy + a_9 YEAR\_Dummy + e_{it}, \quad (2)$$

where, RM_proxy_{it}: The sum of *Ab.OCF*, *Ab.PROD_cost*, and *Ab.EXP* of firm *i* in year *t* (we multiply *Ab.OCF* and *Ab.EXP* by -1 so that the sum of the three variables will be indicative of overall real earnings management). $CORP\_INDEX_{it}$: The sum of *B_SCALE*, *B_MEET*, and *OUTSIDE* of firm *i* in year *t* (we multiply *B_MEET* by -1 so that the sum of the three variables will be indicative of overall corporate governance).

The number of directors on the board (*B_SCALE*) represents board size, the number of meetings (*B_MEET*) represents directors' activity, and the proportion of external directors on the board (*OUTSIDE*) indicates independence. The rate of participation of external directors in board meetings (*O_ACTIVITY*) represents external directors' activity and the proportion of financial experts among external directors (*O_EXPERT*) represents the external directors' professionalism. We control for firm size (*SIZE*), capital structure (*LEVERAGE*)[4], and performance (*ROA*). In addition, we use the largest shareholder's holding[5] (*OWNER*) and whether or not a firm is owner-managed (*OWNER_DUMMY*) to control for ownerships. Finally, we use dummy variables (*IND_Dummy* and *YEAR_Dummy*) to control for internal director's compensation (*COMPEN*) and for industrial and yearly effects that might exist. All these control variables[6] follow previous studies regarding real activity based earnings management.

For the robustness check, we develop [Model 3] and [Model 4] to examine the associations between corporate governance and real activity-based earnings management, especially when the firm has an internal audit committee or incurs a loss, considering each interaction term variable as shown below.

[Model 3]

$$RM\_Proxy_{it} = a_0 + a_1 CORP\_INDEX_{it} + a_2 COMMITTEE_{it} + a_3 CORP\_INDEX*COMMITTEE_{it} + a_4 SIZE_{it} + a_5 LEVERAGE_{it} + a_6 ROA_{it} + a_7 OWNER_{it} + a_8 COMPEN_{it} + a_9 OWNER\_DUMMY_{it} + a_{10} IND\_Dummy + a_{11} YEAR\_Dummy + e_{it}, \quad (3)$$

[Model 4]

$$RM\_Proxy_{it} = a_0 + a_1 CORP\_INDEX_{it} + a_2 LOSS_{it} + a_3 CORP\_INDEX*LOSS_{it} + a_4 SIZE_{it} + a_5 LEVERAGE_{it} + a_6 ROA_{it} + a_7 OWNER_{it} + a_8 COMPEN_{it} + a_9 OWNER\_DUMMY_{it} + a_{10} IND\_Dummy + a_{11} YEAR\_Dummy + e_{it}, \quad (4)$$

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[4] We use total assets as a denominator because using net assets may result in negative numbers, which can distort the continuity of a firm's debt ratio.

[5] Data are available from the TS2000 database of the Korean listed firms' associations.

[6] One of referee recommends for controlling firm's financing decision such as seasoned equity offering and we obtain qualitatively the same results when we include a control variable of SEO, which is untabulated.

where, $COMMITTEE_{it}$: Indicator variable with a value of 1 if there is audit committee within firm i in year t, 0 otherwise. $LOSS_{it}$: Indicator variable with a value of 1 if firm i in year t report a loss, 0 otherwise. $CORP\_INDEX*COMMITTEE_{it}$: An interaction term between *CORP_INDEX* and *COMMITTEE*. $CORP\_INDEX*LOSS_{it}$: An interaction term between *CORP_INDEX* and *LOSS*.

In the literature on corporate governance, there is concern about endogenous relationships among variables. Managers' abnormal operational or investment decisions are both influenced by weaker corporate governance yet also affect the structure of governance. To address this concern, we employ the following [Model 5] and control for endogeneity. Following a previous study (Kim 2006), we also consider a dummy variable for firms' assets (*SIZE_DUMMY*) in addition to firm size (*SIZE*), because certain applications of Korean law depends on whether firms are large[7] or small.

[Model 5: 2SLS regressions]

1st Stage: $CORP\_GOV_{it} = a_0 + a_1 RM\_Proxy_{it} + a_2 SIZE\_DUMMY_{it} + a_3 SIZE_{it} + e_{it}$,

2nd Stage: $RM\_Proxy_{it} = b_0 + b_1 CORP\_GOV_{it} + b_2 SIZE_{it} + b_3 LEVERAGE_{it} + b_4 ROA_{it} + b_5 OWNER_{it} + b_6 COMPEN_{it} + b_7 OWNER\_DUMMY_{it} + b_8 IND\_Dummy + b_9 YEAR\_Dummy + e_{it}$, (5)

where, $CORP\_GOV_{it}$ = Individual characteristic of corporate governance or aggregate index; *B_SCALE*, *B_MEET*, *OUTSIDE, O_ACTIVITY, O_EXPERT* and *CORP_INDEX*. $SIZE\_DUMMY_{it}$: Indicator variable with a value of 1 the if total assets of firm i in year t are equal to or above 2 trillion Won, 0 otherwise.

3.2. Measurement of variables

We use each abnormal cash flow from operations, abnormal production costs, abnormal discretionary expenses, and a combined measure as proxies for overall real activity-based earnings management. We rely on previous estimation models for normal levels of real activities and regard abnormal levels of real operations as real activity-based earnings management. The abnormal level of each measure is computed as the actual level of a variable minus its normal level. We estimate normal levels of cash flow from operations, production costs, and discretionary expenses using a procedure developed by Dechow *et al.* (1998), as implemented by Zang (2005) and Roychowdhury (2006), and we run cross-sectional regressions for every industry and year, as follows.

$$OCF_{it}/A_{it-1} = a_0 (1/A_{it-1}) + a_1 (S_{it}/A_{it-1}) + a_2 (C\_S_{it}/A_{it-1}) + e_{it}, \quad (6)$$

$$COGS_{it}/A_{it-1} = a_0 (1/A_{it-1}) + a_1 (S_{it}/A_{it-1}) + e_{it}, \quad (7)$$

$$C\_INV_{it}/A_{it-1} = a_0 (1/A_{it-1}) + a_1 (C\_S_{it}/A_{it-1}) + a_2 (C\_S_{it-1}/A_{it-1}) + e_{it}, \quad (8)$$

$$PROD_{it}/A_{it-1} = a_0 (1/A_{it-1}) + a_1 (S_{it}/A_{it-1}) + a_2 (C\_S_{it}/A_{it-1}) + a_3 (C\_S_{it-1}/A_{it-1}) + e_{it}, \quad (9)$$

$$DISCEXP_{it}/A_{it-1} = a_0 (1/A_{it-1}) + a_1 (S_{it-1}/A_{it-1}) + e_{it}, \quad (10)$$

[7] Large firms those that have assets above 2 trillion Won have to have an internal audit committee.

where, OCF_{it}: Cash flows from operations of firm i in year t. $PROD_{it}$: $COGS$ plus C_INV of firm i in year t. $COGS_{it}$: Cost of goods sold of firm i in year t. C_INV_{it}: Change in inventory of firm i in year t. $DISCEXP_{it}$: Discretionary expenses of firm i in year t (Employee welfare + Advertising + R&D expense + Education and training). $A_{it\text{-}1}$: Total assets of firm i at the beginning of year t. S_{it}: Sales of firm i in year t. C_S_{it}: Change in sales of firm i in year $t(S_{it} - S_{it\text{-}1})$. $C\_S_{it\text{-}1}$: Change in sales of firm i in year t-1$(S_{it\text{-}1} - S_{it\text{-}2})$.

We regard normal cash flow from operations as a linear function of sales and changes in sales in the current period. Production costs are defined as the sum of the cost of goods sold (*COGS*) and the change in inventory (*C_INV*) during the year. We consider discretionary expenses including employee welfare, advertising, R&D expense, and education and training expenses, and also express normal portion of discretionary expenses as a linear function of lagged sales[8]. We use a single measure (*RM_Proxy*)[9] combining each individual measure in order to capture overall effects of abnormal real activities because firms that manage earnings upwards are likely to use multiple activities[10].

3.3. Sample selection

We took our sample from the firms that were listed on the Korean Stock Exchange (KSE) from 2005 to 2007. We restricted the sample to nonfinancial firms, because financial firms operate in highly regulated industries that have accounting rules different from those in other industries. We also excluded firms that have negative capital. Financial data were obtained from the Fn-DataGuidePro database. Data on corporate governance, such as board size, number of meetings, and the proportion of external directors, were all hand-collected from annual reports. Ownership data was obtained from the TS2000. We required that each firm-year observation has the data necessary to calculate the abnormal real activities used in this analysis. Further, each firm-year observation was required to have a fiscal year ending in December, to ensure homogeneity. We deleted the top and bottom 1% of the distribution so that the results were not affected by outliers. Our final sample comprised 1.104 firm-year observations.

Panel A of Table 1 shows the distribution of the sample over time and *Panel B* reports industrial composition. Our samples are evenly distributed by year and the composition by industry is similar to that of the population.

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[8] The reason why lagged sales are used is because modeling discretionary expense as a function of current sales creates a technical problem in that unusually low residuals can result if firms manage sales upwards to increase earnings in a certain year and estimate normal levels of discretionary expenses.

[9] We multiply abnormal cash flows from operations and abnormal discretionary expense by –1 to make it easier to interpret the results. Price discount or channel stuffing has a negative effect on contemporaneous abnormal *OCF*. Excessive price discount or overproduction leads to abnormally high production costs relative to sales. Cutting discretionary expenses leads to abnormally low discretionary expenses relative to sales. Each direction implying earnings management is not the same and we make it to the same direction.

[10] Cohen and Zarowin (2010) combine the 3 individual proxies to compute 2 kinds of aggregate measures, RM_1 and RM_2, because double discounting issue may exist. We obtain qualitatively the same (untabulated) results when we use 2 kinds of combining measures. We thank the referee for pointing it out.

Table 1. Samples distribution

Panel A: *Time Distribution*

Year	Frequency	%	Cumulative %
2005	377	34.15	34.15
2006	362	32.79	66.94
2007	365	33.06	100
Total	1.104	100	–

Panel B: *Industry Distribution*

Industry	Code	Frequency	%	Industry	Code	Frequency	%
Food products	I.005	83	7.52%	Health	I.014	10	0.91%
Textile products	I.006	49	4.44%	Transport	I.015	81	7.34%
Paper and Paper products	I.007	50	4.53%	Distributions	I.016	76	6.88%
Chemical products	I.008	184	16.67%	Electricity and Gas	I.017	22	1.99%
Medicine	I.009	62	5.62%	Construction	I.018	73	6.61%
Nonmetal Minerals	I.010	51	4.62%	Transport and Storage	I.019	32	2.9%
Metals	I.011	90	8.15%	Service	I.026	35	3.17%
Machinery	I.012	78	7.07%	Manufacturing	I.027	30	2.72%
Electronics	I.013	98	8.88%	Total		1.104	100%

Note: Industry classification is by Fn-DataGuidePro database

4. Empirical results

4.1. Descriptive statistics

Table 2 reports the descriptive statistics on proxies for earnings management and other variables that were examined. *Panel A* reports the regression coefficients used to estimate 'normal' level of proxies. The coefficients are consistent with prior studies (Roychowedhurry 2006; Kim *et al*. 2008). Each coefficient of *OCF* and production costs on sales is positive and significant, indicating that a higher sale implies higher *OCF* and production costs.

The number of directors on the board (*B_SCALE*) is about 5~6 on average. The number of meetings (*B_MEET*), which ranges from 1 to 150, is about 16 times a year on average[11]. External directors account for 32.3% of the total number of directors (*OUTSIDE*) on average and their participation rates in board meetings (*O_ACTIVITY*) are 71.7%.

[11] Simply, this is the number of board meetings and we use log specification to mitigate heteroskedasticity when we run OLS or 2SLS, including *B_SCALE* and *B_MEET*.

About 9.4% of the external directors are financial experts (*O_EXPERT*). 16.3% of the sample firms have an internal audit committee (*COMMITTEE*).

Table 3 reports correlations among variables. It shows the Pearson correlation coefficients based on two tailed tests.

Table 2. Descriptive statistics

Panel A: *Model parameters*

Variables	OCF_{it}/A_{it-1}		$PROD_{it}/A_{it-1}$		$DISCEXP_{it}/A_{it-1}$	
	Estimate	*t-value*	*Estimate*	*t-value*	*Estimate*	*t-value*
Intercept	0.028	9.67^{***}	–0.065	-14.19^{***}	0.009	9.21^{***}
$1/A_{it-1}$	–534220	-4.66^{***}	–179318	–1.02	–82827	-2.08^{**}
S_{it}/A_{it-1}	0.029	10.11^{***}	0.88	189^{***}		
S_{it-1}/A_{it-1}					0.010	11.28^{***}
C_S_{it}/A_{it-1}	0.040	5.24^{***}	–0.005	–0.5		
C_S_{it-1}/A_{it-1}			–0.032	-2.81^{***}		
Adjusted R^2	0.04		0.90		0.02	

Notes: ***: significant at the 1% level, **: significant at the 5% level, *: significant at the 10%

Panel B: *Descriptive statistics*

Variables	Mean	Std.Dev	Min	1Q	Median	3Q	Max
RM_Proxy	–0.016	0.165	–0.643	–0.116	–0.016	0.084	0.538
Ab.OCF	–0.002	0.075	–0.272	–0.051	0.001	0.044	0.287
Ab.PROD_cost	–0.018	0.109	–0.464	–0.074	–0.011	0.044	0.387
Ab.EXP	0.000	0.023	–0.121	–0.010	–0.002	0.006	0.137
B_SCALE	5.941	2.073	3.00	4.00	6.00	7.00	14.00
B_MEET	16.27	12.90	1.00	8.00	13.00	20.00	150.00
OUTSIDE	0.323	0.102	0.00	0.25	0.286	0.333	0.750
O_ACTIVITY	0.717	0.288	0.00	0.50	0.813	1.00	1.00
O_EXPERT	0.094	0.243	0.00	0.00	0.00	0.00	1.00
COMMITTEE	0.163	0.370	0.00	0.00	0.00	0.00	1.00
CORP_INDEX	0.599	0.525	–0.40	0.20	0.60	1.00	1.80
SIZE	19.33	1.167	16.84	18.44	19.14	20.07	22.70
LEVERAGE	0.476	0.206	0.101	0.320	0.467	0.615	1.544
ROA	0.056	0.071	–0.221	0.019	0.054	0.094	0.352
LOSS	0.151	0.358	0.000	0.000	0.000	0.000	1.000
OWNER	0.372	0.175	0.027	0.234	0.361	0.489	0.878
COMPEN	0.007	0.009	0.00001	0.002	0.004	0.009	0.120
OWNER_DUMMY	0.281	0.449	0.000	0.000	0.000	1.000	1.000

Table 3. Correlations

	RM_Proxy	*B_SCALE*	*B_MEET*	*OUTSIDE*	*O_ACTIVITY*	*O_EXPERT*	*COMMITTEE*	*SIZE*	*LEVERAGE*	*ROA*	*OWNER*	*COMPEN*
RM_Proxy		–0.134	0.095	–0.108	–0.040	–0.043	–0.117	–0.133	0.251	–0.453	–0.033	0.150
		<0001	0.002	0.000	0.191	0.157	0.000	<0001	<0001	<0001	0.278	<0001
B_SCALE			0.024	0.327	–0.053	–0.050	0.399	0.483	0.109	0.110	–0.053	–0.055
			0.427	<0001	0.079	0.096	<0001	<0001	0.000	0.000	0.082	0.071
B_MEET				–0.078	–0.214	–0.071	–0.014	0.185	0.249	–0.028	–0.012	–0.034
				0.010	<0001	0.018	0.639	<0001	<0001	0.346	0.698	0.261
OUTSIDE					0.150	–0.007	0.519	0.391	0.113	0.026	–0.092	–0.194
					<0001	0.814	<0001	<0001	0.000	0.395	0.002	<0001
O_ACTIVITY						0.036	0.120	0.139	–0.093	0.062	0.002	–0.091
						0.235	<0001	<0001	0.002	0.042	0.942	0.003
O_EXPERT							0.058	–0.022	–0.063	0.012	0.110	0.038
							0.054	0.465	0.035	0.685	0.000	0.212
COMMITTEE								0.438	0.127	0.072	–0.056	–0.165
								<0001	<0001	0.017	0.064	<0001
SIZE									0.176	0.170	–0.062	–0.429
									<0001	<0001	0.041	<0001
LEVERAGE										–0.185	–0.082	0.056
										<0001	0.007	0.066
ROA											0.045	–0.152
											0.135	<0001
OWNER												0.022
												0.467

Note: Pearson correlations based on two-tailed tests

Each board size (*B_SCALE*) or independence (*OUTSIDE*) is associated negatively with real activity-based earnings management (*RM_Proxy*). The presence of an internal audit committee (*COMMITTEE*) is correlated negatively with real activity-based earnings management. Board size (*B_SCALE*) is associated positively with firm size (*SIZE*). Each board size (*B_SCALE*), independence (*OUTSIDE*), and whether or not there is an internal audit committee (*COMMITTEE*) is associated negatively with the largest shareholder's holdings (*OWNER*). Both firm size (*SIZE*) and debt ratio (*LEVERAGE*) are correlated negatively with the largest shareholder's holdings (*OWNER*). Real activity-based earnings management is correlated positively with board compensation (*COMPEN*).

4.2. Effect on real activity-based earnings management of corporate governance

Table 4 reports the results of [Model 1], which examines the associations between the characteristics of corporate governance and real activity-based earnings management. It shows each result using sales manipulation, overproduction, and cutting discretionary expenses as a proxy for real activity-based earnings management at both individual and aggregate levels.

All adjusted R^2*s* are significant, whether they are examined using an individual or an aggregated measure of real activity-based earnings management. From the perspective of an aggregated measure of real activity-based earnings management, both board size (*B_SIZE*) and the proportion of external directors (*OUTSIDE*) influence earnings management negatively through abnormal real activities (*RM_Proxy*). This result suggests that board scale and independence effectively constrain managers' abnormal operational/investment decisions. That is, when boards are large and the proportion of external directors is high, the board can prevent managers from managing earnings by using abnormal real activities[12] efficiently. Many studies on the efficiency of board size report that smaller boards perform better (Yermack 1996 etc.), but we find a contrary result with respect to earnings management. It is consistent with the results of previous studies that larger boards may have more independent directors and a larger board might be better at preventing earnings management (Dalton *et al.* 1999; Xie *et al.* 2003). We may presume from our findings that larger boards may have a greater number of experienced directors, who are effective at limiting real activity-based earnings management. In addition, the estimated value of earnings management (*RM_Proxy*) is smaller in firms that have an internal audit committee (*COMMITTEE*). We may infer from this result that the existence of an internal audit committee also has the effect of reducing real activity-based earnings management.

Reviewing the results for real activity-based earnings management individually, earnings management that uses overproduction (representing a higher level of *Ab.PROD cost*) or cutting discretionary expenses (representing a lower level of *Ab.EXP*) falls as the board size (*B_SCALE*) increases. Earnings management that uses aggressive sales

[12] We have the point of view that earnings management through real activities is against shareholders interest in this study but sometimes it may work in favor of shareholders interest. It is still an issue whether reducing discretionary expenses are good in the perspective of shareholder.

Table 4. Regression of earnings management on corporate governance (OLS regression)

[Model 1]

$RM_{it} = a_0 + a_1 B\_SCALE_{it} + a_2 B\_MEET_{it} + a_3 OUTSIDE_{it} + a_4 O\_ACTIVITY_{it} + a_5 O\_EXPERT_{it} + a_6 COMMITTEE_{i\,t} + a_7 SIZE_{it} + a_8 LEVERAGE_{it} + a_9 ROA_{it} + a_{10} OWNER_{it} + a_{11} COMPEN_{it} + a_{12} OWNER\_DUMMY_{it} + a_{13} IND\_Dummy + a_{14} YEAR\_Dummy + e_{it}$

Coefficients	Exp. sign	Aggregate variable	Individual variable		
		RM_Proxy	*Ab.OCF*	*Ab.PROD cost*	*Ab.EXP*
a_0	**?**	0.020 (0.22)	–0.255(–6.15***)	–0.210(–3.18***)	0.023(1.59)
a_1	+/–	**–0.035(–2.19**)**	–0.009(–1.32)	–0.037(–3.33***)	0.006(2.78**)
a_2	–	0.010(1.49)	–0.007(–2.36**)	0.002(0.50)	–0.0007(–0.65)
a_3	–	–0.114(–2.13**)	0.046(1.96**)	–0.059(–1.71*)	–0.001(–0.58)
a_4	–	0.018(1.12)	0.0001(0.02)	0.018(1.78*)	–0.000003(–0.00)
a_5	–	–0.018(–1.03)	0.0009(0.12)	–0.019(–1.52)	–0.001(–0.58)
a_6	–	**–0.027(–1.68*)**	–0.007(–1.11)	–0.017(–1.70*)	0.005(2.28**)
a_7	+/–	–0.0003(–0.06)	0.015(6.32***)	0.013(3.40***)	–0.001(–2.07**)
a_8	+	0.152(6.56***)	–0.086(–8.47***)	0.062(3.81***)	–0.003(–1.09)
a_9	–	–0.918(–13.7***)	0.403(13.7***)	–0.512(–10.8***)	0.002(0.23)
a_{10}	–	–0.002(–0.08)	–0.011(–1.00)	–0.007(–0.42)	0.005(1.41)
a_{11}	+	1.121(2.05**)	0.616(2.57**)	1.321(3.44***)	–0.416(–4.83***)
a_{12}	–	0.002(0.21)	–0.007(0.10)	–0.003(–0.51)	0.001(0.97)
a_{13}	+/–	Inc.	Inc.	Inc.	Inc.
a_{14}	+/–	Inc.	Inc.	Inc.	Inc.
F		29.7***	34.9***	18.2***	4.64***
Adj. R^2		24.5	27.7	16.3	3.95
N		1.104	1.104	1.104	1.104

Notes: ***: significant at the 1% level, **: significant at the 5% level, *: significant at the 10% RM_{it}: Individual (aggregated) abnormal real activity of firm *i* in year *t* (*Ab.OCF*, *Ab.PROD_cost*, *Ab.EXP*, and *RM_Proxy*)

promotions (representing a lower level of *Ab.OCF*) or overproduction (*Ab.PROD cost*) is effectively controlled as the number of external directors increases (*OUTSIDE*). Unexpectedly, aggressive sales promotions (*Ab.OCF*) are higher when board meetings (*B_MEET*) are frequent, while overproduction (*Ab.PROD cost*) is higher when the participation of external directors (*O_ACTIVITY*) is high. From these findings, it may be inferred that holding board meetings frequently implies that there are many cases to be discussed or approved by the board and that managers have many opportunities to make discretionary decisions regarding aggressive sales promotions or overproduction.

Regarding the results with control variables[13], the debt ratio is correlated significantly and positive with real activity-based earnings management, whether it be considered individually or aggregately. This suggests that firms that have greater debts are likely to be engaged in real activity-based earnings management. The association between a firm's performance and real activity-based earnings management is significant and negative, whether the earnings management be considered individually or aggregately, which implies that firms whose performance is poor are more likely to engage in real activity-based earnings management. Managers are likely to engage in earnings management, as measured by abnormal real activity (*RM_Proxy*), when the board compensation (*COMPEN*) is higher. Those results on control variables are consistent with correlations and previous studies.

The characteristics of corporate governance, such as board size, the number of meetings, independence, or the presence of an internal audit committee, may work comprehensively rather than individually. *Panel A* of Table 5 shows the results for the effect of corporate governance when we use a corporate governance index. a_1 shows a significantly negative sign (–0.036, $P < 0.001$) and indicates that the overall strength of corporate governance constrains real activity-based earnings management. Results of other variables are all consistent with the results shown in Table 4.

Table 5. Results of audit committee inside or loss firm

Panel A: *Results of using Corporate Governance Index*

[Model 2]

$$RM\_Proxy_{it} = a_0 + a_1 CORP\_INDEX_{it} + a_2 SIZE_{it} + a_3 LEVERAGE_{it} + a_4 ROA_{it} + a_5 OWNER_{it} + a_6 COMPEN_{it} + a_7 OWNER\_DUMMY_{it} + a_8 IND\_Dummy + a_9 YEAR\_Dummy + e_{it}$$

Coefficients	Exp. sign	Full sample	Audit committee	No audit committee	Profit firm	Loss firm
a_0	**?**	0.071(0.78)	–0.390(–1.54)	0.119(1.14)	0.078(0.78)	0.340(1.62)
a_1	–	**–0.036(-3.91***)**	**–0.135(–3.50**)**	**–0.020(–2.06**)**	**–0.030(–3.07***)**	**–0.056(–2.64***)**
a_2	–	–0.004(–1.02)	0.024(1.92*)	–0.008(–1.50)	–0.005(–1.02)	–0.013(–1.23)
a_3	–	0.149(6.56***)	0.073(1.12)	0.157(6.67***)	0.151(6.20***)	0.101(1.87*)
a_4	–	–0.913(–13.6***)	–1.074(–6.39***)	–0.869(–12.2***)	–1.049(–11.4**)	–0.396(–1.82*)
a_5	–	–0.006(–0.24)	0.035(0.53)	–0.002(–0.08)	0.017(0.62)	**–0.141(–2.54**)**
a_6	–	1.003(1.87*)	1.715(0.66)	0.833(1.56)	0.958(1.63)	–0.028(–0.02)
a_7	+/–	–0.0003(-0.03)	**–0.071(–2.51**)**	0.011(1.17)	0.002(0.25)	–0.017(–0.74)
a_8	+/–	Inc.	Inc.	Inc.	Inc.	Inc.
a_9	+/–	Inc.	Inc.	Inc.	Inc.	Inc.
F		48.8***	10.9***	40.1***	34.9***	4.28***
Adj. R^2		24.0	28.1	23.4	20.6	12.7
N		1.104	180	923	937	167

[13] Multicollinearity is not an issue here and the highest VIF is 1.87.

Notes:
RM_proxy_{it}: The sum of *Ab.OCF*, *Ab.PROD_cost*, and *Ab.EXP* of firm *i* in year *t* (we multiply *Ab.OCF* and *Ab.EXP* by –1 so that the sum of the three variables will be indicative of overall real earnings management);
$CORP\_INDEX_{it}$: The sum of *B_SCALE*, *B_MEET*, and *OUTSIDE* of firm *i* in year *t* (we multiply *B_MEET* by –1so that the sum of the three variables will be indicative of overall corporate governance)

Panel B: *Results of existing an audit committee or reporting loss*

[Model 3]

$$RM\_Proxy_{it} = a_0 + a_1 CORP\_INDEX_{it} + a_2 COMMITTEE_{it} + a_3 CORP\_INDEX*COMMITTEE_{it} + a_4 SIZE_{it} + a_5 LEVERAGE_{it} + a_6 ROA_{it} + a_7 OWNER_{it} + a_8 COMPEN_{it} + a_9 OWNER\_DUMMY_{it} + a_{10} IND\_Dummy + a_{11} YEAR\_Dummy + e_{it}$$

[Model 4]

$$RM\_Proxy_{it} = a_0 + a_1 CORP\_INDEX_{it} + a_2 LOSS_{it} + a_3 CORP\_INDEX*LOSS_{it} + a_4 SIZE_{it} + a_5 LEVERAGE_{it} + a_6 ROA_{it} + a_7 OWNER_{it} + a_8 COMPEN_{it} + a_9 OWNER\_DUMMY_{it} + a_{10} IND\_Dummy + a_{11} YEAR\_Dummy + e_{it}$$

Coefficients	Exp. sign	**[Model 3]**	**[Model 4]**
		Audit committee	Loss firm
a_0	**?**	–0.002(–0.02)	0.085(0.95)
a_1	–	–0.023(–2.30**)	–0.029(–3.48***)
a_2	–	0.039(1.09)	–0.017(–0.89)
a_3	–	**–0.065(–1.89*)**	**–0.025(–1.13)**
a_4	–	–0.001(–0.25)	–0.005(–1.15)
a_5	–	0.150(6.71***)	0.146(6.58***)
a_6	–	–0.906(13.7***)	–1.004(–11.8***)
a_7	+/–	–0.005(–0.23)	0.0001(0.01)
a_8		0.984(1.86*)	0.938(1.77*)
a_9		0.001(0.10)	0.001(0.18)
a_{10}	+/–	Inc.	Inc.
a_{11}	+/–	Inc.	Inc.
F		39.5***	39.7***
Adj. R^2		24.4	24.5
N		1.104	1.104

Notes:
$CORP\_INDEX_{it}$: The sum of *B_SCALE*, *B_MEET*, and *OUTSIDE* of firm *i* in year *t* (we multiply *B_MEET* by –1so that the sum of the three variables will be indicative of overall corporate governance);
$COMMITTEE_{it}$: Indicator variable with a value of 1 if there is an audit committee within firm *i* in year *t*, 0 otherwise;
$LOSS_{it}$: Indicator variable with a value of 1 if firm *i* in year *t* reports a loss, 0 otherwise;
$CORP\_INDEX*COMMITTEE_{it}$: An interaction term between *CORP_INDEX* and *COMMITTEE*;
$CORP\_INDEX*LOSS_{it}$: An interaction term between *CORP_INDEX* and *LOSS*

4.3. Robustness check

Firms that have assets of over 2 trillion Korean Won are required by law to have an internal audit committee. The presence of an internal audit committee provides an internal control mechanism for monitoring management's activity. In light of McMullen's (1996) finding that earnings management or fraud perpetrated by managers is lower in firms that have an internal audit committee than in those that do not, we examine the association between real activity-based earnings management and corporate governance for those firms that have an internal audit committee. Firms that incur a loss are likely to be engaged in earnings management using either accounting choices or abnormal decisions. The results based on subsamples are shown in *Panel A* of Table 5 and the results based on interaction terms in *Panel B* of Table 5. We may presume from our findings that the effect of corporate governance on real activity-based earnings management is negative for firms that have an internal audit committee (a_3 of [Model 3] in results of *Panel B* is –0.065, $P < 0.10$). There is a significant negative relationship between real activity-based earnings management and ownership (–0.141, $P < 0.05$, *OWNER* of loss firm) or the presence of an owner-manager (–0.071, $P < 0.05$, *OWNER_DUMMY* of existing an audit committee), as shown in *Panel A*. Even though a_1 of firms that incur a loss in [Model 2] is significantly negative and its level is lower than that of firms that make a profit, as shown in *Panel A*, those associations are not significant when we test it using interaction terms in [Model 4] (a_3 of [Model 4] is –0.025). Other results are consistent with our main results reported in Table 4.

Hermalin and Weisbach argue that the variables *board structure* and *performance* are endogenous and find that previous studies on boards, the results of which are inconsistent, often neglect this issue. We test this argument by employing two-stage least square (2SLS) regressions and obtain results that are consistent with ours. These are reported in Table 6. In the first stage, we run real activity-based earnings management (*RM_Proxy*) and corporate governance individually (*B_SCALE,B_MEET, OUTSIDE, O_ACTIVITY,* and *O_EXPERT*) or aggregately (*CORP_INDEX*), where we control for firm size (*SIZE*) and size dummy (*SIZE_DUMMY*)[14]. We obtain a result in the second-stage regression that is consistent with our main results, even though each coefficient of corporate governance (*CORP_GOV*), b_1, is larger than the OLS coefficients in [Model 1] and significant. Regarding the corporate governance index, we consider all significant individual characteristics (*B_SCALE, B_MEET*, and *OUTSIDE*) and obtain consistent results[15].

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[14] An asset dummy that indicates large firms is considered in this study, following Black *et al*. (2006). Multicollinearity is insignificant.

[15] Even we make corporate governance index considering all factors, results are qualitatively the same.

Table 6. Regression of earnings management on corporate governance (2SLS)

[Model 5]

1st Stage: $CORP\_GOV_{it} = a_0 + a_1 RM\_Proxy_{it} + a_2 SIZE\_DUMMY_{it} + a_3 SIZE_{it} + e_{it}$

2nd Stage: $RM\_Proxy_{it} = b_0 + b_1 CORP\_GOV_{it} + b_2 SIZE_{it} + b_3 LEVERAGE_{it} + b_4 ROA_{it} + b_5 OWNER_{it} + b_6 COMPEN_{it} + b_7 OWNER\_DUMMY_{it} + b_8 IND\_Dummy + b_9 YEAR\_Dummy + e_{it}$

Coefficients	Exp. sign	*B_SCALE*	*B_MEET*	*OUTSIDE*	*O_ACTIVITY*	*O_EXPERT*	*CORP_INDEX*
b_0	**?**	–0.896(–1.91*)	–0.022(0.16)	0.009(0.10)	1.046(0.43)	2.747(1.06)	–0.277(–1.78*)
b_1	+/–	**–0.72(–2.37**)**	**0.370(2.58**)**	**–0.44(–3.97***)**	**–20.9(–0.30)**	**–13.73(–0.24)**	**–0.18(–3.57***)**
b_2	–	0.106(2.13**)	–0.051(–3.3***)	0.004(0.82)	0.762(0.27)	–0.079(–0.29)	0.017(1.81*)
b_3	–	0.163(4.29***)	0.066 (0.64)	0.160(7.06***)	–1.908(–0.16)	–0.197(–0.05)	0.142(6.16***)
b_4	–	–0.73(–5.45***)	–0.47(–4.57***)	–0.93(–13.9***)	2.382(1.36)	0.156(0.09)	–0.83(–11.75***)
b_5	–	–0.041(–0.90)	–0.004(–0.25)	–0.014(–0.55)	0.063(0.14)	0.365(0.04)	–0.004(–0.20)
b_6	–	6.128(2.56**)	0.515(1.39)	0.864(1.61)	–7.928(–0.19)	2.162(0.04)	0.907(1.74*)
b_7	+/–	–0.011(–0.63)	0.0004(0.03)	0.002(0.27)	–0.029(–0.24)	0.100(0.04)	0.005(0.59)
b_8	+/–	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.
b_9	+/–	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.
F		17.3***	16.6***	48.4***	0.09	0.13	39.3***
Adj. R^2		9.63	9.25	23.52	2.49	2.49	20.1
N		1.104	1.104	1.104	1.104	167	1.104

Notes:

$CORP\_GOV_{it}$: Individual characteristic of corporate governance or aggregate index; *B_SCALE*, *B_MEET*, *OUTSIDE, O_ACTIVITY, O_EXPERT* and *CORP_INDEX*;

$CORP\_INDEX_{it}$: The sum of *B_SCALE*, *B_MEET*, and *OUTSIDE* of firm *i* in year *t* (we multiply *B_MEET* by –1 so that the sum of the three variables will be indicative of overall corporate governance);

$SIZE\_DUMMY_{it}$: Indicator variable with a value of 1 if the total assets of firm *i* in year *t* are equal to or above 2 trillion Won, 0 otherwise

5. Conclusions

Previous studies have supported that corporate governance effectively controls managers' earnings management. However, they all used abnormal accruals as a proxy for earnings management. Hitherto, the effect of corporate governance on real activity-based earnings management has not been investigated. We examined how real activity-based earnings management is affected by corporate governance, using data for firms listed on the Korean stock exchange. We found that if corporate governance influences firms' real operational or investment decisions and if it is identified which factors are most influential, then managers' discretionary activities, such as sales manipulation, overproducing, and cutting expenses, could be controlled effectively. We considered the following board characteristics: board size, the number of board meetings, the proportion of external directors, external directors' activities, and the financial expertise of the

external directors. We examine those characteristics both individually and aggregately using a corporate governance index. In particular, we tested the relationships between corporate governance and real activity-based earnings management when a firm has an internal audit committee or when it makes a loss. Sales manipulation, overproduction, and cutting discretionary expenses were used as a proxy for real activity-based earnings management.

The results show that managers are less likely to be engaged in real activity-based earnings management when the board of directors is large enough to control their operational or investment decisions or when the board of directors consists of more external directors so that it operates independently to a large extent. Earnings management through sales manipulation increases as the board's activity increases. We did not expect this result; we surmise that frequent board meetings means there are many issues regarding abnormal operational or investment, such as sales promotions or overproduction, that must be decided but that cannot be settled for the best. We did not test this conjecture, leaving it for further work. These associations are more pronounced when we employ a corporate governance index as an aggregated measure or when a firm has an internal audit committee. Consistent results are found when we consider problems regarding endogenous relationships among variables using 2SLS. Our study also considered those associations when firms have an internal audit committee inside. However, it is debatable whether an audit committee is actually independent of the board of directors or not, because it is a sub organization of the board. We leave the issue of the independence of internal audit committees for further study. Our study focus on upwards earnings management rather than downwards because inflation of earnings cause damage on shareholder's wealth which is a main concern. Our analysis and conclusion are based on proxies for earnings management and these are calculated by estimation models developed by previous studies, and therefore are subject to any biases inherent in the estimation models. It is the first empirical evidence and meaningful that a firm's real operational or investment decisions could be influenced by well established governance mechanism in practice.

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APPENDIX

Definition of variables

Variables	Definition
	Earnings management proxies
RM_proxy	Sum of *Ab.OCF*, *Ab.PROD_cost*, and *Ab.EXP* (We multiply *Ab.OCF* and *Ab.EXP* by negative one so that the sum of the three variables will be indicative of overall real earnings management)
Ab.OCF	Abnormal cash flows from operations
Ab.PROD_cost	Abnormal production costs
Ab.EXP	Abnormal discretionary expenses (the sum of employee welfare, advertising, R&D expense, and education and training expenses)
	Corporate governance variables
B_SCALE	Number of directors on board, which used as natural log forms in this study
B_MEET	Number of board meetings, which used as natural log form in this study
OUTSIDE	Proportion of outside directors (# of Outside director ÷ # of total directors on board)
Outside director	Firm's board of directors is not current employee of the firm, regardless of an ex-employment in the firm
O_ACTIVITY	Simple participation rate at board meetings by outside directors
O_EXPERT	Proportion of outside directors as financial experts
Financial experts	Professor in the field of accounting or finance, CPAs, or person who had consulting experience on finance
COMMITTEE	Indicator variable with a value of 1 if there is audit committee within firm, 0 otherwise
CORP_INDEX	Sum of *B_SCALE*, *B_MEET*, and *OUTSIDE* (We multiply *B_MEET* by negative one so that the sum of the three variables will be indicative of overall corporate governance)
$CORP\_GOV_{it}$	Individual characteristic of corporate governance or aggregate index; *B_SCALE*, *B_MEET*, *OUTSIDE, O_ACTIVITY, O_EXPERT* and *CORP_INDEX*
	Control variables
SIZE	Natural log of total assets
SIZE_DUMMY	Indicator variable with a value of 1 if total assets are equal to or above 2 trillion Won, 0 otherwise
LEVERAGE	Debt ratio deflated by lagged assets
ROA	Return of assets (Earnings before tax/ Total Assets)
LOSS	Indicator variable with a value of 1 if net income is below zero, 0 otherwise
OWNER	Large shareholder's ownership which includes holdings of a majority shareholder, his or her family, and affiliated firms which have special relations with the firm according to Article 2 of the Securities and Exchange Act.
COMPEN	Board of directors' compensation which includes salary, bonus, and stock option.
OWNER_DUMMY	Indicator variable with a value of 1 if manager is an owner, 0 otherwise
IND_Dummy	Industry dummy variables
YEAR_Dummy	Year dummy variables

Note: This table provides definitions of the variables that were used in this study. Data were obtained from Fn-DataGuidePro,TS2000, and annual reports

ĮMONIŲ VALDYMO POVEIKIS, PAGRĮSTAS DARBO UŽMOKESČIO VALDYMU: KORĖJOS PAVYZDYS

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Santrauka

Šiame straipsnyje siekiama nustatyti, kokią įtaką turi kompanijos vadovo sprendimai, susiję su gaunamų pajamų iš darbuotojų tiesioginės veiklos / operacijų ar investicinių sprendimų kontrole. Tyrime dalyvavo Korėjos kompanijos. Autorių atlikti tyrimai parodė, kad darbuotojų darbo užmokesčio valdymas yra efektyvesnis nei tiesioginė vadovo kontrolė. Straipsnyje minima, kad priėmus sprendimą valdyti darbo užmokesčius, būtina keisti visą įmonės valdymo struktūrą. Gauti rezultatai yra kaip siūlymas peržiūrėti atitinkamus nacionalinius teisės aktus Korėjoje.

Reikšminiai žodžiai: įmonių valdymas, darbo užmokestis, valdymas, pajamos, kompanijos.

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