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Reexamination of the non-linear relationship between management ownership and earnings management: Evidence from Japan

Abstract

The purpose of this paper is to provide further evidence on the functional form of relationship between management ownership and earnings management in the Japanese context. Applying regression model with third order polynomial like Teshima and Shuto (2008), this study finds evidence of non-monotonic (cubic) relationship between management ownership and earnings management which supports alignment-entrenchment-alignment hypothesis. However, this study attempts to confirm the robustness of such findings with two additional approaches, namely, piece-wise linear regression and third order polynomial regression with mean centering adjustment. Unlike initial results, further evidence indicate that though the relationship between management ownership and earnings management is non-linear but the nature is quadratic ('U'-shaped) which supports alignment-entrenchment hypothesis. Such conflicting findings will surely assist the future researchers to be cautious in designing non-linear models while investigating the relationship between ownership structure and earnings management.

Keywords: Discretionary accruals; earnings management; managerial entrenchment effect; incentive alignment effect; management ownership; Ownership structure.

1. **Introduction**

Berle and Means (1932) document that when shareholders are dispersed, managers will try to maximize their own interests at the costs of shareholders' value maximization goal. Following Berle and Means (1932), Jensen and Meckling (1976) suggest that such attempts decline as management ownership rises. This argument is often denoted as 'Incentive alignment hypothesis' which states that greater managerial stake in the ownership of the company aligns the interest of the managers with that of shareholders, and thus reduce the level of opportunistic behavior of managers (e.g., Velury and Jenkins, 2006; Warfield et al., 1995). On the contrary, another stream of research (e.g., Cohen et al., 2008; Darrough et al., 1998) argues that greater managerial ownership provides greater discretion in the hands of the managers which may induce them to involve with more opportunistic activities that favor their welfare. This argument is frequently denoted as 'Managerial entrenchment hypothesis' However, the empirical literature includes no consensus on the exact direction of the relationship between managerial ownership and their opportunistic behavior. The most recent studies relax the assumption of a strictly linear relationship and examine the non-linear relationship between managerial share ownership and opportunistic behaviors. They argue that the relationship between managerial ownership and opportunistic behavior of management is non-monotonic where both the alignment as well as entrenchment effects operate at different level of managerial shareholdings (e.g., Bos et al., 2013; Khan and Mather, 2013; Sánchez-Ballesta and García-Meca 2007; Yang et al., 2008; Yeo et al., 2002). For low levels of managerial ownership, external discipline and internal controls or incentives will dominate managerial behavior and thus, align their interests with that of other shareholders. When managerial ownership rises to a certain threshold (i.e. once managers gain controlling authority or voting rights), managerial labor market and external market for corporate

control become ineffective and there will be a resurgence of managerial entrenchment behavior (Yeo et al., 2002). Therefore, the relationship between managerial ownership and mangerial opportunistic behaviors is non-monotonic like 'U' shape (i.e., alignment-entrenchment hypothesis). As further extension to this stream of research, Davies et al. (2005) argue that managerial incentives again akin to other shareholders at very high level of such ownership, because their financial wellbeing is highly affected by the wellbeing of other shareholders and the company as well. Like Davies et al. (2005), Teshima and Shuto (2008) have constructed a theoretical model demonstrating the incentive alignment effect for both high and low levels of managerial ownership and the management entrenchment intermediate levels of managerial ownership (i.e., alignment-entrenchment-alignment hypothesis). According to Tehshima and Shuto (2008):

> *Two types of motivation for managers relating to managerial shareholdings: the first is that managers will work to enhance the value of shares in a firm if they hold shares; the second is that managers, expecting to be reappointed, will make an effort to inspire the confidence of shareholders. The former motivation is expected to increase with managerial shareholdings, but is nonexistent when managers have no or very marginal shareholding. On the other hand, the latter motivation is not effective when managers have a sufficiently large number of shares and, therefore, do not need to worry about dismissal. (*p. 109)

They suggest that a non-monotonic relationship exists when managers' private benefit derived from their position is large and/or the sensitivity of the probability of managerial dismissal linked to corporate performance is high. Using a sample of Japanese listed firms for the period 1991-2000, they provide empirical evidence of a significant non-monotonic (cubic) relationship between managerial ownership and opportunistic managerial behaviors. As a proxy of opportunistic behaviors of management, they use the amount of earnings discretionarily adjusted

by managers, which is commonly termed as 'earnings management'. Their empirical evidences find that as managerial ownership increases, earnings management decreases for both high and low levels of managerial ownership, while it increases for intermediate levels of managerial ownership.

Based on the work of Teshima and Shuto (2008), this study attempts to reexamine this issue more robustly with alternative empirical models using very recent data in the Japanese context. Along with using the third-order polynomial model suggested by Tehsima and Shuto (2008), this study adopts two additional approaches, namely, piece-wise linear regression and third-order polynomial regression with mean-centering adjustment to check the non-linear relationship between managerial ownership and earnings management. Chen et al. (1993) argue that findings reported in the prior literature may be sensitive to alternative model specifications. Failure to test sensitivity of results to other model specifications contributes to the contradictory results in the literature (Scherer, 1988). In addition, as the work of Tehshima and Shuto (2008) is based on data during the period 1990s, when Japanese economy went through severe financial turmoil, it would be atleast worthwhile to reinvestigate the empirical validity of their proposed theoretical model in the post-crisis period. Darrough et al. (1998) argue that the stock market crash of the 1990s had an effect on the earnings management behavior or incentives of Japanese firms and its relationship with managerial ownership.

This study reveals very interesting findings. When third-order polynomial model like Teshima and Shuto (2008) is applied, this study finds evidence of non-monotonic (cubic) relationship between management ownership and earnings management, based on 11,360 firm-year observations during the period 2001-2011. Consistent with alignment-entrenchment-alignment hypothesis, earnings management decreases first, then increases, and finally decreases as

ownership by managers rises. However, such findings can't be confirmed with two alternative approaches. The further evidence shows that the relationship between managerial ownership and earnings management is non-linear (quadratic) with 'U' pattern (i.e., earnings management decreases first, and then increases as managerial ownership increases) which supports alignment-entrenchment hypothesis rather than alignment-entrenchment-alignment hypothesis. Such findings cast a serious doubt on the empirical validity of the theoretical model developed by Tehshima and Shuto (2008) in the Japanese context. Moreover, the findings of this study will surely make the future researchers careful in drawing conclusion about the relationship between ownership structure and earnings management. Particularly, this study demonstrates the importance of applying multiple non-linear model specifications to test this phenomenon rather than relying on one approach.

The remainder of this paper is organized as follows. Section 2 presents review of prior studies, and hypotheses to be empirically tested in this study. Section 3 describes research design and sample characteristics. Section 4 presents empirical results, and Section 5 concludes the paper.

2. **Literature review and hypotheses development**

The typical characteristics of publicly traded companies is the separation of ownership from control, which gives rise to agency conflicts between managers and shareholders (Berle and Means, 1932; Demsetz and Lehn, 1985; Jensen and Meckling, 1976; Shleifer and Vishny, 1997). Managers of diffusely owned firms have incentives to report earnings that deviates from the substance of underlying economic transactions to maximize private benefits at the cost of shareholders or creditors (Christie and Zimmerman, 1994; Dechow and Skinner, 2000; Healy and Wahlen, 1999; Leuz et al., 2003; Warfield et al.,1995). Accrual based earnings management

is one process through which managers can present reported earnings in a manner that deviates from the underlying real and economic transactions of a firm (Bos et al., 2013; Scott, 2012). Mitra and Rodrigue (2002) argue that, as earnings management technique, accruals earnings management is the most damaging to the usefulness of accounting reports because outside investors are unaware of the extent of such accruals. In empirical research, accrual earnings management is widely used as a proxy of opportunistic behaviors of managers to maximize their interests at the costs of shareholders. (e.g., Dechow et al., 1995; Jones, 1991; Kazsnik, 1999; Kothari et al., 2005).

Despite the importance of potential implications, there exists no theoretical or empirical consensus on whether managerial ownership reduces or aggravates earnings management behaviors. There are two competing hypotheses of the effect of managerial ownership on earnings management. The first one is called incentive-alignment hypothesis. This hypothesis argues that self-serving and opportunistic managerial behavior is most likely to manifest when managers own little or no equity in the firm. Managers with marginal or no equity stake have the tendency to manage earnings to increase their performance related bonus or compensation, relax contractual constrains of debt covenants, seek protection against dismissal when underperforming, and to window dress the financial statement prior to the offering of securities to the public (Jensen and Meckling, 1976; Healy, 1985; Healy and Wahlen, 1999; Shuto, 2007; Yang et al., 2008). However, as capital bonding increases, the incentive of managers to act in the interest of shareholders also increases. This incentive-alignment leads managers to adopt accounting policies and estimation techniques that reflect the underlying economic transactions of the firm. Consistent with this framework, Warfield et al. (1995) first find a negative

relationship between managerial share ownership and magnitude of abnormal accruals for US firms. Velury and Jenkins (2006) also find similar results in the US context.

A competing view is the managerial entrenchment effect, which is based on the argument that greater managerial ownership increases the discretionary power of the manager which is ultimately used to expropriate wealth from other shareholders. When managers own relatively large shares in the company, their control over the operation as well as governance of the firms substantially increase, which induces them to involve with more aggressive earnings management to maximize their own utility (for example, excessive bonus, influencing share price, getting external fund, meeting debt covenants). Moreover, greater managerial ownership limits accounting information flows to outside investors, and creates information asymmetry. Information asymmetry allows managers to manipulate earnings in order to maximize their own interests, thus lowering the transparency and informativesness of reported earnings. Cheng and Warfield (2005) focus on the relation between equity incentives and signed abnormal accruals, and find that managers with high equity incentive are more likely to involve with earnings management. Cohen et al. (2008) also find that discretionary accruals are positively related to managerial equity incentives in the pre- and post Sarbanes-Oxley Act 2002 periods for US firms. Interestingly, in contrast to the results of Warfield et al. (1995) and others (Cheng and Warfield 2005; Cohen et al., 2008), Francis et al.(1999) and Rajgopal et al. (1999) find no evidence that managerial share ownership has a significant impact on income-increasing or decreasing accruals of US firms. Gabrielsen et al. (2002) report no relationship between managerial ownership and absolute abnormal accruals for Danish firms. Other studies such as by Othman and Zeghal (2006) for Canada and France, and Young (1999) for UK also examine linear relations and report mixed results. In Japanese context, Darrough et al. (1998) investigate the monotonic relationship

between managerial ownership and discretionary accruals, and find a significant positive relationship in 1989 but no significant relationship in subsequent three years.

A series of studies (Bos et al. 2013; Khan and Mather, 2013; Yeo et al., 2002; Sánchez-Ballesta and García-Meca 2007) relax the assumption of a strictly linear relationship and examine nonlinear (quadratic) relations between managerial share ownership and abnormal accruals. [1] These studies build on the idea that greater equity ownership can be equally beneficial or detrimental to shareholders. It can prompt managers to act in the best interest of shareholders, but also induce them to exercise control over the firm at the expense of shareholder wealth when market discipline or managerial labor markets are weak or the board is entrenched (Bos et al., 2013). As management ownership continues to increase beyond the low range, mangers tend to gain stronger control over the firm, and external monitoring becomes less effective. Although the alignment effect may still be operative, but the management entrenchment will nevertheless exert a relative greater impact. Consistent with this view, Yeo *et al.* (2002) and Sánchez-Ballesta and García-Meca (2007) find a U-shaped relationship between management ownership and discretionary accruals for firms listed in Singapore and Spain, respectively. Their results show that discretionary accruals fall with greater managerial ownership and find turning points at 25 percent and between 37-48 percent, respectively, after which, earnings manipulation increases. Based on a study of Australian listed companies, Khan and Mather (2013) also find a negative relationship between value of managerial share ownership and discretionary accruals at lower levels of ownership value but a positive relationship when ownership value exceed a certain level. As an extension of non-linear investigation in the empirical analysis of ownership-performance link, Morck et al. (1988) and Short and Keasey(1999) persuasively posit that the entrenchment

effect would be dominant for intermediate level of managerial ownership, while the alignment effect would be dominant for low and high levels of ownership. They also find evidence in support of their expected non-monotonic relationship between managerial ownership and corporate performance or value. While investigating the relationship between managerial ownership and earnings management in the Japanese context, Teshima and Shuto (2008) propose a theoretical model demonstrating the incentive alignment effect for both high and low levels of managerial ownership and the management entrenchment intermediate level of managerial ownership. They find that the relationship is negative until managers own 13.6 percent of share capital. The relation turns positive for regions of 13.6 percent to 38.8 percent and negative again when managerial share ownership exceeds 38.8 percent of equity share capital.

This study is designed to reexamine the same issue more robustly with alternative empirical models using very recent data in the Japanese context. Chen et al. (1993) argue that findings reported in the prior literature may be sensitive to alternative model specifications. Failure to test sensitivity of results to other model specifications contributes to the contradictory results in the literature (Scherer, 1988). In addition, as the work of Tehshima and Shuto (2008) is based on data during the period 1990s, when Japanese economy went through severe financial turmoil, it would be worthwhile to reinvestigate the empirical validity of their proposed theoretical model in the post-crisis period. Darrough et al. (1998) argue that the stock market crash of the 1990s had an effect on the earnings management behavior or incentives of Japanese firms and its relationship with managerial ownership. Therefore, like Tehsima and Shuto (2008), the following hypothesis has been deigned to investigate in this study:

H1: The forces of alignment and entrenchment that affect managerial behavior lead to a non-linear relationship between share ownership by managers and earnings management.

The above hypothesis can be fragmented into following three hypotheses:

H1a: For low level of managerial ownership, increasing share-ownership to managers decrease the opportunistic behavior of managers (earnings management). [Incentive alignment hypothesis]

H1b: For intermediate level of managerial ownership, increasing share-ownership to managers increase the opportunistic behavior of managers (earnings management). [Managerial entrenchment hypothesis]

H1c: For high level of managerial ownership, increasing share-ownership to managers decreases the opportunistic behavior of managers (earnings management). [Incentive alignment hypothesis]

<<<<<FIGURE 1 ABOUT HERE>>>>>>>>>

3. **Research design**

3.1 Measure of earnings management

Following Kasznik (1999), this study estimates nondiscretionary accruals as a function of (a) change in revenue adjusted for change in receivables, (b) the level of property, plant, and equipment, and (c) change in cash flow from operations. Kasznik (1999) extend the modified Jones model (Dechow et al., 1995) by for including the change in cash flow from operations in it. As reason Kasznik (1999) points to Dechow's (1994) finding that change in cash flow from operations is negatively correlated with total accruals. Like Teshima and Shuto (2008), this study uses a cross-sectional model to control the effect of change in industry-wide economic conditions on total accruals and to allow the coefficient to vary across years. In estimating the cross-sectional accruals model, each firm-year is grouped into an estimation portfolio that

consists of observations with the same Toyo Stock Exchange (TSE) new industry classification code and fiscal year. The cross-sectional model is specified as follows:

$$TAC_{j,p} = \alpha_p + \beta_{1,p}(\Delta REV_{j,p} - \Delta REC_{j,p}) + \beta_{2,p}PPE_{j,p} + \beta_{3,p}\Delta CFO_{j,p} + \varepsilon_{j,p}$$

where,

TAC= total accruals, [(Δcurrent assets-Δcash and cash equivalents)- (Δcurrent liabilities-Δfinancing items) - Δother allowances-depreciation]

Δfinancing items = changes in short-term debt+ changes in commercial paper+ changes in current portion of bonds and convertible bonds,

Δother allowances=changes in allowances classified within fixed assets,

ΔREV= change in sales revenue,

PPE= gross property, plant, and equipment,

ΔCFO=change in cash flow from operations,[Δ(NI-TAC)]

NI=income before extra-ordinary items.

The subscript j denotes each firm in the estimation portfolio p. All variables are deflated by average total assets.

Using the above model, discretionary accruals (DAC) are estimated as the difference (residual) between the actual value and the predicted value of total accruals (TAC). Nondiscretionary accruals depend on the level of activity of the firm, whereas discretionary accruals (DAC) reflect

the subjective or discretionary judgment of the managers about the firm performance. Managers often exercise discretion over accounting methods, estimation and recognition criteria to opportunistically manage these discretionary accruals to serve their purpose. The absolute value discretionary accruals ($|DAC|$) is used as the proxy for opportunistic earnings management behavior.

3.2 Model design and variables

Following Teshima and Shuto (2008), this study estimates the following regression with third order polynomial to estimate the relationship between managerial ownership and earnings management:

$$|DAC|_{it} = \alpha_0 + \sum_{k=1}^{3} \beta_k \, DIR_{it}^k + \sum_{m=1}^{5} \delta_m Control \, variables_{it} + Industry \; effect + Year \; effect + \varepsilon_{it}$$

The variable 'DIR' which denotes fraction of shares owned by top-managers, who are also the directors of the companies, and its' higher order terms (DIR^2, DIR^3) are the main research variables in this study. As mention in Teshima and Shuto (2008), in most of the Japanese firms, directors perform the role that their counterparts in the United States would perform as executive managers. The subscript i denotes each firm in the each fiscal year t.

Along with managerial ownership variable(s), this study considers several control variables which may affect the relationship between managerial ownership and earnings management. First, this study includes fractions of shareholdings by financial institutions (denoted hereafter as 'FIN') and other corporations (denoted as 'CORP') as control variables in the regression model. Large institutional shareholders reduce the scope for managers to diverse greatly from the interest of shareholders (Davies et al 2005; Mitra and Cready, 2005) and inhibit managers from

increasing or decreasing reported profits towards the managers' desired level or range of profits (Chung et al., 2002; Rajgopal et al. 1999; Velury and Jenkins, 2006). Consistent with efficient monitoring hypothesis, this study expects that the shareholdings of financial institutions (FIN) and other corporations (CORP) would have a negative relationship with earnings management.

This study also controls for several other factors that have considered to be related with earnings management by Teshima and Shuto (2008). These include top-executives' compensation (COMP), firm size (SIZE) and leverage (DER). '*SIZE*' is defined as the natural logarithms of total sales, '*DER*' is defined as total debt divided by total assets, '*COMP*' is defined as total cash compensation paid to managers (directors) divided by total assets. In addition, industry dummies and year dummies are included in regression model to control for the industry-specific and time-specific macro-economic conditions that might have some influence on empirical findings.

3.3 Sample

The sample of Japanese firms is selected from the period 2001 to 2011 based on the following criteria:

(i)   Firms are listed on first and second sections of TSE.

(ii)   Financial companies including banks, securities firms, and insurance firms are excluded.

(iii)   The accounting period of the firms is unchanged during the period 2001 to 2011.

(iv)   The financial statement data of the firms necessary for the study are available in Nikkei-NEEDS database.

(v)   Industry sectors having less than 10 firms are also excluded.

The selection process yields 11,360 firm-year observations for Japanese non-financial firms publicly traded on the first section and second section of the TSE. Table 1 details the breakdown of observations across different industry-sectors.

<<<<<<TABLE 1 ABOUT HERE>>>>>>>>>

4. **Empirical findings**

4.1 Descriptive statistics

Table 2 presents descriptive statistics of sample firms. The average of absolute value of discretionary accruals (|DAC|) is around 3 percent across entire sample which is very similar to that of Tehshima and Shuto (2008) in the Japanese context . The average of shares owned by managers (DIR) is about 4 percent, which is close to the value suggested by Basu et al. (2007), Sakawa and Watanabel (2008), and Tehshima and Shuto (2008) taking evidence in the 1990s Japanese listed companies. Ownership by financial institutions (FIN) is about 26 percent and ownership by other business corporations (CORP) is about 27 percent, indicating the strong control of institutional shareholders on Japanese companies.

Regarding firm characteristic variables, the average of firm size (SIZE) measured by total sales is 208,471 million yen. The average of leverage (DER) is about 58 percent, which is almost an identical value to that reported by Basu et al. (2007), Sakawa and Watanabel (2008), and Tehshima and Shuto (2008) taking evidence in the 1990s Japanese listed companies. This implies that the Japanese firms are still largely dependent on debt financing. The average level of managerial cash compensation (COMP) is around .03 percent of total assets.

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Table 3 demonstrates the Pearson correlation matrix of variables of interests. Managerial ownership (DIR) is positively correlated with |DAC|. The positive relation between managerial ownership and |DAC| suggests the existence of entrenchment effects with increasing ownership. However, a simple correlation between managerial ownership and |DAC| may be masking a more complex functional form for this relationship, a possibility that we examine in later multivariate tests. In addition, managerial ownership is negatively correlated with institutional ownership (both financial and business corporations). This implies that when the external monitoring is strong, managers will hold relatively less shares. Moreover, managerial ownership is negatively correlated with firm's size and leverage, but positively correlated with the level of managerial cash compensation. None of the correlation coefficients between variables is too high to consider multicollinearity problem in this stage.

4.2 *Regression results*

The estimated results using two-ways fixed effect regression (industry effect and year effect) are shown in table 4. This study tests the linear, quadratic, and cubic relationship between managerial ownership and absolute value of discretionary accruals in model 1, model 2, and model 3, respectively. In model 1, the results show that the coefficient of DIR is statistically insignificant, which implies that there is no linear relationship between managerial ownership and absolute value of discretionary accruals. In order to check the non-linear relationship, further attempt is made to run model 2 (quadratic non-linear model) and model 3 (cubic non-linear model). In model 2, the coefficients of DIR and DIR^2 are statistically significant with expected signs: the coefficient of DIR is negative (p<.01), that of DIR^2 is positive (p<.01). These finding confirm that the relationship between managerial ownership and absolute value of discretionary accruals is non-linear. The calculated turning points for the nonlinear relationship are 17 percent

(a minima point). It implies the absolute value of discretionary accruals is negatively related to managerial ownership in the 0-17 percent range (low level), positively related when managerial ownership exceeds 17 percent ('U' shape). In model 3, like Teshima and Shuto (2008), this study further finds the evidence of cubic non-linear relationship where the coefficients of DIR, DIR^2, and DIR^3 are all statistically significant with expected signs: the coefficient of DIR is negative (p<.01), that of DIR^2 is positive (p<.01), and that of DIR^3 is negative (p<.05). The calculated turning points for the nonlinear relationship are 11.6 percent (a minima point) and 37.20 percent (a maxima point). [2] It implies the absolute value of discretionary accruals is negatively related to managerial ownership in the 0-11.6 percent range (low level), positively related in the 11.6-37.20 percent ownership range (intermediate level), and negatively related when managerial ownership exceeds 37.20 percent (high level). [3] Like Teshima and Shuto (2008), the results suggests that as managerial ownership increases, earnings management decreases for both high and low levels of managerial ownership, while it increases for intermediate levels of managerial ownership.

<<<<<< TABLE 4 ABOUT HERE>>>>>>>>>

However, there are two potential concerns about higher order polynomial model formulation, and thus, about findings so far. First, there might be a problem of high multi-collinearity between the lower order and higher order polynomial terms. Hill et al. (2012, p. 191) mention that it is sometimes true that having a variable and its square or cube in the same model causes collinearity problems. Asteriou and Hall (2007, p. 163) mention that polynomials of order higher than two should be avoided for two reasons. First, because of reduction of the degrees of freedom, and second, because there is a possibility of high correlation between the polynomial terms (often denoted as 'structural multicollinearity'). As a consequence of collinerity, the

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estimated coefficients become unreliable and standard errors become very large. Moreover, the sample bias can become so large that the estimated coefficients get the incorrect sign (Vogelvang, 2005). In table 5(A), this study has reported the VIF values of three models (model 1, model 2, and model 3). It clearly shows that the VIF values of managerial ownership variables (DIR, DIR^2, and DIR^3) in model 3 are very large. According to Hair et al. (1998), VIF values greater than 10 indicate a multicollinearity problem.

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Second, the common non-normality of the ownership data and the statistical analysis adopted are areas that might require more careful attention. Prior studies argue that when the distribution of managerial ownership is skewed positively, the few observations with large-most managerial ownership might drive the results towards them in the polynomial model formulation.[4] In table 6, this study finds that the number of observations in the range 0-11.6 percent is 10,020 (88.2 percent), the number of observations in the range 11.6-37.2 percent is 1,243 (10.94 percent), and the number of observations above 37.2 percent is 97 (0.86 percent). This clearly indicates that the distribution of managerial ownership in Japanese context is very positively skewed. Therefore, it is very essential to reexamine the findings in table 4 with additional/alternative methods available in prior studies that can reduce or remove the aforementioned two problems and contribute toward the robustness of observed findings.

<<<<<<TABLE 6 ABOUT HERE>>>>>>>>>>

4.3 *Additional analysis*

As a first attempt, this study did not change basic structure of the regression model but make an adjustment in data, which is commonly known as mean-centering approach. The common

problem of multi-collinearity in polynomial regression can be solved or addressed by mean-centering approach (Mitchell, 2012, p. 58; Ruppert, 2011, p. 334; Wongrin et al., 2013, p. 330). Bradley and Srivastava (1979) and Dalal and Zickar (2012) argue that mean-centering atleast reduces nonessential collinearity. They also argue that mean-centering increase the interpretability of the results. Therefore, this study has adjusted the fraction of managerial ownership of each firm by deducting the industry-wise cross-sectional mean value of managerial ownership, and estimate the following regression:

$$|DAC|_{it} = \alpha_0 + \sum_{k=1}^{3} \beta_k \, DIRC_{it}^k + \sum_{m=1}^{5} \delta_m Control \; variables_{it} + Industry \; effect + Year \; effect + \varepsilon_{it}$$

where,

$DIRC_{it}$= fraction of shares owned by directors adjusted for industry mean, $[DIRC_{it}=DIR_{it}- \overline{DIR}]$

$\overline{DIR}$= industry wise cross-sectional mean fraction of shares owned by directors.

The results are presented in table 7. The results show that the model 2 is better than model 1 in terms of individual variable significance. In model 3, when the cubic term of managerial ownership is added, the result shows that it is insignificant. Considering all these, model 2 is found to be the statistically appropriate model to estimate the relationship between managerial ownership and earnings management. The absolute value of discretionary accruals is negatively related to managerial ownership in the 0-11.6 percent range (low level), positively related above 11.7 percent ownership range (high level). Unlike findings in table 4, these findings indicate that the non-monotonic relationship is quadratic or 'U' shape. These findings sharply contradict with the initial findings and the findings of Teshima and Shuto (2008). In table 5(B) shows that the

VIF values of model 1, model 2, and model 3 after mean-centering adjustment are very close to the tolerable limits, and thus, minimize the problem of structural multi-collinerity.

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As a further attempt, this study has applied another type of empirical model as suggested by Morck et al. (1988) to examine the non-monotonic relationship between managerial ownership and earnings management, commonly known as piece-wise linear regression. Morck et al. (1988) and Borsch-Supan and Koke (2002) argue that an econometric better approach is to re-estimate turning points of non-linear equation models with piece-wise linear equations.[5] However, as existing literature fails to provide exactly defined ranges of managerial ownership to examine non-linearity with earnings management, this study adopts the ranges which are derived in table 4 (0-11.6 percent, 11.6- 37.2 percent, and 37.2 percent above) and test the calculated regions with the following piece-wise linear regression:[6]

$$|DAC|_{it} \quad = \quad \alpha_0 \quad + \quad \beta_1 DIR_{(0\_p1)it} + \beta_2 DIR_{(p1\_p2)it} \quad + \quad \beta_3 DIR_{(p2\_above)it} \quad +$$

$$\sum_{m=1}^{5} \delta_m Control\ variables_{it} + Industry\ effect + Year\ effect + \varepsilon_{it}$$

where, 0_p1=managerial ownership is less than 11.6%, p1_p2= managerial ownership is greater than or equal to 11.6% but less than 37.2%, p2_above= managerial ownership is greater than or equal to 37.2%. Other variables are same as defined before.

<<<<<<<TABLE 8 ABOUT HERE>>>>>>>>>>

Table 8 depicts the findings. It shows that the relationship between the absolute value of discretionary accruals is negatively related to managerial ownership in the 0-11.6 percent range (low level), positively related in the 11.6-37.20 percent ownership range (intermediate level). But

there is no significant relationship when managerial ownership exceeds 37.20 percent (high level). These findings again confirm that even though earnings management is a non-linear function of managerial ownership but such relationship is quadratic ('U' shape), not cubic as we see in table 4. VIF values in table 5(C) show that there is no concern of multi-collinearity among the variables with piece-wise model formulation. Moreover, this method is not as sensitive as to the presence of outliers, enhancing more robust conclusion for the whole range of managerial ownership.

Based on findings in this section, it seems more convincing that managerial ownership has non-monotonic 'U'-shaped impact on earnings management as measured by absolute value of discretionary accruals. Consistent with alignment-entrancement hypothesis, it deceases first (alignment hypothesis) and then increases as managerial ownership increases (entrenchment hypothesis) beyond approx. 11 percent. Such findings contradict with the findings of Teshima and Shuto (2008), who argue that it deceases first (alignment hypothesis), then increases (entrenchment hypothesis), and finally decreases again (alignment hypothesis).   This surely casts doubt on the empirical validity of the theoretical model conjectured by Teshima and Shuto (2008) in their paper.

Regarding control variables, like Darrough et al. (1998) as well as Teshima and Shuto (2008), this study does not find consistent evidence that leverage (DER), managerial compensation (COMP) and ownership by other business corporation (CORP) have significant relationship with earnings management. However, consistent with efficient monitoring hypothesis, this study finds that ownership by financial institutions (FIN) has significant negative relationship with earnings management proxy.   It means that financial institutional ownership contravene earnings

management behaviors in the Japanese listed companies. In addition, the results show that firm size (SIZE) has negative significant relationship with earnings management proxy. It implies that larger firms in Japanese context are subject to greater monitoring and control by the state, and thus, lower susceptible to earnings management tendency.

5. <u>Conclusion</u>

This paper reexamines the non-monotonic relationship between managerial ownership and managerial opportunistic behavior in the form of earnings management which is measured by absolute value of discretionary accruals. Consistent with Teshima and Shuto (2008), the study initially finds non-linear (cubic) relationship between the managerial ownership and the absolute value of discretionary accruals. According to alignment-entrenchment-alignment hypothesis, the relationship between them is significantly negative in low and high levels and significantly positive for intermediate level of managerial ownership. However, when the same phenomenon is tested with two additional methods, namely, polynomial regression with men-centering adjustment and piece-wise linear regression, the results provide strong evidence for a significant non-linear link between managerial ownership and earnings management. However, the nature of non-linearity is quadratic ('U'-shaped). Consistent with alignment-entrenchment hypothesis, it decreases first as managerial ownership raises up to the level around 11 percent, and any further increment in such ownership allows managers greater discretion which increases earnings management.

The findings surely cast doubt on the empirical validity of theoretical model proposed by the Teshima and Shuto (2008) to investigate the relationship between managerial ownership and earnings management. Moreover, such conflicting evidence has a potential research implication. The findings will surely assist the future researchers to be cautious in drawing conclusion about

the relationship between ownership structure and earnings management using polynomial models. Particularly, this study highlights the importance of applying alternative model specifications to test a nonlinearity rather than solely relying conventional polynomial models.

End Notes

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[1] Knowing little about the functional forms, the commonly employed linear specifications imply, if counterfactual, missing higher order terms in the equation that has been estimated (Borsch-Supan and Koke, 2002, pp.311-312). They also argue that if quadratic or higher order terms are left out, it creates a left-out variable bias and causes the coefficient of linear ownership variable to be underestimated.

[2] The turning points are found by differentiating |DAC| (say, y) with respect to DIR (say, x), assuming all other variables are constant, letting $\frac{\partial y}{\partial x} = 0$, and solving for x. To determine whether x is a maximum or minimum turning point, the value of $\delta^2 y/\delta x^2$ is calculated. If $\delta^2 y/\delta x^2 > 0$, then the turning point is a minima, and if $\delta^2 y/\delta x^2 < 0$, then the turning point is a maxima.

[3] In earlier paper, Teshima and Shuto (2008) find the similar conclusion for the ranges 0-13.6 percent, 13,6-38.8 percent , and above 38.8 percent based on the study of listed Japanese companies in the 1990s.

[4] McConnel and Servaes (1990) and Chen et al. (1993) mention that this ownership pattern can create difficulties in specifying accurate non-linear models with multiple inflection points because few high managerial ownership observations can pull the regression line disproportionally towards them.

Spline regression or piece-wise linear regression models have substantially greater flexibility than polynomial regression models in low dimensions and are generally less likely to generate perfect multi-collinearity in higher dimensions (Marsh and Cormier, 2002, p. 3).

[6] The piece-wise linear regression is used to re-estimate and verify the turning points of the non-linear equation models as theory provides little specific information in the Japanese context about the   regions of managerial ownership that are beneficial or detrimental to shareholder wealth.

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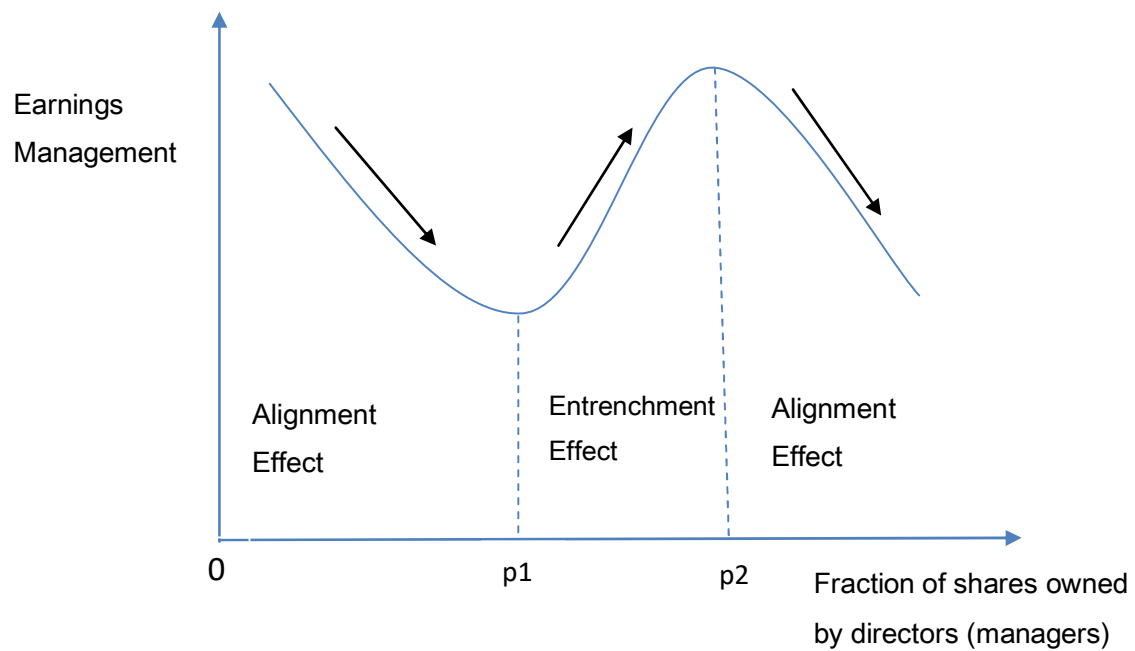
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Figure 1. Non-monotonic   Relationship Between Earnings Management and Director (managerial) share ownership.

Source: Developed by author.

Table 1. Industry-wise Sample Classifications			
TSE-industry name	observation	Percent	Cumulative Freq.
Chemicals	1,062	9.35	9.35
Construction	769	6.77	16.12
Electric Appliances	1,143	10.06	26.18
Electric Power & Gas	200	1.76	27.94
Foods	539	4.74	32.68
Glass & Ceramics Products	292	2.57	35.26
Information & Communication	365	3.21	38.47
Iron & Steel	349	3.07	41.54
Land Transportation	419	3.69	45.23
Machinery	1,081	9.52	54.74
Marine Transportation	117	1.03	55.77
Metal Products	290	2.55	58.33
Nonferrous Metals	265	2.33	60.66
Other Products	445	3.92	64.58
Pharmaceutical	208	1.83	66.41
Precision Instruments	228	2.01	68.42
Pulp & Paper	107	0.94	69.36
Real Estate	241	2.12	71.48
Retail Trade	506	4.45	75.93
Rubber Products	133	1.17	77.1
Services	452	3.98	81.08
Textile & Apparels	273	2.4	83.49
Transport Equipment	616	5.42	88.91
Warehousing and Harbor transport.	222	1.95	90.86
Wholesale Trade	1,038	9.14	100
Total	11,360	100	
Source: Author's research			

Table 2. Descriptive Statistics

Variable	Observation	Mean	Median	SD
|DAC|	11,360	0.028	0.02	0.025
DIR	11,360	0.039	0.01	0.075
FIN	11,360	0.269	0.26	0.135
CORP	11,360	0.258	0.22	0.169
COMP	11,360	0.003	0.00	0.004
DER	11,360	0.569	0.57	0.187
SIZE	11,360	10.987	10.86	1.427

Source: Author's research.
Notes: Variable descriptions
DAC|=absolute value of discretionary accruals using the modified CFO Jones model (Kasznik, 1999); DIR=fraction of the shares owned by directors; FIN= fraction of the shares owned by financial institutions; CORP =fraction of the shares owned by other corporations; COMP= total cash compensation paid to all directors divided by total assets; DER =total debt divided by total assets; SIZE = natural logarithm of sales.

Table 3. Correlation Matrix

Variable	|DAC|	DIR	FIN	CORP	COMP	DER	SIZE
|DAC|	1						
DIR	0.0502*	1					
FIN	−0.1090*	−0.3155*	1				
CORP	0.0401*	−0.1514*	−0.5342*	1			
COMP	0.0392*	0.3338*	−0.3652*	0.0886*	1		
DER	0.0296*	−0.1272*	−0.0172	0.0950*	−0.1698*	1	
SIZE	−0.0605*	−0.2708*	0.4737*	−0.1823*	−0.5445*	0.2287*	1

Source: Author's research.
Note: * indicates statistically significant at 5%.

Table 4. Regression Results of Discretionary Accruals on Ownership Variables

Independent variable	Model 1		Model 2		Model 3	
	Dependent variable= |DAC|					
	Coeff.	t–statistic	coeff.	t–statistic	coeff.	t–statistic
C	0.044***	13.09	0.047***	13.53	0.048***	13.61
DIR	−0.004	−0.79	−0.038***	−3.66	−0.079***	−4.15
DIR^2			0.111***	3.43	0.444***	3.19
DIR^3					−0.606**	−2.38
FIN	−0.013***	−4.42	−0.014***	−4.77	−0.014***	−4.87
CORP	−0.002	−1.02	−0.003	−1.37	−0.003	−1.54
COMP	−0.09	−1.14	−0.083	−1.05	−0.082	1.04
DER	0.003**	1.97	0.002	1.61	0.002	1.52
SIZE	−0.001***	−3.39	−0.001***	−3.74	−0.001***	−3.94
Industry dummies	Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes	
Adjusted R^2	0.069		0.07		0.071	
F–Statistic	28.76		28.27		27.77	
N	11,360		11,360		11,360	
Turning point(s)			17.10%		11.60%	
					37.20%	

Source: Author's research.

Notes: (1) Variable descriptions

DIR2 = square of the fraction of the shares owned by directors,

DIR3=cube of the fraction of the shares owned by directors.

(2) Indicator variables for the TSE industry classification code and for the years, from 2001 to 2011, are included but not reported.

(3) t–statistics are based on heteroskedasticity consistent standard errors and covariance.

(4) *** , **, and * indicate statistically significant at 1%, 5%, and 10%, respectively.

Table 5(A). Variance Inflation Factor (VIF) for Collinearity Check

Variable	Model 1 VIF	Model 1 1/VIF	Model 2 VIF	Model 2 1/VIF	Model 3 VIF	Model 3 1/VIF
DIR	1.39	0.7194	8.38	0.1193	31.8	0.0314
DIR^2			7.42	0.1348	163.22	0.0061
DIR^3					69.1	0.0145
FIN	2.13	0.4695	2.15	0.4651	2.16	0.4633
CORP	1.67	0.5988	1.68	0.5952	1.69	0.5916
COMP	1.52	0.6579	1.52	0.6579	1.52	0.6558
DER	1.10	0.9091	1.11	0.9009	1.11	0.9022
SIZE	1.70	0.5882	1.71	0.5848	1.72	0.5799
Mean VIF	1.59		3.43		34.04	

Source: Author's research.

Table 5(B). Variance Inflation Factor (VIF) for Collinearity Check

Variable	Model 1 VIF	Model 1 1/VIF	Model 2 VIF	Model 2 1/VIF	Model 3 VIF	Model 3 1/VIF
DIRC	1.29	0.7752	2.75	0.3636	2.86	0.3497
$DIRC^2$			2.45	0.4082	10.47	0.0955
$DIRC^3$					10.22	0.0978
FIN	2.04	0.4902	2.05	0.4878	2.07	0.4831
CORP	1.65	0.6061	1.65	0.6061	1.65	0.6061
COMP	1.50	0.6667	1.51	0.6623	1.51	0.6623
DER	1.09	0.9174	1.09	0.9174	1.10	0.9091
SIZE	1.70	0.5882	1.71	0.5848	1.71	0.5848
Mean VIF	1.55		1.89		3.95	

Source: Author's research.

Table 5(C). Variance Inflation Factor (VIF) for Collinearity Check

Variable	Model 1 VIF	Model 1 1/VIF	Model 2 VIF	Model 2 1/VIF	Model 3 VIF	Model 3 1/VIF
DIR_{0_p1}	1.43	0.6993	1.99	0.5014	2.05	0.4878
DIR_{p1_p2}			1.70	0.5895	2.18	0.4592
DIR_{p2_over}					1.34	0.7439
FIN	2.13	0.4694	2.16	0.4638	2.16	0.4634
CORP	1.66	0.6019	1.68	0.5936	1.69	0.5929
COMP	1.52	0.6595	1.52	0.6561	1.52	0.6561
DER	1.10	0.9091	1.11	0.9040	1.11	0.9036
SIZE	1.70	0.5871	1.71	0.5842	1.71	0.5842
Mean VIF	1.59		1.70		1.72	

Source: Author's research.

Table 6. No. of Firm-year Observations by Turning Points of Director Ownership		
Ownership by directors		
percentage range	No. of observations	Percent (%)
<11.6%	10020	88.20
11.6%>= and <37.20%	1243	10.94
>=37.20%	97	0.86
Total	11360	100
Source: Author's research.		

Table 7. Regression (mean-centering adjustment) Results of Discretionary Accruals on Ownership Variables

Independent variable	Model 1 Coeff.	Model 1 t-statistic		Model 2 coeff.	Model 2 t-statistic		Model 3 coeff.	Model 3 t-statistic
			Dependent variable= |DAC|					
C	0.045***	13.25		0.045***	13.46		0.045***	13.44
DIRC	−0.005	−1.13		−0.021***	−2.94		−0.021***	−2.94
DIRC^2				0.090***	2.71		0.124*	1.72
DIRC^3							−0.114	−0.55
FIN	−0.013***	−4.54		−0.013***	−4.68		−0.013***	−4.67
CORP	−0.002	−1.15		−0.003	−1.38		−0.003	−1.39
COMP	−0.086	−1.09		−0.078	−0.99		−0.079	−0.99
DER	0.003*	1.94		0.003*	1.83		0.003*	1.85
SIZE	−0.001***	−3.4		−0.001***	−3.62		−0.001***	−3.61
Industry dummies	Yes			Yes			Yes	
Year dummies	Yes			Yes			Yes	
Adjusted R^2	0.069			0.070			0.070	
F-Statistic	28.78			28.28			27.72	
N	11,360			11,360			11,360	
Turning point(s)				11.70%				

Source: Author's research.

Notes: (1) Variables descriptions
DIRC= fraction of the shares owned by directors(mean-centered),
DIRC2 = square of the fraction of the shares owned by directors(mean-centered),
DIRC3=cube of the fraction of the shares owned by directors(mean-centered).
(2) Indicator variables for the TSE industry classification and for the years, from 2001 to 2011, are included but not reported.
(3) t-statistics are based on heteroskedasticity consistent standard errors and covariance.
(4) *** , **, and * indicate statistically significant at 1%, 5%, and 10%, respectively.

Table 8. Regression (piece-wise) Results of Discretionary Accruals on Ownership Variables

Independent variable	Dependent variable= |DAC|					
	Model 1		Model 2		Model 3	
	Coeff.	t-statistic	coeff.	t-statistic	coeff.	t-statistic
C	0.047***	13.53	0.047***	13.63	0.047***	13.63
DIR_{0_P1}	−0.026***	−3.24	−0.04***	−4.39	−0.040***	−4.35
DIR_{p1_p2}			0.025***	2.88	0.025***	2.63
DIR_{p2_over}					0.002	0.03
FIN	−0.015***	−5.26	−0.014***	−4.87	−0.014***	−4.87
CORP	−0.004*	−1.91	−0.003	−1.50	−0.003	−1.50
COMP	−0.069	−0.88	−0.086	−1.09	−0.086	−1.09
DER	0.003	1.65	0.002	1.58	0.002	1.58
SIZE	−0.001***	−3.61	−0.001***	−3.80	−0.001***	−3.80
Industry dummies	Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes	
Adjusted R^2	0.070		0.071		0.071	
F-Statistic	28.89		28.35		27.7	
N	11,360		11,360		11,360	
Turning point(s)					11.6% (p1)	
					37.2% (p2)	

Source: Author's research.

Notes: (1) Variables descriptions

DIR0_p1 = DIR (fraction of shares owned by directors) if DIR < p1, =p1 if DIR >= p1,

DIRp1_p2 = 0 if DIR < p1, = (DIR−p1) if DIR >= p1 and <p2, = (p2−p1) if DIR>=p2,

DIRp2_over=0 if DIR<p2, = (DIR−p2) if DIR>=p2.

(2) Indicator variables for the TSE industry classification and for the years, from 2001 to 2011, are included but not reported.

(3) t-statistics are based on heteroskedasticity consistent standard errors and covariance.

(4) ***, **, and * indicate statistically significant at 1%, 5%, and 10%, respectively.