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Non-Controlling Interests and Proxy of Real Activities Manipulation in Stakeholder-Oriented Corporate Governance*

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Abstract

The purpose of this paper is to analyze the relationship between the ratio of non-controlling shareholder interests (minority equity ratio, MER) and the measurement error in real activities manipulation (RM) proxy for Japanese firms. Many Japanese firms have practiced stakeholder-oriented corporate governance systems. Previous studies suggest that the higher the MER, the more Japanese businesses tend to employ management techniques for the group's sales growth while also reallocating resources inside the group to reduce principal-principal conflicts. Such differences in management strategies by firms could lead to measurement error in the RM proxy. The analysis uses 16,450 firm-years listed on the Tokyo Stock Exchange. The results of our analysis show that there is a positive relationship between MER and the RM proxy, and high persistence of RM proxies, suggesting that the RM proxies may contain measurement error. We also find that MER is correlated with variables associated with management strategy and that controlling for these variables can reduce the measurement error of RM proxy in firms with large MER. This study extends previous research on measurement error in RM proxy by relating them to ownership structure and corporate governance. This paper would contribute to researchers examining issues related to RM.

Keywords: Real Activities Manipulation, Earnings Management, Principal-Principal Conflicts, Stakeholder-Oriented Corporate Governance

JEL Classification Code: M41, G30, G32, G34

1. Introduction

This paper investigates the relationship between non-controlling shareholder interests and real activities manipulation (RM) proxy in Japanese firms where stakeholder-oriented corporate governance systems are practiced. Conflicts between controlling and non-controlling shareholders are called principal-principal (PP) conflicts (Dharwadkar et al., 2000; Young et al., 2008). A previous study has noted that stakeholder-oriented corporate governance systems practiced in Japanese firms could mitigate PP conflicts (Young et al., 2008). In Japanese firms, many shares are held inter-company, and long-term management strategies to maximize market share and sales are adopted under the monitoring of various stakeholders, such as banks, other firms, or employees (Abegglen & Stalk, 1985; Desender et al., 2016; Young et al., 2008). As a result, the higher the ratio of non-controlling shareholder interests (minority equity ratio, MER), the more Japanese firms tend to adopt management strategies for the sales growth of the firm group and simultaneously reallocate resources within the firm group to mitigate PP conflicts (Sakawa & Watanabel, 2018; Fujita & Yamada, 2022).

Recent research has demonstrated that various management practices used by companies result in measurement errors in RM proxies (Srivastava, 2019). According to Healy and Wahlen (1999), "Earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter

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financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers (p.368).” In recent years, the economic and academic importance of RM, which manipulates earnings by deviating business activities from normal levels, has increased (Cohen et al., 2008; Graham et al., 2005). Although RM proxy, proposed by Roychowdhury (2006), has become the de facto standard in studies on RM, it relies on the strong assumption that sales are the only determinant of costs and cash flows, and similar patterns of cash flows and costs occur in companies within the same industry (Srivastava, 2019). Conversely, if these assumptions are not satisfied, the RM proxy will contain measurement error other than true RM (Cohen et al., 2020; Gilliam, 2021; Siriviriyakul, 2021; Srivastava, 2019; Vorst, 2016). Srivastava (2019) found that differences in management strategies by firms can lead to measurement error in RM proxy. Therefore, the corporate governance characteristics of Japanese firms may also be related to the measurement error in the RM proxy.

This paper links the insights from studies on stakeholder-oriented corporate governance systems with those from studies on Roychowdhury’s (2006) RM proxy by focusing on the MER of Japanese firms. If the errors included in the RM proxy are related to firm ownership structure, researchers may observe spurious correlations between the variables relevant to their hypotheses and the RM proxy. Understanding the relationship between corporate governance and RM proxy is crucial for measuring the effects of corporate governance.

2. RM Measurements and Research Question

2.1. RM Measurement and Its Problems

Roychowdhury (2006) developed a model that captures three types of RM: increasing sales, overproduction, and reducing discretionary expenditures. The model is based on the accounting process model by Dechow et al. (1998) and relies on their assumptions that sales follow a random walk process and that all costs are incurred as a percentage of sales. Roychowdhury’s (2006) model first estimates cash flows from operations, production costs, and discretionary expenditures resulting from normal business activities by industry and year using ordinary least squares (OLS) as a function of sales, such as in equations (1) through (3) below:

$$\frac{\mathrm{CFO}_{i,t}}{\mathrm{Asset}_{i,t-1}} = \alpha_0 + \alpha_1 \frac{1}{\mathrm{Asset}_{i,t-1}} + \alpha_2 \frac{\mathrm{Sales}_{i,t}}{\mathrm{Asset}_{i,t-1}} + \alpha_3 \frac{\Delta\mathrm{Sales}_{i,t}}{\mathrm{Asset}_{i,t-1}} + \varepsilon \quad (1)$$

$$\frac{\mathrm{PROD}_{i,t}}{\mathrm{Asset}_{i,t-1}} = \beta_0 + \beta_1 \frac{1}{\mathrm{Asset}_{i,t-1}} + \beta_2 \frac{\mathrm{Sales}_{i,t}}{\mathrm{Asset}_{i,t-1}} + \beta_3 \frac{\Delta\mathrm{Sales}_{i,t}}{\mathrm{Asset}_{i,t-1}} + \beta_4 \frac{\Delta\mathrm{Sales}_{i,t-1}}{\mathrm{Asset}_{i,t-1}} + \varepsilon \quad (2)$$

$$\frac{\mathrm{DISX}_{i,t}}{\mathrm{Asset}_{i,t-1}} = \gamma_0 + \gamma_1 \frac{1}{\mathrm{Asset}_{i,t-1}} + \gamma_2 \frac{\mathrm{Sales}_{i,t-1}}{\mathrm{Asset}_{i,t-1}} + \varepsilon \quad (3)$$

where CFO represents cash flow from operations, PROD represents production costs, DISX represents discretionary expenditure, Sales represents total sales, and Asset represents total assets. In addition, *i* and *t* in the subscripts of each variable represent the firm and the year, respectively. Next, the residuals in equations (1) through (3) are considered as RM proxy (i.e., the abnormal deviations from normal business activities due to RM). In other words, in Roychowdhury’s (2006) model, all cash flows and costs that are not related to past or current total sales are considered to be caused by RM. Most previous studies on RM have used Roychowdhury’s (2006) RM proxy.

Previous studies have noted that Roychowdhury’s (2006) RM proxy has various estimation problems and may contain errors that are not motivated to mislead outside investors. RM proxy has been associated with extreme performance, too large relative to the benchmark, high persistence, large bias, and low detection power of RM (Cohen et al., 2020; Gilliam, 2021; Siriviriyakul, 2021; Srivastava, 2019). These results imply that the RM proxy contains measurement error. One important factor that can cause the error is the difference in status corresponding to management strategies by firms. A firm determines its optimal management strategy considering future market share and earnings, based on which it changes its business activities. As a result, a firm’s normal level of business activities may not be estimated only from its past or current total sales (Srivastava, 2019; Vorst, 2016).

2.2. Research Question

Conflicts between controlling shareholders and non-controlling shareholders may arise due to the concentrated ownership structure, which allows controlling shareholders to exercise management control and enjoy private benefits at the expense of non-controlling shareholders (Dharwadkar et al., 2000; Shleifer & Vishny, 1997; Young et al., 2008). Such PP conflicts (Dharwadkar et al., 2000; Young et al., 2008) are more likely to arise when the controlling shareholder’s right to control is significantly stronger, e.g., in family ownership, which occurs in many East Asian firms (Muntahanah et al., 2021).

In Japanese firms, the presence of non-controlling shareholders in subsidiaries might be a factor that creates PP conflicts. The development of stock markets for emerging

firms around 2000 in Japan and of international corporate activities (e.g., foreign direct investment) caused many firms to have non-controlling shareholder interests on their balance sheets and have ownership structures that potentially create PP conflicts (Fujita & Yamada, 2022).

However, stakeholder-oriented corporate governance systems, as practiced in Japanese firms, are expected to mitigate PP conflicts (Young et al., 2008). Japanese firm managers seek to achieve goals that are beneficial to all stakeholders resulting in monitoring by banks and other firms under a strong inter-firm network (Desender et al., 2016; Lincoln & Gerlach, 2004; Yoshimori, 1995). In addition, Japanese firms are characterized by their desire to maximize sales (Abegglen & Stalk, 1985; Blinder, 2000). If the parent company grows its subsidiary by maximizing sales, then wealth is distributed to all shareholders of the subsidiary, including non-controlling shareholders, through capital gains. Therefore, PP conflicts are expected to be mitigated. It has been implied that parent firms of Japanese firm groups adopt a strategy to grow the sales of their subsidiaries when there are non-controlling shareholders in the group, and to execute this strategy, they reduce the dividends of their subsidiaries or temporarily transfer the earnings of their subsidiaries to the parent firm or other group firms (Fujita & Yamada, 2022; Sakawa & Watanabel, 2018). As a result, resources within the group would be efficiently reallocated in firm groups with non-controlling shareholders. Therefore, PP conflicts would not be apparent in Japanese firm groups, and there would be little incentive for parent firms to manage their earnings due to PP conflicts. Moreover, it has been noted that parent companies may require auditors to impose a higher level of verification when non-controlling shareholders are present (Yamada & Fujita, 2022).

Nevertheless, RM may be falsely detected in Japanese firms when non-controlling shareholders are present; RM proxy may have measurement errors due to differences in the management strategies adopted by firms (Srivastava, 2019). For example, a Japanese firm group that reports non-controlling shareholder interests may observe a decrease in abnormal CFO and an increase in abnormal production costs because sales and production activities are aggressively pursued to grow the sales of the subsidiary. Also, there may be a decrease in abnormal discretionary expenditure as efficient reallocation of resources leads to rationalization of expenditures. As a result, RM proxy may contain measurement error in Japanese companies that use stakeholder-oriented corporate governance systems if MER is high. Hence, we present the following research question:

RQ: *In Japanese firms, where stakeholder-oriented corporate governance systems are practiced, does RM proxy contain measurement error when MER is large?*

3. Results and Discussion

3.1. Sample Selection

We collected the data needed for the analysis from NEEDS-FinancialQUEST and NEEDS-Cges by Nikkei Media Marketing, Inc. The selection criteria for the samples for analysis were as follows: (1) the data period is from 2013 to 2019; (2) the firm is listed on the Tokyo Stock Exchange; (3) the firm is classified as a general business industry (non-financial industry); (4) the fiscal year is 12 months; (5) the firm reported non-negative net assets and non-controlling shareholder interests; and (6) there are at least 15 firms in the industry-year that includes the observation.

The number of observations that satisfied the above criteria, for which there were no missing values in the data needed to create the variables, was 16,450 firm years.

3.2. Descriptive Statistics

First, we split the sample into five portfolios according to the size of MER, which is the non-controlling shareholder interests divided by the net assets on the consolidated balance sheet. Then, for each portfolio, we observe the descriptive statistics of RM proxy (Roy_RM3, Roy_AbCFO, Roy_AbPROD, and Roy_AbDISX) estimated following Roychowdhury (2006). Roy_AbCFO and Roy_AbDISX are the residuals calculated from the estimation of equations (1) and (3) by industry year and multiplied by −1, respectively. Roy_AbPROD represents the residuals calculated from estimating equation (2) by industry year. Roy_RM3 is the sum of Roy_AbCFO, Roy_AbPROD, and Roy_AbDISX. Therefore, the expected values of Roy_RM3, Roy_AbCFO, Roy_AbPROD, and Roy_AbDISX are zero. Table A1 in the Appendix provides the definition of each variable.

Table 1 shows the descriptive statistics of each variable for each portfolio. For MERQ4, which has the largest MER, and MERQ3, which has the next largest MER, the mean value of Roy_RM3 is statistically significant and positive at the 1% level. In contrast, for Without MER, the mean value of Roy_RM3 is negative and statistically significant at the 1% level. The same tendency is observed for Roy_AbPROD and Roy_AbDISX, which are components of Roy_RM3. This means that the mean value of RM proxies tends to be larger for portfolios with larger MER. Additionally, when comparing the RM proxy and the ROA, the mean value of Roy_RM3 is 65.6% (0.040/0.061) of the mean value of ROA for MERQ4. Such an abnormal magnitude of the RM proxy relative to the ROA implies that the RM proxy may contain an error related to MER.

Table 1: Descriptive Statistics of Each Variable for Each Portfolio

Variables	MERQ4		MERQ3		MERQ2		MERQ1		Without MER	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
MER	0.126***	0.099	0.035***	0.010	0.012***	0.004	0.002***	0.002	0.000	0.000
Roy_RM3	0.040***	0.215	0.021***	0.256	–0.008	0.249	–0.002	0.279	–0.017***	0.399
Roy_AbCFO	0.005***	0.057	0.001	0.073	–0.002	0.063	–0.002	0.072	–0.001	0.105
Roy_AbPROD	0.023***	0.141	0.014***	0.155	–0.005	0.154	–0.005	0.173	–0.009***	0.237
Roy_AbDISX	0.013***	0.072	0.006***	0.078	–0.002	0.092	0.004**	0.086	–0.007***	0.138
ROA	0.061***	0.056	0.068***	0.097	0.067***	0.066	0.074***	0.086	0.078***	0.128
obs.	2320		2321		2321		2320		7168	

Note: Table 1 presents the descriptive statistics of each variable for each of the five portfolios into which the sample is divided by the size of MER. MERQ4 represents the portfolio with the largest MER, and MERQ1 represents the portfolio with the smallest MER. Without MER refers to the portfolio of firm-years, in which non-controlling interests are not reported. *** and ** indicate statistical significance at the 1% and 5% levels, respectively.

3.3. Persistence of RM Proxy

We observed that the mean value of the RM proxy is not zero depending on the size of MER in Section 3.2. However, as MER increases and the influence of PP conflicts within firm groups grows higher, managers may manipulate earnings to hide information (Fan & Wong, 2002; Widagdo et al., 2021; Yim, 2020). Thus, the relationship between MER and RM proxy may capture the true RM.

We check the persistence of the RM proxy. RM is the temporary deviation of a firm's business activity from optimal levels to manipulate earnings (Vorst, 2016). Therefore, if the RM proxy captures the true RM, we would expect that the persistence of the RM proxy is small, as well as the accrual-based manipulation. However, if the RM proxy contains an error due to firm characteristics associated with MER, the RM proxy should have persistence.

Table 2 summarizes the coefficients obtained by regressing the RM proxy on the previous year's RM proxy for each of the portfolios that are the same as in Table 1. The coefficient for Roy_RM3 is 0.820 for MERQ4, 0.839 for MERQ3, 0.878 for MERQ2, 0.881 for MERQ1, and 0.800 for Without MER, all statistically significant at the 1% level. The individual RM proxy shows a similar coefficient. These results imply that Roychowdhury's (2006) RM proxy captures business activities that deviate from the average level for each industry year rather than true RM.

3.4. The Relationship between MER and Management Strategy

In this subsection, we investigate the determinants of the measurement error in the RM proxy associated with MER. As previously noted, in Japanese firms that adopt stakeholder-oriented corporate governance systems, the larger the MER, the more management strategies are adopted to facilitate the sales growth of subsidiaries, and the more efficient management resources are reallocated within the firm group (Sakawa & Watanabel 2018; Fujita & Yamada 2022). According to Srivastava (2019), an RM proxy estimated without considering management strategy contains measurement error. Therefore, the relationship between MER and management strategy induced by stakeholder-oriented corporate governance systems may cause a measurement error in the RM proxy.

Srivastava (2019) proposes a model that adds variables related to management strategy to the estimation model of Roychowdhury (2006) shown in equations (1) through (3) based on Gunny (2010). For example, equation (2), which estimates normal production costs, is modified as in equation (4) below:

$$\begin{aligned}\frac{\mathrm{PROD}_{i,t}}{\mathrm{Asset}_{i,t-1}} = {} & \beta_0 + \beta_1 \frac{1}{\mathrm{Asset}_{i,t-1}} + \beta_2 \frac{\mathrm{Sales}_{i,t}}{\mathrm{Asset}_{i,t-1}} \\ & + \beta_3 \frac{\Delta\mathrm{Sales}_{i,t}}{\mathrm{Asset}_{i,t-1}} + \beta_4 \frac{\Delta\mathrm{Sales}_{i,t-1}}{\mathrm{Asset}_{i,t-1}} \\ & + \beta_5 \ln\mathrm{MV}_{i,t} + \beta_6 \mathrm{ROA}_{i,t-1} \\ & + \beta_7 \mathrm{MTB}_{i,t} + \beta_8 \frac{\mathrm{Sales}_{i,t+1}}{\mathrm{Asset}_{i,t-1}} \\ & + \beta_9 \frac{\mathrm{PROD}_{i,t-1}}{\mathrm{Asset}_{i,t-1}} + \varepsilon\end{aligned} \tag{4}$$

The newly added variables, firm size ($\ln\mathrm{MV}_{i,t}$), past profitability ($\mathrm{ROA}_{i,t-1}$), and growth opportunities ($\mathrm{MTB}_{i,t}$),

Table 2: Persistence of RM Proxy for Each Portfolio

Variables	MERQ4		MERQ3		MERQ2		MERQ1		Without MER	
	coeff	*t*-stat	coeff	*t*-stat	coeff	*t*-stat	coeff	*t*-stat	coeff	*t*-stat
Roy_RM3	0.820	45.210***	0.839	41.920***	0.878	53.380***	0.881	57.410***	0.800	62.700***
Roy_AbCFO	0.359	11.850***	0.408	9.984***	0.440	12.700***	0.428	14.830***	0.334	16.020***
Roy_AbPROD	0.838	47.820***	0.880	48.110***	0.895	60.170***	0.886	61.760***	0.837	72.780***
Roy_AbDISX	0.914	63.350***	0.907	68.560***	0.918	59.200***	0.959	82.260***	0.864	74.890***
obs.	2320		2321		2321		2320		7168	

Note: Table 2 presents the results of the analysis of the persistence of each RM proxy for each portfolio, where the sample is divided into five portfolios by the size of MER. MERQ4 represents the portfolio with the largest MER, and MERQ1 represents the portfolio with the smallest MER. Without MER refers to the portfolio of firm-years, in which non-controlling interests are not reported. The coefficients in the table are the regression coefficients a_1 of the following regression models for Roy_RM3, Roy_AbCFO, Roy_AbPROD, and Roy_AbDISX, estimated by OLS for each portfolio; $X_{t+1} = a_0 + a_1X_t + e$. *** indicates the result of a *t*-test with White's standard error, which is statistically significant at the 1% level. Outliers that may affect the estimation results are treated according to Welsch (1980).

Table 3: The Relationship between MER and Variables Associated with Management Strategy

Variables	Dependent variable: MER					
	Model1		Model2		Model3	
	coeff	*t*-stat	coeff	*t*-stat	coeff	*t*-stat
const	–0.037	–11.830***	–0.039	–12.220***	–0.035	–10.260***
lnMV	0.006	20.040***	0.006	20.120***	0.006	19.400***
LagROA	–0.036	–9.554***	–0.037	–9.783***	–0.031	–7.211***
MTB	0.000	–2.534**	0.000	–2.492**	0.000	–2.072**
LeadSalesA			0.001	3.168***	0.002	2.130**
LagCFOA					–0.011	–2.178**
LagPRODA					0.002	1.826*
LagDISXA					–0.031	–9.230***
INDDUM	yes		yes		yes	
YEARDUM	yes		yes		yes	
Adj.R^2	0.078		0.079		0.083	
obs.	16450		16450		16450	

Note: Table 3 shows the results of the analysis of the relationship between MER and variables affecting the strategy. "Lag" indicates the value in the previous period, and "Lead" indicates the value in the following period. ***, **, and * indicate the results of *t*-tests with White's standard error, which are statistically significant at the 1%, 5%, and 10% levels, respectively. Outliers that may affect the estimation results are treated according to Welsch (1980).

control for the investment opportunity set. In addition, the next period's sales are added ($Sales_{i,t+1}$), as investment plans are undertaken for future earnings, which drive costs and cash flows. Moreover, costs and cash flows from past business activities (e.g., $PROD_{i,t-1}$) are controlled for.

If the management strategies employed by firms differ depending on the size of MER, then a correlation should be observed between MER and the variables that capture the management strategies of firms, such as those presented in Srivastava (2019). Table 3 summarizes the results of the OLS

Table 4: The Simulation Results for Type I Error for Each Portfolio

Variables	MERQ4		MERQ3		MERQ2		MERQ1		Without MER	
	Reject. Rate	*z*-stat	Reject. Rate	*z*-stat	Reject. Rate	*z*-stat	Reject. Rate	*z*-stat	Reject. Rate	*z*-stat
Roy_RM3	0.278	16.085***	0.071	2.584***	0.003	–27.163	0.018	–7.607	0.033	–3.008
Roy_AbCFO	0.047	–0.448	0.050	0.000	0.004	–23.035	0.010	–12.706	0.080	3.495***
Roy_AbPROD	0.254	14.812***	0.093	4.680***	0.004	–23.035	0.012	–11.031	0.042	–1.261
Roy_AbDISX	0.206	12.192***	0.038	–1.984	0.004	–23.035	0.040	–1.613	0.013	–10.324
Sri_RM3	0.017	–8.069	0.055	0.693	0.004	–23.035	0.014	–9.685	0.084	3.874***
Sri_AbCFO	0.041	–1.435	0.058	1.082	0.012	–11.031	0.027	–4.485	0.060	1.331*
Sri_AbPROD	0.031	–3.465	0.040	–1.613	0.003	–27.163	0.015	–9.101	0.087	4.149***
Sri_AbDISX	0.001	–49.000	0.003	–27.163	0.012	–11.031	0.024	–5.369	0.124	7.097***

Note: Table 4 shows the rejection rate at the 5% level of the null hypothesis of no RM (i.e., the rate of Type I error) for each portfolio. MERQ4 represents the portfolio with the largest MER, and MERQ1 represents the portfolio with the smallest MER. Without MER is the portfolio of firm-years, in which non-controlling interests are not reported. *** and * are the results of the one-tailed *z*-test (H_0: The rejection rate is equal to 5%), and they indicate statistically significant at the 1% and 10% levels, respectively.

estimation of the model with MER as the dependent variable and the variables associated with management strategy added in Srivastava (2019) as independent variables. The coefficients of $lnMV_{i,t}$, $ROA_{i,t-1}$, and $MTB_{i,t}$ affecting the investment opportunity set are statistically significant for Models 1 through 3. The coefficient of $Sales_{i,t+1}$ is statistically significant for both Model 2 and Model 3. Furthermore, in terms of the coefficients of the variables representing the level of past business activities, the coefficients of $CFO_{i,t-1}$, $PROD_{i,t-1}$, and $DISX_{i,t-1}$ are statistically significant for Model 3. These indicate that there is a correlation between MER and variables that affect management strategy. Therefore, the measurement error in RM proxy that occurs in portfolios with large MER may be due to management strategies to mitigate PP conflicts between parent firms and non-controlling shareholders under stakeholder-oriented corporate governance systems.

3.5. The Measurement Error of RM Proxy and Management Strategy

The results in Table 3 indicate that MER is correlated with variables related to management strategy. Therefore, the model proposed by Srivastava (2019) may be used to correct the measurement error that MER introduces in the RM proxy. We examine the rate of Type I error by simulating the following procedure for each portfolio, about Dechow et al. (1995) and Kothari et al. (2005): (a) Randomly select 100 observations from each portfolio; (b) Generate a dummy variable named PART that equals to 1 for the selected observation and 0 for others; (c) For full observations, regress RM proxy estimated using the Roychowdhury (2006) and Srivastava (2019) models on PART; and (d) Repeat steps (a) through (c) above 1000 times and calculate the rejection rate at the 5% level of the null hypothesis of no RM (the frequency at which the coefficient of PART is statistically significant at the 5% level).

Since PART is a random variable, the expected value of the RM proxy for each portfolio, classified by the size of MER, is zero, unless there is a bias in the error contained in the RM proxy that correlates with MER. Therefore, the regression coefficient of PART is expected not to be statistically significantly different from zero for any portfolio. However, when testing statistical hypotheses, even if the RM proxies are not biased at all, a large variance in the RM proxies would result in a Type I error with the same probability that the PART coefficient would be set in the rejection region. Thus, we performed a one-tailed *z*-test to determine whether the rejection rate calculated in the procedure (d) is greater than 5%. If the RM proxy has a bias that correlates with MER, we would expect the rejection rate to be greater than 5% as MER increases.

Table 4 shows the simulation results for Type I errors by portfolio. The rejection rates for Roychowdhury's (2006) RM proxy, Roy_RM3, are 27.8% for MERQ4 and 7.1% for MERQ3, both greater than 5% and statistically significant at the 1% level. On the other hand, the rejection rates for Srivastava's (2019) RM proxy, Sri_RM3, are not observed above 5% in any portfolio with MER. These results imply that using Roychowdhury's (2006) RM proxy leads to Type I error for firms with large MER while using Srivastava's (2019) RM proxy can mitigate these Type I errors. Therefore, using Roychowdhury's (2006) RM proxy may lead to erroneous inferences about the presence or absence of true

RM and causality when there is an ownership structure, which can affect strategy. When performing analysis on RM, it would be necessary to use Srivastava's (2019) RM proxy to confirm the robustness of the results. Nevertheless, for portfolios with zero non-controlling shareholder interests (Without MER), the rejection rate of Sri_RM3 is 8.4%, which is statistically significant at the 1% level. This suggests that Srivastava's (2019) RM proxy is not useful for all firms. When researchers conduct their analyses on RM, they will need to add various robustness tests for measurement error in the RM proxy caused by differences in management strategies that are correlated with MER.

4. Conclusion

We examined the relationship between MER and RM proxy for Japanese firm groups, finding that in firms with large MER, measurement error in RM proxy is caused by management strategies that mitigate PP conflicts. We also found that controlling for variables that affect management strategy may correct the bias of RM proxy error. Addressing how to control for variables that affect management strategy remains a challenge. When using Srivastava's (2019) model without modification, the error in the RM proxy for firms that do not include MER is not corrected. When testing for RM for Japanese firms, researchers should carefully consider how the error in the RM proxy that is correlated with MER affects the results of the analysis.

This paper extended previous studies on measurement error in RM proxy by relating them to ownership structure and corporate governance. Many previous studies have pointed out that firm characteristics such as performance, growth, and management strategy can introduce errors in the RM proxy estimation model. Our study extended these studies and found that the presence of MER affected the error in RM proxy via the associated changes in management strategy in Japanese firms where stakeholder-oriented corporate governance systems were adopted. Corporate governance practices are affected by various institutional contexts at the country level (Aguilera & Jackson, 2003). When examining firm-level RM, researchers may need to consider differences in corporate governance at the country level and the associated differences in management strategy.

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Appendix

Table A1: Variable Definitions

Variables	Definition
MER	The ratio of non-controlling interests to net assets: Minority equity ratio
Assets	Total assets
CFO	Cash flow from operations
PROD	The sum of the cost of goods sold and changes in inventory
DISX	The sum of the R&D costs, the advertising costs, the promotion costs, the compensations to executive officers, the bonuses to executive officers, and the salaries and welfare to employees
Sales	Total sales
LnMV	The natural logarithm of the market value of equity
ROA	Return on assets is calculated by dividing net income by beginning-of-year assets
MTB	The ratio of the market value of equity to the book value of net assets
Roy_AbCFO	Abnormal cash flow from operations calculated from Roychowdhury's (2006) model multiplied by -1
Roy_AbPROD	Abnormal production costs calculated from Roychowdhury's (2006) model

Variables	Definition
Roy_AbDISX	Abnormal discretionary expenditures calculated from Roychowdhury's (2006) model multiplied by −1
Roy_RM3	The sum of Roy_AbCFO, Roy_AbPROD, and Roy_AbDISX
Sri_AbCFO	Abnormal cash flow from operations calculated from Srivastava's (2019) model multiplied by −1
Sri_AbPROD	Abnormal production costs calculated from Srivastava's (2019) model
Sri_AbDISX	Abnormal discretionary expenditures calculated from Srivastava's (2019) model multiplied by −1
Sri_RM3	The sum of Sri_AbCFO, Sri_AbPROD, and Sri_AbDISX