An Empirical Analysis of Japanese Firms' Earnings Management Using Quarterly Earnings

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Abstract

This paper uses quarterly earnings to examine earnings management in the fourth quarter to avoid annual loss reporting. The results show that many firms convert from a cumulative loss in the third quarter to a cumulative profit in the fourth quarter. Moreover, such a turnaround is associated with accrual earnings management in the fourth quarter to avoid annual loss reporting. The findings suggest that quarterly earnings can be useful in revealing managements' discretionary behaviors even after annual earnings have been disclosed.

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1. Introduction

In June 2022, Japan's Financial Services Agency (FSA) published the *Disclosure Working Group Report: Toward Building a Capital Market that Enhances Medium- to Long-Term Corporate Value*. The report emphasized the necessity of revising the existing quarterly disclosure framework. Subsequently, in 2023, the FSA submitted a bill to the National Diet to amend the Financial Instruments and Exchange Act, a move expected to abolish the requirement for quarterly securities reports.

The *Working Group Report* highlighted the accumulation of empirical research concerning the quarterly disclosure system and market short-termism. It focused on the cost-benefit tradeoff of high-frequency financial reporting—specifically, the tension

between short-term oriented corporate behavior and the provision of timely financial information.

On the other hand, quarterly financial information provides valuable insights into the timing of earnings management (Givoly and Ronen [1981]). By comparing cumulative earnings up to the third quarter with annual cumulative earnings or fourth-quarter earnings, it is possible to detect the presence of earnings management at the annual level (Kerstein and Rai [2007]; Das, Shroff, and Zhang [2009]).

A disproportionately high number of firms that report negative cumulative earnings through the third quarter subsequently report positive quarterly earnings in the fourth quarter. Assuming that earnings management is conducted during the fourth quarter, such a pattern suggests that firms turning profitable in this period may be engaging in earnings management at the fiscal year-end.

Even after annual earnings are disclosed, previously reported quarterly earnings remain useful for assessing the quality of annual earnings. Therefore, the quarterly disclosure system may not only serve to provide timely information to capital markets but also function as a mechanism useful to evaluating managerial earnings management practices.

The purpose of this study is to examine earnings management behavior aimed at avoiding annual losses in the fourth quarter using the distribution of quarterly earnings as the analytical framework. The structure of this paper is as follows. Section 2 reviews prior research and derives the research questions and hypotheses to be examined. Section 3 presents the research design employed in this study. Section 4 reports the results of the analysis. Section 5 provides additional analyses. Finally, Section 6 concludes the paper.

2. Prior Research and Hypothesis Development

Managers are motivated by stock price reactions, debt covenants, executive compensation, and career concerns to engage in earnings management to meet specific benchmarks related to reported earnings (Healy [1985], Kaplan [1994], Matsumoto [2002]). As a result, the number of firms reporting earnings slightly above benchmarks increases, and the distribution of reported earnings becomes discontinuous around these benchmarks. Burgstahler and Dichev [1997] show that the distributions of reported earnings, earnings growth rates, and analyst forecast errors for U.S. listed firms are discontinuous, suggesting the existence of earnings management to avoid losses,

earnings decreases, and negative earnings surprises. It has also been shown that Japanese firms exhibit pronounced earnings management to avoid losses (Shuto [2010]).

The approach of Burgstahler and Dichev [1997] can be applied not only to annual earnings, but also to quarterly earnings. Observing the distribution of quarterly earnings suggests that earnings management occurs in the fourth quarter, which serves as the last chance for annual earnings management (Dhaliwal, Gleason, and Mills [2004]). It has also been pointed out that earnings management aimed at smoothing annual earnings in the fourth quarter increases the volatility of quarterly earnings (Givoly and Ronen [1981]), providing evidence that earnings management focusing on annual earnings occurs in the fourth quarter.

Based on the finding that annual earnings management to meet benchmarks is implemented in the fourth quarter, some studies use the reversal phenomenon of earnings between the third and fourth quarters to detect earnings management. Das et al. [2009] argue that, assuming earnings management to meet benchmarks occurs in the fourth quarter, firms that report cumulative losses through the third quarter but positive annual cumulative earnings exhibit a reversal phenomenon that can be used to detect earnings management. Consistent with this argument, they show that firms with negative cumulative earnings through the third quarter are more likely to engage in earnings management that increases earnings to avoid annual losses, resulting in positive fourth-quarter earnings. Conversely, firms with positive cumulative earnings through the third quarter are more likely to engage in earnings management that decreases earnings to preserve future reserves, making fourth-quarter losses more likely.

If Japanese firms also engage in earnings management in the fourth quarter to avoid annual losses, there is room to examine earnings management using the trajectory of quarterly earnings. Therefore, the question of when annual earnings management occurs is an important issue in earnings management research.

Incentives to avoid losses arising from debt and executive compensation contracts are often tied to annual earnings (fourth-quarter cumulative earnings) (Oyer [1998], Fujiyama, Kagaya, Suzuki, and Takahashi [2014], Kochiyama and Nakamura [2017]), so managers are more concerned with achieving benchmarks in annual earnings than in quarterly earnings. Therefore, earnings management is likely to occur in the fourth quarter when the outlook for annual earnings becomes clear (Dhaliwal et al. [2004], Kerstein and Rai [2007], Das et al. [2009]). Based on this, prior research assumes that earnings management is implemented at fiscal year-end. In Japan, it has

also been pointed out that the proportion of firms turning from negative earnings in the third quarter to positive earnings in the fourth quarter is higher than in other countries (Fujiyama et al. [2014]), suggesting that earnings management targeting annual earnings occurs in the fourth quarter.

However, in Japan, first- and third-quarter reported earnings are not subject to audit, while second- and fourth-quarter earnings are audited because they are disclosed together with semiannual and annual earnings. Some studies point out that audited earnings are less subject to earnings management than unaudited quarters (Brown and Pinello [2007]). Kagaya, Nakano, Matsumoto, and Machida [2011], who compared accruals by quarter in 2008–2009, also suggest that accrual earnings management occurs in the first and third quarters, which are unaudited, rather than in the second and fourth quarters, which are audited. Therefore, whether Japanese firms engage in earnings management in the fourth quarter to avoid annual losses remains an empirical question.

Das et al. [2009] also note that the reversal phenomenon in the fourth quarter may not be due to earnings management implemented in the fourth quarter. Alternative explanations include 1) earnings management before the fourth quarter, 2) accrual reversals, 3) mean reversion, and 4) normal business activities. Even if a reversal phenomenon is observed between the third and fourth quarters, it cannot be conclusively attributed to discretionary earnings management in the fourth quarter aimed at avoiding annual losses.

To examine these empirical issues, I set the following hypotheses (H1–H3). First, if loss-avoidance behavior in annual earnings occurs in the fourth quarter, the proportion of firms with positive cumulative earnings in the fourth quarter (annual earnings) is expected to be higher than in the third quarter (H1).

Hypothesis 1: The proportion of positive cumulative earnings is higher in the fourth quarter than in the third quarter.

If the reversal phenomenon assumed in H1 is due to discretionary earnings management aimed at avoiding annual losses, then, as Burgstahler and Dichev [1997] point out, discontinuities in the distribution of annual earnings—traces of earnings management—are expected. Furthermore, if annual earnings management is implemented in the fourth quarter as assumed by Das et al. [2009], the discontinuity in

the distribution of cumulative earnings should expand from the third to the fourth quarter (H2a). Conversely, if alternative explanations such as accrual reversals, mean reversion, or normal business activities are more plausible, no discontinuity should be observed in the distribution of cumulative earnings in the fourth quarter. If earnings management before the fourth quarter causes the reversal phenomenon, the discontinuity should already be evident in the third quarter, and the discontinuity should not expand from the third to the fourth quarter. In other words, if the discontinuity in cumulative earnings increases from the third to the fourth quarter, the explanation that the reversal is due to discretionary earnings management in the fourth quarter is more plausible than the alternative explanations.

However, since annual earnings and fourth-quarter earnings are determined simultaneously, even if the reversal phenomenon in annual earnings occurs as assumed in H1, it may not be primarily driven by earnings management targeting annual earnings as assumed in H2a. It is possible that earnings management aimed at avoiding losses in the fourth-quarter three-month earnings unintentionally causes the reversal phenomenon in annual earnings. In that case, the discontinuity in the distribution of three-month earnings would increase from the third to the fourth quarter, while the discontinuity in cumulative earnings would not (H2b). Conversely, if the reversal and discontinuity in annual earnings are caused by earnings management targeting annual earnings, the discontinuity in three-month earnings should not expand from the third to the fourth quarter (H2b).

Hypothesis 2a: The discontinuity in the distribution of cumulative earnings expands from the third to the fourth quarter.

Hypothesis 2b: The discontinuity in the distribution of three-month earnings does not expand from the third to the fourth quarter.

As annual earnings management determines fourth-quarter earnings, the fourth-quarter three-month earnings can be considered the sum of pre-adjustment fourth-quarter earnings and the annual earnings adjustment amount. This adjustment amount is systematically determined based on pre-adjustment annual earnings. Specifically, if pre-adjustment annual earnings are negative, the adjustment amount increases in proportion to the loss if earnings management is implemented. If pre-adjustment annual

earnings are positive, no adjustment occurs, and the adjustment amount is zero. If the loss is too large to offset, no adjustment occurs, and the adjustment amount is zero. Thus, the adjustment amount is directly related to the reversal phenomenon and the discontinuity in annual earnings.

On the other hand, pre-adjustment fourth-quarter earnings are only indirectly related to the adjustment amount through pre-adjustment annual earnings. As long as quarterly earnings are evenly distributed across four quarters, the fourth quarter accounts for about 25% of annual earnings, so its influence on the adjustment amount is limited. However, if cumulative earnings through the third quarter are so low that adjustment is difficult, positive pre-adjustment fourth-quarter earnings may make adjustment more feasible, increasing the adjustment amount. Because of this weak link to actual business performance, the adjustment amount likely increases the volatility of post-adjustment fourth-quarter earnings compared to pre-adjustment earnings.

Although the true value of pre-adjustment fourth-quarter earnings is unobservable, assuming no difference in variance between pre-adjustment third- and fourth-quarter earnings and that annual earnings management only affects fourth-quarter earnings, the distribution of third-quarter earnings can be considered the counterfactual distribution of fourth-quarter earnings without adjustment. Therefore, if annual earnings management occurs in the fourth quarter, the variance of fourth-quarter earnings should be greater than that of third-quarter earnings (H3a).

Nevertheless, the assumption that pre-adjustment third- and fourth-quarter earnings have similar distributions may not hold. For example, if sales are concentrated in the fourth quarter, normal business activities could increase volatility in the fourth quarter. In such cases, volatility in the fourth quarter could increase not only for three-month earnings but also for cumulative earnings.

Crucially, if the increased volatility in fourth-quarter earnings is due to systematic adjustments based on pre-adjustment annual earnings, the volatility of cumulative earnings should not increase. This is because earnings management aimed at avoiding annual losses, while increasing discontinuity as assumed in H2a, is systematically related to pre-adjustment annual earnings. Assuming pre-adjustment annual earnings are negative and post-adjustment annual earnings are positive but below the overall average, the deviation from the mean shrinks after adjustment, making an increase in variance unlikely. If cumulative earnings through the third quarter represent the counterfactual for annual earnings without adjustment, the

variance of cumulative earnings should not increase in the fourth quarter. Therefore, if annual earnings management in the fourth quarter increases the volatility of three-month earnings, the variance of cumulative earnings should not increase (H3b).

Hypothesis 3a: The variance of three-month earnings is greater in the fourth quarter than in the third quarter.

Hypothesis 3b: The variance of cumulative earnings does not increase from the third to the fourth quarter.

3. Research Design

3.1 Comparison of Positive Earnings Ratios Between Third-Quarter Cumulative Earnings and Fourth-Quarter Cumulative Earnings

To test Hypothesis 1, I follow the method used in previous studies which compare the frequency distributions of reported earnings versus pre-managed earnings. Specifically, I examine the distributions of cumulative net income after taxes for the third and fourth quarters. First, I calculate third-quarter cumulative earnings scaled by beginning-of-period market capitalization. For firms with third-quarter cumulative earnings near zero, I compare the proportion of positive earnings between the third-quarter cumulative earnings and the fourth-quarter cumulative earnings. Regarding the range around zero, I examine five intervals from ±1% to ±5% and conduct statistical tests on the differences in ratios.

3.2 Comparison of Earnings Distribution Discontinuities Between the Third and Fourth Quarters

To test Hypotheses 2a and 2b, I rely on the earnings distribution approach of Burgstahler and Dichev [1997], using histograms to illustrate earnings distribution discontinuities and standardized difference analysis to statistically test for discontinuities. For quarterly earnings analyses, I set the interval for scaled quarterly earnings to [–0.0375, 0.0625) and divide it into 80 bins with a width of 0.00125 to construct a frequency distribution table and draw histograms. For cumulative earnings in the third and fourth quarters, I use intervals of [–0.1125, 0.1875) and [–0.15, 0.25), which are three and four times the quarterly range, with bin widths of 0.00375 and 0.005, respectively. After plotting histograms for quarterly and cumulative earnings, I

use standardized difference analysis to statistically test earnings distribution discontinuities.

3.2.1 Standardized Difference Analysis

In the earnings distribution approach and standardized difference analysis, the null hypothesis assumes that the earnings distribution is continuous around the benchmark, and rejecting this null supports the alternative hypothesis that the distribution is discontinuous. This test requires two assumptions: the distribution is continuous in intervals unaffected by earnings management, and under a continuous distribution, the expected frequency for bin n (E[Np_n]) equals the midpoint of the frequencies of the adjacent bins n−1 (Np_{n-1}) and n+1 (Np_{n+1}) (see Equation (1)).

Under the null hypothesis, the standardized difference SD_n which is the difference (D_n) between the actual frequency Np_n and its expected value E[Np_n] divided by the estimated standard deviation $\sigma[D_n]$, follows a distribution with mean 0 and standard deviation 1 (see Equations (2), (3), and (4)). Therefore, when SD_n is significantly greater or less than zero, the null hypothesis is rejected, indicating a discontinuity in bin n. This analysis calculates standardized differences for all bins except the two endpoints, so no parametric assumption is needed about which bins are affected by earnings management. In this study, I compute standardized differences not only for bins adjacent to the benchmark but also for others to verify whether the most pronounced discontinuity occurs near the benchmark.

$$E[Np_n] = \frac{1}{2}Np_{n-1} + \frac{1}{2}Np_{n+1} \tag{1}$$

$$D_n = Np_n - E[Np_n] \tag{2}$$

$$\sigma[D_n] = \sqrt{Np_n(1-p_n) + \frac{1}{4}N(p_{n-1}+p_{n+1})(1-p_{n-1}-p_{n+1})} \tag{3}$$

$$SD_n = \frac{D_n}{\sigma[D_n]} = \frac{Np_n - \left(\frac{1}{2}Np_{n-1} + \frac{1}{2}Np_{n+1}\right)}{\sqrt{Np_n(1-p_n) + \frac{1}{4}N(p_{n-1}+p_{n+1})(1-p_{n-1}-p_{n+1})}} \tag{4}$$

3.3 Comparison of Variances Between Quarterly Earnings and Cumulative Earnings

To test Hypotheses 3a and 3b, I calculate the variance of quarterly earnings and cumulative earnings scaled by beginning-of-period market capitalization. Next, I conduct statistical tests on the ratios of variances between quarters. However, even if quarterly earnings are equal across all four quarters, the variance of cumulative earnings systematically increases with the length of the accumulation period. Therefore, to ensure comparability of cumulative earnings variances across different periods, I divide cumulative earnings for the second, third, and fourth quarters by 2, 3, and 4, respectively, and calculate the variance based on these normalized values.

3.4 Data and Sample

The firms analyzed in this study meet the following conditions: 1) they are listed on Japanese stock exchanges; 2) they are not classified as financial institutions (banks, securities, insurance); 3) the necessary information for analysis is available. I use quarterly financial data for these firms that meet the following conditions: 4) their fiscal years begin between April 1, 2003, and March 31, 2019; 5) their cumulative reporting periods are of 3, 6, 9, or 12 months. The financial and stock price data used in this study are obtained from NEEDS-Financial QUEST provided by Nikkei Inc.

4. Results

The descriptive statistics for the scaled cumulative quarterly earnings and quarterly earnings of the sample analyzed in this study are shown in Table 1. For cumulative earnings, both the mean and median increase from the third to the fourth quarter, while the standard deviation and interquartile range decrease. In contrast, for quarterly earnings, the mean and median decrease from the third to the fourth quarter, while the standard deviation and interquartile range increase. In addition, we confirm that in 9.8% of firm-years, earnings turn from a cumulative negative in the third quarter to a quarter positive in the fourth quarter, and in 15.7% of firm-years, earnings turn from a cumulative positive in the third quarter to a quarter negative in the fourth quarter.

	N	Mean	Median	SD	Interquartile
1Q quarterly	44,437	0.0052	0.0109	0.0949	0.0224
2Q quarterly	44,789	0.0107	0.0139	0.1198	0.0221
3Q quarterly	45,006	0.0126	0.0149	0.0795	0.0239
4Q quarterly	45,264	0.0064	0.0132	0.1665	0.0281

2Q cumulative /2	47,418	0.0081	0.0125	0.1451	0.0194
3Q cumulative /3	44,549	0.0103	0.0137	0.0994	0.0192
4Q cumulative /4	46,266	0.0108	0.0141	0.0807	0.0178

Table 1. Descriptive Statistics of Quarterly Earnings

To compare different horizons, the cumulative earnings for the second, third, and fourth quarters are presented after being divided by 2, 3, and 4, respectively.

(1) Comparison of Positive Earnings Ratios Between Third-Quarter Cumulative Earnings and Fourth-Quarter Cumulative Earnings

For Hypothesis 1, Table 2 reports the proportion of firms with positive cumulative earnings in the third and fourth quarters among firms for which scaled third-quarter cumulative earnings (NP) are near zero. Among firms with NP within ±1%, 63.36% report positive cumulative earnings in the third quarter, whereas 76.71% report positive cumulative (annual) earnings in the fourth quarter, an increase of 13.36 percentage points. Similarly, when the threshold for "near zero" earnings is changed, the proportion of firms with positive earnings consistently increases from the third to the fourth quarter. In all cases, the difference in positive earnings ratios is significantly positive at the 1% level. Therefore, these results are consistent with Hypothesis 1 and suggest the existence of firms that achieve positive annual earnings through earnings management in the fourth quarter.

Table 2. Difference in Positive Ratios of Cumulative Earnings

		3Q Cumulative Earnings			4Q Cumulative Earnings				
	(1)	(2)	(3)	(3)/(1)	(4)	(5)	(5)/(1)	(5)/(1)- (3)/(1)	
	Total	Negative	Positive	Positive ratio	Negative	Positive	Positive ratio	Difference In ratio	z-value
-0.01<NP<0.01	2,044	749	1,295	0.6336	476	1,568	0.7671	0.1336***	9.3205
-0.02<NP<0.02	4,416	1,303	3,113	0.7049	878	3,538	0.8012	0.0962***	10.4869
-0.03<NP<0.03	7,518	1,800	5,718	0.7606	1,251	6,267	0.8336	0.0730***	11.1326
-0.04<NP<0.04	10,867	2,197	8,670	0.7978	1,549	9,318	0.8575	0.0596***	11.6378
-0.05<NP<0.05	14,211	2,493	11,718	0.8246	1,763	12,448	0.8759	0.0514***	12.1352

*** denotes that the difference in ratios is statistically significant at the 1% level (two-tailed test), indicating it is not equal to zero.

(2) Comparison of Earnings Distribution Discontinuities Between the Third and Fourth Quarters

For Hypothesis 2a, the histograms depicting the earnings distribution for cumulative quarterly earnings are shown in the upper panel of Figure 1. Comparing the third quarter (upper left) and the fourth quarter (upper right), a more pronounced distributional

discontinuity is observed in the fourth quarter. The results of the statistical tests using standardized differences for the illustrated discontinuities are presented in the upper panel of Table 3. For both the third and fourth quarters, cumulative earnings exhibit statistically significant discontinuities near the zero benchmark at the 1% level. This suggests that earnings management aimed at achieving the loss-avoidance benchmark occurs in both quarters. However, the standardized difference on the left side of zero for fourth-quarter cumulative earnings is –13.28, which is smaller than that for the third quarter. Therefore, earnings management aimed at achieving the annual loss-avoidance benchmark appears to be more pronounced in the fourth quarter than in the third quarter.[1]

For Hypothesis 2b, the histograms depicting the earnings distribution for three-month quarterly earnings are shown in the lower panel of Figure 1. While a distributional discontinuity is observed in the third quarter (lower left), the discontinuity diminishes in the fourth quarter (lower right). The statistical test results also indicate that in the third quarter, the discontinuity is statistically significant at the 1% level, whereas in the fourth quarter, the standardized difference for the bin immediately to the right of zero is no longer statistically significant (lower panel of Table 3). On the left side of zero, the standardized difference remains significantly positive at the 1% level; however, the bin with the largest standardized difference is located elsewhere. Therefore, it cannot be said that an abnormally high concentration of firms just above the benchmark occurs in the fourth-quarter three-month earnings distribution.

Although two benchmarks exist in the fourth quarter—three-month earnings and cumulative earnings—the most important benchmark is annual earnings. Consequently, the three-month earnings benchmark becomes relatively less important,

[1] It is plausible that differences between three-quarter cumulative earnings and fourth-quarter earnings arise due to factors such as the seasonality of business performance. If characteristics of fourth-quarter earnings—other than discretionary earnings management—are responsible for the discontinuity observed in the distribution of cumulative earnings, then similar discontinuities should also be observable in twelve-month aggregated earnings that do not coincide with the fiscal year-end (Jacob and Jorgensen [2007]). Following Jacob and Jorgensen [2007], I examined the standardized differences near zero for twelve-month aggregated earnings, comprising the fourth quarter of the previous year and the first through third quarters of the current year. The results were –1.19 (left side) and 0.27 (right side), indicating no statistically significant discontinuity. Therefore, the likelihood that non-discretionary characteristics of fourth-quarter earnings are the cause is low, and the explanation that annual earnings management is responsible appears more plausible.

resulting in the disappearance of distributional discontinuities for quarterly earnings, while pronounced discontinuities remain for cumulative earnings. In contrast, the third-quarter cumulative earnings benchmark is less critical than annual earnings, and during the third-quarter reporting period, firms may target either the three-month earnings benchmark or the cumulative earnings benchmark. As a result, discontinuities are observed in both benchmarks in the third quarter.

Overall, these findings indicate that the discontinuity in cumulative earnings increases from the third to the fourth quarter, while the discontinuity in quarterly earnings does not, which is consistent with our hypotheses. In other words, the expansion of distributional discontinuities during the fourth quarter appears to result from discretionary actions aimed at reversing losses before year-end.

Figure 1. Distributions of Cumulative and Quarterly Earnings

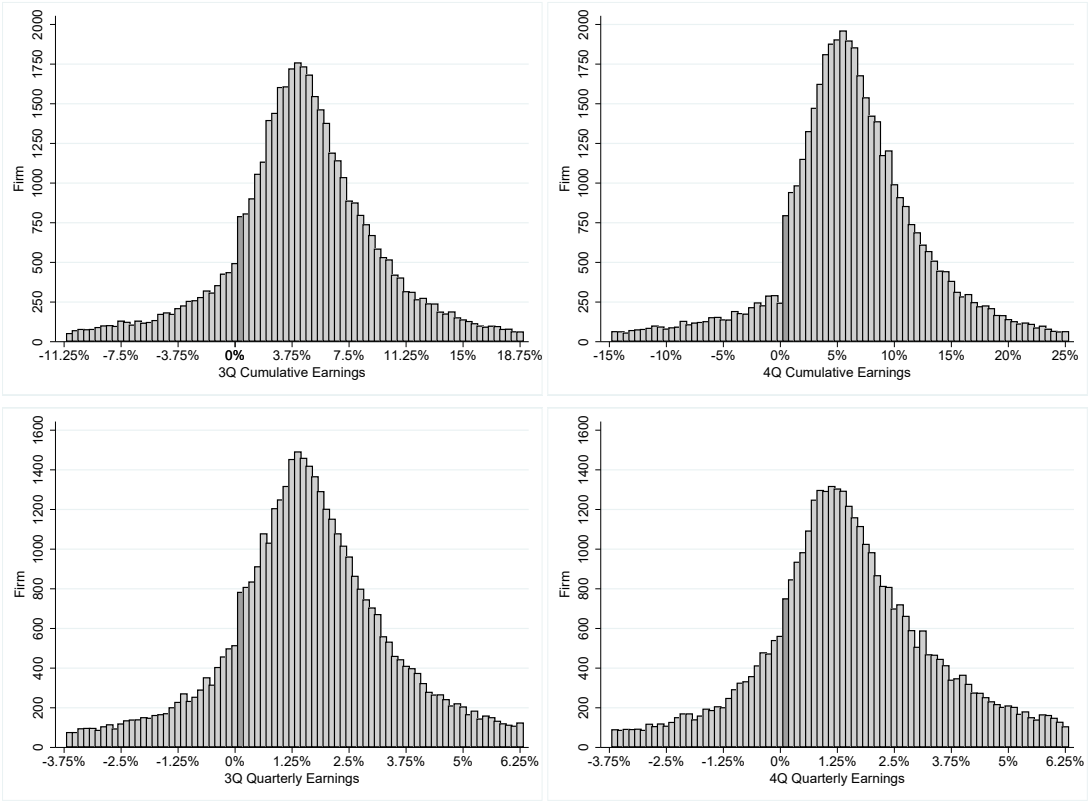

Table 3. Standardized Difference Analysis of Quarterly Earnings

	Test Period		Periods other than the Test Period			
	Left of Zero	Right of Zero	Mean	Median	Minimum	Maximum
3Q cumulative	-4.26***	4.22***	-0.04	0.02	-2.28	2.47
4Q cumulative	-13.28***	6.20***	0.00	-0.04	-2.89	2.95
3Q quarterly	-4.42***	3.70***	-0.04	0.03	-2.82	2.74

4Q quarterly	-2.85***	1.42	-0.01	0.09	-2.96	3.53

*** denotes figures that are statistically significant at the 1% level (two-tailed test).

(3) Comparison of Variances Between Quarterly Earnings and Cumulative Earnings

For Hypothesis 3a, the results of statistical tests on the ratio of variances in quarterly earnings are presented in Table 4. These results show that the variance of third-quarter earnings and that of fourth-quarter earnings differ significantly at the 1% level. Combined with the descriptive statistics in Table 1, this indicates that the variance in quarterly earnings increases in the fourth quarter. In contrast, no statistically significant differences in variance are observed for other quarter-to-quarter comparisons. Therefore, the variance in quarterly earnings remains largely unchanged from the first to the second quarter (during the second quarter) and from the second to the third quarter (during the third quarter). These results are consistent across both Levene's test, which focuses on deviations from the mean, and the Brown–Forsythe test, which focuses on deviations from the median, and are robust to outliers in cumulative earnings.

For Hypothesis 3b, the results of statistical tests on the ratio of variances in cumulative earnings are shown in Table 5. These results indicate that the variance ratio between third-quarter cumulative earnings and fourth-quarter cumulative earnings (annual earnings) is not significantly different from one, meaning there is no statistically significant difference in variance. In contrast, all other comparisons show significant differences at the 1% level. Therefore, while the variance of cumulative earnings changes substantially from the first to the second quarter (during the second quarter) and from the second to the third quarter (during the third quarter), it does not change significantly from the third to the fourth quarter. If the increase in quarterly earnings variance in the fourth quarter reflected an expansion in business volatility unrelated to annual earnings management, the variance of fourth-quarter cumulative earnings should also increase. However, the increase in variance occurs only in quarterly earnings, with no change in cumulative earnings variance. Thus, the observed increase in the variance of fourth-quarter three-month earnings likely reflects the impact of earnings management aimed at achieving the annual benchmark, rather than underlying business volatility in pre-adjustment earnings.

Overall, these findings indicate that the variance of fourth-quarter earnings increases relative to the third quarter, while the variance of cumulative earnings does not, which is consistent with our hypotheses. In other words, the reversal phenomenon

and the expansion of distributional discontinuities appear to result from earnings management that increases earnings implemented in the fourth quarter to avoid annual losses.

Table 4. Test Results for Homogeneity of Variance in Quarterly Earnings

F-Value	1Q	2Q	3Q	4Q
1Q Quarterly Earnings		1.564	0.913	328.185***
2Q Quarterly Earnings	0.224		0.276	255.850***
3Q Quarterly Earnings	0.087	0.578		336.242***
4Q Quarterly Earnings	340.250***	284.537***	380.438***	

*** denotes that the ratio of variances is statistically significantly different from 1 at the 1% significance level.

The bottom-left values represent the results of Levene's test, which evaluates dispersion based on the mean, while the top-right values correspond to the results of the Brown-Forsythe test, which assesses dispersion based on the median.

Table 5. Test Results for Homogeneity of Variance in Cumulative Earnings

F-Value	1Q	2Q	3Q	4Q
1Q Cumulative Earnings		11.406***	65.639***	96.500***
2Q Cumulative Earnings	13.444***		8.942***	14.137***
3Q Cumulative Earnings	79.108***	10.990***		0.505
4Q Cumulative Earnings	114.046***	16.635***	0.450	

*** denotes that the ratio of variances is statistically significantly different from 1 at the 1% significance level.

The bottom-left values represent the results of Levene's test, which evaluates dispersion based on the mean, while the top-right values correspond to the results of the Brown–Forsythe test, which assesses dispersion based on the median.

5. Additional Analysis

The reversal of earnings from the third to the fourth quarter is likely driven by earnings management implemented during the fourth quarter. However, such earnings management can take two forms: accrual earnings management, which involves discretionary changes in accounting methods or estimates, and real earnings management, which involves discretionary reductions in expenditures (Das et al. [2009]). In this section, as an additional analysis, I examine whether the achievement of positive earnings through reversal is driven by accrual or real earnings management. Specifically, the amount of accrual earnings management is estimated using the CFO-adjusted Jones model of Kasznik (1999), while the amount of real earnings management is measured by discretionary expense reductions following Roychowdhury (2006).

Table 6 compares the amounts of accrual and real earnings management between firms that reversed from a cumulative loss in the third quarter to positive annual earnings and those that remained at loss. For firms that achieved positive earnings, the amount of accrual earnings management is positive, whereas for firms that remained in

loss, it is negative. The difference between the two groups is statistically significant, consistent with the explanation that earnings reversal is driven by accrual earnings management. In contrast, no statistically significant difference is observed in real earnings management between the two groups, which is inconsistent with the explanation that reversal is achieved through real earnings management. The finding that accrual earnings management that increases earnings—rather than real earnings management involving cash flow changes—is the primary mechanism aligns with our assumption that such adjustments are implemented in the fourth quarter when pre-adjustment annual losses become apparent.

Table 6. Earnings Management by Cumulative Loss Firms in the Third Quarter

	(1) Positive Annual Earnings	(2) Negative Annual Earnings	(3) (1)-(2)
Accrual Earnings Management	0.0004	−0.0562	0.0566***
Real Earnings Management	0.0020	0.0027	-0.0007

*** denotes figures that are significant at the 1% level (two-tailed test).

6. Conclusion

The empirical results indicate that in the fourth quarter, firms exhibit earnings reversals, an expansion of distributional discontinuities in cumulative earnings, increased volatility in quarterly earnings, and income-increasing accounting-based earnings management. These findings are consistent with the expectation that Japanese firms engage in earnings management that increases earnings in the fourth quarter to avoid annual losses. Conversely, the results are inconsistent with alternative explanations such as 1) earnings management prior to the fourth quarter, 2) accrual reversals, 3) mean reversion, and 4) normal business activities. Therefore, it can be concluded that Japanese firms engage in earnings management at fiscal year-end, and that avoiding annual losses through such management is particularly pronounced. These findings align with the assumption in prior research that decisions regarding earnings management are implemented at the fiscal year-end.

This study examines annual earnings management using quarterly earnings disclosed under Japan's quarterly financial reporting system. If annual earnings management can be detected through quarterly earnings, the quarterly disclosure system may not only provide timely information to the securities market but also serve as a mechanism to retrospectively reveal intra-year managerial earnings management.

However, while this study demonstrates that annual earnings management is implemented in the fourth quarter, the results also suggest that earnings management based on quarterly benchmarks occurs at other points during the year. Therefore, an important avenue for future research is to identify which managers or firms place greater emphasis on annual earnings as a benchmark and which prioritize quarterly earnings as a benchmark.

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