The Relation of Earnings Management to Firm Size

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1st Draft: January 2003
Revised: May 2003

Abstract

This study examines the relation of corporate earnings management to firm size. We observe that firm size plays differing roles in earnings management: Small-sized firms engage in more earnings management to avoid reporting losses than large- or medium-sized firms. On the other hand, large- and medium-sized firms exhibit more aggressive earnings management to avoid reporting earnings decreases than small-sized firms. Our findings provide further insight into the analyses of Degeorge et al. (1999) regarding how behavioral earnings thresholds induce specific types of earnings management when firm size is considered.

Keywords: **Earnings Management, Behavioral Thresholds, Firm Size, Discretionary Accruals**

The Relation of Earnings Management to Firm Size

1. Introduction

In recent months, corporate earnings management raised serious concerns among financial markets regulators, operators, investors, and academic researchers, as reflected in the speech of the former SEC Chairman Pitt (2002). A series of recent financial disclosures involving Enron, Worldcom, Tyco, Xerox, Global Crossing aggravated this concern. As Healy and Wahlen (1999) suggest, the issue of how pervasive the earnings management among listed companies is critically important to the public, regulators and practitioners. If there is evidence on frequent earnings management irregularities, regulators or accountants should exercise appropriate measures or actions to monitor the problem.

Burgstahler and Dichev (1997), Burgstahler (1998), and Degeorge et al. (1999) have opened a new avenue of research by utilizing pooled cross-sectional distributions of earnings or changes in earnings to test for the presence of earnings management and to estimate the pervasiveness of those practices. From the unusual pattern of frequency distributions around the zero mean of standardized earnings or standardized changes in earnings, Burgstahler and Dichev (1997), for example, estimate that 8-12% of the firms with small pre-managed earnings decreases manipulate earnings to achieve earnings increases and 30-44% of the firms with small pre-managed losses manage earnings to create positive earnings. In addition, they report that these practices are more prevalent among medium- and large-sized firms.[1] Despite their pioneering effort, the relation of earnings management to firm size remains unexplored and unknown. In this study, we study this unexplored relation.

Two opposing views exist on the role of firm size in earnings management as discussed below. The larger the firm size, the less earnings management may be feasible. First, the size of a firm is related to its internal control system. Large-sized firms may have more sophisticated

[1] Refer to Footnote No. 11 in Burgstahler and Dichev (1997, p. 112).

internal control systems and have more competent internal auditors as compared to small-sized firms. An effective internal control system contributes to the reliability of financial information disclosed to the public. In addition, corporate governance mitigates the degree of earnings management and improves the quality of financial reporting (Warfield, et al., 195 and Beasley et al., 2000). Therefore, large-sized firms are more likely to design and maintain more sophisticated and effective internal control systems in comparison to small-sized firms, reducing the likelihood of manipulating earnings by management.

Second, large-sized firms are usually audited by auditors from big 5 accounting firms that tend to have more experienced auditors who could help prevent earnings misrepresentation. Quality differentiation exists in controlling aggressive and opportunistic earnings management among big international accounting firms, national firms, and local firms (Francis, et al., 1999). Specifically, the firms audited by big 5 tend to report lower levels of discretionary accruals even though they have high level of accruals. In addition, firms audited by big 5 also report lower levels of discretionary accruals (Becker et al., 1998; Francis et al., 1999; and Payne and Robb, 2000). Gore et al. (2001) report that non-big 5 auditors allow more earnings management than big 5 auditors. Lennox (1999) also finds that the audit reports issued by large auditors are more informative, exhibiting that auditor size is positively related to audit accuracy. Heninger (2001) documents a positive association between risk of audit litigation and abnormal accruals. These studies demonstrate that large-sized firms tend to receive better audit services from established auditing firms due to larger operating budgets.

Third, large-sized firms take into account the reputation costs when engaging in earnings management. These firms may have better appreciation of market environment, better control over their operations and better understanding of their businesses relative to small-sized firms. Large-sized firms may have established their credibility in business community and social responsibility as well, including the credibility of financial information because they are more able to utilize best expertise and modern information technology in generating reliable and timely

information compared to small-sized firms. Hence, the cost of engaging in earnings management will be higher for large-sized firms than small-sized firms. Therefore, their concern about reputations may prevent large-sized firms from manipulating earnings. Finally, large-sized firms may be less likely to manage earnings relative to smaller counterparts because they are followed by more financial analysts.

In contrast, an opposing view suggests that large-sized firms are more likely to manage earnings than small-sized firms. First, as Barton and Simko (2002) indicate, large-sized firms face more pressures to meet or beat the analysts' expectations. Myers and Skinner (2000) compile empirical evidence that large-sized firms do not report accurate earnings after studying their earnings growth for at least 14 quarters. Rangan (1998) also notes that the firms in his study manipulating current accruals to overstate earnings in the year before seasoned equity offerings are older and larger.[2]

Second, large-sized firms have greater bargaining power with auditors. The larger the firm size, the more bargaining power they have in negotiations with auditors. Nelson et al. (2002) document that auditors are more likely to waive earnings management attempts by large clients. Third, large-sized firms have more room to maneuver given wide range of accounting treatments available. They may have greater current assets, i.e. better ability, to do earnings management than small-sized firms. Fourth, large-sized firms have stronger management power. Even though strong internal control systems do exist, the management may override the internal control system to manipulate earnings to outrun the thresholds. Finally, large-sized firms may manage earnings to decrease political costs. In all, the incentives and abilities to manage earnings may vary among firms of different sizes.

These competing views and evidence raise a question on the relation of earnings management to firm size. Are large- and medium-sized firms more likely to manage earnings than small-sized firms after controlling for various firm attributes that may affect earnings

[2] Refer to Footnote No. 4 of Rangan (1998, p. 105).

management practices? This question must be resolved empirically. However, none of the past studies has thoroughly investigated the effect of firm size on earnings management. The main purpose of the study is to fill this gap in empirical research on earnings management. Specifically, this paper examines the relation between firm size and earnings management, rather than just control for firm size in conjunction with specific corporate events. In addition to examining the frequency distributions of earnings and the changes in earnings following Burgstahler and Dichev (1997), this study employs parametric analyses using multivariate probit regressions to examine the impact of firm size on earnings management while controlling for various firm attributes (e.g., earnings performance in past years, sales growth, operating cycle, capital intensity, status of auditors, etc.) which may encourage or discourage earnings manipulations. We believe this study is the first one which examines the relation of earnings management to firm size in a comprehensive and systematic manner. Our results indicate that both large- and small-sized firms manage earnings to avoid reporting small negative earnings or small earnings decreases, which are consistent with the findings of Burgstahler and Dichev (1997). However, we observe that firm size plays differing roles in managing earnings or earnings changes. Contrary to the results compiled by Burgstahler and Dichev (1997), we find that small firms engage in more earnings management than large- or medium-sized firms to avoid reporting losses. On the other hand, large- and medium-sized firms exhibit more aggressive earnings management to avoid reporting earnings decreases than small-sized firms. A reasonable explanation is that it is easier for large firms to report positive earnings than positive change in earnings, while small firms may not have the same capacity as large firms in reporting positive earnings. Our findings provide further insight into the analyses of Degeorge et al. (1999) regarding how behavioral earnings thresholds induce specific types of earnings management as firm size is considered.

This rest of the paper is organized as follows. In Section 2, we discuss the data and methodology. In section 3, we present the empirical results. In Section 4, we conclude the paper.

2. Data and Methodology

2.1. Sample and Data

This paper includes all companies whose financial statement data are available from Compustat database for the 18-year period from 1983 to 2000. Following Burgstahler and Dichev (1997), banks, financial institutions (SIC codes between 6000 and 6500), and firms in regulated industries (SIC codes between 4400 and 5000) are excluded. For the computation of earnings or changes in earnings, we use net income (NI, Compustat item #172), divided by the beginning market value (MKVALF). Specifically, the level of earnings is equal to $NI_t/MKVALF_{t-1}$, while the change in earnings is $(NI_t-NI_{t-1})/MKVALF_{t-2}$. To avoid the influence of extreme values, we eliminate the observations with absolute value of scaled earnings or change in scaled earnings over 5.

To examine the relation of earnings management to firm size, we classify sample firms into large-, medium-, and small-sized firm groups based on the beginning market value of each year. The corresponding groups in each year are pooled to form three size groups.

2.2. Frequency Distributions of Scaled Earnings and Changes in Scaled Earnings

In recent years, a new approach examining pooled cross-sectional distributions of earnings or changes in earnings have been employed to test for earnings management (Burgstahler and Dichev, 1997; Burgstahler, 1998; and Degeorge et al., 1999). With annual data from 1976-1994, Burgstahler and Dichev (1997) document empirical evidence that firms manage reported earnings to avoid earnings decreases and losses. Burgstahler (1998) uses quarterly data to test for earnings management and reports that firms with small positive earnings exhibit a usually high frequency of earnings management while firms with small negative earnings demonstrate a lower frequency. Degeorge et al. (1999) introduce behavioral thresholds for earnings management and model how thresholds induce earnings management. Their study shows discontinuity in the earnings distributions and exhibiting a strong tendency of earnings

management exceeding the thresholds. Das and Zhang (2003) provide evidence that firms manipulate earnings in order to report one more cent of earnings per share by rounding-up.

Replicating the Burgstahler and Dichev (1997) method, the first of part of our empirical analyses focuses on the frequency distributions of the differences between the actual number of observations in earnings changes (or earnings) and the expected number of observations in the same variable, divided by the estimated standard deviation of the difference, to highlight the relation between firm size and earnings management. Naturally, we use Burgstahler and Dichev's assumption that under the null hypothesis, the standardized differences are distributed approximately normal with mean 0 and standard deviation 1. In other words, the test statistics under the null hypothesis is:

$$\frac{X - \hat{X}}{\sigma_{X-\hat{X}}} \sim N(0,1) \qquad (1)$$

where, X is the actual number of the observations in the interval .

$\hat{X}$ is the expected number of the observations in the interval.

$\sigma_{X-\hat{X}}$ is the estimated standard error of the difference.

The expected number of the observations in the interval is the average of the number of observations in the intervals immediately adjacent to the interval. Thus, we test for discontinuity at zero. If there is no discontinuity at zero in a particular size group, it may imply that earnings management in these size groups is unlikely to occur. Otherwise, discontinuity at zero suggests that the firms in that particular size group are managing earnings to avoid losses or a decrease in earnings.

2.3. Multivariate Probit Analysis

We conduct the parametric analysis using a multivariate probit analysis to test whether firm size affects its earnings manipulation, while controlling for various firm attributes such as previous performance, sales growth, capital intensity, operating cycle, and the status of auditor.

Our primary interest is in the firm's behavior of manipulating earnings level or the change in earnings from negative to positive value to avoid earnings losses or earnings decreases. Because ordinary linear regression models are unable to capture the firm behavior in earnings manipulation, we use a binary choice model as defined below.

$$\text{Prob } (Y=1) = F(\beta X) \qquad (2)$$

We employ two sets of the binary choice model; the first one using scaled earnings level as dependent variable and the second one using changes in scaled earnings as dependent variable. The dependent variable (Y) will take on the value of 1 if scaled earnings or change in scaled earnings is positive and 0 otherwise. In using the binary choice model, we believe that a set of variables (X) explains the probability that Y takes on the value of 1 through a function F. There are several choices for the F function. In this study, we use probit model where F is a continuous density function of normal distribution. Then the estimated coefficient $\hat{\beta}$ will reflect the effect of X on the probability that a firm has positive earnings or positive change in scaled earnings (Y=1). The magnitude of coefficients, however, is not very useful by itself in this model. Our interest is in the estimation of the effect of X on the probability that Y has positive values, $\partial F(\beta X)/\partial X$. Unlike linear regression model where the coefficient itself represents the marginal effect of X on the dependent variable, the estimation of the effect of X on the probability in the binary choice model is complicated by the nonlinear nature of F function. The effect of X on the probability is calculated by $\partial F(\beta X)/\partial X$ which is the product of β and $(\partial F(\beta X)/\partial(\beta X))$. That is, in order to calculate the marginal effect of X on the probability, we need to multiply the coefficient, β, by $(\partial F(\beta X)/\partial(\beta X))$ which depends on the value of X. In the probit, $(\partial F(\beta X)/\partial(\beta X))$ has a maximum value of about 0.4 at X=0 and decreases as X deviates from zero. We need to evaluate the marginal effect at an X value of our interest and a typical choice is the average of X. Thus, we report the marginal effect $\partial F(\beta X)/\partial X$ using average value of X when it is a continuous variable.

But, when X is a dummy variable, we report the marginal effect by changing X from zero to one holding all other variables fixed.

The model allows us to test whether any of the control variables would increase the probability of firm's earnings management. It is true that there is no way to tell whether a firm is managing earnings. Burgstahler and Dichev (1997) report apparent discontinuity at mean zero for both earnings and changes in earnings using a distribution analysis. They demonstrate that the number of observations reporting small positive earnings or earnings changes is significantly greater than expected and the number of observations reporting small negative earnings or earnings changes is significantly smaller than expected. This result is viewed as an evidence of earnings manipulation. Our approach will have an explanatory power especially when we restrict our attention to the narrow area around zero where we suspect firms to manage earnings. The results reported in the next section are based on the regressions using sample with scaled earnings or change in scaled earnings between -0.01 and 0.01.

Throughout the analysis, the variable of our primary interest is firm size. For the probit analysis, we measure firm size as the natural logarithm of a firm's market value at the beginning of the year.[3] We run another set of probit regressions, replacing continuous firm size variable with size dummy variables for the medium and large size firms because it allows more effective interpretation. We also include a number of dummy variables in the multivariate probit model to control for confounding effects of: (i) sales growth; (ii) previous performance in earnings or earnings change; (iii) capital intensity ratio; (iv) the status of auditor; (v) operating cycle; (vi) industries; and (vii) years. The next section discusses these variables in greater details.

2.4. Control Variables

2.4.1. Earnings Performance in the Previous Years

[3] We have also introduced a second measure, the natural logarithm of its asset value at the beginning of the year. We report only the results based on the market value since the results using the asset value are similar to those using the market value.

Myers and Skinner (2000) document that the firms that had preceding positive earnings are more likely to manipulate earnings to keep the consecutive earnings growth trend. Therefore, the performance in previous years affects the managers' tendency to manipulate earnings to avoid reporting negative earnings or earnings decreases. The rapidly growing firms have strong incentives to manage earnings to keep consistent growth or meet the market expectation. Barth et al. (1999) and Myers and Skinner (2000) examine the firms with continuous earnings growth. They find that these firms are priced at a premium that increases with the length of the earnings string, and that the stock price declines significantly when the earnings string ends. This implies that the management of the firms with consistent earnings growth has incentives to maintain their earnings strings. Besides the real earnings growth, earnings must be managed well to keep up with their earnings, if necessary. Bartov et al. (2002) compile evidence that firms may meet or beat earnings expectations through earnings management. Myers and Skinner (2000) note that their sample firms tend to be usually large. Therefore, we expect that large-sized firms have stronger motivations and are more likely to manipulate earnings to keep consistent earnings growth trend and meet or beat earnings expectations.

We include three dummy variables for previous earnings performance. Observations are sorted into four groups based on the length of the previous run of positive earnings or earnings increases. The four groups include: a group whose scaled earnings or changes in scaled earnings are negative in the previous year; a group whose scaled earnings or changes in scaled earnings are positive in the previous year; a group whose scaled earnings or changes in scaled earnings for last two consecutive years are positive; and a group whose scaled earnings or changes in scaled earnings are positive for three or more years. Dummy variables representing last three groups are introduced and will be compared to the first group which is the reference group. We expect the coefficients of these dummy variables to be positive. The estimated coefficients of these variables will indicate the differences between the probabilities of those firms with positive

earnings in the past year(s) and the probability of the firms with negative earnings in the previous year.

2.4.2. Sales Growth

Sales growth may affect the propensities of firms to manage earnings. High sales growth usually improves the bottom line in income statement that is controlled by the variable, earnings performance in previous years, so the firms with high sales growth may not necessarily manipulate earnings to report positive earnings or change in earnings. Given the earnings performance, however, the high-growth firms would aggressively recognize revenues in order to maintain the growth trend, particularly with a series of consecutive increases in sales. Myers and Skinner (2000) observe, for example, that their sample firms have higher sales growth rates than the firms in the control group. So it becomes necessary to control for sales growth to isolate the relation between firm size and earnings management.

Observations are divided into three groups based on the sales growth rate, calculated as current period sales minus last period sales divided by last period sales. Two dummy variables representing for medium- and high-growth rates are included in the model while the low-growth group serves as the base group. We expect the coefficients of these dummy variables to be positive.

2.4.3. Capital Intensity

Capital intensity as measured by the ratio of the sum of gross amount of property, plant, and equipment to total assets may influence the manager's ability to manage earnings. The lower the capital intensity ratio (CIR), the higher the likelihood of the manager engaging in earnings management. The ability for firms to manage earnings varies, because of the varying mix of current and noncurrent assets. Some firm characteristics determine the properties of accruals. For example, the firm's capital intensity produces long-term accruals (Francis et al. 1999). Different firms require different operating conditions. Specifically, some firms have greater current assets and current liabilities relative to other firms. The firms with large current assets

and/or current liabilities have the greater ability to manipulate earnings through working capital than the firms with small current assets and/or current liabilities. Burgstahler and Dichev (1997) suggest that the firms with high levels of current assets and current liabilities face less ex ante costs of earnings management to avoid losses or earnings decreases through manipulating working capital relative to the firms with low levels of current assets and current liabilities. They document evidence on the ex post results of earnings management that levels of cash flow from operations, changes in working capital, and other accruals for the portfolio immediately to the right of zero are significantly different from those for the portfolio immediately to the left of zero. So it can be inferred that firms with greater current assets or current liabilities provide more room for the management to manipulate earnings than firms with smaller current assets or current liabilities.

We categorize the observations into low, medium, and high CIR groups and examine the differential behavior of the three groups in earnings manipulation. Negative coefficients would be expected for these dummies when the low capital intensity firms serve as the benchmark base group.

2.4.4. Operating Cycles

The behavior of earnings management may also be affected by the firm's operating cycle. The shorter the operating cycle, the more the opportunities for firms to control earnings. In the earnings management literature, the vehicles used for earnings management are either the choices of accounting methods or the estimation of accruals. Many studies test for earnings management by examining the magnitude of estimated discretionary accruals. The reason is that changes of accounting methods are obvious and less discretionary. Therefore, current accruals are the primary tool for the management to do earnings management, while long-term accruals are less subject to earnings management (Guenther, 1994). Rangan (1998) and Teoh et al. (1998) also document that current accruals are the critical factor in shifting earnings between the current and future periods.

The classification of current and long-term accruals depends on the definition of operating cycle. Dechow and Dichev (2002) find that the quality of accruals and earnings is negatively related to operating cycles. Therefore, we include operating cycle (OC) as a control variable in the model to examine whether the operating cycle affects the firm's propensity to manage earnings. Based on the length of the operating cycle, the observations are divided into three groups. The coefficients estimated for the dummy variables for the medium and high OC are expected to be negative.

2.4.5. Status of Auditor

The big 5 auditors are expected to provide high-quality audit services. The levels of discretionary accruals for the firms audited by big 5s are lower relative to those for the firms audited by non-big 5s (Becker et al., 1998; Francis et al., 1999; and Payne and Robb, 2000). Gore et al. (2001) report that non-big 5 auditors allow more earnings management than the big 5 auditors. In contrast, Libby and Kinney (2000) suggest that the big 5 auditors may allow their clients to engage in income-increasing accounting misstatements, making the sign of auditor estimates unpredictable. We include a dummy variable to examine how the status of auditor affects the firm's earnings management practices. In the model, non-big 5 auditors are treated as the base group. We expect negative sign for this dummy variable, indicating that big 5 auditors are less likely to allow the firms to manage earnings to avoid loss or earnings decreases.

2.4.6. Industry classification and years

Many studies assume the abilities of firms to manage earnings are invariant over time or across firms. A few prior studies document earnings management in specific industries. Using a sample of companies in printing and publishing, nondurable wholesale goods, and business services, for example, McNichols and Wilson (1998) document that firms manage their earnings by choosing income-decreasing accruals when income is extreme. Beasley et al (2000) find that the fraudulent techniques vary greatly across these industries. Specifically, technology firms usually use revenue frauds while the financial-services firms prefer to use asset frauds and

misappropriations. The sample SEO firms in Teoh et al. (1998a) exhibit a strong tendency of using discretionary current accruals to report higher net income before the offering. Over 30% of the sample firms are in electronic equipment and services industries (two digit SIC code are 35, 36, and 73). Nelson et al. (2002) document that significantly more earnings management attempts by firms in the electronics industry than would be suggested by the survey audit partner or managers' experience. These studies imply that industry classifications should be considered in testing for earnings management. We sort the sample firms based on 2-digit SIC code. A total of eight industries are obtained. They include: manufacturing, wholesale, retail, real estate, service, mining & mineral, construction, and others. We include seven dummy variables for the last seven industries cited above to compare with the manufacturing industry. Finally, year dummy variables are included to control different price levels over years but for which coefficients are not reported in the table for the benefit of reporting simplicity.

3. Empirical Findings

3.1. Frequency Distribution Analysis

In Table 1, we present descriptive statistics summarizing the level of earnings (Panel A) and changes in earnings (Panel B) by firm size. The total number of observations for earnings level is 69,958, which are approximately equally divided among three size groups. The number of observations varies among the three groups because of missing observations. Scaled earnings are monotonically increasing with firm size, ranging from the median value of 0.003 for the small-sized firms to 0.062 for the large-sized firms as summarized in Panel A. However, the changes in scaled earnings tend to be larger for the small- than large-sized firms. The median value for the small-sized firms is 0.014 which contrasts with the counterpart figure of 0.008 for the large-sized firms. In both cases, standard deviations are monotonically decreasing with firm size.

[Insert Table 1]

Figure 1 presents the histogram of scaled earnings for each size group for the range from -0.30 to +0.30. The histogram for the large-sized firm group shows a single-peaked, bell-shaped distribution, while the histograms for the small- and medium-sized firm groups exhibit flatter shapes. All histograms for the three size groups show discontinuities at mean zero, which is an indication that the firms avoid reporting earnings losses. The standardized differences for the interval on the left of zero (for the interval on the right of zero) for the small-, medium-, and large-sized firm groups are -18.11 (20.01), -12.97 (9.84), and -7.98 (8.74), respectively.

[Insert Figure 1 and Table 2]

The standardized differences are all statistically significant for all three groups. Because standardized differences represent how far the actual number of observations is deviated from the expected number of observations within the given interval and also the absolute magnitude of the standardized differences are decreasing in firm size, the actual number is more significantly far from the expected number of observations for the small-sized firms than for large-sized firms. In contrast to Burgstahler and Dichev (1997), this finding provides strong indication that small-sized firms are managing earnings more aggressively than large-sized firms to avoid reporting earnings losses.[4]

The histograms of changes in earnings are presented in Figure 2 for the three size groups. The large-sized firm group again exhibits a single-peaked, bell-shaped distribution, whereas the small- and medium-sized firm groups show flatter distributions. However, the standardized differences for the interval on the left of zero (for the interval on the right of zero) are -9.60 (13.07), -19.38 (16.67), and -13.61 (9.59) for the small-, medium-, and large-sized firm groups, respectively. The results indicate that the large- and medium-sized firms manipulate earnings more extensively than the small-sized firms to avoid earnings decreases. A reasonable explanation is that it is more important for large- and medium-sized firms to report positive

[4] The study period of Burgstahler and Dichev (1997), 1977-1994, overlaps the first part of our study period, 1983-2000.

change in earnings than to report positive earnings because it is easy for these firms to achieve positive earnings relative to small firms while small firms may have to report positive earnings and then pursue earnings increases.

[Insert Figure 2]

3.2. Multivariate Probit Analysis Results

We begin our empirical investigation by examining the relation between firm size and earnings management. We define the observations falling in the range of (0, 0.01) as the samples firms that engage in earnings management to report positive earnings or positive change in scaled earnings and the observations in the range of (-0.01, 0) as the sample firms that do not engage in earnings management.[5] Table 3 reports the estimates from probit regressions of earnings and changes in earnings in Panels A and B, respectively. The probit estimate (-0.051) of firm size effect in the regression of earnings is negative and significant at the 5% level (Z=-3.43), indicating that small firm tends to have higher probability of reporting small positive earnings. The result is similar when we include two dummy variables signifying the medium- and large-sized firms instead of the continuous firm size variable. The results in Table 4 indicate that the probability of manipulating earnings to report small positive earnings is far lower for the medium- and large-sized firms. The average probability for the large-sized firms to report small positive earnings is 11.4% lower than that for the small-sized firm. This corresponding probability for the medium-sized firms is 8.3%.

Returning back to Table 3, the estimate of firm size effect (+0.023) in the probit regression of earnings changes is positive and significant (Z=2.93), which indicates that large-sized firm tends to manage earnings to report small, positive changes in earning more often than small-sized firm. The results are qualitatively the same if two dummy variables representing

[5] We do not use the wider ranges of (0, 0.02), (0, 0.03), (-0.02, 0), or (-0.03, 0) examined by Burgstahler and Dichev (1997) because these ranges will include more observations that may not reflect in earnings management.

medium- and large-sized firms replace the continuous size variable. The probability that medium- and large-sized firms report small increases in earnings is greater than the probability associated with small-sized firms by 2.9% and 5.1%, respectively, as summarized in Panel B of Table 4. These results are consistent with the distribution-based frequency analysis presented in the previous section[6]. Our findings provide further insight into the analyses of Degeorge et al. (1999) regarding how behavioral earnings thresholds induce specific types of earnings management when firm size is considered.

[Insert Tables 3 and 4]

The effects of higher sales growth are in line with our expectations. The estimated marginal effects of two dummy variables for medium and high sales growth on the probability are all positive and statistically significant. They are 0.063 (Z=2.55) and 0.037 (Z=1.46) for the regression of scaled earnings and 0.138 (Z=10.15) and 0.119 (Z=6.98) for the regression of change in scaled earnings, respectively. The magnitudes of the effects of sales growth are quite substantial in the change in scaled earnings probit regression. It is not surprising, however, because high sales growth is an important determinant of earnings increases.

The effects of earnings performance in previous years confirm our prediction as well as past empirical findings. For all three dummy variables, the effect of previous earnings increases on the probability is positive and significant, (Z=2.26, 2.22, and 6.25, respectively). Compared to the firms with earnings decreases in the previous year, the likelihood of reporting earnings increase this year is 3.5%, 4.2% and 9.7% higher for firms with previous earnings increase for last one to three years. The effect of previous positive earnings changes on the probability increases as the length of the previous run of positive earnings change increases, confirming that

[6] We also examine the narrow ranges such as (0, 0.0025) and (0, 0.005) for scaled earnings and changes in earnings. In the case of scaled earnings, the marginal effects of firm size are consistently negative and significant, -0.0217 (Z=-2.10) and -0.0174 (Z=-2.27) for the intervals (0, 0.0025) and (0, 0,005), respectively. For probit regressions for the changes in earnings, however, the results are mixed. The marginal effect of firm size is positive (0.0013) but insignificant (Z=0.33) for the interval (0, 0.005), while the marginal effect of firm size is negative (-0.0011) and insignificant (Z=-0.19) for the interval (0, 0.0025).

the firms reporting earnings increases in last three years are more likely to report positive changes in earnings in the current year. Similar results are obtained for the probit analysis with scaled earnings level as the dependent variable even though the effects of previous positive earnings on the probability are positive but modest. The estimated effects on the probability are 0.058 (Z=2.08), 0.057 (Z=1.64), and 0.075 (Z=2.98), respectively. The magnitude of the marginal effects for the dummy variable representing three years of positive earnings is the largest, implying that the firms that report positive earnings in last three years are more likely to report positive earnings in current year and then more likely to manage earnings to report positive earnings. This result is in contrast to Burgstahler and Dichev (1997) in that they provide little evidence of a pattern that firms with longer preceding consecutive positive earnings are more likely to manage earnings, but is consistent with Barth et al (1999) and Myers and Skinners (2000).

In order to test the hypothesis that large firms have stronger desires and are more likely to manipulate earnings to keep consistent earnings growth trend, we run the same regressions separately for the small- and large-sized firm group. We find strong effect of previous performance on the probability of reporting earnings increases for the large-sized firms, while no significant effect is found for the small-sized firms. The estimated marginal effect of the dummy variable for big 5 auditors is significantly positive in the earnings regression, 0.093 (Z=3.27), implying that the probability for firms audited by a big- 5 auditor reporting smaller positive earnings is higher than that of the firms audited by non-big 5. Our result is consistent with Becker, et al. (1998), Francis, et al (1999), and Gore, et al. (2001), but does not support Libby and Kinney (2001). The status of auditors has expected sign, even though insignificant, in the change in earnings regression. This result implies that the big-5 auditors are less likely to allow the firms to report earnings increases than non-big 5 auditors.

For the dummy variables signifying capital intensity and operating cycle, our results do not support our predictions. The marginal effects of dummy variables for the medium and high

CIR are positive but insignificant (in most cases) in both probit regressions: 0.046 (Z=1.78) and 0.017 (Z=0.57) for the scaled earnings regression and 0.036 (Z=2.16) and 0.027 (Z=1.55) for the changes in scaled earnings regression. This suggests that medium- and high-CIR groups exhibit a higher propensity to report small positive earnings or earnings increases than the low CIR group. A possible explanation may be found from the fact that it may be more difficult to manage earnings for the firms with high capital intensity ratios than the firms with low capital intensity ratios so that the degree of earnings management is more extensive if large-sized firms tend to report positive earnings or earnings increases.

The marginal effects of dummy variables representing medium- and long-operating cycle are estimated at 0.046 (Z=1.78) and 0.017 (Z=0.57) for the scaled earnings regression and 0.016 (Z=1.07) and 0.023 (Z=1.32) for the changes in scaled earnings regression, respectively. These estimates suggest that medium- and long-OC groups tend to report more positive earnings or earnings increase than short-OC group even though these effects are not statistically significant. The results are somewhat surprising and we may have to question how valid OC is in assessing the firm behavior in earnings management.

Finally, an examination of industry effects suggests that no substantial difference in earning manipulation is observed in different industries. In the scaled earnings regression, all seven industries show lower probability in reporting small positive earnings than the manufacturing industry, but the estimates of industry effects are all insignificant, except for retail industry. In the probit regressions for changes in scaled earnings, wholesale, retail, and service industries show a higher probability in reporting small earnings increase than manufacturing sector, while real estate, mineral, construction industries show lower probability in reporting small earning increase. However all these effects are statistically insignificant as in the changes in scaled earnings regression.

3.3. Interaction Effects and the Role of Control Variables

To address how the firm size effect interacts with various firm attributes, we introduce interaction terms between firm size as measured by market value of equity and control variables in both regressions. Table 5 reports the estimated coefficients and z-values for the interaction terms. Original non-interaction terms are also included in the regressions, but not reported in the tables since our primary interest here is the anlayses of interaction terms. As noted, most interaction terms are statistically insignificant in both scaled earnings and changes in scaled earnings regressions. Only the interaction between sales growth and firm size is significant in both regressions: The medium-growth group shows a stronger negative firm size effect than other groups in the scaled earnings regression while it shows a stronger positive firm size effect in the changes in scaled earnings regression. The estimated effects of industry interactions suggest that a positive firm size effect in the earnings change regression is most apparent in the service and construction industry and least apparent in the real estate industry. The estimates of interactions from earnings regression do not show any indication of significant difference in the firm size effect across industry. Interactions with other variables are also very modest in that they are not statistically significant.

[Insert Table 5]

4. Conclusion

Recent accounting scandals raise serious concerns in credibility of financial reporting. It becomes necessary to access the extent of earnings management or identify what kinds of firms are engaging in earnings management. The firm size has positive impacts on earnings management because large firms usually have strong internal control systems and governance mechanisms, can access high quality services from large CPA firms, and care its reputations. These factors may discourage earnings management. In contrast, however, the large firms may also face more pressure to report positive earnings or earnings increases, have more bargaining power in negotiation with auditors, have higher abilities to maneuver given wide range of

accounting treatments available, and have stronger management power to make it easier to manipulate earnings.

This paper's analyses focus on the relation of earnings management to firm size by using the distribution analysis and multivariate probit analysis. Specifically, this paper examines whether the large-sized firms are more likely to manage earnings than small-sized firms. This paper's contributions may be found in two major areas: first, we open the door for a parametric assessment (probit analyses) of pervasiveness of earnings management, going beyond Burghstaler and Dichev (1997); second, we control for confounding effects from earnings performance in past years, sales growth, operating cycle, capital intensity, status of auditors, to minimize any confounding effects in examining the effect of firm size.

Consistent with Burgstahler and Dichev (1997), we find that that both large- and small-sized firms manage earnings to avoid reporting small negative earnings or small earnings decreases. Contrary to the results compiled by Burgstahler and Dichev (1997), however, we find that small firms engage in more earnings management than large- or medium-sized firms to avoid reporting losses. On the other hand, large- and medium-sized firms exhibit more aggressive earnings management to avoid reporting earnings decreases than small-sized firms. A reasonable explanation is that it would be easier for large-sized firms to report positive changes in earnings than positive earnings, while small-sized firms may not have the same capacity as large-sized counterparts in reporting positive earnings.

Our results are consistent with Degeorge et al. (1999) reporting that firms may manage earnings to report positive earnings, to show earnings increases, and then to beat or meet market expectations in the order of importance. In our results, the probability that firms manage earnings to avoid earnings losses is monotonically decreasing with firm size, implying that it is the most important objective for small firms to report positive earnings. The probability firms do earnings manipulations to report earnings increases is increasing with firm size, implying that it is more

important for large firms to report positive change in earnings that positive earnings, because it may be easier for large firms to report positive earnings than small firms.

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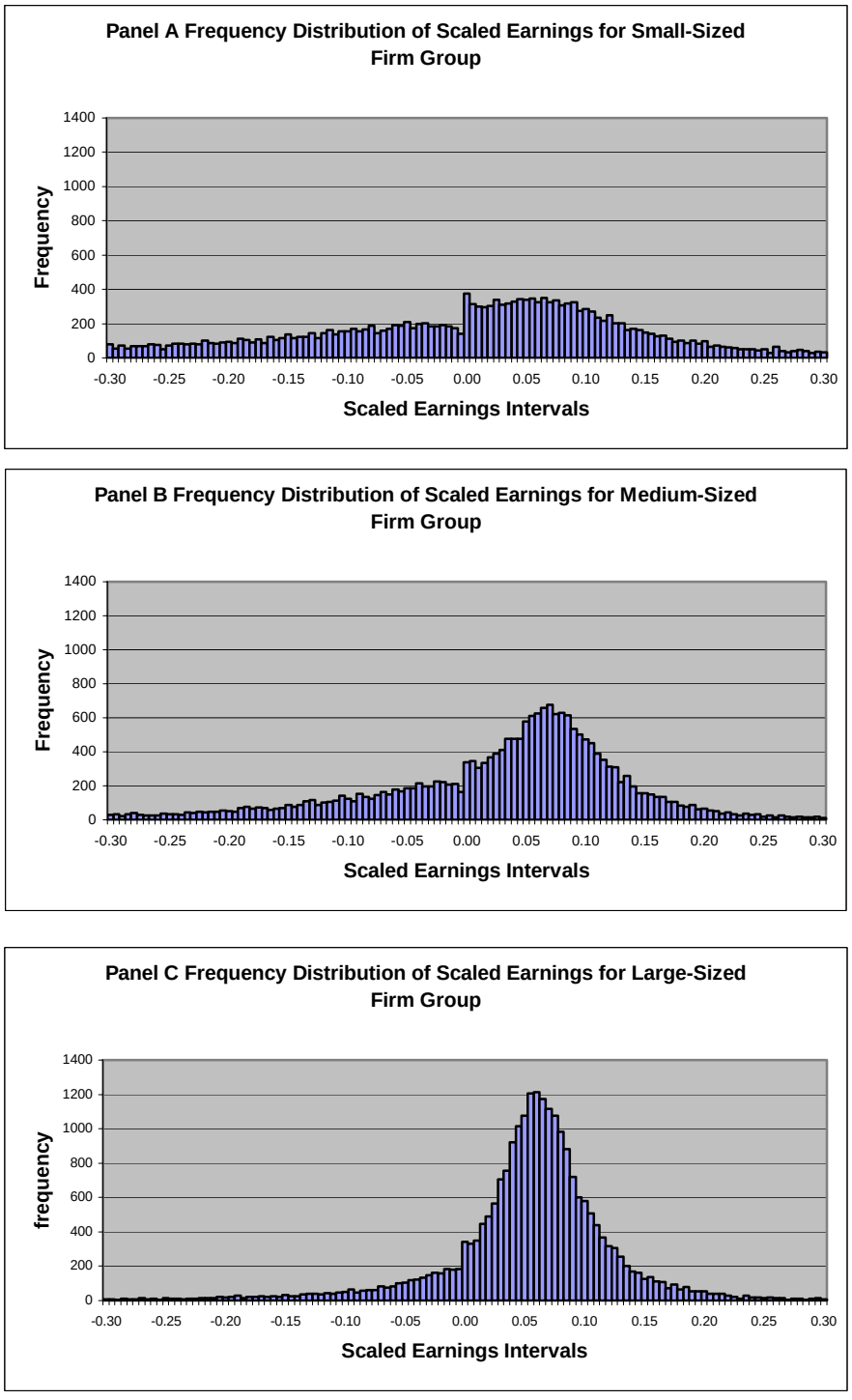

Figure 1
Frequency Distribution of Earnings
Scaled by the Beginning Market Value

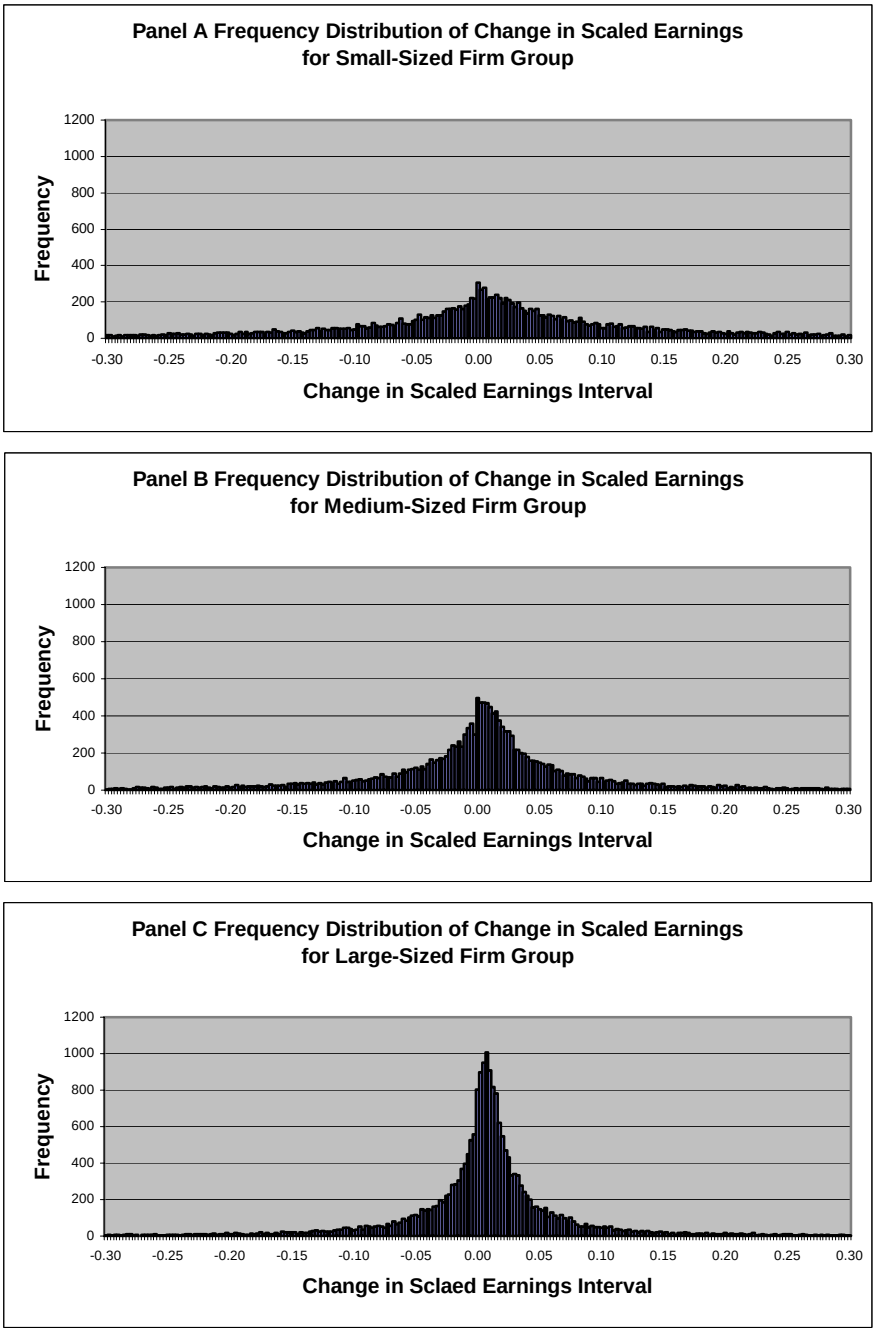

Figure 2
Frequency Distribution of Changes in Scaled Earnings

Table 1
Descriptive Statistics of Scaled Earnings
and Changes in Scaled Earnings

Panel A: Scaled earnings by firm size

Firm Size	N	Mean	STD	25%	Median	75%
Small	23769	-0.110	0.586	-0.191	0.003	0.095
Medium	22119	0.002	0.268	-0.036	0.051	0.096
Large	24070	0.049	0.139	0.032	0.062	0.091
Whole	69958	-0.020	0.388	0.041	0.050	0.093

Panel B: Changes in scaled earnings by firm size

Firm Size	N	Mean	STD	25%	Median	75%
Small	20480	0.034	0.592	-0.073	0.014	0.114
Medium	18861	-0.005	0.309	-0.039	0.006	0.042
Large	21825	0.004	0.172	-0.014	0.008	0.029
Whole	61166	0.011	0.397	-0.034	0.008	0.049

Notes:
1. Firm size is based on the beginning market value of fiscal year, MV_{t-1}.
2. MV_t = Market value at the end of fiscal year.
3. $Earnings_t$: Net income in year t.
4. Scaled $earnings_t$= $Earnings_t/MV_{t-1}$.
5. Scaled change in $earnings_t$ = $(Earnings_t-Earnings_{t-1})/MV_{t-2}$.

Table 2 Standardized Differences around Zero

Firm Size	Scaled Earnings in Ranges of		Changes in Scaled Earnings in Ranges of	
	(-0.005, 0)	(0,0.005)	(-0.0025, 0)	(0,0,0025)
Small	-18.11*	20.01*	-9.60*	13.07*
Medium	-12.97*	9.84*	-19.38*	16.67*
Large	-7.98*	8.74*	-13.61*	9.59*

* All significant at less than 0.005 level

Table 3
Results of Probit Regression Analyses

	Coefficients	Marginal Effect	Z-Value
Panel A: Scaled Earnings Probit Analysis			
Firm size	-0.051	-0.018	-3.43
Medium Sales growth	0.178	0.063	2.55
High Sales growth	0.103	0.037	1.46
1 positive Earnings	0.165	0.058	2.08
2 positive Earnings	0.163	0.057	1.64
3 positive Earnings	0.212	0.075	2.98
Medium CIR	0.174	0.062	2.52
High CIR	0.037	0.013	0.46
Big 5 auditor	0.251	0.093	3.27
Medium OC	0.129	0.046	1.78
High OC	0.047	0.017	0.57
Industry: Whole Sale	-0.022	-0.008	-0.14
Industry: Retail	-0.241	-0.091	-2.00
Industry: Real Estate	-0.200	-0.075	-1.38
Industry: Service	-0.087	-0.032	-1.07
Industry: Mineral	-0.070	-0.026	-0.56
Industry: Construction	-0.028	-0.010	-0.10
Industry : Others	-0.158	-0.058	-1.63
Panel B: Changes in Scaled Earnings Probit Analysis			
Firm Size	0.023	0.009	2.93
Medium sales growth	0.364	0.138	10.15
High sales growth	0.327	0.119	6.98
1 Earnings increase	0.093	0.035	2.26
2 Earnings increase	0.111	0.042	2.22
3 Earnings increase	0.260	0.097	6.25
Medium CIR	0.095	0.036	2.16
High CIR	0.072	0.027	1.55
Big 5 auditor	-0.016	-0.006	-0.30
Medium OC	0.042	0.016	1.07
High OC	0.061	0.023	1.32
Industry: Whole Sale	0.018	0.007	0.23
Industry: Retail	0.102	0.038	1.68
Industry: Real Estate	-0.052	-0.020	-0.57
Industry: Service	0.054	0.020	1.01
Industry: Mineral	-0.123	-0.047	-1.45
Industry: Construction	-0.083	-0.032	-0.43
Industry : Others	0.034	0.013	0.72

Table 4
Probit Regression Analyses
with Firm Size Dummies

Panel A: Scaled Earnings Probit Analysis

Firm Size	Coefficient	Marginal Effect	Z-Value
Medium	-0.227	-0.083	-3.07
Large	-0.310	-0.114	-3.90

Panel B: Changes in Scaled Earnings Probit Analysis

Firm Size	Coefficient	Marginal Effect	Z-Value
Medium	0.078	0.029	1.53
Large	0.133	0.051	2.71

Table 5
Interaction Between Firm Size and Control Variables

	Coefficient	Marginal Effect	Z-Value
Panel A: Scaled Earnings Probit Regression Analysis			
Medium Sales growth*MV	-0.069	-0.025	-2.18
High Sales growth *MV	-0.012	-0.004	-0.36
1 positive earnings*MV	0.058	-0.021	1.59
2 positive earnings*MV	0.029	0.011	0.63
3 positive earnings*MV	0.015	0.005	0.44
Medium CIR*MV	-0.024	-0.009	-0.72
High CIR*MV	-0.034	-0.012	-0.93
Big 5 auditor*MV	-0.009	-0.003	-0.21
Medium OC*MV	-0.033	-0.012	-0.98
High OC*MV	-0.017	-0.006	-0.45
Whole Sale*MV	-0.044	-0.016	-0.52
Retail*MV	-0.027	-0.010	-0.44
Real Estate*MV	0.062	0.022	0.85
Service*MV	-0.072	-0.026	-1.84
Mineral*MV	0.093	0.034	1.60
Construction*MV	-0.136	-0.048	-0.64
Other Industries*MV	0.025	0.009	0.62
Panel B: Changes in Scaled Earnings Probit Regression Analysis			
Medium Sales growth*MV	0.034	0.013	2.22
High Sales growth *MV	0.011	0.004	0.51
1 earnings increase*MV	0.018	0.007	1.01
2 earnings increase*MV	0.028	0.011	1.28
3 earnings increase*MV	0.032	0.012	1.62
Medium CIR*MV	-0.010	-0.004	-0.49
High CIR*MV	-0.032	-0.012	-1.50
Big 5 auditor*MV	0.025	0.009	1.03
Medium OC*MV	-0.001	-0.0004	-0.07
High OC*MV	-0.001	-0.005	-0.07
Whole Sale*MV	0.043	0.017	1.17
Retail*MV	-0.012	-0.004	-0.43
Real Estate*MV	-0.110	-0.420	-2.20
Service*MV	0.072	0.027	2.96
Mineral*MV	-0.001	-0.0003	-0.02
Construction*MV	0.320	0.122	2.71
Other Industries*MV	0.004	0.001	0.17