The Effect of Firm Size on Earnings Management

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Abstract

This study examines the effect of firm size on corporate earnings management. Documented is empirical evidence that both large- and small-sized firms manage earnings to avoid reporting small negative earnings or small earnings decreases. However, we observe that firm size plays differing roles in earnings management. 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.

Keywords: Earnings Management, Behavioral Thresholds.

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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 in 2002. A series of recent financial disclosures involving Enron, Worldcom, Tyco, Xerox, Global Crossing aggravated this concern, resulting in the passage of the Sarbanes-Oxley Act. For example, the CEO and CFO have to sign a statement to accompany the audit report to certify the "appropriateness of the financial statements and disclosures contained in the periodic report, and that those financial statements and disclosures fairly present, in all material respects, the operations and financial condition of the issuer" in order to boost the public confidence in financial disclosures.

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. For example, if there is evidence on frequent earnings management irregularities, regulators or accountants should exercise appropriate measures or actions to monitor the problem. During the past two decades, most studies focused on accrual-based earnings management in conjunction with specific corporate events under which the companies have strong motivations and are most likely to manage earnings.[1] In recent years, however, the pooled cross-sectional distributions of earnings or changes in earnings are utilized to test for earnings management and to estimate the pervasiveness

[1] Various types of corporate events include bonus plans (Healy, 1985; Gaver, et al., 1995; and Holthausen, et al., 1995), provision of bad debts (McNichols and Wilson, 1988), executive changes (Pourciau, 1993), debt covenants restraints (Press and Weintrop, 1990; Beneish and Press, 1993; Smith, 1993; Sweeney, 1994; and DeFond and Jiambalvo 1994), initial public offerings (Teoh, et al., 1998b), seasoned equity offerings (Rangan, 1998 and Teoh, et al., 1998a), labor union negotiations (Liberty and Zimmerman, 1986), management buyouts (DeAngelo, 1986), import relief (Jones, 1991), and SEC investigation (Beneish,1997 and Bonner, et al., 1998).

of earnings management [Burgstahler and Dichev, 1997, Burgstahler, 1998, and Degeorge et al., 1999]. From the unusual pattern of frequency distributions around the zero mean of standardized earnings or standardized changes in earnings, for example, Burgstahler and Dichev (1997) detect that firms manage earnings to avoid reporting earnings decreases (with statistical tests) and earnings losses (with visual evidence but without statistical tests). In addition, they observe that these practices are more prevalent among medium- and large-sized firms.[2] Despite their pioneering effort, the impact of firm size on earnings management practices has yet to be explored further. In this study, we assess the effect of firm size on earnings management practices because we believe firm size is an important determinant but it is perceived to have differing impact as discussed below.

The firm size may have a positive impact on earnings management. First, the size of a firm is related to the internal control system. Larger companies may have more sophisticated internal control systems and have more competent internal auditors as compared to smaller companies. An efficient internal control system helps control inaccurate disclosure of financial information to the public. Another important factor in mitigating earnings management and improving the quality of financial reporting is corporate governance (Warfield, et al., 1995). Beasley, et al (2000) report that deceitful companies in technology, health-care, and financial services have less internal audit support and are accompanied by weak corporate governance mechanisms. Therefore, larger firms are more likely to design and maintain more sophisticated and effective internal control systems in comparison to smaller firms, reducing the likelihood of manipulating earnings by management.

Second, large firms are usually audited by auditors from big 5 CPA firms. Large CPA firms tend to have more experienced auditors that in turn could help prevent

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

earnings misrepresentation. Gore, et al. (2001) report that non-big 5 auditors allow more earnings management than big 5 auditors. Francis, et al. (1999) document quality differentiation in controlling aggressive and opportunistic earnings management among international big 6 accounting firms, national firms, and local firms. Specifically, the big 6 audited firms tend to report lower levels of discretionary accruals even though they have high level of accruals, indicating that big 6 auditors mitigate earnings management. 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). Lennox (1999) also finds that the audit reports issued by large auditors are more accurate and 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 show that large firms are more advantageous than small firms in terms of receiving better audit services from established auditing firms due to larger operating budgets.

Third, large firms take into account the reputation costs when engaging in earnings management. Large firms have usually grown up with a long history during which they may have better appreciation of market environment, better control over their operations and better understanding of their businesses relative to small firms. They may have established their credibility in business community and social responsibility as well, including the credibility of financial information disclosed by these firms because large firms are more able to use best expertise and modern information technology to generate reliable and timely information compared to small firms. Hence, the costof engaging in earnings management will be higher for large firms than small firms. Therefore, their concern about reputations may prevent large firms from manipulating earnings.

In contrast, large firms are more likely to manage earnings than small firms. First, large firms face more pressure than small firms. Barton and Simko (2002) indicate that large firms face more pressures to meet or beat the analysts' expectations. Myers and Skinner (2000) compile empirical evidence that large firms do not report accurate earnings after studying earnings growth of large-sized firms for at least 14 quarters. Rangan (1998) also notes that while the firms in his study manipulate accruals to overstate earnings in the year when these firms conduct seasoned equity offerings, while his sample firms are older and larger.[3]

Second, the large firms have greater bargaining power with auditors. The larger the firms, 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, the large firms have more room to maneuver given wide range of accounting treatments available. Large firms may have more current assets, i.e. higher ability, to do earnings management relative to small firms. Finally, large 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. In all, the incentives and abilities to manage earnings may vary among firms of different sizes.

These competing views and evidence raise a question as to whether large firms are more likely to manage earnings than small firms. Another unresolved question is how the effect of firm size on earnings management practices would be affected by various firm characteristics such as growth, capital intensity, operating cycles, etc. These questions 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.

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

Specifically, this paper examines the effect of firm size on earnings management, rather than just control firm size in conjunction with specific corporate events. This paper extends Burgstahler and Dichev (1997) to test the effect of firm size on earnings management. Built on Burgstahler and Dichev (1997), this study introduces parametric analyses using multivariate probit regressions in addition to examining the frequency distribution. Another contribution of this paper is investigating the effect of firm size while controlling for other factors such as earnings performance in past years, sales growth, operating cycle, capital intensity, status of auditors, to minimize any confounding effects.

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 changes in earnings than positive earnings, while small firms may not have the same capacity as large firms in reporting positive earnings.

This rest of the paper is organized as follows. Section 2 discusses the data and methodology. In section 3, the empirical results are presented. Section 4 concludes 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 because of wide variations in their capital structures and the intensity of government regulations. For the computation of the earnings or the change 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 effect of firm size, all the available observations are grouped into large-, medium-, and small-sized firm groups. The observations available for each year are sorted by the beginning market value and assigned to one of the three groups. The corresponding groups for 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 the pooled cross-sectional distribution of earnings or changes in earnings is 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. They estimate that 8-12% of the firms with small pre-managed earnings decreases exercise discretion to report earnings increases and 30-40% of the firms with slightly negative pre-managed earnings exercise discretion to report positive earnings. Burgstahler (1998) uses quarterly data to test for earnings management and reports that firms with small positive earnings exhibit an 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 (2002) 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, we test the effect of firm size on earnings management. Naturally, we use Burgstahler and Dichev's assumption that under the null hypothesis, the standardized differences will be 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 factors such as previous performance, sales growth, the 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 $\hat{\alpha}$ 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 change 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.[4] We sometimes include dummy variables for the medium and large size firm instead of continuous firm size variable when it allows more effective interpretation. We also include a number of dummy variables in the multivariate probit

[4] 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.

model. They include: (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

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 or expectation management. Myers and Skinner (2000) note that their sample firms tend to be usually large. Therefore, we expect that large firms have stronger desires 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 divided into four groups based on the length of the previous run of positive earnings or earnings increases. A group whose scaled earnings or change in scaled earnings is negative last year, a group whose scaled earnings or change in

scaled earnings is positive last year, a group whose scaled earnings or change 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 included and will be compared to the first 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) to have small positive earnings or earnings increase 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. The firms with high growth may not necessarily manipulate earnings to report positive earnings or change in earnings, while those with low growth rates may have to bias up earnings or change in earnings through earnings management. The high growth firms, however, may manipulate earnings once they form a consecutive earnings or sales growth trend. Myers and Skinner (2000) note, for example, that their sample firms have higher sales growth rates than the firms in the control group. So it becomes necessary to control sales growth to isolate the effect of firm size.

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, regardless of earnings management.

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 higher 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 low current assets and/or current liabilities. Burgstahler and Dichev (1997) suggest that the firms with high levels of current assets and current liabilities before earnings management 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 and 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 higher current assets or current liabilities provide more room for the management to manipulate earnings than firms with lower 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 better 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) show 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 is 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

Table 1 presents the descriptive statistics summarizing the level of earnings (Panel A) and the change 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 because of missing observations. Scaled earnings are monotonically increasing with firm size, ranging from the median value of 0.002 for the small-sized from 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-sized firms than large-sized firms. The median value for the small-sized firms is 0.013 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 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. The standardized differences are all statistically significant for all three groups. However, the absolute magnitude of the standardized differences are decreasing in firm size, implying the degree that earnings losses happen less frequently than would be expected to small firms is higher than that to large firm group. In contrast to Burgstahler and Dichev (1997), this provides evidence that small

firms are managing earnings more aggressively than large firms to avoid reporting earnings losses.

[Insert Figure 1]

The histograms of the change in earnings are illustrated 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) for the small-, medium-, and large-sized firm groups are: -9.60 (13.07), -19.38 (16.67), and -13.61 (9.59). The magnitude of the standardized differences is increasing in firm size, indicating the degree that earnings decreases occur less frequently than expected for large-sized firms is higher than those for the small- and medium-sized firm groups. This provides evidence that the large- and medium-sized firms manipulate earnings more extensively than the small-sized firms to avoid earnings decreases, thus supporting the findings of Burgstahler and Dichev (1997). A reasonable explanation is that it is more important for large- and medium-sized firms to report positive 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 effect of firm size on the firm's earnings manipulation. Table 2 reports the estimates from probit regressions of earnings level and earnings change. The probit estimate 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 for the medium- and large-sized

firms instead of the continuous firm size variable. Our results indicate that the probability of reporting 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 percentage points lower than that for the small size firm. This corresponding probability for the medium-sized firms is 8.3 percentage points.

In contrast, the estimate of firm size effect in the probit regression of earnings change is positive and significant (Z=2.93), indicating that large firm tends to report small earning increase more often than small firm. The results are qualitatively the same if two dummy variables representing the medium- and large-sized firms are included in the regression. The probability that medium- and large-sized firms report small earnings increase is greater than the probability for small size firms by 2.9 and 5.1 percentage points, respectively. These results are consistent with the distribution-based frequency analysis presented in section 3.1.

[Insert Table 2]

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 in most cases. 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 roughly confirm our prediction as well as past empirical findings. For all three dummy variables, the effect of previous earnings increase is on the probability is positive and significant, (Z=2.26, 2.22, and 6.25, respectively). That is, compared to firms with earnings decrease last 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 change on the probability increases as the length of the previous run of positive earnings change increases, confirming that the firms reporting earnings increases in last three years are more likely to report positive change in earnings in the current year. Similar results are obtained for the probit analysis with scaled earnings level as the dependent variable. The effects of previous positive earnings on the probability are positive but rather 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- group and large-sized group. We find strong effect of previous performance on the probability of reporting earnings increase 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 change in scaled earnings regression. This suggests that medium and high CIR groups exhibit higher propensity to report small positive earnings or earnings increase 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 ratio than the firms with low capital intensity ratio so that the degree of earnings management is more extensive if large firms tend to report positive earnings or earnings increases by manipulating earnings.

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 change 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 change in scaled earnings regression.

3.3. Interaction Effects and the Role of Control Variables

To address how the firm size effect varies with different firm characteristics, we introduce interact terms between firm size as measured by market value of equity and the control variables in both regressions. Table 3 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 in the estimates of interaction terms. As noted, most interaction terms are statistically insignificant in both scaled earnings and change in scaled earnings regressions. Only the interaction between sales growth and firm size is significant in both the scaled earnings regression and the change in scaled earnings regression. Hence, the medium sales growth group shows a stronger negative firm size effect than other groups in the scaled earnings regression while it shows stronger positive firm size effect in the change 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 the sense that they are not statistically significant.

[Insert Table 3]

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 focuses on the firm size effect on earnings management 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.

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

Panel A: Scaled earnings by firm size

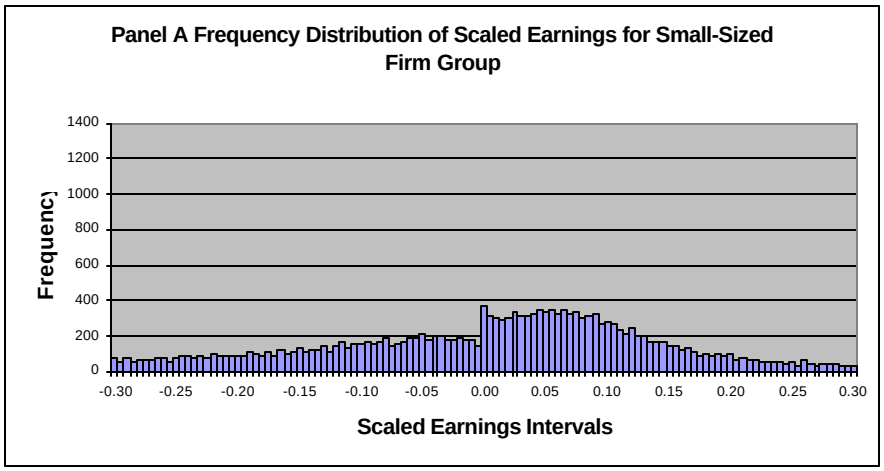
Firm Size	N	Mean	STD	25%	Median	75%
Small	23769	-0.110	0.586	-0.191	0.003	0.095
Medium	22119	0.002	0.268	-0.036	0.051	0.096
Large	24070	0.049	0.139	0.032	0.062	0.091
Whole	69958	-0.020	0.388	0.041	0.050	0.093

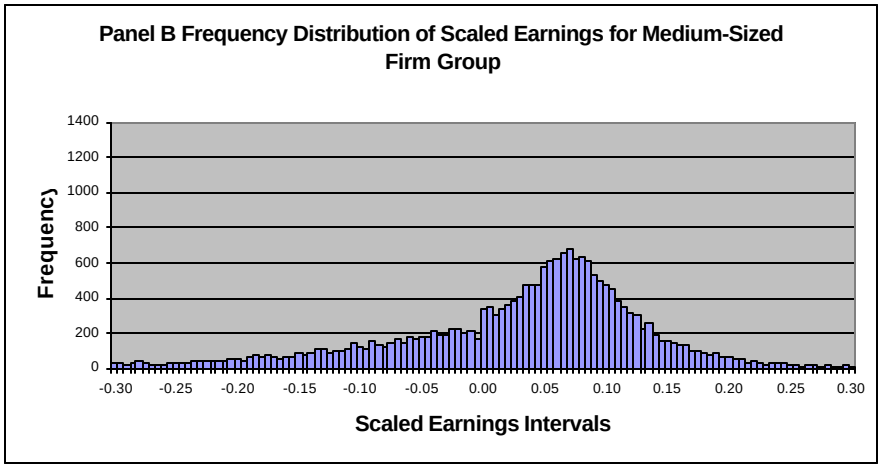
Panel B: Changes in scaled earnings by firm size

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 $earnings_t$ = $(Earnings_t-Earnings_{t-1})/MV_{t-2}$.





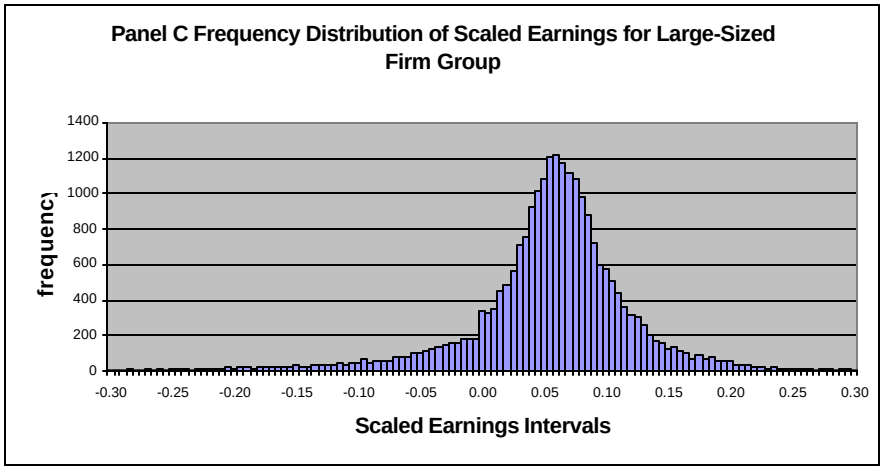


Figure 1
Frequency Distribution of Earnings
Scaled by the Beginning Market Value.

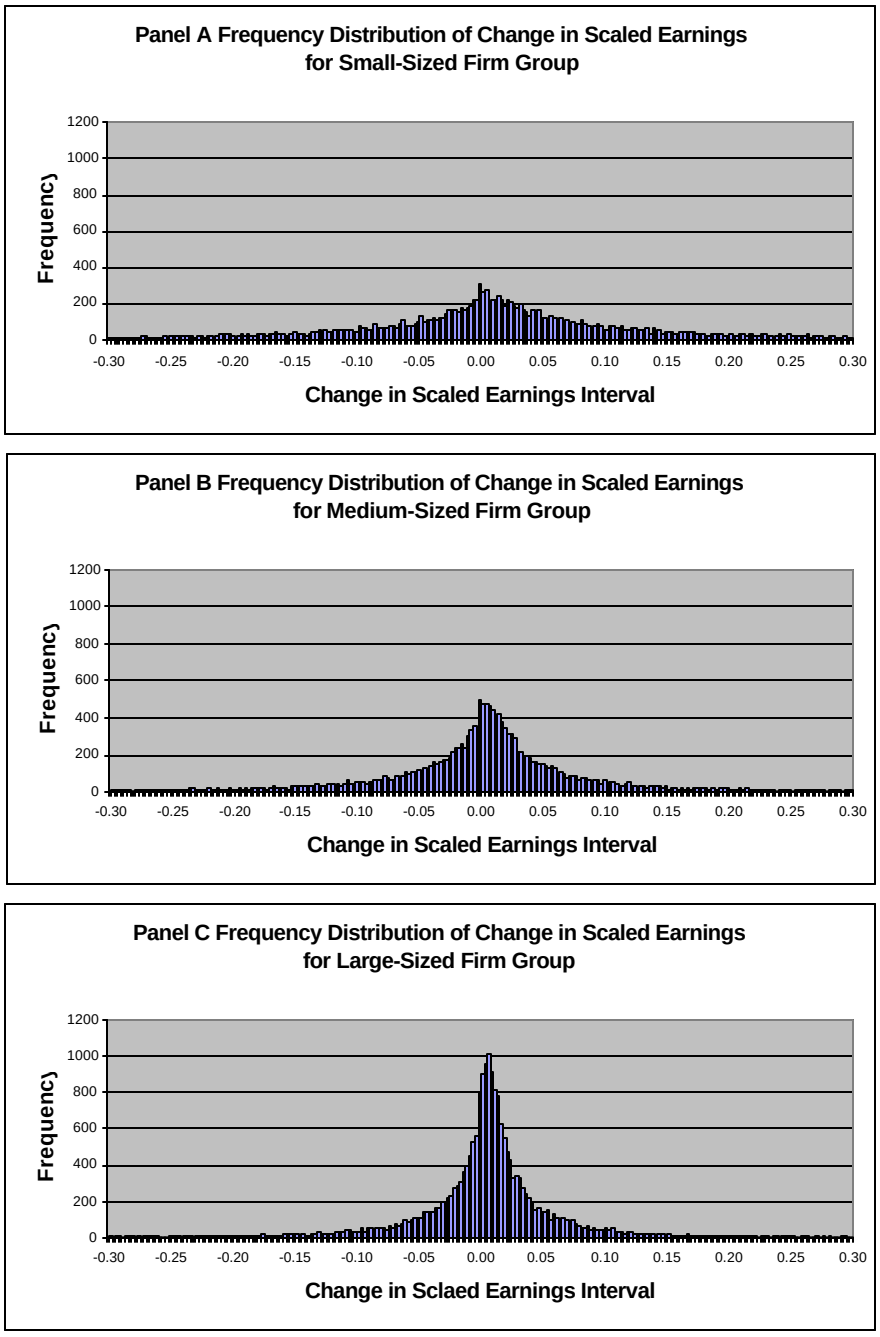


Figure 2
Frequency Distribution of Changes in Earnings
Ecaled by the Beginning Market Value

Table 2
Results of Probit Analyses

	Coefficients	dF/dX	Z
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 3
Interaction Between Firm Size and Control Variables

	Coefficient	dF/dX	Z
Panel A: Scaled Earnings Probit 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 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