Real and Accrual-based Earnings Management in the Pre- and Post-Sarbanes Oxley Periods*

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First Version: January 2004

Current Version: June 2007

* We acknowledge the financial support from the Accounting Research Center at the Kellogg School and helpful comments from Dan Dhaliwal, April Klein, Krishna Kumar, Eddie Riedl, Suraj Srinivasan, Ira Weiss, Jerry Zimmermann, two anonymous reviewers, participants at the HBS Accounting and Control seminar, the 2006 FARS meeting, the 2004 AAA Annual meeting, the 2004 Corporate Governance Conference at the University of Washington in St. Louis, and the 2004 LBS Accounting Symposium. All remaining errors are our own. Earlier versions of this paper were circulated under the title: "Trends in Earnings Management and Informativeness of Earnings in the Pre- and Post-Sarbanes Oxley Periods."

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Abstract

We document that accrual-based earnings management increased steadily from 1987 until the passage of the Sarbanes Oxley Act (SOX) in 2002, followed by a significant decline after the passage of SOX. Conversely, the level of real earnings management activities declined prior to SOX and increased significantly after the passage of SOX, suggesting that firms switched from accrual-based to real earnings management methods after the passage of SOX. We also find evidence that the accrual-based earnings management activities were particularly high in the period immediately preceding SOX. Consistent with these results, we find that firms that just achieved important earnings benchmarks used less accruals and more real earnings management after SOX when compared to similar firms before SOX. Finally, our analysis provides evidence that the increases in accrual-based earnings management in the period preceding SOX were concurrent with increases in the fraction of equity based compensation.

1. Introduction

The recent wave of corporate governance failures has raised concerns about the integrity of the accounting information provided to investors and resulted in a drop in investor confidence (Jain, Kim and Rezaee, 2003; Rezaee and Jain, 2003; Rezaee, 2002). These failures were highly publicized and ultimately led to the passage of the Sarbanes Oxley Act (SOX, July 30, 2002). The changes mandated by SOX were extensive, with President George W. Bush commenting that this Act constitutes "the most far-reaching reforms of American business practices since the time of Franklin D. Roosevelt."[1] Similarly, the head of the AICPA commented that SOX "contains some of the most far-reaching changes that Congress has ever introduced to the business world"[2] including an unprecedented shift in the regulation of corporate governance from the states to the federal government.[3]

Although SOX proposed sweeping changes, the scope of the events that led to the passage of the act and the consequences of the resulting regulatory changes have yet to be systematically studied. Specifically, it is unclear whether there really was a widespread breakdown of the reliability of financial reporting prior to the passage of SOX or whether the highly publicized scandals were isolated instances of individuals engaging in blatant financial manipulations. And if it were the former, how did the passage of SOX affect firms' financial reporting practices? Moreover, some argue that these frauds occurred after 70 years of ever increasing securities regulation, suggesting that more regulation may not be the answer (Ribstein, 2002).

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[1] Elizabeth Bumiller, "Bush Signs Bill aimed at Fraud in Corporations," *N.Y. Times*, July 31, 2002.
[2] Barry C. Melancon, "A New Accounting Culture," www.aicpa.org, September 4, 2002.
[3] Traditionally, the federal government has focused on regulating disclosure, public trading, and antitrust, while regulating corporate governance has been the focus of the states.

We investigate the prevalence of both accrual-based and real earnings management activities in the period leading to the passage of SOX and in the period following the passage of SOX. Our primary motivation for conducting this analysis is to investigate whether the period leading to the passage of SOX was characterized by widespread increase in earnings management rather than by a few highly publicized events, and whether the passage of SOX resulted in a reduction in earnings management.

We carry out our investigation by dividing the sample period into two time periods: the period prior to the passage of SOX (the pre-SOX period: 1987 through 2001), and the period after the passage of SOX (the post-SOX period: 2002 through 2005). We further subdivide the pre-SOX period into two sub-periods: the period prior to the major corporate scandals (the pre-SCA period: 1987 through 1999) and the period immediately preceding the passage of SOX when the major scandals occurred (the SCA period: 2000 and 2001).

We document that the pre-SOX period was characterized by increasing accrual-based earnings management culminating in even larger increases in the SCA period but declining real earnings management. We also document that the increase in accrual-based earnings management in the SCA period was associated with a contemporaneous increase in equity based compensation, in particular, option-based compensation.

Following the passage of SOX accrual-based earnings management declined significantly, while real earnings management increased significantly. Consistent with the results of a recent survey by Graham, Harvey, and Rajgopal (2005), this suggests that firms switched to managing earnings using real methods, possibly because these techniques, while more costly, are likely to be harder to detect.

In additional analyses, we examine both the pre-SOX and post-SOX accrual-based and real earnings management activities for a subset of firms that are more likely to have managed earnings (we refer to these firms as the SUSPECT firms). Specifically, we examine three incentives for managing earnings, namely, meeting or beating last year's earnings, meeting or beating the consensus analysts' forecast and avoiding reporting losses. We focus on these incentives because Graham, et al. (2005) document that these specific motives are among the most important reasons for earnings management behavior.

Consistent with our full sample results, we find that both before and after SOX, SUSPECT firms had significantly higher discretionary accruals when compared to firms that either just missed those benchmarks or firms that were not close to either making or missing those benchmarks. However, these SUSPECT firms used significantly less income-increasing accrual-management after SOX when compared to firms in similar circumstances before SOX. An analysis of the real earnings management behavior of these firms indicates that the SUSPECT firms had significantly higher real earnings management activities after SOX when compared to the firms in similar circumstances prior to SOX.

Our results contribute to the current debate on the pervasiveness of earnings management prior to the passage of SOX, and the impact of SOX on such behavior. While we find an increase in accrual-based earnings management prior to SOX, our evidence suggests that firms are likely to have switched to earnings-management techniques that while more costly to shareholders, are harder to detect. This evidence

forms an important consideration in the debate on the costs and benefits of the new regulation.

The remainder of the paper proceeds as follows. Section 2 provides a discussion of the research questions and hypotheses. Section 3 discusses the empirical methodology, including the data and sample selection and the various measures of earnings management used in the study. The tests and results are discussed in Section 4, and Section 5 concludes.

2. Motivation, Research Questions and Hypotheses

In a recent commentary, US Treasury secretary Henry Paulson emphasized the importance of strong capital markets, and pointed out that capital markets rely on trust, and that trust is based on financial information presumed to be accurate and to reflect economic reality.[4] The series of corporate scandals occurring in 2000-2001 eroded that trust in financial reports. Indeed, one of the main objectives of SOX was to restore the integrity of financial statements by curbing earnings management and accounting fraud. Therefore, the extent of earnings management prior to SOX and the effect of SOX on earnings management is an important research topic.

The primary purpose of this paper is to examine the extent of earnings management in the period leading to the scandals and prior to SOX, and the changes in such activities after the passage of SOX.[5] Our examination of changes in firms' earnings management activities is motivated in part by the literature documenting that managerial propensity to

[4] Henry Paulson, "The Key Test of Accurate Financial Reporting is Trust," *Financial Times*, May 17, 2007.
[5] In a related study, Lobo and Zhou (2006) investigate whether the SOX mandate that financial statements be certified by firms' CEOs and CFOs resulted in an increase in the conservatism in financial reporting, and find evidence of greater conservatism in reported earnings.

manage earnings and to avoid negative earnings surprises has increased significantly over time (Brown, 2001; Bartov et. al., 2002; Lopez and Rees, 2001; Matsumoto, 2002; Brown and Caylor, 2003). Our main objective is to examine whether the degree of earnings management increased over time and reached a zenith in the period surrounding the corporate accounting scandals, and declined after the passage of SOX.

Consistent with the literature, we examine earnings management activities using discretionary accruals. However, in addition to using accrual-based accounting estimates and methods, firms are likely to employ real operational activities to manipulate earnings numbers as well (Healy and Wahlen, 1999; Fudenberg and Tirole, 1995; Dechow and Skinner, 2000). In fact, in their survey Graham et al. (2005) report the following:[6]

> "… [W]e find strong evidence that managers take real economic actions to maintain accounting appearances. In particular, 80% of survey participants report that they would decrease discretionary spending on R&D, advertising, and maintenance to meet an earnings target. More than half (55.3%) state that they would delay starting a new project to meet an earnings target, even if such a delay entailed a small sacrifice in value…."

Thus, to provide a more complete study of the trends in earnings management activities in the periods before and after SOX, we also examine real earnings management activities over the sample period.

Next, we examine possible explanations for any changes in earnings management activities over the sample period. We focus on the hypothesis that managers' choices of accounting practices are influenced by the impact of these accounting methods on their compensation. Managers with higher stock and option-based compensation are more sensitive to short-term stock prices, and can use their discretion to affect reported

[6] In a recent working paper, Zang (2006) investigates whether managers use real and accrual manipulations in managing earnings as substitutes. Based on a model she develops, she provides evidence consistent with managers using real and accrual manipulations as substitutes.

earnings if capital markets have difficulty detecting earnings management (see Fields et al., 2001, for a discussion on the pricing of earnings management.)[7]

Prior studies (e.g., Cheng and Warfield (2005) and Bergstresser, and Philippon (2006)) provide evidence suggesting that equity incentives derived from stock-option compensation are positively associated with managements' likelihood to engage in accrual-based earnings management activities. However, Johnson, Ryan, and Tian, (2005) conclude that only unrestricted stock holdings are associated with the occurrence of accounting fraud, while the stock option grants are not, while Erickson, Hanlon, and Maydew (2006) find no consistent evidence that executive equity incentives are associated with fraud.

In addition to equity-based compensation, executives are also rewarded based on explicit bonus-linked targets for reported income. Healy (1985) presents evidence that the accruals policies of managers are related to the non-linear incentives inherent in their bonus contracts. Therefore, we investigate whether earnings-based compensation contracts are associated with earnings management.

Our focus on the compensation structure is motivated by the current debate whether stock-based compensation and bonus grants are associated with earnings management. Further, there has been a significant increase in the grant of stock options in the past decade. We examine whether there is an increasing trend in bonus and option

[7] For instance, Coffee (2003) asserts that the increase in stock-based executive compensation created an environment where managers became very sensitive to short-term stock performance. Greenspan (2002) opines that "the highly desirable spread of shareholding and options among business managers perversely created incentives to artificially inflate earnings to keep stock prices high and rising." Fuller and Jensen (2002, p. 42) also state that "[a]s stock options became an increasing part of executive compensation, and managers who made great fortunes on options became the stuff of legends, the preservation or enhancement of short-term stock prices became a personal (and damaging) priority for many CEOs and CFOs. High share prices and earnings multiples stoked already amply endowed managerial egos, and management teams proved reluctant to undermine their own stature by surrendering hard won records of quarter-over-quarter earnings growth."

compensation particularly in the period leading to SOX, and whether that is related to the level of earnings management during that period.

Specifically, our hypothesis that managers behave opportunistically due to compensation-related incentives has two empirical predictions. First, changes in reported earnings are affected by changes in the compensation and incentives of managers. Second, even after controlling for managerial incentives, earnings management would decline after the passage of SOX, either because of the sanctions imposed on managers by SOX or because of the adverse publicity and legal costs imposed on executives and firms who were accused of fraudulent reporting practices.

Our final objective is to investigate whether after the passage of SOX corporations replaced some accrual-based earnings management with real earnings management, which is harder to detect but also likely to be more costly to the firm (Graham et al., 2005).[8] Accrual manipulation is more likely to draw auditor or regulator scrutiny than real operational decisions on production and pricing. If firms are more wary after the passage of SOX, then they are likely to engage in more real earnings management activities after SOX. This conjecture is also suggested by Graham et al. (2005):

"… [W]e acknowledge that the aftermath of accounting scandals at Enron and WorldCom and the certification requirements imposed by the Sarbanes–Oxley Act may have changed managers' preferences for the mix between taking accounting versus real actions to manage earnings."

Given the above argument, investigating the trends in both real and accrual-based earnings management after SOX is important. Evidence of a decline in one type of earnings management may lead one to conclude that such activities have decreased in

[8] In their survey, Graham et al. report (page 66): "Managers candidly admit that they would take real economic actions such as delaying maintenance or advertising expenditure, and would even give up positive NPV projects, to meet short-term earnings benchmarks."

response to regulators or other events, when in fact a substitution of one earnings management method for another has occurred. We thus hypothesize and test whether the level of real earnings management increased after the passage of SOX, i.e., whether firms substituted between real and accrual-based methods after SOX. The next section discusses the empirical methodology employed in the study.

3. Empirical Methodology

3.1 Data and Sample Description

We collect our sample from the COMPUSTAT annual industrial and research files for the period 1987-2005. We restrict our sample to all nonfinancial firms with available data, and require at least 8 observations in each 2-digit SIC grouping per year. Further, we require that each firm-year observation has the data necessary to calculate the discretionary accruals metrics and real earnings management proxies we employ in our analysis. This restriction likely introduces a survivorship bias into the sample resulting in the inclusion of larger and more successful firms. We expect that this will reduce the variation in our earnings management metrics resulting in a more conservative test of our research questions.

Following Collins and Hribar (2002), we use cash flows from operations obtained from the Statement of Cash Flows reported under the Statement of Financial Accounting Standards No. 95 (SFAS No. 95, FASB 1987).[9] The sample period of 1987-2005 permits us to use SFAS No. 95 statement of cash flow data to estimate accruals, rather than a balance sheet approach.

[9] SFAS No. 95 requires firms to present a statement of cash flows for fiscal years ending after July 15, 1988. Some firms early-adopted SFAS No. 95, so our sample begins in 1987.

The sample obtained from COMPUSTAT consists of 8,157 firms representing 87,217 firm-year observations. To test the compensation hypothesis, we use data from ExecuComp, which is available only from 1992 onwards. Thus, merging the full sample with ExecuComp results in a second (and smaller) sample consisting of 2,018 firms and 31,668 firm-year observations (the ExecuComp sample) for the 1992 through 2005 period.

3.2 Event Periods

We focus in our analysis on earnings management across two main time periods – the pre-SOX period (further classified into the pre-SCA and the SCA periods), and the post-SOX period. The pre-SOX period extends from 1987 through 2001, and the post-SOX period extends from 2002 through the end of 2005. Within the pre-SOX period, we classify the period from 1987 through 1999 as the pre-SCA period, and the period from 2000 through 2001 as the SCA period (i.e., the period that purportedly lead to the passage of SOX).[10] Figure 1 depicts these different time periods analyzed.[11]

3.3 Earnings Management Metrics

Accrual-based Earnings Management

[10] We acknowledge that the subdivision into the pre-SCA and SCA periods may induce hindsight bias into the analysis. We thus repeat our analysis by only dividing the entire sample period into the pre-SOX and the post-SOX periods. Our conclusions on earnings management activities before and after SOX are unchanged and become stronger. We do not report these results in the paper for the sake of brevity, but will provide them upon request.

[11] The use of annual data determines how we subdivide the sample period to some extent. Although some scandals took place in the beginning of 2002, we include 2002 in the post-SOX period, since SOX was passed in 2002. Also, even though the most public phase of the scandals began with Enron in 2001, we include year 2000 in the SCA period since some frauds also occurred in 2000 (e.g., Xerox). Further, as a robustness check, we also repeat our analysis using quarterly data and subdivide the sample period using the "Corporate Scandal Sheet" developed by Forbes (Forbes 2002). Specifically, we define the SCA period as extending from Q3, 2001 through Q2, 2002, and the Post-SOX period as extending from Q3, 2002 onwards. Our main conclusions remain unchanged, which provides added confidence in the results obtained using annual data. Finally, as suggested by the referee we repeat all analyses by defining the post-SOX period as the years 2003 through 2005 and this did not materially alter any of our reported results.

We use a cross-sectional model of discretionary accruals, where for each year we estimate the model for every industry classified by its 2-digit SIC code. Thus, our approach partially controls for industry-wide changes in economic conditions that affect total accruals while allowing the coefficients to vary across time (Kasznik, 1999; DeFond and Jiambalvo, 1994). [12]

Our primary model is the modified cross-sectional Jones model (Jones 1991) as described in Dechow et al. (1995).[13] The modified Jones model is estimated for each 2 digit SIC-year grouping as follows:

$$\frac{TA_{it}}{Assets_{i,t-1}} = k_{1t}\frac{1}{Assets_{i,t-1}} + k_2\frac{\Delta \mathrm{Re}v_{it}}{Assets_{i,t-1}} + k_3\frac{PPE_{it}}{Assets_{i,t-1}} + \varepsilon_{it} \qquad (1)$$

where, for fiscal year *t* and firm *i*, *TA* represents total accruals defined as:

$TA_{it} = EBXI_{it} - CFO_{it}$, where *EBXI* is the earnings before extraordinary items and discontinued operations (annual Compustat data item 123) and *CFO* is the operating cash flows (from continuing operations) taken from the statement of cash flows (annual Compustat data item 308 – annual Compustat data item 124), $Asset_{it-1}$ represents total assets (annual Compustat data item 6), ΔREV_{it} is the change in revenues (annual Compustat data item 12) from the preceding year and PPE_{it} is the gross value of property, plant and equipment (annual Compustat data item 7).

[12] We obtain qualitatively the same results when we use a time-series approach which assumes temporal stationarity of the parameters for each firm.

[13] A caveat: various studies in the literature raise the concern that discretionary accruals measured using the Jones model might be capturing nondiscretionary components, and these errors in discretionary accruals are likely to be correlated with stock prices and performance measures in general. While this concern is valid and we acknowledge this limitation in measuring discretionary accruals, note that we use discretionary accruals as a dependent variable and not as an explanatory variable. If indeed discretionary accruals are measured with error, the only consequence in our case will be a lower explanatory power of the model, i.e., we will obtain lower R-squares. Otherwise, using discretionary accruals measured using the Jones model as a dependent variable is not likely to introduce any bias in our results.

The coefficient estimates from equation (1) are used to estimate the firm-specific normal accruals (NA_{it}) for our sample firms:

$$NA_{it} = \hat{k}_{1t}\frac{1}{Assets_{i,t-1}} + \hat{k}_2\frac{(\Delta Rev_{it} - \Delta AR_{it})}{Assets_{i,t-1}} + \hat{k}_3\frac{PPE_{it}}{Assets_{i,t-1}} \quad (2)$$

where ΔAR_{it} is the change in accounts receivable (annual Compustat data item 2) from the preceding year. Following the methodology used in the literature, we estimate the industry-specific regressions using the change in reported revenues, implicitly assuming no discretionary choices with respect to revenue recognition. However, while computing the normal accruals, we adjust the reported revenues of the sample firms for the change in accounts receivable to capture any potential accounting discretion arising from credit sales. Our measure of discretionary accruals is the difference between total accruals and the fitted normal accruals, defined as $DA_{it} = (TA_{it} / Asset_{it-1}) - NA_{it}$.

In contrast to studies that focus on a specific corporate event, our analysis using the full sample is conducted in calendar time. Consequently, because accruals reverse over time and we cannot condition the analysis on events that are hypothesized to provide managers with incentives to manage reported earnings in any given direction (e.g., inflate reported earnings) we compute the absolute value of discretionary accruals to proxy for earnings management and refer to it as *ABS_DA* throughout the analysis.[14] In contrast, our test of the SUSPECT firms (that is, firms that were just able to meet or beat earnings benchmarks) is based on a directional test.

In our robustness tests, we used two alternative measures of discretionary accruals. In one alternative measure we estimated the following in the first stage:

[14] We repeat our analysis using the square of discretionary accruals and the results are somewhat stronger. Although the squared discretionary accruals have more desirable distributional properties, we report the results using the absolute values of discretionary accruals to allow comparison with other research.

$$\frac{TA_{it}}{Assets_{i,t-1}} = k_{1t}\frac{1}{Assets_{i,t-1}} + k_2\frac{(\Delta REV_{it} - \Delta AR_{it})}{Assets_{i,t-1}} + k_3\frac{PPE_{it}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (3)$$

Using the coefficient estimates obtained from (3), we calculated the level of normal accruals (NA_{it}) as a percent of lagged total assets. We also repeat our tests by using a measure based on the performance-matched discretionary accruals advanced in Kothari Leone, and Wasley (2005). As suggested by Kothari et al. (2005), we match each firm-year observation with another from the same two-digit SIC code and year with the closest return on assets in the current year, ROA_{it} (net income divided by total assets).[15] Our results using these alternate measures of accruals are consistent with those reported in the paper.

Real Earnings Management

We rely on prior studies to develop our proxies for real earnings management. As in Roychowdhury (2006) we consider the abnormal levels of cash flow from operations (CFO), discretionary expenses and production costs to study the level of real activities manipulations. Subsequent evidence in Zang (2006) and Gunny (2006) further increase our confidence in the empirical validity of these proxies. We focus on three manipulation methods and their impact on the above three variables:

1. Acceleration of the timing of sales through increased price discounts or more lenient credit terms.
2. Reporting of lower cost of goods sold through increased production.

[15] We also carry out performance matching based on two-digit SIC code, year and ROA (both current ROA and lagged ROA) and obtain results similar to those reported in the paper.

3. Decreases in discretionary expenses which include advertising expense, research and development, and SG&A expenses.

We first generate the normal levels of CFO, discretionary expenses and production costs using the model developed by Dechow, Kothari and Watts (1998) as implemented in Roychowdhury (2006). We express normal CFO as a linear function of sales and change in sales. To estimate this model, we run the following cross-sectional regression for each industry and year:

$$\frac{CFO_{it}}{Assets_{i,t-1}} = k_{1t}\frac{1}{Assets_{i,t-1}} + k_2\frac{Sales_{it}}{Assets_{i,t-1}} + k_3\frac{\Delta Sales_{it}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (4)$$

Abnormal CFO is actual CFO minus the normal level of CFO calculated using the estimated coefficient from (4).

Production costs are defined as the sum of cost of goods sold (COGS) and change in inventory during the year. We model COGS as a linear function of contemporaneous sales:

$$\frac{COGS_{it}}{Assets_{i,t-1}} = k_{1t}\frac{1}{Assets_{i,t-1}} + k_2\frac{Sales_{it}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (5)$$

Next, we model inventory growth by the following

$$\frac{\Delta INV_{it}}{Assets_{i,t-1}} = k_{1t}\frac{1}{Assets_{i,t-1}} + k_2\frac{\Delta Sales_{it}}{Assets_{i,t-1}} + k_3\frac{\Delta Sales_{i,t-1}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (6)$$

Using (5) and (6), we estimate the normal level of production costs as:

$$\frac{\Pr od_{it}}{Assets_{i,t-1}} = k_{1t}\frac{1}{Assets_{i,t-1}} + k_2\frac{Sales_{it}}{Assets_{i,t-1}} + k_3\frac{\Delta Sales_{it}}{Assets_{i,t-1}} + k_4\frac{\Delta Sales_{it-1}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (7)$$

We model the normal level of discretionary expenses as:

$$\frac{DiscExp_{it}}{Assets_{i,t-1}} = k_{1t}\frac{1}{Assets_{i,t-1}} + k_2\frac{Sales_{it}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (8)$$

Modeling discretionary expenses as a function of current sales creates a mechanical problem if firms manage sales upwards to increase reported earnings in a certain year, resulting in significantly lower residuals from running a regression as derived in (8). To address this issue, we model discretionary expenses as a function of lagged sales and estimate the following model to derive 'normal' levels of discretionary expenses:

$$\frac{DiscExp_{it}}{Assets_{i,t-1}} = k_{1t}\frac{1}{Assets_{i,t-1}} + k_2\frac{Sales_{i,t-1}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (9)$$

In the above equations *CFO* is cash flow from operations in period *t* (Compustat data item 308 – annual Compustat data item 124); *Prod* represents the production costs in period *t*, defined as the sum of COGS (annual Compustat data item 41) and the change in inventories (annual Compustat data item 3); *DiscExp* represents the discretionary expenditures in period *t*, defined as the sum of advertising expenses (annual Compustat data item 45), R&D expenses (annual Compustat data item 46)[16] and SG&A (annual Compustat data item 189). The abnormal CFO (*R_CFO*), abnormal production costs (*R_PROD*) and abnormal discretionary expenses (*R_DISX*) are computed as the difference between the actual values and the normal levels predicted from equations (4) (7) and (9). We use these three variables as proxies for real earnings management. In addition, we compute a single variable by combining these three individual variables. Specifically, we compute *RM_PROXY* as the sum of the standardized variables, *R_CFO*, *R_PROD* and *R_DISX*, and report results corresponding to this single real earnings management proxy as well.

[16] As long as SG&A is available, advertising expenses and R&D are set to zero if they are missing.

4. Tests and Results

4.1 Descriptive Statistics: Earnings Management

We begin with an exploratory analysis of the trends over time in the various earnings management metrics. Table 1A provides summary statistics of the full sample while Table 1B provides summary statistics of the ExecuComp sample.[17] Both samples are significantly larger (at the 0.001 level) in terms of total assets and market capitalization when compared to the "average" firm listed on COMPUSTAT. Sample firms have a 13% annual growth in sales, a market-to-book ratio of 4.94 and a leverage ratio of 0.41 (18%, 4.70, and 0.22 respectively for the ExecuComp subsample).

The operating cycles of our sample firms is, on average, approximately 142.56 days (124.69 days for the ExecuComp subsample) suggesting that accruals are likely to reverse in the subsequent year. Consistent with prior research we find a positive and significant correlation (0.019, Pearson; 0.053 Spearman; both significant at the 1% level, results not tabulated) between the operating cycle and discretionary accruals (Dechow and Dichev, 2002). Finally, requiring the availability of ExecuComp data while considerably increasing firm size does not seem to have a significant impact on fundamental measures such as leverage, growth of sales, or market-to-book ratios.

As expected, *TA* (total accruals deflated by prior-year total assets) are negative at -0.10 (-0.07 for the ExecuComp subsample) with a standard deviation of 0.25 (0.12 for the for the ExecuComp subsample). In contrast the average *DA* (discretionary accruals)

[17] Whenever possible, we perform the tests on both the full and the ExecuComp samples to assess the impact of the ExecuComp selection on our results.

are 0.00 (standard deviation of 0.20) for the full sample and -0.01 (0.11) for the ExecuComp subsample.[18]

While the average *DA* is zero, we find that positive discretionary accruals (*Positive_DA*) are, on average, larger in magnitude than negative discretionary accruals (*Negative_DA*). This is not only true for the mean, but also for the median and the 75th percentiles. This is however not true for the ExecuComp sample (except at the 75th percentile). Thus, for the full sample, it appears that larger earnings increasing *DA*'s are followed by smaller but more frequent reversals.

The main variable of interest is the absolute value of discretionary accruals (*ABS_DA*). We use the absolute value because our hypotheses do not predict any specific direction for earnings management. Moreover, the absolute value also captures accrual reversals following earnings management. The average for *ABS_DA* is 0.11 (0.07 for the ExecuComp sample). At first, this may seem a large value as percentage of total assets. However, recall that while *DA* has a mean of zero, the mean is shifted to the right by taking absolute values.[19, 20]

Nevertheless, we conduct some additional analyses to get more reassurance on the magnitudes of the discretionary accrual measure. First, we selected a few firms that had

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[18] Note that the mean Jones model residual is zero by construction (residual of a regression), whereas the mean modified Jones model residual is not constrained to be zero by construction.

[19] If X follows a normal distribution with mean μ and variance σ^2 then the expected absolute value of X is given by

$$E[|X|] = \sigma\sqrt{2/\pi}e^{-\frac{\mu^2}{2\sigma^2}} + \mu\left[2\Phi(\frac{\mu}{\sigma}) - 1\right]$$

where $\Phi(\cdot)$ is the standard normal cumulative distribution function

[20] We also perform two "sanity checks." First, we generated 1000 random variables from a normal distribution with mean 0.00 and a standard deviation of 0.20. The mean of the absolute values of those random variables is 0.173. Second, we computed the ROA and the absolute value of the ROA for our sample firms. While the average ROA for our sample firms is -0.06 with a standard deviation of 0.191 (0.046 and 0.207 for the ExecuComp subsample) the absolute value of ROA is 0.22 (0.118 for the ExecuComp subsample).

very high absolute values of DA as percentage of total assets (higher than 15%) and examined their financial statements.[21] Among the 12 firms examined, we find that more than 50 percent of them had large asset impairment and restructuring charges and write-offs related to goodwill, while the rest had merger related charges and significant growth in accounts receivables and inventory. These partly explain the large magnitudes we obtain. To check whether the results are affected when we eliminate outliers, we winsorized the top and bottom one percent of the distribution. On winsorizing, the mean (median) of *ABS_DA*, is 0.06 (0.05) for the full sample and 0.04 (0.04) for the ExecuComp sample. These magnitudes of discretionary accruals appear more realistic. Moreover, our cross-sectional results and inferences are not affected by repeating all our analyses using the winsorized sample.

Finally, we also check the discretionary accruals of the firms that were involved in accounting scandals. Untabulated results indicate that all but one of the firms involved in accounting scandals fall in the 90th percentile of the *ABS_DA* distribution in the SCA period.

The last three rows of Panels A and B of Table 1 report our proxies for real earnings management. Comparing the 25th and 75th percentiles of the real earnings management proxies to *DA* suggests that accrual-based earnings management takes larger values. This observation is consistent with Graham et al.'s (2005) survey result suggesting that real earnings management is more costly.

The last five rows of Panel B of Table 1 report both the dollar amount obtained from bonuses and characteristics of equity-based compensation, i.e., exercisable and unexercisable options and stock ownership. For the entire sample period, the average

[21] We thank one of the referees for this suggestion.

ExecuComp CEO received annual bonuses of $454,040, representing 16 percent of their compensation. Option grants and other unexercisable options are on average 0.34% of outstanding shares, while exercisable options are on average 0.75% of outstanding shares. The sum of restricted stock grants and aggregate shares held by the CEO averages 5.19%.

Table 2, Panel A summarizes time-trends of the accrual and real earnings management proxies. To summarize the data, we regress each of the variables on a time-trend variable, *Time*, defined as the difference between the year and 1987, and two dummy variables, *SCA*, which takes the value of 1 in the scandal period (years 2000 and 2001) and 0 otherwise, and *SOX* which takes the value of 1 in the post-SOX period (years 2002, 2003 and 2005) and 0 otherwise. We choose this procedure to describe the variables because many of our variables exhibit significant time trends (non-stationarity), rendering traditional summary statistics uninformative.

The coefficient for the time trend in Row 1 ($\hat{b}$) indicates that the magnitude of discretionary accruals (*ABS_DA*) has been increasing significantly (at the 1% level) over the sample period with that increase being nearly symmetric for both *Positive_DA* and *Negative_DA* (rows 2 and 3).

The magnitude of discretionary accruals increased significantly in the SCA period ($\hat{c}$ in Row 1) with positive (i.e., income-increasing, Row 2) discretionary accruals contributing twice as much to that increase than income-decreasing *DA*s (Row 3, both significant at the 1% level).

Finally, the magnitude of discretionary accruals declined significantly in the post-SOX period ($\hat{d}$ in Row 1). Moreover, the magnitude (absolute value) of the coefficient for *Positive_DA* ($\hat{d}$ in Row 2) is approximately three times larger than the coefficient for

Negative_DA ($\hat{d}$ in Row 3) suggesting that most of that decline in accrual-based management results from the reduction of *Positive_DA*s.

Figures 2, 3a and 3b provide graphical illustrations of these results. Figure 2 indicates that the SCA period was, indeed, associated with a high level of earnings management. Figures 3a and 3b plot the trends in positive and negative discretionary accruals. Positive discretionary accruals peaked in the SCA period and negative discretionary accruals were the lowest in that period. These trends reversed in the post-SOX period.

Among the real earnings management variable, except for *R_DISX* which increased over the period, the other real earnings management variables do not show an increasing trend over the sample period (the time trend coefficients are either not significant or negative). Abnormal production costs and abnormal cash flows both increased significantly in the post-SOX period, but were either not significantly higher or were significantly lower in the SCA period. On the other hand, abnormal discretionary expenses were significantly higher in the SCA period and significantly lower in the post-SOX period. The combined variable *RM_PROXY* shows a decreasing trend over time, but is significantly higher both in the SCA period and in the post-SOX periods.

Figure 4 graphically illustrates these trends. A comparison of the post-SOX coefficients for accrual-based and the real earnings management suggests that there may have been a substitution effect: while accrual-based earnings management decreased, overall firms increased the use of real earnings management methods.

The correlation among accrual-based and real earnings management is reported in Table 2, Panel B. The correlations are consistent with such a substitution effect: we find a significant negative relation between discretionary accruals and the real earnings

management metrics, suggesting that firms are likely to substitute between these two earnings management methods. Further, the three real earnings management variables are also negatively correlated, indicating that firms switch between real earnings management methods.

In summary, the above analysis indicates that the overall level of accrual-based earnings management decreased from the SCA period to the post-SOX period, while overall the level of real earnings management increased in the post-SOX period. However, there was significantly higher earnings management, particularly income-increasing earnings management, during the SCA period as compared to the pre-SCA period. One interpretation of this result is that the SCA period was characterized by higher earnings management; and the scandal firms were not just a "few bad apples," but a representation of the generally high level of corporate misconduct. Another observation is that, although earnings management using accrual-based means increased from the pre-SCA to the SCA period, it declined significantly from the SCA period to the post-SOX period.

Whether this decline is caused by the passage of SOX or other concurrent events (such as the negative publicity of the most egregious governance failures and the highly visible enforcement actions directed at the offending corporate officers) cannot be inferred from this analysis, however. Moreover, firms appeared to have switched to managing earnings using real management techniques after SOX, probably because such methods of manipulation are harder to detect. How this substitution between the different types of earnings management affected the overall level of earnings management post-

SOX is unclear. We formally examine the determinants of earnings management in our multivariate analysis next.

4.2 Trends in and Determinants of Earnings Management

We examine the trends in and determinants of the level of earnings management over time by estimating the following regression:

$$\begin{aligned} DEP_j = {} & \alpha_0 + \alpha_1 \times BIG_j + \alpha_2 \times \Delta GDP_j + \alpha_3 \times MKTVAL_j + \alpha_4 \times Time \\ & + \alpha_5 \times SCA + \alpha_6 \times SOX + \alpha_7 \times RM\_PROXY + \alpha_8 \times BONUS_j \\ & + \alpha_9 \times BONUS_j \times SCA + \alpha_{10} \times BONUS_j \times SOX + \alpha_{11} \times UN\_OPTION_j \\ & + \alpha_{12} \times UN\_OPTION_j \times SCA + \alpha_{13} \times UN\_OPTION_j \times SOX \\ & + \alpha_{14} \times EX\_OPTION_j + \alpha_{15} \times EX\_OPTION_j \times SCA \\ & + \alpha_{16} \times EX\_OPTION_j \times SOX + \alpha_{17} \times OWNER_j \\ & + \alpha_{18} \times OWNER_j \times SCA + \alpha_{19} \times OWNER_j \times SOX \end{aligned} \quad (10)$$

where DEP_j represents the various earnings management metrics, including discretionary accruals, positive discretionary accruals, and negative discretionary accruals; *BIG* is a dummy variable equal to 1 if the auditor is a big-five audit firm (or their successors); ΔGDP is the change in the GDP; *MKTVAL* is market value of equity; *Time* is the calendar year minus 1987; *SCA* is a dummy variable that is equal to 1 for the years 2000 and 2001, and 0 otherwise (represents the SCA period); *SOX* is a dummy variable that is equal to 1 for the years 2002 onwards, and 0 otherwise (represents the post-SOX period); *BONUS* is the average bonus compensation as a proportion of total compensation received by the CEO and the CFO of a firm; *EX_OPTION* is the number of unexercised options that the executives held at year-end that were vested scaled by total outstanding shares of the firm. *UN_OPTION* is the number of options grants in the current period and other unexercised options that the executives held at year-end that have not vested scaled by

total outstanding shares of the firm; and *OWNER* is the sum of restricted stock grants in the current period and the aggregate number of shares held by the executives at year-end (excluding stock options) scaled by total outstanding shares of the firm.[22] The compensation variables proxy for performance-based compensation and are defined in accordance with prior studies (Chang and Warfield, 2005). We include these variables to test the conjecture that the bonus and equity components of executive compensation are likely to induce opportunistic behavior in managers. [23]

We include the variable ΔGDP as a proxy for real economic activity. We include this to control for the effect of economic activity on earnings management, since what might be classified as opportunistic earnings management may, in fact, be a consequence of changing economic conditions. Discretionary accruals may also reflect firms' responses to and representations of changes in economic conditions. If this were true, then changes in earnings management metrics will coincide with changes in measures of economic activity such as operating cash flows, revenues, prior stock returns, industry performance, changes in gross domestic product, etc. Further, after controlling for changes in economic activities, there should be no relation between increases in earnings management and the compensation variables. [24]

We include control variables for the auditors in the above regression to examine whether the earnings management activity of firms audited by the large audit firms were different from the rest of the sample firms over the three sub-periods analyzed. Note that

[22] We also repeat the analyses by measuring the compensation related variables for the top five executives of a firm, and the results are qualitatively unchanged.

[23] The timing of variable measurement is consistent with Cheng and Warfield (2005, p. 448). The equity incentive variables are measured during or at the end of fiscal year t whereas the earnings management variable is measured based on information disclosed after the end of fiscal year t.

[24] In Section 4.4 we discuss some robustness tests we conduct to further test whether we are indeed capturing earnings management activities.

we make no claim that differences in the earnings management activities (if any) of these firms were to the result of the monitoring activities of the audit firms, since there could be a self-selection by certain types of firms in their selection of big audit firms. In addition, to the extent that audit firms specialize in specific industries and levels of earnings management are likely to vary across industries, the audit firm dummies may also control for industry characteristics. Finally, we include market value of equity as a proxy for firm size.

Next, we examine the trends in and determinants of real earnings management activities of firms by estimating the following regression:

$$\begin{aligned} DEP_j = {} & \alpha_0 + \alpha_1 \times BIG_j + \alpha_2 \times \Delta GDP_j + \alpha_3 \times MKTVAL_j + \alpha_4 \times Time \\ & + \alpha_5 \times SCA + \alpha_6 \times SOX + \alpha_7 \times ABS\_DA_j + \alpha_8 \times BONUS_j \\ & + \alpha_9 \times BONUS_j \times SCA + \alpha_{10} \times BONUS_j \times SOX + \alpha_{11} \times UN\_OPTION_j \\ & + \alpha_{12} \times UN\_OPTION_j \times SCA + \alpha_{13} \times UN\_OPTION_j \times SOX \\ & + \alpha_{14} \times EX\_OPTION_j + \alpha_{15} \times EX\_OPTION_j \times SCA \\ & + \alpha_{16} \times EX\_OPTION_j \times SOX + \alpha_{17} \times OWNER_j \\ & + \alpha_{18} \times OWNER_j \times SCA + \alpha_{19} \times OWNER_j \times SOX \end{aligned} \quad (11)$$

where DEP_j represents the three real earnings management metrics *R_CFO*, *R_PROD* and *R_DISX* and the combined variable *RM_PROXY*. All other variables are as defined above.

Firms may follow an overall earnings management strategy and use a mix of real and accrual-based earnings management tools. Alternatively, they can choose between the two management techniques, using the technique that is less costly for them. To control for this possibility we also include a variable representing accrual-based earnings management (we include *ABS_DA* in the regression). If it were more costly for firms to manage earnings using accrual-based techniques after the passage of SOX and they

substituted this by using real management techniques instead, then we should observe a significant increase in the latter after SOX. On the other hand, firms could have decreased earnings management activities as a whole – in which case we would observe a decrease in real earnings management after SOX as well. The results of these regressions are discussed next.

4.3 Results

Tables 3 and 4 present the results of the determinants of the level of earnings management by firms. Table 3 reports the results when we use the absolute value of discretionary accruals, *ABS_DA*, and when we split discretionary accruals into positive and negative discretionary accruals. Table 4 reports the results when we use the measures for real earnings management activities. We discuss the results for the accrual-based earnings management variables first.

Consistent with the preliminary analysis reported in Table 2, we find a positive trend in the level of earnings management, including income-increasing earnings management, and a negative trend in income-decreasing earnings management. This indicates that overall earnings management increased over the sample period. The dummy variable *SOX* is negative and significant for *ABS_DA* as well as for positive discretionary accruals and positive and significant for negative discretionary accruals. This suggests that, controlling for the other independent variables, the period after SOX was characterized by lower income-increasing earnings management. Several simultaneous occurrences could have contributed to a decrease in earnings management activities after passage of SOX, including the increased vigilance of investors, auditors and regulators, and greater

care taken by managers in financial reporting after the adverse publicity caused by the scandals. Thus, we are cautious in attributing the decrease in the level of earnings management solely to the passage of SOX from this analysis.

Unlike our analysis in Table 2, the dummy variable representing the scandal period is not significant for any of the variables. Thus, the entire increase in the accrual-based earnings management is related to the increase in equity-based compensation.

We find that the percentage of bonus compensation is not correlated with earnings management for the entire period, and this association did not significantly change in the SCA or the post-SOX periods. Positive discretionary accruals, however, were significant and positively associated with the percentage of compensation received from bonuses in the scandal period.

Consistent with our conjecture, the percentage of compensation derived from option grants and other unexercised options and stock ownership are significantly positively associated with discretionary accruals as well as with positive discretionary accruals. For option grants and other unexercised options this effect increased significantly in the SCA period for positive discretionary accruals and decreased significantly in the post-SOX period. This suggests that option compensation provide managers with incentives to manipulate earnings upwards (Fuller and Jensen, 2002, Greenspan 2002, and Coffee 2003), and this effect was significantly higher during the period surrounding the corporate scandals. One possible explanation for the decline after SOX could be the penalties on incentive compensation introduced by SOX. Option grants and other unexercised options and ownership are significantly negatively correlated with negative discretionary accruals overall and after SOX. This suggests that the presence of stock and

options in the compensation structure reduces the incentive to manage earnings downwards. Surprisingly, option grants and other unexercised options are positively associated with options in the scandal period. We find this positive coefficient in the scandal period surprising and difficult to explain.

The coefficient on exercisable options is positive (for *ABS_DA* and *Positive_DA*) and negative (for *Negative_DA*) but statistically insignificant, a result consistent with the evidence in Cheng and Warfield (2005). This finding is somewhat unintuitive because one would expect both unexercisable and exercisable options to have similar effects on managers' incentives to manage earnings. Cheng and Warfield argue that equity incentives lead to earnings management via future trading in the company's stock, and because exercisable options are not correlated with future trading (unlike unexercisable options and ownership), these are not related to earnings management. This is likely to explain our results as well, but we do not examine this reasoning further as this is beyond the scope of our analysis.

These results are reinforced by Figure 5 which plots bonus and option compensation (based on a Black Scholes valuation) as a percentage of total compensation. The figure indicates that while bonus compensation was relatively stable around 15-20 percent over the entire period, stock option compensation increased over time and peaked to as much as 45 percent of total compensation in 2001. This increase in option compensation during the scandal period provides an explanation for the significantly higher association between options and earnings management during that period. This is consistent with the evidence in Cheng and Warfield (2005) and Bergstresser and Philippon (2006). Overall, the evidence in Cheng and Warfield (2005) suggests that equity incentives derived from

stock option compensation lead to incentives to engage in accrual-based earnings management activities. In addition, Bergstresser and Philippon (2006) show that the use of discretionary accruals to manipulate reported earnings is more pronounced at firms where the CEO's compensation is more closely tied to stock options. The evidence we document also supports the assertions made by Coffee (2003) and Greenspan (2002), and Fuller and Jensen (2002), among others, that stock-based compensation increase managers' incentives to inflate reported earnings and, consequently, stock prices.

Overall, these results identify compensation, primarily derived from stock options, as being significantly correlated with accrual-based earnings management in the period leading up to the passage of SOX. The association between options and accrual-based earnings management increased during the scandal period and decreased in the post-SOX period. As mentioned earlier, one explanation for the latter result could be the provisions in Sections 302 and 304 in SOX that mandates the return of any incentive compensation owing to material noncompliance with any financial reporting requirement. This could have made executives with stock options more conservative in their financial reporting practices.

The coefficient for the change in GDP (ΔGDP), our proxy for real economic activity, is negative and significant for discretionary accruals and for positive discretionary accruals and positive and significant for negative discretionary accruals.[25] This result has two (not necessarily mutually exclusive) interpretations. First, it suggests that even absent opportunistic behavior by managers, poor economic conditions are accompanied

[25] The documented results are robust to an alternative measures of economic activities, namely, industry adjusted ROA. We also repeated the analysis by including measures of growth, either the book-to-market ratio or the growth in sales as an additional control variable, and our results are qualitatively unaltered by these inclusions. Including prior year stock returns as well as using the logarithm of market value of equity as alternative measures of size does not affect the reported results.

by more discretionary accruals. Second, corporations are more likely to manage earnings when economic conditions are poor. However, even after controlling for economic conditions, we find a significant reduction in earnings management activities following the passage of SOX. We find evidence that earnings management is significantly less for larger firms and for clients of big audit firms.[26]

We next discuss the results for the real earnings management variables (Table 4). The results are similar for all three real earnings management variables and the combined variable *RM_PROXY*; thus, we report all three sets of results but discuss those for only the combined variable *RM_PROXY* (we point out differences in the results whenever applicable). Consistent with the results in Table 2, the level of overall real earnings management decreased over the sample period, but increased significantly during the scandal period and after SOX. However, discretionary spending increased over the sample period and in the scandal period, and decreased significantly after SOX.

The accrual-based earnings management variable, *ABS_DA*, is negative and significant, which indicate that firms substitute between real and accrual-based earnings management activities, a result consistent with Graham et al. (2005) and Zang (2006).

The coefficient estimates on bonus, option grants and other unexercisable options and stock ownership are negative and significant, indicating that executives with higher bonus, unexercisable options and stock ownership managed earnings using real techniques less. However, except for discretionary spending, the interaction terms between option grants and other unexercisable options and SOX and between ownership

[26] In unreported results, we did not find significant differences in earnings management between Big and non-Big audit firm clients between the pre-SCA, the SCA, and the post-SOX periods.

and SOX are positive and significant, suggesting that executives with more unexercisable options and stock managed earnings using real methods more in the post-SOX period.

In light of the results obtained for the accrual-based earnings management variables which indicate that executives with more stock and options manage earnings more, the above findings could result from the substitution between real and accrual-based earnings management activities undertaken by firms. In the post-SOX period, we found earlier that those individuals with more stock and unexercisable options were less likely to use accrual-based means to manage earnings. These results support the conjecture that after SOX, stock and options provided increased incentives to manage earnings using real methods. In other words, if managers expect earnings management using real methods to be harder to detect, the passage of SOX is likely to result in a substitution of real earnings management for accrual-based earnings management. Similar to results for accrual-based earnings management, exercisable options are not significantly associated with real earnings management. The results for the other control variables are similar to those obtained in the case of the accrual-based earnings management variables.

Finally, we refined our real earnings management analysis by distinguishing between manufacturing firms and non-manufacturing firms: Overproduction and price discounts both generate abnormally high production costs relative to sales. Both manufacturing firms and non-manufacturing firms can offer price discounts to increase sales but overproduction as a real earnings management tool is available only to manufacturing firms. Based on two-digit SIC codes, we divided the sample firms into manufacturing and non-manufacturing industries and repeated the analysis. We continue to find for non-manufacturing firms results which are consistent with those documented in column 2 of

Table 4. We tested an alternative specification in which we included a dummy variable for manufacturing firms in Table 4 and interacted it with the time trend variables. We defined this dummy to take the value of 1 if the industry's two-digit SIC code falls between 20 and 39. The dummy variable came in positive and significant (an intercept effect), and the interaction with *SCA*, although negative, was insignificant, whereas the interaction with *SOX* was significantly positive, consistent with the results documented in Table 4, column 2. Finally, including interaction terms between the variables ΔGDP and *BIG* with the time variables did not affect the results reported in Tables 3 and 4.

Overall, the multivariate analysis can be summarized as follows: once we control for changes in the compensation structure, we do not find support for the claim that the SCA period was, on average, characterized by significantly higher accrual-based earnings management activities. However, we find higher real earnings management in the SCA period. These results suggest that there was an (as yet unidentified) exogenous force that affected the compensation structure and also either directly or indirectly (via the compensation structure) affected accrual-based earnings management.

After SOX, the level of accrual-based earnings management declined, but there was a significant increase in the overall level of real earnings management activities. Though the analysis does not allow inferences on whether the overall level of earnings management changed after SOX, it does indicate that firms seemed to switch to more real management activities after SOX, possibly since such methods are harder to detect thus reducing the costs of earnings management. Finally, we find that compensation derived primarily from unexercisable stock options contributes significantly to the incentives of

executives to manipulate earnings, a result consistent with recent research (e.g., Cheng and Warfield, 2005).

4.4 Suspect Firm Analysis

One concern in the above analysis is whether our proxies are capturing earnings management activities of firms, or whether these trends that we observe represent some other phenomenon. To obtain more confidence that the above results do represent the trend in earnings management activities, we also conduct the following analysis. We identify a sample of firms that are likely to have managed earnings based on three benchmarks that firms are likely to have incentives to meet, and examine whether earnings management strategies (i.e., the values of discretionary accruals, *DA*, and *RM_PROXY*) to meet these benchmarks have changed in the post-SOX period as compared to the pre-SOX period.

First, as in Roychowdhury (2006), we identify firm-year observations with net income before extraordinary items scaled by total assets that lies in the interval [0, 0.005) (we label these as SUSPECT firm-years), since it is likely that these firms during these years managed their earnings to report income marginally above zero. Table 5, Panel A reports the earnings management before and after SOX for firms that "just" managed to avoid reporting a loss.

Next, we use a second measure of SUSPECT firm-years when the change in net income before extraordinary items scaled by total assets lies in the interval [0, 0.005). This latter definition is consistent with evidence in prior research that firms are more

likely to manage earnings in order to meet prior years' earnings numbers (Graham et. al., 2005). The results for this measure are reported in Table 5, Panel B.

Finally, recent research has suggested that meeting/beating analysts' forecasts is an important benchmark for firms and firms are likely to manipulate earnings to achieve this (DeGeorge, Patel and Zeckhauser, 1999; Graham et al., 2005). Consistent with Roychowdhury (2006), we examine the accrual and real earnings management activities of firms that managed to meet or beat the final analysts' consensus forecast outstanding prior to the earnings announcement date (we use this consensus forecast as the ex post proxy for what managers expect the final consensus forecast to be for the year).[27] We obtain annual analyst forecasts from I/B/E/S and consider only the forecasts made and/or revised after the beginning of the fiscal year. We define the forecast error (FE) as the difference between actual earnings per share (EPS) as reported by I/B/E/S less the consensus forecast of earnings per share. We focus on firm-year observations where the FE is one cent per share or less ($\$0.00 \leq$ EPS – Consensus forecast $\leq \$0.01$). We then define SUSPECT_FE as a binary variable taking the value of 1 if FE is one cent per share or less and zero otherwise. Table 5, Panel C presents the results of this analysis.

For each of the above three subgroups, we also compute earnings management for firms that just missed the three earnings targets and for all other firms that neither just missed nor just made the income targets. Because the suspect firms are likely to have engaged in income-increasing earnings management, we find that (not surprisingly) both before and after SOX, all three groups of suspect firms had significantly higher

[27] Note that as an earnings benchmark meeting/beating analyst forecasts are different from meeting/ beating the zero earnings benchmark and loss avoidance. Given that analysts revise their forecasts several times a year, this forms a moving target and it is not obvious as to which specific forecasts managers regard as the target they need to beat.

discretionary accruals when compared to either comparison group (results not tabulated). However, all firms that just avoided a loss (Panel A), that just managed to meet-or-beat last year's earnings (Panel B), as well as those that managed to meet or beat the consensus analyst forecast (Panel C) used significantly less income-increasing accrual-management after SOX when compared to firms in the same bin-intervals before SOX. An analysis of the real earnings management behavior of these firms indicates that the SUSPECT firms used significantly lower real earnings management than the other firms both before and after SOX (untabulated). However, real earnings management for these firms is significantly higher after SOX when compared to the firms in the same bin-intervals prior to SOX. This analysis provides us with greater confidence in the earlier results and strengthens our argument for the substitution between accrual and real earnings management methods after SOX.

5. Summary and Conclusion

We document both real and accrual-based changes in earnings management over time and examine whether the passage of SOX affected earnings management activities. Our results indicate that earnings management increased steadily over the sample period, and meeting or beating prior year's earnings numbers, consensus analysts' forecasts and avoiding losses continued to be important incentives to manage earnings. We find an increase in earnings management in the period preceding the passage of SOX.

Our evidence suggests that subsequent to the passage of SOX, the level of earnings management returned to the pre-SOX trend line. We also find that while the level of accrual-based earnings management declined, the level of real earnings management

activities increased significantly after the passage of SOX, suggesting that firms shifted from using accrual-based to real earnings management after SOX. Finally, our results indicate that the increase in accrual-based earnings management prior to SOX was concurrent with a shift in the fraction of equity-based executive compensation.

Our analysis does not permit us to attribute the above changes in earnings management activities solely to SOX. Several simultaneous occurrences could have contributed to a decrease in earnings management activities after passage of SOX, including the increased vigilance of investors, auditors and regulators, and greater care taken by managers in financial reporting after the adverse publicity caused by the scandals. Thus, although most of these other concurrent events are indirectly related to the regulations in SOX, we are cautious in making any causality inferences.

Finally, consistent with the results in Cheng and Warfield (2005) and Bergstresser and Philippon (2006), we interpret our evidence that the opportunistic behaviors of managers was one of the major antecedents of accrual-based earnings management during the period leading to SOX – primarily related to dramatic increases in the fraction of compensation derived from stock options.

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FIGURE 1: TIME PERIODS ANALYSED

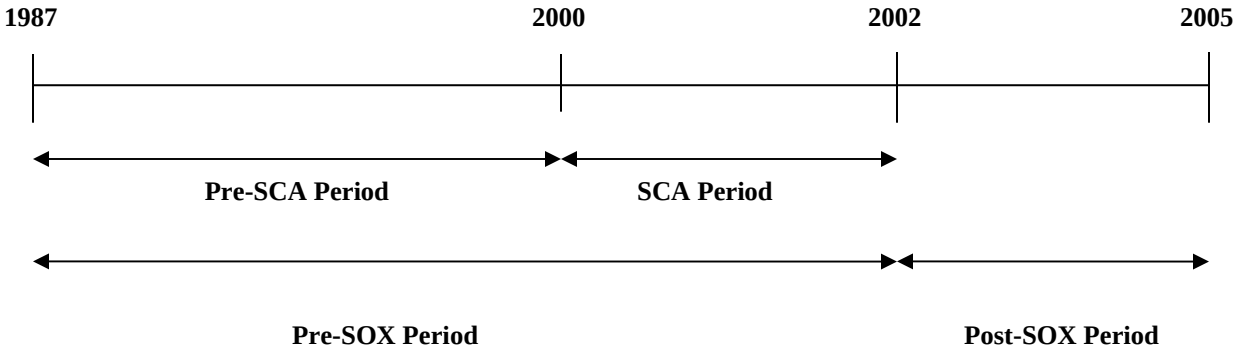
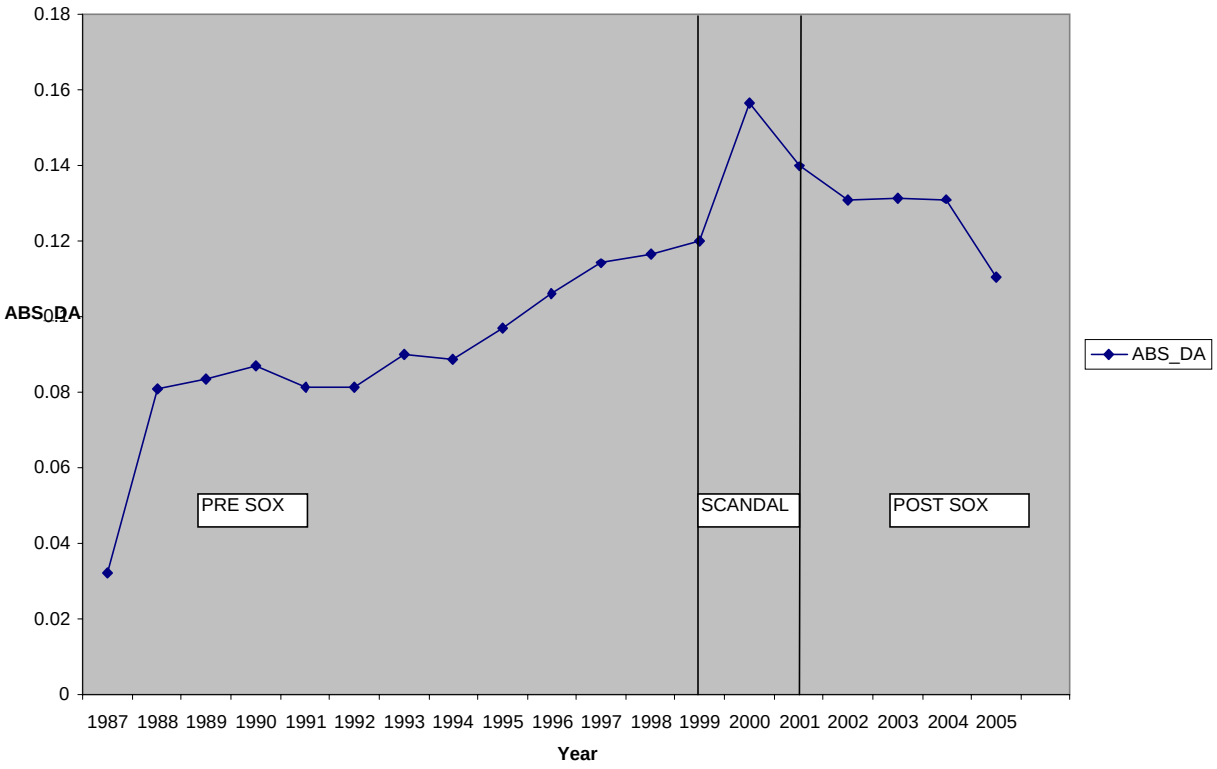


Figure 2: Absolute Value of Discretionary Accruals Over Time, 1987-2005



Legend to Figure 2: This figure plots the absolute value of discretionary accruals computed using the Modified Jones Model over the 1987-2005 sample period.

Figure 3a: Postive Discretionary Accruals Over Time, 1987-2005

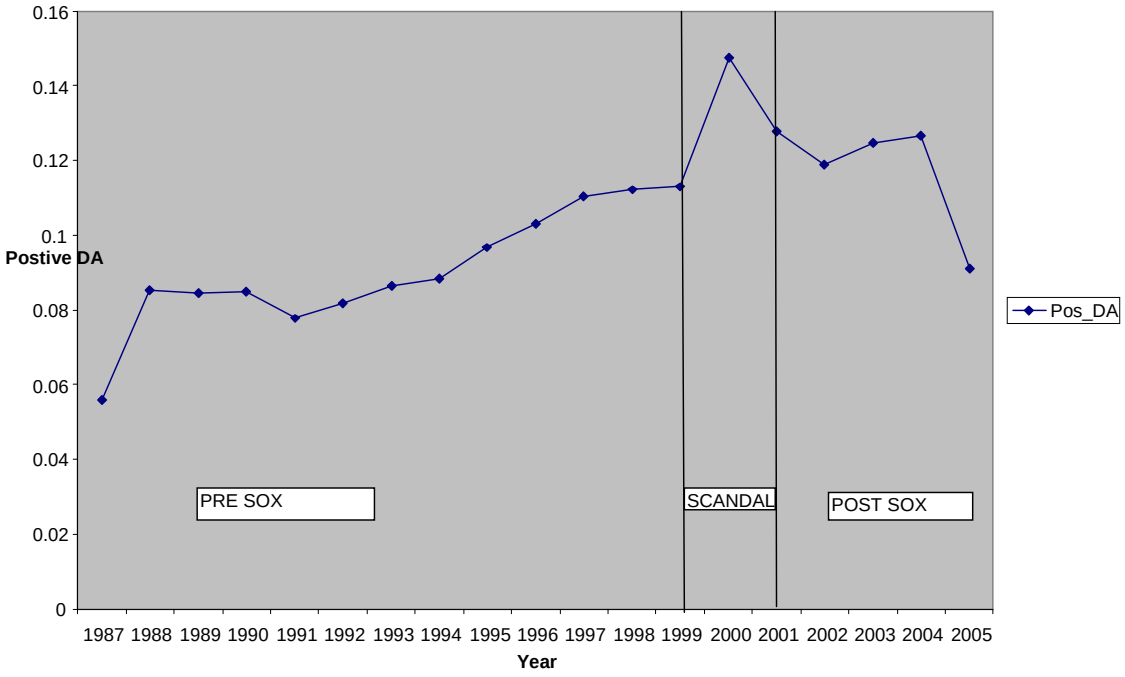
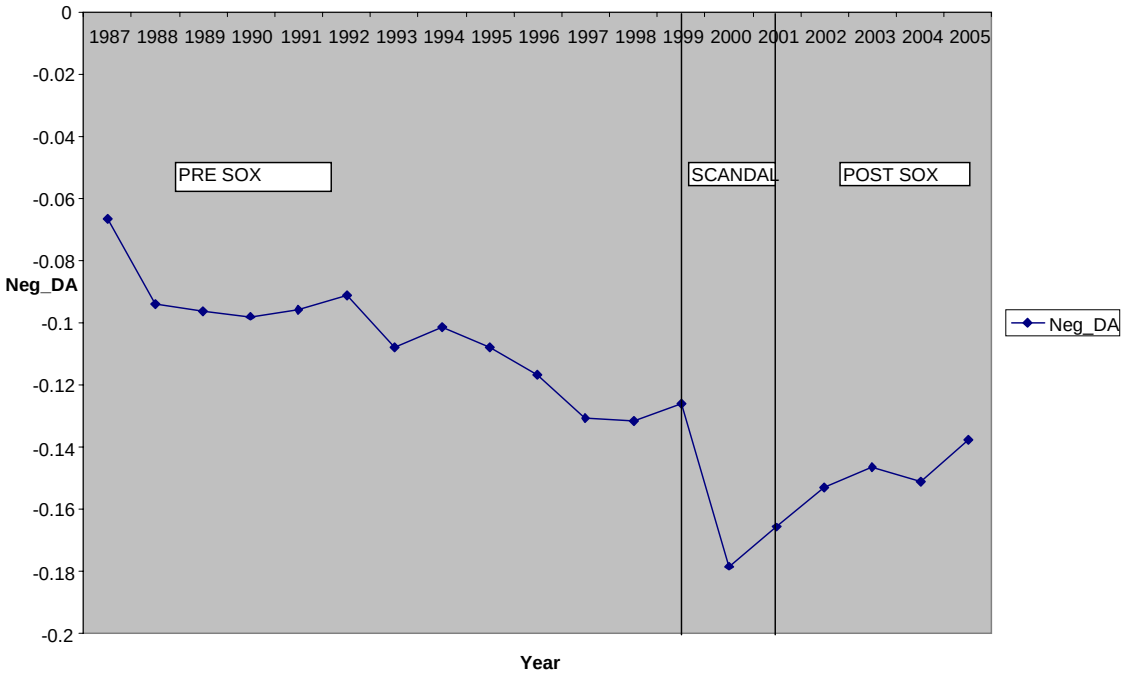
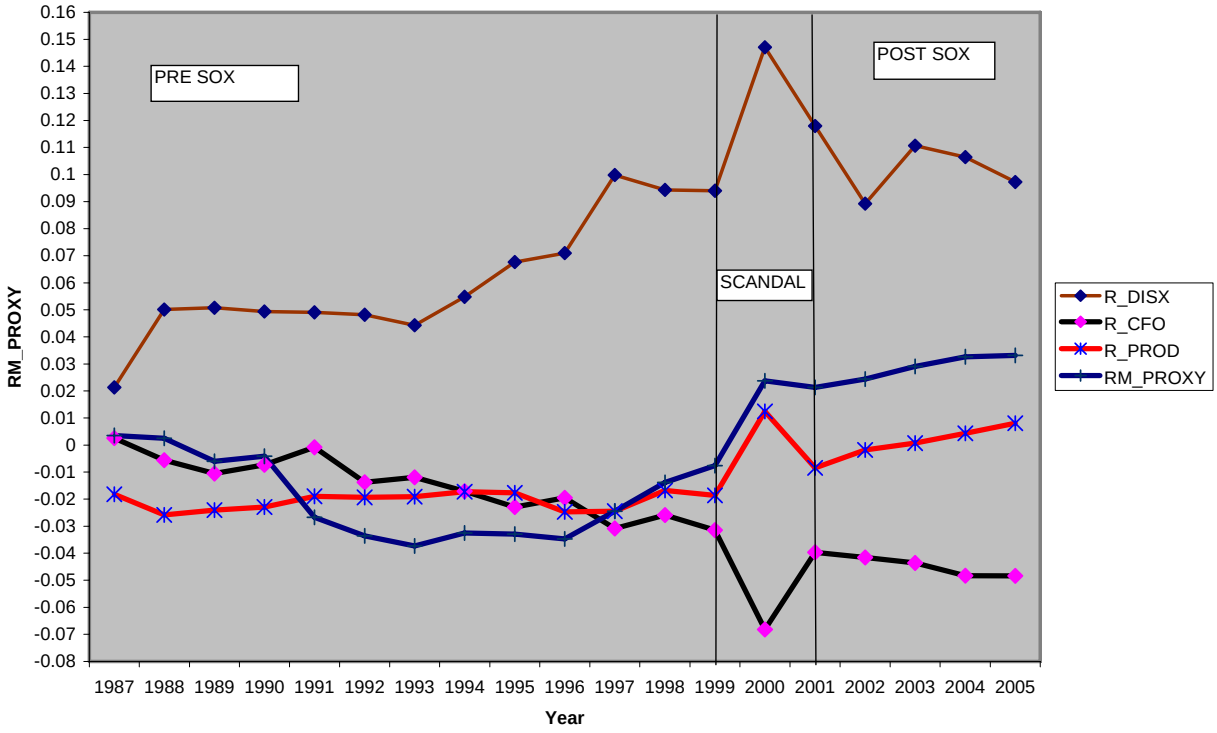


Figure 3b: Negative Discretionary Accruals Over Time, 1987-2005



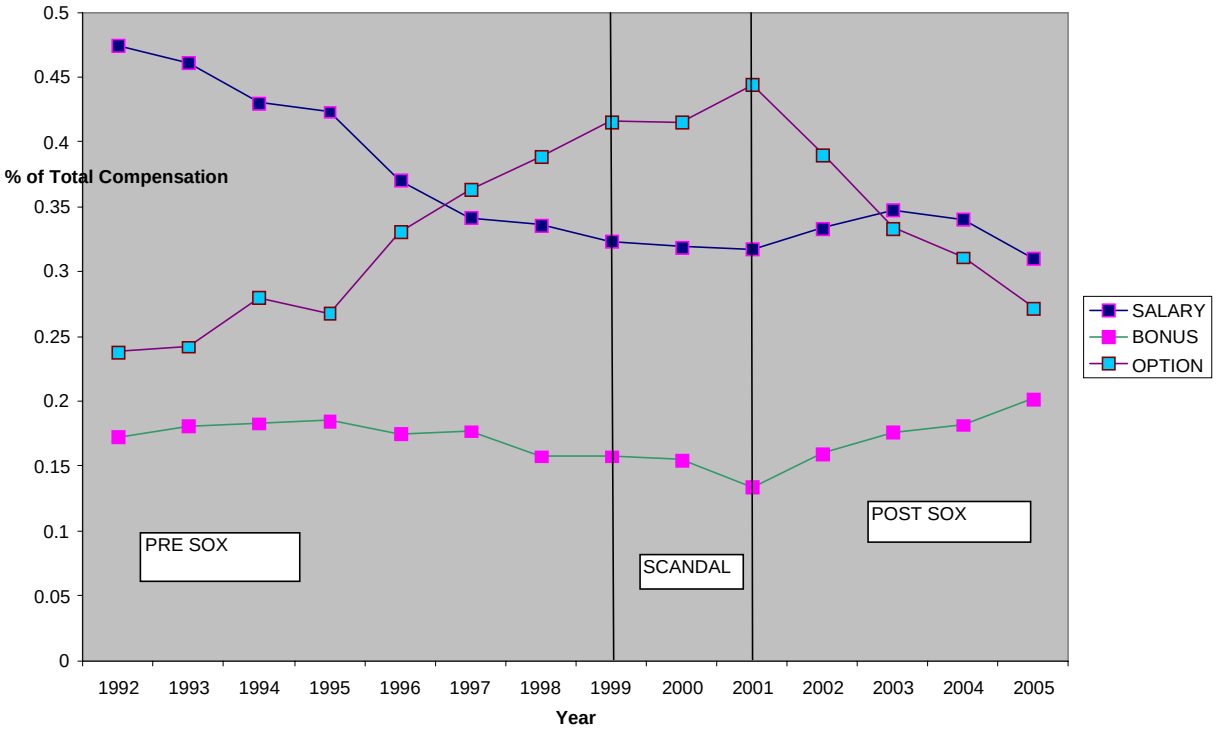
Legend to Figure 3: This figure plots positive and negative discretionary accruals computed using the Modified Jones Model over the 1987-2005 sample period.

Figure 4: Real Earnings Management Proxies Over Time, 1987-2005



Legend to Figure 4: Figure 4 plots abnormal cash from operations, abnormal production costs, abnormal discretionary expenses, and the sum of the standardized three real earnings management proxies, *RM_PROXY* over the 1987-2005 sample period.

Figure 5: Compensation Over Time, 1992 - 2005



Legend to Figure 5: This figures plots trends in executive compensation (for CEOs and CFOs) over the sample period, 1992-2005. All variables are presented as a percentage of total compensation.

Table 1, Panel A
Full Sample, 1987-2005; N = 87,217

	25th Percentile	Mean	Median	75th Percentile	Standard Deviation
Total Assets	17.54	1401.43	89.02	438.68	8815
Market Capitalization	15.08	1616.11	76.71	441.13	11855.55
Sales	17.05	1396.32	94.70	492.98	7555.65
Growth of Sales	-0.04	0.13	0.08	0.25	0.49
OC (Days)	79.15	142.56	124.05	186.01	90.89
Leverage	0.04	0.41	0.21	0.39	0.26
Market-to-Book	1.11	4.94	1.92	3.48	6.17
Total Accruals	-0.12	-0.10	-0.06	-0.001	0.25
DA	-0.05	0.00	0.00	0.05	0.20
Positive_DA	0.02	0.09	0.06	0.11	0.09
Negative_DA	-0.03	-0.05	-0.02	-0.01	0.18
ABS_DA	0.03	0.11	0.06	0.12	0.17
R_CFO	-0.06	-0.02	0.01	0.08	0.35
R_PROD	-0.17	-0.06	0.04	0.06	0.31
R_DISX	-0.09	0.08	0.01	0.18	0.58
RM_PROXY	-0.08	0.01	-0.01	0.06	0.35

Table 1, Panel B
ExecuComp Sample, 1992-2005; N = 31,668

	25th Percentile	Mean	Median	75th Percentile	Standard Deviation
Total Assets	334.88	4232.66	849.40	2611.80	19038.10
Market Capitalization	388.27	5491.55	978.67	3280.46	20283.20
Sales	331.89	4025.76	895.94	2678.90	13039.01
Growth of Sales	0.01	0.18	0.09	0.22	0.76
OC (Days)	72.49	124.69	111.27	160.10	73.61
Leverage	0.05	0.22	0.20	0.33	0.20
Market-to-Book	1.63	4.70	2.48	4.04	6.45
Total Accruals	-0.10	-0.07	-0.06	-0.02	0.12
DA	-0.05	-0.01	-0.01	0.03	0.11
Positive_DA	0.00	0.03	0.00	0.03	0.06
Negative_DA	-0.05	-0.04	-0.01	-0.00	0.08
ABS_DA	0.01	0.07	0.04	0.08	0.09
R_CFO	-0.00	0.05	0.05	0.11	0.15
R_PROD	-0.17	-0.05	-0.04	0.05	0.28
R_DISX	-0.10	0.01	0.00	0.12	0.15
RM_PROXY	-0.06	0.00	0.00	0.06	0.16
***BONUS* (%)**	0.04	0.16	0.14	0.25	0.15
***BONUS* ($)**	60.00	454.04	219.32	526.80	821.30
***EX_OPTIONS* (%)**	0.312	0.745	0.432	0.874	0.857
***UN_OPTIONS* (%)**	0.104	0.341	0.214	0.473	0.537
***OWNER* (%)**	0.764	5.191	1.067	3.057	1.067

Notes to Table 1:

Total Assets is annual Compustat data item 6; *Market Capitalization* is measured as the price per share (annual Compustat data item 199) times the number of shares outstanding (annual Compustat data item 25). *Sales* is annual Compustat data item 12; *Growth of Sales* is the change is sales divided by lagged sales; *Total Accruals* is the difference between operating cash flows (annual Compustat data item 308), adjusted for extraordinary items and discontinued operations (annual Compustat data item 124) and income before extraordinary items (annual Compustat data item 123) divided by lagged total assets; *DA* are discretionary accruals computed using the Modified Jones Model; *ABS_DA* is the absolute value of discretionary accruals computed using the Modified Jones model; *OC*, or the operating Cycle (in days), is calculated as $\frac{(AR_t + AR_{t-1})/2}{(Sales/360)} + \frac{(INV_t + INV_{t-1})/2}{(COGS/360)}$; *Leverage* is total liabilities (annual Compustat data item 9 plus data item 34) divided by total assets; *Book-to-Market* ratio is calculated as the market capitalization divided by the book value of common equity (annual Compustat data item 60); *Positive_DA* is the value of positive discretionary accruals computed using the Modified Jones Model; *Negative_DA* is the value of negative discretionary accruals computed using the Modified Jones Model; *R_CFO* represents the level of abnormal cash flows from operations; *R_PROD* represents the level of abnormal production costs, where production costs are defined as the sum of cost of goods sold and the change in inventories; *R_DISX* represents the level of abnormal discretionary expenses, where discretionary expenses are the sum of advertising expenses (annual Compustat data item 45), R&D expenses (annual Compustat data item 46) and SG&A expenses (annual Compustat data 189); *RM_PROXY* is the sum of the standardized three real earnings management proxies, i.e., *R_CFO*, *R_PROD* and *R_DISX*; *BONUS* (%) is the average bonus compensation as a proportion of total compensation received by the CEO and CFO of the firm; *BONUS* ($) is the BONUS variable in Execucomp in thousands of dollars; *EX_OPTIONS* (%) represents exercisable options which is the number of unexercised options that the executive held at year-end that were vested scaled by total outstanding shares of the firm; *UN_OPTIONS* (%) represents unexercisable options defined as the number of unexercised options (including options grants in the current period) that the executive held at year-end that had not vested scaled by total outstanding shares of the firm; and *OWNER* is defined as the sum of restricted stock grants in the current period and the aggregate number of shares held by the executive at year-end (excluding stock options) scaled by total outstanding shares of the firm.

Table 2, Panel A
Time Trend Analysis of Earnings Management Metrics Over Time, 1987 – 2005

Dependent Variables	$Dep_{jq} = a + b \times Time + c \times SCA + d \times SOX$				
	$\hat{a}$	$\hat{b}$	$\hat{c}$	$\hat{d}$	Adjusted R^2
ABS_DA	0.053***	0.003***	0.027***	-0.015***	0.024
Positive_DA	0.028***	0.002***	0.026***	-0.019**	0.029
Negative_DA	-0.040***	-0.003***	-0.012***	0.006***	0.015
R_PROD	-0.040***	-0.002	0.008	0.032***	0.009
R_CFO	0.022***	-0.003**	-0.007***	0.007**	0.007
R_DISX	0.028***	0.005***	0.008***	-0.011***	0.010
RM_PROXY	-0.018***	-0.005**	0.033**	0.041***	0.011

Table 2, Panel B
Correlation between the Earnings Management Proxies 1987-2005

	DA	*ABS_DA*	*R_CFO*	*R_PROD*	*R_DISX*	*RM_PROXY*
DA	1	0.398***	-0.237***	-0.029***	-0.163***	-0.331***
ABS_DA	0.298***	1	-0.184***	-0.047***	-0.174***	-0.153***
R_CFO	-0.214***	-0.114***	1	-0.274***	-0.142***	0.447***
R_PROD	-0.024***	-0.314***	-0.183***	1	-0.243***	0.579***
R_DISX	-0.143***	-0.164***	-0.214***	-0.187***	1	0.487***
RM_PROXY	-0.237***	-0.149***	0.381***	0.427**	0.422***	1

*** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10%

Notes to Table 2:

DA are discretionary accruals computed using the Modified Jones model; *ABS_DA* is the absolute value of discretionary accruals computed using the Modified Jones model; *Positive_DA* is the value of positive discretionary accruals computed using the Modified Jones Model; *Negative_DA* is the value of negative discretionary accruals computed using the Modified Jones Model;; *TIME* is a trend variable equal to the difference between the current year and 1987; *SCA* is a dummy variable equal to one if the year is either 2000 or 2001; *SOX* is a dummy variable for years equal to 2002, 2003, 2004 and 2005.

Table 3

Determinants of Accrual Based Earnings Management Activities
1987 – 2005

$$DEP_j = \alpha_0 + \alpha_1 \times BIG_j + \alpha_2 \times \Delta GDP_j + \alpha_3 \times MKTVAL_j + \alpha_4 \times Time + \alpha_5 \times SCA + \alpha_6 \times SOX + \alpha_7 \times RM\_PROXY + \alpha_8 \times BONUS_j + \alpha_9 \times BONUS_j \times SCA + \alpha_{10} \times BONUS_j \times SOX + \alpha_{11} \times UN\_OPTION_j + \alpha_{12} \times UN\_OPTION_j \times SCA + \alpha_{13} \times UN\_OPTION_j \times SOX + \alpha_{14} \times EX\_OPTION_j + \alpha_{15} \times EX\_OPTION_j \times SCA + \alpha_{16} \times EX\_OPTION_j \times SOX + \alpha_{17} \times OWNER_j + \alpha_{18} \times OWNER_j \times SCA + \alpha_{19} \times OWNER_j \times SOX$$

	ABS_DA		**Positive_DA**		**Negative_DA**	
	Coeff.	**(t-stat)**	**Coeff.**	**(t-stat)**	**Coeff.**	**(t-stat)**
Intercept	0.124	(23.22)	0.024	(9.73)	-0.053	(-18.41)
BIG	-0.025	(-6.91)	-0.008	(-2.29)	-0.013	(-2.51)
ΔGDP	-0.118	(-6.77)	-0.138	(-5.87)	0.094	(2.96)
MKTVAL	-0.008	(-20.09)	-0.002	(-7.24)	0.006	(13.42)
Time	0.003	(8.27)	0.003	(15.43)	-0.013	(-2.69)
SCA	0.002	(0.38)	-0.001	(-0.37)	-0.002	(-0.47)
SOX	-0.018	(-4.27)	-0.021	(-6.43)	0.008	(3.41)
RM_PROXY	-0.424	(-5.74)	-0.517	(-6.14)	0.113	(1.62)
BONUS	0.002	(0.42)	-0.004	(-1.21)	0.003	(0.83)
BONUS × SCA	-0.005	(-0.57)	0.026	(2.49)	0.017	(0.91)
BONUS × SOX	0.013	(1.18)	0.007	(1.12)	0.002	(0.46)
UN_OPTION	0.537	(12.61)	0.498	(8.73)	-0.261	(-8.29)
UN_OPTION × SCA	-0.157	(-0.92)	0.176	(6.67)	0.148	(2.24)
UN_OPTION × SOX	-0.243	(-3.57)	-0.186	(-7.44)	-0.084	(-2.04)
EX_OPTION	0.123	(1.09)	0.084	(0.72)	-0.053	(-0.49)
EX_OPTION× SCA	-0.007	(-0.72)	-0.046	(-0.92)	0.004	(0.87)
EX_OPTION× SOX	-0.009	(-1.07)	-0.008	(-1.22)	-0.003	(-0.81)
OWNER	0.094	(5.67)	0.099	(5.08)	-0.048	(-3.37)
OWNER× SCA	0.004	(0.53)	0.008	(1.04)	0.001	(0.38)
OWNER× SOX	-0.037	(-3.91)	-0.052	(-5.83)	-0.017	(-2.24)
Adjusted R^2	0.079		0.076		0.055	
F- value (Pr > F)	157.87	(<0.0001)	172.69	(<0.0001)	156.42	(<0.0001)

Notes to Table 3:

The dependent variable is either *ABS_DA*, *Positive_DA* or *Negative_DA* where *ABS_DA* is the absolute value of discretionary accruals computed using the Modified Jones Model, *Positive_DA* is the value of positive discretionary accruals computed using the Modified Jones model and *Negative_DA* is the value of negative discretionary accruals computed using the Modified Jones model; *RM_PROXY* is the sum of the standardized three real earnings management proxies, i.e., *R_CFO, R_PROD* and *R_DISX*; Δ *GDP* is the percent change in the real gross domestic product from the previous year; *BIG* is a dummy variable if the company is audited by a big 5 (4) auditor; *MKTVAL* is market value of equity; *TIME* is a trend variable equal to the difference between the current year of observation and 1987; *SCA* is a dummy variable equal to one if the year of observation is in 2000 or 2001; *SOX* is a dummy variable equal to one if the year of observation is in 2002, 2003, 2004 or 2005; *BONUS* is the average bonus compensation as a proportion of total compensation received by the CEO and CFO of the firm; *EX_OPTION* is the number of unexercised options that the executive held at yearend that were vested scaled by total outstanding shares of the firm. *UN_OPTION* is the number of unexercised options (including options grants in the current period) that the executive held at yearend that had not vested scaled by total outstanding shares of the firm. *OWNER* is the sum of restricted stock grants in the current period and the aggregate number of shares held by the executive at yearend (excluding stock options) scaled by total outstanding shares of the firm.

t-statistics are calculated using Huber-White standard errors.

Table 4

Determinants of Real Earnings Management Activities
1987 – 2005

$$DEP_j = \alpha_0 + \alpha_1 \times BIG_j + \alpha_2 \times \Delta GDP_j + \alpha_3 \times MKTVAL_j + \alpha_4 \times Time + \alpha_5 \times SCA + \alpha_6 \times SOX$$
$$+ \alpha_7 \times ABS\_DA_j + \alpha_8 \times BONUS_j + \alpha_9 \times BONUS_j \times SCA + \alpha_{10} \times BONUS_j \times SOX$$
$$+ \alpha_{11} \times UN\_OPTION_j + \alpha_{12} \times UN\_OPTION_j \times SCA + \alpha_{13} \times UN\_OPTION_j \times SOX$$
$$+ \alpha_{14} \times EX\_OPTION_j + \alpha_{15} \times EX\_OPTION_j \times SCA + \alpha_{16} \times EX\_OPTION_j \times SOX$$
$$+ \alpha_{17} \times OWNER_j + \alpha_{18} \times OWNER_j \times SCA + \alpha_{19} \times OWNER_j \times SOX$$

	R_CFO		**R_PROD**		**R_DISX**		**RM_PROXY**	
	Coeff.	**(t-stat)**	**Coeff.**	**(t-stat)**	**Coeff.**	**(t-stat)**	**Coeff.**	**(t-stat)**
Intercept	0.016	(3.21)	0.078	(9.41)	0.013	(5.92)	-0.046	(-3.21)
BIG	-0.004	(-0.64)	-0.003	(-0.71)	-0.008	(-0.52)	-0.002	(-0.72)
ΔGDP	-0.153	(-2.54)	-0.199	(-3.97)	-0.191	(-4.81)	-0.159	(-4.41)
MKTVAL	-0.013	(-5.28)	-0.014	(-6.59)	0.005	(5.76)	-0.031	(-5.73)
Time	-0.002	(-2.13)	-0.002	(-1.58)	0.004	(2.72)	-0.004	(-2.87)
SCA	-0.006	(-1.14)	-0.015	(-1.81)	0.009	(3.71)	0.031	(3.15)
SOX	0.007	(1.93)	0.039	(5.07)	-0.016	(-3.75)	0.032	(5.69)
ABS_DA	-0.085	(-8.39)	-0.098	(-8.96)	-0.016	(-1.74)	-0.079	(-6.74)
BONUS	-0.048	(-5.34)	-0.061	(-7.91)	-0.021	(-1.93)	-0.044	(-4.11)
BONUS × SCA	.005	(0.92)	0.004	(0.58)	0.007	(1.06)	0.002	(0.87)
BONUS × SOX	0.008	(1.17)	0.003	(0.76)	0.003	(0.72)	0.004	(0.76)
UN_OPTION	-0.289	(-7.23)	-0.168	(-11.09)	-0.142	(-8.95)	-0.194	(-9.21)
UN_OPTION × SCA	0.052	(2.81)	0.013	(1.87)	-0.008	(-0.83)	0.039	(1.68)
UN_OPTION × SOX	0.126	(6.76)	0.074	(5.11)	-0.015	(-3.98)	0.093	(3.71)
EX_OPTION	-0.169	(-1.46)	-0.069	(-0.56)	-0.073	(-0.59)	-0.134	(-0.53)
EX_OPTION× SCA	-0.043	(-0.92)	-0.025	(-0.64)	-0.005	(-0.93)	-0.036	(-0.78)
EX_OPTION× SOX	0.006	(0.55)	0.004	(0.32)	0.004	(0.31)	0.004	(0.39)
OWNER	-0.241	(-3.93)	-0.281	(-2.92)	-0.148	(-2.65)	-0.175	(-2.77)
OWNER× SCA	0.126	(2.19)	0.176	(2.74)	-0.043	(-2.36)	0.119	(2.59)
OWNER× SOX	0.187	(4.69)	0.212	(3.27)	-0.009	(-1.95)	0.196	(3.29)
Adjusted R^2	0.618		0.716		0.737		0.774	
F- value (Pr > F)	2692.69 (<0.0001)		2467.31 (<0.0001)		2528.17 (<0.0001)		2653.79 (<0.0001)	

Notes to Table 4:

The dependent variable is either *R_CFO*, *R_PROD, R_DISX* or *RM_PROXY* where *R_CFO* represents the level of abnormal cash flows from operations, *R_PROD* represents the level of abnormal production costs, where production costs are defined as the sum of cost of goods sold and the change in inventories and *R_DISX* represents the level of abnormal discretionary expenses, where discretionary expenses are the sum of advertising expenses, R&D expenses and SG&A expenses, and *RM_PROXY* is the sum of the standardized three real earnings management proxies, i.e., *R_CFO, R_PROD* and *R_DISX*; ΔGDP is the percent change in the real gross domestic product from the previous year; *BIG* is a dummy variable if the company is audited by a big 5 (4) auditor; *MKTVAL* is market value of equity; *TIME* is a trend variable equal to the difference between the year of observation and 1987; *SCA* is a dummy variable equal to one if the year of observation is in 2000 or 2001; *SOX* is a dummy variable equal to one if the year of observation is in 2002, 2003, 2004 or 2005; *ABS_DA* is the absolute value of discretionary accruals computed using the Modified Jones model; *BONUS* is the average bonus compensation as a proportion of total compensation received by the CEO and CFO of the firm; *EX_OPTION* is the number of unexercised options that the executive held at yearend that were vested scaled by total outstanding shares of the firm. *UN_OPTION* is the number of unexercised options (including options grants in the current period) that the executive held at yearend that had not vested scaled by total outstanding shares of the firm. *OWNER* is the sum of restricted stock grants in the current period and the aggregate number of shares held by the executive at yearend (excluding stock options) scaled by total outstanding shares of the firm.

t-statistics are calculated using Huber-White standard errors.

Table 5, Panel A
Accrual-Based and Real Earnings Management
Firms that "Just" Avoided Reporting Losses

	Prior to SOX (1)	After SOX (2)	DIFFERENCE (1) – (2)
DA	0.073	0.052	0.021***
RM_PROXY	-0.114	0.010	-0.214***

*** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10%

Table 5, Panel B
Accrual-Based and Real Earnings Management
Firms that Managed to Meet-or-Beat Last Year's Net Income

	Prior to SOX (1)	After SOX (2)	DIFFERENCE (1) – (2)
DA	0.048	0.029	0.019***
RM_PROXY	-0.103	0.004	-0.107***

*** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10%

Table 5, Panel C
Accrual-Based and Real Earnings Management
Firms that Managed to just Meet or Beat Analyst Forecasts by a cent per share

	Prior to SOX (1)	After SOX (2)	DIFFERENCE (1) – (2)
DA	0.032	0.024	0.008**
RM_PROXY	-0.087	-0.034	-0.053***

*** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10%

Notes to Table 5:

Panel A: Firm-years "Just" avoiding reporting a loss are defined as firm-year observations where net income before extraordinary items scaled by total assets lies in the interval [0, 0.005).

Panel B: Firm-years that "Meet-or-Beat" last year's net income are defined as firm-year observations where the change in net income before extraordinary items scaled by total assets lies in the interval [0, 0.005).

Panel C: Firm-years that "Meet or Beat" analyst forecasts by a cent per share or less.

DA represents discretionary accruals computed using the Modified Jones model; *RM_PROXY* is the sum of the standardized three real earnings management proxies, i.e., *R_CFO*, *R_PROD* and *R_DISX*.