Corporate Financial Reporting in the post Sarbanes Oxley Act era

Panagiotis Patatoukas

Yale School of Management

Term Paper for Data Mining

Abstract

I revisit the question whether financial reporting has changed after the passage of the Sarbanes Oxley (SOX) Act in 2002, with a particular focus on opportunistic earnings management. I employ a sample of more than 400 listed firms in US stock exchanges and for each firm I calculate values for a collection of different measures of unconditional reporting conservatism, earnings management and earnings quality for the years before and after the enforcement of the SOX Act. I employ a war chest of data mining tools and identify interesting attributes in the data. I document that the measures of unconditional reporting conservatism, earnings management and quality are useful predictors of firm level conditional reporting conservatism for both the pre and post SOX years. Comparing the pre and post SOX periods, I provide evidence that in the post SOX year even though firms tend to be reporting more conservative in their *Balance Sheets*, they also tend to report more opportunistically in their *Income Statements*. The result is surprising given that the SOX act has been enforced in response to a series of corporate scandals entailing extensive earnings management.

1. Motivation and research question

The Sarbanes Oxley Act of 2002 is a US federal law passed in response to a series of major corporate scandals including those related to Enron, Worldcom and other companies such as Adelphia, Xerox and Global Crossing. The SOX Act is the most sweeping federal law concerning corporate governance since the adoption of the initial Securities Laws in 1933 and 1934. The SOX act aims to improve the reliability of corporate disclosures by modifying the governance, reporting and disclosure requirements for public companies. In general, investors anticipated that SOX would constrain earnings management and enhance the quality of financial statement information.

Reporting conservatism impacts the quality of earnings but it should not be confused with earnings management. In the empirical accounting literature, Basu (1997) defines conservatism as the accountant's tendency to require a higher degree of verification to recognize good news than bad news. Traditionally low earnings quality has been associated to aggressive accounting choices and high earnings quality to conservative accounting choices. The SEC supports the view that both excessively conservative and aggressive reporting choices are forms of managing earnings.

The earnings management literature has identified reported Special Items as an earnings management tool. Management's preferences affect the magnitude and timing of write offs in a more significant and direct way than in most accounting disclosures (Elliot and Shaw, 1988). Special Items are subject to a large degree of management subjectivity and have long been suspected of being reported opportunistically (Strong and Meyer, 1987). The latter is especially true for the pre SOX period.

This study is an attempt to examine earnings management, earnings quality and reporting conservatism in the pre and post SOX period. Understanding and measuring earnings quality is an issue of paramount importance for both academics and practitioners. Investors value earnings quality and are willing to pay more for the equity of high earnings quality firms. A high-quality earnings number, as defined by Dechow and Schrand (2004) is one that satisfies the following three criteria: "It reflects current

operating performance; it is a good indicator of future operating performance; and it accurately annualizes the intrinsic value of the firm".

2. Defining earnings management, earnings quality and reporting conservatism

Healy and Wahlen (1999) provide the following definition of earnings management: *"Earnings Management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the firm or to influence contractual outcomes that depend on accounting figure"*.

Measures of earnings quality attempt to capture the impact of earnings management, i.e. the intentional misrepresentation of accounting figures, on the quality of reported earnings. A high-quality earnings number is one that satisfies the following criteria: reflects current and future operating performance and accurately annualizes the intrinsic value of the firm".

Several measures of earnings quality have been developed in the accounting and finance literature based, for example, on the persistence properties of earnings, accruals, the predictability of future cash flows, the ability of current earnings and cash flows to predict future earnings and cash flows.

Reporting conservatism impacts the quality of earnings but it should not be confused with earnings management. Basu (1997) defines conservatism as the accountant's tendency to require a higher degree of verification to recognize good news than bad news. Basu employs the Returns Response Coefficient (RRC) reverse regression model of unexpected earnings on unexpected returns and finds that market adjusted current period earnings reflect a greater fraction of negative returns (bad news) than positive returns (good news). Basu measures reporting conservatism as the difference of the RRC coefficient of annual earnings to bad and good news (the RRC asymmetry).

Traditionally low earnings quality has been associated to aggressive accounting choices and high earnings quality to conservative accounting choices. The SEC

supports the view that both excessively conservative and aggressive reporting choices are forms of managing earnings. The problem of the current earnings management detection technology available is that the required by the GAAP conservative choices, for example a write off, could be falsely treated as earnings management. In other words the earnings management measures available cannot "tell the difference" between an excessive/ managed write off and a required write off (conservatism and excessive conservatism).

For each firm included in the Wharton Research Data Services (WRDS) database that satisfies the minimum data requirements, I estimate a conditional reporting conservatism Basu-score along with values for eleven other measures of earnings quality, earnings management and reporting conservatism.

3. Variables definition and data inputs

Theoretically the twelve different measures employed in this study are grouped in three categories: measures of earnings management, measures of earnings quality and measures of reporting conservatism. In what follows I define and explain the calculations underlying all the variables.

Measures of Earnings management

Discretionary Accruals

I define discretionary accruals as the prediction error of the Jones (1991) accruals model modified by Dechow et al (1995), Hunt et al (1997) and Subramanyam (1996). The fitted values of the modified Jones model are the non discretionary accruals and thus the regression residuals are the discretionary accruals. The firm specific discretionary accruals models that I employ are the following:

MJ1: Modified Jones Model (Dechow et al 1995)

$$Exp_t\left(\frac{TA_t}{A_{t-1}}\right) = NDA_t = \alpha 1\frac{1}{A_{t-1}} + \beta 1\left(\frac{\Delta REV_t}{A_{t-1}} - \frac{\Delta REC_t}{A_{t-1}}\right) + \beta 2\frac{PPE_t}{A_{t-1}}$$

MJ2: Jones Model with CFO term (Hunt et al 1997, Subramanyam 1996))

$$Exp_t\left(\frac{TA_t}{A_{t-1}}\right) = NDA_t = \alpha 1\frac{1}{A_{t-1}} + \beta 1\frac{\Delta REV_t}{A_{t-1}} + \beta 2\frac{PPE_t}{A_{t-1}} + \beta 3\frac{CFO_t}{A_{t-1}}$$

MJ3: Accounting Process Model (Garza-Gomez et al 2000)

$$Exp_t\left(\frac{TA_t}{A_{t-1}}\right) = NDA_t = \alpha 1 + \beta 1\frac{\Delta CFO_t}{A_{t-1}} + \beta 2\frac{TA_{t-1}}{A_{t-1}}$$

Where:

NDAt= non discretionary accruals at t

TAt= total accruals at t estimated using the cash flow approach as the difference of Operating Income and Cash flows from Operations

At-1= total assets at t-1

ΔREVt = change in revenue from period t-1 to t

ΔRECt = change in receivables from period t-1 to t

PPEt = gross plant property and equipment

CFOt= cash flow from operations at t

ΔCFOt= change in CFO from period t-1 to t

My sample is spanning the post SFAS 95 period (1988-2004) since I use the cash flow statement approach for estimating total accruals. Collins and Hribar (2002) support that there is significant measurement error associated with the balance sheet approach to estimating accruals that reduces the discretionary accruals models' power to detect earnings management and thus they advocate the cash flow statement approach to estimating total accruals. I require at least ten years of time series data for a firm to be included in the sample.

I estimate the discretionary accruals per share as the regression residuals of the DA models employed, divided by the number of common shares outstanding and multiplied by the lagged total assets. I then proxy the unmanaged earnings for each firm as the price deflated difference of annual earnings and discretionary accruals.

<u>Performance adjusted discretionary accruals (pmj)</u>

Kothari, Leone and Wasley (2005) suggest that performance-matched discretionary accrual measures enhance the reliability of inferences from earnings management research. Performance matching on return on assets controls for the effect of performance on measured discretionary accruals. I follow the method proposed by Kothari et al. (2002) and include returns on assets (ROA) as a control for firm performance in the Modified Jones regression model in order to estimate performance adjusted discretionary accruals.

The ratio *σ(OI) / σ(CFO)* (smooth)

The ratio at the firm level of the standard deviation of operating income, to the firm level standard deviation of the cash flows from operations (Hunt et al 1997, Leuz et al 2002, Pincus and Rajgopal 2002)). The ratio compares the standard deviation of Operating Income and that of Cash Flows from Operations. This ratio could be interpreted as an Earnings Smoothing measure, ratios less than one indicate more variability in operating cash flows relative to the variability of Operating Income, which could be indicative of using accruals to smooth earnings and thus of earnings management. I calculate the rolling standard deviation over a five year window for both OI and CFO.

Accruals (a) and Scaled Total Accruals (ta)

Accruals are often considered a measure of earnings management (Richardson et al 2001, Richardson, 2003). Chan et al. (2001) provide evidence that high levels of total accruals are indicative of low earnings transparency, and plausibly extensive earnings management. They support that for the firms with the highest total accruals, managers are manipulating earnings. Richardson (2003) finds that high accruals firms are on average smaller and less liquid than low accruals firms, and thus managers of high accruals firms are more likely to be engaged in earnings manipulation. In general, total accruals tend to be income decreasing (negative) primarily due to non-current accruals for depreciation and amortization, averaging at approximately 5% of lagged total assets (Collins and Hribar, 2000).

Measures of earnings quality and reporting conservatism

C-Score (c)

The C-Score that was developed by Penman and Zhang (1999) could be classified as a measure of "Unconditional Conservatism". The C-Score measures the effect of conservative accounting on the balance sheet as the ratio of Hidden Reserves (HR due to conservatism) to Net Operating Assets.

C_Score= Hidden Reserves/NOA

Penman and Zhang (1999) construct the C-score based only on the accounting treatment of Inventories, R&D and Advertising Expenditures. The three corresponding Hidden Reserves components are calculated as following:

- Inventory hidden reserve equals the LIFO reserve reported in footnotes (INV HR).
- R&D hidden reserve is the estimated R&D assets using the coefficients of Lev and Sougiannis (1996) to capitalize and amortize R&D (RD HR).
- Advertising expenses are capitalized and amortized using an ad hoc accelerated method over two years (MKT HR).

And thus: C_Score= (INV HR + R&D HR + MKT HR)/ NOA

Q-Score (q)

While the C-score measures the effect of conservative accounting on the balance sheet, the Q-score measures the effect of conservative accounting on the quality of earnings in the income statement. The Q Score at year t for firm X is defined as the difference in the C score of firm i for year t and the median C Score of the SIC industry that firm i belongs. For Example: Q Score '06 = C Score'06- Industry median C Score'06

Market to Book ratio (mb)

The market to book ratio has been proposed as a measure of unconditional conservatism. In these lines, accounting choices cause the book value to deviate from the market value. The more aggressive accounting is, the higher the book value relatively to the market value is and thus the lower the MB ratio. The more conservative accounting is the lower the book value of equity is relatively to its market value and thus the higher the MB ratio.

The Basu measure of conditional accounting conservatism

In the seminal paper "the conservatism principle and the asymmetric timeliness of earnings" Basu (1997) interprets reporting conservatism as the accountant's tendency to require a greater degree of verification for recognizing bad news than good news. Under this interpretation of conservatism, annual reported earnings are expected to more quickly reflect bad rather than good news. This embedded asymmetry has implications for the timeliness and persistence properties of earnings.

Basu (1997) provides evidence in support of the prediction that unexpected earnings are more timely (sensitive) in reflecting publicly available bad news than good news. Basu employs the simple reverse regression setting using market adjusted earnings as the dependent variable and market adjusted returns as the independent variable, in order to examine the timeliness properties of earnings. In essence the Basu model of the asymmetric timeliness of earnings to good and bad news is a direct time series application of the RRC (Returns Response Coefficient) regression model developed by Beaver et al. (1980):

$$\frac{UE_t}{P_{t-1}} = \alpha 0 + \alpha 1 D_t + \beta 0 R_{mt} + \beta 1 R_{mt} D_t + error_t$$

Where:

$\frac{UE_t}{P_{t-1}}$: the earnings per share in fiscal year t deflated for the lagged closing stock price and adjusted for the market wide equal weighted mean E_t/P_{t-1}

R_{mt}: the market adjusted raw return over the 12-month period commencing with the fourth month of fiscal year

D_t: dummy variable that takes the value 0 for good news (positive market adjusted raw returns) and 1 for bad news (negative market adjusted raw returns)

β0 : the reverse regression's slope coefficient for positive unexpected returns (good news RRC)

(β0+β1): the reverse regression's slope coefficient for the negative unexpected returns (bad news RRC) and β1 captures the differential timeliness/sensitivity of earnings to good and bad news. Conservatism implies that (β0+β1)>β0 or β1>0.

The RRC asymmetry or alternatively the asymmetry in the timeliness properties of earnings to good and bad news is defined as the difference of the RRC regression's slope coefficients to good and bad news and is captured by β1. Basu argues that reporting conservatism results in earnings to more timely reflect bad news than good news and interprets the RRC asymmetry as the outcome of reporting conservatism. For the first time in the accounting literature I apply the RRC regression model at the firm level. I require for a firm to remain in the sample to have both good and bad news years and at least ten years of time series data.

Data inputs

I follow closely the methodology adopted by the prior literature so as to ensure that my results are directly comparable to those documented across the stream of accounting research on reporting conservatism.

I begin my analysis with a sample consisting of all firm-years from the intersection of the COMPUSTAT and the CRSP databases (both included in the WRDS platform) over the period 1988-2003. The minimum data required for each firm year to be included in the sample are the current year's earnings before extraordinary items per share (data item 58), common shares outstanding (data item 25), book value of total assets (data item 6), operating income (data123), cash flow from operations (data 308), historical SIC code (data324), R&D expenses (data 46), marketing expenses, inventory, intangible assets (data33), liabilities (data181), cash (data1), extraordinary items (data192), current debt (data 5), the previous year's fiscal year end stock price (data item199) and fiscal year equity returns. I exclude from the sample penny stocks (stocks trading at less than a dollar per share). Prices and per share accounting items have been adjusted for stock splits and new equity issues (data item 27).

Fiscal year returns are 12 month buy and hold returns beginning the fourth month of the fiscal year so as to ensure that the market response to the previous year's earnings is excluded. Returns are adjusted by the CRSP equal weighted index.

4. Data analysis

4.1 Initial data analysis for the pre and post SOX full sample of firms

The full samples for 2001 and 2003 include listed firms in NASDAQ, AMEX and NYSE for which all data requirements prescribed above are satisfied. A firm enters the final sample if it exists in both the pre and post SOX sample; this requirement results in the loss of twenty firms and is consistent with the fact that in the post SOX era many listed firms decided to delist, rather than to bear the additional cost of compliance with the SOX regulatory requirements.

The full sample includes 421 different firms and values for twelve different measures of earnings quality, earnings management and reporting conservatism. The summary statistics, histograms and pairs plot for 2001 and 2003 are provided in the Appendix.

From the histograms and pairs plot I am able to identify extreme observations. In these lines, I pin down firms with negative Market to Book ratio. For the MB ratio to be negative it has to be the case that the book value of equity of a firm is negative, the latter is true for firms with cumulative losses that exceed the initial contributions of the equity holders. These firms are consistent loss making firms and are "atypical" of listed firms given that the listing rules of the major stock exchanges require positive book values.

For these reasons I exclude firms that exhibit negative Market to Book ratio in either the pre or post SOX year (14 firms). Similarly, I exclude firms with extremely high Market to Book ratio; the cutoff value that I set is 1000. A Market to Book ratio of 1000 implies that the firm's equity stock is trading at a market value of 1000 times its book value; these stocks are extremely overvalued and subject to speculative trading. I identify these firms (12 firms) and exclude them from the final sample of the pre and post SOX years.

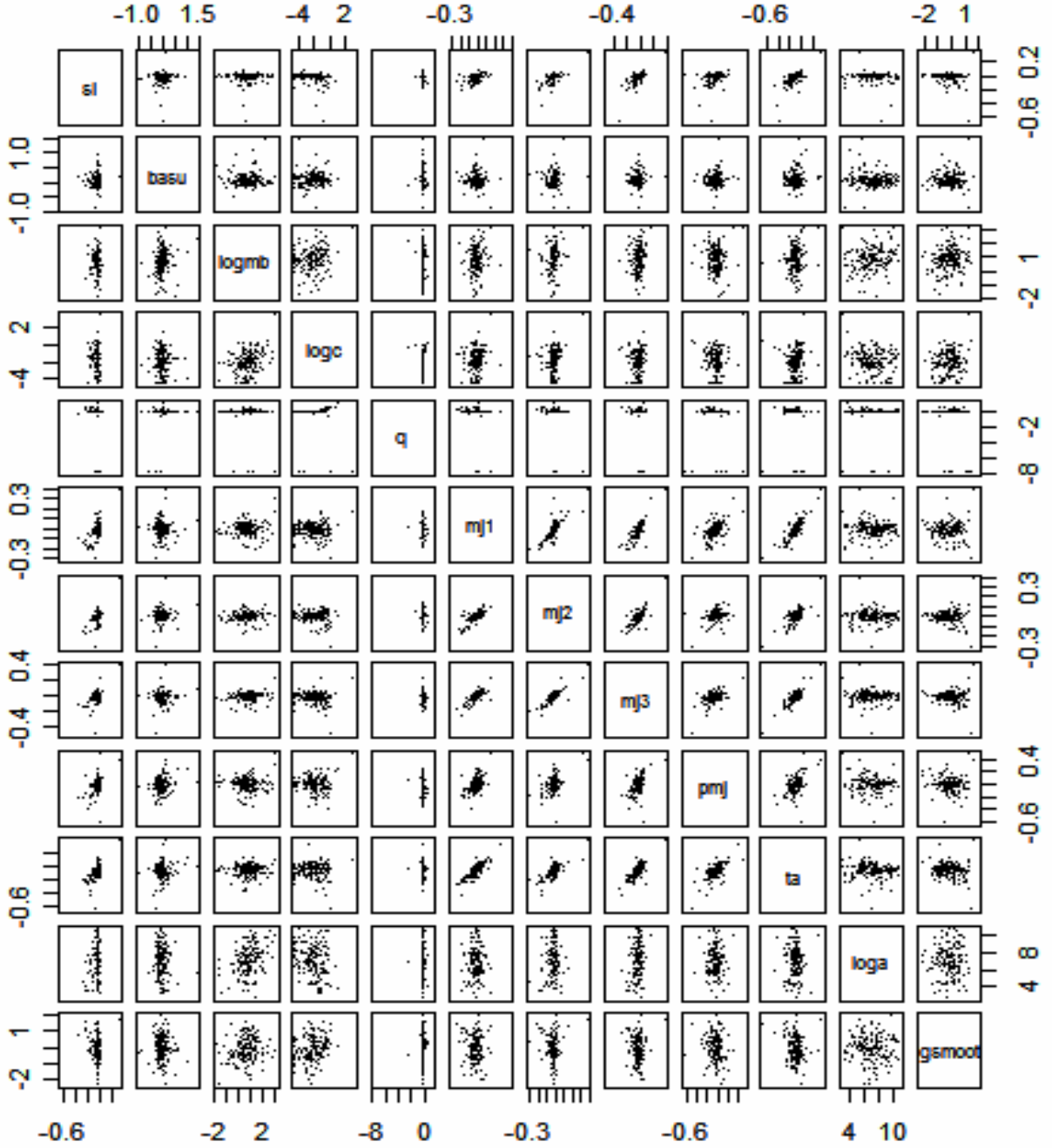
From the company identification ticker (data=gvkey from the Compustat database) I **identify** those firms with extreme MB ratios and based on their industry classification code I track the nature of their operations. Interestingly enough these firms are *Utilities* and are not representative of the population of listed firms given that the set of financial reporting and regulatory rules that applies to them is different.

I also identify firms with extreme values for the Basu measure of reporting conservatism. I restrict the Basu measure of reporting conservatism within the theoretical range [-2, 2]. The interpretation is that for every dollar of incoming good (bad) news the firm recognizes at most two dollars of gains (losses). If the Basu measure is 2 then it means that the firm on average for every dollar of good news it recognizes two dollars of gains and if it is -2 then the firm on average for every dollar of bad news it recognizes two dollars of losses. Such aggressive or conservative practices are atypical and thus I exclude firms with values outside this range in either the pre or post SOX years. Seven firms fail to satisfy the criterion and thus are excluded from my final sample. From the ticker identification codes I pin down the specifics of these seven firms and these firms turn out to be operating in the heavy construction and mining industry.

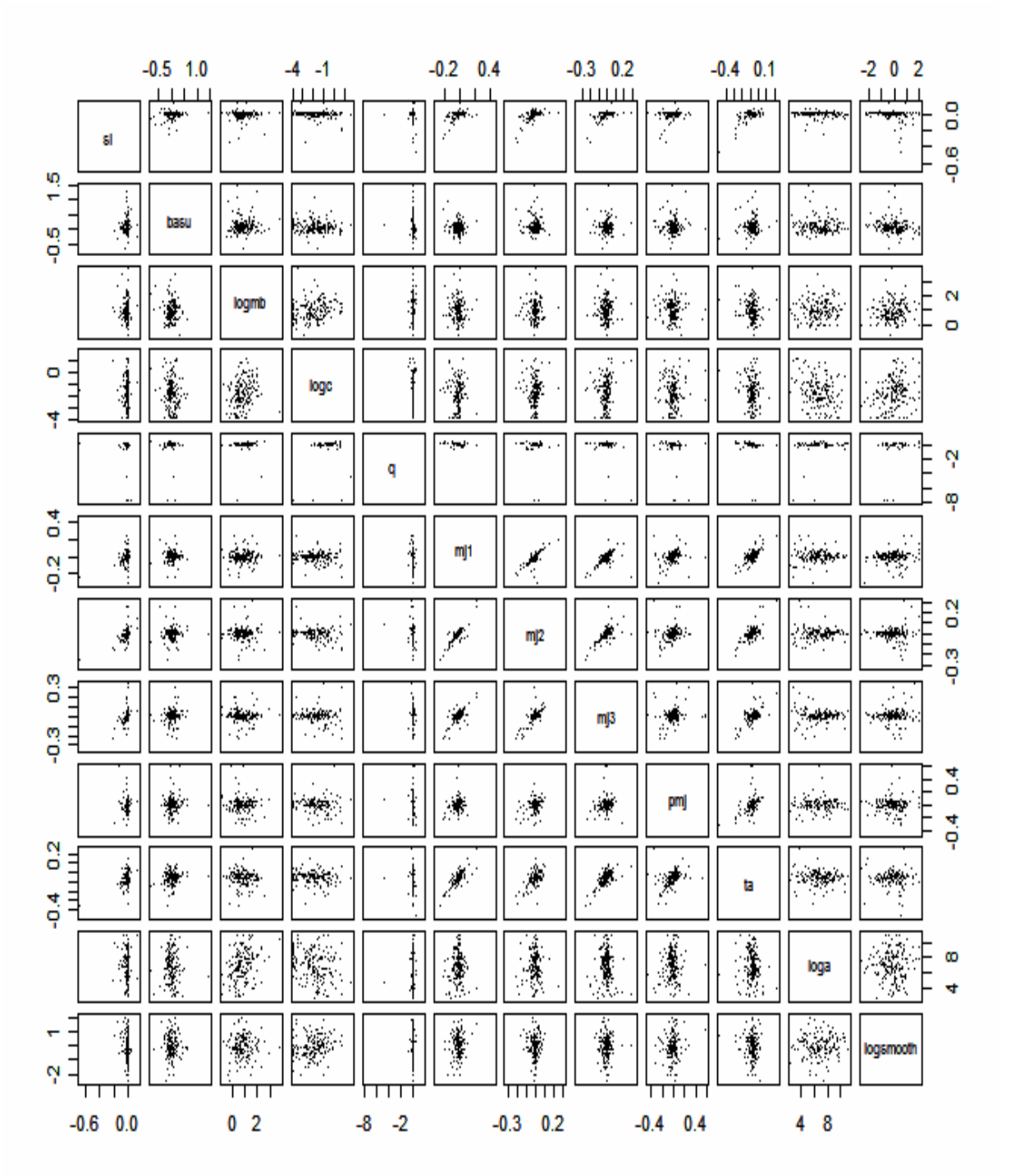
The final sample of firms includes 388 firms with values for all the different measures in the years 2001 and 2003. The histograms and pairs plot for the final sample of firms for both the pre and post SOX years are provided in the Appendix.

From the histograms of all the different measures in 2001 and 2003, I observe that the C-Score (c), Total Accruals (a), the Smoothing Ratio (smooth) and the Market to Book ratio (mb) are skewed to the right and thus I consider their log-transformation. In the Appendix I provide the histograms of the log transformed variables, summary statistics and the pairs plot for the final sample after the log transformations for both 2001 and 2003. For the reader's convenience I provide here for both the pre and post SOX years the summary statistic and pairs plot for the final sample of firms:

Pairs plot for final sample of 2001 after log transformations



Pairs plot for the final sample of 2003 after log transformations



Summary Statistics for the final sample of 2001 and 2003

4.2 Correlation Matrices for the pre and post SOX years

In the end of this section I provide the correlation matrices for 2001 and 2003 including all measures, for the final sample of 388 firms.

For both 2001 and 2003 Special Items are highly positively correlated with all the discretionary accruals (MJ1, MJ2, MJ3 and PMJ) measures and the total accruals. Special items are also negatively correlated with the Smoothing ratio consistent with the idea coined in the earnings management literature that special items are subject to a large degree of management discretion and that are commonly used as an earnings management tool in the context of financial reporting. In other words the higher reported special items is, the lower the smoothing ratio is and thus the more likely it is that operating income has been managed (smoothed).

As expected all the versions of the Modified Jones measures and the performance adjusted discretionary accruals are highly positively correlated with each other. The Total Accruals are also highly positively correlated with al these discretionary accruals measures consistent with the idea that total and discretionary accruals are “good” proxies of earnings management. Another detail surfacing from the correlation matrix is that total accruals are negatively correlated with Special items consistent with the finding that Special items (see summary statistics for 2001 and 2003 in the Appendix) that on average special items are negative i.e. income decreasing.

The log transformation of the Market to Book ratio is positively correlated with the log transformation of the C-Score and that is expected since both measures are purported to be capturing unconditional reporting conservatism (or conservatism in the Balance Sheet). Similarly the log Market to Book ratio is positively correlated to the log of Total Accruals implying that the more conditionally conservative financial reporting is the higher the total accruals are. The latter makes sense given that total accruals constitute the link between two consecutive Balance Sheet statements under the assumption that the causality flows from accounting choices (conservative aggressive reporting) to accounting means (total accruals).

Another interesting finding from the correlation matrix is that the log of the C-Score is positively correlated with the log of Smoothing ratio implying that the more

unconditionally conservative financial reporting is (higher C-Score) the higher the log of the Smoothing ratio is and thus by the definition of the smoothing ratio, the more variable operating income is relatively to cash flows from operations. In other words, unconditional conservatism (as proxied by the C-Score) is negatively associated with Earnings Management (as proxied by the smoothing ratio and given that high/low smoothing ratio is indicative of low/high earnings management).

Correlation matrices for the final sample of 2001 and 2003

5. Data Mining

5.1 Principal components analysis for the pre and post SOX years

In the previous section I examined the correlation matrix for all the different measures of reporting conservatism, earnings quality and earnings management in the pre and post SOX period and documented that for some of the measures, especially the discretionary accruals, performance adjusted accruals and total accruals, the correlation is high. The next step in my exploratory data analysis involves principal component analysis. Given the high correlations for some of the measures, PCA could potentially allow me to account for most of the variance in my data with fewer dimensions without a substantial loss of information. To avoid any scaling issues I standardize all measures for both the pre and post SOX period.

The principal components are in essence linear combinations of all the measures in my dataset. The principal components' loadings on the different measures allow me to interpret the extracted principal components and determine which of the different measures are influential in the formation of principal components. After scaling all the variables in my final dataset I perform PCA for both the pre and post SOX years, the importance and loadings of the different components are provided in the Appendix.

For 2001 the first six principal components account for almost 82% of the total variability in the data. Given the principal components' loadings on the different measures, I attempt to provide an intuitive interpretation of the six extracted components:

- The first PC is driven by the discretionary accruals and scaled total accruals measures, while the third PC is driven by the log of Accruals. Accruals are typically used as an earnings management means affecting mostly the Balance Sheet. In these lines, I label the first and third component as the Earnings Management on the Balance Sheet components.
- The second PC is loading on the log Market to Book ratio and the log of the C-Score. Both the Market to Book ratio and the C-Score are purported to be capturing unconditional reporting conservatism, i.e. reporting conservatism on

the Balance Sheet. In that sense, I label the second PC as the Unconditional Conservatism component.

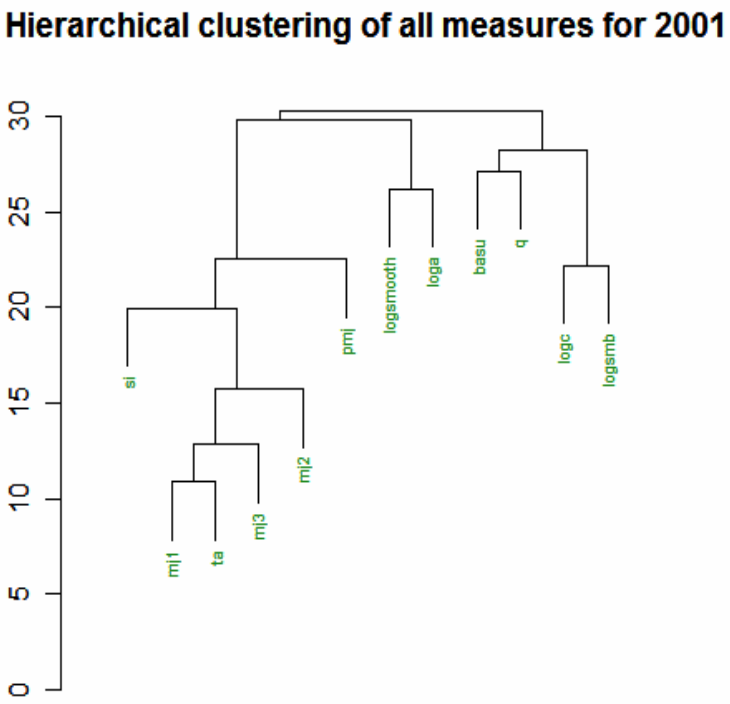
- The fourth PC is driven by the Quality-Score and I label it as the Earnings quality component.
- The fifth PC is driven by the Basu measure of conservatism and I label it as the Conditional Conservatism component. Conditional reporting conservatism captures the reporting conservatism choices that "go through" the Income Statement, while Unconditional conservatism is reflected on the Balance Sheet items.
- The sixth PC is driven by the Income Smoothing ratio. The income smoothing ratio is the ratio compares the variability of operating income to the variability of cash flows from operations and thus the sixth PC captures the earnings management on the income statement and thus I label it as the Earnings Management on the Income Statement component.

For 2003 the first six principal components capture almost 80% of the total variance in my data. For the post SOX year the interpretation of the first six extracted principal components is relatively consistent to the pre SOX year; only the interpretation of the sixth principal component significantly changes. In the post SOX period the sixth principal component is driven by the Basu measure and thus both the sixth and fifth principal components are driven by the Basu measure (Conditional Conservatism).

Unfortunately, for both the pre and post SOX period, PCA does not allow me to capture most of the variation with radically fewer dimensions. Nevertheless, PCA will be useful in the k-means clustering part of my exploratory data analysis (Section 4.5).

5.2 Unsupervised Hierarchical Clustering

In this section I will examine the clustering of the twelve different measures for the pre and post SOX years. My objective is to identify clusters of measures and then compare the clustering solution with my theoretical grouping of the different attributes in earnings quality measures, earnings management measures and reporting conservatism measures. In this part I am interested on the clustering of measures and not on the clustering of firms based on their values for the different measures. In this vein, I perform clustering analysis on the transpose of my dataset. Essentially I am representing the data in the 388-dimensional space (388 firms in the final sample) and identify clusters of measures.



For the pre and post SOX years the clustering of measures does not change and the clustering trees are identical (the clustering trees for both 2001 and 2003 are provided in the Appendix). From the clustering trees I observe that four major sub clusters are formed.

The first one includes the Special Items (si), all the measures of discretionary accruals (mj1, mj2,mj3, pmj) and scaled total accruals (ta), while the second one includes the log of the Smoothing ratio and the log of raw Accruals. These two sub-clusters are linked together forming the first cluster of measures which I naturally label as the ***Earnings Management group of measures*** consistent with my original theoretical grouping of measures (Section3).

The third sub cluster includes the Basu measure of conditional conservatism (Income statement conservatism) and the Q- Score of income statement quality; these two measures "originate" from the income statement and are purported to be capturing related aspects of financial reporting choices. I label this sub-cluster as the *Income Statement based group of measures*. The fourth sub-cluster includes the log of the C-Score and the log of the Market to Book; these two variables measure unconditional reporting conservatism (Balance Sheet conservatism) and thus I label this sub-cluster as the *Balance Sheet based group of measures*. These two sub-clusters are linked together forming the second cluster of measures which corresponds to ***Reporting Conservatism and Earnings Quality group of measures***.

Hierarchical clustering allows me to conclude that there are no major swifts in the grouping of the different measures in the pre and post SOX years and that the different clusters closely follow the theoretical grouping of the measures.

5.3 K-Means Clustering and Principal Components Analysis

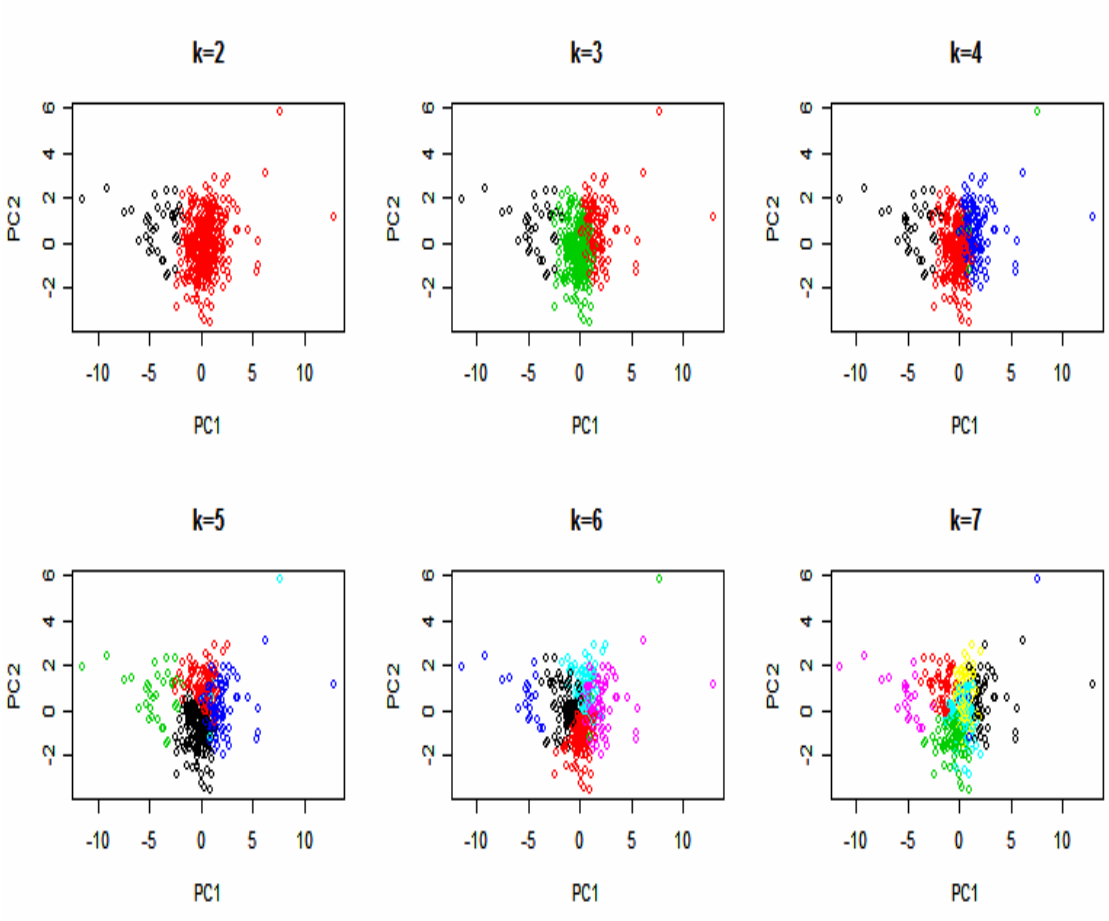
In the k-means clustering, the algorithm starts with k random clusters, and then move objects between those clusters with the goal to 1) minimize variability within clusters and 2) maximize variability between clusters. An important question that needs to be answered before applying the k-means algorithms is how many clusters there are in the data. This is not known a priori and, in fact, there might be no definite or unique answer as to what value k should take. As a first cut in answering this question I start with the plot of the within-cluster sum of squares for each cluster for up to twelve clusters. If there is some natural grouping in the data the SS plot should be able to pick it up. For both the pre and post SOX years the within SS plot does not exhibit the "desired elbow" and thus I am not able to determine the number k of clusters based on these plots (the pre and post SOX plots can be found in the Appendix).

Another commonly used method to determine the number of clusters is to look at the clusters in the Principal Components space. In simple words, I plot the first principal component versus the second principal component and over-impose the k-means clustering solution for different k. I adjust the number k of clusters and choose the

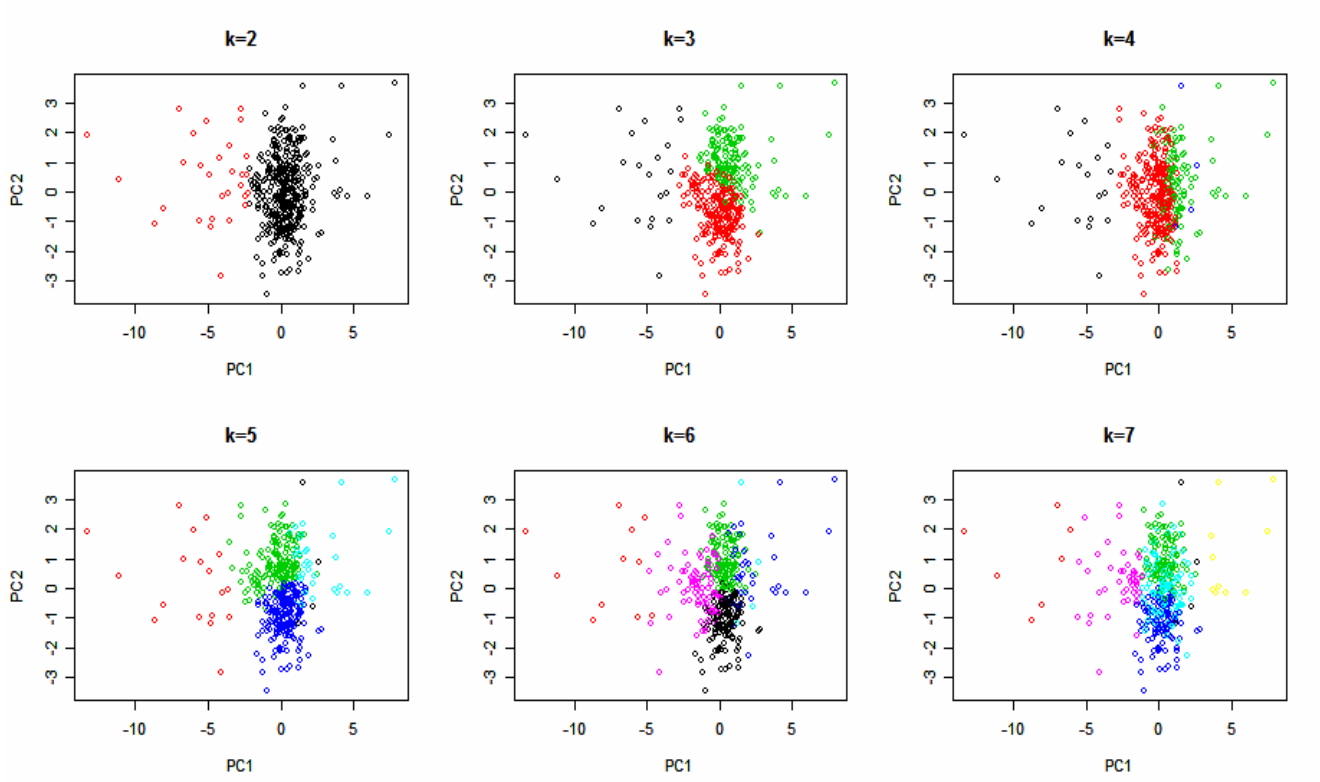
clustering which gives homogenous groups. I focus on the first two principal components because these are the two linear combinations of all the twelve measures that capture a great portion of the variability in my data (enlarged graphs are provided in the Appendix).

For both the pre and post SOX periods, I plot the first principal component versus the second principal component and observe that for k>=4 the k-means groups are not well separated. For k=3 I am able to identify three well separated groups for both the pre and post SOX data.

Graph1: K-means Clustering and PCA for 2001; plots of the first versus the second principal component and k-means clustering for different k



Graph2: K-means Clustering and PCA for 2003; plots of the first versus the second principal component and k-means clustering for different k



In the PCA section (5.1) I documented that for both the pre and post SOX period the main drivers of the first principal component are discretionary accruals and scaled total accruals. I plot discretionary accruals (MJ1) versus scaled total accruals (TA) I and over-impose the k-means clustering solution for k=3. From the resulting graph I observe that the k-means clustering solution identifies three fairly homogeneous groups for 2001 and 2003 with respect to discretionary accruals and total scaled accruals (see Appendix).

In order to compare the k-means clustering solution before and after the SOX, I tabulate the clustering solutions for 2001 and 2003 and construct a confusion matrix. From the confusion matrix I observe that the grouping of firms in the three different clusters remains surprisingly stable in the pre and post SOX years and almost in 90% of the cases the group memberships do not change.

Confusion matrix for k-means clusters (k=3) 2001 versus 2003			
	1	**2**	**3**
1	99	2	2
2	18	127	3
3	1	16	120

5.3.1 K-means and conditional reporting conservatism firms' grouping

A grouping of firms that is of particular interest is based on the Basu measure of conditional reporting conservatism. For both the pre and post SOX years I group firms in aggressive, unbiased and conservative based on the 25^{th} and 75^{th} percentile of the distribution of the Basu measure at the corresponding years; for example a firm is grouped a aggressive if its Basu score is less than the 25^{th} percentile of the distribution of the measure across firms and similarly a firm is classified as conservative if its score is more than the 75^{th} percentile; any score in between the first and third quartile corresponds to unbiased accounting. In order to get a better understanding I compare the k-means grouping to the grouping of firms based on the Basu measure of conditional reporting conservatism.

Confusion matrix for the Basu versus the k-means (k=3) grouping of firms for 2001			
	1	**2**	**3**
Aggressive	41	19	37
Unbiased	67	62	65
Conservative	29	22	46

Confusion matrix for the Basu versus the k-means (k=3) grouping of firms for 2003			
	1	**2**	**3**
Aggressive	68	67	59
Unbiased	28	39	30
Conservative	22	39	36

From the confusion matrices of the Basu grouping versus the k-means clustering solutions for the pre and post SOX period, I observe that the k-means clustering does not really capture well the grouping of firms in aggressive, unbiased and conservative. For 2001 (2003) for only 38% (36%) of the cases, the Basu grouping agrees with the k-means clustering. Given that the k-means clustering of firms in three groups is based on all the twelve measures of earnings quality, earnings management and conservatism the question that arises is to what extent I would be able to predict the Basu-grouping of firms based on these measures. In the following section I turn my analysis to this question.

5.4 Classification Tree

In this section I will attempt to explain the grouping of firms in conditionally conservative, unbiased and aggressive, based on the earnings management, earnings quality and conditional conservatism variables.

For that reason, I will employ a classification tree to predict the tri-nary Basu grouping of firms, using as predictors all the measures that proxy for earnings management, unconditional conservatism and earnings quality. The Basu-grouping of firms is particularly important since it is purported to be capturing how timely firms are reporting incoming market wide news in their Income Statement. The timeliness of the financial reporting practices to incoming market news is an attribute of increasing interest given that financial reporting standard setters in the US are increasingly moving towards Mark to Market financial reporting requirements. The mark to market approach

is evident in the requirements introduced for the expensing of executive stock options and the revaluation of derivatives and other financial instruments.

The grouping of firms in conditionally conservative, unbiased and aggressive is based on the Basu measure. For both the pre and post SOX years I group firms in aggressive, unbiased and conservative based on the 25^{th} and 75^{th} percentile of the distribution of the Basu measure in the corresponding years; a firm is grouped as aggressive if its Basu score is less than the 25^{th} percentile of the distribution of the measure across firms and similarly a firm is classified as conservative if its score is more than the 75^{th} percentile, while any score in between corresponds to unbiased accounting. I create a categorical variable with three levels corresponding to the three different groups (D=1 if aggressive, D=2 if unbiased, D=3 if conservative).

The classification regression tree allows me to predict the Basu-grouping of firms based on all the other measures of earnings management, quality and reporting conservatism. Classification regression trees generally handle well categorical response variables with more than two levels. I run the classification regression tree for both the pre and post SOX years and compare the predictive ability of the model. Before I do so, I examine the consistency of the grouping of firms in 2001 and 2003 based on the Basu measure. I summarize the comparison of the Basu-group memberships in 2001 and 2003 in the following confusion matrix:

Confusion matrix for Basu 2001/2003 grouping

	Aggressive	Unbiased	Conservative
Aggressive	81	14	2
Unbiased	14	168	12
Conservative	2	12	83

The grouping of firms in the pre and post SOX years based on the Basu measure is relatively consistent, since in almost 86% of the cases the Basu grouping of firms in 2001 agrees with the Basu grouping in 2003.

In light of the relative consistency of firms' conditional conservatism grouping in the pre and post regulation years, the application of the classification regression tree is more meaningful. The objective is to predict the tri-nary grouping of firm (conditionally aggressive, unbiased and conservative) based on special items, discretionary and total accruals, the market to book ratio and the smoothing ratio. I apply the *rpart* function in R and tabulate the predicted grouping versus the true grouping for both 2001 and 2003.

From the confusion matrix I calculate the predictive ability of the classification model as the ratio of the sum of the elements of the main diagonal over the total number of firms (sum of all the elements of the confusion matrix). Remember that the samples in 2001 and 2003 are paired and thus the number of firms in the pre and post SOX years is identical.

The classification model does a better job in predicting the Basu grouping in 2001 (62.47%) as opposed to 2003 (58.66%).

Method 1 62.47% **Confusion matrix for true versus predicted Basu-grouping for 2001**			
	Aggressive	Unbiased	Conservative
Aggressive	15	48	42
Unbiased	16	181	13
Conservative	5	34	67

Method 1 58.66% **Confusion matrix for true versus predicted Basu grouping for 2003**			
	Aggressive	Unbiased	Conservative
Aggressive	32	43	22
Unbiased	9	161	24
Conservative	10	33	54

The drop in the predictive ability of the model in 2003 could be potentially explained by the higher frequency of extreme observations in the final sample of firms in 2003 that obscure the classification results. As a robustness check I employ an alternative grouping of firms in aggressive, unbiased and conservative. In the previous

analysis, I partitioned firms in three groups based on the first and third quartile of the Basu distribution separately for 2001 and 2003 (method 1) and thus the cutoff values of the Basu measure were different in the two years. Notice that the pre and post SOX samples are paired and thus the size of the three groups are identical in 2001 and 2003, even though the group memberships might well change. The alternative grouping of firms is based on the first and third quartile of the distribution of the Basu measure in 2001, for both the pre and post SOX years (method 2). In what follows I repeat the above analysis.

First of all I compare the Basu-grouping of firms in 2003 based on the two alternative methods. I tabulate the Basu-grouping of firms based on the first and second method for 2003 (of course the grouping of 2001 is the same under method 1 and 2):

Method 1 vs. Method 2
Confusion matrix for Basu-grouping of firms in 2003

	Aggressive	**Unbiased**	**Conservative**
Aggressive	97	0	0
Unbiased	0	191	3
Conservative	0	0	97

It is apparent that the grouping of firms in conservative, unbiased and aggressive is almost insensitive to the alternative groupings. Only three firms are classified as conservative under the second method and as unbiased based on the first method. The 99% consistency rate is justified in light of the fact that the distribution of the Basu measure does not vary much in the pre and post SOX years. Given that the grouping of firms is almost unchanged I do not expect the post SOX classification regression results to significantly change for the alternative grouping of firms in 2003.

Method 2 62.47% **Confusion matrix for true versus predicted Basu-grouping for 2003**			
	Aggressive	Unbiased	Conservative
Aggressive	27	52	16
Unbiased	12	184	19
Conservative	8	51	52

In the above matrix I tabulate the classification regression results and the true Basu-grouping of firms based on the second method (2001 cutoff values). The classification model performs slightly better in predicting the method 2 Basu grouping in 2003 (62.47%) than the method 1 Basu grouping (58.66%). The grouping of firms based on the pre SOX cutoff values for both 2001 and 2003 is more informative and that is why the classification results improve.

Overall the classification regression tree classifies correctly 62.47% of all cases for both 2001 and 2003. The question is whether it is possible to improve these results using alternative classification methods.

5.5 Alternative Classification methods

5.5.1 Random Forests

The Random Forests algorithm grows many classification trees; each tree gives a classification and thus each tree votes for class memberships. The forest chooses the classification that has the most votes over all the trees in the forest. The developers of the Random Forest algorithm claim that the algorithm has unexcelled in accuracy among current algorithms. In my dataset the Random Forest algorithm performs poorly in classifying firms in aggressive, unbiased and conservative reporters. The classification error is as high as 52% for 2001 and 54.4% for 2003. So the random forest performs worse than the simple classification regression tree for both years.

Random Forest 47.98% **Confusion matrix for true versus predicted Basu-grouping for 2001**			
	Aggressive	Unbiased	Conservative
Aggressive	13	84	8
Unbiased	18	170	22
Conservative	8	79	19

Random Forest 45.60% **Confusion matrix for true versus predicted Basu-grouping for 2003**			
	Aggressive	Unbiased	Conservative
Aggressive	7	79	9
Unbiased	21	167	27
Conservative	7	86	18

Given that the results obtained from the Random Forest Classification algorithm are discouraging, I turn my analysis to the Support Vector Machines classifiers.

5.5.2 Support Vector Machines

The SVM classifier is a powerful data mining tool for the classification of both linear and non linear data that could potentially allow me to predict the Basu firm grouping more efficiently than the Classification regression tree. The basic idea behind the SVMs is that of the maximal margin hyperpane; a linear SVM is trained to explicitly look for this type of hyperplane in linearly separable data. This main idea can be extended to non linearly separable data.

The grouping of firms based on pre SOX cutoff values is more informative in the sense that it is not affected by (the minor) swifts in the cross sectional distribution of the Basu measure in the post SOX year. In this vein, I group firms based on the first and

third quartile of the distribution of the Basu measure in 2001 for both the pre and post SOX years. Firms with a Basu score below the 25th percentile of the Basu measure's distribution are labeled as aggressive, firms within the 25th and 75th quartiles as unbiased and firms above the 75th quartile as conservative. This grouping method is more informative given that it allows the potential swift in the distribution of the Basu measure in the post SOX year to affect the firms' grouping.

The SVM classification method allows me to answer the question whether I can classify firms in conditionally conservative, aggressive and unbiased reporters based on earnings management, earnings quality and conditional conservatism attributes. I run the SVM classification method for both the pre and post SOX years and compare the predictive ability of the model. I will start my analysis using a linear SVM and compare its performance to that of the classification regression tree then I will consider using a non linear SVM.

Throughout my analysis I use the ksvm function of the "kernlab" library in R. I report the classification results using both linear and non linear SVMs. For the non linear SVMs I experimented with several kernel functions and I tabulate the results based on the ANOVA kernel function. Similarly to the previous section I calculate the predictive ability of the SVM classification model as the ratio of the sum of the elements of the main diagonal over the total number of firms in sample (i.e. the sum of all the elements of the confusion matrix). Unfortunately, the plot function in R only supports visualization of binary classification problems. I tabulate results based on the linear kernel and radial kernel. The results are similar for other kernel functions such as the ANOVA, radial basis kernel and the Laplacian kernel.

The linear SVM does a poor job classifying firms in either conservative or aggressive for both 2001 and 2003. Essentially the linear SVM pools all firms together as unbiased reporters and even though it succeeds in not misclassifying truly unbiased reporters, the classification error is as high as 48-49%. It could be the case that the data are not linearly separable and thus the linear SVM might not be the appropriate classification technique. For that reason I also report results based on a non linear SVM that uses the radial basis Gaussian kernel function.

Linear SVM 51.07% **Confusion matrix for true versus predicted Basu-grouping for 2001**			
	Aggressive	Unbiased	Conservative
Aggressive	4	101	0
Unbiased	0	210	0
Conservative	0	105	1

Non Linear SVM (Radial basis Gaussian Kernel) 67.69% **Confusion matrix for true versus predicted Basu-grouping for 2001**			
	Aggressive	Unbiased	Conservative
Aggressive	41	64	2
Unbiased	0	209	1
Conservative	0	69	35

The first observation is that the non linear SVM outperforms by far the linear SVM and thus the data are not linearly separable. Interestingly enough the poor performance of the linear SVM is comparable to that of the Random Forest algorithm. Further, the non linear SVM outperforms the classification regression tree; the SVM (classification regression tree) classifies correctly 67.69% (62.47%) of all cases in 2001 and 69.12% (62.47%) of all cases in 2003. Admittedly the difference in the performance of the non linear SVM and that of the classification regression tree is not too dramatic in but yet it is significant for both 2001 and 2003.

Linear SVM 52.02% **Confusion matrix for true versus predicted Basu-grouping for 2003**			
	Aggressive	Unbiased	Conservative
Aggressive	2	91	2
Unbiased	1	214	1
Conservative	0	108	3

Non Linear SVM (Radial basis Gaussian Kernel) 69.12% **Confusion matrix for true versus predicted Basu-grouping for 2003**			
	Aggressive	Unbiased	Conservative
Aggressive	39	54	2
Unbiased	0	214	1
Conservative	1	72	38

The non linear SVM classification model is predicting fairly well the Basu-grouping of firms for both the pre and post SOX years and thus I conclude that earnings management, earnings quality and unconditional reporting conservatism are "useful" in predicting conditional conservatism. The difficulty in the classification task is concentrated on the aggressive and conservative reporters. It is possible to get better results if I were to employ a different grouping of firms at the first place. For example rather than partitioning firms at the first place based on the first and third quartiles of the Basu measure's distribution I could allow for a bandwidth around these cutoff values and thus I could pin down the "marginal" conservative or aggressive reporters and potentially exclude these firms from my analysis or simply pool them with the unbiased reporters.

As a robustness check I evaluate the non linear SVM classifier performing ***Leave One Out Cross Validation***. At the first step I train the non linear SVM using all records. At the second step I use the trained model to predict and validate the classification of the record that is left out from the training process. I repeat the validation process N times. The "svm" function in the e1071 library, conveniently allows the execution of k-fold cross validation. The cross validated misclassification error slightly drops for 2001 at 61% and for 2003 at 65.7%.

In general though, my findings (i.e. that the conditional reporting conservatism-based partitioning of firms is predictable based on earnings management and reporting quality) is important given that the Basu-grouping of firms is purported to be capturing how timely firms are reporting incoming market-wide news in their Income Statement.

Thus these findings are in support of theoretical claims that reporting conservatism is inexorably linked to reporting quality and earnings management.

6. Paired sample t-tests

In the final sample there are 388 firms with values for twelve different variables proxying for earnings quality, reporting conservatism and earnings management. For a firm to participate in the final sample, it has to have values for all measures for both 2001 and 2003. The question that naturally arises is whether in the post SOX year earnings quality, reporting choices and earnings management have changed. Each variable is measured before and after the SOX for any given firm and thus a paired sample t-test could be used to detect significant changes in the post SOX year.

The paired sample t-test allows me to determine whether there is a statistically significant difference between the average values of the same measurement made before and after the passage of SOX. Both pre and post measurements are made on each firm for all variables and the test is based on ***paired sample*** differences. The null hypothesis is that the mean paired sample difference is zero and the two sided alternative is that the mean paired sample difference is not equal to zero.

H_0: $\Delta = \mu_{post} - \mu_{pre} = 0$

H_1: $\Delta = \mu_{post} - \mu_{pre} \neq 0$

In the following table I present the paired sample t-test results for the twelve different measures of the final sample of 388 firms:

paired sample t-tests	**mean of differences**	**t stat**	**p-value**	**95% Confidence Interval**	
Special Items	0.01172615	**2.6397**	0.008	0.002992	0.020459958
Basu	0.001694156	0.2902	0.7718	-0.00979	0.013173374
log(MB)	0.1264755	**4.0756**	0.00005	0.065462	0.1874887
log(C-Score)	0.05158796	**2.0679**	0.03931	0.00254	0.100636201
Q-Score	0.08209592	1.2975	0.1952	-0.0423	0.20649478
MJ1	0.006196009	1.1503	0.2507	-0.00439	0.016785975
MJ2	0.005884857	1.2999	0.1944	-0.00302	0.014785659
MJ3	0.01071507	**2.1424**	0.03278	0.000882	0.020548373
PMJ	0.01629962	**2.1286**	0.03392	0.001244	0.031355033

TA	0.01131272	**2.1281**	0.03396	0.000861	0.021764562
log(A)	0.01281765	0.7772	0.4406	-0.01983	0.04546328
log(Smooth)	-0.01667563	-0.4768	0.6338	-0.08544	0.05208985

Across all measures the mean of difference is positive with the exception of the log of the Smoothing ratio and thus in the post SOX period earnings quality (Q-Score) and reporting conservatism (C-Score, Basu, MB ratio) have increased. At the same time earnings management, as captured by the measures of discretionary accruals (MJ1, MJ2, MJ3, PMJ), total scaled accruals (TA), special items and the smoothing ratio, has increased. More specifically the mean paired sample differences are significant (at the 5% level) for the measures log(MB), log (C Score), MJ3, PMJ, Special Items and TA.

6.1 Discussion of the results

In the pre SOX period unconditional reporting conservatism as captured by the Market to Book ratio and the C-Score has significantly increased and this is expected in light of the more stringent capital expensing requirements introduced after 2002 by the SOX. At the same time though, the higher magnitude of discretionary accruals (MJ1, MJ2, MJ3 and PMJ), total scaled accruals (TA) and the lower income smoothing ratio (Smooth) indicate that in the post SOX period earnings management has increased.

From the comparison of the pre and post SOX period, I provide evidence that firms have become more conservative in their financial reporting. The surprising finding is that even though firms have become more conservative in the post SOX year, they report significantly higher discretionary, total accruals and special items and experience a lower smoothing ratio, i.e. more variability in operating cash flows relative to the variability of Operating Income, consistent with using accruals and special items to manage the earnings stream.

These findings appear to be contradicting each other; on the one hand firms seem to be reporting more conservatively in the post SOX year and on the other they are reporting more opportunistically, managing more extensively earnings. But how do these facts reconcile with each other? A plausible explanation is that firms in the post

SOX era have become more conservative in their accounting choices; they tend to more timely recognize bad news as opposed to good news and understate their book value relatively to their market value ***but they do so excessively***.

The excessive use of conservative financial reporting methods is another form of managing earnings that the SEC has long recognized. In fact, the SEC supports the view that both excessively conservative and aggressive reporting choices are forms of managing earnings.

The implementation of excessive conservative choices is consistent with firms being excessively pessimistic over their future prospects after the market crash of 2002 and the passage of the SOX regulation. It is also consistent with the opportunistic use of excessively conservative reporting with the intention to build up reserves that could be used to smooth out expected future bad performance.

6.2 Robustness

In this sub section I resort to the histograms and pairs plot of the paired differences for all measures (both are provided in the Appendix along with summary statistics), so as to obtain a better understanding of the paired sample differences in the pre and post SOX period. The histogram and pairs plot of paired differences will allow me to identify outlier-firms that potentially drive/ obscure the results.

First of all the mean (median) paired sample differences of log Market to Book ratio is 0.12 (0.05) and thus the distribution of the log MB is right skewed. There are four firms in the extreme of the right tail with a log Market to Book paired difference of more than 2. The question that arises is whether the finding that in the post SOX year the log MB ratio has significantly increased, is driven by these few extreme observations.

In these lines, the mean (median) paired sample C-Score differences are 0.049 (0.030). I identify that in the distribution of the paired sample differences of the log C-Score there are only two firms with pre and post SOX C-Score difference of more than 2 and four firms of less than -2. In light of these potential extreme values I need to revisit

the finding that the log C-Score is found to have significantly increased in the post SOX period.

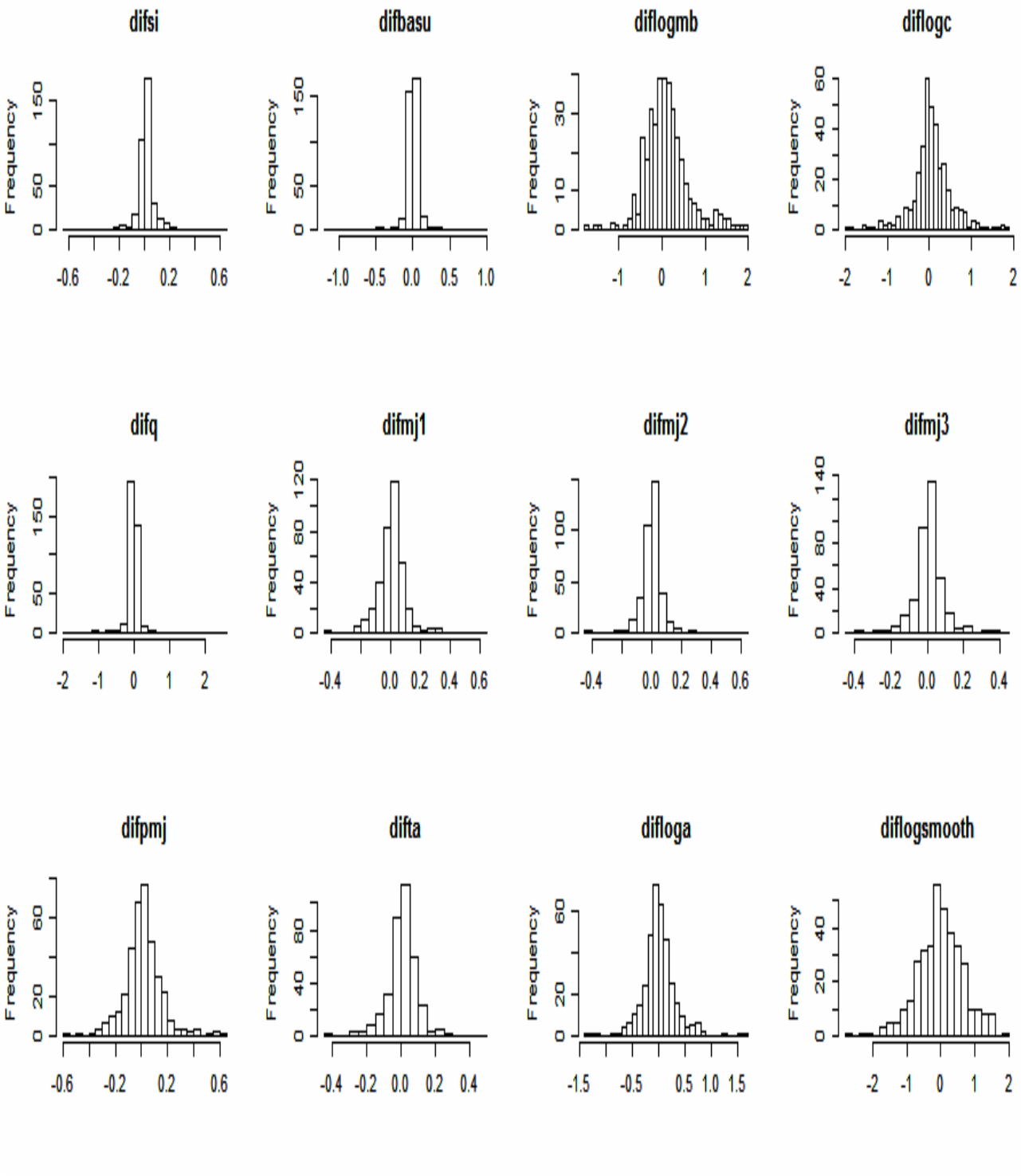
Similarly the mean (median) paired sample Q-Score difference is 0.08 (-0.002) and from the histogram of the distribution of the Q-Score paired sample difference I identify seven firms with a paired sample Q-Score difference of more than 5 and three with less than -5.

In order to test the robustness of my results I trim my final sample excluding firms according to the following criteria:

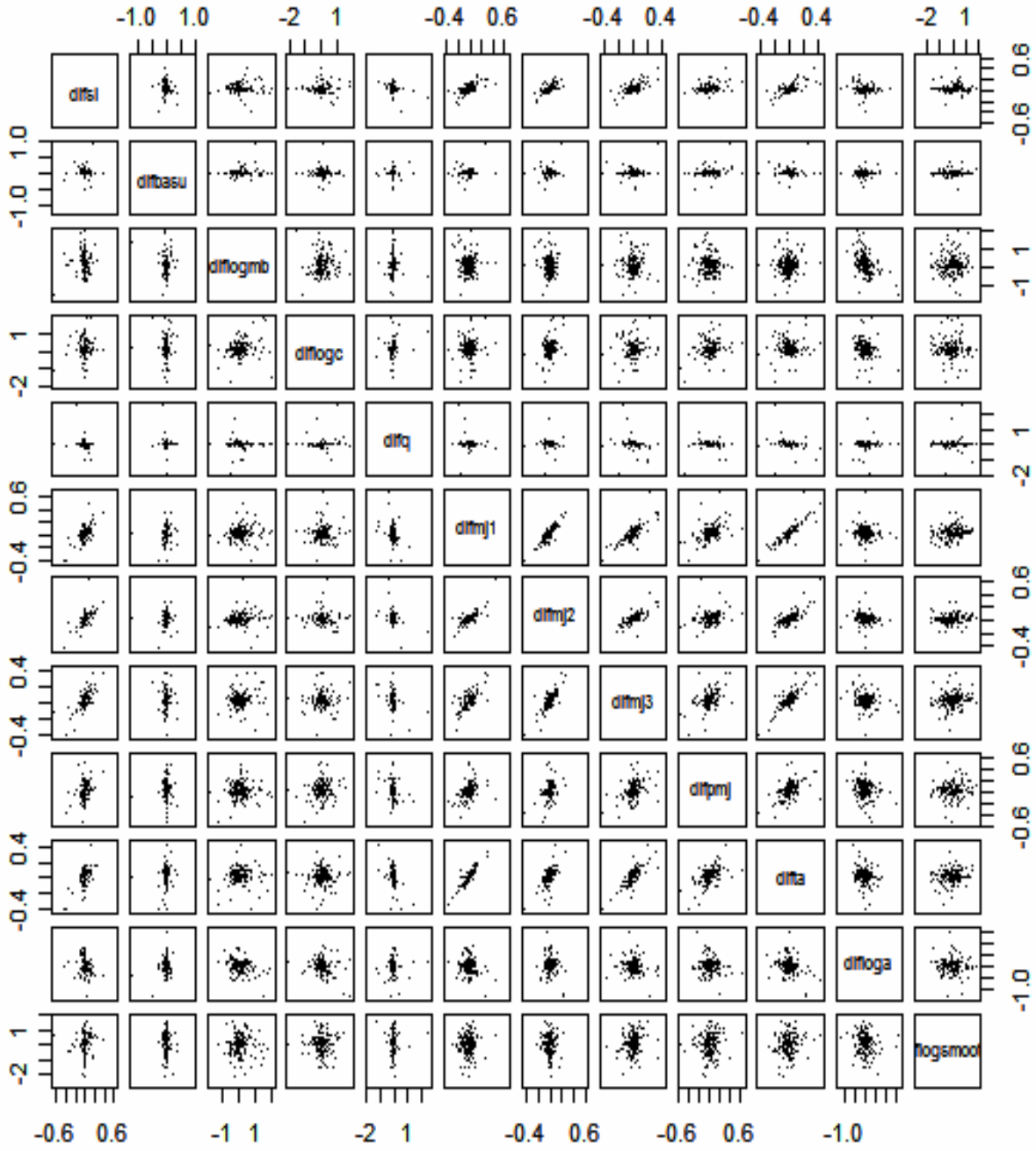
- *The log Market to Book paired sample difference is more than 2.*
- *The log C-Score paired sample difference is more than 2 or less than -2.*
- *The Q-Score paired sample difference is more than 5 or less than -5.*

The trimmed sample of firms includes 370 firms. From the ticket identification codes I pin down that all the excluded firms are small capitalization firms, operating in the high tech sector of internet providers. These firms were the ones that were more adversely affected by the market crash of 2001. I re-employ the paired sample t-test for the trimmed sample of firms. For the reader's convenience I include the histograms and pairs plot of the paired sample differences corresponding to the trimmed sample of 370 firms here:

Histograms of paired mean differences for the trimmed sample of firms



Pairs plot of paired mean differences for the trimmed sample of firms



In the following table I present the paired sample t-test results for the twelve different measures of the trimmed sample of 370 firms:

paired sample t-tests	mean of differences	T stat	p-value	95% Confidence Interval	
Special Items	0.01057818	**2.3372**	0.01996	0.001678033	0.019478330
Basu	-0.002001433	-0.3429	0.7319	-0.01347978	0.009476914
log(MB)	0.1021476	**3.8283**	0.0001516	0.04967865	0.15461655
log(C-Score)	0.06080205	**2.386**	0.01754	0.01069235	0.11091175
Q-Score	-0.007337252	-0.5363	0.5921	-0.03423958	0.01956508
MJ1	0.005361088	1.0177	0.3095	0.3095	0.015720171
MJ2	0.004646628	1.0729	0.284	-0.00386955	0.013162811
MJ3	0.01051403	**2.1234**	0.0344	0.00120496	0.017557907
PMJ	0.01578952	**2.1175**	0.0349	0.00173752	0.027880301
TA	0.01031163	**2.1192**	0.0347	0.00134104	0.018961763
log(A)	0.00990724	0.6001	0.5488	-0.02255889	0.04237337
log(Smooth)	-0.01247773	-0.3513	0.7255	-0.08231820	0.05736274

Across all measures the mean of difference is positive with the exception of the log of the Smoothing ratio and thus in the post SOX period earnings quality (Q-Score) and reporting conservatism (C-Score, Basu, MB ratio) have increased and at the same time earnings management has increased (MJ1, MJ2, MJ3, PMJ, TA Special Items and log of Smoothing ratio). As for the final sample, the mean paired sample differences are significant (at the 5% level) for the measures log(MB), log (C Score), MJ3, PMJ, Special Items and TA.

The surprising finding that in the post SOX year firms are not only reporting more conservatively, but also more opportunistically remains intact for the trimmed sample and thus it is not driven by few extreme observations.

6.3 Identifying interesting groups of firms based on the pre and post SOX differences

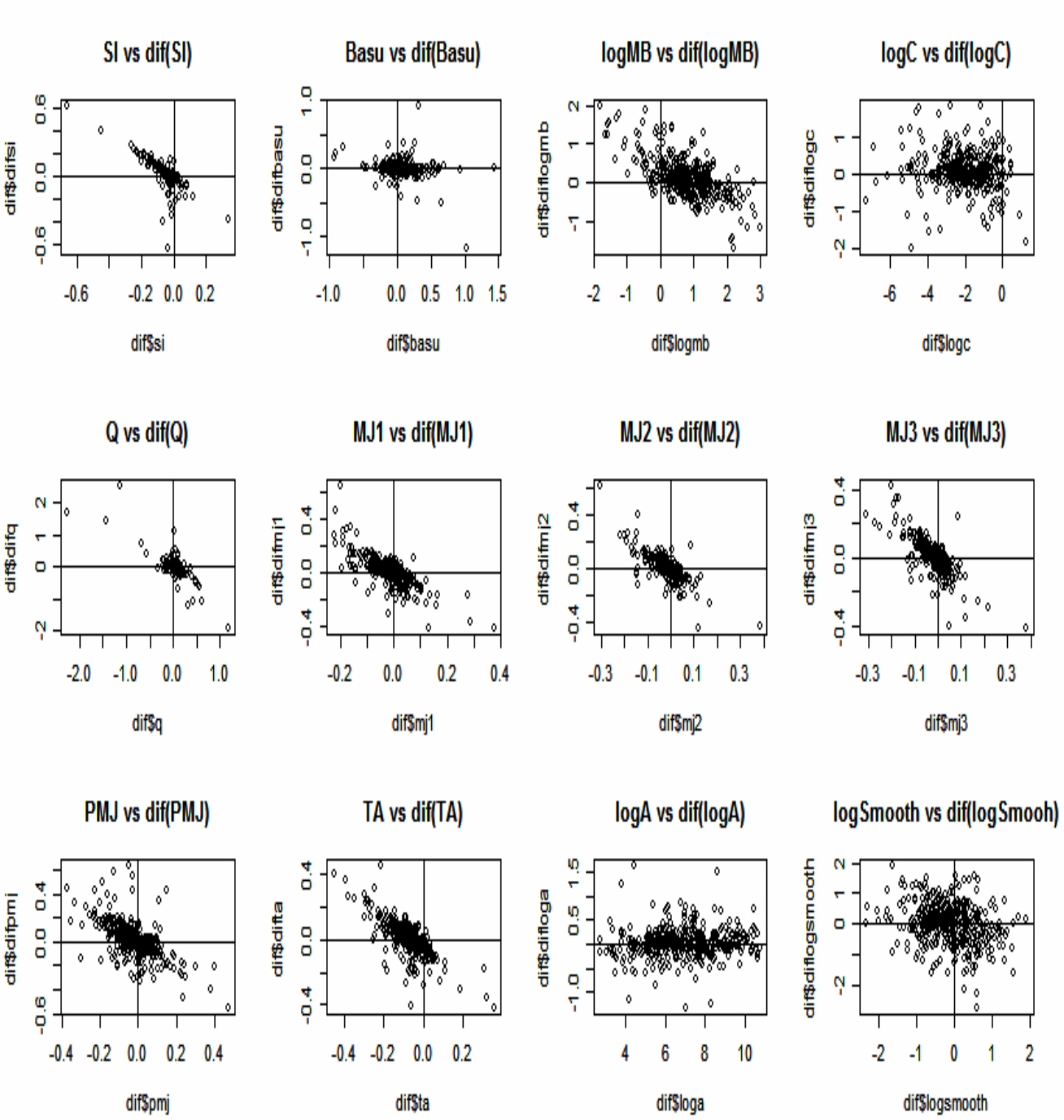
In the Appendix I provide the plots of values in 2001 versus the paired sample differences (2003-2001) across all measures, for both the final and the trimmed sample

of firms. These plots enable me to identify clusters of firms based on the pre SOX values and the post SOX differences. The analysis does not materially change for the final and trimmed samples.

From the plot of special items in 2001 versus its paired sample differences I identify an interesting group of firms. Firms that in 2001 had high *negative* special items are the ones that experienced the higher *increase* in special items; intuitively these are the firms that are more likely to have been using opportunistically negative special items in 2001 in order to manage downwards their earnings. It seems that in the post SOX year, these firms reduced the use of *negative* special items but at the same time increased the use of *positive* special items so as to manage their earnings upwards. It seems that firms that were aggressively managing earnings downwards in the pre SOX period are now aggressively managing earnings upwards consistent with releasing the pre SOX "cookie jar reserves" in the post SOX year. Cookie jar reserves is a jargon term used for reserves that are created in the past used to artificially boost performance in the future.

Similarly, from the plot of log Market to Book ratio in 2001 versus its paired sample differences I uncover that the firms with low log Market to Book ratio in the pre SOX year are the ones that experienced the highest increases in the log MB ratio in the post SOX year. In other words, the firms that were the most aggressive reporters in the pre SOX year are the ones that in the post SOX year have experienced the biggest increases in the magnitude of conservatism in their financial reporting.

Plots of values in 2001 versus the paired sample differences across all measures for the trimmed sample of firms



In these lines, based on the plots of discretionary accruals (MJ3 and PMJ) and total scaled accruals (TA), I pin down firms that in the pre SOX years had low discretionary accruals (total accruals) as the ones that experienced the highest increase in the post SOX years. Further, firms that in the pre SOX years had high discretionary accruals (total scaled accruals) are the ones that in the post SOX year experienced the highest drop in their discretionary accruals (total scaled accruals). These findings imply that firms which in the pre SOX year were managing earnings downwards through low discretionary accruals, in the post SOX year are increasing their discretionary accruals consistently with releasing prior reserves and managing earnings upwards in 2003. At the same time firms that were managing earnings upwards in the pre SOX year through high discretionary accruals are the ones that are more likely to have already used up their reserves and thus in the post SOX year are decreasing their discretionary accruals managing earnings downwards through low discretionary accruals so as to "recharge" their reserves.

7. Conclusions

This study explores a unique sample of more than 400 US firms, listed in major stock exchanges. For each firm I estimate values for twelve different measures of unconditional and conditional reporting conservatism, earnings management and earnings quality for the years before and after the passage of the Sarbanes Oxley Act. I employ a war chest of data mining tools and identify interesting attributes in the dataset. Instead of reiterating all these results in the conclusion, I highlight the three major findings of this study.

The first finding is that for both the pre and post SOX years, earnings management, earnings quality and unconditional reporting conservatism are useful variables in predicting which firms are *conditionally* conservative, unbiased or aggressive. This finding is particularly important given the theoretical link between conditional and unconditional reporting conservatism and the long recognized by the SEC links of earnings management and reporting conservatism.

The second finding is that in the post SOX year firms have become more conservative in their financial reporting, but this comes as no surprise given the more stringent capital expensing requirements enforced by the SOX act. The surprising finding is that even though firms have become more conservative in the post SOX year, they report significantly higher discretionary, total accruals and special items consistent with an increase in earnings management **after** the passage of the new regulation.

In the post SOX year, firms are significantly more conservative in their *Balance Sheet* reporting choices, but at the same they are significantly more opportunistic in their *Income Statement* reporting choices. Even though these findings seem to be pointing to different directions they clearly give credit to the view held by the SEC that the excessive use of conservative financial reporting methods is another form of managing earnings. These results have direct implications for the standard setters and call for a more rigorous investigation of the pre and post SOX changes in corporate financial reporting.

References

Basu, S., 1997. The conservatism principle and the asymmetric timeliness of earnings. *Journal of Accounting Economics* **24**, pp. 3–37

Brown S., Kin Lo and Thomas Lys, 1999. Use of R2 in accounting research: measuring changes in value relevance over the last four decades *Journal of Accounting and Economics* **28**, pp. 83-115

Collins, D.W. and Kothari, S.P., 1989. An analysis of the inter-temporal and cross-sectional determinants of earnings response coefficients. *Journal of Accounting and Economics* **11**, pp. 143–181

Collins, D.W., Pincus, M., Xie, H., 1996. Equity valuation and negative earnings. Working paper series 95-16, University of Iowa.

Conrad J., Cornell B. and Landsamn W.R., 2002. When Is Bad News Really Bad News?. *The Journal of Fiance* **LVII,** pp. 2507-2532

Dechow, P. 1994. Accounting earnings and cash flows as measures of firm performance: The role of accounting accruals. *Journal of Accounting and Economics* **18,** pp. 3–42

Easton, P. and Haris T.S., 1991. Earnings as an Explanatory Variable of Returns. *Journal of Accounting Research* **29**, pp. 19–36

Hunt, A., Moyer, S.E., and Shevlin, T., 1997. Earnings volatility, earnings management and equity value. Working paper, University of Washington.

Jones, J.J. 1991. Earnings management during import relief investigations. *Journal of Accounting Research*, **29**, pp.193-228

Kormendi, R. and Lipe, R., 1987. Earnings innovations, earnings persistence, and stock returns. *Journal of Business* **60**, pp. 323–345

Patatoukas, P. 2006. Has financial reporting changed in the Post SOX era?, Working Paper, SOM, Yale University.

Patatoukas, P. 2006. Is Reporting Conservatism on the Rise?, Working Paper, SOM, Yale University.

Appendix

The Appendix includes graphs and tables in the following order:

I. *Graphs for 2001*

II. *Tables for 2001*

III. *Graphs for 2003*

IV. Tables for 2003

V. Graphs for paired sample differences

VI. *Tables for paired sample differences*