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Earnings management during recessions

A study on US listed firms

Alexander Airaxin

23563@student.hhs.se

Love Berglund

23709@student.hhs.se

Abstract

We examine the relationship between underlying macroeconomic conditions and the tendencies for firms to manage earning. We do this by focusing on both accrual-based and real activities manipulation over time, using a time-series approach. We find some evidence that during periods of recession firms manage earnings downwards through the use of discretionary accruals.

Contents

1. Introduction

In this section we introduce the subject with a short background to our research questions. We further talk about the purpose of this paper and how it is delimited. We end the section with a disposition description for the remainder of the paper.

1.1 Background

Accounting allows companies to translate their, often complicated, everyday business into easily interpreted numbers of profitability and performance. To easily compare different companies, and to be able to trust financial reports, there are accounting standards. In the US, domestic firms typically follow the Generally Accepted Accounting Principles (US GAAP) and foreign firms trading in the US may follow International Financial Reporting Standards (IFRS). The guidelines and principals of these standards help various stakeholders use and make decisions based upon information obtained through firms' financial reports. Accounting scandals, such as the Enron scandal in 2001, showed how big of an impact earnings management, or other fraudulent accounting behaviour, can have on society at large.

In this paper, we examine the relationship between underlying macroeconomic conditions and the tendencies for firms to manage earnings. Most previous literature has focused on the relationship between earnings management and firm-specific effects (Cohen & Zaronwin, 2007). However, previous literature has also shown that various economic conditions have an effect on earnings management. Bereskin et al. (2015) found that, in a sample of US firms 1990-2012, shifts in earnings management could be related to significant tax, regulatory and economic changes over time. In this study we argue that the tendencies for firms to manage their earnings shift depending on the underlying macroeconomic conditions. We define the underlying macroeconomic conditions by weather the economy is in a recession or not, as reported by the National Bureau of Economic Research (NBER).

In previous studies, namely two models have become dominant in measuring earnings management. Jones (1991) focus on accrual earnings management while more recent papers have developed models for measuring real earnings management (Roychowdhury 2006; Cohen et al. 2008; Zang 2007). The two ways of managing earnings, by accruals or real manipulation,

can act as substitutes (Zang 2012). For that reason, this study encompasses both types of earnings management since our aim is to find out if earnings management on a whole differ between different macroeconomic conditions. If we chose to look at only accruals, or only real manipulation, our conclusions could not be fully justified since managers may have substituted one for the other.

There are many possible factors contributing to why earnings management may increase or decrease over time. New regulations can affect earnings management, at least in the short term, as managers are less confident their manipulation won't get caught by these new regulations. Cohen et al. (2007) noticed a decrease in accrual-based earnings management after the passage of Sarbanes Oxley (SOX) act in 2002 but that real earnings management activities increased after SOX. Bereskin et al. (2015) found that significant tax, regulatory or other economic changes could affect the level of earnings management. Because of the many possible factors which contribute to the level of earnings management, our goal in the current study is not to explain the total variation seen in earnings management over the years, but rather to study if the underlying economic conditions do in fact affect how managers use earnings management or not. Our conclusions drawn could thus say to be conservatively made, as we are aware that other factors play a role.

Our study is relevant not only because it investigates the relationship between earnings management and underlying economic conditions but also because of our chosen approach in measuring and testing. There is a limited amount of research performed in this area and thus our study contributes to the earnings management literature.

Previous research (Cohen et al. 2007 and more) has attempted to measure such a relationship using mostly a cross-sectional approach to either the jones model or a derivative thereof. We however conjecture that this approach is not statistically sound since if macro-economic conditions have an effect on the overall sample, which is theorised, then a cross-sectional regression will not show accurate values because we measure on all firms for one specific year. We develop our reasoning under section *method*. Our method of time-series regression has its own set of issues but at least not, in theory, the issue stated above. Our study should therefore suite well as a complement to previous research.

1.2 Delimitations

Our study is limited to the period 1988 – 2010. This is because effective from fiscal years ending after July 15, 1988, the Financial Accounting Standards Board Statement (SFAS) #95 requires US companies to report a cash-flow statement. Therefore, this limitation allows us to SFAS #95 statement of cash flow data rather than using a balance-sheet approach. This limitation is also appropriate because a lot of the previous research has done this limitation too, which makes comparisons easier.

Our study is also limited to publicly held companies in the US. There are mainly three reasons for this, (i) we get a larger sample of data over our desired time-period, (ii) our research questions are most relevant for public companies because of market incentives of earnings management (see literature review), and (iii) for comparability with prior research as most related research have been done in publicly held companies. We also only accept firms that were active (i.e. hadn't filed for bankruptcy) during the investigated time period.

Finally, the focus of our study is limited to research whether a link between earnings management and the underlying economy exists. More evidence on why this link does or doesn't exist is not within the scope of this paper. The paper also does not go into explaining why the underlying economy is in a certain state at a certain time, instead we refer to the National Bureau of Economic Research for information on the underlying economy.

1.3 Disposition

The remainder of this paper is structured as follow: in section 2 we present the theoretical framework for our study and relevant previous literature in the research area of earnings management. In section 3 we present how we conducted our study, namely the data and models used for measuring earnings management. Then, in section 4 we present the results of our study, followed by a discussion of the result in section 5. We finish our paper in section 6 where we talk about reliability, validity and generality of our study and we also make suggestions for future research.

2. Theory & Previous Research

In this section we present the theories and theoretical framework behind why earnings management occurs. We also define earnings management. Then we introduce the most common approaches that previous research has used to detect and measure earnings management. We also talk about how the underlying economy is defined in our paper.

Accrual-based accounting is different to cash-based accounting. They differ in terms of the timing of recognizing revenue and expenses. Whilst cash-based accounting is focused on a more immediate timing, the accrual method focuses on anticipated revenue and expenses. Due to the operating nature of firms, a lot of information would be hidden if only cash-based accounting would be used, for example in a company with growing sales made on credit. Accrual-based accounting will, unlike cash-based, reflect these credit sales. Although some uncertainty might exist with those transactions, they do generally provide a better picture of the company when reported correctly. Management, however, possesses tools for achieving a desired picture of financial reports rather than a complete and fairer picture when it comes to estimates. For example, suppose a manager wishes to meet a quarterly sales target to get a bonus, the manager might be tempted to offer a discount to make customers purchases realized in the current quarter. Another thing managers might do is to reduce their estimates of uncollectible accounts which could be justified for by better economic outlook. Because of the context of a business it is often hard to prove that a manager's estimate is right or wrong in the current period. Because of the estimation processes, which are necessary for accrual-based accounting information, room for manipulation of accounting numbers exist inherently.

2.1 Theoretical economic framework behind Earnings Management

2.1.1 Agency Theory

Agency theory is widely used in many fields of research and is often described as principal-agent theory. The theory analyses the contract between a principal and an agent using assumptions about people, organizations, and information (Jensen, 1983).

In simple terms, agency theory describes the goal conflict between an agent (e.g. management of a company) and a principal (e.g. the company's shareholders) (Jensen & Meckling, 1976). Goal conflict can occur because the agent is more risk averse than the principle, as the principal can diversify his portfolio while the agent is unable to diversify his employment. Another goal conflict can occur because of the limited insight the principal has into the agent's work, because of the information asymmetry that exists. The goal conflict in agency-principal theory ultimately may result in the agent (manager) making decisions that benefit him rather than what is best for the principal (shareholders, or the company on a whole).

To achieve goal congruence between the agent and principal, many organizations put interest alignment mechanisms in place. The most commonly discussed for management are stock option plans or bonuses (Demsetz, 1983). The idea behind this is that managers best interest is now aligned with shareholders interest i.e. maximizing stockholder wealth.

2.1.2 Positive Accounting Theory

Another relevant theory is positive accounting theory (PAT), developed by Watts and Zimmerman (1986). PAT stands in contrast to normative accounting, as it tries to explain why managers use the actual accounting practises they do, while the latter seek to explain what would be optimal. The theory is based on similar assumptions about people as agency-theory, namely that people (e.g. managers) are motivated by economic self-interest. In practise, this would mean a manager selects accounting method based on numerous factors, for example how external stakeholders would view the financial numbers based on the underlying economic conditions and picks the one which would result in the highest personal gain.

2.1.3 Big Bath Accounting

Big bath accounting is a term which usually means reducing earnings today so that you can increase earnings tomorrow (Riahi-Belkaoui, 2004). The situation, described by Healy and Wahlen (2004), is when the current earnings are so low it is nearly impossible to reach the target earnings. The managers then get an incentive to *take a bath* by lowering earnings in hope they can increase earnings tomorrow and reach the target earnings. Another view of Big Bath is

given by Copeland and Moore (1972) who defines big bath accounting as "cleaning" the balance sheet; managers write down assets and make provisions for calculated losses.

In recessions, firms make lower earnings and sometimes have negative earnings. We can therefore expect, in accordance with big bath accounting, that firms will write down earnings during recession years. Healy and Wahlen (1999) showed that mangers of companies that did not reach expected earnings, or if the earnings were low, had incentives to write down earnings even further. This is also in line with Kirschenheiter and Melumad (2002) findings that firms increase losses in order to save earnings for future years.

2.2 Earnings Management

There are various definitions of earnings management. Ronen and Yaari (2008) summarize the different views of earnings management as by classifying them into three boxes.

White	Grey	Black
Earnings management is taking advantage of the flexibility in the choice of accounting treatment to signal the manager's private information on future cash flows	Earnings management is choosing an accounting treatment that is either opportunistic (maximizing the utility of management only) or economically efficient.	Earnings management is the practice of using tricks to misrepresent or reduce transparency of the financial reports.
Ronen and Sadan (1981), Demski, Patell and Wolfson (1984), Demski (1998), Beneish (2001), Sankar and Subramanyam (2001)	Field, Lus, and Vincent (2001), Scott (2003)	Schipper (1989), Levitt (1998), Healy and Wahlen (1999), Tzur and Yaari (1999), Chtorou, Bédard, and Courteau (2001), Miller and Bahnson (2002).

The white box represents beneficial earnings management which would enhance the transparency of financial reports. The grey box represents earnings management which is within

the boundaries of accounting standards but could give a too opportunistic view. The black box represents earnings manipulation and fraud.

A widely accepted definition of earnings management, and the one used in our paper, is given by Healy and Wahlen (1999) who states the following:

> **Definition:** "*Earnings management occurs when managers use judgement in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reporting accounting numbers.*"

Healy and Wahlen (1999) further brings up situations when earnings management occurs. They state that it occurs when managers compensation is tied to earnings or to increase their job security or when managers are trying to avoid debt covenants. However, they state that prior research is unclear as to how widespread this phenomenon is. They further suggest that regulatory considerations may induce managers to manage their earnings.

There are extensive evidence of managers using earnings management activities (see for instance Cohen and Zarowin, 2007). Cohen and Zarowin brings up, based on prior studies, three categories of reasons why managers participate in earnings management: (i) capital markets motivations, (ii) contractual arrangements, and (iii) to influence and impact third parties. To our study, category (i) is most relevant because we predict that capital markets motivations differ in recession periods and non-recession periods.

2.2.1 Capital markets motivation for Earnings Management

As described in the section above, capital markets motivation is most relevant to this study and here we look at it further.

The motivator comes from investors and potential investors, who looks at a firm's financial reports for valuation purposes. Conrad et al. (2002) found evidence that investors react differently to news about the firm (e.g. quarterly earnings reports) if the overall economy is good or bad. Thus, the incentive for managers to participate in earnings management activities

should be different depending on the overall state of the economy, as our research question propose.

2.2.2 Accrual-based earnings management vs. Real earnings management

Managers have two different tools to achieve earnings management. The first is through accruals and the second by real activities (Schipper, 1989). In accrual manipulation, the subjectivity of accounting choices could be used to give a false picture of the financial reports. There are no real changes in the actual operations in the firm. In contrast, real earnings management take the form of altering actual operations in order to achieve a desired outcome, possibly to meet an earnings benchmark or similar (Roychowdhury 2006). Both methods can be used by managers to manage the firm's earnings upwards or downwards.

The bulk of previous research have been focused only on accrual-based earnings management. However, more recent work does also consider real earnings management (Cohen et al (2007), Cohen and Zarowin (2008), Chi et al. (2010)). One reason for this, as found in a study by Graham et al. (2005), was that managers take real economic action to maintain accounting appearances. For example, 55,3 % of managers asked said they would delay starting a new project to meet an earnings target. This is further supported by Zang (2012) who found that managers substituted between accrual-based earnings management and real earnings management based on their relative costs. In the current study we therefore study both real- and accrual-based earnings management.

Further information on accrual-based earnings management models can be found in section 2.4.1 and more information on real earnings management models are found in section 2.4.2.

2.3 Macroeconomic conditions

The macroeconomic condition refers to the state of the economy. The economy goes through good times (booms) and bad times (recessions) which varies over time and business cycles. The state of the economy is influenced by numerous factors, including unemployment rate, inflation, productivity, market expectations and more.

The Business Cycle Dating Committee of the NBER looks at several of these factors when determining if a month in USA is to be defined as in recession or not in recession. The NBER states:[1] "*A recession is a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales.*" In our research, we use their definition of recession.

There are also other possible ways of measuring the macroeconomic conditions. Khurana et al. (2007) measures the state of the economy by annual GDP growth rate. Another possible method is to proxy macroeconomic conditions with analysts' forecast expectations or other earnings benchmarks. Prior research has shown that managers manage earnings to meet or beat forecasts (for example Matsumoto, 2002; Brown and Caylor, 2005). Managers participating in earnings management to meet or beat forecasts is an issue which chairman Arthur Levitt of the United States Securities and Exchange Commission (SEC) have addressed.[2]

2.4 Earnings management and the underlying economy

Our prediction about the underlying economy having an effect on earnings management is based on two opposing theories.

Firstly, Conrad et al. (2002) finds evidence about investors, on aggregate, respond differently to news during good and bad times. In good times, investors are optimistic and thus expect that good outcomes will continue. They find that during good times, good news does not affect stock prices so much where as bad news during good times will have a greater effect on stock prices. Conrad et al. (2002) explains the phenomenon with news having different effect on the overall market discount rate in good and bad times. During good economic times, investors will downward their assessment of the overall economy and it creates additional uncertainty, resulting in higher market discount rate. In bad times, bad news is confirming what investors

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[1] For a more detailed discussion, see www.nber.org/cycles/recessions.html

[2] See for instance a transcript of a speech held by Chairman Arthur Levitt on this topic, https://www.sec.gov/news/speech/speecharchive/1998/spch220.txt

already know while good news leads to a positive reassessment of the economy but is somewhat offset by higher uncertainty.

If Conrad et al. (2002) findings hold true, managers will most likely manage earnings upwards during good times, since poor earnings in this period will affect stock prices more negatively.

Secondly, theory behind Relative Performance Evelution (RPE) is also relevant. RPE states that individual firms evaluate themselves as the difference between their output (i.e. earnings) and the aggregate output of their competitors. In other words, firms are evaluated in relation to how their competitors perform. If RPE holds true, managers will particularly want to report good earnings when their competitors are doing well, i.e. in good times, and therefore feel pressured to report high earnings.

An opposing prediction is however suggested by Graham et al (2005) that firms boost earnings more when the economy is down because the reversal effect comes when the economy is recovering, and real earnings are expected to increase. In other words, using earnings management as a means of income smoothing over the business cycle. Dechow (1994) showed that a negative shock to cash flows during the Global Financial Crisis was associated with a positive increase in accruals. The opposing theory to that of Graham et al is that of the *big bath* accounting theory discussed under section 2.1.3.

In summary, both Conrad et al. (2002) and the theory behind RPE will suggest that firms are more likely to upwards their earnings in good times (booms) than in bad times (recessions). Graham et al. (2005) suggests managers may upwards their earnings in bad times as a means of income smoothing and the opposing view being that firms manage earnings downwards during recession as these losses are recuperated during later years.

As our study uses data from NBER to proxy for recession periods we focus on linking our results to the theory suggested by Graham et al and the opposing view of *big bath* accounting.

2.4.1 Accrual-based earnings management models

Accruals can be grouped into two categories, (1) nondiscretionary accruals and (2) discretionary accruals. This grouping is made because simply measuring the total raw accrual would not be a good proxy for earnings management since high raw accruals could be the result of high sales growth or other valid business reasons. Therefore, the model used in this study, the modified

Jones model, gives us total discretionary accruals. These are accruals which exists due to management choices, rather than business condition, and therefore should act as a better proxy for accrual-based earnings management.

Since discretionary accruals are a result of management subjectivity, there is no model that perfectly captures the sum of discretionary accruals. The most widely used models for estimating discretionary accruals all start by identifying total accruals, and then subtracting a non-discretionary accrual component from the total. The most influential models are the Healy model, the DeAngelo model, the Jones & modified Jones models and the industry model. (Dechow et al. 1995).

There are several models that attempt to measure accrual-based earnings management. Dechow et al. (1995) compared the following models and their ability to predict accrual-based earnings management: Healy model (Healy, 1985), the DeAngelo model (DeAngelo, 1986), the Jones model & modified Jones model (Jones, 1991) and the industry model. According to the findings of Dechow et al. (1995) the modified Jones model gives the best test out of them. Hence, it is the modified Jones model we use in our study as described by Dechow et al. (1995) to measure earning management through accruals.

2.4.2 Real earnings management models

In addition to accrual, operation cash flows are also an important aspect of earnings.

The real earnings management literature was given more attention in 2006 and forward, when Roychowdhury developed his model for detecting earnings management. Before that, most attention was given to accruals in earnings management literature (Roychowdhury, 2006). Roychowdhury (2006) describes real activities manipulation as the following:

> **Definition**: *"Real activities manipulation is defined as management actions that deviate from normal business practices, undertaken with the primary objective of meeting certain earnings thresholds."*

The idea of managers manipulating earnings by engaging in real activities have been noted before. Schipper (1989) emphasised this in his definition of earnings management by stating how managers could change the timing of investments or other financial decisions in order to alter the earnings in the current period. Healy and Wahlen (1999) had a similar statement in

their definition of earnings management, referring to managers structuring transactions to alter earnings.

There have been attempts prior to Roychowdhury (2006) to establish real activities manipulation models. The models attempt to measure the expected normal levels of production cost, cash flows from operations, R&D, etc. and then subtracting the actuals levels of production cost etc. The residual represents abnormal levels and is described as representing real activities manipulation.

The most notable models (Xu et al. 2007) are: Berger (1993), and then extended by Gunny (2005) who developed a model to estimate the normal R&D expenses. Anderson et al. (2003), and then extended by Gunny (2005) developed a model to estimate normal SG&A expenses. The work on R&D and SG&A expenses was then further developed by Roychowdhury (2006) to measure normal discretionary expenditure. Roychowdhury then also added a model for estimating normal level of production costs following Dechow et al. (1998) and a model for normal levels of CFO. The result by Roychowdhury was a real activities manipulation models which captured the most important aspects of real activities which managers engages in. More on that the Roychowdhury model in the next section, where we present data and methodology.

3. Data & Methodology

In this section we begin with presenting our data and how we obtained it. Following the empirical approach, we present our research questions. Lastly, we thoroughly describe our method.

3.1 Empirical methodology

3.1.1 Data and sample description

In the study we used Compustat – North America, accessed via Wharton Research Data Services (WRDS), to obtain the data in our sample for the period 1988-2010. Compustat North America daily contains annual and quarterly data items from the income statement, balance sheet and statement of cash flow for our time-period. The data obtained from Compustat was then manually checked by comparing data items at random to firm's actual financial statements.

From the sample, in accordance with previous research (e.g. Roychowdhury 2006), we removed financial firms (SIC number between 6000 – 6500, e.g. banks) and firms in regulated industries (SIC number between 4000 – 4999, e.g. electricity providers). Further, we require at least 10 years of observations for each firm and no missing data which would be required to use the modified Jones or Roychowdhury model (e.g. missing value for assets). Cohen et al. (2008) points out that this restriction will likely lead to a survivorship bias in our sample, resulting in a more conservative test as it likely reduces the variation in earnings management. Also, as we only include companies that were active (i.e. hadn't filed for bankruptcy) during the period, this also increases overall survivorship bias.

The table below summarizes our complete sample.

Number of firms

Firms listed between 1988-2010	1508
(Subtract) Financial firms	-193
(Subtract) Regulated industries	-233
(Subtract) Firms with missing values[a]	-381
	701

[a]Firm where any firm year value for assets = 0 have been excluded due to model limitations

Number of observations

	1999-2010	8412
	1999-2002	2804
	2006-2010	3505

We let data from the NBER[3] determine periods of recession and let this proxy for macro-conditions. We chose this proxy because of NBER's reputation as a respected bureau for providing start and end dates of recessions in the United States.

3.2 Recession years

We are researching the underlying macroeconomic effects on earnings management. The important event periods are thus how we differentiate economic conditions. Our approach is to differentiate years which are in recession as defined by the NBER. The most recent recessions, as defined by NBER Business Cycle Dating Committee, lasted from December 2007 to June 2009 and from March 2001 to November 2001. The NBER states the following about how they determine recession years:

> "The NBER does not define a recession in terms of two consecutive quarters of decline in real GDP. Rather, a recession is a significant decline in economic activity spread

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[3] The NBER is a collection of macroeconomic experts in the USA. As of 2010, the panel is made up by Robert Hall (Stanford), Martin Feldstein (Harvard), Jeffrey Frankel (Harvard), Robert Gordon (Northwestern), James Poterba (MIT), David Romer (U.C. Berkeley), James Stock (Harvard), and Mark Watson (Princeton).

across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales."[4]

We create variables using the data from NBER which are analysed separately. One variable, REC_DUM, is a dummy variable which takes the value 1 during recession and 0 in other periods. The other variable REC_VAR varies between 1/12 through 12/12 depending on how many months during that year was classified as recession months. Note that period 2007 has not been classified as a recession year although one month (December) has been classified as a recession period. We motivate this with the conjecture that the results would be skewed in the case where 2007 is also classed as a recession year in our REC_DUM variable even though 2007 was not, generally, a recession year.

Periods of recession are presented below.

Period	Months of recession[a]	REC_DUM	REC_VAR
1999	0	0	0
2000	0	0	0
2001	8	1	0,667
2002	0	0	0
2003	0	0	0
2004	0	0	0
2005	0	0	0
2006	0	0	0
2007	1[b]	0	0
2008	12	1	1
2009	6	1	0,5
2010	0	0	0

[a] Data according to NBER

[b] 2007 has not been classified as having any recession months as this is conjectured to skew the results

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[4] Quote is from http://www.nber.org/cycles.html where there is also further information on the recession data.

3.3 Research method

We want to test the following.

T_1: Whether or not our variables REC_DUM and REC_VAR have a significant effect on our dependent variable *amount of estimated discretionary accrual by lagged assets for firm and year* (DA), *amount of estimated real earnings management by lagged assets for firm and year* (RE) or the both combined.

T_2: Whether or not the distribution of DA, RE and both combined overall changes significantly over periods of recession and non-recession.

Before we can perform our tests, we need to estimate values for DA and RE which is done according to section 3.4.1 and 3.4.2 respectively.

3.3.1 Test through regression

For T_1 we perform a regression where our dependent variable is DA, RE or our combined metric and our independent variable is REC_DUM or REC_VAR. We cluster standard errors on a firm-level.

For DA we add the following control variables to adjust for specific factors which may affect discretionary accruals:

- Return-on-Assets (ROA)
- Book-to-market (BM)
- Audit firm (Big four)

Return-on-Assets has been shown in previous studies to have a positive correlation with DA (Kothari et al. 2005) meaning that, in general, a higher ROA is related to higher discretionary accruals. Adding ROA as control variable will control for the impact of firm performance on unexpected accruals.

Book-to-market is also added as a control variable for DA following Larcker and Richardson (2004) and Teoh et al. (1998). The reason is that BM serves as a proxy for expected firm growth

in operations. Growing firms are expected to have larger accruals, which are not necessary due to managerial behaviour of earnings management.

Lastly, *Audit firm* (Big four) is added as a control variable following research by Becker et al 1998 who showed that high audit quality constrained the tendency for firms to manage earnings through accruals. We define the control variable as high audit quality if the firm was audited by a "Big-4" audit firm: EY, Deloitte, KPMG or PwC as Deangelo (1981) showed that large audit firms provide higher quality audit than smaller audit firms.

For RE we add the following control variables

- Z-score
- Market share

Z-score is used following Zang (2012) as a control variable. The Z-score we use, following prior research, is the following modified version of Altman's Z-score (Altman, 2000):

$$ZSCORE_t = 0.3 \frac{NI_t}{Assets_t} + \frac{Sales_t}{Assets_t} + 1.4 \frac{Retained\ Earnings_t}{Assets_t} + 1.3 \frac{Working\ Capital_t}{Assets_t} +$$

$$0.6 \frac{Stock\ Price_t * Shares\ Outstanding_t}{Liabilities_t}$$

The Z-score captures the firm's financial health and thereby capture the cost of using real activities manipulation. The higher the score, the higher the firm health and this means lower cost to use real activities manipulation.

Market share is used following Zang (2012) as a control variable, and states market position of a firm based on their competitors in the industry. Competitors are defined, following Harris (1988), by three-digit SIC codes. We then calculate market share using:

$$Market\ share_t = \frac{Sales_t}{Total\ sales\ of\ industry_t}$$

The market leader status is an inverse of costs associated with real earnings management, meaning that the higher the market share, or the more leading a firm is in the market, the higher costs are associated to use real activities manipulation.

For the combined model (DA + RE) we use the control variables for both DA and RE

We run regressions on 3 periods; 1999 – 2010, 1999 - 2002, 2006 – 2010 in order to both get a general result as to the effect our variable has on DA and RE but also isolated around periods where, according to our gathered data from NBER we have some sort of recession period.

The following regression models will be used where REC is either REC_VAR or REC_DUM;

$$DA_{t_j} = \alpha + \beta_{DA_1} REC_t + \beta_{DA_2} ROA_{t_j} + \beta_{DA_3} BM_{t_j} + \beta_{DA_4} Audit_{t_j} + \varepsilon_{t_j}$$

Where,

DA_{t_j} Estimated Discretionary accruals for a firm (j) for year t

REC_t Value according to section 3.2 Recession periods

ROA_{t_j} Return-on-assets for a firm (j) for year t

BM_{t_j} Book-to-market ratio for a firm (j) for year t

$Audit_{t_j}$ Dummy variable = 1 if firm (j) is audited by *big four* at time t

$$RE_{t_j} = \alpha + \beta_{RE_1} REC_t + \beta_{RE_2} Zscore_{t_j} + \beta_{RE_3} Mshare_{t_j} + \varepsilon_{t_j}$$

Where,

RE_{t_j} Estimated Real earnings metric for a firm (j) for year t

REC_t Value according to section 3.2 Recession periods

$Zscore_{t_j}$ Z-score as defined above for a firm (j) for year t

$Mshare_{t_j}$ Market leader position based on competitors for a firm (j) for year t

$$(DA + RE)_{t_j} = \alpha + \beta_{(DA+RE)_1} REC_t + \beta_{(DA+RE)_2} ROA_{t_j} + \beta_{(DA+RE)_3} BM_{t_j}$$
$$+ \beta_{(DA+RE)_4} Audit_{t_j} + \beta_{(DA+RE)_5} Zscore_{t_j} + \beta_{(DA+RE)_6} Mshare_{t_j} + \varepsilon_{t_j}$$

Where,

$(DA + RE)_{t_j}$ The combined metric of discretionary accruals and real earnings management

            for a firm (j) for year t

All other variables as states previously.

3.3.2 Test through distribution analysis

For T_2 we combine data (DA, RE or combined) from each firm for a certain year and pools these together. We then perform a Mann-Whitney U-tests comparing these various data sets (year 1 compared to year 2) and determine whether or not we can reject the null-hypothesis that theses samples came from the same distribution on a statistical significance of $\alpha < 0,1$. If this is the case we can determine that, in our sample, the distribution of either DA, RE or combined differs during i.e. a period of recession and non-recession. We can then study what these differences in distribution say in comparison to our hypothesis and previous research.

Mann-Whitney U-test is a good test in our case not only because it is well known in statistics but also because it is a non-parametric test and so does not require the data having a normal distribution.

3.4 Earnings management metrics

3.4.1 Detecting accrual-based earnings management

We estimate discretionary accruals (DA) on a firm by firm basis using the time series approach for the Modified Jones model. Although cross-sectional analysis is more commonly used this

is not possible in our case since we are comparing variations in time, i.e. from one year to another. Cross-sectional analyses are powerful in determining variations within the same year or period. Moreover, since we expect DA in general to vary during times of recession and times of non-recession on a general scale, a cross-sectional approach will not be able to capture this.

The model for DA is as follows:

$$DA_{t_j} = TA_{t_j} - NDA_{t_j}$$

Where,

DA_{t_j} Discretionary accruals for a firm (j) for year t over lagged assets (t-1)

TA_{t_j} Total accruals for a firm (j) for year t, calculated as earnings before extraordinary items (IBEI) less cash flow from operations (CFFO) over lagged assets (t-1)

NDA_{t_j} Non-discretionary accruals for a firm (j) for year t, estimated through firm-specific regression, over lagged assets (t-1)

$$NDA_{t_j} = \alpha + \beta_1 \frac{1}{A_{t-1}} + \beta_2 \frac{\Delta REV_j - \Delta AR_j}{A_{t-1}} + \beta_3 \frac{PPE_{t_j}}{A_{t-1}} + \varepsilon_{t_j}$$

Where,

ΔREV Change in revenue for a firm (j) from t-1 to t

ΔAR Change in accounts receivable for a firm (j) from t-1 to t

PPE Property, plant and equipment for a firm (j) at year t

A_{t-1_j} Total assets for a firm (j) for year t-1 (also called lagged assets)

α, β_1, β_2 & β_3 are estimated through regressions using 10 years prior data rolling for a specific firm (j) meaning that, for example, NDA_{t_j} for year 2006 uses data for firm j for years 1996-2005.

Using this method, we create a time series of DA for the period 1999 through 2010 specific for each firm.

Exhibit I is an illustration of the estimation method where the X1, X2 and X3 values for the 10 years prior to the estimation year are used to explain Y and so gives us coefficients for year 11. The same regression technique is used for estimating real earnings measures.

3.4.2 Detecting real earnings management

The process of estimating real earnings management (RE) is similar to DA. For comparability purposes with discretionary accruals, the same data set is used.

Following Roychowdhury (2006) we look at three proxies for real activities manipulation:

1. Abnormal cash flow from operations (CFO), defined as the reported cash flow in the company's cash-flow statement.
2. Discretionary expenses, defined as the sum of (a) advertising expenses, (b) research and development (R&D) expenses and (c) selling, general and administrative (SG&A) expenses.
3. Production costs, defined as the sum of (a) cost of goods sold (COGS) and (b) change in inventory.

The three proxies on real earnings manipulations capture important aspects of real manipulations which managers may engage in, mainly:

- Managers offering temporary price discounts or longer credit terms in order to accelerate the timing of sales. The result from this is increased sales in the current period (given a positive margin) but lower cash flow in the period from the longer credit terms.

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- Managers can increase the production (overproduction) temporarily to report a lower cost of goods sold. This happens because fixed costs (e.g. overhead costs) are spread out over more units.

- Managers can temporarily decrease the spending on R&D, advertising and/or SG&A. This would reduce the spending in the current period and thus boost earnings in the current period, even if this could be at the cost of lower earnings in the long-term.

Using the model developed by Roychowdhury (2006) we get the normal levels of the normal levels of CFO, discretionary expenses and production costs. The residual, or abnormal level minus the normal level, gives us the variables used to proxy real earnings management. The model that Roychowdhury developed, using prior research made by Dechow et al (1998), and which we used in the current report are the following:

The model for abnormal CFO is estimated by:

$$ACFO_{t_j} = CFO_{t_j} - NCFO_{t_j}$$

Where,

$ACFO_{t_j}$ Abnormal cash flow from operations for a firm (j) at year t over lagged assets (t-1)

CFO_{t_j} Cash flow from operations as reported in the cash flow statement for a firm (j) for year t over lagged assets (t-1)

$NCFO_{t_j}$ Normal cash flow from operations for a firm (j) at time t estimated through firm specific regression

$$NCFO_{t_j} = \alpha + \beta_1 \frac{1}{A_{t-1_j}} + \beta_2 \frac{S_{t_j}}{A_{t-1_j}} + \beta_3 \frac{\Delta S_j}{A_{t-1_j}} + \varepsilon_{t_j}$$

Where,

A_{t-1_j} Total assets in year t – 1 (also called lagged assets)

S_{t_j} Total sales for a firm (j) for year t

ΔS_j Change in sales for a firm (j) from t-1 to t

α, β_1, β_2 & β_3 are estimated through regressions using 10 years prior data rolling for a specific firm (j) meaning that, for example, $NCFO_{t_j}$ for year 2006 uses data for firm j for years 1996-2005.

The model for abnormal production cost is estimated by:

$$APROD_{t_j} = PROD_t - NPROD_{t_j}$$

Where

$APROD_{t_j}$ Abnormal production cost for a firm (j) at year t, over lagged assets (t-1)

$PROD_{t_j}$ Production cost or COGS + change in inventory for a firm (j) for year t, over lagged assets (t-1)

$NPROD_{t_j}$ Normal production cost for a firm (j) for year t over lagged assets, estimated through regression

$$NPROD_{t_j} = \alpha + \beta_1 \frac{1}{A_{t-1_j}} + \beta_2 \frac{S_{t_j}}{A_{t-1_j}} + \beta_3 \frac{\Delta S_j}{A_{t-1_j}} + \beta_4 \frac{\Delta S_{t-1_j}}{A_{t-1_j}} + \varepsilon_{t_j}$$

Where,

A_{t-1_j} Total assets for a firm (j) for year t-1 (also called lagged assets)

S_{t_j} Total sales for a firm (j) for year t

ΔS_j Change in total sales for a firm (j) from t-1 to t

ΔS_{t-1_j} Change in total sales for a firm (j) from t-2 to t-1

α, β_1, β_2 & β_3 are estimated through regressions using 10 years prior data rolling for a specific firm (j) meaning that, for example, $NPROD_{t_j}$ for year 2006 uses data for firm j for years 1996-2005.

The model for abnormal discretionary expenses, $ADISEXP$, is estimated

$$ADISEXP_{t_j} = DISEXP_{t_j} - NDISEXP_{t_j}$$

Where

$ADISEXP_{t_j}$ Abnormal discretionary expenses for a firm (j) for year t, over lagged
         assets

$DISEXP_{t_j}$ Discretionary expenses or cost for research & development, advertising
         and selling, general & administration for a firm (j) for year t, over lagged
         assets

$NDISEXP_{t_j}$ Normal discretionary expenses for a firm (j) for year t estimated through
         regression over lagged assets

$$NDISEXP_{t_j} = \alpha + \beta_1 \frac{1}{A_{t-1_j}} + \beta_2 \frac{S_{t_j}}{A_{t-1_j}} + \varepsilon_{t_j}$$

Where,

A_{t-1_j} Total assets for a firm (j) for year t-1

S_{t_j} Total sales for a firm (j) for year t

α, β_1, β_2 are estimated through regressions using 10 years prior data rolling for a specific firm (j) meaning that, for example, $NDISEXP_{t_j}$ for year 2006 uses data for firm j for years 1996-2005.

Finally, to get the sum of total real earnings manipulation, RM_t, we sum the residuals for the three models, namely,

$$RM_{t_j} = ACFO_{t_j} + APROD_{t_j} + ADISEXP_{t_j}$$

Using this method, we create a time series of RM for the period 1999 through 2010. Like we did for the accruals, this is done for each individual company.

3.5 Data management

For this study we choose not to remove outliers but instead opt for winsorzing all data on a 5% level. This is done to minimize errors owing to extreme values that could otherwise skew the results whilst still keeping the same amount of observations. All variables are winsorized at a 5 % level. No other corrections or adjustments are made.

4. Results & Analysis

In this section we present the results of our conducted study as well as providing an analysis of these results.

4.1 Regression test

Table 1

Period	1999-2010		1999-2002		2006-2010	
Model specification	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Baseline	x	x	x	x	x	x
Controls[a]		x		x		x
Discretionary accruals						
Coeffecient REC_VAR	-2,32%***	-1,75%***	-1,91%***	-1,77%**	-2,28%***	-1,36%***
Robust standard errors	0,36%	0,35%	0,71%	0,69%	0,46%	0,44%
Observations	8412	8412	2804	2804	3505	3505
R-Squared	0,46%	6,05%	0,24%	5,41%	0,65%	7,27%
Real earnings metrics						
Coeffecient REC_VAR	0,05%	0,02%	0,84%	0,84%	-0,25%	-0,37%
Robust standard errors	0,41%	0,41%	0,83%	0,,83%	0,52%	0,51%
Observations	8412	8412	2804	2804	3505	3505
R-Squared	0,00%	0,03%	0,03%	0,15%	0,01%	0,02%
Discretionary accruals and Real earnings metrics combined						
Coeffecient REC_VAR	-2,33%***	-1,97%	-0,88%	-0,79%	-2,67%***	-2,19%***
Robust standard errors	0,48%	0,48%	0,91%	0,93%	0,57%	0,58%
Observations	8412	8412	2804	2804	3505	3505
R-Squared	0,28%	1,69%	0,03%	2,14%	0,55%	1,82%

Note: Regressions of DA, RE and DA & RE combined on REC_VAR

Statistcally signifcant coefficients are expressed as follows: *** p < 0,01, ** p < 0,05, * p < 0,1

[a]Controls: For DA - Return-on-Assets, Book-to-market & Audit indicator

For RE - Zscore & Market share. For DA & RE combined - all previously stated

Table 2

Period	1999-2010		1999-2002		2006-2010	
Model specification	(1)	(2)	(1)	(2)	(1)	(2)
Baseline	x	x	x	x	x	x
Controls[a]		x		x		x
Discretionary accruals						
Coeffecient REC_DUM	-1,92%***	-1,48%***	-1,27%***	-1,15%**	-2,12%***	-1,42%***
Robust standard errors	0,27%	0,27%	0,47%	0,46%	0,39%	0,37%
Observations	8412	8412	2804	2804	3505	3505
R-Squared	0,55%	6,12%	0,24%	5,36%	0,83%	6,98%
Real earnings metrics						
Coeffecient REC_DUM	0,06%	0,03%	0,56%	0,56%	-0,22%	-0,22%
Robust standard errors	0,31%	0,32%	0,56%	0,56%	0,43%	0,41%
Observations	8412	8412	2804	2804	3505	3505
R-Squared	0,00%	0,03%	0,03%	0,03%	0,01%	0,02%
Discretionary accruals and Real earnings metrics combined						
Coeffecient REC_DUM	-1,87%***	-1,59%	-0,59%	-0,53%	-2,40%***	-1,97%***
Robust standard errors	0,37%	0,37%	0,62%	0,62%	0,49%	0,52%
Observations	8412	8412	2804	2804	3505	3505
R-Squared	0,31%	1,71%	0,03%	2,11%	0,65%	1,72%

Note: Regressions of DA, RE and DA & RE combined on REC_DUM

Statistcally signifcant coefficients are expressed as follows: *** $p < 0,01$, ** $p < 0,05$, * $p < 0,1$

[a]Controls: For DA - Return-on-Assets, Book-to-market & Audit indicator

For RE - Zscore & Market share. For DA & RE combined - all previously stated

We run regressions in two variations, our baseline model which contains no control variables and our full model according to section 3.3.1.

Both Tables 1 and 2 show evidence that both our variable REC_VAR and REC_DUM have some effect on at least discretionary accruals. The effect is in most cases statistically significant at below a 1% level. The results also show that, in general, our variables have a negative correlation with the size of discretionary accruals. Overall explanatory power is however low in both the baseline case as in the model with control variables implemented but see an increase in explanatory value in the latter.

The fact that, overall, our variables receive negative coefficient signs gives evidence towards the *big bath accounting* theory we discussed under literature review as an alternative theory for income smoothing i.e. that managers, during recession-years further decrease earnings as market expectations are generally low. This excessive decrease in earnings are later reversed and boost earnings upwards when market expectations have increased.

Both Tables 1 and 2 show evidence that both our variables REC_VAR and REC_DUM have little or no effect at all on real earnings metrics i.e. there does not seem to be a relationship

between periods of recession and firms managing earnings, in either direction, through the use of real earnings management. Although, as we noted in literature review, managers generally favour real earnings management as opposed to management through discretionary accruals, in our test these results also makes intrinsic sense since financial reports (of which this report is based) are created after-the-fact i.e. after the year has concluded. Real earnings management usually has to take place in real-time whilst management through discretionary accruals can be implemented after-the-fact.

Combining both discretionary accruals and real earnings metrics per firm and year we instead receive a figure showing the combined effect from earnings management. These results are also statistically significant with the exception 1999-2002 and receive negative coefficient signs, further strengthening the evidence for big bath accounting as it considers both real and accrual approaches.

4.2 Results from distribution analysis

The data can be estimated, by use of prudent statistical considerations (West et al. 1995) to be normally distributed in all cases. Please see Exhibit A for distribution statistics. Figures and graphs presented in relation to the results hereafter have therefore been modelled according to their normal distribution. This increases overall ability for observation.

Table 3

Shift in median (year-to-year)

	Discretionary accruals	Real earnings metrics	Combined
1999 to 2000	0,009	-0,007	-0,005
2000 to 2001	-0,0252***	0,014**	-0,004
2001 to 2002	0,001	0,003	0,004
2002 to 2003	0,021***	0	0,013***
2003 to 2004	0,011**	-0,005	0,008*
2004 to 2005	-0,001	-0,015***	-0,013**
2005 to 2006	0,002	0,011**	0,013**
2006 to 2007	-0,014***	0,001	-0,012***
2007 to 2008	-0,005*	-0,004	-0,014**
2008 to 2009	-0,014	0,003	-0,005
2009 to 2010	0,023***	-0,003	0,02***

Note: Table shows shift in median values from one year to another

Sign. shift in median is expressed as follows *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Sign. is calculated using the Mann-Whitney U-test to compare sample data sets

Table 4

Shift in median (Non-recession/Recession)

	Discretionary accruals	Real earnings metrics	Combined
Shift	-0,020***	0,001	-0,017***
Non-recession	*0,004*	*0,004*	*0,007*
Recession	*-0,016*	*0,005*	*-0,010*

Note: Table shows shift in median values from Recession to Non-recession years

Significant shift in median is expressed as follows *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Significance is calculated using the Mann-Whitney U-test to compare sample data sets

Median values in cursive

Table 3 shows the shifts in median values from one year to another. Significant shifts are determined through the Mann-Whitney U-test where we can reject the null-hypothesis that the sample data came from the same distribution implying that the distribution for one year varies significantly from the previous year. For median values per year see exhibit D.

In terms of discretionary accruals, we see significant negative shifts in distribution for 2001 compared to 2000 where 2001 is also regarded as a recession period and 2006 through 2008 where 2008 is regarded as a recession period. In terms of results compared to the purpose of

the T_2 according to section 3.3 we can conclude that we see significant shifts in distribution for periods classified as recession periods. These shifts are also negative giving evidence for, again, the *big bath* accounting theory. We, however, also see a negative shift for 2006 through 2007 where neither 2006 nor 2007 is classified as a recession period. The remaining significant shifts are positive ones and are following periods of recessions 2002 through 2003 and 2009 through 2010 which could also be evidence for the *big bath* accounting theory as previous losses are reversed accordingly.

In terms of real earnings management, we see a positive shift from 2000 through 2001 where 2001 is classified as a recession year. This is circumstantial evidence of real earnings management being used to boost earnings during recession periods i.e. applying income smoothing techniques which was conjectured by Graham et al. We also see significant shifts for 2004 through 2006 which we have no clear conjecture for as to the reason why.

As the combined metric combines both discretionary accruals and real earnings management per firm year we here have the complete effect per firm. We here see significant shifts for 2002 through 2008 where 2008 is a recession year and 2009 through 2010. The recession period of 2008 is also followed by a negative shift giving further evidence for the *big bath* accounting theory. The significant positive shift from 2009 through 2010 is also further evidence as previous losses are reversed.

Table 4 shows distribution for combined data for recession years and non-recession years. We see a clear negative shift in discretionary accruals for recession periods giving further evidence for the *big bath* accounting theory. For real earnings management the shift is positive but not significant. The combined model echoes the result from the discretionary accruals model.

By studying how the median values shift over time (please see exhibit D) we can see that we appear, at least for discretionary accruals, to have some sort of cyclical pattern. Please also see exhibit G for changes in normal distribution where sign $p < 0.05$ for illustration of the shift in distribution from one year to the next and exhibit F which graphically shows the results of table 4.

5. Conclusion, discussion and future research

In this section we conclude our findings before we discuss the validity, reliability and generalizability of the study. We end the report with a discussion on suggestions we think would be interesting for future research.

5.1 Conclusion

The aim of our study was to test whether there is a correlation between earnings management and the underlying economy. We conducted our test in an American setting between the years 1998-2010 on publicly listed companies. After the tests, we can now conclude that we find evidence, at least in the case of discretionary accruals, for the *big bath* accounting theory in both regression tests and distribution analysis. Although distribution analysis can be somewhat circumstantial, this in combination with the regression test bring us the conclusion that, at least for the period tested and under the assumptions that our models correctly estimated discretionary accruals (which is itself a major overstatement, see 5.1.1 Validity), we can say that there seem to exists a negative relationship between discretionary accruals and the presence of recessions meaning that during times of recession, managers further decrease earnings which can be reversed as profits in later period – implying the use of big bath accounting. We can also conclude, under the same assumptions stated before, that we can't observe a direct relationship between the tendencies to manage earnings through real earnings management and the presence of a recession. The combined data model echoes, in most cases, the results from the discretionary accruals model.

5.2 Validity

Firstly, the reader should take the explanatory power of the modified Jones model and Roychowdhury model into consideration when interpreting our results. Although prior studies were originally designed to use a time-series approach (e.g. Dechow et al. 1995), it is not without metalogical issues. More recent models for detecting discretionary accruals typically use a cross-sectional approach, which have been shown to be more powerful to detect earnings management (Jeter & Shivakumar, 1999). The same metalogical considerations should be noted

on Roychowdhury's model, as it was originally designed to use with a cross-sectional approach. However, a time-series approach was necessary in this study to be able to answer our research questions.

Secondly, our shifts seen in earnings management around recession and non-recession can't be sure to be explained solely to a changed underlying economy. As prior research has shown, earnings management is the result of a large number of various factors. This is seen in the low overall explanatory effect of our models. Our study also covered a timeline which consisted of only 2 recessions and a total of 3 years. A study with a longer time-period would answer our research questions with more certainty and on a more general scale. However, that would also yield some reliability issues which are discussed below.

5.2.1 Sample critique

As we have delimited our study and excluded companies owing to various considerations (see section 3.1) we accept that our study is non-representative a general scale.

Also, since we only used data from companies that were listed during the entire time frame there is a certain risk of survivorship bias in the findings. Whilst including companies that went defunct as a result of any of the recessions periods we determined would have been interesting in terms of research, we were unsure how this would influence the regression models and so refrained from including these companies.

5.2.2 Statistical considerations

Firstly, we must consider that the regression tests based on discretionary accruals and real earnings metrics are inherently flawed since the estimation of both discretionary accruals and real earnings measures are not an exact science as we discussed earlier. Under the assumption that these metrics are correctly estimated we must also consider the implication of using our chosen control variables and more specifically the impact in term of multicollinearity i.e. that two or more explanatory variables are themselves correlated (Wooldridge 2009). We test for multicollinearity by both correlation tests (see exhibit B) and VIF (see exhibit C). Although we observe high correlation between certain variables, none of the VIF values cause alarm. More over our variables REC_VAR and REC_DUM do not correlate significantly with any other explanatory variable.

In order to test the strength of our model we also run a robustness test and present this data in a panel (see exhibit E). Since statistical significance is mostly observed for discretionary accruals we only perform the robustness test on this model. Robustness test 1 is done without winzorising the data according to section 3.5 Data management. In our original test, owing to hypothesised different variances between sample firms, we clustered standard errors on a firm-by-firm basis. We therefore also perform a robustness test (2) where the standard errors are not clustered.

With the unwinzorised data we lose overall significance in our tests which is evidence that our chosen model is sensitive. Whilst winzorising or removing outliers is generally acceptable, we would like to have seen a lesser loss of significance in our robustness test. The fact that our coefficient changes sign for the period 1999-2002 compared to our original test further calls into question the validity of our results.

Clustering does not, overall, seem to have an effect on the model as results are similar if not more or less identical when clustering for standard errors are removed.

A final consideration in terms of validity is whether we find similar results from our control variables as previous research has found. As only the results from our discretionary accruals model where statistically significant, we only comment on these. Regressed coefficients of our control variables or located under exhibit H. We find similar evidence of *Return-on-Assets* having a positive relationship with discretionary accruals. We did not predict a sign for *book-to-market* but merely that previous research has found a connection. Our results further point towards this. Finally, our Audit indicator control was expected to have an impact which we also see in our results. Although not all results are statistically significant we still view the results of our control variables as adding to the validity of our results.

5.3 Reliability

As far as the actual data, we believe our study to be reliable. All data has been gathered from WRDS Compustat and the control variables in our study have been used in previous research. Compustat is a well-known database and widely used in accounting research on US firms. For increased reliability, we have also successfully made random sample tests where we compared Compustat data with actual financial reports.

The data are then used on well-known models and should be reliability and replicability of our study should be high. Although calculations have been double-checked, and database data items have been tested by random sample, there is still risk for potential errors which can't be completely ruled out.

To replicate our study on a longer time-period, one should note that SFAS No. 95 statement of cash flow data is only available past year 1987. Future researchers who wish to use a longer time-period would then need to apply a balance sheet approach for those years which could cause reliability concerns in terms of what adjustments are made in order to calculate cash flows from operations.

5.4 Generalizability

The generalizability of this study should be applied with caution. Although it is not too farfetched to believe the same pattern of earnings management occurs on the whole population, or in other markets (e.g. European firms), the underlying economy and regulations do differ. This will most likely result in different incentives or ability for managers to manage earnings. Also, our delimitations reduce overall generalizability (see section 5.2.1 *Sample Critique*). The conclusions drawn here should thus not be transferred to other settings, instead we wish to see more future research in this area, which is discussed below.

5.5 Suggestions for future research

Most current research on earnings management are on firm-specific effects, which means there are a lot of potential for more research on relating earnings management to the economy. One example to do this is by using another proxy for the underlying economy, for example analysist reports. It would also be interesting to look specifically at certain industries which are more prone to business cycle swings. A qualitative study could also provide more insight to *why* managers engage in EM activities during different economic times.

We would also like to see similar research on different markets, such as the European or the Asian market. Although the state of the economy in the US often also affect the rest of the world due to its dominance in the world economy, other regions of the world apply different legislation and accounting standards which could mean we see a different pattern in there.

Finally, to increase the validity, future research could apply a longer time-period and thus also capture more recessions. This would increase the explanatory power of our research, meaning that the shifts we see are in fact due to the underlying economy. However, this could potentially also cause methodological issues, due to balance sheet method must be applied to calculate cash-flow from operations.

6. Appendix

Exhibit A – Distribution statistics

Exihibt A - Distribution statistics

	1999			2000			2001			2002			2003			2004		
	DA	RE	DA+RE	DA	RE	DA+RE	DA	RE	DA+RE	DA	RE	DA+RE	DA	RE	DA+RE	DA	RE	DA+RE
Skewness	-0,08	0,25	0,24	-0,29	0,28	0,27	0,04	0,02	0,25	-0,09	0,07	0,19	-0,14	0,08	0,19	-0,37	0,27	0,11
Kurtosis	0,53	0,43	0,68	0,47	0,28	0,52	0,25	0,23	0,52	0,38	0,45	0,55	0,81	0,67	1,04	0,91	0,81	0,99
Mean	0,00	0,00	0,00	0,00	0,00	0,00	-0,02	0,01	-0,01	-0,02	0,02	-0,01	0,00	0,01	0,02	0,01	0,02	0,02
Standard deviation	0,11	0,13	0,15	0,11	0,14	0,15	0,11	0,13	0,15	0,11	0,13	0,15	0,11	0,12	0,14	0,11	0,12	0,14
Median	0,00	0,00	0,00	0,00	0,01	0,00	-0,02	0,01	-0,01	-0,02	0,01	0,00	0,00	0,01	0,01	0,01	0,01	0,02
Observations	701	701	701	701	701	701	701	701	701	701	701	701	701	701	701	701	701	701

	2005			2006			2007			2008			2009			2010		
	DA	RE	DA+RE	DA	RE	DA+RE	DA	RE	DA+RE	DA	RE	DA+RE	DA	RE	DA+RE	DA	RE	DA+RE
Skewness	-0,34	0,44	0,12	-0,53	0,25	0,14	-0,31	0,28	0,18	-0,18	0,23	0,17	0,06	0,21	0,42	-0,08	0,24	0,20
Kurtosis	0,92	1,27	1,24	1,00	0,78	1,17	0,72	0,74	0,97	0,44	0,75	0,78	0,17	0,75	0,71	0,80	0,69	0,78
Mean	0,01	0,00	0,01	0,01	0,01	0,02	-0,01	0,01	0,01	-0,01	0,00	-0,01	-0,02	0,01	-0,01	0,01	0,01	0,02
Standard deviation	0,11	0,12	0,13	0,11	0,12	0,13	0,11	0,12	0,14	0,11	0,12	0,14	0,12	0,12	0,15	0,11	0,13	0,15
Median	0,01	-0,01	0,01	0,01	0,00	0,02	0,00	0,01	0,01	-0,01	0,00	-0,01	-0,02	0,00	-0,01	0,00	0,00	0,01
Observations	701	701	701	701	701	701	701	701	701	701	701	701	701	701	701	701	701	701

Exhibit B – Pearson's bivariate correlation test

1999-2010	REC_VAR	REC_DUM	Return-on-Assets	Book-to-market	Audit indicator	Z-score	Market share
REC_VAR	-	-					
REC_DUM	-	-					
Return-on-Assets	-6,99%*	-7,14%*	-				
Book-to-market	3,65%*	3,34%*	0,5%	-			
Audit indicator	-3,55%*	-3,78%*	24,2%	-32,59%*	-		
Z-score	5,78%*	-5,67*%	36,75%*	3,03%*	4,38*%	-	
Market share	-0,05%	-0,05%	16,28%*	-17,64%*	22,16%*	-4,53%*	-

1999-2002	REC_VAR	REC_DUM	Return-on-Assets	Book-to-market	Audit indicator	Z-score	Market share
REC_VAR	-	-					
REC_DUM	-	-					
Return-on-Assets	-2,06%*	-2,06%*	-				
Book-to-market	-0,31%*	-0,31%*	0,7%	-			
Audit indicator	-3,94%*	-3,94%*	15,34%*	21,54%*	-		
Z-score	0,03%	0,03%	26,32%*	3,06%	5,10%*	-	
Market share	0,00%	0,00%	16,64%*	19,73%*	12,42%*	5,68%*	-

2006-2010	REC_VAR	REC_DUM	Return-on-Assets	Book-to-market	Audit indicator	Z-score	Market share
REC_VAR	-	-					
REC_DUM	-	-					
Return-on-Assets	-10,88%*	-11,66%*	-				
Book-to-market	7,55%*	6,81%*	-2,5%	-			
Audit indicator	-0,74%*	-0,84%*	27,66%*	-44,22%*	-		
Z-score	8,76*%	-9,06%*	45,89%*	7,20%*	3,47%*	-	
Market share	0,05%	0,06%	16,79%*	-18,14%*	28,67%*	1,6%	-

Note: * denotes significance for p < 0,1, REC_DUM and REC_VAR are not used together for any regression

Pearsons bivarate correlations test has been implemented

Exhibit C – Variance inflation factor

	VIF			1/VIF		
	1999-2010	*1999-2002*	*2006-2010*	*1999-2010*	*1999-2002*	*2006-2010*
REC_VAR	1,01	1	1,02	0,990	1	0,980
Return-on-Assets	1,27	1,14	1,43	0,787	0,877	0,699
Book-to-market	1,14	1,09	1,28	0,877	0,917	0,781
Audit indicator	1,22	1,08	1,43	0,820	0,926	0,699
Z-score	1,17	1,09	1,3	0,855	0,917	0,769
Market share	1,09	1,09	1,11	0,917	0,917	0,901

Note: VIF stands for variance of inflation factor, VIF > 5 evidence of multicollinearity

REC_DUM & REC_VAR are not regressed together but yield similar statistics

Exhibit D – Median values

		Median values		
Year	Discretionary accruals	Real earnings metrics	Combined	
1999	-0,0036	0,0033	0,0012	
2000	0,0051	-0,0037	-0,0035	
2001	-0,0201	0,0108	-0,0070	
2002	-0,0196	0,0140	-0,0028	
2003	0,0013	0,0142	0,0104	
2004	0,0126	0,0088	0,0187	
2005	0,0114	-0,0059	0,0055	
2006	0,0134	0,0046	0,0180	
2007	-0,0006	0,0056	0,0058	
2008	-0,0059	0,0013	-0,0084	
2009	-0,0194	0,0040	-0,0138	
2010	0,0037	0,0006	0,0067	

Median values over time (Real earnings metric)

Median values over time (Combined model)

Median values over time (Discretionary accruals)
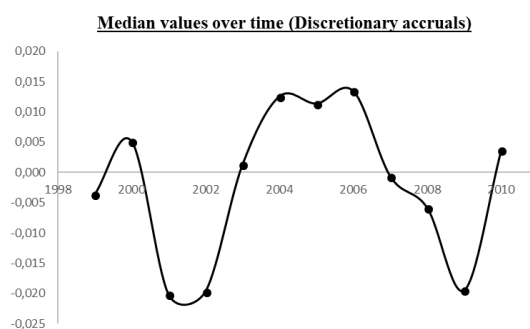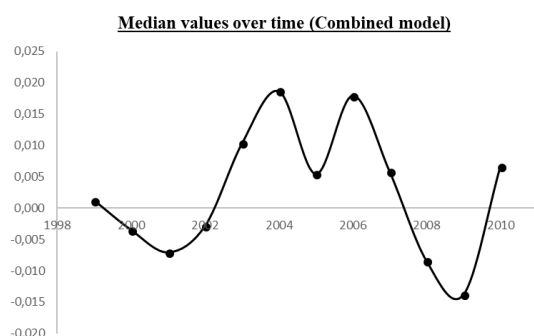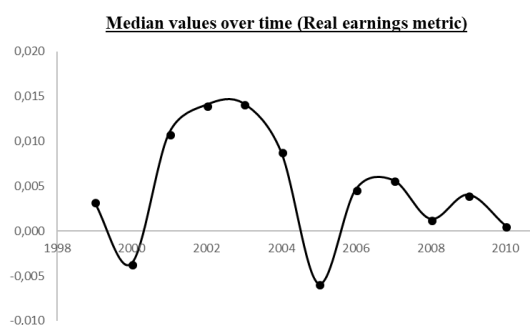
Exhibit E – Robustness test

Period	1999-2010		1999-2002		2006-2010	
Robustness test[a]	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Discretionary accruals						
Coeffecient REC_VAR	-7,11%	-1,75%***	5,80%	-1,76%***	-1,20%	-1,37%***
Robust standard errors	12,69%	0,36%	4,70%	0,72%	27,00%	0,47%
Observations	8407	8407	2804	2804	3500	3500
R-Squared	7,18%	6,01%	1,59%	5,27%	10,58%	7,16%

**Note**: Regressions of DA on REC_VAR

Statistcally signifcant coefficients are expressed as follows: *** $p < 0,01$, ** $p < 0,05$, * $p < 0,1$

[a]Modell specificication: Baseline and control variables included

(1) unwinsorized

(2) unclustered standard errrors

Exhibit F – Distributions during recession and non-recession periods

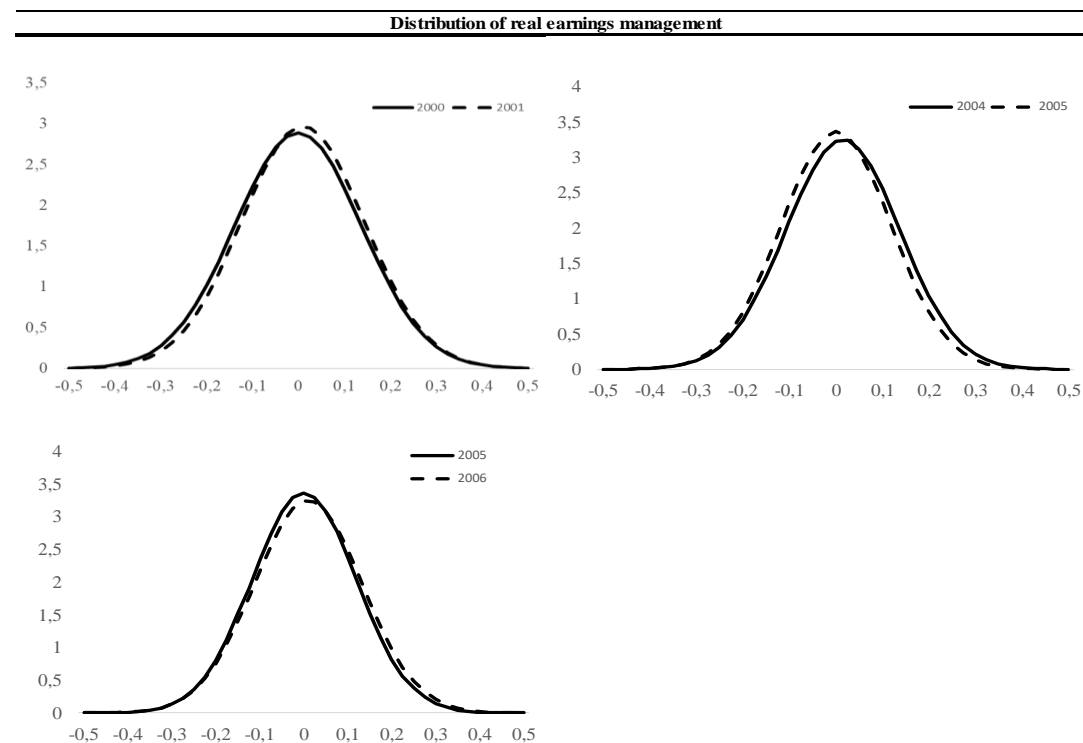| Discretionary accruals	Real earnings management	Combined model
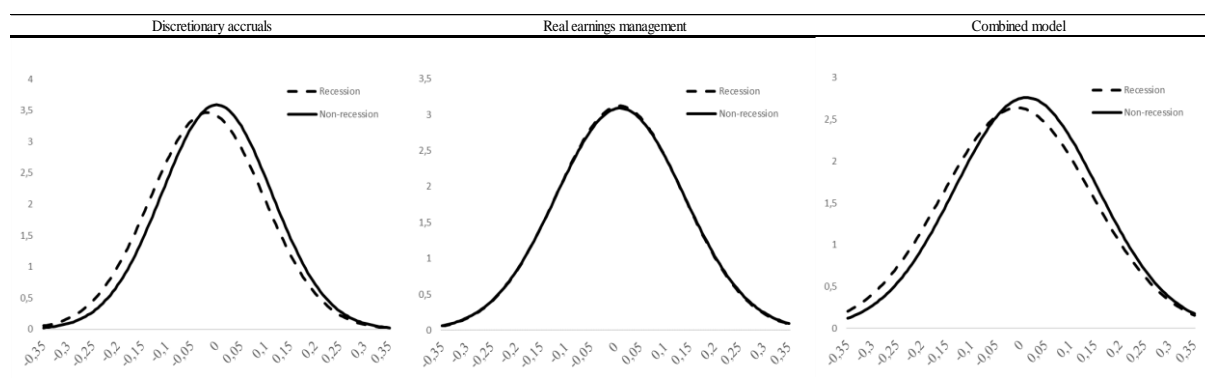
Note: The graph illustrates the approx. Normal distribution of discretionary accruals, real earnings management and the combined model for recession years compared to non-recession years

Exhibit G – Distributions during significant changes
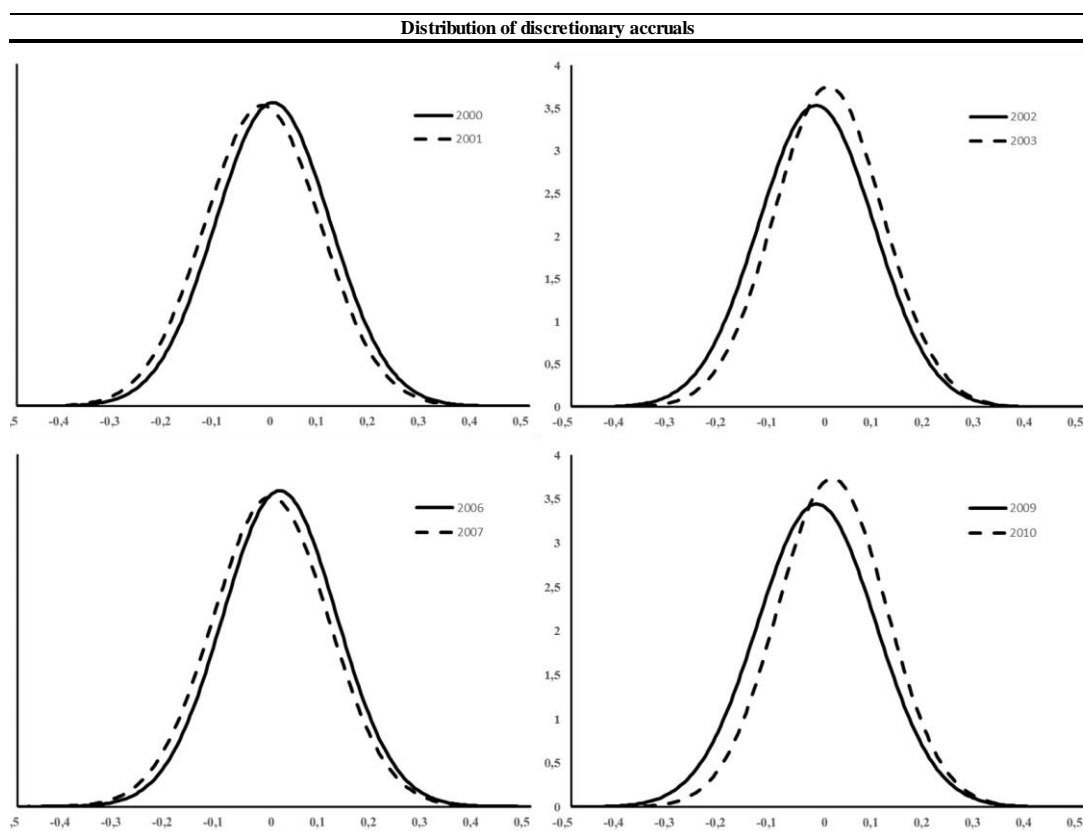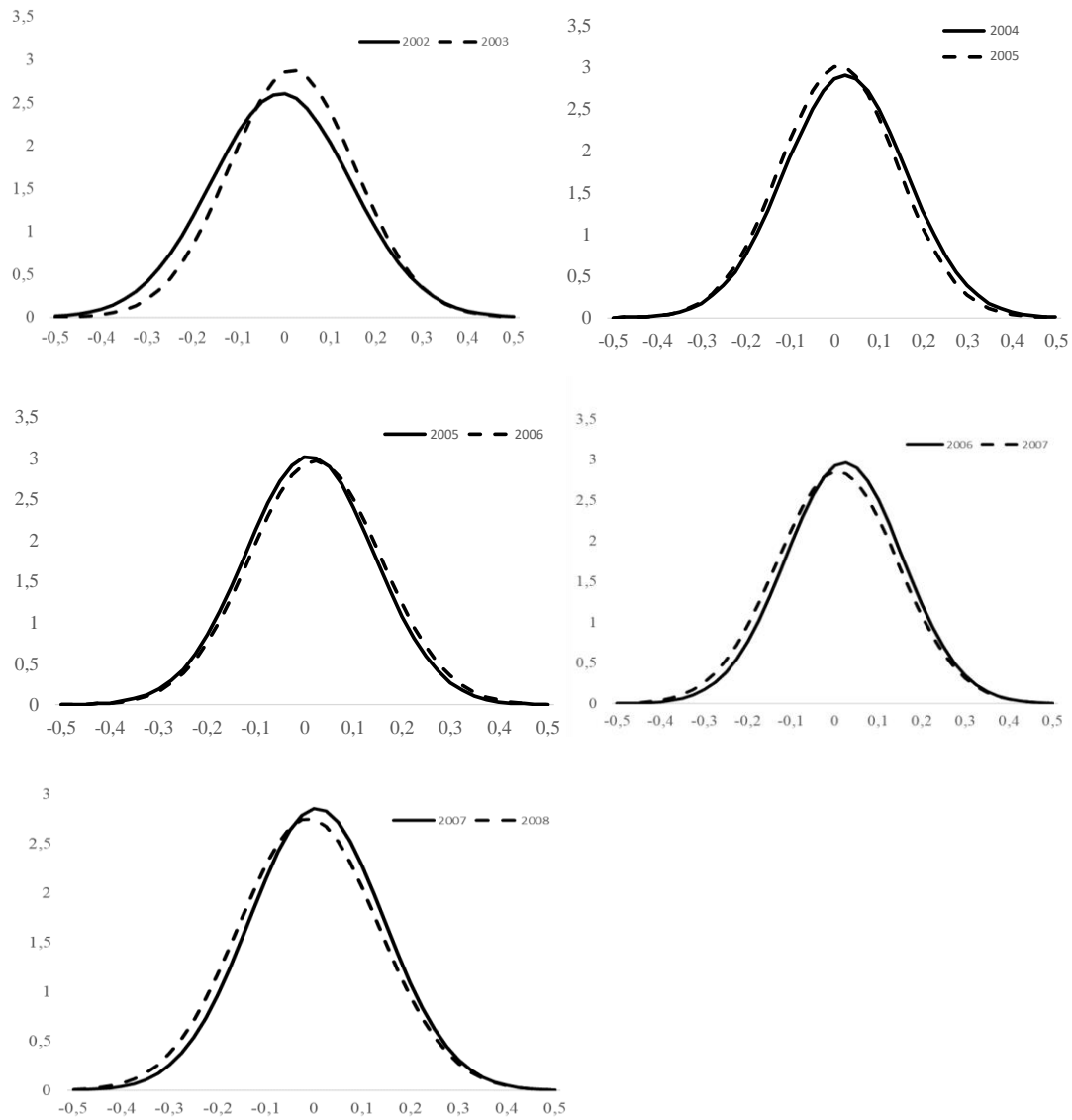
Distribution of discretionary accruals

Note: Graphs illustrate the approx. normal distribution of discretionary accruals and the shift from one year to the next
Only shifts that are statiscally significant for $p < 0.05$ have been graphed. Dotted lines represent continous line + 1 year

Distribution of real earnings management

Note: Graphs illustrate the approx. normal distribution of discretionary accruals and the shift from one year to the next
Only shifts that are statiscally significant for $p < 0.05$ have been graphed. Dotted lines represent continous line + 1 year

Note: Graphs illustrate the approx. normal distribution of discretionary accruals and the shift from one year to the next
Only shifts that are statiscally significant for p < 0.05 have been graphed. Dotted lines represent continous line + 1 year

Exhibit H – Coefficients of control variables

	1999-2010	*1999-2002*	*2006-2010*
Return-on-Assets	18,26% ***	17,34% ***	20,31% ***
Book-to-market	-3,41% **	-1,17%	-4,85% **
Audit indicator	-1,16% ***	-0,56%	-1,79% ***

Note: The table shows the regressed coefficients for the control variables
of the model for explaining Discreationary accruals
Statistcally signficant coeffecients are expressed as follows: *** p < 0.01,
** p < 0.05, * p < 0.1

Exhibit I – estimation method

Year	(Y) $\frac{TA}{A_{t-1}}$	(X1) $\frac{1}{A_{t-1}}$	(X2) $\frac{\Delta REV - \Delta AR}{A_{t-1}}$	(X3) $\frac{PPE}{A_{t-1}}$	Constant (A)	B1	B2	B3	Z Normal Accrual[a]	DA Disc. Accrual[b]
1989	0,35	0,40	0,19	0,30						
1990	0,03	0,25	-0,02	0,27						
1991	0,55	0,20	0,86	0,44						
1992	-0,01	0,10	0,50	0,26						
1993	0,00	0,09	0,45	0,30						
1994	0,09	0,07	0,16	0,30						
1995	0,25	0,06	0,67	0,36						
1996	0,14	0,04	0,73	0,30						
1997	0,31	0,03	-0,15	0,25						
1998	0,00	0,02	0,25	0,22						
1999	0,03	0,02	0,34	0,24	-0,68	0,10	-0,24	3,08	-0,012	0,04

a   A+(B1*X2)+(B2*X2)+(B3*X3)

b   Y-Z

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7. Bibliography

Articles

Altman, E. (2000) Predicting Financial Distress of Companies: Revisiting the Z-Score and ZETA Models. *Working paper*, New York University.

Zang, A. (2012) Evidence on the Trade-Off between Real Activities Manipulation and Accrual-Based Earnings Management. *The Accounting Review*, Vol. 87, No. 2, pp. 675-703.

Bereskin, F., Kieschnick, R., and Rotenberg, W. (2015) Earnings Management over Time. *Working Paper,* Rotman School of Management.

Berger, P. (1993) Explicit and implicit tax effects of the R&D tax credit. *Journal of Accounting Research*, Vol 31, No. 2, pp. 131-171.

Brown, L., and Caylor, M. (2005) A Temporal Analysis of Quarterly Earnings Thresholds: Propensities and Valuation Consequences. *The Accounting Review*, Vol. 80, No. 2, pp. 423-440.

Chi, W., Lisic, L., and Pevzner, M. (2011) Is Enhanced Audit Quality Associated with Greater Real Earnings Management? *Accounting Horizons*, Vol 25, No 2, pp. 315-335.

Cohen, D., and Zarowin, P. (2007) Earnings management over the business cycle. *Working paper*, New York University.

Cohen, D., Dey, A., and Lys, T. (2008) Real and Accrual-Based Earnings Management in the Pre- and Post-Sarbanes-Oxley Periods. *The Accounting Review*, Vol. 83, No. 3, pp. 757-787.

Conrad, J., Cornell, B., and Landsman, W. (2002) When is Bad News Really Bad News? *Journal of Finance*, Vol. 57, No. 6, pp. 2507-2532.

DeAngelo, L. (1986) Accounting numbers as market valuation substitutes: A study of management buyouts of public stockholders. *The Accounting Review*, Vol. 61, No. 3, pp. 400-420.

DeAngelo, L. (1981) Auditor Size and Audit Quality. *Journal of Accounting and Economics*, Vol. 3, No. 3, pp. 297-322.

Dechow, P., Sloan, R., Sweeney, A. (1995) Detecting Earnings Management. *The Accounting Review*, Vol. 70, No. 2, pp. 193-225.

Dechow, P., Kothari, S., and Watts, R. (1998) The relation between earnings and cash flows. *Journal of Accounting and Economics*, Vol. 25, No. 2, pp. 133-168.

Demsetz, H. (1983) The structure of corporate ownership and the theory of the firm. *Journal of Law and Economics*, Vol. 26, No. 2, pp. 375-390.

Graham, J., Harvey, C., and Rajgopal, S. (2005) The economic implications of corporate financial reporting. *Journal of Accounting and Economics*. Vol 40, No. 1-3, pp. 3-73.

Gunny, W. (2005) What are the consequences of real earnings management? *Working paper*, University of Colorado.

Harris, M. (1998) The association between competition and managers' business segment reporting decisions. *Journal of Accounting Research*, Vol. 36, No. 1, pp. 111-128.

Healy, P. (1985) The effects of bonus schemes on accounting decisions. *Journal of Accounting and Economics*, Vol. 7, No. 1-3, pp. 85-107.

Healy, P., and Wahlen, J. (1999) A Review of the Earnings Management Literature and Its Implications for Standard Setting. *Accounting Horizons*, Vol. 13, No. 4, pp. 365-383.

Jensen, M. (1983) Organization theory and methodology. *The Accounting Review*, Vol. 58, No. 2, pp. 319-338.

Jensen, M., and Meckling, W. (1976) Theory of the firm: Managerial behaviour, agency costs, and ownership structure. *Journal of Financial Economics*, Vol. 3, No. 4, pp. 305-360.

Jeter D., and Shivakumar L. (1999) Cross-sectional Estimation of Abnormal Accruals Using Quarterly and Annual Data: Effectiveness in Detecting Event-Specific Earnings Management. *Accounting and Business Research*, Vol. 29, No. 4, pp. 299-319.

Jones, J. (1991) Earnings management during import relief investigations. *Journal of Accounting Research*, Vol. 29, No, 2, pp. 193-228.

Kirschenheiter, M., and Melumad, N. (2002) Can "Big Bath" and Earnings Smoothing Co-Exist as Equilibrium Financial Reporting Strategies? *Journal of Accounting Research*, Vol. 40, No. 3, pp. 761-796.

Kothari, S., Leone, A., and Wasley, C. (2005) Performance matched discretionary accrual measures. *Journal of Accounting and Economic*, Vol. 39, No, 1, pp. 163-197.

Becker, L., DeFond, L., Jiambalvo, J., and Subramanyam, K. (2010). The Effect of Audit Quality on Earnings Management. *Contemporary Accounting Research*, Vol 15, No. 1, pp. 1-24.

Larcker, D., and Richardson, S. (2004) Fees Paid to Audit Firms, Accrual Choices, and Corporate Governance. *Journal of Accounting Research*, Vol. 42, No. 3, pp. 625-658.

Matsumoto, D. (2002), Management Incentives to Avoid Negative Earnings Surprises. *The Accounting Review*, Vol. 77, No. 3, pp. 483–514.

Patricia, M., Dechow, P., Sloan, R., and Sweeney, A. (1994) Detecting Earnings Management. *The Accounting Review*, Vol. 70, No. 2, pp. 193-225.

Roychowdhury, S. (2006) Earnings management through real activities manipulation. *Journal of Accounting and Economics*, Vol. 42, No. 3, pp. 335-370.

Schipper, K. (1989) Commentary on earnings management. *Accounting Horizons,* Vol. 3, No, 4, pp. 91-102.

Teoh, S., Welch, I., and Wong, T. (1997) Earnings management and the underperformance of seasoned equity offerings. *Journal of Financial Economics*, Vol 50, No. 1, pp. 63-99.

Xu, R., Taylor, G., and Dugan, M. (2007) Review of Real Earnings Management Literature. *Journal of Accounting Literature*. Vol 26, pp. 195-228.

Zang, A. (2012) Evidence on the Trade-Off between Real Activities Manipulation and Accrual-Based Earnings Management. *The Accounting Review*, Vol. 87, No. 2, pp. 675-703.

Books

Riahi-Belkaoui, A. (2004) Accounting theory. Cengage Learning EMEA.

Ronen J., and Yaari V. (2008) Earning management: Emerging Insights in Theory, Practice, and Research, Springer Publisher.

Watts, R., and Zimmerman, J. (1986) Positive Accounting Theory, Prentice-Hall Inc.

West, S., Finsch, J., and Curran, P. (1995) Structural equation models with nonnormal variables: problems and remedies. Sage Publications, Inc.

Wooldridge, J.M. (2009) Introductory econometrics: a modern approach. South-Western Pub.

Internet resources

National Bureau of Economic Research, Inc., 2018, *US Business Cycle Expansions and Contractions*, published 9/20/10, accessed 5/1/18.