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Master Thesis: Earnings Management during the Financial Crisis

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# Introduction

Financial reports and specifically earnings figures are of interest to investors, analysts, and board members since they provide critical information when investment decisions are made (Degeorge et al., 1999). While several figures found in financial statements (e.g. dividends, cash flows, and capital investments) can be used as performance indicators the earnings figure provides significantly more insight into a firm’s performance on the medium to long term. It is therefore not surprising that managers aim to maximize earnings figures through earnings management activities. Earnings management is a tool used by management to meet or exceed expectations in current or future periods. The overall goal being to stabilize earnings of consecutive periods to ensure a low variability. Stable earnings signal less risk, which decreases financing costs and positively impacts the stock price. Considering the importance of earnings it is not surprising that managers aim to meet or exceed earnings targets through specific accounting treatments such as earnings management.

The following chapters will focus on accrual earnings management carried out by U.S. non-financial firms during a financial crisis. U.S. firms are chosen over European firms since only the market developments in the U.S. clearly show a negative trend in Gross Domestic Product (GDP) during 2008 and 2009. This makes the distinction of two phases during the financial crisis possible. Usually earnings are managed downward when earnings exceed expectations and upward when predicted levels are not reached.

Does this imply that earnings are managed upwards during a financial crisis? This specific question will be answered in this thesis by researching the trend of accrual earnings management during different periods of the financial crisis.

## Main Research Question and Sub-Questions

Research on financial crises (e.g. Asian crisis and the 2008 financial crisis) has shown that a multitude of factors incentivize managers to engage in earnings management (e.g. Charoenwong & Jiraporn, 2008; Lang & Maffett, 2011; Habib et al., 2013). These authors do, however, not distinguish different phases in a financial crisis. It is thus unclear when which incentives play a role and whether a discernible pattern in earnings management exists during a financial crisis. The following research question has been formulated to establish whether a pattern in accrual earnings management is visible during the financial crisis:

*“Do financial figures indicate that managers have employed accrual earnings management to manage earnings upward or downward during the financial crisis?”*

To get an insight into accrual earnings management during the financial crisis the following sub-questions will be answered:

* How can accrual and real earnings management activities be distinguished?
* Which motives do managers have to engage in earnings management?
* Which constraints to earnings management exist?
* Which models can be used to measure accrual earnings management?
* Do accruals show a positive or negative trend during the financial crisis?

## Sample Period

Sample data will be collected for the 2000-2011 sample time frame. The data for the years 2000-2007 is used as the estimation period. To establish trends in accrual earnings management the sample time frame will further be divided into the following three distinct two-year periods:

2006-2007: prior to the financial crisis

2008-2009: during financial crisis phase one

2010-2011: during financial crisis phase two

As can be seen in the graph below, a clear decrease in U.S. Gross Domestic Product (GDP) is visible during the first phase (2008-2009) whereas the economy stabilizes in the second phase (2010-2011), in which a growth in GDP is visible. A country’s GDP includes all goods and services produced domestically in a specific period.

*Figure 1.1: Percentage Change from Preceding Period in Real Gross Domestic Product (2006-2011) Source: U.S. Department of Commerce: Bureau of Economic Analysis*

By studying the developments in earnings management activities in these distinct periods during the financial crisis an insight will be gathered in the influences of a financial crisis on accrual earnings management.

## Structure and Methodology

Before hypotheses can be developed and empirically tested a literature review concerning earnings management is carried out. In this literature review the first four sub-questions will be answered. Chapter 2 gives an introduction to earnings management and will discuss the differences between accrual and real earnings management as well as accrual and real earnings management techniques. Accounting theory that provide insights into motives behind earnings management, motives to engage in earnings management, and constraints to earnings management will be discussed in chapter 3. Available models to study earnings management will be discussed in chapter 4 after which three accrual earnings management measurement models will be selected as the measurement models for this thesis. Chapter 5 discusses prior literature on earnings management during a financial crisis. In chapter 6 the research hypotheses are developed. In chapter 7 the research design that is used to test the hypotheses is discussed. Chapter 8 discusses the results. Findings are then drawn from the results in chapter 9. And finally, all chapters are summarized and conclusions are drawn in chapter 10.

The developed hypotheses will be tested empirically by using the modified Jones model and two modifications of the original Jones model. The modified Jones model will be used as the base model since it is the most used earnings management measurement model. The results of the models will be compared to establish whether the selected models show different trends. Two types of accruals can be distinguished, discretionary and non-discretionary accruals. Discretionary accruals are at the discretion of management and can be used to either manage earnings upward or downward. Non-discretionary accruals will increase or decrease based on a firm’s operations (e.g. changes in revenue and inventory level) as well as external factors such as a financial downturn. Most earnings management models estimate total and non-discretionary accruals to calculate discretionary accruals, which is used as a proxy for accrual earnings management. Since the original Jones model was said to have a low-test power it was modified to improve the detection of accrual earnings management. Accrual earnings management measurement models are said to have a low-test power when the model is not able to detect earnings management. More specifically, models are said not to be able to distinguish all discretionary accruals from non-discretionary accruals. Most models will over or under estimate non-discretionary accruals and thereby over or understate the residuals. This in turn will lead to wrong inferences being drawn from the results. More recent models have attempted to improve earnings management detection of the Jones model by for instance adding a performance component to control for extreme performance. Two of these modified models will be selected and used to establish whether the model provides different insights into accrual earnings management during the financial crisis.

SPSS will be used to carry out the statistical analysis that is needed to test the developed hypotheses. A cross-sectional model will be used, which entails that the statistical model is calculated by analyzing data available for all firms of a specific industry and year. The variables as well as the betas are calculated by SPSS and used to construct the model. The completed model is then used to test the hypotheses.

## Relevance

Once the developed hypotheses have been empiricaly tested and the conclusions have been drawn from the findings an insight will have been created into earnings management activities during the financial crisis. More specifically, choices being made by managers to manage earnings upward or downward in different phases of the financial crisis are studied.

The outcome of this research will be valuable to several parties. First and foremost financial statement users and preparers will find the findings useful since they will help them to draw conclusions concerning the earnings quality during different phases of a financial crisis. Moreover, a high level of earnings management leads to a low level of earnings quality. Standard setters aim to increase the quality of earnings and will therefore also be interested in earnings management activities during a financial crisis. Auditors on the other hand focus on the detection of non-General Accepted Accounting Principles (GAAP) earnings manipulation, which are illegal. Since the used models do not distinguish within-GAAP from non-GAAP earnings manipulation the findings will not be as useful for auditors. A further party to which the findings are relevent are future researchers that want to use an accrual earnings management model to test for accrual earnings management. The findings will show how the selection of accrual earnings management models will impact the conclusions that will be drawn. Based on the found differences future research will be able to better assess which model to use for their research.

While research involving European firms may seem to be more relevant for this thesis, the U.S. sample provides two important advantages for this type of research. First and foremost, three two year periods need to be created in order to test for trends during the financial crisis. As has been discussed in section 1.3, the U.S. GDP shows three distinct periods. This is not the case in Europe. While U.S. GDP decreases in both years of the second phase (2008-2009) European GDP only decreases in 2009. Consequently, no distinct two year periods could be created with European data. Secondly, data concerning U.S. firms are more easily accessible and available databases provide more extensive data for the U.S. The increased data availability is likely to improve the reliability of the findings.

## Limitations

Several important limitations exist. Firstly, the models that will be used to estimate discretionary accruals are said to have a low-test power. Moreover, the earnings management models are not efficient enough in isolating the proxy for accrual earnings management, which are discretionary accruals. Critics show that estimates of discretionary accruals include considerable amounts of nondiscretionary accruals (e.g. Guay et al., 1996; Dechow et al., 1998). This issue will be counteracted by taking a large sample. A large sample and the use of a eight-year estimation period minimizes the influence of a low level of power on the reliability of the findings. Data gathered from databases such as Compustat might, however, contain inaccurate representations of firms’ financial data. More specifically, mistakes can be made when data is entered in the database. Such mistakes can negatively influence the reliability of the findings. The models also lack in proving causality. When studying earnings management through the application of earnings management models only quantitative data is used. Researchers do not interview managers to ensure that their findings represent reality and are not caused by other disregarded factors.

The categorization of the ‘during’ and ‘prior’ to the financial crisis periods could be argued to not reflect reality entirely. The categorization is supported by the GDP numbers as well as a CFO survey carried out by Deloitte in 2009. However, when one looks critically at the GDP growth rates in figure 1 a positive development is visible during the second half of 2009. This may indicate that the categorization into two distinct periods in not entirely accurate. One possible solution would be to split 2009 between the two phases. However, no clear distinction can be made and this might differ by industry. A further limitation is the fact that the periods in which the sample time frame is divided are fairly small. More specifically, the two phases of the financial crisis periods are only two years long. This makes the measurement of specific trends susceptible to events affecting earnings management activities, which might not be considered. Lastly, a survivor bias may exist since firms for which data is not available for the two financial crisis periods will be excluded from the sample. As Dechow et al. (1998) indicate, such a survivor bias may lead to positively biased correlations.

## Summary

By testing the mentioned hypotheses the research findings will give an insight into the use of accrual earnings management during a financial crisis. The findings will allow me to conclude whether managers employ accrual earnings management to manage earnings upward or downward during a financial crisis. The findings of this research will be valuable to financial statement creators and users since they directly relate to the reliability of those statements. While modified Jones model does provide a higher test power than earlier models this model continues to be criticized for having a low test power. To improve the reliability of the findings two additional models will be used to estimate discretionary accruals.

# An introduction to Earnings Management

In the following paragraphs several aspects of earnings management will be discussed. First, earnings management will be defined. Next, the application of different earnings management activities and the motives/incentives to engage in such activities as well as the constraints will be discussed.

## Defining Earnings Management

Earnings management occurs when judgment is used as management structures transactions and reports financials (Healy & Wahlen, 1999). More specifically, firms engage in earnings management by shifting income between periods through timing of reported or actual events (Degeorge et al., 1999). Management teams employ earnings management to either mislead stakeholders concerning the performance of the firm or to influence contractual outcomes based on earnings figures (Healy & Wahlen, 1999). Earnings management can impact one person (e.g. increased bonus payment) but often impacts the entire firm (e.g. higher current earnings and lower long term value). Moreover, earnings management is often used to attain several different outcomes that increase the firm’s value and therefore also the bonus payments or option value (Schipper 1989). Next to this, management is predicted to engage in earnings management when earnings exceed the upper limit or fall short of the lower limit of earnings based bonus plans.

Ronen and Yaari (2008) distinguish three types of earnings management: white, grey, and black earnings management. White earnings management is the least obtrusive type since it is employed to signal manager’s private information concerning future cash flows to investors. Moreover, managers use the flexibility in the choice of alternative accounting treatments to communicate personal information. Gray earnings management is used to either maximize the management’s utility or when the chosen accounting treatment is economically efficient. Black earnings management on the other hand reflects tricks that are used to misrepresent or reduce transparency of presented financials.

## Accrual versus Real Earnings Management

A firm can engage in earnings management by employing accrual based and real transaction based earnings management. These two components are illustrated by the following equation:

*E* = TA + NCF

In which,

E = reported earnings

TA = total accruals

NCF = net cash flows or change in the cash accounts

Total accruals are manipulated through accruals earnings management whereas net cash flows are manipulated through real earnings management (Fang Li et al., 2008). Accrual earnings management for instance arises when a product is sold on credit and the payment is collected at a later point then at which the product is sold. The same applies to pre-paid goods or services. In these cases the cash flow does not reflect the reported earnings since the income is realized before or after it is received in cash. Two types of accruals can be distinguished, discretionary and non-discretionary accruals (Cohen et al., 2008). Discretionary accruals are at discretion of management whereas non-discretionary accruals will increase or decrease based on a firm’s operation and external factors. Non-discretionary accruals can vary between years when for instance revenues and inventory levels change and when external economic conditions impact the business (e.g. lower salaries during a financial crisis). Discretionary accruals are often used as a proxy for earnings management since they reflect the reporting choices made by the management team. Discretionary accruals can for instance be altered by “using increasing or decreasing estimates of bad debt reserves, warranty costs, and inventory write-downs” (Fang Li et al., 2008: 2). Evidence indicates that accrual based earnings management was used extensively before the passage of the Sarbanes-Oxley act in 2002 (e.g. Cohen et al., 2008).

Cohen et al.’s (2008) findings provide evidence that a switch from accrual to real earnings management occurred after the introduction of SOX. These authors also find that the overall level of earnings management remained stable after the introduction of SOX. Cohen et al. (2008) identify the following three manipulation methods that are classified as real earnings management:

* Increasing sales volume by offering discounts or by making credit terms more lenient
* Increasing production to report lower cost of goods sold per unit
* Decreasing discretionary expenses (e.g. advertising, Research and Development (R&D), and Selling, General and, Administrative (SG&A) expenses)

Further real earnings management techniques exist. These will be discussed in section 2.4. Earnings management techniques are often used to smooth earnings. Earnings variability is decreased through the smoothing of earnings by for instance providing “a generous allowance in good years and skimp[ing] in lean years” (Arya et al., 1998: 8). A high variability of earnings signals risk, which increases financing cost, and is therefore not desirable. Financing costs (e.g. interest on loans) are increased to compensate the lender for the higher risk of default. Consequently, firms will try to decrease variability of earnings to keep financing cost low. In the next two sections several accrual and real earnings management techniques will be discussed. First a detailed overview will be given of accrual based earnings management techniques. And real earnings management techniques will be discussed in section 2.4.

## Accrual Earnings Management Techniques

Thirteen different types of earnings management techniques can be distinguished. All thirteen techniques are based on US GAAP. Only US GAAP techniques will be discussed since the sample firms are all based in the United States of America and therefore report according to the US GAAP framework.

### Cookie Jar Reserve Techniques

US GAAP regulations state that reserves need to be created to ensure payment of future obligations (McKee, 2005). These obligations need to be measurable, a high level of certainty concerning the future payment of the obligation needs to exist, and the obligation must be related to an event in the past. Even if these criteria are fulfilled the future obligation will have to be estimated since it is in most cases unclear how large the expense will be. The estimation element creates a possibility for earnings management. By creating a larger reserve than is estimated to be necessary expenses in a specific period can be increased, which decreases earnings, and a cookie jar reserve is created. The cookie jar reserve can then be used to increase future earnings.

Cookie jar reserves are used when firms engage in the following activities (McKee, 2005):

* Estimating sales returns and allowances
* Estimating bad debt write-offs
* Estimating inventory write-downs
* Estimating warranty costs
* Estimating pension expenses
* Terminating pension plans
* Estimating percentage of completion for long-term contracts

### Big Bath Techniques

Big bath techniques are applied in lean years to boost earnings in good years (McKee, 2005). More specifically, managers tend to increase expenses in bad years since they assume that a single year of poor performance is not as harmful as several years of bad performance. This technique is often applied when firms engage in restructuring activities and large restructuring expenses ensue (Elliot and Shaw, 1988). Arya et al. (1998) find that big bath techniques are most often used when restructuring activities coincide with a transition to a new management team. Accounting standards state that big bath techniques can be used when management must substantially restructure its business or eliminate operations and/or subsidiaries to remain competitive (McKee, 2005). In such cases firms are allowed to charge losses associated with such activities against earnings. Since restructuring costs have to be estimated, an opportunity to engage in earnings management arises.

Big bath techniques are also used in the following cases (McKee, 2005):

* Troubled debt restructuring
* Asset impairment and write-down
* Operations disposal

### Big Bet on the Future Techniques

When a firm acquires another firm it is said to ‘make a big bet on the future’ (McKee, 2005). This type of earnings management contains accrual as well as real transaction based earnings management. The acquisition of another firm enables the parent firm to boost earnings by consolidating the income statements, which integrates the earnings of the acquired firm into those of the parent firm. By timing a specific acquisition current or future earnings can be boosted through real earnings management. Earnings are further boosted when a firm writes off in-progress research and development cost invested by the acquired firm through accrual based earnings management. More specifically, a substantial part of the acquisition price can be written off against current earnings by writing off in-progress research and development cost. Future earnings are boosted since these are protected against charges related to the acquisition.

### Flushing the Investment Portfolio

Investments in other firms are made to set up a strategic alliance and/or to invest excess funds (McKee, 2005). Such investments are categorized as a passive investment when a firm acquires less than twenty percent of the shares. GAAP requires management to further categorize passive investments as either a ‘trading security’ or ‘available for sale security’. The following four techniques are used to engage in earnings management:

* *Change of holding intent*: Different regulations that deal with the reporting of unrealized gains and losses apply to securities classified as a ‘trading security’ and ‘available for sale security’. More specifically, unrealized gains or losses are either reported on the income statement or not reported at all. By changing the holding intent unrealized gains are moved onto of off the income statement, which affects earnings.
* *Write-down of impaired securities*: Earnings can be decreased by writing-down a security that has had a long-term decline in fair market value. Such a write-off will be recorded as a loss and thereby decreases earnings.

### Amortization, Depreciation, and Depletion

Amortization, depreciation, and depletion are used to write-off assets that provide a long term benefit (McKee, 2005). An expense is reported that reflects the benefit associated with the used asset for a specific period. Extensive judgment is used in writing off assets since factors such as the useful life of an asset will have to be estimated. The following activities provide opportunities for earnings management:

* *Selecting the write-off method*: Initial expenses differ between different write-off methods. More specifically, the double declining balance depreciation method doubles initial expenses and decreases future expenses when compared to the straight-line depreciation method. When management chooses to employ the double decline method current earnings will be decreased whereas future earnings will be boosted.
* *Selecting the write-off period*: Estimation of useful life of an asset can be substantially longer than the actual physical life. This will minimize write-offs during the first years but will significantly increase write-offs during the last year. Consequently, future expenses will increase significantly while current expenses are decreased.
* *Estimating salvage value*: When an asset is sold or disposed of at the end of its useful life a salvage value is often collected. This salvage value is estimated when the asset is acquired and the depreciation is calculated. Since the salvage value will often be collected after ten or more years the estimation of this figure can vary greatly. Moreover, the estimated salvage value will impact periodical expenses and thereby also earnings. A high salvage value will decrease expenses whereas a lower salvage value increases expenses associated with the write-off per period.
* *Change to non-operating use*: Long-term assets can be reported as either in operating use or non-operating use. When the switch is made to non-operating use it is no longer necessary to record depreciation or amortization expenses.

### Operating versus Non-operating Income

Earnings can be classified as either operating or non-operating income. Firms can engage in earnings management since grey areas exist concerning the classification of operating income in these two categories (McKee, 2005).

### Early Retirement of Debt

Long-term debt is usually recorded at amortized book value (McKee, 2005). The book value of long-term debt can significantly differ from the cash payment needed to retire debt early. More specifically, any gain or loss generated by the early retirement of debt will influence earnings. Management can therefore manage earnings by timing the early retirement of debt.

## Real Earnings Management Techniques

As has been discussed above, real earnings management can be used as a substitute for accrual-based earnings management or in combination with accrual-based earnings management. Managers can manipulate earnings by manipulating several operating, investing, and financing activities (Xu et al., 2007). Two distinct categories of real earnings management activities can be identified: real earnings management through adjustment of operating and investing activities and real earnings management through adjustment of financing activities.

### Adjustment of Operating and Investing Activities

*Managing discretionary expenses*

Discretionary expenses such as research and development (R&D) as well as selling, general, and administrative (SG&A) expenses are often used to increase or decrease reported earnings (Xu et al., 2007). Discretionary expenditures are directly expensed under US GAAP rather than capitalized on the balance sheet. This provides management with the possibility to adjust discretionary expenditures as they see fit to avoid losses, maintain an increased trend of earnings, to meet analysts’ earnings forecast, and to smooth earnings.

*Managing production, inventory, and sales*

Management can decide to manage production, inventory, and sales to smooth earnings or meet earnings targets (Xu et al., 2007). Production can be increased to decrease cost of goods sold per product (Roychowdhury, 2006) and discounts can be given to increase sales (Jackson &Wilcox, 2000).

*Timing sales of long-term assets*

Unrealized gains or losses will be recorded when long-term assets are sold before the end of their useful life (McKee, 2005). The following methods can be used:

* *Outright sale*: A firm sells off a specific asset when it most increases earnings.
* *Sale/Leaseback*: An asset is sold and thereby removed from the balance sheet and directly leased back. Gains are recorded in subsequent periods whereas losses are recorded directly.

*Structuring of investment transactions to take advantage of alternative accounting choices*

Transaction (re)classification can be used to gain a benefit associated with the treatment of a transaction (e.g. business acquisitions, leases, issuance of convertible debt, and equity investment) (Xu et al., 2007). Moreover, accounting standards require management to apply judgment to structure transactions, this judgment can be used to alter transactions and thereby also earnings.

### Adjustment of financing activities

*Repurchasing outstanding stocks*

Outstanding stocks can be repurchased to increase earnings per share (EPS). By using a part of the earnings to buy-back a number of shares outstanding current and future EPS can be increased (Xu et al., 2007). Another reason to repurchase stock is to mitigate the dilution of earnings per share (Bens et al., 2003).

*Granting stock options*

Granting of stock options at or above the current market value provides a less costly alternative to cash and stock compensation and is therefore used to increase earnings (Xu et al., 2007). SFAS 13 lets management choose whether stock options granted at or below market value will be recognized as an expense related to options. Choosing not to expense the granted options in the case that predicted earnings would fail to match analysts’ predictions can increase earnings. If earnings will exceed expectation, management can choose to expense the granted options to decrease earnings.

*Employing financial instruments*

The volatility of operating cash flow and earnings is increased by fluctuations of interest rates, commodity prices, and foreign exchange rates (Xu et al., 2007). These effects are often cancelled out by using financial derivatives with accrual earnings management.

*Structuring of financing transaction to take advantage of alternative accounting choices*

To increase earnings per share firms issue contingent convertible bonds rather than traditional convertible bonds (Xu et al., 2007). Contingent convertible bonds have an additional predetermined stock price (the upside contingency), which needs to be reached before the conversion against the strike price can be carried out. Firms will choose to issue contingent convertible bonds to ensure that bonds will be converted into equity less frequently to keep the number of shares outstanding low.

### Consequences of Real Earnings Management

The application of the real earnings management activities discussed above is often motivated by the focus on short-term performance indicators (e.g. earnings and earnings per share) since these are in most cases linked to compensation schemes. However, by solely focusing on short-term performance, long-term performance can be influenced negatively. By changing the timing of real business transactions management may deviate from optimal operational practices and impose real costs on the firm (Ewert & Wagenhofer, 2005). Projects that provide a superior net present value are often ignored to increase current (short-term) earnings (Gunny, 2005).

## Summary

In this chapter an introduction to earnings management has been given. The most important notion to take away is the fact that US GAAP does not prohibit earnings management activities. However, earnings manipulations that do not adhere to US GAAP are. The earnings management measures that will be employed in later chapters are not able to distinguish between these two types of earnings management. Consequently, all earnings manipulations done by a firm will be categorized as earnings management. Accrual earnings management has been compared to real earnings management. Real earnings management activities directly impact the cash flow whereas accrual earnings management changes reported earnings rather than cash flow.

# Explaining Earnings Management

In the following chapter the understanding of earnings management will be extended by discussing accounting theories, motives to engage in earnings management, and constraints to earnings management.

## Theoretical Economic Frameworks

Accounting research can be divided into two groups: positive research and normative research (Deegan & Unerman, 2011). Positive accounting research seeks to predict and explain phenomena and is based on empirical observation. Positive theories begin with assumptions and develop predictions based on logical deduction. Normative research on the other hand prescribes rather than predicts behavior and is based on what the researchers believes to be the right response in a particular situation. The research to be carried out is of a positive nature since it aims to predict the level of accrual earnings management used during a financial crisis. Several accounting theories are important for the research to be carried out: agency theory, positive accounting theory, political economy theory, legitimacy as well as institutional theory, and stakeholder theory.

### Agency Theory

Agency theory describes the principal-agent relationship that exists between owners of a firms and the management team that runs the firm (Jensen & Meckling, 1972). It extents risk sharing literature by focusing on issues that can arise when cooperating parties have different goals (Jensen & Meckling, 1976). The theory focuses on the principal-agent problem that arises in such relationships. The agent acts on behalf of the principal by managing the business on a day-to-day basis. Information asymmetry arises since the agent has access to information that is superior to the information accessible to the principal (Jensen & Mecklin, 1972). By managing a business on a day-to-day basis the agent has a superior insight into the business while the principal only receives periodic updates. A principal-agent problem arises when the principal’s interests differ from those of the agent. In such a case the agent may engage in behavior that benefits himself rather than the principal.

Compensation schemes are often used to align the interests of the agent with those of the principal (Shapiro 2005). Bonuses are for example used to incentivize management to reach certain predetermined goals that benefit the principal.

### Positive Accounting Theory

Positive accounting theory (PAT), which has been developed by Watts and Zimmerman (1986), seeks to predict and explain why managers choose to use specific accounting methods (Deegan & Unerman, 2011). The theory relies on the rational economic person assumption, which states that individuals are primarily motivated by self-interest (Deegan & Unerman, 2011). This implies that individuals will aim to maximize their own wealth by exploiting the earlier discussed information asymmetry. When selecting an accounting method the manager takes several considerations into account. Accounting based bonus systems are thought to influence the individual’s decision by linking a certain outcome to increased personal wealth (e.g. a bonus payment). External factors such as whether the organization is close to breaching a debt covenant and whether the organization is subject to political scrutiny are also thought to influence the individual’s decision (Deegan & Unerman, 2011). Positive accounting theory thereby aims to describe, explain, and predict behavior of individuals by taking firm internal as well as external factors into account.

More recently researchers (e.g. Sunder, 1999; Sawabe & Yamaji, 1999; Begley & Freedman, 2004; Graham, 2005) have questioned the applicability of three main hypotheses associated with PAT (the bonus plan hypothesis, debt-equity hypothesis, and the political cost hypothesis) when studying recent events and different cultures. Since the three hypotheses have particular institutional and environmental backgrounds researchers question whether they are still applicable nowadays. According to the bonus plan hypothesis managers are compensated based on how well they are perceived to manage the firm. To assess managers’ performance financial statements and thus earnings are used as a benchmark. In recent years performance evaluations have, however, expanded their focus to include more performance indicators that measure investments in long-term performance and the development of employees. Financial statements and earnings figures that focus on one dimensional and short-term performance have become less important for performance evaluations. The applicability of the bonus plan hypothesis is thus questionable since it does not incorporate the additional motivators for management teams. A similar reasoning applies to the debt-equity hypothesis. Debt covenants have been expanded to include additional performance indicators so that the role of accounting numbers in public debt contracts has changed (Begley & Friedman, 2004). Recent research has confirmed that earnings quality depends on institutional factors (Ball, Robin, & Wu, 2003; Soderstrom & Sun, 2007). The political cost theory, which states that firms will select accounting methods to reduce political costs, does thus still seem to be relevant.

### Political Economy Theory

Political economy theory operates under the assumption that society, politics, and economics are inseparable and that researchers will gain a broader perspective by taking the associated societal issues into account (Deegan & Unerman, 2011). Moreover, “the political economy perspective perceives accounting reports as social, political, and economic documents. They serve as a tool for constructing, sustaining, and legitimizing economic and political arrangement, institutions, and ideological themes which contribute to the corporation’s private interests” (Guthrie & Parker, 1990 in Deegan & Unerman, 2011). The authors also state that corporate reports should not be seen as neutral and unbiased reports but rather as reports that have been created to mediate and accommodate a variety of interests. Political economy theory has been used to derive both legitimacy and institutional theory (Gray et al., 1996 in Deegan & Unerman, 2011). These theories will be discussed next.

### Legitimacy and Institutional Theory

Legitimacy theory states that organizations aim to ensure the legitimacy of their operations by operating within the bounds and norms of specific societies (Deegan & Unerman, 2011). This theory for example discusses the disclosure strategies employed by organizations to ensure legitimacy. Institutional theory takes a broader scope by exploring organizational forms that are adopted to ensure legitimacy. Moreover, “institutional theory views organizations as operating within a social framework of norms, values, and taken-for-granted assumption about what constitutes appropriate or acceptable economic behavior” (Oliver, 1997 in Deegan & Unerman, 2011: 361). Organizations are thought to conform to these pressures since they are rewarded with legitimacy and resources (Scott, 1987 in Deegan & Unerman, 2011).

### Stakeholder Theory

Many similarities exist between stakeholder theory and legitimacy theory. These theories should therefore be “seen as two (overlapping) perspectives of the issue which are set within a framework of assumptions about political economy” (Gray et al., 1995 in Deegan & Unerman, 2011: 348). Both theories employ the assumption that organizations are part of a broader social system in which organizations have impact on and are impacted by the actions of other groups. Stakeholder theory divides society into different stakeholder groups whereas legitimacy theory identifies a society as one group. Stakeholder theory hereby distinguishes different types of influences that particular groups have on an organization and the associated contracts that are entered into. The theory also takes stakeholder power into account, which is used to “coerce the organization into complying with stakeholders’ expectations” (Deegan & Unerman, 2011: 348).

The discussed accounting theory will be of importance when developing hypotheses in a later section since the decision to engage in specific earnings management methods will be influenced by several factors discussed in these theories. Next, incentives to engage in earnings management will be discussed.

## Incentives to Engage in Earnings Management

Degeorge et al. (1999) find that managers engage in earnings management in order to pass three specific thresholds (p. 8):

* “To report positive profits, that is, report earnings that are above zero;
* To sustain recent performance, that is, make at least last year’s earnings; and
* To meet analysts’ expectations, particularly the analysts’ consensus earnings forecast”.

The following incentives motivate firms to engage in earnings management: personal considerations, contractual motives, competitive considerations, corporate control contests, capital market motives, political cost motives, and stakeholder considerations (Dechow et al., 1995). Goncharov (2005) classifies such incentives into two groups: motives that make shareholders the winning party (contractual motivations, capital market motivations, and regulatory motivations) and motives that make managers the winning party (contractual motivations, behavioral motivations, and capital market motivations). These motives range from personal to very broad market based incentives.

### Shareholders as a Winning Party

*Capital market motives* are provided by investors that use the accounting information for valuation purposes. This incentivizes management to engage in earnings management since the perception of the firm’s performance is at stake (Goncharov, 2005). Erickson and Wang (1999) find that a parent firm when acquiring another firm overstates earnings. The target firm will anticipate the overstatement of earnings and will price this into the acquisition price. Thus, providing a capital market incentive to engage in earnings management. Shivakumar (2000) finds similar incentives during a public offering of shares. Investors assume that all firms will increase earnings through earnings management and price this into the share price. Therefore, firms are motivated to engage in earnings management. The short-term increase of the stock price that is the direct consequence hereof makes the shareholder the winning party.

*Contractual motives* exist before debt is granted and after debt is granted (Goncharov, 2005). Motives are provided before debt is granted since financing will have to be acquired against favorable terms. After having been granted debt firms will want to avoid technical default and will therefore engage in earnings management if this is approached. Watts and Zimmerman (1978) provide evidence that debt covenants give incentives to engage in earnings management.

*Regulatory motives* can be linked to the ‘political cost hypothesis’ (Watts and Zimmerman’s, 1978 & 1979). This hypothesis states that “the political sector has the power to effect wealth transfers between various groups” (Watts & Zimmerman, 1978: 115) and that firms will adapt accounting policies to minimize the possibility of wealth transfers (e.g. taxes) to other parties.

### Managers as a Winning Party

*Capital market motives* do not only benefit shareholders. Since management compensation schemes are often linked to performance indicators, such as firm value and share price, the associated bonus payments will be increased when short-term performance improves. Two situations in which management can directly benefit from capital market incentives can be identified: management buyouts and takeovers. Management buyouts, which are used when a firm wants to go public, provide a clear incentive to engage in downward earnings management (DeAngelo, 1986; Perry & Williams, 1994). Moreover, the share price is decreased by managing earnings downward, which in turn decreases the funds needed for the management buyout. Takeovers are also identified as a situation in which managers tend to engage in earnings management. Management of a target firm is likely to lose control over the firm once a takeover occurs. Therefore, upward earnings management will be applied to increase the share price, which discourages takeovers (Easterwood et al., 1997 &1998).

*Contractual motives* are provided by explicit compensation contracts used to counteract incentives identified by agency theory. These compensation contracts in turn provide incentives for earnings management (Goncharov, 2005). When predetermined earnings targets are linked to bonus payments and targets are not reached, earnings management can be employed to reach the predetermined target. A lower and upper bound or target is often specified. Downward earnings management is employed when earnings are far below the lower bound or above the upper bound (Healy, 1985). Upward earnings management is used to increase the current period remuneration when earnings fall within the two bounds or slightly below the lower bound.

*Behavioral motives* are twofold: showing better performance than the former CEO and job anxiety (Wells, 2002). New CEOs are shown to employ downward earnings management during the first months since this is a transition period. The CEO is not evaluated based on this transition period and therefore creates earnings reserves. These reserves are then used to boost earnings in future periods, which positively impacts the bonus payment received by the CEO.

## Earnings Management Constraints

Now that motives to engage in earnings management have been discussed the focus will be shifted to constraints on earnings management. Earnings management activities are constraint by corporate governance, political forces, accounting standards, and culture.

### Corporate Governance

Corporate governance can be defined as “the complex set of constraints that shape the ex post bargaining over the quasi-rents generated by the firm” (Gillan, 2006: 382). Corporate governance is thus used to constrain management’s activities to ensure that management does not abuse the asymmetry of information that exists between them and owners as well as other providers of finance. Corporate governance measures are applied on two levels: internal to the firm and external to the firm. The board of directors as well as the audit committee is at the center of internal control and advises and monitors management. The audit committee specifically focuses on reducing the risk of earnings management (Chtourou et al., 2001). Auditors are hired to reduce information asymmetry. External control relies on the fact that management needs to acquire financing from external parties and will therefore be constrained through for instance debt covenants.

### Political Forces

The extend of earnings management can be influenced by political forces either directly through accounting and tax laws as well as laws that offer investor protection (Ball et al., 2000) or indirectly through the influence of market powers (La Porta et al., 1998). Accounting, tax, and investor protection laws reduce the risk associated with equity capital that may be expropriated by insiders (e.g. misappropriation of assets, installing possibly unqualified family members, and overpaying of executives). Market forces such as shareholders and creditors influence earnings management indirectly. Shareholders posses voting rights with which they can vote out directors if dividends are not paid. Creditors on the other hand have the power to repossess collateral (La Porta et al., 1998).

In the aftermath of several corporate scandals (e.g. Enron, 2001 and WorldCom, 2002) investor confidence had to be improved in order to stabilize the market. The Sarbanes-Oxley act “mandated a number of reforms to enhance corporate responsibility, enhance financial disclosures and combat corporate and accounting fraud, and created the ‘Public Company Accounting Oversight Board’, also known as the PCAOB, to oversee the activities of the auditing profession” (SEC, 2002).

### Accounting Standards

Accounting standard frameworks ensure consistency of earning figures. They are, however, flexible to enable firms to adjust the provided standards to their business (Goncharov, 2005). Thereby, the accounting standards provide several choices, which in turn leads to differences in earnings quality. As a consequence of this flexibility the latitude of accounting standards is related to the extent of earnings management being used. Several researchers (e.g. Born, 2001) compared International Accounting Standards (IAS)/International Financial Reporting Standards (IFRS) and U.S. GAAP standards and found IAS/IFRS standards to provide more varied accounting choices. This is explained by the fact that IAS/IFRS standards are used in multiple countries and will therefore have to be more flexible (Goncharov, 2005). It is therefore more likely that earnings management practices will be applied in countries that employ the IAS/IFRS framework.

### Culture

Culture has been shown to influence earnings management practices. Hofstede’s (1980) framework has been regularly used to measure the influence of certain cultural dimensions on earnings management (e.g. Guan & Pourjalili, 2003; Kinnunen & Koskela, 2003). Guan and Pourjalili (2003) find that power distance, individualism, masculinity, and uncertainty avoidance, which are four of Hofstede’s (1980) cultural dimensions, signal the direction as well as magnitude of accrual earnings management. In addition, Kinnunen and Koskela (2003) find that earnings management is positively related to power distance.

## Summary

In this chapter theoretical frameworks that are of importance when studying earnings management have been discussed. In addition, several types of motives have been discussed that encourage managers to engage in earnings management. The agency theory is of significant importance when such motives are discussed. More specifically, incentives created through for instance compensation contracts stimulate earnings management. Constraints that apply to earnings management activities are mostly market based. However, internal initiatives such as corporate governance also decrease the propensity to engage in earnings management. As has been discussed the research to be carried out is of a positive nature. This insight as well as the insights gathered concerning motives and constraints will be used to develop hypotheses in chapter 5.

# Measuring Earnings Management

Two approaches to measure accruals management can be distinguished: the single accrual approach and the total accrual approach. The single accrual approach measures earnings management by focusing on single accounting items whereas the total accrual approach focuses on multiple accounting items. Single accrual models are mainly used to measure accruals in financial firms/institutions (e.g. loan loss provisions in banks). These models are not of importance for this thesis since the focus is solely on non-financial firms. The focus of this thesis is on total accrual management models that can be used to measure earnings management in non-financial firms. Several models of this type will be discussed.

## Total Accrual Management Models

Total accruals are examined and categorized into discretionary (e.g. sales and advertising expenses) and nondiscretionary accruals (e.g. salary expenses). Discretionary accruals are often used as a proxy for accruals earnings management since these accruals are directly influenced by managements’ actions. However, discretionary accruals are difficult to estimate, which leads to the fact that most researchers develop models that use nondiscretionary accruals to estimate discretionary accruals. Several models operate under the assumption that nondiscretionary accruals are constant and are therefore categorized as ‘stationary discretionary accrual models’ (e.g. Healy model, 1985; DeAngelo model, 1986; Industry model (Dechow &Sloan, 1991); and the Components model (Thomas & Zhang, 2000)). Models that do not assume that non-discretionary accruals are constant are ‘performance-based discretionary accruals models’. These models assume that nondiscretionary accruals are not constant since operations as well as external factors influence these accruals (e.g. original Jones model, 1991; modified Jones model (Dechow et al., 1995); Cash flow Jones model (Dechow, 1994); Margin model (Peasnell et al., 2000); and the performance matched model (Kothari et al., 2005)).

The fact that nondiscretionary accruals are not constant is of specific importance when earnings management is studied during a financial crisis. Moreover, economic changes external to the firm have been shown to significantly impact non-discretionary accruals (Kaplan, 1985). Therefore, a performance-based discretionary accruals model will be used in this research. Several models of this type will be discussed after which two models will be selected to test the hypotheses.

#### Original Jones Model

To test whether firms use downward earnings management during import relief investigations Jones (1991) chose to rely on a discretionary accruals estimate of total rather than single accruals. Hereby she deviated from the procedure used by McNichols and Wilson (1988), who employed estimates of the discretionary accrual component of a single accrual to test for earnings management. This shift in approach was needed since the investigations focused on earnings before taxes, which can be managed through the adjustment of multiple accruals. Non-discretionary accruals are estimated after which the residuals are used as a proxy for earnings management. The model incorporates economic changes external to the firm that influence nondiscretionary accruals by adding gross property, plant, and equipment as well as changes in revenues as independent variables.

##### Estimating Discretionary Accruals with Original Jones Model

Earlier studies (e.g. Healy, 1985; DeAngelo, 1986; McNichols, 1988) discuss the partitioning of total accruals into discretionary and non-discretionary accruals. DeAngelo (1986) compared total accruals to the prior year total accruals and assumed that any difference between the two figures will be caused by changes in discretionary accruals. Moreover, non-discretionary accruals are assumed to be constant. Jones (1991) builds on these models but follows Kaplan’s (1985) findings that non-discretionary accruals change based on economic conditions. Thus, non-discretionary accruals have to be estimated. This is done in three steps. The first step is to calculate total accruals by using the following equation:

*TA* = (∆Non-cash current assets - ∆Current liabilities excl. current portion of long term debt – Depreciation and Amortization) / Lagged total assets

The second step is to use an estimation period of fourteen to thirty-two years and ordinary least squares to estimate ai, b1i, and b2i of αi, β1i, andβ2i respectively. Estimation periods are chosen based on the research topic. Two examples are economic cycles when studying a specific economic development and the time that a manager held a management position at a firm when studying how for example a CEO change influences earnings management. The following equation is used:

*TAt /At-1*=α [1/At-1 ]+ β1 [∆REVt /At-1] + β2 [PPEt /At-1 ] + εt

*Where*

*TAt = total accruals*

*At-1= total assets*

*∆REVt = first change in revenues*

*PPEt = gross property, plant, and equipment*

Next, these estimates are used to calculate the prediction error when estimating total accruals. The prediction error is defined as:

*ut*= TAt /At-1 –(a [1/At-1 ]+ b1t [∆REVt /At-1] + b2 [PPEt /At-1 ])

The calculated prediction error is used as a proxy for discretionary accruals. The positive or negative value of discretionary accruals in turn shows whether upward or downward earnings management has occurred. From this the following equations to calculate NDA and DA can be deduced:

*NDAt* = a [1/At-1 ]+ b1t [∆REVt /At-1] + b2 [PPEt /At-1 ]

*DAt* = TAt – NDAt

##### Identifying the Weaknesses of Original Jones Model

While the original Jones model has provided important insights into measurement of accruals earnings management, it has been criticized for misspecification. Misspecification of the model causes the misclassification of accruals as either discretionary or non-discretionary. This causes a researcher to find manipulation when it does not exist or not to find manipulation when it does exist (Bernard & Skinner, 1996). Researchers have attempted to improve the model by modifying it. Two types of modifications can be distinguished: data modification and variable modifications.

*Data modification*: This type of modification solely focuses on the data being used to estimate accruals. DeFond and Jiambalvo (1994) introduced the most significant data modification. While Jones (1991) used time-series data these authors claimed that specification of the model could be improved by using cross-sectional data.

*Variable modifications*:To improve model specification several authors have adjusted the original model. Modified models add additional variables or replace existing variables to improve the model specification (e.g. Modified Jones model; Performance-matched model). Several models of this type will now be discussed in more detail.

### Modified Jones Model

To improve the specification of the original Jones model Dechow et al. (1995) proposed to adjust changes in sales for the change in receivables. This modification was applied to reduce the measurement error of discretionary accruals when managers apply discretion over sales. More specifically, the modification shifts the focus from total sales to sales on credit since these are thought to be influenced more easily than cash sales. Dechow et al. (1995) find that the modified Jones model provides a more powerful test of earnings management when compared to the Healy, DeAngelo, original Jones, and industry model. The adjustment can be demonstrated by comparing the equations that are used to estimate non-discretionary accruals. The following equation can be deduced from the approach that Jones (1991) uses:

*NDAt* = a1 (1/At-1) + a2 ∆REVt + a3 PPEt

*Where*

*NDAt = non-discretionary accruals in period t*

*At-1 = total lagged assets*

*∆REVt = change in revenue when moving from t-1 to period t scaled by lagged total assets*

*PPEt = gross property, plant, and equipment scaled by lagged total assets*

*a1, a2, a3 = firm specific parameters*

Dechow et al. (1995) modify this equation in the following way:

*NDAt* = a1 (1/At-1) + a2 (∆REVt - ∆RECt) + a3 PPEt

*Where*

*∆RECt = change in net receivables when moving from t-1 to period t scaled by lagged total asssets*

### Beneish Model

Based on criticism (e.g. Guay et al., 1996) concerning imprecise estimation of discretionary accruals when incentives are correlated with performance, Beneish (1997) further modified the model. To control for the correlation between incentives and performance, total lagged accruals and prior stock performance are added to the modified Jones model:

*NDAt* = a1 (1/At-1) + a2 (∆REVt - ∆RECt) + a3 PPEt + a4TAt-1 + a5 Pt

*Where*

*TAt-1 = lagged total accruals*

*Pt = prior stock performance*

Beneish (1997) shows that these modifications increase the model’s ability to detect earnings management patterns over multiple years. The adjusted model is particularly useful when studying firms that experience extreme performance in contexts such as security offerings and financial distress. Such contexts provide incentives to engage in earnings management to overstate the value of the firm through the boosting of earnings.

### Cash Flow Jones Model

Shivakumar (1996) makes an adjustment to the original Jones model by including operating cash flows as a non-discretionary component of earnings management. This modification is based on earlier findings by Dechow (1994), which show that a strong negative correlation exists between accruals and cash flow from operation. Based on these findings Dechow (1995) indicates that the original Jones model is not well specified when measuring earnings management in firms with extreme cash flows. To improve specification for such samples operating cash flow is added as a control variable. The following equation reflects this adjustment:

*NDAt*=a1 (1/At-1) + a2 ∆REVt + a3 PPEt + a4 CFOt

*Where*

*CFOt = operating cash flow in period t*

### Accounting Process Model

Dechow’s (1994) findings that a relation between accruals and cash flow exists also inspired Garza-Gomez et al. (1999) to develop an accrual measurement model to measure accruals in Japan. This is not based on the original Jones model. Moreover, their paper introduces a discretionary accrual model based on the model of accounting process, as described by Dechow et al. (1998). Total accruals are first decomposed into two components: short-term (working capital) and long-term accruals. These are then calculated separately. Short-term accruals are calculated in the following way:

*STA* = (∆CA - ∆Cash) – (∆CL - ∆FI)

*Where (item numbers of the Japanese Development Bank (Kaigin) database are in parentheses)*

*STA = short-term accruals*

*∆CA = change in current assets*

*∆Cash = change in cash*

*∆CL = change in current liability*

*∆FI = change in financing items (82, 83, 84, 85, 86)*

Long-term accruals are calculated as follows:

*LTA* = - Dep - ∆Allow

*Where (item numbers of the Japanese Development Bank (Kaigin) database are in parentheses)*

*LTA = long-term accruals*

*Dep = depreciation not considered in inventory*

*∆Allow = change in allowances (122, 123, 124, 125, 126)*

Total accruals are then calculated by adding short and long-term accruals:

*TAt* = STAt + LTAt

Calculated short-term accruals are used to estimate the parameters in the following equation:

*STAt* = α0s + α1s STAt-1 + α2s CFt + α3s CFt-1 + εt

*Where*

*∆CFt = change in cash flow*

To model long-term accruals the authors assume that they follow a random walk:

*LTAt* = α0s + α1s LTAt-1 + α2s LTAt-2 … + εt

The two models are then combined into the accounting process model:

*TAt /At-1*=α0 [1/At-1]+ α1s [STAt-1/At-1] + α1l [LTAt-1 /At-1 ] + α2 [(CFt – CFt-1) /At-1 ] + εt

The authors call this model the accounting process model since has been designed to reflect the relationships between earnings, accruals, and cash flows, which arise when GAAP is used.

### McNichols Model

McNichols (2002) builds on Dechow and Dichev’s (2002) work by adding past, present, and future cash flows to the Jones model. Hereby Bernard and Stober’s (1989) as well as Dechow et al.’s (1998) claim that accruals do not fully adjust to sales shocks directly but that this takes several periods is followed. Including the cash flow of three periods should increase explanatory power since it reduces the extent to which variables that are correlated with a firm’s economic fundamentals are omitted. More specifically, future cash flows are included since earnings growth is a significant correlated factor that is omitted in the Jones model. The adjustments are included in the following model:

*NDAt* = a1 (1/At-1) + a2 CFOt-1 + a3 CFOt + a4 CFOt+1 ∆REVt + a5 PPEt

Results confirm that past, present, and future cash flows are significantly and positively associated with accruals. The association with current cash flow is the strongest. By including these cash flows in the Jones model the model’s explanatory is increased from R2 equals 0.07 to 0.3.

### Forward Looking Model

To improve the classification of discretionary and non-discretionary accruals Dechow et al. (2003) add additional variables that are expected to vary with non-discretionary accruals. Three modifications are made. The first is made to solve the issue that the modified Jones model is not able to discriminate between discretionary and nondiscretionary credit sales. This is done by first predicting the normal part of change in receivables by using the following equation:

*∆RECt* = a1 + k ∆REVt + εt

This model is used to estimate k, which captures expected change in accounts receivable for one unit change in revenues. By adding k the model is able to distinguish the unexpected change in credit sales from the expected change. Thereby the model can classify expected credit sales as non-discretionary and unexpected credit sales as discretionary accruals. In Dechow et al.’s (2003) sample a one hundred dollar increase in sales on average leads to a seven dollar increase in accounts receivable. The modified Jones model would classify these seven dollar as discretionary while the forward looking model classifies them as non-discretionary accruals. The increased ability to classify a part of accounts receivable changes as non-discretionary accruals slightly increases the explanatory power of this model.

Based on this three adjustments are made to the modified Jones model. The cash sales variable is replaced by a variable that incorporates the expected credit sales. And two control variables are added for economic circumstances, lagged total accruals and future sales growth. Lagged total accruals controls for persistent accruals and future revenue growth controls for the influence of future sales growth on working capital accruals levels. These adaptations are shown in the final model:

*NDAt* = a1 (1/At-1) + a2 ((1+k) ∆REVt - ∆RECt) + a3 PPEt + a4 TAt-1 + a5 Gr\_Salest

*Where*

*k = expected change in accounts receivable for a given change in sales*

*TAt-1 = total lagged accruals*

*Gr\_Salest = change in sales from current to next year scaled by current sales*

### Performance Matched Model

To discuss the next model we once more have to look at the accounting process model found in Dechow et al. (1998). This simple earnings, cash flow, and accruals model explains increases in working capital accruals by linking it to sales and earnings growth. More specifically, firms invest in working capital to support the growth of sales. This causes expected accruals to be non-zero and creates earnings momentum, specifically in firms that experience unusual performance. Prior earnings management models are unable to distinguish the correlation between performance and accruals. Such models are therefore misspecified when used to test for earnings management on samples that experience extreme performance. Kothari et al. (2005) aim to control for extreme economic performance in two ways. The simpler of the two is the addition of current or lagged return on assets to the original as well as modified Jones model:

Original Jones: *NDAt* = α1 + α2 ∆REVt + α3 PPEt + a4 ROAt or (t-1)

Modified Jones: *NDAt* = α1 + α2 (∆REVt - ∆RECt) + α3 PPEt + a4 ROAt or (t-1)

*Where*

*ROAt or (t-1) = Return on assets at period t or t-1*

The second approach also employs the modified models but adds a another step. Once the modified models have been used to estimate the accruals, performance matching based on ROA is applied. The authors match each ﬁrm-year observation with another observation from the same two-digit SIC code and year with the closest return on assets in the current as well as prior year. The performance matched discretionary accruals are then calculated by subtracting the matched firm-year discretionary accruals from the first firm-year discretionary accruals. ROA is chosen as the matching variable based on Dechow et al.’s (1998) finding that it controls for the effect of performance on discretionary accruals and Barber and Lyon’s (1996) finding that it outperforms other variables. The choice to either rely on current or on lagged ROA will depend on the specific hypothesis being tested.

The research findings show that performance matched models reveal a lesser degree of misspecification when compared to other models. In addition, the original Jones is shown to slightly outperform the modified Jones model when performance matching is applied.

## Selecting the Earnings Management Measurement Models

Now that relevant accrual earnings management measurement models have been discussed one or more of these models should be selected. To be able to select a model the performance of the discussed models should be taken into account. Dechow et al. (1995) test the ability of the Healy, DeAngelo, Jones, Modified Jones, and Industry model to detect earnings management. These authors find that the tested models are reasonably well specified when a random sample of event years is used. Test power is low, however, when testing for earnings management of economically plausible magnitudes and when extreme performance occurs. Out of the five models that are tested the modified Jones model is shown to be the best-specified model and does therefore provide the highest test power. Guay et al. (1996) test the same models and find that the Jones and modified Jones model provide the highest test power. In developing the Accounting Process model Garza-Gomez et al. (1999) tested whether this model increases the ability to detect earnings management. These authors find that addition of cash flow as an explanatory variable significantly increases the ability to capture variation in total accruals. While the modified Jones model explains on average only 23.1 percent of the variation this increases to more than 80 percent when the Cash Flow Jones (84.1%) and Accounting Process model (93.1%) are used. The authors explain this difference by the fact that the modified Jones model leaves most of the explanatory power of total accruals in the discretionary rather than non-discretionary part. More specifically, the modified Jones model overestimates discretionary accruals. As has been discussed in the prior section, Dechow et al. (2003) aim to improve the explanatory power with their Forward Looking model by distinguishing discretionary from non-discretionary credit sales. The authors find that their modifications double the explanatory power of the modiﬁed Jones model (R2 increases from 9.2% to 20%). In addition, the modifications are shown not to compromise the models ability to detect earnings management. Kothari et al. (2005) test whether the addition of ROAt or ROAt-1 as independent variables improves the performance of the Jones and modified Jones model. These authors find that performance improvement is unpredictable and subsequently develop the Performance matched model. Results show that the use of a ROAt as a performance-matched measure in combination with the Jones model increases the explanatory power of the model. The same applies to a lesser extend for the modified Jones model. In the most recent paper that compares accrual earnings management measurement models Dechow et al. (2012) compare five models. They find that the McNichols model (R2 = 28.29%) explains more of the variation than the Healy (0%), Jones (12.8%), modified Jones (6.79%), and Dechow and Dichev model (17.33%) when measuring performance-matched discretionary accruals. McNichols (2002) combines determinants from the Jones as well as Dechow and Dichev (2002) models to improve explanatory power. More specifically, past, present, and future cash flows are included as independent variables to explain non-discretionary accruals. Overall, all five models appear to be relatively well specified (Dechow et al., 2012). All discussed results are summarized in the table below.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Stationary discretionary accruals models** | | | | **Performance-based discretionary accruals models** | | | | | | | |
|  | Healy | | De Angelo | Industry | Jones | M. Jones | CF Jones | AP | FL | PM | DD | Mc Nichols |
| Dechow (1995) | X | | X | X | X | XX |  |  |  |  |  |  |
|  |  | |  |  |  |  |  |  |  |  |  |  |
| Guay (1996) | X | | X | X | XX | XX |  |  |  |  |  |  |
|  |  | |  |  |  |  |  |  |  |  |  |  |
| Garza-Gomez (1999) | | |  |  |  | X | X | XX |  |  |  |  |
|  | |  |  |  |  |  |  |  |  |  |  |  |
| Dechow (2003) | | |  |  |  | X |  |  | XX |  |  |  |
|  | |  |  |  |  |  |  |  |  |  |  |  |
| Kothari (2005) | | |  |  | X | X |  |  |  | XX |  |  |
|  | |  |  |  |  |  |  |  |  |  |  |  |
| Dechow (2012) | | X |  |  | X | X |  |  |  |  | X | XX |

*Table 4.1: Accrual models overview (X indicates that the model has been tested and XX indicates the model with the best performance)*

*Where*

*CF Jones: Cash Flow Jones model by Shivakumar (1999)*

*AP: Accounting Process model by Garza-Gomez et al. (1999)*

*FL: Forward Looking model by Dechow et al. (2003)*

*PM: Performance-matched model by Kothari et al. (2005)*

*DD: Dechow and Dichev model (2002)*

*McNichols: McNichols model (2002)*

To test the developed hypotheses one or more accrual earnings management measurement models have to be selected. As has been discussed, the focus is on total rather than single accrual models. In addition, only models that assume that non-discretionary accruals are not constant will be taken into consideration. Three models are selected. First and foremost, the modified Jones model will be used since this is the most widely applied model. Second, the forward-looking model will be used. This model has been shown to outperform the modified Jones model since it distinguishes discretionary from non-discretionary credit sales. Credit sales could increase during a financial crisis, which makes it important to check whether this model provides other insights than the other two models. Thirdly, the McNichols model will be used since it controls for extreme performance by adding cash flows. Extreme performance is likely during a financial crisis, which makes it of interest whether controlling for extreme performance influences the findings. To summarize, the following three models will be used to test the hypotheses that will be developed in the next chapter:

* Modified Jones model
* McNichols model
* Forward-looking model

## Summary

In this chapter several total accrual earnings management models have been discussed. The original Jones model (1991) was first discussed in detail. This model has provided important insights concerning the classification of total accruals into discretionary and non-discretionary accruals. While this classification is one of the strong points of the model, it has been criticized for misspecification. More specifically, other authors have found that discretionary accruals are classified as non-discretionary accruals and vice versa. To improve the classification into these two types of accruals modification have been made to the original Jones model. Several modifications of the model have been discussed. Based on prior research the modified Jones, Forward-looking, and McNichols model have been selected as the accrual earnings management measurement models. In the next chapter the to be tested hypotheses will be developed.

# Prior Literature

In this chapter prior literature will be discussed in detail. Since limited literature is available about earnings management during a financial crisis several studies about earnings management in distressed firms are included. Specific focus is on the methodology used by authors to measure earnings management and test hypotheses. An overview of key points discussed can be found in appendix 2.

## Earnings Management Response to Debt Covenant Violations and Debt Restructuring

Jaggi and Lee (2002) study accrual earnings management in financially distressed firms in the 1989 to 1996 period. The authors specifically focus on the choice of upward or downward earnings management based on the severity of financial distress and whether this choice is influenced by possible waivers. Four different accrual earnings management measurement models are used to measure earnings management: cross-sectional versions of the original and modified Jones models, time-series version of modified Jones model, and the performance matched model.

These four models are used to test four hypotheses. The first two hypotheses focus on the relationship between creditor’s waivers and discretionary accruals while the third hypothesis focusses on different effects of permanent and temporary waivers. The fourth hypothesis tests whether firms that restructure debt are associated with downward accrual earnings management. To test these hypotheses the authors use prediction errors as a proxy for accrual earnings management. First, the four models are used to calculate the prediction errors. Second, the prediction errors are standardized by dividing them by the standard deviation of error terms. Following earlier research (Jones, 1991; DeFond & Jiambalvo, 1994) statistical significance is evaluated based on the Z statistic of the calculated standardized prediction errors. Sample cases are selected by identifying financially distressed firms with debt covenant violations and debt restructuring listed in the Compact Disclosure and National Automated Accounting Research System (NAARS). Only firms that are publicly traded, incorporated in the United States, non-financial, and for which data is available for at least six year of the sample time frame (1989-1996) are included. Data for at least six years is required to calculate the coefficients of the time-series Jones model. Finally, sample firms that engaged in mergers, takeovers and leveraged buyouts are excluded to ensure that these events do not negatively influence the significance of the findings. Such cases are identified by examining the Wall Street Index and Compact Disclosure databases. These databases are also used to identify whether waivers are granted or not. Permanent and temporary waivers are identified based on the waiver’s duration described in footnotes of collected annual reports. The final sample consists of 135 firms, which constitutes 150 debt covenant violations. The number of debt covenant violations exceeds the number of firms since some firms reported more than one violation.

Results show that standardized prediction errors are consistently positive for waiver firms. Firms that received waivers are thus shown to have employed upward earnings management. Non-waiver firms on the other hand are shown to have employed downward earnings management. Results of all four models lead to the same conclusions. Results for permanent waiver firms show positive prediction errors and are significant (at different levels) for all four models. Standardized prediction errors for temporary firms are insignificant. Nonetheless, the authors conclude that firms with permanent waivers have comparatively higher positive discretionary accruals than firms with temporary waivers. Results used to test the last hypothesis confirm that firms that engage in debt restructuring manage earnings downward. Whether a firm that engages in debt restructuring reports debt violations or not does not influence the choice to engage in upward or downward earnings management. Robustness of these results are tested by including changes in management and audit qualifications as dummy variables. Controlling for these variables does not change the inferences drawn from the results. All four hypotheses are thus confirmed.

## Earnings Management in Economic Downturns and Adjacent Periods: Evidence from the 1990-1991 Recession

Lin and Shih (2002) study earnings management during the 1990-1991 recession. All three recession quarters show a negative Gross Domestic Product (GDP) growth rate: -.7%, -3.2%, and -2% respectively. The recession being studied started in Q3 1990 and ended in Q1 1991. It did thus last three quarters. Two main hypotheses are tested. First, the authors hypothesize that managers defer income in periods of weak and strong earnings to future periods. This hypothesis is based on the bonus hypothesis by Healy (1985). Since managers do not have a chance of receiving a bonus when earnings are weak and when the bonus cap has been reached in strong periods they are shifted to future periods. In such cases earnings are essentially saved for future periods to boost earnings and thereby bonuses. Second, the authors hypothesize that investors react less to poor earnings during a recession.

The original Jones model (1991) is used by the authors to estimate discretionary accruals. Different earnings management measurement models are not compared and the selection of the Jones model is not explained. Four dummy variables for the quarters of a year are added to the model to test for earnings management across the different quarters. The following model shows how the four dummy variables are integrated in the original Jones model:

*TAt /At-1*=α [1/Ait-1 ]+ β1 [∆REVt /At-1] + β2 [PPEt /At-1 ] + β3 Q1 + β4 Q2 + β5 Q3 + β6 Q4 + εit

Total accruals are calculated by subtracting operating cash flows from income before extraordinary items. The equation is estimated for each firm individually by using time series data. The residual is then used as a proxy for earnings management. To verify the results the authors also estimate the model by using pooled firm and quarter data. The sample contains twenty quarters between 1989 and 1993. This period was selected since the authors aimed to have data for many quarters available and since this recession was recent enough to make the findings relevant. Sample data is collected from the Compustat database. Financial institutions, firms that do not have a December 31 fiscal year end, and firms with incomplete data are excluded. The final sample consists of 513 firms or 10,260 firm-quarters. Virtually all industries identified by 2 digit SIC codes are part of the sample.

The authors test for earnings management in several steps. First, average discretionary accruals across all firms are calculated per quarter. The results are then plotted in a figure to distinguish a possible pattern visually. The results of this first step support the hypothesis that managers engage in downward earnings management during a financial crisis to boost earnings during a recovery phase. Second, the accrual earnings management trend is plotted together with the GDP trend to establish whether a correlation exists between the two. The relationship between accruals and GDP is shown to have the shape of an inverted U. To confirm the visual impressions the following model is created:

*MDAt* = β*0* + β*1GDPt* + β*2GDPt2* + ε*t*

*Where*

*MDAt = mean discretionary accruals in quarter t*

*GDPt = real GDP growth in quarter t*

*GDP2t = real GDP growth in quarter t squared*

An R2 value of .327 indicates that a large part of the variation in discretionary accruals is explained by movement in GDP. Results are consistent with Healy’s (1985) hypothesis. Next, the significance of detected downward earnings management during the 1990-1991 recession is tested by employing the following two models:

*TAt /At-1 =* β*0* (*1/ATt-1*)+ β*1*(*ΔREVt/ATt-1*) *+* β*2*(*PPEt/ATt-1*)*+* β*3 Q1 +* β*4 Q2 +*

β*5 Q3 +* β*6 Q4* + β*7 Q3Y90* + β*8 Q4Y90* + β*9 Q1Y91* + ε*t*

*TAt /At-1 =* β*0* (*1/ATt-1*)+ β*1* (*ΔREVt/ATt-1*) *+* β*2* (*PPEt/ATt-1*)*+* β*3 Q1 +* β*4 Q2 +*

β*5 Q3 +* β*6 Q4* + β*7 Q4Y90* + ε*t*

*Where*

*QmYn = dummy variable that equals 1 if quarter t is quarter m in year n*

The models are estimated for each firm individually, after which the average across firm for each regression coefficient is calculated. Results show that earnings management activities are concentrated in Q3 and Q4 of 1990. To verify the results the first model is also estimated by pooling data across firms and quarters. Results do not differ significantly. Dummy variables are also added to test whether this changes the results for the pooled regression. This is not the case. To test whether discretionary accruals reverse in next quarters the following model is created:

*DCAi,+0* = β*0* + β*1DCAi,+1* + β*2DCAi,+2* + β*3DCAi,+3* +

β*4DCAi,+4* + β*5DCAi,+5* + β*6DCAi,+6* + ε*i*

*Where*

*DCAi,+0 = discretionary accruals of firm i in Q4 1990*

*DCAi,+n = discretionary accruals of firm i in nth quarter after Q4 1990*

The model is estimated by using cross-sectional regression. The results show that earnings reserves have been released strategically in quarters with moderate economic growth. To distinguish between different levels of earnings management firms are sorted into deciles based on changes in revenue when moving from Q3 to Q4 in 1990. Alternative partition variables are reported earnings (Healy, 1985), non-discretionary accruals (Gaver et al., 1995), and bonus amount received by managers (Holthausen et al., 1995). These variable have, however, been shown to be biased. The identified biases are avoided by partitioning firms based on revenues. Results confirm that firms that experience the largest changes in revenue engage in downward earnings management. This once more confirms the bonus plan hypothesis. A desire to smooth earnings across periods can, however, not be ruled out.

Next, an additional hypothesis is tested that states that large firm are less free to manipulate earnings since they are more closely examined by analysts. To test the hypothesis the sample is divided into deciles that reflect firm size based on total assets. Results confirm that small firms have larger mean discretionary accruals in absolute value. Overall, many firms are found to have managed earnings downward during the 1990-1991 recession. Mean discretionary accruals are found to be negative in quarters with very strong or weak GDP growth, and positive in quarters with moderate GDP growth.

## Audit Quality: Earnings Management in the Context of the 1997 Asian Crisis

Johl et al. (2003) study the relationship between audit quality and earnings management during the Asian crisis. The crisis period is divided into three periods: pre-crisis (1994-1996), crisis (1997-1998), and post-crisis (1999). The authors use the modified Jones model combined with the frequency distribution approach to test the hypotheses. The latter is used to complement the results since the modified Jones model has been criticized for its inability to measure earnings management in periods of extreme financial performance. Performance matching is used to further increase the reliability of the findings.

The frequency distribution approach is used to examine the density of discretionary accruals surrounding two chosen thresholds: zero or higher EPS in current year (avoiding losses) and equal or increased EPS when compared to last year (sustaining previous years’ profits). Earnings management is constituted if there is an unusual number of firms at or slightly above the threshold. Based on the findings a dummy variable is added to the research model. The dummy variable indicates whether a firm is expected to have engaged in earnings management. Next to this, twelve control variables are used in the multivariate analysis. The following seven control variables are based on prior research by Becker et al. (1998): operating cash flow, leverage, natural log of total assets, absolute total assets, first sample year with new auditor, last sample year is followed by an auditor change, and increase of 10% or more in total outstanding shares during the year. And the following five control variables are added by the authors: industry type (consumer, industrial, or property sector), pre crisis (1994-1996), and crisis (1997-1998). Data is hand collected from annual reports, which are retrieved from the Kuala Lumpur Stock Exchange (KLSE) and Securities Commission library. Missing data was collected from several other sources. Financial and IPO firms as well as firms that changed their fiscal year end are excluded. The final sample consists of 1,512 Malaysian observations.

Results show that Big 5 auditors constrain upward accrual earnings management but only industry specialized Big 5 auditors constrain downward accrual earnings management. When testing earnings management across the different periods, the industry type control variable is the only control variable that is not significant in all regressions when testing hypothesis 1. When linking crisis periods to auditor quality a change becomes apparent. Prior to the crisis no difference is detected in the constraining of earnings management between Big 5 and non-Big 5 auditors. Post crisis periods on the other hand show that Big 5 auditors provide a higher quality.

## Earnings management of distressed firms during debt renegotiations

Saleh and Ahmed (2005) study earnings management of Malaysian distressed firms during debt renegotiations. A sample time frame is selected that coincides with the Asian financial crisis (1998-1999) to study distressed firms during a financial crisis. The authors hypothesize that earnings will be managed downward during renegotiation periods. Firms under debt contract renegotiation are further hypothesized to have significantly more negative discretionary accruals than other poorly performing firms.

The authors use the original Jones (1991) and modified Jones (1995) models as well as the working capital versions of these models to test for earnings management. A sample that ranges from 1994 to 2000 and consists of 153 Malaysian firms is used. Sample collection was done in three steps. First, a list of firms that restructured debt was created by searching through firms’ announcements for several terms that indicate external restructuring. Second, financial statements for these firms were collected from the Kuala Lumpur Stock Exchange Research Information Systems (KLSE-RIS) database. Third, copies of annual reports were obtained from the KLSE library to get additional information. Fourth, a sample of control firms is collected. These control firms are selected based on not failing debt payment and showing at least two consecutive years of negative earnings. This is done since failing firms were found to experience two years of negative earnings before failing. Financial institutions, banks, and firms in regulated industries (e.g. utilities) were excluded from the sample since accruals are different in these industries. The final sample includes 36 firms that renegotiated debt with government support, 58 firms that renegotiated debt without government support, and 59 firms that performed poorly yet maintained debt repayment. The main sample consists of a total of 153 firms from five industries and 59 control firms. Government support was provided by the Corporate Debt Restructuring Committee, which was created by the Malaysian government to assist firms in financial distress. Following Peasnell et al. (2000) the authors align fiscal years by assuming that a fiscal year includes all firms that have their fiscal year-end falling between June 1st in the current year and May 31st in the next year.

To measure total accruals the authors use the cash flow rather than balance sheet approach. The cash flow approach measures total accruals by subtracting operating cash flows from income before tax and extraordinary items. The balance sheet approach is not used since this has been shown to introduce negative bias when discontinued operations are part of the sample (e.g. Hribar & Collins, 2002). This is clearly the case in this sample. Following DeFond and Jiambalvo (1994) the authors use cross-sectional versions of the original and modified Jones model. To complete the models the authors use end of period PPE level rather than gross PPE since the later is not available in the used database. The models are estimated cross-sectional by industry-year. Prediction errors are used as the proxy for discretionary accruals. To increase the validity of the findings, working capital versions of the original and modified Jones model are examined. Working capital models exclude depreciation since changes in depreciation method need to be disclosed, which decreases incentives to manage earnings by using depreciation. More specifically, PPE as a variable is excluded from the models since this includes depreciation. To estimate the models the authors use working capital movements in the cash flow statement. This eliminates non-operating changes in current accounts.

Estimation of the models shows that the change in revenue variable coefficient is positive and significant, which is consistent with prior studies (e.g. DeFond & Jiambalvo, 1994). PPE coefficients are not significant. This is explained by the fact that failing firms sell and write-down assets during a recession. Total accrual models show a slightly higher R2 value (0.324) than the working capital variants (0.208). To limit the effect of outliers discretionary accruals are winsorized. Discretionary accruals are estimated for the three years prior to and one year after renegotiation. Results show that discretionary accruals are managed upward during two to three years prior to renegotiations and downward during the year preceding renegotiations. Total accrual models show a higher level of negative discretionary accruals than working capital models. To establish whether negative financial performance has a negative impact on the findings, operating cash flows are added as an additional variable. The authors do, however, not find material differences in the results. The results are then compared to the control firms. Discretionary accruals in the renegotiation year are shown to be significantly more negative for firms that renegotiated debt than for the control sample. Next, multivariate tests are carried out to control for the following firm specific factors that are correlated with accounting choices: audit qualifications, management changes, firm performance levels, leverage and size, audit quality, and liquidity. Audit qualification, management changes, leverage, size are expected to have a negative association with discretionary accruals whereas firm performance and audit quality are expected to have a positive relation with discretionary accruals. No directional association is predicted for liquidity. Multicolliearity is tested and found not to be a problem in regression estimation.

Multivariate results suggest that both debt renegotiating and control firms have managed earnings downward when control variables are not used. Audit quality and leverage are significantly negative whereas size and auditor size are significantly positive. Management changes and performance are not significant. All measurement models are significant and have an explanatory power between 22.7 and 25.9 percent. To ensure that results are not negatively impacted by the fact that the sample is drawn from different industries, dummy variables for the industries are added. The renegotiation dummy variable is significantly negative and explanatory power is increased to 31.9 percent. Further variables are added to establish whether the two negotiation years and CDRC assistance impact the findings. The results remain the same. Firms that have undertaken debt restructuring are thus concluded to have managed earnings downward during the renegotiation year.

## Market perceptions of discretionary accruals by debt renegotiating firms during economic downturn

Ahmed et al. (2008) examine how the market responds to discretionary accruals of financially distressed Malaysian firms that renegotiated debt during the Asian financial crisis. The authors use the cross-sectional as well as working capital versions of the original and modified Jones models to estimate discretionary accruals. Their research methodology is similar to the one that is used by Saleh and Ahmed (2005). The discussion of this article will therefore be less detailed.

The authors select the sample from Bursa Malaysia listed firms that renegotiated debt with lenders between 1998 and 1999. Data is collected for 1997-2001 after cases have been selected by searching firm announcements on the Bursa Malaysia website for several terms that indicate restructuring of debt. The final sample consists of 139 firms. In addition to this sample, a control sample is selected to improve the reliability of the results. CFO is added as an additional variable to the accrual models to ensure that discretionary accruals are not negatively influence by firm performance. Once discretionary accruals have been estimated using the mentioned models the estimates are used to complete a price model. This price model uses market value as dependent variable and book value of equity, operating cash flow, non-discretionary accruals, and discretionary accruals as independent variables. The following control variables are used: audit qualifications, changes in senior management, leverage, size of the audit firm, profitability (ROI), and managerial ownership. Out of these control variables only managerial ownership is found to be significant. To check the robustness of the results the variables of the research model are deflated by the number of shares as well as lagged total assets. Results do, however, not change materially. The authors also add a dummy variable to distinguish between firms that receive CDRC (governmental) support and firms that renegotiate directly with the lender. The addition of this dummy variable does not change the findings.

The authors conclude that discretionary accruals signal that wealth is transferred from lenders or government to investors or that true performance is distorted. Next to this, the conclusion is drawn that discretionary accruals are not associated with earnings one or two years ahead.

## Earnings management in Malaysian IPOs: The East Asian crisis, ownership control, and post-IPO performance

Ahmad-Zaluki et al. (2009) study earnings management in the context of IPOs during the Asian crisis. The authors examine whether IPO firms employ upward earnings management during the financial crisis and whether level of earnings management increases during the crisis. In addition, the influence of profit guarantees and retained ownership on earnings management is tested. Finally, level of earnings management is linked to future stock performance.

To test the hypotheses the authors use the cross-sectional version of the modified Jones model. Coefficients are estimated in each year for each industry since this allows parameters to vary over time and by industry. The final sample consists of 250 IPO that are listed on the Kuala Lumpur Stock Exchange. The sample time frame ranges from 1990 till 2000. The sample is collected from Datastream, annual reports, and the Pacific-Basin Capital Market (PACAP) Research Centre database. Several smaller industries are combined into six industry groups to ensure that the sample is representative. Several control variables are used in the multivariate analysis: crisis years, profit guarantees, the level of retained share ownership, auditor reputation, underwriter prestige, company age, size of initial returns (underpricing), the degree of leverage, company size, and board of listing.

The univariate analysis shows that IPO firms engage in upward earnings management during the IPO year and the two post-IPO years. Earnings managed is reversed three years after the IPO year through the use of downward earnings management. Results show that 75 percent of the IPO firms employs upward earnings management during the crisis while 57 percent uses upward earnings management during non-crisis years. The multivariate analysis results confirm that the crisis period is an important determinant for earnings management. IPO firms are found to use upward earnings management during the crisis period to improve valuation. Retained ownership is also found to have a significant impact on earnings management. A positive relationship is found to exist between retained ownership and upward earnings management. From the control variables auditor reputation and company age are found to be significant earnings management determinants. Big 5 auditors are found to constrain earnings management. The significance of company age is explained by the fact that older firms are less uncertain of the value of an IPO and do thus not need to employ earnings management. Results also suggest that extensive earnings management in IPO firms negatively impacts long-term performance. This does, however, only apply for IPOs that are issued during the economic crisis period. No relationship is found between earnings management and long-term performance in non-crisis periods. Environmental factors should thus be considered in IPO studies.

## An appraisal of financially distressed companies’ earnings management: Evidence from listed companies in China

Chen et al. (2010) study the earnings management behavior of financially distressed Chinese firms. The authors test whether downward earnings management is used by firms that make a loss, approach Special Treatment (ST) designation, and have received the ST designation. Chinese stock exchanges designate a firm as ST when its financial situation is deteriorating. In firms that are designated as an ST firm management can be replaced or have its salary reduced and funding costs will increase. Outcomes are then compared for private and state-owned companies and for highly and less regulated industries. The modified Jones model is used to measure earnings management. The selection of this model is based on the fact that all models have weaknesses and that the modified Jones model has continuously been adopted. Sample data is collected from the CCER database, firms from the financial and insurance sector have been excluded. The final sample consists of 74 firms that have received the ST designation. The sample time frame ranges from 2002 to 2006. Firms are classified as state-owned or private-sector based on ownership classification contained in the CCER database. Industry regulation level is established based on the GICS code found in the CCER database.

The modified Jones model is estimated cross-sectional by industry. Firms are classified by industry based on two digit GICS codes. The empirical model includes four control variables: ROA, CFO, firm size, and leverage. ROA is used to control for incentives that are provided by low profit margins and CFO is used to control for the negative correlation between accruals and cash flows. Firm size is included to control for the fact that large firms are more susceptible to government regulation. And leverage controls for the fact that more heavily leveraged firms present a greater risk of defaulting on debt agreements. The variance inflation factor (VIF) is used to assess multicollinearity issues. Since VIF for all values is below 10 no multicollinearity is detected.

Results show that discretionary accruals are used to manage earnings downward in the year that firms make a loss. The same applies to the year in which firms receive the ST designation. Earnings are, however, managed upward in the year after the ST designation have been received to avoid de-listing of the stock exchange. The distinction made between state-owned an private firms is shown not to impact earnings management practices. Industry regulation on the other hand does impact earnings management practices. Firms in less regulated industries are found to be more likely to engage in earnings management.

## Value relevance of discretionary accruals in the Asian financial crisis of 1997-1998

Choi et al. (2011) study changes in the information value of reported earnings during the Asian financial crisis. Institutional context and information asymmetry are taken as additional variables that are thought to influence the information value. The authors use the performance matched model to estimate discretionary accruals. The model is estimated per two digit SIC industry and across all countries included in the sample. Sample data is collected from Worldscope and Datastream. The sample consist of 10,406 firm-year observation from nine Asian countries: Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Taiwan, and Thailand. The sample time frame ranges from 1995 to 2000. During this time three periods are distinguished: pre-crisis (1995-1996), crisis (1997-1998), and post-crisis (1999-2000). Since the number of firms per country differs to a large extend, weighted least squares (WLS) is used to ensure that an equal weight is assigned to each country. Discretionary, non-discretionary, and operating cash flows are winsorized at the 1st and 99th percentile. Country specific control variables that are used by the authors in the multivariate analysis are not discussed.

During the crisis period the information value of discretionary accruals declines sharply. More specifically, the information value of discretionary accruals is found to decline by 50 percent during the crisis period. Post-crisis the information value increases to a higher level than prior to the crisis. The authors compare results of OLS and WLS and conclude that the switch to WLS does not change the results. The authors therefore continue with solely using OLS regression. To test whether the institutional context plays a role in the information value of discretionary accruals the sample is split into two. One part of the sample contains countries with strong institutions and the other part contains countries in which institutions are weak. The results confirm the hypothesis that the information value of discretionary accruals decreases significantly in countries with weak institutions during a crisis. Next, the third hypothesis is confirmed. Results show that information value of accruals decreases to a greater extend during a crisis in firm with high information asymmetry. The robustness of these finings are checked by carrying out a sensitivity analysis. Model coefficients are re-estimated for each two digit SIC industry and each sample year. This does not change the results significantly. The authors also re-estimate the model for each country and year. This does not change the results. Then the sample is split in two based on the profitability of the sample firms. One half of the sample consists of profitable firms whereas the other half consists of firms that realized a loss. The coefficients are re-estimated once more to check whether profitability of firms negatively influences the reliability of the findings. Results are similar to earlier results, which indicates that findings are robust. Next, the authors include three additional control variables: natural log of total assets, book-to-market ratio, and leverage. These variables are found to be insignificant. Since Japanese firms make up 30% of the total sample it could be argued that findings are influenced to a large extend by these firms. Therefore these firms are excluded from the sample to check whether this leads to different findings. This is not the case. Finally, a sub sample is created that consist of firms that did not go bankrupt to ensure that bankruptcy does not influence the findings in a negative way. Since the last sensitivity test does not lead to different findings, the authors conclude that their findings are robust. The overall conclusion is that the information value of discretionary accruals has significantly declined during the financial crisis. This effect is, however, mediated by strong institutions and low information asymmetry.

## Financial distress, earnings management and market pricing of accruals during the global financial crisis

Habib et al. (2013) study earnings management practices in financially distressed firms and check whether this has changed during the global financial crisis. The authors also research whether market pricing of discretionary accruals during the financial crisis differs between distressed and non-distressed firms. The modified Jones model is used to measure earnings management. An initial sample of 1,200 firm-year observations is collected from 1999-2011. Financial institutions and industries with less than 6 observations are excluded from the sample. The final sample consists of 767 firm-year observations.

The authors identify financially distressed firms as firms that have negative working capital, a net loss, or negative working capital and a net loss. After having marked firms that conform to these criteria as distressed, discretionary accruals are calculated. These two variables are used as inputs for the regression model. The regression model also incorporates six control variables: firm size (log of total assets), operating cash flow divided by total assets, leverage, audit quality, ownership concentration, and firm growth opportunities. Three additional dummy variables are added that indicate whether an observation is part of a distressed firm and the global financial crisis period (2008-2011).

The univariate results show that discretionary accruals for distressed firms are significantly more negative than those of non-distressed firms. Managers of distressed firms are thus shown to use downward earnings management. No significant difference is found between before crisis discretionary accruals levels and during the crisis discretionary accruals levels. The multivariate analysis confirms that distressed firms employ downward earnings management and that the crisis period does not significantly influence earnings management. The results show that audit quality and growth opportunities are not significant as control variables. All other control variables are significant in two or more of the regressions used. Further analysis shows that investors see discretionary accruals as informative rather than opportunistic. A sensitivity analysis is carried out to check whether several factors negatively affect the reliability of the findings. Legitimate asset write-offs is the first of these factors. Assets write-offs cause negative accruals and could thus lead to the detection of earnings management while this is not the case. A dummy variable is added for asset write-offs. While this dummy variable is significant it does not change the inferences drawn from earlier results. To test whether prior year discretionary accruals influence the findings it is added as an independent variable. This does not change the results since the variable is insignificant. The authors also check whether extreme performance may have impacted their findings. They use the performance-matched model to estimate discretionary accruals. This does not change the findings. The overall conclusion is thus that distressed firms manage earnings downward and that this association does not change during the financial crisis.

## The effects of the European debt crisis on earnings quality

Kousenidis et al. (2013) study effects of the financial crisis on earnings quality. They focus on European countries with a weak fiscal sustainability that are under supervision of the European Union. Quality aspects that are studied are value relevance, timeliness, conditional conservatism, smoothing, management, persistence, and predictability. The authors use the performance-matched model to test whether earnings management is constrained by a stricter financial reporting regime during the financial crisis. The authors expect that a shift from income smoothing to big bath techniques occurs during the financial crisis.

The authors collect data from Compustat Global for the period 2008-2011. This period is divided into two sub-periods: prior to the crisis (2008-2009) and crisis (2010-2011). Only firms for which data is available for both sub-periods are included in the sample. Next, financial firms and firms with negative book values are excluded. Following Kothari et al. (2005) the authors also exclude observations falling into the top three percent of the squared residuals of model estimates. Data from five countries are included: Spain, Greece, Ireland, Italy, and Portugal. The final sample includes 552 firms, which constitutes 2,208 firm-year observations. To further improve estimation of the models the authors estimate them cross-sectional and cross-industry while using the Global Industry Classification Standard (GICS) rather than classification based on SIC. The GICS has been found to provide more reliable industry groupings when estimating discretionary accruals. To test for differences between the two sub-period groups the Difference-in-Difference approach (Ashenfelter & Car, 1985) is used. Firms are partitioned into two groups based on the level of absolute discretionary accruals. A high and a low earnings management group is thus created. To reflect this partition in the models, dummy variables are added. Two dummy variables are added: high or low earnings management and pre-crisis or crisis period. Leverage, logarithm of the ratio of market capitalization, and operating cash flow are added as control variables. Barth et al.’s (2007) model is used to measure earnings smoothing and Tendeloo and Vanstraelen’s (2005) model is used to measure big bath techniques. The first model measures the variability of earnings to assess the level of earnings smoothing. The second model tests the association between discretionary accruals and negative special items to assess whether big bath techniques are used.

Results show that all three control variables are significant in the pre-crisis period. Leverage is, however, not significant in the crisis period while the other two are. Results support the hypothesis that earnings management decreases during the financial crisis. More specifically, earnings smoothing is found to decrease during the financial crisis period. Earnings smoothing is then studied in more detail by comparing the high discretionary with low discretionary accruals sub-samples. While earnings smoothing decreases in the low discretionary accruals sample it slightly increases in the high discretionary accruals sample. Subsequent analysis checks whether a shift from earnings smoothing to big bath techniques occurred. Results do not support this hypothesis.

## Conclusion

In this chapter prior literature has been reviewed to provide an input for the hypotheses that will be developed in the next chapter and the research method that is used to test these hypotheses. Research findings show that earnings management decreases during a financial crisis (Kousenidis et al., 2013). Firms are found to manage earnings downward during financial crises and specifically when firms make a loss and are financially distressed (Lin & Shih, 2002; Chen et al., 2010; Habib et al., 2013). During a financial crisis managers are motivated to manage earnings downward since they will not receive a bonus. Reserves are created so that future earnings can be boosted, which should increase future bonus payments. Lin and Shih (2002) confirm that earnings reserves are strategically released in periods with moderate earnings. Quarters with moderate GDP growth are characterized by positive mean discretionary accruals whereas quarters with strong or weak GDP growth are characterized by negative mean discretionary accruals. More recently researchers have studied earnings management in debt renegotiation (Saleh & Ahmed, 2005) and IPO firms (Ahmad-Zaluki et al., 2009). Firms that have restructured debt are found to manage earnings downward whereas IPO firms are found to manage earnings upward. Debt restructuring can be expected to occur on a larger scale during a financial crisis since firms will more often default on debt repayments. IPOs on the other are less prevalent during a financial crisis (MarketWatch, 2011). Earnings management studies that focus on the recent financial crisis are rare. While Lin and Shih (2002) study earnings management during the 1990-1991 recession, it is not clear whether these research findings are still relevant nowadays. External factors influence earnings management practices and could therefore change the constituted trends. The measurements carried out in this thesis will show whether a relationship exists between the recent financial crisis and the use of discretionary accruals. Limited research on accruals earnings management during the recent financial crisis is available. The hypotheses that will be developed in the next chapter will be used to provide insights into the use of accruals earnings management during this crisis. Positive and negative changes in GDP on a yearly basis will be linked to upward or downward accrual earnings management. The hypotheses will answer how a financial crisis impacts the use of accrual earnings management. The finding that accruals have been used strategically to manage earnings during the 1990-1991 recession (Lin & Shih, 2002) will thereby be extended to the present day.

The modified Jones model is the most widely used model to measure earnings management. Seven out of ten authors employ the modified Jones model to measure earnings management. Four authors use the original Jones model and two use the performance-matched model developed by Kothari et al. (2005). Sample selection differs by research but exclusion criteria are similar. All authors exclude financial institutions and firms for which data is missing. Two main methods are used to divide final samples into industries. A majority of the authors use two digit SIC codes while some authors claim that estimation of accruals models can be improved by classifying industries based on GICS codes. Research models are similar but differ in the use of control variables. The most used and significant control variables are: leverage (7), firm size (5), and operating cash flow (4). All but one paper found that earnings are managed downward during the financial crisis. IPO firms are found to manage earnings upward during a financial crisis whereas debt renegotiating firms are found to manage earnings downward. Information that can be drawn from discretionary accruals from either of these firms has been found to significantly decrease during a financial crisis. These findings will be used to develop hypotheses in the next chapter and design the research in chapter 7.

# Developing the Hypotheses

In this chapter the research hypotheses will be developed based on insights gathered from prior literature and accounting theories. Since the research is of a positive nature motives that are thought to be present during a financial crisis will be used to predict and ultimately explain earnings management behavior. Different incentives have been identified by political economy and stakeholder theory. Managers need to accommodate a variety of interests and will therefore manage earnings to provide a different level of information to financial statement users (McVay, 2006). Charoenwong and Jiraporn’s (2008) pre- and post- analyses shows that non-financial firms located in Thailand engaged in earnings management during the crisis and stop managing earnings after the crisis. A financial crisis does thus provide additional incentives to engage in earnings management.

## Research Hypotheses

The earlier discussed accounting theories make clear that the agency, positive accounting, and political economy theory can be used to distinguish incentives that arise during a financial crisis. To minimize the exposure to actions taken by the agent due to information asymmetry, contracts have been created to align interests. The incentives created by such bonus contracts are discussed by positive accounting theory as part of the bonus plan hypothesis. According to this hypothesis bonus contracts induce downward earnings management when the lower earnings bound specified in the contract is not reached or the upper bound is exceeded. This intuition is supported by Yoon and Miller’s (2002) findings that firms engage in earnings management when operating performance is either weak or strong. Since firms perform worse during a financial crisis the likelihood increases that lower bounds are not reached. Managers will thus be incentivized to manage earnings downward. As has been discussed earlier, big bath techniques can be used to create reserves during lean periods so that future earnings can be boosted. Managers are incentivized to boost future earnings since they will receive a higher bonus but also since the perception of their firm’s performance is at stake. More specifically, capital markets expect firms to perform poorly during a financial crisis whereas strong performance is expected after a financial crisis (Habib et al., 2013). Firms do thus engage in downward earnings management during a financial crisis (Saleh and Ahmed, 2005; Chai et al., 2007; Ahmed et al., 2008; Habib et al., 2013; Kousenidis et al., 2013) to ensure that earnings can be boosted as the economy picks up. Lang and Maffet (2011) do, however, find that an increased level of scrutiny from creditors, auditor, and other stakeholders during the Asian crisis decreases the discretion of management to manage reported earnings. Large movements in earnings management should thus not be expected. Based on these theories and findings the following hypothesis is developed:

***H1****:* During phase one (2008-2009) discretionary accruals have a negative relation with reported earnings

While income-decreasing actions appear to be dominant during a financial crisis other authors find specific situations in which income increasing earnings management is used. The GDP figures discussed earlier show a positive trend. Although this will not entail that all firms will be profitable, improved performance can induce managers to boost earnings by employing the created reserves. Lin and Shih (2002) do, however, find that earnings reserves are released strategically in periods of moderate growth. Reserves could thus be released during a different period than is being studied. Firms that continue to realize losses may be able to sustain negative results during the first phase of the financial crisis. Continued losses can, however, lead to bankruptcy or debt covenant violation, which provides other incentives. Possible reasons are improved borrowing terms and benefitting from government support. Rosner (2003) finds that firms that become bankrupt do not appear to be distressed in the periods before bankruptcy occurs. This is explained by a tendency to use income increasing earnings management when a firm is in financial distress since managers want to secure their bonuses as well as job. The debt-equity hypothesis proposed by positive accounting theory describes additional incentives to engage in upward earnings management. Weaker performance during a financial crisis can cause a firm to approach technical default on the debt covenant, which incentivizes managers to manage earnings upward. DeFond and Jiambalvo (1994) confirm that firms engage in upward earnings management when technical default is approached. Similarly, Saleh and Ahmed (2005) find that firms in Malaysia employed income-decreasing techniques during debt renegotiations. Liquidity providers and specifically debt covenants do thus provide incentives to engage in limited upward earnings management. Moreover, liquidity providers are shown to avoid firms with non-transparent earnings reports during financial crises (Lang & Maffet, 2011). Less earnings management is associated with greater transparency, which will motivate managers to minimize earnings management activities when borrowing needs to be increased. These findings are used to develop the following hypothesis:

***H2****:* During phase two (2010-2011) discretionary accruals have a positive relation with reported earnings

## Conclusion

Two hypotheses have been developed that will be used to test whether an earnings management pattern is discernible during the recent financial crisis. Since this is a positive research the hypotheses are used to predict and explain the behavior of managers during the recent financial crisis. In the next chapter the research design will be discussed.

# Designing the research

In this chapter the methodology that will be employed to measure earnings management during the recent financial crisis will be discussed. First, the sample will be selected. Next, the statistical methods to be employed will be discussed. The focus is solely on quantitative statistical procedures since they are “suitable for analysis of large data samples perform relatively well, and the estimation procedure is clear and can be observed” (Goncharov, 2005: 70).

## Selecting the Sample

To test developed hypotheses a sample is extracted from the Compustat North America database. The Compustat North America database enables researchers to collect large amounts of data concerning stock listed North American and Canadian firms. Fiscal year data is available from 1950 onwards and quarterly data is available from 1961 onwards. To test the effect of a financial crisis on earnings management activities a sample that contains non-financial firms located in the United States will be extracted from Compustat. The sample time frame ranges from 2000 till 2011. The years 2000 till 2007 are included since these will be used as the estimation period.

Based on several selection criteria a part of the data has to be excluded. As stated above, only non-financial firms will be included in the sample. Based on earlier earnings management research banks, insurance companies, other financial holdings companies (SIC 6000-6499) will be excluded from the sample. Becker et al. (1998) and Rusmin (2010) state that banks, insurance companies, and other financial holdings have to be excluded when measuring discretionary accruals since specific regulations apply to these industries that could affect discretionary accruals. Next, firm-year observations for which data required to complete the three selected models are missing need to be excluded. Single firm-year observation for which data are missing and that are that are part of the estimation period (2000-2007) can be excluded. If such firm-year observations are part of the event period (2008-2011), data for the entire event period needs to be excluded. This is necessary since the two phases in the event period need to be compared. Removing data of one firm in one of the phases decreases the comparability of the two event period phases. To further increase the comparability of the event period phases, firm data for which not all four years are available are excluded. Once data have been excluded since not all 4 years are available or data fields are empty the data is split by into separate files based on the two digits SIC classification. This needs to be done since regression coefficients will have to be estimated by industry. Finally, SIC files that contain less than six firms with event period data need to be excluded. This number is based on earlier research by Habib et al. (2013). The following SIC groupings are excluded: 100 (117 observations), 200 (22), 700 (47), 800 (29), 900 (4), 1,200 (59), 1,400 (109), 1,500 (39), 1,700 (122), 2,100 (51), 4,100 (28), 4,600 (35), 4,700 (119), 5,200 (80), 7,500 (70), 7,600 (15), 8,100 (19), 8,300 (95), and 9,900 (276). These are 19 out of the 66 SIC groupings or 1,336 of the 45,623 firm-year observations contained in the sample. The following table shows the exclusion process:

|  |  |
| --- | --- |
|  | Firm-year observations |
| Original sample | 133,312 |
| SIC 6000-6499 excluded | -16,508 |
| Data for variables not available | -56,848 |
| Data for 2008-2011 not available | -13,255 |
| SIC grouping < 6 firms | -1,336 |
| **Final sample (estimation & event period)** | **45,365** |

The final sample includes both the estimation and event period data. It includes 6,858 firm-year observations for the event period (2008-2011), which are 1,714 individual firms.

## Three Requirements to use Linear Regression

When the data have been sorted, split by industry, and additional variables have been calculated, the data can be used to estimate non-discretionary accruals and discretionary accruals. Before employing linear regression the data set should first be tested for normality, homoscedasticity, and linearity. As De Vocht (2002) states, regression cannot be used to estimate the residuals when one or more of the three requirements is not met.

First, the data should be normally distributed. Normal distribution can be checked either numerically or graphically. When checking graphically whether the data have a normal distribution, the histogram should display a bell shaped curve. Creating a normal P-P plot that displays the expected and observed cumulative probability of the discretionary accrual variables can further test linearity. The plot should show a straight line to confirm linearity. Second, the data needs to be tested for homoscedasticity. Homoscedasticity exists when all random variables have the same finite variance. The assumption of homoscedasticity is made in using linear regression since it simplifies the mathematical treatment. Homoscedasticity is tested by creating a scatter plot of the predicted variable (NDA) and the regression residuals (DA). In the case that the scatter plot does not show a horn shaped pattern, homoscedasticity is confirmed. Third, linearity needs to be tested. The same scatter plot is used to test the data for linearity. Linearity is present when the scatter plot shows that the data is well balanced.

### Normalization of Data

The data that are used to complete the accrual measurement models needs to be normalized in order for it to be normally distributed. Without normalizing the data the first requirement discussed above would not be met and linear regression could not be used in the analysis. To normalize data, the mean and standard deviation of all observations for a specific firm of one variable needs to be calculated. The following formula is then used to calculate the normalized value:

*Normalized value* = (observation – mean) / standard deviation

Data of all independent variables used to complete the accrual measurement models are normalized. This leads to the fact that variables that are usually not negative such as PPE will contain negative values. The following example explains why:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Fiscal Year** | **PPE** | **Mean** | **Std. Dev.** | **Norm. Value** |
| 2006 | 100 | 106.333 | 4.502 | -1.407 |
| 2007 | 110 | 106.333 | 4.502 | 0.814 |
| 2008 | 112 | 106.333 | 4.502 | 1.259 |
| 2009 | 105 | 106.333 | 4.502 | -0.296 |
| 2010 | 108 | 106.333 | 4.502 | 0.370 |
| 2011 | 103 | 106.333 | 4.502 | -0.740 |

*Table 7.2: Normalization Example*

As can be seen in table 7.2, half of the normalized values are negative (3 out of 6 observations). This is caused by the fact that the mean, which is subtracted from the observation, is by definition larger than half of the observations.

## Testing the Hypotheses

Once the sample has been gathered, the usable data have been extracted, and normalized it will be used to complete the selected earnings management measurement models. This will be done in several steps. First, total accruals for each year are calculated by using the following formula (completed with normalized data):

*TA*t = (∆Non-cash current assets - ∆Current liabilities excl. current portion of long term debt – Depreciation and Amortization) / Lagged total assets

Second, the calculated total accruals will be used to estimate non-discretionary accruals. An eight-year estimation period is used to estimate the regression coefficients α1, α2, α3, and α4 by industry. The estimated coefficients are then used as the coefficients a1, a2, a3, and a4 in the NDA equation. The following equations are used to estimate the coefficients and non-discretionary accruals based on normalized data from the estimation period (2000-2007):

Modified Jones (1995):

*TAt* = α1 (1 / Assetst-1) + α2 ∆Salest + α3 PPEt + εt

*NDAt* = a1 (1 / Assetst-1) + a2 (∆REVt - ∆RECt) + a3 PPEt

McNichols (2002):

*TAt* = α1 (1/Assetst-1) + α2 CFOt-1 + α3 CFOt + α4 CFOt+1 ∆REVt + α5 PPEt + εt

*NDAt* = a1 (1/Assetst-1) + a2 CFOt-1 + a3 CFOt + a4 CFOt+1 ∆REVt + a5 PPEt

Forward-looking (2003):

*TAt* = α 1 (1/Assetst-1) + α 2 ((1+k) ∆REVt - ∆RECt) + α 3 PPEt + α 4 TAt-1 + α 5 Gr\_Salest + εt

∆RECt = a1 + k ∆REVt + εt

*NDAt* = a1 (1/Assetst-1) + a2 ((1+k) ∆REVt - ∆RECt) + a3 PPEt + a4 TAt-1 + a5 Gr\_Salest

Third, the residual or in this case discretionary accruals are estimated by subtracting non-discretionary accruals from total accruals for the three periods (2006-2011):

*DAt* = TAt – NDAt

Before these three models can be used to estimate discretionary accruals the independent variables have to be tested for multi-collinearity. Testing for multi-collinearity shows whether two or more independent variables are highly correlated. If multi-collinearity is present in the model the estimates of the regression coefficients can become unstable and standard errors of the coefficients can be inflated. While no distinct rules apply to the multi-collinearity analysis, I will assume that multi-collinearity is present when VIF values are that larger than 10. This value has also been used by Chen et al. (2010). The tables below present the outcome of the VIF values of the independent variables contained in the three models.

Modified Jones:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| ∆Rev - ∆Rec | 0.989 | 1.011 |
| PPE | 0.989 | 1.011 |

*Table 7.3: Multi-collinearity test, Dependent variable: 1/At-1*

McNichols:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| CFOt-1 | 0.905 | 1.105 |
| CFO | 0.902 | 1.109 |
| CFOt+1 | 0.969 | 1.032 |
| ∆Rev | 0.915 | 1.093 |
| PPE | 0.937 | 1.067 |

*Table 7.4: Multi-collinearity test, Dependent variable: 1/At-1*

Forward looking:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| (1+k) \* Rev - Rec | 0.457 | 2.188 |
| PPE | 0.954 | 1.049 |
| TAt-1 | 0.97 | 1.031 |
| Gr. Sales | 0.445 | 2.245 |

*Table 7.5: Multi-collinearity test, Dependent variable: 1/At-1*

The values presented above show that it is unlikely that multi-collinearity is present in any of the three models. Additional tests can be found in appendix 3. VIF values for the modified Jones and McNichols models are close to 1 and multi-collinearity is thus unlikely. VIF values for the forward looking do slightly exceed 2, which shows that the model’s independent variables are unlikely to be highly correlated. The models can thus be used to estimate the residuals. The estimated residuals will be used to test whether a trend is visible during the financial crisis. To test for earnings management patterns during the financial crisis a research model needs to be created. The research model that will be used in this analysis is discussed in the next subsection.

### Analyses to be carried out

Once all variables have been estimated the correlation between the used variables needs to be tested. A two-tailed Pearson correlation test will be carried out to establish the correlation between the used variables. Next, a univariate regression is carried out to make changes in the variables during different periods of the financial crisis visible. The univariate analysis shows the difference between the mean of each variable. To compare the means an independent sample T-test is carried out. The final analysis to be done is a multivariate analysis, which is used to test the developed hypotheses. In order to be able to carry out a multivariate analysis a research model has to be created. Two dummy variables need to be used that identify the two phases of the financial crisis. Crisis1 identifies the first phase of the financial crisis by taking a value of 1 in the case that fiscal year equals 2008 or 2009 and Crisis2 does the same for fiscal year 2010 and 2011. To complete the research model control variables need to be added. Based on earlier research of earnings management during a crisis (Johl et al., 2003; Chia et al., 2007; Chen et al., 2010; Choi et al., 2011; Habib et al., 2013; Kousenidis et al., 2013) three control variables are added. These variables are combined in the following model:

*TAt, NDAt, or DAt* = β0 + β1 Crisis1 + β2 Crisis2 + β3 Size + β4 Leverage+ β5 OCF + εt

*Where*

*Crisis1 = dummy variable coded 1 if the firm-year observations are part of phase one*

*Crisis2 = dummy variable coded 1 if the firm-year observations are part of phase two*

*Size = firm size measured as the log value of total assets (normalized)*

*Leverage = ratio of long-term debt to total assets (normalized)*

*OCF = operating cash flows divided by total assets (normalized)*

Also this model has to be tested for multi-collinearity. If multi-collinearity is detected variables need to be removed from the model since they would negatively impact the findings. The table below shows the required data to check for multi-collinearity.

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| Size | .810 | 1.234 |
| Leverage | .819 | 1.221 |
| OCF | .979 | 1.021 |
| Crisis2 | .968 | 1.033 |

*Table 7.6: Multi-collinearity test Research model, Dependent variable: Crisis1*

All independent variables have a VIF value close to one, which indicates that there is no multi-collinearity. To ensure that these results are correct the variables are switched so that they have all been the dependent variable. The results remain the same, all VIF values are close to one. Therefore, none of the values that are part of the research model have to be removed.

## Summary

In this chapter the research design has been discussed.. The required data will be collected from Compustat and will contain non-financial US firms. The sample time frame ranges from 2005 until 2011. The steps that need to be taken to estimate the selected earnings management measurement models have been discussed in detail and the research model has been developed and tested. Five variables are used to carry out the multivariate analysis. Results achieved by carrying out the research are presented in the next chapter.

# Research Results

In this chapter the research results will be discussed. First, the findings regarding earnings management through the use of discretionary accruals are analyzed to establish whether a relation with the identified financial crisis periods can be identified. Second, two additional analyses are carried out.

## Data testing

This section is used to discuss descriptive statistics as well as the test of three requirements for using linear regression to test the developed hypotheses.

### Descriptive statistics

In this section the descriptive statistics of the independent, dependent, and control variables are listed. The table below shows multiple descriptive statistics of the normalized variables (up to TAt-1), estimated non-discretionary and discretionary accruals, and the crisis dummy variables. All normalized variables show negative minimum values. While this might be counterintuitive for variables such as PPE, negative values are caused by normalization.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **N** | **Min** | **Max** | **Mean** | **MSE** | **Std. Dev.** |
| At-1 | 45365 | -1.97 | 3.53 | .2318 | .00350 | .74600 |
| 1/At-1 | 45365 | -3.08 | 3.46 | -.0052 | .00462 | .98472 |
| PPE | 45365 | -3.32 | 3.46 | .0004 | .00467 | .99416 |
| ∆Rev | 45365 | -3.43 | 3.53 | -.0020 | .00467 | .99393 |
| ∆Rec | 45365 | -3.53 | 3.55 | -.0003 | .00469 | .99860 |
| ∆Rev - ∆Rec | 45365 | -3.60 | 3.58 | .0371 | .00482 | 102.622 |
| (1+k) \* Rev - Rec | 45365 | -6.73 | 7.63 | -.0023 | .00621 | 132.216 |
| CFOt-1 | 45365 | -3.52 | 3.57 | .0874 | .00440 | .93638 |
| CFO | 45365 | -3.48 | 3.59 | .0329 | .00462 | .98471 |
| CFOt+1 | 45365 | -3.47 | 3.59 | .0273 | .00465 | .99049 |
| Gr. Sales | 45365 | -3.64 | 3.42 | .0300 | .00480 | 102.209 |
| Size | 45362 | -3.30 | 3.44 | .0673 | .00436 | .92890 |
| OCF | 45362 | -3.59 | 3.58 | .0070 | .00461 | .98203 |
| Lev | 39550 | -3.16 | 3.61 | .0072 | .00488 | .97038 |
| TA | 45365 | -3.60 | 3.56 | -.0726 | .00477 | 101.662 |
| TAt-1 | 45365 | -3.60 | 3.56 | -.0204 | .00472 | 100.590 |
| NDAmj | 45365 | -2.00 | 1.62 | -.0021 | .00197 | .41893 |
| DAmj | 45365 | -3.80 | 4.32 | -.0705 | .00439 | .93603 |
| NDAmn | 45365 | -2.58 | 2.12 | -.0076 | .00211 | .44943 |
| DAmn | 45365 | -3.71 | 4.41 | -.0650 | .00431 | .91751 |
| NDAfl | 45365 | -2.78 | 2.84 | -.0004 | .00257 | .54677 |
| DAfl | 45365 | -3.82 | 4.13 | -.0723 | .00405 | .86319 |
| Crisis1 | 45365 | .00 | 1.00 | .0756 | .00124 | .26437 |
| Crisis2 | 45365 | .00 | 1.00 | .0756 | .00124 | .26430 |
| Valid N (listwise) | 39550 |  |  |  |  |  |

*Table 8.1: Descriptive statistics (normalized data)*

*Where:*

*At-1 = total assets prior year (normalized)*

*1/A = 1 / total assets current year (normalized)*

*PPE = property, plant, and equipment scaled by lagged total assets (normalized)*

*∆Rev = change in sales scaled by lagged total assets (normalized)*

*∆Rec = change in accounts receivable scaled by lagged total assets (normalized)*

*∆Rev - ∆Rec = change in sales minus change in accounts receivable / by assetst-1 (normalized)*

*(1+k) \* ∆Rev – ∆Rec = 1 + expected change in accounts receivable for a given change in sales \* change in sales scaled by lagged total assets - change in accounts receivable scaled by lagged total assets (normalized)*

*CFOt-1 = net operating cash flow prior year (normalized)*

*CFO = net operating cash flow current year (normalized)*

*CFOt+1 = net operating cash flow next year (normalized)*

*Gr. Sales = change in sales from current to next year scaled by current sales (normalized)*

*Size = control variable: firm size measured as the log value of total assets (normalized)*

*OCF = control variable: operating cash flow / total assets current year (normalized)*

*Lev = control variable: ratio of long-term debt to total assets (normalized)*

*TA = total accruals scaled by lagged total assets (normalized)*

*TAt-1 = prior year total accruals scaled by lagged total assets (normalized)*

*NDAmj = non-discretionary accruals scaled by lagged total assets modified Jones*

*DAmj = discretionary accruals scaled by lagged total assets McNichols*

*NDAmn = non-discretionary accruals scaled by lagged total assets McNichols*

*DAmn = discretionary accruals scaled by lagged total assets McNichols*

*NDAfl = non-discretionary accruals scaled by lagged total assets Forward Looking*

*DAfl = discretionary accruals scaled by lagged total assets McNichols*

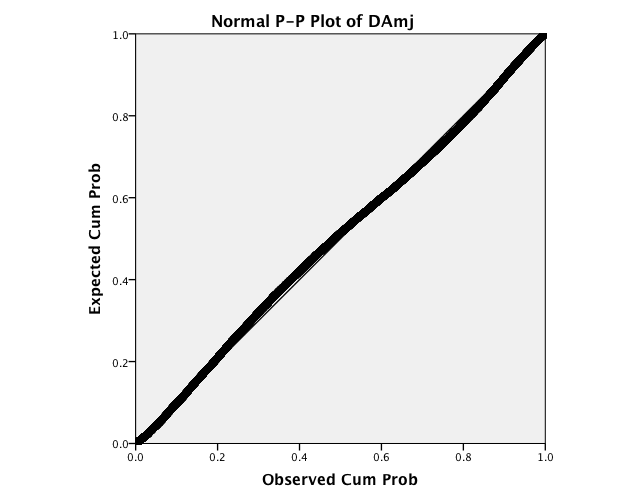
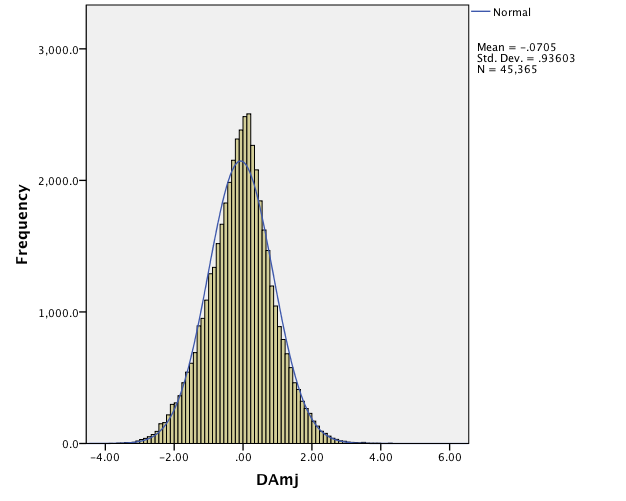
*Crisis1 = dummy variable coded 1 if the firm-year observations are part of phase one*

*Crisis2 = dummy variable coded 1 if the firm-year observations are part of phase two*

### Testing three requirements

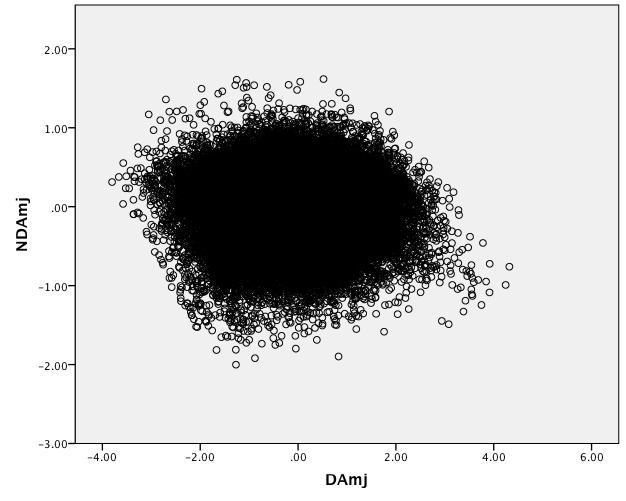
Before employing linear regression the data set should be tested for normality, homoscedasticity, and linearity. As De Vocht (2002) states, regression cannot be used to estimate the residuals when one or more of the three requirements is not met.

First, the data is tested for normal distribution in two steps. First, a histogram is created that graphically presents the spread of discretionary accruals calculated with the modified Jones model. The data represented on the left in figure 7.1 shows an almost perfect bell shaped curve, which partially confirms that the data is normally distributed. Figures for the data that was calculated by using the McNichols and Forward looking models can be found in appendix 3. These figures also partially confirm that the data of all models are normally distributed. Second, a P-P plot is created that shows the expected and observed cumulative probability of the discretionary accrual variables. Since the plot shows a straight line the figure confirms that the data are normally distributed. The same applies to the P-P plots of the McNichols and Forward looking models in appendix 3. The data of all three models are therefore normally distributed and the first requirement is met.



*Figure 8.1: Histogram and Normal P-P Plot of DAmj data*

Next, the data needs to be tested for homoscedasticity. Homoscedasticity exists when all random variables have the same finite variance. The assumption of homoscedasticity is made in using linear regression since it simplifies the mathematical treatment. Homoscedasticity is tested by creating a scatter plot of the predicted variable (NDA) and the regression residuals (DA). In the case that the scatter plot does not show a horn shaped pattern, homoscedasticity is confirmed. Since this is the case in the scatterplots of all three models the second requirement is met.



*Figure 8.2: Scatterplot of DAmj and NDAmj*

Lastly, the data needs to be tested for linearity. The same scatter plot is used to test the data for linearity. Linearity is present when the scatter plot shows that the data is well balanced. While the data might appear to be clustered at first sight, this is only the case since the data consists of a large amount of firm-year observations. Moreover, the data of all the models are well balanced and the scatter plots do therefore confirm that the third requirement is met. Since all requirements are met linear regression can be used to test the hypotheses.

## Results

Now that the three requirements have been met linear regression can be used to estimate the residuals. Results of the linear regression will be presented in this section. Before the final results can be discussed graphical evidence and the correlation between the used variables is discussed. A two-tailed Pearson correlation test is carried out to establish the correlation between the used variables. Next, a univariate regression is carried out to make changes in the variables during different periods of the financial crisis visible. The final analysis to be done is a multivariate analysis, which is used to test the developed hypotheses.

### Graphical Evidence

Figure 7.1 presents a graph of the earlier discussed trend in GDP figures in combination with a trend of the estimated discretionary accruals for all three models. The figures show a negative trend from 2006 till the beginning of 2009. GDP growth is negative in the last part of 2007, 2008, and 2009. The discretionary accruals from all three models show a comparable but less pronounced trend. The trend is, however, delayed by a year. While the lowest point in GDP is reached in 2009, discretionary accruals reach the lowest point in 2010. Discretionary accruals are close to zero up to 2009, at which point they become negative, and return to 0 in 2011. A negative trend in discretionary accruals is discernible from 2008 till 2010. From 2010 till 2011 a positive trend is visible. Up to 2009 all three models present similar discretionary accruals. From that point on the Forward looking model presents more positive discretionary accruals in 2010 and more negative discretionary accruals in 2011. Discretionary accruals estimated by the modified Jones model are slightly more negative in 2010 than discretionary accruals estimated by the McNichols model. In all other years discretionary accruals estimated by these two models are very similar. Discretionary accruals estimated by the modified Jones model are therefore only visible in 2010 in the figure below. These insights will be extended in the next sections.

C:\Users\fabian.nullmeier\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\67BXADV7\Grab grafiek fabian.tiff *Figure 8.3: Real GDP and DA trend*

### Pearson Correlation Test

The Pearson correlation test is used to check the correlations between all variables being used in estimating the residuals. These correlations can be used to assess the explanatory power of a variable. Variables can have a positive, negative or no correlation. In the case that the correlation is 1, a perfect positive correlation is found. In the case that the correlation is -1, a perfect negative correlation is found. And when the correlation is 0 no correlation is present. Correlations that are significant at the 0.01 level are marked with \*\* whereas correlations that are significant at the 0.05 level are marked with \*. The most important correlations are discussed next. The correlation value is presented by model and accompanied by the significance value in the form of a p value.

As can be seen in the table in appendix 6, the correlation between total (TA) and discretionary accruals (DA) estimated by the modified Jones model is significant and positive (.911 p = .000). The correlation value of .911 is close to 1 and does thus indicate that an almost perfect positive correlation exists between TA and DA. The p value of .000 indicates that this correlation is highly significant. The same applies to the relationship between TA and DA estimated by the other two models (McNichols: .879 p = .000; Forward looking: .843 p = .000). The relationship between total and non-discretionary accruals (NDA) estimated by all three models is also positive and highly significant (modified Jones: .391 p = .000; McNichols: .431 p = .000; Forward looking: .528 p = .000). The correlation values for the latter relationship are, however, significantly lower. This indicates that TA and NDA are not as highly correlated as TA and DA. The constituted positive relationship between the variables entails that if total accruals increase (decrease) that the discretionary and non-discretionary accruals will increase (decrease) as well. Discretionary and non-discretionary accruals on the other hand have a negative relationship for all models (-.023 p = .000; -.012 p = .008; -.011 p = .017). If one of the two increases (decreases) the other will thus decrease (increase). This relationship is strongest for the modified Jones model and weakest for the Forward looking model.

The correlation values for the crisis phases dummy variables with discretionary accruals give an indication of a possible trend in discretionary accruals during the crisis. The correlation between the dummy variable for the first phase of the crisis and DA estimated by all three models is found to be insignificant (.000 p = .987; -.004 p = .355; .003 p = .498). This could indicate that there is no relationship between the first phase of the crisis and discretionary accruals. Non-discretionary accruals do, however, show a significant and positive correlation with this dummy variable (.129 p = .000; .129 p = .000; .094 p = .000). A positive relation could thus exist between the first phase of the crisis and non-discretionary accruals. The dummy variable for the second phase of the crisis shows a significant and negative correlation with discretionary accruals (-.067 p = .000; -.065 p = .000; -.088 p = .000) and a significant and positive correlation with non-discretionary accruals (.055 p = .000; .045 p = .000; .067 p = .000). Both correlations are, however, weak since the correlation values are close to 0. These findings indicate that a negative relationship could exist between the second phase of the financial crisis and discretionary accruals. Non-discretionary accruals on the other hand could have a positive relationship with the second phase of the financial crisis. These findings are further tested in the next sections.

### Univariate Analysis

The univariate analysis shows the difference between the mean of each variable. To compare the means an independent sample T-test has been carried out. The outcome of the analysis can be found in table 8.3 on page 54. Forty-two pairs have been created. The pairs are based on the crisis phase. Variables marked with 0 represent data from the pre-crisis period (2006-2007), variables marked with 1 represent the first phase of the crisis (2008-2009), and variables marked with 2 represent the second phase of the crisis (2010-2011). All pairs but the following five are significant at the 0.01 level: 1/A 1-2, Size 0-1, Lev 1-2, TA 0-1, and TAt-1 0-1. And all but the following two pairs are significant at the 0.05 level: 1/A 1-2 and Size 0-1. Out of the three control variables leverage increases significantly when moving from the pre-crisis to the first phase of the crisis period. Size and leverage increase significantly when moving from the first to the second phase of the crisis. The control variable for operating cash flows increases when moving from 0-1 and decreases when moving from 1-2.

Discretionary accruals for all three models show a significant decrease when moving from period 0-1 and from 1-2. Period 0 discretionary accruals are positive for the modified Jones (0.0011) and Forward looking model (0.0330) whereas they are negative for the McNichols model (-0.0001). When the results from the modified Jones and Forward looking model are used a move from upward to downward earnings management is thus discernable. Results from the McNichols model do not confirm this finding. Period 0 discretionary accruals from the McNichols are, however, just slightly negative. The Forward looking model presents the highest positive discretionary accruals for period 0 and the most negative discretionary accruals for period 3. Discretionary accruals are the most negative in period 1 when using the modified Jones model.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Mean 1** | **Mean 2** | **Mean Difference** | **Sig.** |
| At-1 0-1 | .3914 | .5425 | .1511 | *.000\*\** |
| At-1 1-2 | .5425 | .6429 | .1004 | *.000\*\** |
| 1/At-1 0-1 | -.2991 | -.5173 | -.2182 | *.000\*\** |
| 1/At-1 1-2 | -.5173 | -.4987 | .0186 | *.285* |
| PPE 0-1 | -.0454 | -.2125 | -.1671 | *.000\*\** |
| PPE 1-2 | -.2125 | .0410 | .2535 | *.000\*\** |
| ∆Rev 0-1 | .0894 | -.4919 | -.5813 | *.000\*\** |
| ∆Rev 1-2 | -.4919 | .0380 | .5299 | *.000\*\** |
| ∆Rec 0-1 | .0949 | -.3684 | -.4633 | *.000\*\** |
| ∆Rec 1-2 | -.3684 | .0648 | .4332 | *.000\*\** |
| (1 + k) \* ∆Rev - ∆Rec 0-1 | .0432 | -.3745 | -.4177 | *.000\*\** |
| (1 + k) \* ∆Rev - ∆Rec 1-2 | -.3745 | .0019 | .3764 | *.000\*\** |
| CFOt-1 0-1 | .1804 | .3600 | .1796 | *.000\*\** |
| CFOt-1 1-2 | .3600 | .5797 | .2197 | *.000\*\** |
| CFO 0-1 | .1920 | .3442 | .1522 | *.000\*\** |
| CFO 1-2 | .3442 | .4582 | .1140 | *.000\*\** |
| CFOt+1 0-1 | .0413 | .4657 | .4244 | *.000\*\** |
| CFOt+1 1-2 | .4657 | .5829 | .1172 | *.000\*\** |
| Gr. Sales 0-1 | .1385 | -.5104 | -.6489 | *.000\*\** |
| Gr. Sales 1-2 | -.5104 | .1136 | .6240 | *.000\*\** |
| Size 0-1 | .3974 | .3983 | .0009 | *.956* |
| Size 1-2 | .3983 | .6203 | .2220 | *.000\*\** |
| OCF 0-1 | .0029 | .1097 | .1068 | *.000\*\** |
| OCF 1-2 | .1097 | -.0212 | -.1309 | *.000\*\** |
| Lev 0-1 | .0840 | .1850 | .1010 | *.000\*\** |
| Lev 1-2 | .1850 | .2388 | .0538 | *.022\** |
| TA 0-1 | .0611 | .1163 | .0552 | *.008\** |
| TA 1-2 | .1163 | -.2098 | -.3261 | *.000\*\** |
| TAt-1 0-1 | .0708 | .1290 | .0582 | *.005\** |
| TAt-1 1-2 | .1290 | -.2107 | -.3397 | *.000\*\** |
| NDAmj 0-1 | .0600 | .1866 | .1266 | *.000\*\** |
| NDAmj 1-2 | .1866 | .0789 | -.1077 | *.000\*\** |
| DAmj 0-1 | .0011 | -.0703 | -.0714 | *.000\*\** |
| DAmj1-2 | -.0703 | -.2887 | -.2184 | *.000\*\** |
| NDAmn 0-1 | .0612 | .1952 | .1340 | *.000\*\** |
| NDAmn 1-2 | .1952 | .0639 | -.1313 | *.000\*\** |
| DAmn 0-1 | -.0001 | -.0789 | -.0788 | *.000\*\** |
| DAmn 1-2 | -.0789 | -.2737 | -.1948 | *.000\*\** |
| NDAfl 0-1 | .0282 | .1789 | .1507 | *.000\*\** |
| NDAfl 1-2 | .1789 | .1280 | -.0509 | *.000\*\** |
| DAfl 0-1 | .0330 | -.0627 | -.0957 | *.000\*\** |
| Dafl 1-2 | -.0627 | -.3378 | -.2751 | *.000\*\** |

*Table 8.3: Independent Sample T-test*

#### Univariate analysis: Conclusion

The discussed results of the univariate analysis confirm hypothesis 1 and reject hypothesis 2. Hypothesis 1 states that discretionary accruals have a negative relation with the first phase and hypothesis 2 states that discretionary accruals have a positive relation with the second phase of the crisis. Discretionary accruals estimated with all three models are negative during the first phase of the crisis, which confirms hypothesis 1. Discretionary accruals during the second phase of the crisis are also negative, which leads to the rejection of hypothesis 2.

### Testing the Hypotheses: Multivariate analysis

In this section a multivariate analysis will be used to test the hypotheses. Discretionary accruals estimated by all three accrual measurement models will be used to test the hypotheses after which the results will be compared. In this multivariate analysis linear regression is used to test whether the two crisis periods have a positive or negative and significant relation with discretionary accruals. The multivariate analysis is carried out in four steps for each accrual measurement model. First, a regression is run that tests whether Crisis1 has a significant relation with discretionary accruals. Second, a regression is run that tests whether Crisis2 has a significant relation with discretionary accruals. Third, a model that includes Crisis1 as well as Crisis2 is tested. And fourth, a model that includes both crisis variables as well as three control variables will be used to test whether the crisis variables have a significant relation with discretionary accruals. The horizontal numbers (1-4) in tables 8.4, 8.5, and 8.6 indicate which of the four steps has been used to test the relationship.

#### Modified Jones model

In this section the modified Jones model discretionary accruals will be used to test the hypotheses. The following table shows the results of the multivariate analysis:

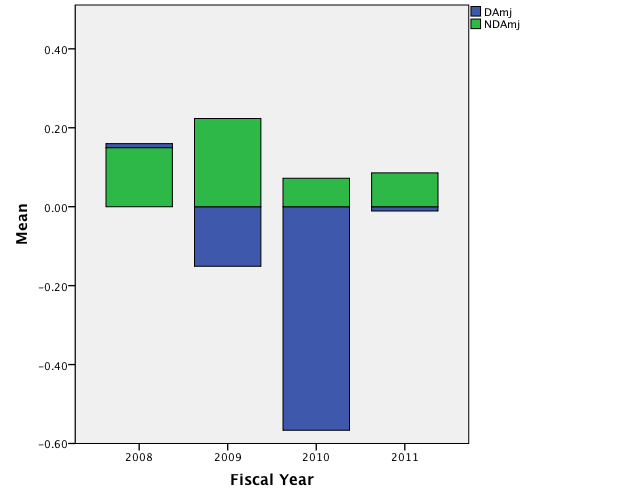
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **1** | **2** | **3** | **4** |
| Crisis1 | .000 |  | -.051 | .006 |
|  | *.987* |  | *.250* | *.740* |
| Crisis2 |  | -.236\*\* | -.238\*\* | -.198\*\* |
|  |  | *.000* | *.000* | *.000* |
| Size |  |  |  | -.064\*\* |
|  |  |  |  | *.000* |
| OCF |  |  |  | .011\* |
|  |  |  |  | *.021* |
| Lev |  |  |  | .002 |
|  |  |  |  | *.743* |
| Intercept | -.071\*\* | -.053\*\* | -.051\*\* | -.052\*\* |
|  | *.000* | *.000* | *.000* | *.000* |
| Adjusted R2 | .000 | .004 | .004 | .009 |

*Table 8.4: Linear regression of DA estimated with modified Jones model*

The results presented above show that the first phase of the crisis has an insignificant relation with discretionary accruals estimated by the modified Jones model. The regression models used in step 1, 3, and 4 all confirm that no significant relationship exists. The regression model used in the first step gives a first indication that DA and Crisis1 do not have a significant relation since the p value of .987 is close to 1. The insignificance of this relationship is confirmed by the first regression model’s adjusted R2 value of .000. The relationship increases in significance when Crisis2 is included in step 3. The p value of .250 does, however, still confirm that the relationship is insignificant. The final step that includes three control variables confirms that the relationship between DA and Crisis1 is insignificant (.006 p = .740). The first phase of the financial crisis does thus not appear to have a relation with discretionary accruals. Crisis 2 on the other hand is highly significant in all three steps used to test the relationship with discretionary accruals. It is shown to have a negative relation with discretionary accruals (-.198 p = .000). Both hypotheses are thus rejected when the modified Jones is used to estimate discretionary accruals.

Only size is highly significant as a control variable and has a negative relation with discretionary accruals (-.064 p = .000). The operating cash flow control variable (OCF) is significant at the 0.05 level and is shown to have a positive relation with discretionary accruals (.021 p = .000). Leverage shows a slightly positive relation but is insignificant (.002 p = .743).

Figure 8.4 provides an insight into the developments of discretionary and non-discretionary accruals, as estimated by the modified Jones model, during the event period. Discretionary accruals are positive during 2008 and become negative thereafter. Discretionary accruals are most negative in 2010. Non-discretionary accruals increase when moving from 2008 to 2009 but significantly decrease in 2010 as well as 2011. The graphical representation confirms that earnings are earnings are not solely managed downward during the first phase and that earnings are not managed upward during the second phase.



*Figure 8.4: DA and NDA estimated with the modified Jones model*

#### McNichols model

The McNichols model adds past, present, and future cash flows to the Jones model to increase explanatory power. The regression results can be found in the following table:

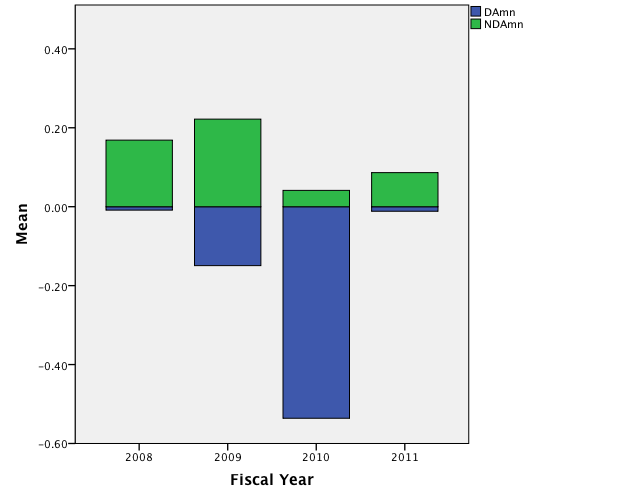
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **1** | **2** | **3** | **4** |
| Crisis1 | -.015 |  | -.034\* | -.016 |
|  | *.355* |  | *.039* | *.325* |
| Crisis2 |  | -.226\*\* | -.228\*\* | -.195\*\* |
|  |  | *.000* | *.000* | *.000* |
| Size |  |  |  | -.051\*\* |
|  |  |  |  | *.000* |
| OCF |  |  |  | .036\*\* |
|  |  |  |  | *.000* |
| Lev |  |  |  | -.004 |
|  |  |  |  | *.502* |
| Intercept | -.064\*\* | -.048\*\* | -.045\*\* | -.046\*\* |
|  | *.000* | *.000* | *.000* | *.000* |
| Adjusted R2 | .000 | .004 | .004 | .009 |

*Table 8.5: Linear regression of DA estimated with McNichols model*

The results presented in table 8.5 do not differ to a great extend from the results in the previous two sections. Crisis 1 is insignificant in all three steps whereas Crisis 2 is significant in all three steps in which it is used. Crisis 1 is shown to have a negative yet insignificant relation with discretionary accruals (-.016 p = .325). Significance levels are, however, closer to significance than the ones presented in the last section (.325 vs. .740). The results and the adjusted R2 value of .000 confirm the finding that no relation exists between the first phase of the crisis and discretionary accruals. Crisis 2 on the other hand is again shown to have a negative relation with discretionary accruals (-.195 p = .000). Both the modified Jones and McNichols model discretionary accruals are shown to have a significant and negative relation with the second phase of the crisis. The relation is, however, slightly less negative for the McNichols model (-.195 vs. -.198). These results confirm the rejection of both hypotheses.

Two of the control variables are highly significant: size and OCF. Size is shown to have a highly significant negative relation (-.051 p = .000) and OCF is shown to have a high significant positive relation with discretionary accruals (.036 p = .000). These results show that size has a slightly less negative relation and OCF has a slightly more positive and significant relation when compared to the modified Jones model results. Also in this measurement model leverage is shown to be insignificant. It is, however, slightly closer to significance (.502 vs. .743) and negative rather than positive (-.004 vs. .002). R2 values of the regression models used in all four steps do not change when compared to the modified Jones model.

The figure below shows a similar trend as figure 8.4. Non-discretionary accruals increase when moving to 2009 but decrease significantly when moving to the second phase of the financial crisis. In 2010 they decrease more when using the McNichols model. Next to this, the McNichols discretionary accruals are negative in all four years whereas those estimated with the modified Jones model are positive in 2008.



*Figure 8.5: DA and NDA estimated with the McNichols model*

#### Forward Looking model

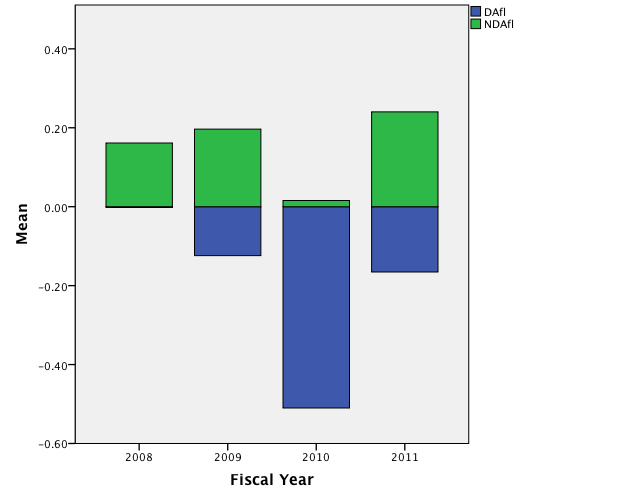
The last model that is used to test the two hypotheses is the Forward looking model. This model can classify expected credit sales as non-discretionary and unexpected credit sales as discretionary accruals. Next to this, two additional variables (TAt-1 and Gr. Sales) are added to control for economic performance. These changes are expected to increase the explanatory power of the model. Table 8.6 presents the results of the linear regression carried out with the discretionary accruals that were calculated by using the Forward looking model.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **1** | **2** | **3** | **4** |
| Crisis1 | .010 |  | -.013 | .005 |
|  | *.498* |  | *.390* | *.754* |
| Crisis2 |  | -.287\*\* | -.288\*\* | -.264\*\* |
|  |  | *.000* | *.000* | *.000* |
| Size |  |  |  | -.039\*\* |
|  |  |  |  | *.000* |
| OCF |  |  |  | -.016\*\* |
|  |  |  |  | *.000* |
| Lev |  |  |  | -.002 |
|  |  |  |  | *.732* |
| Intercept | -.073\*\* | -.051\*\* | -.049\*\* | -.050\*\* |
|  | *.000* | *.000* | *.000* | *.000* |
| Adjusted R2 | .000 | .008 | .008 | .011 |

*Table 8.6: Linear regression of DA estimated with Forward looking model*

The results presented in this section lead to the same conclusions as in the prior two sections. Crisis1 has a positive yet insignificant relation with discretionary accruals (.005 p = .754). This relation is the most insignificant of the three measurement models used. The insignificance of this relationship is once more confirmed by the adjusted R2 value of .000 when only this variable is used in step 1. Crisis2 has a negative and highly significant relation with discretionary accruals in all four-regression models (-.264 p = 0.000). This negative relationship is consistent across all three accrual measurement models. These results confirm that both hypotheses are rejected.

Size and OCF are significant and negative whereas leverage is negative and insignificant. The adjusted R2 values increase for all but the regression model used in the first step when the Forward looking model is used.



*Figure 8.6: DA and NDA estimated with the Forward looking model*

The figure above shows a similar trend as the ones in the previous sections. Non-discretionary accruals do, however, decrease more in 2010 and increase more in 2011 than when the modified Jones and McNichols models are used.

## Summary

The results presented in this chapter have been used to test two hypotheses. The first hypothesis states that a negative relation exists between the first phase of the crisis (2008-2009) and discretionary accruals. The second hypothesis states that a positive relation exists between the second phase of the crisis (2010-2011) and discretionary accruals. The univariate analysis confirmed hypothesis 1 and rejected hypothesis 2. The multivariate analysis rejected both hypotheses.

# Findings

In this chapter findings will be discussed based on the results presented in the prior chapter. To extend the findings additional analyses are carried out.

## Interpreting the Results

The previous chapter has presented the results of multiple analyses. The graphical evidence presented in section 8.2.1 gave an indication that it takes a year for discretionary accruals to respond to the economic downturn. Since the hypotheses did not take this into account the expected pattern was not found. The Pearson correlation test gave a first indication that discretionary accruals have no relation with the first phase of the crisis (2008-2009) and a negative relation with the second phase of the crisis (2010-2011). Results of the univariate analysis provide a deeper insight into changes of discretionary accruals during the event period. When discretionary accruals of the modified Jones and Forward looking model are used, a move from positive to negative discretionary accruals is visible when moving from the pre-crisis (2006-2007) to the first phase of the crisis (2008-2009) period. The McNichols model discretionary accruals do not confirm this shift since discretionary accruals are negative in the pre-crisis and first phase period. Discretionary accruals for all models become more negative when moving from the first to the second phase of the crisis. The results of this analysis confirm hypothesis 1 and reject hypothesis 2. More specifically, discretionary accruals are found to be negative by all three models during the first as well as the second phase of the crisis.

The multivariate analysis results lead to the rejection of hypothesis 1 as well as 2. Hypothesis 1 is rejected since the results show that no significant relation exists between discretionary accruals and the first phase of the crisis. Hypothesis 2 is rejected since a negative relation is shown to exist between discretionary accruals and the second phase of the crisis. These findings are consistent across all accrual measurement models.

The three control variables’ significance differs by accrual measurement model. Only size is significant when using the modified Jones model whereas size and the operating cash flow control variables are significant when the McNichols and Forward looking models are used. Leverage is shown to be insignificant for all three accrual measurement models.

Since the conclusions that can be drawn based on the outcomes of the uni- and multivariate analysis are different, the importance of these analyses should be explained. While the univariate analysis confirms hypothesis 1, the multivariate analysis rejects the same hypothesis. The univariate analysis provides an overview of the mean discretionary accruals during the identified phases of the financial crisis. It does not test for a relationship with these phases. A multivariate analysis on the other hand establishes whether a relationship exists between the studied variables. It should thus be clear that the multivariate analysis is the most important tool to test the hypotheses. Based on this insight, both hypotheses are rejected. The expected pattern of a negative relation between discretionary accruals and the first phase and a positive relation between discretionary accruals and the second phase is thus not confirmed. The main explanation for the rejection of the hypotheses is the fact that discretionary accruals appear to respond to a change in GDP with a one-year delay. The hypotheses did not take this into account, which could have caused the phases to be misspecified. To test whether the expected pattern is present one year later an additional analysis is carried out in the next section.

## Extending the Findings

To test whether the expected patter occurs a year later an additional multivariate analysis is carried out. The regression that is run tests whether a positive or negative and significant relation exists between the year 2006-2012 and discretionary accruals. The year 2012 is added as an additional sample year. Table 9.1 presents the regression results of this analysis.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Modified Jones** | **McNichols** | **Forward Looking** |
| Size | -.084\*\* | -.072\*\* | -.060\*\* |
|  | *.000* | *.000* | *.000* |
| OCF | .013\*\* | .038\*\* | -.014\*\* |
|  | *.006* | *.000* | *.001* |
| Leverage | -.002 | -.008 | -.004 |
|  | *.777* | *.139* | *.411* |
| 2006 | .118\*\* | .101\*\* | .147\*\* |
|  | *.000* | *.000* | *.000* |
| 2007 | .121\*\* | .118\*\* | .137\*\* |
|  | *.000* | *.000* | *.000* |
| 2008 | .133\*\* | .105\*\* | .114\*\* |
|  | *.000* | *.000* | *.000* |
| 2009 | -.036 | -.048\* | -.009 |
|  | *.121* | *.036* | *.671* |
| 2010 | -.435\*\* | -.415\*\* | -.388\*\* |
|  | *.000* | *.000* | *.000* |
| 2011 | .135\*\* | .125\*\* | -.035 |
|  | *.000* | *.000* | *.111* |
| 2012 | .214\*\* | .284\*\* | .217\*\* |
|  | *.000* | *.000* | *.000* |
| Intercept | -.086\*\* | -.082\*\* | -.089\*\* |
|  | *.000* | *.000* | *.000* |
| Adjusted R2 | .021 | .022 | .020 |

*Table 9.1: Linear Regression DA by year*

The results presented in table 9.1 confirm that discretionary accruals respond to changes in GDP with a year delay. Discretionary accruals estimated by all three accrual measurement models are found to have a positive and significant relation with the years 2006-2008. A year after change in GDP becomes negative, discretionary accruals also become negative. This negative trend lasts from 2009 till 2010 when the modified Jones and McNichols models are used and from 2009 till 2011 when the Forward looking model is used. This relation is, however, not significant for 2009 when the modified Jones and Forward looking models are used to estimate discretionary accruals. The relation between 2009 and discretionary accruals estimated by the McNichols model is significant at the 0.05 level. The negative relation reverses to a positive relation for the years 2011 and 2012 for all but the Forward looking model. This occurs a year after the GDP has returned to a positive value. Discretionary accruals estimated by this model are shown to have a negative yet insignificant relation with the year 2011. A positive and highly significant relation is found to exist between the year 2012 and discretionary accruals estimated with all three models. These findings are summarized in table 9.2. Overall this indicates that discretionary accruals do indeed take a year to respond to an economic downturn.

Lin and Shih’s (2002) finding that managers strategically release earnings during periods with less growth is confirmed in the figure below. When moving from 2010 to 2011 the growth in GDP slows down from 2.4 to 1.8. This decrease in growth is followed by an increase in upward earnings management when moving from 2011 to 2012. Discretionary accruals estimated with the modified Jones model increase from .134 to .214 and DA estimated with the McNichols model increase from .125 to .284. The same conclusion cannot be drawn based on the discretionary accruals estimated with the Forward looking since the relationship is not significant for the year 2011.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** |
| ∆ GDP | 2.7 | 1.9 | -0.3 | -3.1 | 2.4 | 1.8 | 2.2 |
| DAmj | .118\*\* | .121\*\* | .133\*\* | -.036 | -.435\*\* | .135\*\* | .214\*\* |
| DAmn | .101\*\* | .118\*\* | .105\*\* | -.048\* | -.415\*\* | .125\*\* | .284\*\* |
| DAfl | .147\*\* | .137\*\* | .114\*\* | -.009 | -.388\*\* | -.035 | .217\*\* |

*Table 9.2: Trend in GDP and DA*

### 9.2.1 Explanatory Power of the Accrual Measurement Models

To provide an insight into the explanatory power of the different accrual measurement models used in this thesis, R2 values have been collected while estimating discretionary accruals. An overview of the R2 values by industry can be found in appendix 7. Means of these values have been calculated and compared by using a paired sample t-test. The results are presented in table 9.3. The results show that the Forward looking model outperforms the modified Jones model by about 10 percent and the McNichols model by about 8 percent in explaining the variation in total accruals.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Models** | **Mean 1** | **Mean 2** | **Mean difference** | **Sig.** |
| MJ-MN | .1868 | .2090 | .0222\*\* | *.000* |
| MJ-FL | .1868 | .2867 | .0999\*\* | *.000* |
| MN-FL | .2090 | .2867 | .0778\*\* | *.000* |

*Table 9.3: Paired sample t-test results R2 by model*

## Summary

In this chapter findings based on the results presented in chapter 8 have been presented. Both hypotheses were rejected since the expected pattern was not found. Additional analyses carried out in this chapter did, however, confirm that the expected pattern occurs a year later. Discretionary accruals have thus been shown to take a year to respond to economic changes. Downward earnings management through the use of accruals has been shown to have occurred during 2009 as well as 2010. This was followed by a shift to upward earnings management in 2011 and 2012. A final analysis was used to assess the explanatory power of the accrual measurement models used in this thesis. The results showed that the Forward looking model outperforms the modified Jones model by about 10 percent and the McNichols model by about 8 percent in explaining the variation in total accruals.

# Summary and Conclusions

This thesis was written to expand my knowledge about earnings management. After having carried out a literature review it became clear that literature on earnings management during a financial crisis was limited. The main aim of this thesis was therefore to provide readers an insight into incentives that play a role during a financial crisis and how these impact the use of accrual earnings management. The sample time frame includes three distinct two-year periods: pre-crisis (2006-2007), first phase of the crisis (2008-2009), and second phase of the crisis (2010-2011). The first phase of the crisis is characterized by a negative growth in GDP whereas the second phase is characterized by a positive growth. The following research question will be answered in this conclusion:

*“Do financial figures indicate that managers have employed accrual earnings management to manage earnings upward or downward during the financial crisis?”*

## The Literature Review

Two types of earnings management were distinguished: accrual and real earnings management. The focus of this thesis was on accrual earnings management during the financial crisis. Several accrual earnings management techniques have been discussed. Out of the discussed techniques big bath techniques have been identified as the most likely to be used during the financial crisis. This technique is used to manage earnings downward during bad years to boost earnings in good years. Agency and positive accounting theory explain the motivation behind the use of this technique. Bonuses contained in compensation schemes to align management’s and owner’s interests provide alternative motives during a financial crisis. More specifically, bonuses are paid after a predetermined earnings threshold is reached. When this threshold is not reached, managers are motivated to manage earnings downward. A reserve will be created that can be used to boost future earnings. This insight is confirmed by the limited literature on earnings management during a financial crisis that is available. Firms are found to manage earnings downward during financial crises and specifically when firms make a loss and are financially distressed (Lin & Shih, 2002; Chen et al., 2010; Habib et al., 2013). The created reserves are then strategically released in periods with moderate earnings (Lin & Shih, 2002). Based on these findings and insights gathered from studying relevant theories the following hypotheses have been formulated:

***H1****:* During phase one (2008-2009) discretionary accruals have a negative relation with reported earnings

***H2****:* During phase two (2010-2011) discretionary accruals have a positive relation with reported earnings

## Measuring Accrual Earnings Management

To test these hypotheses three accrual earnings management measurement models were selected. Such models calculate total accruals after which they categorize these as discretionary and non-discretionary. Discretionary accruals are often used as a proxy for accrual earnings management since this type of accruals is at the discretion of management. The original Jones model significantly improved the detection of accrual earnings management by assuming that non-discretionary accruals are not constant. Building on this assumption several modifications were made to the original Jones model. One of the most used modifications is the modified Jones model, which is based on the insight that credit sales should not be categorized as discretionary accruals. Other modifications aim to controls for factors such as extreme performance by adding additional independent variables. Based on earlier applications of these models when measuring earnings management the following three models have been selected:

* Modified Jones model
* McNichols model
* Forward-looking model

## The Research Design

The selected models are used to estimate discretionary accruals for the event period (2006-2011). These estimations are based on an eight-year estimation period (2000-2007). The final sample includes 45,365 firm-year observations from forty-seven SIC industries. Graphical evidence, a Pearson correlation test, a univariate, and multivariate analysis are used to test the developed hypotheses. The multivariate analysis is carried out by developing a research model that includes two crisis dummy variables and the following three control variables: size, leverage, and operating cash flow (OCF).

## The Results

The graphical evidence gave an indication that the expected accrual earnings management pattern would not be found. More specifically, accruals were shown to take a year to respond to changes in GDP. This was confirmed by the Pearson correlation test and multivariate analysis. No relation was found between the first phase of the crisis and discretionary accruals. And a negative relation was found between the second phase of the crisis and discretionary accruals. The two hypotheses were thus rejected. Out of the three control variables only size is significant when using the modified Jones model whereas size and the operating cash flow control variables are significant when the McNichols and Forward looking models are used. Leverage is shown to be insignificant for all three accrual measurement models.

An additional analysis was carried out to test the intuition that accruals take a year to respond to changes in GDP. A multivariate analysis by year shows that a positive relation exists between discretionary accruals and the years 2006-2008. This relation turns into a negative one for the years 2009 and 2010. The relation is, however, not highly significant for the year 2009. In 2011 and 2012 the relationship returns to a positive one. These findings confirm that accruals take a year to respond to changes in GDP. In addition, the results confirm that earnings reserves are released strategically in periods with moderate growth. To compare the accrual measurement models R2 values have been collected while estimating discretionary accruals. The results from this analysis show that the Forward looking model outperforms the modified Jones model by about 10 percent and the McNichols model by about 8 percent in explaining the variation in total accruals.

## Implications

While the results reject the developed hypotheses, they do provide important insights. First and foremost, accruals have been shown to take a year to respond to changes in GDP. A similar yet less pronounced trend is found when comparing discretionary accruals with GDP. GDP shows a negative growth in the years 2008-2009 whereas discretionary accruals show a negative trend in 2009 and 2010. GDP returns to a positive growth in 2010 and 2011 whereas discretionary accruals return to a positive growth in 2011 and 2012. A similar trend, yet delayed by a year. In addition, managers are shown to strategically release earnings reserves in periods with less growth. After GDP growth has slowed down in 2011 upward earnings management increases in 2012 when compared to 2011. These findings are relevant for financial statement users since they provide insights into the use of earnings management during a financial crisis. By taking the direction of accrual earnings management into account financial statement users get a better insight into the actual performance of a firm.

The findings concerning the specification of the used accrual measurement models will be useful for authors that will have to select one of the accrual measurement models. The Forward looking model outperforms both the modified Jones and McNichols models and should therefore be included in future research.

## Limitations

As has been discussed in chapter 1, several important limitations exist. These will be summarized here. Two important limitations should be kept in mind when applying the research findings. Most importantly, the earnings management measurement models used to detect earnings management have been shown to have a low test power. This entails that earnings management activities might not be detected, which makes the research findings less reliable. Secondly, the distinction being made between the financial crisis periods is debatable. The distinction is based on a trend in GDP and divides the financial crisis into periods using years. As the GDP trend shows there is some overlap concerning the periods in several years. Thus, a specific quarter or month of a year might still be part of a preceding crisis period, which would decrease the reliability of the findings.

## Future Research

While my research has revealed that accrual earnings management shows a distinctive trend during the financial crisis, my analysis does not cover real earnings management. To gain an overview of the complete trend of earnings management during the recent financial crisis the data should also be tested for real earnings management activities. Future research should thus focus on real earnings management activities during the financial crisis and combine the findings with the findings presented here to establish whether total earnings management shows the same trend. Next to this, additional control variables (e.g. the introduction of XBRL) could be added to improve the research model being used to test for earnings management patterns during the financial crisis phases.

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*MarketWatch 2011,* MarketWatch by Wall Street Journal, New York, viewed 24 June 2013, < <http://www.marketwatch.com/story/record-number-of-ipos-shelved-worldwide-2011-09-15>>.

# Appendix

## Appendix 1: Literature Review

|  |  |  |
| --- | --- | --- |
| Author(s) |  |  |
| Jones (1991) | Purpose of study | Benefit of import relief through downward EM |
| Model(s) used | Original Jones |
| Sample: Timeframe | 1980-1985 |
| Sample: Industries | 5 industries (Automobiles, Carbon steel, Stainless and alloy tool steel, Copper, and Footwear) |
| Sample: # of firms | 23 firms, Compustat |
| Methodology | A new EM measurement model is introduced, based on DeAngelo model. Assumes that DA are at the discretion of management and controls for economic effects on NA. |
| Outcome | Managers employ downward EM during import relief investigations. |
| Bartov (1993) | Purpose of study | Establishing whether managers manipulate earnings through the timing of income recognition from disposal of long-lived assets and investments |
| Model(s) used | REM: asset sales |
| Sample: Timeframe | 1987-1989 |
| Sample: Industries | 107 SIC industries |
| Sample: # of firms | 653 firm-year observations, Compustat and CRSP |
| Methodology | Earnings smoothing and debt-equity hypotheses are tested. Univariate and non-parametric tests are used. These are used since they rely on fewer assumptions than regression tests. |
| Outcome | Timing of asset sales is used to smooth intertemporal earnings changes and mitigates accounting-based restrictions in bond covenants. |
| DeFond & Jiambalvo (1994) | Purpose of study | Abnormal accruals of firms that reported debt covenant violations in annual report |
| Model(s) used | Time series and Cross-sectional Jones model |
| Sample: Timeframe | 1985-1988 |
| Sample: Industries | 67 SIC industries (e.g. computer storage devices and air transportation |
| Sample: # of firms | 94 firms, Compustat & NAARS |
| Methodology | Both time series and cross-sectional models of normal accruals are used to proxy for abnormal total and working capital accruals. |
| Outcome | Positive manipulation of accruals in the year prior to manipulation. |
| Dechow, Sloan & Sweeney (1995) | Purpose of study | Evaluate alternative accrual-based models for detecting EM and develops modified Jones model |
| Model(s) used | Healy (1985), DeAngelo (1986), Jones (1991), Modified Jones (1995), Industry model (1991) |
| Sample: Timeframe | 1950-1991 |
| Sample: Industries | - |
| Sample: # of firms | 1000 firm years & 32 firms with 56 firm years, Compustat |
|  | Methodology | Type 1 errors for the tests of of EM based on alternative models to measure DA are compared to evaluate the ability to detect EM. |
| Outcome | Power of the tests is low for EM of economically plausible magnitude. However, when the models are applied to samples of firm-years experiencing extreme financial performance, all models lead to misspecified tests. |
| Kang & Sivaramakrishnan (1995) | Purpose of study | Improving McNichols and Wilson (1988) model |
| Model(s) used | Jones (1991), Standard IV model, and GMM model |
| Sample: Timeframe | 1992 |
| Sample: Industries | - |
| Sample: # of firms | 2829 firms: 1181 firms from PST file and 1648 firms from research file |
| Methodology | In contrast to McNichols and Wilson (1988) these authors aim to capture a larger portion of managed accruals instead of only focussing on a single account. IV based approach is used. |
| Outcome | IV based approach offers significant enhancement over Jones model and the GMM method offers the greatest power and robustness. |
| Beneish (1997) | Purpose of study | Development of model to measure EM in firms that experience extreme financial performance by looking at GAAP violations. |
| Model(s) used | Modified Jones (1995) |
| Sample: Timeframe | 1987-1993 |
| Sample: Industries | 58 industries |
| Sample: # of firms | 64 firms, Compustat, S&P Corporate Text, and 10-K microfiche |
| Methodology | First, the new model is evaluated. Next, the new model is compared to the modified Jones (1995) model. |
| Outcome | Additional variables for modified Jones (1995) model are developed that can be used to measure EM in years with extreme performances. Researchers should augment modified Jones model with lagged total accruals and a measure of past price performance. |
| Bange & De Bondt (1998) | Purpose of study | Establish whether changes in R&D budget anticipate extreme gaps between earnings forecasts and actual earnings. |
| Model(s) used | REM: Mandatory expenditure: R&D earnings management |
| Sample: Timeframe | 1977-1986 |
| Sample: Industries | 60% falls in four industries: business equipment, chemicals, pharmaceuticals, and durables |
| Sample: # of firms | 100 US companies, CRSP, Compustat, and IBES |
| Methodology | Earnings forecasts are compared to reported income to establish a possible gap. A developed model is then used to check whether R&D budgets are adjusted to narrow the gap. |
| Outcome | On average firms employ R&D budget adjustments to narrow the gap between expected and reported earnings. |
| Dechow, Kothari & Watts (1998) | Purpose of study | Develop model of earnings, cash flows, and accruals. |
| Model(s) used | REM: Mandatory expenditure, overproduction |
|  | Sample: Timeframe | 1963-1992 |
| Sample: Industries | - |
| Sample: # of firms | 1337 firms, 22776 first-difference observations, Compustat |
| Methodology | Several models are developed |
| Outcome | Developed model of earnings, cash flows, and accruals. |
| Teoh, Wong & Rao (1998) | Purpose of study | Test whether managers select accruals at the time of an IPO increase earnings. |
| Model(s) used | Cross-sectional Jones (1998) |
| Sample: Timeframe | 1980-1990 |
| Sample: Industries | 63 two digit SIC industries, concentrated in computer and high-tech industries |
| Sample: # of firms | 1682 IPO firms, Compustat |
| Methodology | First, a simple correlation test is carried out to test whether the IPO-year accruals predict the earnings under performance in subsequent years. Next, cross-sectional regression analysis is used to decompose the relative explanatory power of four accruals variables concerning opportunistic EM. Then two key explanatory variables used in the Jones model are explored. |
| Outcome | IPO firms, on average, have high positive issue-year earnings and abnormal accruals, followed by poor long-run earnings and negative abnormal accruals. |
| Peasnell, Pope & Young (2000) | Purpose of study | Examine specifications and power issues of three cross-sectional abnormal accruals models and develop margin model. |
| Model(s) used | Jones (1991), modified Jones (1995), and margin model (2000) |
| Sample: Timeframe | June 1990-May 1997 |
| Sample: Industries | Concentrated in General engineering |
| Sample: # of firms | 837 firms, 4352 firm-year observations, Datastreem |
| Methodology | Empirical tests compare the specification and power of commonly used test statistics across measures of abnormal accruals generated by the Jones (1991) model, modified Jones (1995) model, and the margin model. |
| Outcome | All three cross-sectional models appear well specified when a random sample of firm-years is used. However, the margin models is shown to generate relatively better specified estimates of abnormal accruals when cash flow performance is extreme. |
| Yoon & Miller (2002) | Purpose of study | Investigate the relationship between operating performances and the behavior of discretionary accruals. |
| Model(s) used | Kang and Sivaramkrishnan (1995) and Jones model |
| Sample: Timeframe | 1986-1997 |
| Sample: Industries | 25 industries |
| Sample: # of firms | 546 firms, 2033 firm-year observations, KIS-FAS financial statement database |
|  | Methodology | Four test methods (a mean accrual test, a correlation test, a regression analysis, and a sign-change test) are used. |
| Outcome | When operating performance is poor, the firms tend to choose income-increasing strategies. However, when operating performance is extremely poor, some firms tend to take a big bath, while some of the exceptionally well performing firms tend to select income-decreasing strategies. |
| Dechow, Richardson & Tuna (2003) | Purpose of study | Investigate whether boosting of discretionary accruals explains the fact that too few firms report small losses and too many report small profits. |
| Model(s) used | Modified cross-sectional Jones (1998), Modified Jones adjusted for the expected increase in credit sales (adapted), Modified Jones including lagged value of total accruals (lagged), Modified Jones including future sales growth (Forward looking) |
| Sample: Timeframe | 1988-2000 |
| Sample: Industries | - |
| Sample: # of firms | 2443 firms, 47847 firm-year observations, Compustat |
| Methodology | Modified cross-sectional Jones (1998) is once more modified to include the above mentioned factors. Relative explanatory power is then evaluated. Next, three tests are carried out to validate that the discretionary accrual proxy reflects EM. It is then investigated whether small profit firms are different from all other firms as well as small loss firms. |
| Outcome | Small profit and small loss firms have similar levels of discretionary accruals. Results are therefore not compelling. Auditors actions rather than EM is the explanatory variable. |
| Herrmann, Inoue & Thomas (2003) | Purpose of study | Research the use of income from asset sales and marketable securities to manage earnings. |
| Model(s) used | REM: Asset sales |
| Sample: Timeframe | 1993-1997 |
| Sample: Industries | - |
| Sample: # of firms | 3068 firm-year observations, NEEDS/MICRO database |
| Methodology | Excess income from the sale of assets is measured as income from the sale of fixed assets and marketable securities minus the median for the corresponding industry and year. |
| Outcome | A negative relation is found between income from asset sales and management forecast error. Earnings management through the sale of assets is applied when management's earnings forecasts are not met. |
| Kothari, Leone & Wasley (2005) | Purpose of study | Examine specifications and power of tests based on performance-matched discretionary accruals. |
| Model(s) used | Jones (1991), modified Jones (1995), performance matched model (2005) |
| Sample: Timeframe | 1962-1999 |
| Sample: Industries | - |
| Sample: # of firms | 123000 firm-year observations |
|  | Methodology | The power of the different models is tested and a sensitivity analysis is carried out. |
| Outcome | Under most circumstances, performance-matched discretionary accruals are well specified and powerful. These models are the most reliable from sample-to-sample in terms of type 1 error rates. However, researchers should include a constant term when the Jones or modified Jones model is used to furter mitigate model misspecification. |
| Hoje & Yongtae (2006) | Purpose of study | Examine relationship between disclosure frequency and earnings management |
| Model(s) used | Performance-matched model (2005) |
| Sample: Timeframe | 1990-1997 |
| Sample: Industries | - |
| Sample: # of firms | 1431 SEO offerings, CRSP and Compustat |
| Methodology | Disclosure frequency is established and related to earnings management, which is measured with the performance-matched model (2005). |
| Outcome | Disclosure frequency is inversely related to earnings management |
| McVay (2006) | Purpose of study | Examining the classifications of items within the income statement as an earnings management tool. |
| Model(s) used | Expected core earnings model (developed in this paper) |
| Sample: Timeframe | 1988-2003 |
| Sample: Industries | - |
| Sample: # of firms | 76,901 firm-year observations, Compustat, I/B/E/S, and CRSP |
| Methodology | To test whether managers shift core expenses to special items a model is developed to measure classification shifting. |
| Outcome | Evidence is consistent with managers opportunistically shifting expenses from core expenses to special items. |
| Roychowdhuy (2006) | Purpose of study | Establishing whether operational activities (REM) is used to manage earnings. |
| Model(s) used | REM: cash flows from operations, production costs, and discretionary expenses |
| Sample: Timeframe | 1987-2001 |
| Sample: Industries | 36 industries |
| Sample: # of firms | 3672 firms, 4252 firm-year observations, compustat, 3672 firms, 17338 firm-year-observations, Thomson |
| Methodology | The Dechow et al. (1998) measures REM measures are used. |
| Outcome | Evidence is found which shows that managers manipulate real activities to avoid reporting annual losses. |
| Cohen & Zarowin (2010) | Purpose of study | Both real and accrual-based earnings management activities around seasoned equity offerings are examined. |
| Model(s) used | Cross-sectional Jones (1998), REM: CFO, discretionary expenses, and production costs |
| Sample: Timeframe | 1987-2006 |
|  | Sample: Industries | 16 industries (e.g. food products, chemical products, and manufacturing) |
| Sample: # of firms | 1511 completed offers, Compustat |
| Methodology | The cross-sectional Jones (1998) model is used to measure accrual-based earnings management and the CFO, discretionary expenses, and production costs are used as proxies for real earnings management. |
| Outcome | Firms use real as well as accrual-based EM methods around seasoned equity offerings. Research is a first step in how firms tradeoff between real versus accrual-based EM methods. |
| Kang, Lui & Qi (2010) | Purpose of study | Examine the market return predictability with aggregate Discretionary accruals (extending the finding that relate to disaggregate level). |
| Model(s) used | Jones (1991) |
| Sample: Timeframe | 1965-2004 |
| Sample: Industries | Consumer, Manufacturing, High-tech, Health, other |
| Sample: # of firms | 2450 firms, Compustat & CRSP database |
| Methodology | The Jones (1991) model is used to compute firm level discretionary accruals. These are then used to compare aggregate discretionary accruals and aggregate normal accruals to establish which of the two plays a more important role in causing the power of aggregate accruals to predict market returns. |
| Outcome | Aggregate discretionary accruals positively predict future market returns and negatively correlate with current market returns. Aggregate normal accruals exhibit no power in predicting future market returns. |
| Epps & Guthrie (2010) | Purpose of study | Investigate whether having a SOX 404 material weakness increases discretionary accruals EM |
| Model(s) used | Cross-sectional Jones (1998) including ROA |
| Sample: Timeframe | 2004 |
| Sample: Industries | 38 industries |
| Sample: # of firms | 2580 firms, Compustat |
| Methodology | The cross-sectional Jones (1998) model is used and adjusted to control for performance by including ROA. All variables are deflated by total assets. DA is identified by subtracting NDA from TA. |
| Outcome | Results show that there is an association between material weaknesses and internal control. |
| Hrazdill & Scott (2011) | Purpose of study | Investigate the role of industry classification in estimating Das |
| Model(s) used | Performance-matched model (2005) |
| Sample: Timeframe | 1987-2007 |
| Sample: Industries | 69 for GICS, 48 for FF, 83 NAICS, and 65 for SIC |
| Sample: # of firms | 1500 S&P firms, 137,040 firm-year observations, Compustat |
|  | Methodology | First, several homogeneity tests are carried out to establish whether GICS offers an advantage in identifying firms with similar operating activities. Then, discretionary accruals are estimated by using the performance-matched model (2005). These are then used to establish which industry classification method yields the most meaningful estimates. |
| Outcome | It is shown that GICS does indeed offers an advantage in identifying firms with similar operating activities. GICS provides greater homogeneity when TAC and ROA are used as variables to estimate DA. |
| Rusmin (2010) | Purpose of study | Examine association between magnitude of earnings management and auditor quality. |
| Model(s) used | Cross-sectional Jones model |
| Sample: Timeframe | 2003 |
| Sample: Industries | 17 industries |
| Sample: # of firms | 301 firms |
| Methodology | Discretionary accruals are used to proxy for earnings management and auditor firm industry specialization is used to proxy for auditor quality. |
| Outcome | A negative relation is found between auditor quality and earnings management. |
| Islam, Ali, Ahmad (2011) | Purpose of study | Evaluate effectiveness of modified Jones model in detecting earnings management among IPOs. |
| Model(s) used | Modified Jones (1995), Yoon et al. (2006) |
| Sample: Timeframe | 1995-2005 |
| Sample: Industries | Bank, Insurance and Investment; Manufacturing sector that include Cement, Engineering, Ceramics, Food and Allied products, Jute, Paper and Printing, Pharmaceuticals and Chemicals, Tannery, Industry and Textiles. Finally Service & miscellaneous that include Fuel and Power, IT, Services and Real Estates |
| Sample: # of firms | 142 companies |
| Methodology | Modified Jones model does not fit Asian firms. Therefore, Yoon et al. (2006) model is used. |
| Outcome | Modified Jones model is extended by incorporating current period expenses, trade accounts payable at year-end, depreciation expense, and retirement benefits expense. The inclusion of these few variables significantly increased the explanatory power in detecting earning management. |

## Appendix 2: Crisis Article Review

Author(s)

|  |  |  |
| --- | --- | --- |
| Jaggi & Lee (2002) | Purpose of study | Study earnings management in financially distressed firms |
| Model(s) used | Jones (1991), modified Jones (1995) & Performance-matched (2005) |
| Sample: Timeframe | 1989-1996 |
| Sample: Industries | - |
| Sample: # of firms | 135 firms |
| Methodology | Cross-sectional and time-series versions of the measurement models are used |
| Control variables | Changes in management & audit qualifications |
| Outcome | Waiver firms manage earnings upward whereas non-waiver firms manage earnings downward |
| Lin & Shih (2002) | Purpose of study | Examine earnings management in economic downturns (1990-1991) |
| Model(s) used | Jones (1991) |
| Sample: Timeframe | 1989-1993 |
| Sample: Industries | All non-financial industries |
| Sample: # of firms | 513 firms, 10,260 firm-quarter observation |
| Methodology | Total accruals are estimated for each firm individually using time-series data, residual is used as a proxy for earnings management |
| Control variables | - |
| Outcome | Earnings are managed downwards during very strong or weak earnings |
| Johl, Jub & Houghton (2003) | Purpose of study | Study relationship between audit quality and earnings management during Asian crisis |
| Model(s) used | modified Jones (1995) |
| Sample: Timeframe | 1994-1998 |
| Sample: Industries | 3 industries |
| Sample: # of firms | 1512 observations |
| Methodology | Frequency approach and performance matching is used |
| Control variables | Operating cash flow, leverage, natural log of total assets, absolute total assets, first sample year with new auditor, last sample year is followed by an auditor change, and increase of 10% of more in total outstanding share during the year |
| Outcome | Big 5 auditors constrain upward earnings management, downward earnings management is only constrained by Big 5 auditors that are industry specialists |
| Saleh & Ahmed (2005) | Purpose of study | Examine discretionary accruals in distressed firms that have undertaken debt contract renegotiations during Malaysian financial crisis |
| Model(s) used | Jones (1991) & modified Jones (1995) |
| Sample: Timeframe | 1994-2000 |
| Sample: Industries | five industries |
| Sample: # of firms | 153 firms |
| Methodology | Cash flows approach is used to measure total accruals |
| Control variables | Audit quality, leverage, size & auditor size |
| Outcome | Evidence for downward earnings management is found |
| Ahmed, Godfrey & Saleh (2008) | Purpose of study | Examine how a stock market prices earnings components around economic downturns (Asian crisis) |
| Model(s) used | Jones (1991) & modified Jones (1995) |
| Sample: Timeframe | 1997-2001 |
| Sample: Industries | 5 industries |
| Sample: # of firms | 139 |
| Methodology | A price model that uses market value of equity as dependent variable and operating cash flow, non-discretionary, and discretionary accruals as independent variables is used to test two hypotheses |
| Control variables | Audit qualifications, changes in senior management, leverage, size of the audit firm, profitability (ROI), and managerial ownership |
| Outcome | Negative discretionary accruals for debt renegotiating firms are associated with higher market values of equity and are not related to the firms' future earnings |
| Ahmad-Zaluki, Campbell & Goodacre (2009) | Purpose of study | Examine earnings management during Malaysian IPOs during Asian crisis |
| Model(s) used | modified Jones (1995) |
| Sample: Timeframe | 1990-2000 |
| Sample: Industries | Basic industries, consumer goods, general industrial and IT, services, real estate development, and resources and utilities |
| Sample: # of firms | 254 IPO firms |
| Methodology | Consistent with other IPO studies the modified Jones model is used to proxy for earnings management |
| Control variables | Auditor reputation & company age |
| Outcome | Income increasing earnings management during IPOs occurs primarily during the Asian crisis |
| Chen, Chen & Huang (2010) | Purpose of study | Examine earnings management behavior of financially distressed firms |
| Model(s) used | modified Jones (1995) |
| Sample: Timeframe | 2002-2006 |
| Sample: Industries | - |
| Sample: # of firms | 74 firms |
| Methodology | GICS are used to classify firms in industries |
| Control variables | ROA, CFO, firm size, and leverage |
| Outcome | Downward earnings management is used in the first year that a firm makes a loss, less regulated industries engage in a higher level of earnings management |
| Choi, Kim & Lee (2011) | Purpose of study | Examine information value of discretionary accruals during a financial crisis |
| Model(s) used | Performance-matched model (2005) |
| Sample: Timeframe | 1995-2000 |
| Sample: Industries | - |
| Sample: # of firms | 10,406 firm-year observations |
| Methodology | WLS is evaluated but not found to improve results over OLS |
| Control variables | Log of total assets, book-to-market ratio, and leverage |
| Outcome | Information value of discretionary accruals has significantly declined during the financial crisis |
| Habib, Bhuiyan & Islam (2013) | Purpose of study | Examine earnings management practices during financial crisis (2008) |
| Model(s) used | modified Jones (1995) |
| Sample: Timeframe | 2000-2011 |
| Sample: Industries | non-financial industries |
| Sample: # of firms | 767 firm-year observations |
| Methodology | Three measures of distress and discretionary accruals are used |
| Control variables | Firm size (log of total assets), operating cash flow divided by total assets, leverage & ownership concentration |
| Outcome | Managers of distressed firms engage in income decreasing earnings management |
| Kousenidis, Ladas & Negakis (2013) | Purpose of study | Examine effect of financial crisis on earnings quality |
| Model(s) used | Performance-matched model (2005) |
| Sample: Timeframe | 2008-2011 |
| Sample: Industries | - |
| Sample: # of firms | 552 firms |
| Methodology | GICS are used to classify firms in industries |
| Control variables | Leverage, logarithm of the ratio of market capitalization, and operating cash flow |
| Outcome | Earnings management decreases during financial crisis |

## Appendix 3: Multi-collinearity test of Accrual measurement models

Modified Jones:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| PPE | 0.803 | 1.246 |
| 1/At-1 | 0.803 | 1.246 |

Dependent variable: ∆Rev - ∆Rec

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| 1/At-1 | 1.000 | 1.000 |
| ∆Rev - ∆Rec | 1.000 | 1.000 |

Dependent variable: PPE

McNichols:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| CFO | 0.929 | 1.076 |
| CFOt+1 | 0.971 | 1.03 |
| ∆Rev | 0.929 | 1.077 |
| PPE | 0.772 | 1.295 |
| 1/At-1 | 0.766 | 1.306 |

Dependent variable: CFOt-1

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| CFOt+1 | 0.983 | 1.018 |
| ∆Rev | 0.925 | 1.081 |
| PPE | 0.771 | 1.297 |
| 1/At-1 | 0.757 | 1.321 |
| CFOt-1 | 0.921 | 1.085 |

Dependent variable: CFO

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| ∆Rev | 0.921 | 1.085 |
| PPE | 0.772 | 1.296 |
| 1/At-1 | 0.739 | 1.353 |
| CFOt-1 | 0.875 | 1.143 |
| CFO | 0.893 | 1.120 |

Dependent variable: CFOt+1

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| PPE | 0.801 | 1.248 |
| 1/At-1 | 0.74 | 1.351 |
| CFOt-1 | 0.887 | 1.127 |
| CFO | 0.892 | 1.121 |
| CFOt+1 | 0.977 | 1.023 |

Dependent variable: ∆Rev

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| 1/At-1 | 0.898 | 1.114 |
| CFOt-1 | 0.874 | 1.144 |
| CFO | 0.881 | 1.135 |
| CFOt+1 | 0.97 | 1.031 |
| ∆Rev | 0.95 | 1.053 |

Dependent variable: PPE

Forward looking:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| PPE | 0.781 | 1.28 |
| TAt-1 | 0.975 | 1.025 |
| Gr. Sales | 0.948 | 1.055 |
| 1/At-1 | 0.803 | 1.246 |

Dependent variable: (1+k) \* Rev - Rec

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| TAt-1 | 0.971 | 1.03 |
| Gr. Sales | 0.461 | 2.168 |
| 1/At-1 | 0.992 | 1.008 |
| kRevRec | 0.463 | 2.162 |

Dependent variable: PPE

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| Gr. Sales | 0.446 | 2.241 |
| 1/At-1 | 0.803 | 1.246 |
| (1+k) \* Rev - Rec | 0.46 | 2.176 |
| PPE | 0.773 | 1.293 |

Dependent variable: TAt-1

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| 1/At-1 | 0.803 | 1.246 |
| (1+k) \* Rev - Rec | 0.972 | 1.029 |
| PPE | 0.799 | 1.251 |
| TAt-1 | 0.972 | 1.029 |

Dependent variable: Gr. Sales

## Appendix 4: Multi-collinearity test of Research model

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| Size | 0.826 | 1.210 |
| Leverage | 0.819 | 1.222 |
| OCF | 0.978 | 1.022 |
| Crisis1 | 0.988 | 1.013 |

Dependent variable: Crisis2

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| OCF | 0.982 | 1.018 |
| Leverage | 0.974 | 1.027 |
| Crisis1 | 0.985 | 1.015 |
| Crisis2 | 0.985 | 1.016 |

Dependent variable: Size

|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| Size | 0.804 | 1.243 |
| Leverage | 0.836 | 1.196 |
| Crisis1 | 0.975 | 1.025 |
| Crisis2 | 0.955 | 1.047 |

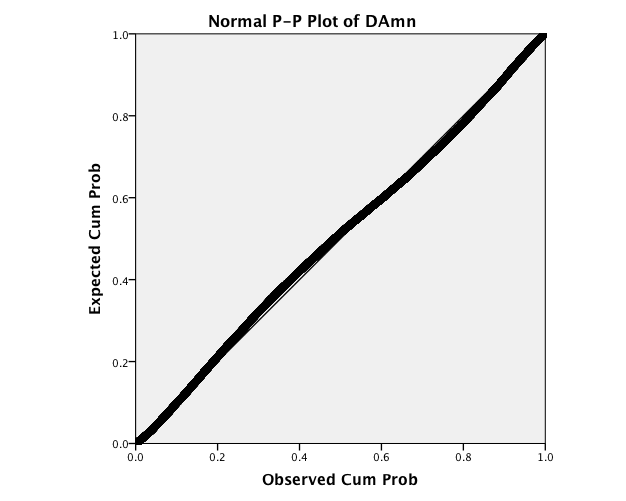
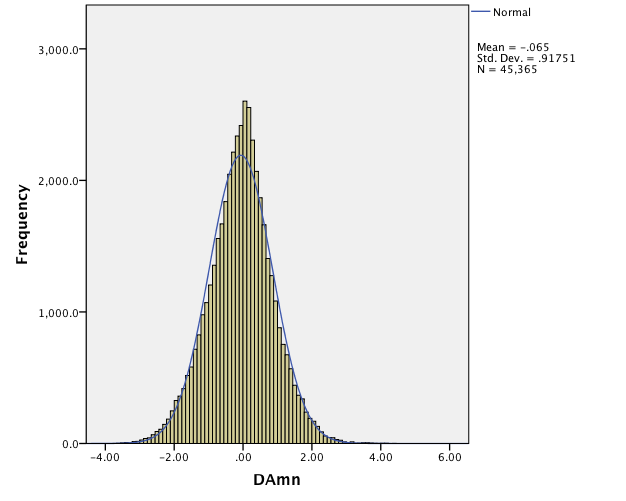
Dependent variable: OCF

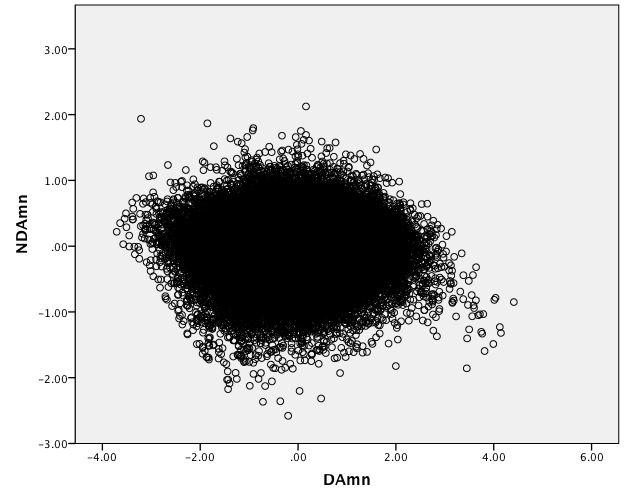
|  |  |  |
| --- | --- | --- |
| **Variable** | **Tolerance** | **VIF** |
| Size | 0.953 | 1.049 |
| OCF | 0.999 | 1.001 |
| Crisis1 | 0.975 | 1.026 |
| Crisis2 | 0.955 | 1.001 |

Dependent variable: Leverage

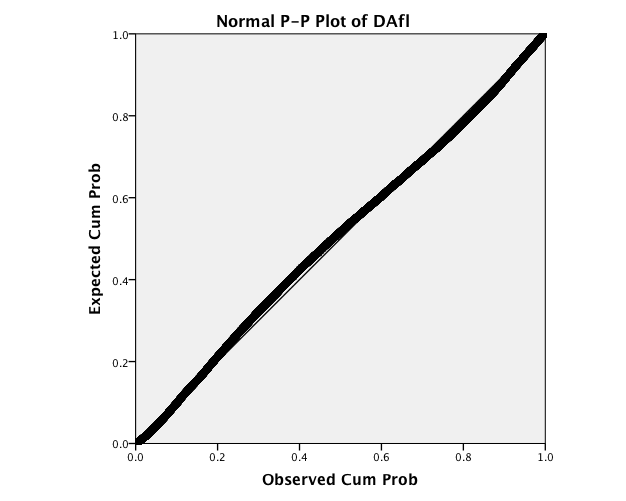
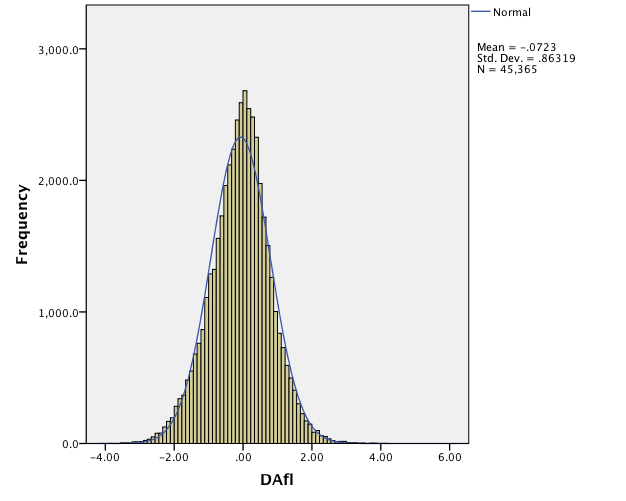
## Appendix 5: Testing the three requirements for linear regression

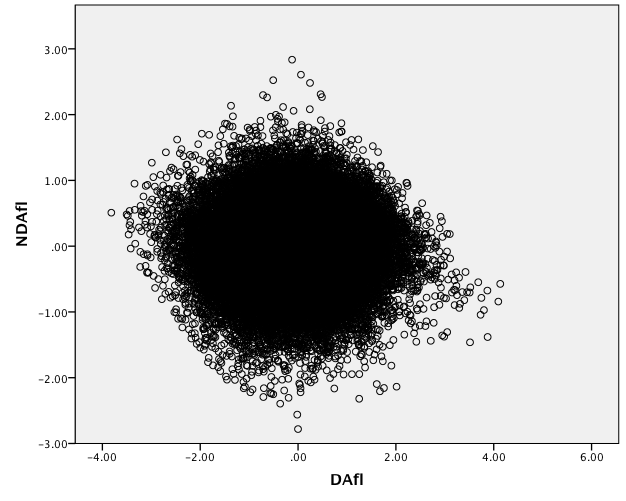
McNichols model:





Forward Looking model:





|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Appendix 6: Pearson Correlation Test | **At-1** | **1 / A** | **PPE** | **∆Rev** | **∆Rec** | **∆Rev - ∆Rec** | **(1 + k) \* ∆Rev - ∆Rec** | **CFO t-1** | **CFO** | **CFOt+1** | **Gr. Sales** | **Size** | **OCF** | **Lev** | **TA** | **TAt-1** | **Nmj** | **Dmj** | **Nmn** | **Dmn** | **Nfl** | **Dfl** | **C1** | **C2** |
| At-1 | 1 | -.846\*\* | -.434\*\* | -.198\*\* | -.202\*\* | .005 | -.073\*\* | .306\*\* | .243\*\* | .025\*\* | -.153\*\* | .655\*\* | -.038\*\* | .311\*\* | .272\*\* | .032\*\* | .683\*\* | -.011\* | .643\*\* | -.014\*\* | .540\*\* | -.023\*\* | .119\*\* | .158\*\* |
|  |  | *.000* | *.000* | *.000* | *.000* | *.257* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.021* | *.000* | *.003* | *.000* | *.000* | *.000* | *.000* |
| 1 / A | -.846\*\* | 1 | .471\*\* | .202\*\* | .215\*\* | .009 | .068\*\* | -.262\*\* | -.227\*\* | -.054\*\* | .155\*\* | -.659\*\* | .035\*\* | -.282\*\* | -.326\*\* | -.011\* | -.790\*\* | .000 | -.759\*\* | .011\* | -.630\*\* | .015\*\* | -.149\*\* | -.143\*\* |
|  | *.000* |  | *.000* | *.000* | *.000* | *.051* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.019* | *.000* | *.990* | *.000* | *.022* | *.000* | *.001* | *.000* | *.000* |
| PPE | -.434\*\* | .471\*\* | 1 | .268\*\* | .303\*\* | .125\*\* | .078\*\* | -.064\*\* | -.029\*\* | -.029\*\* | .213\*\* | -.118\*\* | .043\*\* | -.010\* | -.356\*\* | -.057\*\* | -.838\*\* | -.012\* | -.806\*\* | .001 | -.666\*\* | .003 | -.061\*\* | .012\* |
|  | *.000* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.042* | *.000* | *.000* | *.000* | *.014* | *.000* | *.871* | *.000* | *.510* | *.000* | *.013* |
| ∆Rev | -.198\*\* | .202\*\* | .268\*\* | 1 | .500\*\* | .826\*\* | .760\*\* | -.119\*\* | .059\*\* | .084\*\* | .919\*\* | .115\*\* | .087\*\* | .038\*\* | -.179\*\* | -.106\*\* | -.417\*\* | -.008 | -.422\*\* | .008 | -.258\*\* | -.048\*\* | -.141\*\* | .012\* |
|  | *.000* | *.000* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.088* | *.000* | *.087* | *.000* | *.000* | *.000* | *.014* |
| ∆Rec | -.202\*\* | .215\*\* | .303\*\* | .500\*\* | 1 | .229\*\* | -.179\*\* | -.013\*\* | -.104\*\* | .068\*\* | .450\*\* | .127\*\* | -.127\*\* | .046\*\* | -.322\*\* | .004 | -.315\*\* | -.209\*\* | -.357\*\* | -.182\*\* | -.471\*\* | -.081\*\* | -.105\*\* | .019\*\* |
|  | *.000* | *.000* | *.000* | *.000* |  | *.000* | *.000* | *.006* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.387* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |
| ∆Rev - ∆Rec | .005 | .009 | .125\*\* | .826\*\* | .229\*\* | 1 | .767\*\* | -.048\*\* | .196\*\* | .111\*\* | .853\*\* | .220\*\* | .126\*\* | .102\*\* | -.038\*\* | -.142\*\* | -.272\*\* | .080\*\* | -.226\*\* | .068\*\* | -.068\*\* | -.002 | -.113\*\* | .075\*\* |
|  | *.257* | *.051* | *.000* | *.000* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.668* | *.000* | *.000* |
| (1 + k) \* ∆Rev - ∆Rec | -.073\*\* | .068\*\* | .078\*\* | .760\*\* | -.179\*\* | .767\*\* | 1 | -.126\*\* | .147\*\* | .044\*\* | .706\*\* | .038\*\* | .196\*\* | .010\* | .038\*\* | -.124\*\* | -.239\*\* | .148\*\* | -.213\*\* | .147\*\* | .061\*\* | .006 | -.081\*\* | .001 |
|  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.045* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.178* | *.000* | *.848* |
| CFOt-1 | .306\*\* | -.262\*\* | -.064\*\* | -.119\*\* | -.013\*\* | -.048\*\* | -.126\*\* | 1 | .273\*\* | .019\*\* | -.107\*\* | .315\*\* | .059\*\* | .092\*\* | -.001 | -.018\*\* | .179\*\* | -.082\*\* | .026\*\* | -.014\*\* | .133\*\* | -.086\*\* | .083\*\* | .150\*\* |
|  | *.000* | *.000* | *.000* | *.000* | *.006* | *.000* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.801* | *.000* | *.000* | *.000* | *.000* | *.003* | *.000* | *.000* | *.000* | *.000* |
| CFO | .243\*\* | -.227\*\* | -.029\*\* | .059\*\* | -.104\*\* | .196\*\* | .147\*\* | .273\*\* | 1 | .106\*\* | .068\*\* | .295\*\* | .727\*\* | .094\*\* | .010\* | .028\*\* | .088\*\* | -.028\*\* | .012\* | .006 | .099\*\* | -.051\*\* | .090\*\* | .123\*\* |
|  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.000* | *.027* | *.000* | *.000* | *.000* | *.013* | *.213* | *.000* | *.000* | *.000* | *.000* |
| CFOt+1 | .025\*\* | -.054\*\* | -.029\*\* | .084\*\* | .068\*\* | .111\*\* | .044\*\* | .019\*\* | .106\*\* | 1 | .084\*\* | .050\*\* | .040\*\* | .053\*\* | .030\*\* | -.001 | .025\*\* | .021\*\* | .111\*\* | -.021\*\* | .012\* | .028\*\* | .127\*\* | .160\*\* |
|  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.000* | *.758* | *.000* | *.000* | *.000* | *.000* | *.014* | *.000* | *.000* | *.000* |
| Gr. Sales | -.153\*\* | .155\*\* | .213\*\* | .919\*\* | .450\*\* | .853\*\* | .706\*\* | -.107\*\* | .068\*\* | .084\*\* | 1 | .142\*\* | .076\*\* | .057\*\* | -.137\*\* | -.120\*\* | -.366\*\* | .015\*\* | -.354\*\* | .021\*\* | -.257\*\* | .001 | -.151\*\* | .023\*\* |
|  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.002* | *.000* | *.000* | *.000* | *.834* | *.000* | *.000* |
| Size | .655\*\* | -.659\*\* | -.118\*\* | .115\*\* | .127\*\* | .220\*\* | .038\*\* | .315\*\* | .295\*\* | .050\*\* | .142\*\* | 1 | .017\*\* | .405\*\* | .090\*\* | .019\*\* | .371\*\* | -.068\*\* | .325\*\* | -.060\*\* | .250\*\* | -.053\*\* | .102\*\* | .170\*\* |
|  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |
| OCF | -.038\*\* | .035\*\* | .043\*\* | .087\*\* | -.127\*\* | .126\*\* | .196\*\* | .059\*\* | .727\*\* | .040\*\* | .076\*\* | .017\*\* | 1 | -.129\*\* | -.021\*\* | .027\*\* | -.075\*\* | .011\* | -.124\*\* | .038\*\* | -.011\* | -.017\*\* | .030\*\* | -.008 |
|  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.020* | *.000* | *.000* | *.018* | *.000* | *.000* | *.081* |
| Lev | .311\*\* | -.282\*\* | -.010\* | .038\*\* | .046\*\* | .102\*\* | .010\* | .092\*\* | .094\*\* | .053\*\* | .057\*\* | .405\*\* | -.129\*\* | 1 | .026\*\* | .001 | .129\*\* | -.030\*\* | .129\*\* | -.034\*\* | .084\*\* | -.023\*\* | .056\*\* | .074\*\* |
|  | *.000* | *.000* | *.042* | *.000* | *.000* | *.000* | *.045* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |  | *.000* | *.878* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |
| TA | .272\*\* | -.326\*\* | -.356\*\* | -.179\*\* | -.322\*\* | -.038\*\* | .038\*\* | -.001 | .010\* | .030\*\* | -.137\*\* | .090\*\* | -.021\*\* | .026\*\* | 1 | -.269\*\* | .391\*\* | .911\*\* | .431\*\* | .897\*\* | .528\*\* | .843\*\* | .053\*\* | -.039\*\* |
|  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.801* | *.027* | *.000* | *.000* | *.000* | *.000* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |
| TAt-1 | .032\*\* | -.011\* | -.057\*\* | -.106\*\* | .004 | -.142\*\* | -.124\*\* | -.018\*\* | .028\*\* | -.001 | -.120\*\* | .019\*\* | .027\*\* | .001 | -.269\*\* | 1 | .071\*\* | -.324\*\* | .049\*\* | -.322\*\* | -.507\*\* | .005 | .042\*\* | -.054\*\* |
|  | *.000* | *.019* | *.000* | *.000* | *.387* | *.000* | *.000* | *.000* | *.000* | *.758* | *.000* | *.000* | *.000* | *.878* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.000* | *.336* | *.000* | *.000* |
| NDAmj | .683\*\* | -.790\*\* | -.838\*\* | -.417\*\* | -.315\*\* | -.272\*\* | -.239\*\* | .179\*\* | .088\*\* | .025\*\* | -.366\*\* | .371\*\* | -.075\*\* | .129\*\* | .391\*\* | .071\*\* | 1 | -.023\*\* | .942\*\* | -.028\*\* | .750\*\* | -.015\*\* | .129\*\* | .055\*\* |
|  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.002* | *.000* | *.000* |
| DAmj | -.011\* | .000 | -.012\* | -.008 | -.209\*\* | .080\*\* | .148\*\* | -.082\*\* | -.028\*\* | .021\*\* | .015\*\* | -.068\*\* | .011\* | -.030\*\* | .911\*\* | -.324\*\* | -.023\*\* | 1 | .047\*\* | .987\*\* | .238\*\* | .922\*\* | .000 | -.067\*\* |
|  | *.021* | *.990* | *.014* | *.088* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.002* | *.000* | *.020* | *.000* | *.000* | *.000* | *.000* |  | *.000* | *.000* | *.000* | *.000* | *.987* | *.000* |
| NDAmn | .643\*\* | -.759\*\* | -.806\*\* | -.422\*\* | -.357\*\* | -.226\*\* | -.213\*\* | .026\*\* | .012\* | .111\*\* | -.354\*\* | .325\*\* | -.124\*\* | .129\*\* | .431\*\* | .049\*\* | .942\*\* | .047\*\* | 1 | -.012\*\* | .737\*\* | .040\*\* | .129\*\* | .045\*\* |
|  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.013* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |  | *.008* | *.000* | *.000* | *.000* | *.000* |
| DAmn | -.014\*\* | .011\* | .001 | .008 | -.182\*\* | .068\*\* | .147\*\* | -.014\*\* | .006 | -.021\*\* | .021\*\* | -.060\*\* | .038\*\* | -.034\*\* | .897\*\* | -.322\*\* | -.028\*\* | .987\*\* | -.012\*\* | 1 | .224\*\* | .914\*\* | -.004 | -.065\*\* |
|  | *.003* | *.022* | *.871* | *.087* | *.000* | *.000* | *.000* | *.003* | *.213* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.008* |  | *.000* | *.000* | *.355* | *.000* |
| NDAfl | .540\*\* | -.630\*\* | -.666\*\* | -.258\*\* | -.471\*\* | -.068\*\* | .061\*\* | .133\*\* | .099\*\* | .012\* | -.257\*\* | .250\*\* | -.011\* | .084\*\* | .528\*\* | -.507\*\* | .750\*\* | .238\*\* | .737\*\* | .224\*\* | 1 | -.011\* | .094\*\* | .067\*\* |
|  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.014* | *.000* | *.000* | *.018* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |  | *.017* | *.000* | *.000* |
| DAfl | -.023\*\* | .015\*\* | .003 | -.048\*\* | -.081\*\* | -.002 | .006 | -.086\*\* | -.051\*\* | .028\*\* | .001 | -.053\*\* | -.017\*\* | -.023\*\* | .843\*\* | .005 | -.015\*\* | .922\*\* | .040\*\* | .914\*\* | -.011\* | 1 | .003 | -.088\*\* |
|  | *.000* | *.001* | *.510* | *.000* | *.000* | *.668* | *.178* | *.000* | *.000* | *.000* | *.834* | *.000* | *.000* | *.000* | *.000* | *.336* | *.002* | *.000* | *.000* | *.000* | *.017* |  | *.498* | *.000* |
| Crisis1 | .119\*\* | -.149\*\* | -.061\*\* | -.141\*\* | -.105\*\* | -.113\*\* | -.081\*\* | .083\*\* | .090\*\* | .127\*\* | -.151\*\* | .102\*\* | .030\*\* | .056\*\* | .053\*\* | .042\*\* | .129\*\* | .000 | .129\*\* | -.004 | .094\*\* | .003 | 1 | -.082\*\* |
|  | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.987* | *.000* | *.355* | *.000* | *.498* |  | *.000* |
| Crisis2 | .158\*\* | -.143\*\* | .012\* | .012\* | .019\*\* | .075\*\* | .001 | .150\*\* | .123\*\* | .160\*\* | .023\*\* | .170\*\* | -.008 | .074\*\* | -.039\*\* | -.054\*\* | .055\*\* | -.067\*\* | .045\*\* | -.065\*\* | .067\*\* | -.088\*\* | -.082\*\* | 1 |
|  | *.000* | *.000* | *.013* | *.014* | *.000* | *.000* | *.848* | *.000* | *.000* | *.000* | *.000* | *.000* | *.081* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* | *.000* |  |

## Appendix 7: Explanatory power by industry

|  |  |  |  |
| --- | --- | --- | --- |
| SIC | Modified Jones | McNichols | Forward Looking |
| 1000 | 0,2540 | 0,2670 | 0,2730 |
| 1300 | 0,2500 | 0,2520 | 0,3400 |
| 1600 | 0,2330 | 0,2750 | 0,3980 |
| 2000 | 0,2090 | 0,2260 | 0,3300 |
| 2200 | 0,2130 | 0,3010 | 0,3320 |
| 2300 | 0,1890 | 0,2520 | 0,2980 |
| 2400 | 0,1420 | 0,2100 | 0,1900 |
| 2500 | 0,1610 | 0,1950 | 0,2820 |
| 2600 | 0,2560 | 0,2590 | 0,4070 |
| 2700 | 0,1410 | 0,1500 | 0,2370 |
| 2800 | 0,1420 | 0,1440 | 0,2260 |
| 2900 | 0,3830 | 0,4020 | 0,5250 |
| 3000 | 0,1260 | 0,1420 | 0,2600 |
| 3100 | 0,2380 | 0,2750 | 0,3960 |
| 3200 | 0,1840 | 0,1750 | 0,3070 |
| 3300 | 0,2320 | 0,2480 | 0,3860 |
| 3400 | 0,1940 | 0,2140 | 0,3080 |
| 3500 | 0,2080 | 0,2150 | 0,3430 |
| 3600 | 0,1840 | 0,1880 | 0,2900 |
| 3700 | 0,1690 | 0,1780 | 0,2610 |
| 3800 | 0,1730 | 0,1760 | 0,2630 |
| 3900 | 0,1480 | 0,1720 | 0,2020 |
| 4000 | 0,2090 | 0,2230 | 0,3560 |
| 4200 | 0,2170 | 0,2730 | 0,2880 |
| 4400 | 0,1490 | 0,1580 | 0,2060 |
| 4500 | 0,1250 | 0,1500 | 0,1820 |
| 4800 | 0,2240 | 0,2390 | 0,2620 |
| 4900 | 0,1580 | 0,1730 | 0,4050 |
| 5000 | 0,2300 | 0,3040 | 0,3470 |
| 5100 | 0,2310 | 0,2590 | 0,3370 |
| 5300 | 0,2030 | 0,2560 | 0,2630 |
| 5400 | 0,3300 | 0,3770 | 0,3920 |
| 5500 | 0,1410 | 0,1320 | 0,2060 |
| 5600 | 0,1380 | 0,1440 | 0,2180 |
| 5700 | 0,2180 | 0,2160 | 0,2990 |
| 5800 | 0,1460 | 0,1460 | 0,2360 |
| 5900 | 0,1910 | 0,2110 | 0,2990 |
| 6500 | 0,0470 | 0,0500 | 0,1390 |
| 6700 | 0,0960 | 0,1230 | 0,2040 |
| 7000 | 0,0390 | 0,0300 | 0,1780 |
| 7200 | 0,2410 | 0,3160 | 0,3000 |
| 7300 | 0,1400 | 0,1420 | 0,2150 |
| 7900 | 0,1990 | 0,2130 | 0,2470 |
| 8000 | 0,1620 | 0,1890 | 0,2640 |
| 8200 | 0,1700 | 0,2050 | 0,2230 |
| 8700 | 0,1610 | 0,1680 | 0,2700 |
| Mean | **0,1868** | **0,2090** | **0,2867** |