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Earnings management and the financial crisis: A quantile regression analysis.

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Abstract

This thesis examines the influence of the financial crisis of 2008 on earnings management. The financial crisis period is compared with the period before and after, setting a timeframe between 2002 and 2017. In addition, the period after the financial crisis is compared with the period before. Existing literature suggest that the main reasons for adjusting the level of earnings management, whether this causes earnings management to increase or decrease, hold a managerial incentive. Discretionary accruals were computed by means of the Performance matched Modified Jones Model as a measure of earnings management. Analysing data of German, Dutch, Spanish and Italian listed companies by means of a fixed effects model and a quantile regression model, this thesis finds evidence that companies conduct less earnings management during the financial crisis than the period before. No evidence is found that earnings management decreases the period after the financial crisis. Furthermore, findings suggest that more earnings management is conducted during the pre-crisis period compared to the post-crisis period.

keywords: discretionary accruals, earnings management, pre-crisis, post-crisis, crisis

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1   Introduction

Top accounting scandals, such as the Enron Scandal (2001) and the Tyco Scandal (2002), have received considerable attention from the academic world. Mainly in determining the motivation of the manipulation of earnings and what consequences this does bring with it for all stakeholders of the corresponding firm. However, the financial crisis of 2008 has taken a well-established position in earnings management literature as well. This thesis continues on this and investigates the extent to which earnings management differs between the period before the financial crisis, the financial crisis and after the financial crisis.

During times of crisis, firms may have the tendency to manipulate earnings, consequently making them look either worse or better on paper. Two methods of earnings management are well-known in the accounting literature, namely accrual based earnings management and real earnings management. While the accrual based method seeks to conceal true economic performance by altering accounting methods, real earnings management involves the alteration of business transactions. Filip and Raffournier (2014) argue that firms operate like this due to market and agency relations motives. Market motives are based on the moment the market is not able to detect any conduction of earnings management, consequently assuming that a firm's profit is result of good firm performance. Agency relations motives refer to opportunistic behavior of the managers. Xie et al. (2003) state that since managers are being compensated based on a firm's earnings performance relative to some benchmark, they try to manipulate earnings. Additionally, Mulford and Comiskey (2005) argue that by manipulating earnings a company can adjust their stock prices. So, they claim that it is about the effect on the stock markets. If a company can raise their stock prices by engaging in earnings management, the value of the company increases.

As there is disagreement in the motive for conducting earnings management, there is also disagreement in the academic world about the level of earnings management during the financial crisis. Papers like Filip and Raffournier (2014), Türegün (2020) and Cimini (2015) argue that the use of earnings management decreases with the reason being that there is no real incentive for managers to manipulate earnings, because in times of crisis there is a higher market tolerance for poor performance. Another reason is that in crisis periods the litigation risk

increases, which would result in less earnings management by insiders, because the threat of legal action is too high (Jenkins et al., 2009). The last reason is that there is increased uncertainty about future outcomes in financial distress periods, which should motivate market forces to ask for more conservative earnings resulting in less earnings management. On the other hand, Papers like DeAngelo et al. (1994), DeFond and Jiambalvo (1994) and Persakis and Iatridis (2016) find that earnings management increases during financial difficulties, such as in crises, due to the fact that the corresponding companies are trying to avoid a violent discovery of losses. They also find that earnings quality decreases during the financial crisis. Combining this with the fact that a low degree of earnings quality is correlated with a higher degree of earnings management, it is presumable that there is more earnings management during the crisis period. Dimitras et al. (2015) can relate to both reasoning and showed mixed results regarding earnings management during the financial crisis. They found that managers from Portuguese, Irish and Italian companies both had reasons to reduce earnings management as well as to increase earnings management. The main reason they find is that the corresponding company uses earnings management in order to avoid bankruptcy and the reason for conducting less earnings management is that their financial statements are better controlled, thus monitored, during financial distress.

Although a lot of research has been conducted concerning earnings management, this thesis tries to fill other knowledge gaps. Most researches regarding earnings management and the financial crisis focus on measuring earnings management in a pre-crisis and the crisis period, see Filip and Raffournier (2014), Cimini (2015), Franceschetti (2018), Lisboam and Kacharava (2018) and Costa (2016). However, what differentiates this thesis from those researches is that the pre-crisis, the crisis and post-crisis perspective is taken. So, the post-crisis period is added to the time frame. Due to the fact that there exist mixed findings in the academic literature, this adaptation of a pre-, during- and post-crisis period could reconcile these mixed findings. This is because with multiple periods in which one tests earnings management, the results can vary, meaning that both sides could be justified in this thesis. By tackling a larger time frame, one could also compare the pre-crisis and post-crisis period to find a more comprehensive effect of the financial crisis on earnings management, something most other studies have not examined

before. This thesis also takes a different perspective on the methodology part than most other researches. Although a normal OLS-regression is taken as the standard model, this thesis adds a quantile-regression in order to avoid certain distribution errors. Ramdani and Witteloostuijn (2010) argue that there are a few reasons why a quantile regression is better than an OLS-regression. Results from a quantile regression appear to be more robust, since it generates separate estimates for various quantiles. A quantile regression does not depend on as many strict assumption as the OLS-regression does. Sometimes, the mean of the data is not able to predict a relationship, while other percentiles are. Earnings management measures often have extreme outliers in their sample and is not normally distributed. A quantile regression is a great solution for this. Since a quantile regression is less known in comparison to the ordinary OLS, and in order to avoid repetition, the section "empirical tests" discusses this concept in more detail. Due to the issues examined in this section, this thesis tries to fill a knowledge gap in the academic literature with regard to earnings management and the financial crisis. To explain this, a specific research question needs to be formulated, which is as follows:

To what extent does earnings management differ between the period before the financial crisis, the financial crisis and the period after the financial crisis?

The thesis will have the following structure. Chapter two focuses on the relevant literature regarding earnings management and the financial crisis, as well as setting up the hypotheses. Chapter three gives a detailed overview of the applied methodology and the data. In chapter four the results are shown and discussed. Chapter five consists of the conclusion and discussion of the findings of this thesis.

2 Literature review

This chapter discusses the already existing literature regarding earnings management and the financial crisis. First, a closer look is given at earnings management and why companies implement it. Thereafter, earnings management is put in the perspective of different periods, the pre-, during- and post-crisis periods, explaining whether existing literature beliefs if the level of earnings management with respect to the corresponding period goes either up or down compared to another period. Based on the discussed literature, three hypotheses are composed.

2.1 Earnings management and why companies implement it

Beneish (2001) argues that there is a lack of consensus on the definition of earnings management in the academic world. This could indicate a discrepancy in empirical evidence between researches that adopt different types of definitions of earnings management. Therefore, it is crucial to have a clear definition of earnings management before one discusses earnings management related topics, in which this paper follows Healy and Wahlen (1999):

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

So, the definition of Healy and Wahlen (1999) comes down to the manipulation of financial reporting numbers in order to mislead stakeholders. There are two well-known methods to conduct earnings management: accrual based earnings management and real earnings management (Scott, 2009). However, due to only accrual based earnings management being used in this thesis, it is also the only one further explained. Accruals are the revenues and expenses that are not included in the cash flows and therefore do not affect a firm's cash flows. Accrual based earnings management got a reverse in the accruals in the period after manipulation (Darmawan et al., 2019). This means that an increase in current profits generated through the accrual based method results in a decrease in profits in the next period. The accruals can be classified in two different components, discretionary- and non-discretionary accruals. According

to Xiong (2006), discretionary accruals are not regulated in contracts and falls under a manager's choice policy, while non-discretionary accruals are determined by the economic condition of the firm. So, discretionary accruals can be manipulated by the managers due to it falling under the choice policy.

Caylor et al. (2015) argues that one of the goals of earnings management is to mislead the market with regard to actual performance of the company. The moment the market cannot detect the conduction of earnings management, thus manager's opportunistic behavior, it will be assumed that profits of the firm will be a result of good firm performance. Due to this, managers may have the tendency to manipulate earnings during times of crisis, which would make them look better on paper. Multiple reasons are discussed in the literature. However, these will be discussed in the next sections due to their relation with the crisis periods.

2.2 Earnings management during the crisis

As stated in the previous section, earnings management comes down to the manipulation of financial reporting numbers in order to mislead stakeholders or to influence contractual outcomes. This could come in handy whenever a firm is faced with times of uncertainty, like in crisis periods, to fake their financial numbers and mislead stakeholders. However, existing literature shows mixed results. On the one hand, literature suggests that firms are incentivized to increase their earnings management in times of crisis, but on the other hand also have incentives to decrease their earnings management in times of crisis.

According to Jenkins et al. (2009), it could be argued that during crises litigation risk is higher than in non-crisis periods. This is especially the case when equity markets experience extreme drops in stock prices. This risk should incentive the managers to limit the level of earnings management, because the threat of legal action increases. Periods of financial distress should thus be characterized with less earnings management and, as a result, more conservative earnings. Another reason is that creditors, auditors, and other stakeholders increase their monitoring of firms during crises, which would result in managers having less incentives to manage earnings (Chia et al., 2007). Since the monitoring is increased, those stakeholders are more likely to find out that the firm is conducting earnings management, thus ensuring a higher

probability that external parties will find out that the firms is engaged in earnings management. This could lead to a worse reputation of the firm as they are not showing their true financial numbers. In the research of Filip and Raffournier (2014) they discuss reasoning in favor of both an increase and decrease in earnings management during crises. Among other things, it is stated that a decrease in earnings management during crises may result from a higher demand for conservative earnings. Conservative earnings refers to the revenues which are reported in the same period as in which the corresponding expenses were incurred. Due to the crisis's transitory nature, earnings that are reported would be valued less persistent, and thus not that useful for making predictions. This would result in more uncertainty about future outcomes and therefore motivates market forces in demanding more conservative earnings during crises, preventing firms from manipulating their reported earnings (Jenkins et al., 2009). Next to this, there would be no real incentive for managers to manipulate earnings, due to the fact that there is a higher market tolerance for poor performance in times of crisis (Ahmad-Zaluki et al., 2011). Either way, there is less punishment for poor performance, so why bother engaging in earnings management.

The previous mentioned arguments suggested that earnings management decreases during crisis periods. However, there are reasons to believe that earnings management can increase during crisis periods as well. First, managers of financially distressed firms have incentives to manage earnings downward during difficult times (Filip & Raffournier, 2014). Firms that breach a debt covenant or fail to make a debt repayment must restructure their debt. Reporting losses may help these firms obtain concessions from lenders. Banks are able to refuse these concessions and force the company to liquidate. However, during times of crisis, banks often prefer debt restructuring by waiving covenants rather than exercising the right to call the loan. Similar to this is the concept of "taking a bath", implying that the profit of the firm will be valued as low as possible, sacrificing current year's financials, so that the firm can start the next year with a fresh start. Agency relationships with employees may also result in income-reducing earnings management. According to DeAngelo et al. (1994), by means of reporting losses, managers portray the firm as financial distressed, making it useful for obtaining concessions for these same employees who would otherwise doubt the existence of the financially distressed nature of the firm. Next to these income-reducing motives, there are also income-increasing motives. Ahmad-

Zaluki et al. (2011) argue that managers engage in earnings management to compensate for the decrease of operational performance, due to firms exhibiting lower earnings in crisis periods. Manipulating earnings upward also makes sure that the stock prices do not drop as much as they would have if there was no implementation of earnings management (Charitou et al., 2007). Governmental support could also motivate the conduction of earnings management. It is likely that governments will give financial support to firms that are in need of it in order to survive. It can take various forms (Ahmed et al., 2008). Among them are governmental support with debt restructuring of firms, providing banks with public funds to mitigate the crisis and the introduction of new regulations. This governmental aid is beneficial for firms when they are in a crisis. So, managers are incentivized to deflate earnings by means of earnings management in order to gain such governmental support (Jones, 1991; Navissi, 1999). With these arguments in mind, the first hypothesis is formulated:

H1: Companies engage in more earnings management in the crisis period compared to the pre-crisis period.

Although existing literature finds both the increase in earnings management as well as the decrease in earnings management plausible, this thesis argues that the findings indicating the increase in earnings management during a crisis period more convincing than the findings for a decrease. Despite these mixed results about earnings management during the financial crisis, there is more consensus in the literature concerning earnings management in the period after the financial crisis.

2.3 Earnings management pre crisis and post crisis

Although earnings management has been studied extensively during the crisis, post-crisis earnings management has gotten less attention. Still, few papers substantiate for the level of earnings management post-crisis, mainly through pure empirical evidence. As far as this thesis is concerned, there are various reasons to believe that after the financial crisis earnings management would decrease compared to the crisis period.

Research of Francis et al. (2013) provides evidence that the financial crisis has led to an increase in demand for higher financial reporting quality and higher audit quality. Cimini (2015) believes that this is related to earnings management. The research states that the quality of financial reporting, which is measured by conditional conservatism as well as the audit quality which is the presence of a Big 4 auditor, to cause earnings management to decrease after the financial crisis. This is especially the case in the EU, where firms observed higher requirements for their financial reporting after the financial crisis. Conservatism plays an important role with regard to financial reporting quality (Francis et al., 2013). It addresses agency problems and mitigates asymmetric information between stakeholders and managers, so in turn this would lead to lower earnings management. LaFond and Watts (2008) agree and add that conservatism decreases the ability of managers to manipulate financial statements. Based on this, one could also say that conservatism during the financial crisis should lead to an increase in earnings quality and a reduction in earnings management. Following these researches, the second hypothesis is formulated:

H2: Companies engage in less earnings management in the post-crisis period compared to the crisis period.

Earnings management is thus expected to decrease during the post-crisis period. However, how does it compare to the pre-crisis period. Although not a lot of research has been done on this particular comparison, Kumar and Vij (2017) find in their research that earnings management significantly decreases in the post-crisis period compared with the pre-crisis period. Reasoning behind this is that the economy is in recovery in the post-crisis period, indicating that managers are following the wait and watch strategy ensuring that there is some intensity of monitoring activities by the auditors and stakeholders. The wait and watch strategy is pretty self-explanatory, but in this context it means that managers wait with increasing the level of earnings management, so they can ensure themselves whether the auditors and stakeholders keep their monitoring at the same level as before the crisis. Naturally, this would results in less earnings management post-crisis than pre-crisis. Studies of Cimini (2015) and Lisboa and Kacharava (2018) find similar results and add that after the financial crisis there is still a need for high quality financial information, even more than before the crisis. This need for high quality financial information would translate

into less opportunities to conduct earnings management, meaning that earnings management would also decrease post-crisis in comparison with pre-crisis. These arguments lead to the third, and last, hypothesis:

H3: Companies engage in less earnings management in the post-crisis period compared to the pre-crisis period.

3 Data and Methodology

This section discusses the data which this thesis is using, together with the applied methodology. First, information about the sample and data is provided. Second, through a process of operationalization, the dependent variable is constructed. Third, the independent variables are discussed. Fourth, the implemented control variables are explained along with the relevance of these variables. Last, there is an overview and motivation for the applied empirical tests.

3.1 Data and sample information

The effect of the financial crisis and post-financial crisis on earnings management is investigated empirically, based on a fixed effects model. A fixed effects model is used, since the sample contains panel data. On top of this, a quantile regression is added in order to compare the results with the fixed effects model. The models operate with data about earnings management in the pre-, during- and post-crisis periods and focuses on Dutch, German, Spanish and Italian companies that are listed on a stock exchange market to find the effect. Due to the fact that only Dutch, German, Spanish and Italian companies are used, there is a need for stock market indexes that contain such companies. Considering that a larger sample size is preferred, especially for the quantile regression, there is no specific stock market index used to find matching firms, because this would limit the sample size drastically. The empirical testing will be applied to 710 different companies, and those companies operate in various industries. Table 1 gives an overview of the industries in which the companies operate. Noticeable is that by far the most companies operate in the manufacturing, finance and services industry. All data used in this thesis is retrieved from Eikon.

Table 1. Overview of the industries in which the companies operate.

The table shows the absolute and relative sample distribution of the main business activity in which the companies operate. The Standard Industrial Classification is followed in distinguishing these firms.

Industry	No. unique firms	Observations	Percent	Cumulative
Mining	9	80	1.27	1.27
Construction	24	217	3.38	4.65
Manufacturing	271	2442	38.17	42.82
Transportation	77	690	10.85	53.67
Wholesale	24	214	3.38	57.05
Retail	19	172	2.68	59.73
Finance	159	1435	22.39	82.12
Services	126	1150	17.88	100.00
Total	710	4010	100.00	

This thesis adopts a timeframe of fifteen years, going from 2002 until 2017. This timeframe is distinguished in three periods: the pre-crisis period, the crisis period and the post-crisis period. The pre-crisis period goes from 2002 until 2007, the crisis-period goes from 2007 until 2012 and the post-crisis period goes from 2012 until 2017. This means that the periods hold five years each, like Eng et al. (2019) has also done in their research. Although the reasoning for the timeframe of the financial crisis period should be fairly clear, due to the fact that the financial crisis was from 2007 until 2012, the pre- and post-crisis time frame needs some clarification. A five-year period for the pre- and post-crisis is chosen, because in the interest of seeing a significant difference in earnings management, one needs to use as much data as it does during the crisis period and the pre- and post-crisis period. If approximately the same amount of data is needed, an equally long period is preferred.

3.2 Dependent variables

Due to the fact that this research investigates the level of earnings management used in the pre-crisis, the financial crisis and post-crisis, it is only logical that the dependent variable is earnings management. The paper of Dechow et al. (1995) evaluates different models in measuring earnings management. They show that most researches often use models that focuses on discretionary accruals when measuring earnings management. Models which are evaluated in this paper are among others: The Healy Model (Healy, 1985), The DeAngelo Model (DeAngelo, 1986), The Jones Model (Jones, 1991), The Industry Model (Dechow, 1994) and the Modified Jones Model which is constructed by the authors of the paper themselves. Dechow et al. (1995) argue that the Modified Jones Model is the most powerful test of earnings management. For this reason, knowing that multiple models have been tested, this paper implements, among another, the Modified Jones Model for measuring the discretionary accruals. Not only is the Modified Jones model the most appraised by Dechow et al. (1995), other studies implement this model as well, see Filip and Raffournier (2014), Habib et al. (2013), Türegün (2020), and Lisboa and Kacharava (2018). The formula used in this thesis to calculate the discretionary accruals through this model is as follows:

$$DAC_{it} = \frac{TAC_{it}}{Assets_{i,t-1}} - \left(\alpha_1 \left[\frac{1}{A_{it-1}} \right] + \alpha_2 \left[\left(\frac{\Delta REV_{it} - \Delta REC_{it}}{Assets_{i,t-1}} \right) \right] + \alpha_3 \left[\frac{PPE_{it}}{Assets_{i,t-1}} \right] \right) + \varepsilon$$

In which,

DAC_{it} = Discretionary accruals in year t of firm i;

TAC_{it} = Total accruals in year t of firm i

$\alpha_1, \alpha_2 \ and \ \alpha_3$ = Firm specific parameters

A_{it-1} = Total assets at the end of year t-1 for firm i;

ΔREV_{it} = Difference in revenue between year t and t-1 for firm i

ΔREC_{it} = Difference in net receivables in year t and t-1 for firm i

PPE_{it} = Gross property plant and equipment at the end of year t for firm i

The Modified Jones Model differentiates itself from the normal Jones Model by adding a term that subtracts the differences in net receivables from the differences in revenues, implicitly assuming that all changes in credit sales result from earnings management and making it the most robust (Peasnell et al., 2000). This modified model is created, due to the issue that the standard Jones Model is unable to capture the impact of sales-based manipulation, which the modified model resolves. Peasnell et al. (2000) argue that both models are poorly specified in case of extreme financial performance, leading to typical Type I errors when applied to companies with extreme cash flows. This Type I error is the wrong rejection of an hypothesis which is in reality correct. Times with extreme financial performance would be among others the financial crisis, a period which this thesis explicitly discusses. Meaning that there is a possibility that those Type I errors occur with the testing process, causing doubt on the effectiveness of the Modified Jones Model at measuring earnings management.

This potential Type I error associated with the Modified Jones Model brings the need for a second model that can mitigate those risks. A model that is able in doing so, is the Performance-Matched Jones Model. Shih (2011) states that this model estimates discretionary accruals for samples which are skewed with extremely good or bad performance in order to reduce the frequency of Type I errors. However, the Performance-Matched model is more likely to get issues such as Type II errors in comparison with the Modified Jones Model. This Type II error indicates a false acceptance of the hypothesis. So, due to the fact that both models could face problems, both models are implemented in this thesis to address these Type I and Type II errors. In certain cases, the Modified Jones Model would be a better fit, while in other cases the performance-matched Modified Jones Model is preferred. Another reason, and most often the main reason, to implement this Performance-Matched Jones Model, is because of its immunity for the effects of firm performance. This does not apply for the Modified Jones Model, meaning that accruals could potentially be correlated with firm performance. So, to control for firm past performance, the return on assets of the previous year is added to the Modified Jones Model (Kothari et al., 2005). The formula that is used to calculate the discretionary accruals through this model is as follows in this thesis:

$DAC\_performance_{it}$

$$= \frac{TAC_{it}}{Assets_{i,t-1}} - \left(\alpha_1 \left[\frac{1}{A_{it-1}} \right] + \alpha_2 \left[\left(\frac{\Delta REV_{it}}{Assets_{i,t-1}} \right) \right] + \alpha_3 \left[\frac{PPE_{it}}{Assets_{i,t-1}} \right] \right) + \alpha_4 [ROA_{it-1}]) + \varepsilon$$

In which ROA_{it-1} represents the return on assets of the previous period.

Note that for the empirical analyses the absolute values are taken from both discretionary accruals models, since this thesis is trying to find differences in the level of earnings management and not whether the conducted earnings management is income increasing/ decreasing. This thesis estimates the discretionary accruals of both Modified Jones Model (MJM) and the Performance-Matched Jones Model (PMJM). However, the discretionary accruals of the Modified Jones Model is used as a robustness check, while the discretionary accruals of the Performance-Matched Jones Model is used in the main regression.

3.3   Independent variables

This section discusses the independent variables used in this thesis. Because the effect of different periods around the financial crisis on earnings management is examined, these different periods are among the independent variables. As stated before in this thesis, these include the pre- during- and post-crisis periods. The individual effects of these periods are thus measured on earnings management.

   To operationalize these periods, this thesis follows Costa (2016) in creating dummy variables. Three dummy variables are created, which are the pre-crisis dummy, crisis dummy and the post-crisis dummy. This means that the dummy variable has a value equal to one if the observation year is between the corresponding period, and otherwise zero. So, the value of the pre-crisis dummy is equal to one if the observation year is between 2002 and 2007. The value of the crisis-dummy is equal to one if the observation year is between 2007 and 2012. The value of the post-crisis dummy is equal to one if the observation year is between 2012 and 2017. After all these variables are created, these can be used as a tool to measure if the periods around the financial crisis had a significant effect on earnings management. In doing so, differences between these periods can be examined as well.

3.4 Control variables

Almost all empirical studies have difficulties in establishing an empirical relationship between variables. One of these issues are the potential omitted variables (Konijn et al., 2011). Control variables are discussed in this section, particularly for the purpose of mitigating potential biases caused by these potentially omitted variables. Otherwise, correlation that is found between the pre-, during- and post-crisis and earnings management might be spurious. To avoid this spurious correlation, seven control variables are added to the regression, these include: Firm's age, block holdings, leverage, size, return on equity (ROE), growth and industry.

Block holdings is defined as the sum of all squared block holders of the top 10 shareholders at time t. This variable should account for the effect of ownership concentration. Alves (2012) and Grimaldi and Muserra (2017) argue that ownership concentration is negatively related to earnings management. An agency approach is taken in explaining this relation. Both papers argue that small shareholders are not interested in monitoring management due to the costs. Therefore, those small shareholders have incentives to free-ride in monitoring management. On the other hand, large shareholders have the incentive to actively monitor the management in order to protect their significant investments, also known as the efficient monitoring hypothesis. This monitoring by large shareholders means the reduction of managerial opportunism to conduct earnings management.

Control variables such as age, leverage, size, ROE and growth are universally accepted to be good controls. These are almost always adopted in economic researches, due to their relevance, see e.g. Eng et al. (2019) from which the definitions of these controls are used. Therefore, no real explanation is needed for these variables. However, the variables are still in need of operationalization. Firm's age is measured as firm's age in years, so the difference between the corresponding year that is tested and the year the company is founded. Leverage is measured as total liabilities divided by total assets in order to account for the bankruptcy risk of a company. Size is defined as a natural logarithmic function of the market value of equity at the end of the fiscal year. This variable should account for the size effects. ROE is measured as the net income divided by the average book value of equity. This variable should account for firm profitability.

Growth is calculated as the annual change in sales in order to control for a company's growth prospects, also done in Kothari et al. (2005).

To check whether the financial crisis periods not only affect the level of earnings management in a certain industry, industry control variables are added to the regression as fixed effects. This is achieved through the use of SIC (Standard Industrial Classification) codes. Guenther and Rosman (1994), Fertuck (1975) and Smith (1992) are just a few examples of how SIC codes are used to define industries. Firms in the sample will be assigned a two-digit code (the SIC code) that denotes the industry in which they currently operate. The types of industry used are as follows: construction, transportation, retail, finance, services, mining, manufacturing and wholesale.

3.5   Empirical tests

This thesis adopts a fixed effects analysis as their main regression. The way it differs from other papers concerning earnings management is by conducting an additional quantile regression. Although the fixed effects model is universal and needs no further explanation, the quantile regression is not regularly used and therefore in need of some explanation.

A quantile regression estimates the conditional median or all other percentiles, in contrast to the OLS-regression which estimates the conditional mean (Yu et al., 2003). These percentiles split the sample in certain proportions. E.g., a 90th percentile gives the values which are located in the upper 10 percent border of the sample. The value that is at that 90th percentile can be defined as the value that splits the data at that point. So, one can estimate the effect of certain parts of the data on the response variable. A quantile regression has a number of assumptions. These include the OLS assumptions of linearity and additivity, the independence of observations, a large sample size and the dependent variable should be continuous, meaning that the variable is able to take on an infinite number of values (Hao et al., 2007). Ramdani and Witteloostuijn (2010) argue that there are a few reasons why one should adopt a quantile regression. The paper states that a quantile regression is more robust than a standard OLS-regression, due to the fact that it generates separate estimates for the corresponding quantiles for the distribution of the dependent variable. Next to this, they argue that a quantile regression does not depend on strict assumptions, which an OLS-regression does have. These strict

assumptions being, among others, the absence of extreme outliers and a Gaussian error distribution. This is especially beneficial for earnings management, considering that discretionary accruals often do have extreme outliers and are not normally distributed. Additionally, a quantile regression method enables the understanding of relationships between variables that are not represented by the mean of the data. In comparison to the OLS-regression, the quantile regression seems to have not many limitations. However, there are still a few. Buchinsky (1998) argues that there could be estimation problems, such as the estimates of the covariance matrix and the performance of estimates in samples that appear to be small. Also, it is less efficient to conduct a quantile regression when the assumptions of the OLS-regression are met. This is due to the fact that in that case one needs a larger sample size in order to achieve the same estimation power. We follow Feng and Huang (2021) in estimating the coefficients at the 25th, 50th and 75th quantiles, hence obtaining a broader picture of the relationship between the crisis periods and earnings management.

To perform the fixed effects analysis, the data needs to meet some criteria. First of all, it should be normally distributed. This is done by the process of winsorization. The top and the bottom ten percent of the cases for all variables corresponding to the 10th and 90th percentile are thus recoded, so all outliers have been adjusted, giving a somewhat symmetrical distribution. Second, data should be tested for heteroskedasticity. Heteroskedasticity indicates that the error term differs through values of the independent variable. To test for this, the Breusch-Pagan / Cook-Weisberg test is conducted. Results showed significant, see table 13, indicating that the data suffers from heteroskedasticity. Next to this, the variables are tested for autocorrelation. Table 14 shows the Wooldridge test for autocorrelation. Results appear significant, indicating that the data suffers from autocorrelation. To overcome the problems of heteroskedasticity and autocorrelation, the fixed effects analysis is taken with robust standard errors. This is necessary, due to the fact that a fixed effects model assumes equal variance, which is thus not always the case.

Table 17 shows the Pearson correlation matrix. It provides the correlation levels between all variables. Variable discretionary accruals MJM shows extremely high correlation (0.9971) with discretionary accruals PMJM. However, this is logical since the way both variables

are being calculated is almost exactly the same. The crisis periods also shows some form of correlation (correlation values of -0.4919, -0.4715 and -0.5359), but this is also normal. Time periods often correlate with each other. Return on equity and market value have a correlation coefficient of 0.4008, which is not low but not too high. Both variables have the equity component in their measurement, and it is well known that those variables are often coherent, thus making the correlation acceptable. All other variables seem to have very low correlation values and are thus acceptable to run in the regression model. Next to this, a common issue with data is the problem of multicollinearity. Multicollinearity exists when the dependent variables are linearly related to the independent variable (Alin, 2010). This could increase the variance of the coefficients, making the results unstable and more difficult to interpret. In order to control for this multicollinearity, the Variance Inflation Factor (VIF) test is conducted after the OLS-regressions. Results are shown in table 15. A mean VIF of 1.17, together with the lowest value being 1.00 (Age) and the highest value being 1.37 (post-crisis), indicates that the model is acceptable, due to no existence of higher values than ten.

Table 2: Descriptive statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
(1) Discretionary accruals MJM	6400	-0.0580	0.0582	0.0065	0.1565
(2) Discretionary accruals PMJM	6400	-0.0580	0.0582	0.0064	0.1568
(3) Pre crisis	6400	0.3020	0.4592	0.0000	1.0000
(4) Crisis	6400	0.3586	0.4797	0.0000	1.0000
(5) Post crisis	6400	0.3394	0.4736	0.0000	1.0000
(6) ROE	6400	4.5743	15.1869	-27.4100	24.4700
(7) Market value	6400	18.9129	2.41885	10.5966	25.3488
(8) Leverage	6400	21.7557	16.7555	0.0000	48.8700
(9) Ownership concentration	6400	49.0472	28.4520	0.2678	84.2198
(10) Age	6400	53.8230	43.4763	9.0000	131.0000
(11) Book-to-Market ratio	6400	20.7405	54.2104	-29.7539	160.2116
(12) Growth	6400	6.27242	17.2751	-20.2400	40.1400

Table 2 represents the descriptive statistics, which shows the statistics of the variables. The variables are defined in table 16. No real extraordinary values are observed with regard to the variables. However, the Book-to-Market ratio has a minimum value of approximately 30 and maximum of 160. These values are very large given the low value nature of ratios. It can be explained by that some companies just have either a lot more debt than assets and equity, or vice versa.

Equation 1 below represents the fixed effects model, while equation 2 represents the quantile regression models for the 25th, 50th and 75th percentile. Both models are used in testing hypotheses 1, 2 and 3 as they are measuring the effect of the crisis periods on the discretionary accruals.

(1) $DAC_{performance,it}; DAC_{it}$
$= \beta_0 + \beta_1 crisis + \beta_2 postcrisis + \beta_3 precrisis + \beta_4 Controls + \varepsilon$

(2) $DAC_{performance,it}; DAC_{it}$
$= \beta_0 + \beta_1 crisis + \beta_2 postcrisis + \beta_3 precrisis + \beta_4 Controls + \varepsilon$

In which $Controls$ represent ROE, market value, leverage, block holder dispersion, age and industry.

4   Results

Two OLS-regressions, in particular two fixed effect models, are conducted with the described variables from the methodology section. Simultaneously, the robustness check with the discretionary accruals from the Modified Jones Model is conducted next to the performance based discretionary accruals. After that, multiple quantile regression are run with various quantiles. With regard to the robustness check of the quantile regressions, the same applies as with the fixed effects models.

4.1   OLS-estimations

Table 3 and 4 show the results from the fixed effects models with robust standard errors. In these tables, both the results for the normal test and the robustness test are shown, discretionary accruals MJM for the robustness test and the discretionary accruals PMJM for the normal test. This thesis tries to explain the three hypotheses through three independent variables: Pre-crisis, crisis and post-crisis. Table 3 provides results for testing hypotheses 1 and 3, since in this regression the pre-crisis period is the reference category. Table 4 provides results for testing hypothesis 2, since here the crisis period is the reference category.

  Results from column 1 in table 3 present no supporting empirical evidence for accepting hypothesis 1. In order to demonstrate this, it is necessary to understand that the pre-crisis period is omitted due to that it is characterized as the reference category. So, the coefficient of the crisis period is relative to the pre-crisis period. Hypothesis 1 claimed that companies would engage in more earnings management during the crisis period than during the pre-crisis period. However, it is found that companies engage in less earnings management during the crisis period compared to the pre-crisis period and therefore hypothesis 1 is rejected. The first independent variable in the table, crisis, provides a significant and robust negative effect on the discretionary accruals, indicating that the crisis period has led to lower discretionary accruals relative to the pre-crisis period. Based on existing literature, one can agree with Jenkins et al. (2009), who argued that during crises litigation risk is higher, which should incentive managers to engage in less earnings management. Likewise, creditors, auditors and other stakeholders increase their monitoring

during financial crises, incentivizing managers to conduct less earnings management. Ahmad-Zaluki et al. (2011) added that there is no real incentive for managers, since financial distressed periods lead to higher market tolerance for poor performance. Additionally to the empirical evidence, the second column shows the robustness through the same significance level and the very small deviation between both coefficients.

Results from column 1 in table 3 present supporting empirical evidence for accepting hypothesis 3. The second independent variable, post-crisis, provides a significant and robust negative effect on the discretionary accruals, indicating that the post-crisis period led to lower discretionary accruals compared to the pre-crisis period. This relationship shows that there is a lower level of earnings management in the post-crisis period than in the pre-crisis period. Therefore, one is able to support the existing literature which stated that earnings management decreased during the post-crisis period relative to the pre-crisis period. The expectation that managers would follow the wait and watch strategy, examined by Kumar and Vij (2017), after the financial crisis is therefore applicable on these findings. As discussed in answering hypothesis 1, there is a lot more monitoring during the crisis. However, this is also the case in the post-crisis period. Therefore, managers wait and watch so they can ensure themselves whether auditors and stakeholders do or do not change their monitoring level. Studies from Cimini (2015) and Lisboa and Kacharava (2018) argued that there is a need of high quality financial information after the crisis, especially compared to the pre-crisis period, which would also be applicable on the findings. Additionally to the empirical evidence, the second column also shows for the post-crisis the robustness through the same significance level and the very small deviation between both coefficients.

Table 3. Fixed effects model for both discretionary accruals PMJM and discretionary accruals MJM.

Fixed effects model with robust standard errors. The abbreviations stand for as follows: PMJM is denoted as Performance matched Jones Model and MJM as Modified Jones Model. Pre-crisis denotes the period between 2002-2007, Crisis as the period between 2007-2012, Post-crisis as the period between 2012-2017, *Return on equity* is denoted as ROE, *Firm value* as Size, *Leverage* as Leverage, *Ownership concentration* as Ownership concentration, *Company age* as Age, *Book-to-Market ratio* as Book-Market ratio and *Growth in sales* as Growth. This table is used to test hypotheses 1 and 3.

VARIABLES	(1) Discretionary accruals PMJM	(2) Discretionary accruals MJM
Crisis	-0.00669***	-0.00652***
	(0.00153)	(0.00152)
Post-crisis	-0.00694***	-0.00685***
	(0.00171)	(0.00171)
Pre-crisis	-	-
ROE	-9.24e-05*	-4.90e-05
	(4.77e-05)	(4.71e-05)
Market value	-4.88e-05	-4.23e-05
	(0.000518)	(0.000518)
Leverage	-3.54e-05	-3.31e-05
	(5.80e-05)	(5.79e-05)
Ownership concentration	-3.65e-05	-3.63e-05
	(3.20e-05)	(3.17e-05)
Age	-4.06e-05	-4.09e-05
	(3.02e-05)	(3.03e-05)
Book-market ratio	3.50e-06	2.92e-06
	(2.11e-05)	(2.10e-05)
Growth	-1.90e-05	-2.23e-05
	(3.33e-05)	(3.33e-05)
Constant	0.0690***	0.0686***
	(0.00984)	(0.00982)
Industry FE	YES	YES
Observations	6,400	6,400
Adjusted R-squared	0.0087	0.0074
F(9,709)	3.27***	2.91***
Number of FirmID	710	710

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Furthermore, for the control variables, the fixed effects model is controlled for industry. No real extraordinary results come from this. All control variables, except for ROE, appear to be insignificant. The ROE variable only is significant for the first model, but it still means that there is some kind of relationship between ROE and the discretionary accruals from the PMJM model.

Companies that have a higher ROE appear to engage in less earnings management. Interpreting the magnitude of these other control variables could lead to misleading information. Therefore, there is no relationship between the control variables and earnings management. Although the insignificance of control variables is not problematic, it is unusual to find them almost all insignificant. This especially concerning ownership concentration, since this variable often is associated with earnings management. Aside from that, the fixed effects model provides a measure for the explained variance through the adjusted R-squared. The value of this is 0.0087, which implies that 0.87% of the variance of the discretionary accruals is explained through the model. This means that the model does not have a really high explanatory power, but this often the case in economic research. The F-test is statistically significant, indicating that the entire model is statistically significant, meaning it is applicable.

Results from column 1 in table 4 provide empirical evidence that cannot support hypothesis 2. Hypothesis 2 claimed that there would be a decrease in earnings management in the post-crisis period. Although a negative relationship is found, due to its insignificance, hypothesis 2 is still rejected. This can be demonstrated by the second variable of the model, post crisis. This variable appears to have a negative coefficient, but no significance. This insignificance means that interpreting the magnitude of these control variables could lead to misleading information. Consequently, one cannot state that earnings management is lower during the post-crisis period than the pre-crisis period. Existing literature that stated that the financial crisis led to an increase in demand for higher financial reporting quality and higher audit quality together with conservatism can also not be support because of this insignificance.

Table 4. Fixed effects model for both discretionary accruals PMJM and discretionary accruals MJM.
Fixed effects model with robust standard errors. This table is used to test hypothesis 2.

VARIABLES	(1) Discretionary accruals PMJM	(2) Discretionary accruals MJM
Pre-crisis	0.00669***	0.00652***
	(0.00153)	(0.00152)
Post-crisis	-0.000253	-0.000331
	(0.00143)	(0.00141)

Crisis	-	-
ROE	-9.24e-05*	-4.90e-05
	(4.77e-05)	(4.71e-05)
Market value	-4.88e-05	-4.23e-05
	(0.000518)	(0.000518)
Leverage	-3.54e-05	-3.31e-05
	(5.80e-05)	(5.79e-05)
Ownership concentration	-3.65e-05	-3.63e-05
	(3.20e-05)	(3.17e-05)
Age	-4.06e-05	-4.09e-05
	(3.02e-05)	(3.03e-05)
Book-market ratio	3.50e-06	2.92e-06
	(2.11e-05)	(2.10e-05)
Growth	-1.90e-05	-2.23e-05
	(3.33e-05)	(3.33e-05)
Constant	0.0623***	0.0620***
	(0.00989)	(0.00986)
Industry FE	YES	YES
Observations	6,400	6,400
Adjusted R-squared	0.0087	0.0084
F(9,709)	3.27	2.91
Number of FirmID	710	710

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Furthermore, for the control variables, the same process is implemented as for the previous model. No real extraordinary results come from this, except for the fact that ROE is still the only control variable significant, indicating a relationship between the return on equity of a company and its earnings management. The higher the return on equity, the more the company conducts earnings management. As for the other control variables, these have stayed insignificant, meaning that these results cannot be interpreted. Next to that, the fixed effects model provides a measure for the explained variance through the adjusted R-squared. The value of this is 0.0087, exactly the same as the previous model, which implies that 0.87% of the variance of the discretionary accruals is explained through the model. This means that also this model does not

have a high explanatory power. The F-test is statistically significant, indicating that the entire model is statistically significant, which means it can be used.

4.2 Quantile-estimations

To account for possible insignificance of an independent variable in the fixed effects model and to offer an additional perspective, this thesis added quantile regressions. Table 5 and 6 show the results from the quantile regressions. In these tables, both the results for the normal test and the robustness test are shown, discretionary accruals MJM for the robustness test and the discretionary accruals PMJM for the normal test. For clarity, table 5 and 6 are a summary of the main results from every quantile regression, the 25th, 50th and 75th quantile regression, which are run. Full results of these regressions are shown in table 7 through 12.

The quantile regression from table 5 represents the model for the first and third hypotheses. Results in this table show no support for accepting hypothesis 1 for all percentiles, due to the coefficient's significant negative value. Comparing this with the fixed effect model from the previous section, results are the same, except that the coefficient is slightly larger for the 75th percentile and slightly smaller for the 25th percentile, meaning that the effect of the crisis period differs among percentiles. According to the quantile regression, the first hypothesis should be rejected, based on all tested quantiles. This relationship shows that there is a lower level of earnings management in the crisis period compared to the pre-crisis period. Therefore, one is able to support the existing literature which stated that earnings management decreases during the financial crisis. Since the first hypothesis is rejected, found literature supporting hypothesis 1 does not apply, literature against it does apply.

Table 5. Summary Quantile regression with pre-crisis as reference category

Summary quantile regression for both discretionary accruals MJM and discretionary accruals PMJM, Industry fixed effects. The abbreviations stand for as follows: Pre-crisis denotes the period between 2002-2007, Crisis as the period between 2007-2012 and Post-crisis as the period between 2012-2017. Regressed for the following percentiles: 25th, 50th and 75th.

	(1)	(2)

VARIABLES	Discretionary accruals PMJM	Discretionary accruals MJM
25th percentile		
Crisis	-0.00394**	-0.00363*
	(0.00161)	(0.00187)
Post-crisis	-0.00287*	-0.00261
	(0.00160)	(0.00185)
Pre-crisis	-	-
50th percentile		
Crisis	-0.00608***	-0.00591***
	(0.00132)	(0.00145)
Post-crisis	-0.00603***	-0.00595***
	(0.00131)	(0.00144)
Pre-crisis	-	-
75th percentile		
Crisis	-0.00914***	-0.00913***
	(0.00207)	(0.00206)
Post-crisis	-0.0106***	-0.0107***
	(0.00205)	(0.00204)
Pre-crisis	-	-
Controls	YES	YES
Industry FE	YES	YES
Observations	6,400	6,400

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As for the third hypothesis, which is also tested in table 5, the results show support for accepting this hypothesis and thus is accepted. Expected was a negative relationship between post-crisis and the discretionary accruals, which is also found in the findings. This corresponds to the fixed effects model of the previous section. The same pattern of coefficient movement is examined. For the 25th percentile, the coefficient is smaller than in the fixed effects model, the 50th percentile coefficient appears to be approximately the same and the 75th percentile is larger. The fact that the coefficient of the 50th percentile, the median, is approximately the same as the

coefficient of the mean in the fixed effects model suggests that the mean and median of the sample is roughly the same, which supports the almost symmetrical distribution. Another noticeable matter is the insignificance of the post-crisis variable in the second model, indicating that the second model is less reliable for this test. Due to the fact that the third hypothesis is accepted, the found literature is supported which expected managers to follow the wait and watch strategy and require higher quality of financial information.

Table 6. Summary Quantile regression with crisis as reference category

Summary quantile regression for both discretionary accruals MJM and discretionary accruals PMJM, including Year- and Industry-fixed effects. The abbreviations stand for as follows: Pre-crisis denotes the period between 2002-2007, Crisis as the period between 2007-2012 and Post-crisis as the period between 2012-2017. Regressed for the following percentiles: 25th, 50th and 75th.

VARIABLES	(2) Discretionary accruals PMJM	(1) Discretionary accruals MJM
25th percentile		
Post-crisis	0.00107	0.00102
	(0.00160)	(0.00186)
Pre-crisis	0.00394***	0.00363***
	(4.61e-05)	(6.09e-05)
Crisis	-	-
50th percentile		
Post-crisis	4.17e-05	-4.57e-05
	(0.00131)	(0.00144)
Pre-crisis	0.00608***	0.00591***
	(4.70e-05)	(5.51e-05)
Crisis	-	-
75th percentile		
Post-crisis	-0.00144	-0.00155
	(0.00205)	(0.00204)
Pre-crisis	0.00914***	0.00913***
	(5.35e-05)	(5.58e-05)
Crisis	-	-

Controls	YES	YES
Industry FE	YES	YES
Observations	6,400	6,400

The quantile regression from table 6 represents the quantile model for the second hypotheses. This hypothesis expected that the in the post-crisis period there would be less earnings management compared to the crisis period. Likewise as in the fixed effects model, results show insignificant for the post-crisis period in in all percentiles for the post-crisis variable, consequently rejecting the second hypothesis. This means that the quantile regression established the same conclusion as the fixed effects model, arguing that due to insignificance hypothesis 2 should be rejected. Therefore, there is no support for the existing literature which stated that earnings management decreases after the financial crisis. This means that one cannot argue that a higher financial reporting quality and higher audit quality together with conservatism would lead to less earnings management.

5   Discussion and conclusion

This thesis investigated the extent to which earnings management differs between the period before the financial crisis, the financial crisis and after the financial crisis. In more particular, the crisis period was compared to the pre-crisis period, the crisis period was compared to the post-crisis period and the post-crisis period was compared to the pre-crisis period. A sample of 710 German, Dutch, Spanish and Italian companies was operationalized over a 15 year period (2002-2017). Based on fixed effects models and quantile regression models, the hypotheses were tested. Results of the first hypothesis indicate, against expectations for both the fixed effects models and the quantile regression models, that less earnings management was used during the crisis-period compared to the pre-crisis period and is therefore rejected. This is consistent with the expectation that litigation risk is higher during financial crises, something what should incentivize managers to engage in less earnings management. Additionally, monitoring by stakeholders and auditors is more present during the financial crisis, incentivizing managers to engage in less earnings management as well. The second hypothesis is rejected by the quantile regression and the fixed effects model, giving similar results. Both rejected the hypothesis due to the insignificance of the coefficients. The third hypothesis which argued that there would be more earnings management in the pre-crisis period than in the post-crisis period is accepted, since the found effect is in line with what was expected. There was less earnings management in the post-crisis period than in the pre-crisis period. The found literature therefore also applies and support the fact that managers implement the wait and watch strategy.

When comparing the fixed effects models with the quantile regression models, two differences can be examined. For the model of the first and third hypothesis, the quantile regression model contains slightly different coefficients. A clear pattern is examined. The coefficients of the 25th percentile are slightly smaller than that of the fixed effects model. The coefficients of the 50th percentile are approximately the same of that of the fixed effects model. The coefficients of the 75th percentile are slightly larger than that of the fixed effects model. The fact that the coefficients of the 50th percentile is almost the same as the mean in the fixed effects model indicates an almost symmetrical distribution. Another difference stems from the difference in the significance level of the independent variables between the first quantile

regression model and the first fixed effects model. It appears to be that the 25th percentile is less significant than the other percentiles and the fixed effects model. However, this is nothing extraordinary, so is not in need of further explanation.

Although the findings suggest a relationship between the financial crisis and earnings management, this thesis still holds some shortcomings which call for future research. To begin, this study focused on the absolute values of discretionary accruals, measuring either an increase or decrease in earnings management, thus affecting the level of earnings management. However, in measuring this level, what is left out is the fact whether this change in the level of earnings management is income increasing or income decreasing. Although significant relations are found between earnings management and the crisis periods, it is not known whether this is income increasing or income decreasing. Therefore, future studies that focus on this topic should examine this income increasing/decreasing element as well. By doing so, found relations will hold far more explanatory power and is thus more relevant. In addition, only publicly-traded firms are used in the sample, which may reduce the generalizability of the conclusions. It is stated the crisis periods all have their own effect on the implementation of earnings management in companies. However, there is this possibility that outcomes would be different for private companies. Therefore, future research should take a closer look at private companies as well. Next to this, the quantile regressions only focused on three different percentiles. Although other studies did this as well, there is a possibility that adding more quantiles could affect the results. New studies could therefore focus on multiple more percentiles in order to increase the explanatory power. Future research could also conduct similar research to this thesis, but then involving the new COVID-19 crisis. A lot of new regulations are implemented regarding financial performance since the financial crisis, incentivizing companies to either conduct earnings management or to not conduct earnings management. Together with the COVID-19 crisis, a period of financial distress, this would generate some interesting results. Therefore, the same study for the COVID-19 crisis is interesting to investigate in the years to come and would provide a great contribution to the academic world.

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7   Appendix

Table 7. Quantile regression of the 25th percentile, all variables included.

Quantile regression model with robust standard errors. The abbreviations stand for as follows: PMJM is denoted as Performance matched Jones Model and MJM as Modified Jones Model. Pre-crisis denotes the period between 2002-2007, Crisis as the period between 2007-2012, Post-crisis as the period between 2012-2017, *Return on equity* is denoted as ROE, *Firm value* as Size, *Leverage* as Leverage, *Ownership concentration* as Ownership concentration, *Company age* as Age, *Book-to-Market ratio* as Book-Market ratio and *Growth in sales* as Growth. This table is used to test hypotheses 1 and 3

VARIABLES	(1) Discretionary accruals PMJM	(2) Discretionary accruals MJM
crisis	-0.00394**	-0.00363*
	(0.00161)	(0.00187)
Post-crisis	-0.00287*	-0.00261
	(0.00160)	(0.00185)
Pre-crisis	-	-
ROE	-7.61e-05	-4.30e-05
	(5.38e-05)	(6.24e-05)
Market value	3.43e-05	1.92e-05
	(0.000523)	(0.000610)
Leverage	-3.05e-05	-3.05e-05
	(5.80e-05)	(6.73e-05)
Ownership concentration	-3.39e-05	-3.48e-05
	(3.36e-05)	(3.90e-05)
Age	-9.68e-06	-7.84e-06
	(2.84e-05)	(3.30e-05)
Book-market ratio	2.19e-06	2.99e-07
	(1.84e-05)	(2.14e-05)
Growth	7.15e-06	1.10e-06
	(3.65e-05)	(4.25e-05)
Observations	6,400	6,400

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8. Quantile regression of the 50th percentile, all variables included.

Quantile regression model. This table is used to test hypotheses 1 and 3.

VARIABLES	(1) Discretionary accruals PMJM	(2) Discretionary accruals MJM
crisis	-0.00608***	-0.00591***
	(0.00132)	(0.00145)
Post-crisis	-0.00603***	-0.00595***
	(0.00131)	(0.00144)
Pre-crisis	-	-
ROE	-8.88e-05**	-4.77e-05
	(4.40e-05)	(4.82e-05)
Market value	-3.03e-05	-2.93e-05
	(0.000428)	(0.000471)
Leverage	-3.43e-05	-3.25e-05
	(4.74e-05)	(5.20e-05)
Ownership concentration	-3.59e-05	-3.60e-05
	(2.74e-05)	(3.01e-05)
Age	-3.37e-05	-3.39e-05
	(2.32e-05)	(2.55e-05)
Book-market ratio	3.21e-06	2.37e-06
	(1.51e-05)	(1.66e-05)
Growth	-1.32e-05	-1.74e-05
	(2.99e-05)	(3.28e-05)
Observations	6,400	6,400

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9. Quantile regression of the 75th percentile, all variables included.

Quantile regression model. This table is used to test hypotheses 1 and 3.

VARIABLES	(1) Discretionary accruals PMJM	(2) Discretionary accruals MJM
crisis	-0.00914***	-0.00913***
	(0.00207)	(0.00206)

Post-crisis	-0.0106***	-0.0107***
	(0.00205)	(0.00204)
Pre-crisis	-	-
ROE	-0.000107	-5.44e-05
	(6.91e-05)	(6.85e-05)
Market value	-0.000123	-9.78e-05
	(0.000672)	(0.000669)
Leverage	-3.98e-05	-3.54e-05
	(7.45e-05)	(7.39e-05)
Ownership concentration	-3.88e-05	-3.76e-05
	(4.31e-05)	(4.28e-05)
Age	-6.83e-05*	-7.08e-05*
	(3.65e-05)	(3.62e-05)
Book-market ratio	4.68e-06	5.30e-06
	(2.37e-05)	(2.35e-05)
Growth	-4.24e-05	-4.36e-05
	(4.69e-05)	(4.66e-05)
Observations	6,400	6,400

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10. Quantile regression of the 25th percentile, all variables included.

Quantile regression model. This table is used to test hypothesis 2.

VARIABLES	(1) Discretionary accruals PMJM	(2) Discretionary accruals MJM
Post-crisis	0.00107	0.00102
	(0.00160)	(0.00186)
Pre-crisis	0.00394***	0.00363***
	(4.61e-05)	(6.09e-05)
Crisis	-	-
ROE	-7.61e-05	-4.30e-05
	(5.38e-05)	(6.24e-05)
Market value	3.43e-05	1.92e-05
	(0.000523)	(0.000610)
Leverage	-3.05e-05	-3.05e-05
	(5.80e-05)	(6.73e-05)

	-3.39e-05	-3.48e-05
Ownership concentration	(3.36e-05)	(3.90e-05)
Age	-9.68e-06	-7.84e-06
	(2.84e-05)	(3.30e-05)
Book-market ratio	2.19e-06	2.99e-07
	(1.84e-05)	(2.14e-05)
Growth	7.15e-06	1.10e-06
	(3.65e-05)	(4.25e-05)
Observations	6,400	6,400

<div align="center">

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

</div>

Table 11. Quantile regression of the 50th percentile, all variables included.

Quantile regression model. This table is used to test hypothesis 2.

VARIABLES	(1) Discretionary accruals PMJM	(2) Discretionary accruals MJM
Post-crisis	4.17e-05	-4.57e-05
	(0.00131)	(0.00144)
Pre-crisis	0.00608***	0.00591***
	(4.70e-05)	(5.51e-05)
Crisis	-	-
ROE	-8.88e-05**	-4.77e-05
	(4.40e-05)	(4.82e-05)
Market value	-3.03e-05	-2.93e-05
	(0.000428)	(0.000471)
Leverage	-3.43e-05	-3.25e-05
	(4.74e-05)	(5.20e-05)
Ownership concentration	-3.59e-05	-3.60e-05
	(2.74e-05)	(3.01e-05)
Age	-3.37e-05	-3.39e-05
	(2.32e-05)	(2.55e-05)
Book-market ratio	3.21e-06	2.37e-06
	(1.51e-05)	(1.66e-05)
Growth	-1.32e-05	-1.74e-05
	(2.99e-05)	(3.28e-05)
Observations	6,400	6,400

<div align="center">

Standard errors in parentheses

</div>

Table 12. Quantile regression of the 75th percentile, all variables included.

Quantile regression model. This table is used to test hypothesis 2.

VARIABLES	(1) Discretionary accruals PMJM	(2) Discretionary accruals MJM
Post-crisis	-0.00144	-0.00155
	(0.00205)	(0.00204)
Pre-crisis	0.00914***	0.00913***
	(5.35e-05)	(5.58e-05)
Crisis	-	-
ROE	-0.000107	-5.44e-05
	(6.91e-05)	(6.85e-05)
Market value	-0.000123	-9.78e-05
	(0.000672)	(0.000669)
Leverage	-3.98e-05	-3.54e-05
	(7.45e-05)	(7.39e-05)
Ownership concentration	-3.88e-05	-3.76e-05
	(4.31e-05)	(4.28e-05)
Age	-6.83e-05*	-7.08e-05*
	(3.65e-05)	(3.62e-05)
Book-market ratio	4.68e-06	5.30e-06
	(2.37e-05)	(2.35e-05)
Growth	-4.24e-05	-4.36e-05
	(4.69e-05)	(4.66e-05)
Observations	6,400	6,400

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13. Modified Wald test for heteroskedasticity

Ho: Constant variance	
chi2	3.5e35
Prob > chi2	0.0000
Reject H0	Yes

Table 14. Wooldridge test for autocorrelation

Ho: Constant variance	
F(1,614)	17.145
Prob > chi2	0.0000
Reject H0	Yes

Table 15. Test for multicollinearity

Variable	VIF	1/VIF
Post-crisis	1.37	0.729927
Pre-crisis	1.33	0.754292
Crisis	1.32	0.755422
Market value	1.29	0.775009
ROE	1.23	0.812866
Leverage	1.07	0.937494
Ownership concentration	1.03	0.966235
Book-to-Market ratio	1.02	0.983274
Growth	1.01	0.994724
Age	1.00	0.997594
Mean VIF	1.17	

Table 16. Variables description.

Variable	Description
Discretionary accruals PMMJM	Absolute values of discretionary accruals as a measure for earnings management, based on the Performance Matched Jones Model
Discretionary accruals MJM	Absolute values of discretionary accruals as a measure for earnings management, based on the Modified jones model
Pre crisis	The pre-crisis period, going from 2002 until 2007
Crisis	The crisis period, going from 2007 until 2012
Post crisis	The post-crisis period, going from 2012 until 2017
ROE	Return on Equity of a company
Size	Market value taken in logarithmic value

Leverage	Leverage of a company
Ownership concentration	Ownership concentration as a measure for block holder concentration
Age	The amount of years a company exists
Book-to-Market ratio	The Book-to-Market ratio of a company
Growth	Growth in sales

Table 17. Pearson correlation Matrix

Variable	1	2	3	4	5	6	7	8	9	10	11	12
(1) Discretionary accruals MJM	1											
(2) Discretionary accruals PMJM	0.9971	1										
(3) Pre crisis	-0.0790	0.0797	1									
(4) Crisis	0.0088	0.0071	-0.4919	1								
(5) Post crisis	-0.0855	-0.0845	-0.4715	-0.5359	1							
(6) ROE	-0.0364	-0.0504	-0.0280	0.0139	0.0131	1						
(7) Market value	-0.0705	-0.0770	0.0099	0.0074	0.0021	0.4008	1					
(8) Leverage	-0.0689	-0.0697	0.0258	-0.0093	-0.0155	-0.0784	0.1699	1				
(9) Ownership concentration	-0.0586	-0.0617	-0.0128	-0.0073	0.0198	0.0648	0.1667	-0.0999	1			
(10) Age	0.0101	0.0100	0.0116	0.0021	0.0091	0.0161	-0.0193	-0.0078	0.0105	1		
(11) Book-to-Market ratio	-0.1638	-0.1615	-0.0348	-0.0316	0.0657	0.0021	-0.0975	-0.0395	-0.0147	-0.0219	1	
(12) Growth	-0.0065	-0.0075	0.0000	-0.0061	0.0062	0.0500	0.0017	-0.0521	-0.0073	-0.0130	-0.0035	1