CATÓLICA LISBON
BUSINESS & ECONOMICS

Earnings Management and Leverage in Germany

Tim Rafael Heise

Dissertation written under the supervision of Dr. Fani Kalogirou

Dissertation submitted in partial fulfilment of requirements for the MSc in Finance, at the Universidade Católica Portuguesa, 4th of January 2021.

Earnings Management and Leverage in Germany

Tim Rafael Heise

Abstract

In this study I analyze the relationship between accrual-based as well as real earnings management and leverage using a sample of listed German companies in the period between 2010 and 2019. For both types of earnings management three different models are applied in line with existing research on other countries. The regressions to capture the level of earnings management are estimated cross-sectionally. I find a significant positive relationship between accrual-based earnings management and leverage, while results for real earnings management vary depending on the model applied. Furthermore, I find similar results for a sample of highly levered firms, however, with stronger magnitudes.

Neste estudo, é analisada a relação entre a gestão dos ganhos reais e dos lucros reais através da utilização de uma amostra de empresas alemães cotadas na bolsa no período entre 2010 e 2019. Para ambos os tipos de gestão de lucro são aplicados três modelos distintos de acordo com a investigação existente em outros países. As regressões para captar o nível de gestão dos ganhos são estimadas de forma transversal. É encontrada uma relação positiva significativa entre a gestão dos ganhos baseada no acúmulo e na alavancagem, enquanto os resultados para a gestão dos ganhos reais variam consoante o modelo aplicado. Além disso, os mesmos resultados são encontrados para uma amostra de empresas altamente alavancadas, no entanto, com magnitudes mais fortes.

Keywords: Earnings management, Leverage, Prime Standard, IFRS

Contents

List of Tables

1. Introduction

Following the most recent scandal of a once highly admired and strongly growing German technology company, payment services provider Wirecard AG, the quality of accounting data is once again questioned in public. While in this case the Financial Times revealed fraudulent and hence illegal actions undertaken by the management team and its business partners, earnings management can also be conducted within the letter of the law to move earnings into the desired direction (McCrum, 2020). Managers can achieve that through real transactions as well as through flexibility in accounting rules. Considering the main goal of the IFRS accounting standard setting body, the IASB, to provide reliable financial information to existing and potential investors of any type, this flexibility appears unjustified and potentially misleading.

In 1986, Jensen developed the control hypothesis, which is often cited in the academic literature. He concluded that debt, or for the purpose of my study leverage, has a disciplining effect on managers, which is achieved through the obligation to make continuous interest and principal payments. This free cash flow limiting effect makes it necessary for managers to focus on value maximizing investments and hence generates value for shareholders and other stakeholders. But debt has also other implications as Watts and Zimmerman (1986) worked out with the debt hypothesis. Lenders integrate covenants in the loan contracts in order to discipline managers and take control over certain aspects of the business in case a covenant is violated. Watts and Zimmerman found out that managers tend to move earnings from future periods to the current period to avoid costly covenant breaches. Furthermore, they see motivations for earnings management in management compensation and political costs.

Taking into account that covenant breaches are costly and that covenants are linked to financial results and ratios there is a given likelihood that managers of levered companies make use of earnings management in order to not breach covenants. There are some studies on the relationship between earnings management and leverage on other countries. Interestingly, results differ significantly with no clear pattern among these countries. While there is a positive relation between types of earnings management and leverage in the US and France, a study conducted in Spain shows a relationship depending on the complexity of the business model. In contrast to that, a negative relationship was observed in Malaysia and Pakistan while a study conducted in Brazil showed no significant relationship at all. (Anagnostopulou and Tsekrekos, 2017, Lazzem and Jilani, 2018, Martins et al., 2012, Rodriguez-Perez et al., 2010, Zamri et al., 2013, Wassimullah Toor and Abbas, 2010). This shows that it is impossible to derive results

for Germany from existing literature and makes this study a valuable contribution to literature. Furthermore, research on a European code-law country using IFRS as GAAP is only very limited so far.

This paper uses data of German listed companies that are part of the highly regulated Prime Standard of Deutsche Börse AG, the German stock exchange operator and observes the period between 2010 and 2019. For both, real earnings management and accrual-based earnings management, various models in line with existing literature on the topic are estimated to achieve a higher level of robustness in the results. A number of control variables are implemented in the second level of regressions to increase the robustness and limit potential distortions of the results.

While accrual-based earnings management as expected is positively related to leverage, real earnings management does not show the expected results. Depending on the applied model, real earnings management in relation to leverage shows income-decreasing or insignificant results. The expectation that highly levered companies prefer real earnings management over accrual-based earnings management to improve their results cannot be confirmed either. Accruals models showed again a positive relation with an even stronger magnitude, while real earnings management models all indicate income-decreasing management activities.

The remainder of the paper is organized as follows. Section 2 presents the fundamentals of earnings management, its potential implications on levered companies and the current status of research regarding this topic. Section 3 describes the dataset as well as the methodology to identify earnings management and the control variables and section 4 presents the results. The summary and the limitations of this work as well as suggestions for further research are presented in section 5.

2. Literature Review

2.1 Debt and accounting covenants

Debt or leverage has been a focus of financial literature in many ways due to its far reaching implications on several aspects of business operations and firm value. There are plenty of discussions and papers regarding the value maximizing and disciplining effects of debt on the one hand and its value limiting and cost effects on the other hand.

Jensen (1986) identified one benefit of debt in the often quoted control hypothesis. He came to the conclusion that the obligation to make continuous interest as well as principal payments and the resulting lower free cash flow limits managers in their ability to make discretionary non-

value generating investments. This leads to a reduction in the agency costs of free cash flow and is hence value generating for shareholders but also other stakeholders. Nevertheless, too high debt levels increase the bankruptcy cost of debt for firms as well as debtholders' risk.

As the standard setting body of International Financial Reporting Standards (IFRS), the IASB defines the objective of financial statements as a mean to support existing and potential investors, lenders and creditors in the decision-making process whether to provide resources to the reporting entity or not. This shows that the main addressees of financial information are equity holders, debt holders and suppliers. Yet, according to Ball et al. (2003) adopting high quality accounting standards might be necessary for the provision of high-quality information, but not necessarily sufficient.

According to Beyer et al. (2010) both equity and debt investors use financial information about the target company that is in need of funding ex-ante as well as ex-post. Debt investors in particular use ex-ante information to price the securities that the fundraising companies issue and use ex-post information to design corporate governance mechanisms and monitor compliance with agreed covenants in case of loan contracts. In the context of this study this is of particular importance since it shows that accounting data form the information basis for lenders when (i) giving out a loan and (ii) monitoring the performance of the debtor and potential covenant breaches.

As stated above loan contracts incorporate certain covenants that are monitored on an ongoing basis in defined time intervals. Nikolaev (2010) assigns covenant restrictions to three sub-groups, namely payout-related, investment-related, and financing-related covenants. More important for this study are covenants linked to accounting data that put thresholds on earnings, equity and debt ratios as well as asset book values. Breaching covenants is highly costly for companies, which makes it a priority for managers to stay in the agreed ranges so that control of certain decision or entire operations is not moved to debt-holders. Earnings management is one way to achieve this target when real performance is not as good. As Roberts and Sufi (2009) found out in their study, breaching debt covenants increases interest costs for firms. In addition to that, it reduces the amount of available credit afterwards and hence has the potential to threat the essential refinancing of a business.

2.2 Accrual-based vs. real earnings management

Gunny (2010) gives an accurate differentiation between real earnings manipulation (RM) and accrual-based earnings management (AE). While AE is achieved through the choice of

accounting methods and the use of estimates, it has no direct impact on the operating business of the company. RM on the other hand derives from real transactions in the underlying business. Roychowdhury (2006) defines real earnings management as deviating from ordinary business practices in order to mislead certain stakeholders with regards to meeting financial goals and analyst expectations. While the used methods such as sales acceleration by giving discounts might be useful under certain economic circumstances, an excessive use only to meet earnings targets or analyst forecasts destroys significant firm value in the long-run. Customers, for example, might demand the same price discounts in the future, which leads to margin as well as cashflow pressure in the future. RM provides managers with the advantage that they do not have to change any accounting disclosures or face potential legal liability for overstretching their accounting flexibility. In fact, they are just business decisions and although being potentially harmful for the company not subject to penalties. (Armstrong et al., 2010)

Several surveys conducted among top level executives show a clear preference of RM over AE (Bruns and Merchant, 1990, Graham et al., 2005). First, accruals management is more easily detectable by various stakeholders analyzing financial reports compared to real earnings manipulation that is executed through real transactions in the course of the business operations. Second, using only accruals management after fiscal year end bears the risk of falling short of the earnings target so that real earnings management already provides managers with comfort during the fiscal year.

Managers have a broad set of options to engage in real earnings manipulation including an increase in production to improve gross profit, offer discounts to boost as sells or through selling assets. However, clear empirical evidence so far mainly exists for managers reducing R&D expenses (Bushee, 1998). In addition to that, Dechow and Sloan (1991) found out that managers tend to engage in earnings management through R&D reductions in the end of their tenure to increase short-term earnings and receive a higher compensation through that. In contrast to that, new research conducted by Cazier (2011) concludes that there is no underinvestment in R&D by CEOs in the final period of their tenure observable. Besides R&D manipulation, Bartov (1993) provides some empirical evidence that companies with negative earnings changes tend to report increased profits from asset sales. This is not part of the ordinary and sustainable business and hence a way to potentially mislead stakeholders in the company by artificially keeping earnings up.

Zang (2012) studied whether AE and RM are used as substitutes when managers engage in earnings manipulation activities. She shows a substitutive effect of the two means and found out that the decision whether to use one or the other method depends on costs as well as timing. Lastly, she shows that managers use AE after fiscal year end to adjust what was not achieved through RM during the fiscal year of the company. In addition to that, she found out that companies with higher litigation risks tend to switch from AE to RM activities.

Research on the potential impact of audit quality on the type of earnings management was conducted by Chi et al. (2011). In their study they found out that firms audited by higher quality auditors tend to engage more in RM than in AE, which can be explained by the fact that it is more difficult to be detected. In addition to that, they found a positive relation between the tenure of the audit engagement with the company and the magnitude of RM.

2.3 Debt and debt covenants as incentives for earnings management

The debt hypothesis of positive accounting theory developed by Watts and Zimmerman (1986) states that managers tend to move future earnings to the current period in order not to breach agreed covenants. In addition to not breaching covenants, they see further motivations to manage earnings in management compensation linked to earnings as well as potential political costs. Several studies have focused on the relation of earnings management and debt covenant violations. One paper studied a sample of 94 companies, which reported debt covenant breaches in their annual reports and analyzed the level of AE (Defond and Jiambalvo, 1994). In line with the debt hypothesis, the study found a significant positive relationship between AE and covenant violations in the year prior to the breach. In the year of the violation, there is still evidence of a positive relation when controlling for management changes as well as going concern qualifications of auditors. Chamberlain et al. (2014) analyzed both, AE and RM, on a quarterly basis around covenant violations. They have found out, that managers use both options around the quarters of the potential breach, however, see a preference towards AE due to the easier implementation of such methods. Lastly, Kim et al. (2010) also found a strong relationship between companies that are close to breaching debt covenants and real earnings management. This relationship is even stronger, when companies are in a bad negotiation position, when it comes to the technical violation, i.e. breaching agreed accounting metrics, of debt covenants. The study was conducted with data from US companies.

Dichev and Skinner (2002) conducted large-sample tests on the debt covenant hypothesis using data from private corporate lending platform Dealscan. The researchers concluded that managers tend to use technical measures to avoid violations. This is supported by the finding

that only an unusually small number of companies miss covenants, while an unusually high number of companies just meet or beat the imposed covenant thresholds. In addition to that, they found out that private lenders impose far more and stricter covenants on their debtors and that technical covenant violations take place in approximately 30% of all loans analyzed. However, they also found out that these violations are in many cases not penalized if the debtor is in a generally healthy position and there is a high likelihood that the breach was a one-off effect.

2.4 Earnings management in Germany

There is empirical evidence that companies in common-law countries show a lower earnings management engagement than companies in code-law countries (Leuz et al., 2003). Since Germany is a code-law country there is a given likelihood to observe a higher level of earnings management than in common-law countries like the US and the UK, where already research regarding earnings management and leverage exists.

Van Tendeloo and Vanstraelen (2005) researched the impact on earnings management in German companies following the voluntary adoption of IFRS before it became mandatory in 2005. Until then German large corporates were allowed to choose whether to use IFRS or German GAAP (HGB). The study concludes that despite the implementation of supposedly higher quality standards no reduction in earnings management activities was observable. Goncharov and Zimmermann (2006) also found out that there are no observable differences between earnings management in Germany under IFRS or HGB. However, they found out that it was significantly lower for German firms that reported under US GAAP, which was also allowed until the mandatory implementation of IFRS.

In a study conducted on earnings management practices in German family firms, Achleitner et al. (2014) compared 402 listed family firms with 436 listed non-family firms between 1998 and 2008 considering the implications of the chosen earnings management method on transgenerational value retention sustainability. Their findings show that the two methods are used as substitutes rather than complementary and show a preference of AE over RM. According to the authors the results show that family firms tend to avoid long-term value destroying RM activities, while using AE activities to retain control over the company in the long run.

2.5 Existing literature on earnings management and leverage in other jurisdictions

Past research on the relationship between earnings management and leverage focused on North America as well as emerging markets but only to a little extent on code-law countries in Europe.

In a study with data from listed US corporations Anagnostopoulou and Tsekrekos (2017) analyzed companies´ earnings management practices in the light of leverage levels and leverage increases. They found out that leverage levels and leverage increases are significantly positive related to real earnings management, while they did not come to the same results with accrual-based earnings management. In addition to that, they have found out that both earnings management means have a complementary effect in cases of firms with high leverage levels. Contrary to that, Jelinek (2007) concluded in her study that leverage increases result in a reduction in accrual-based earnings management, which might suggest that leverage increases and leverage levels have opposing effects on earnings management. In another study conducted by Zagers-Mamedova (2009), however, evidence is provided that leverage increases result in real earnings management to influence cashflows from operations. She uses the absolute value of long-term debt as a proxy for leverage.

Fung and Goodwin (2013) analyzed the relationship between short-term debt maturity and AE measured by discretionary accruals in US companies between 2003 and 2006. Consistent with the financial distress theory, they found a positive relation between AE and short-term debt. In addition to that, they observed a weaker relationship in case of firms with a higher creditworthiness.

Zamri et al. (2013) even found in their research about real earnings management and leverage in Malaysia that RM and leverage are significantly negative associated. By limiting earnings management, they argue, leverage could have a positive effect on overall accounting quality. Further emerging market research has been conducted by Martins Ardison et al. (2012) on the Brazilian market analyzing the relation between the leverage ratio and AE in all listed BMF & BOVESPA firms. In their study, they did not find a significant relation between earnings management and leverage, however, it can be mentioned that all coefficients have a positive sign. In line with the control hypothesis, Wassimullah Toor and Abbas (2010) confirmed in a study on the Pakistani textile industry that the lower free cash flow resulting from interest and principal in leveraged firms makes managers invest in value-maximizing projects. By focusing on value-maximizing investments, managers lose the necessity to engage in earnings management activities resulting in a negative relationship between earnings management and leverage.

Rodríguez-Pérez and van Hemmen (2010) conducted research on the relationship between leverage, accrual-based earnings management and the diversification of the underlying business

using a sample of listed Spanish companies and applying various methods to determine the level of discretionary accruals. They have found out that the level of diversification of the company and hence the complexity of the business model plays a decisive role when analyzing earnings management activities. While the relation between leverage and AE is negative and robust across all applied methods in non-complex firms, complex firms show a positive relation between AE and leverage. This shows clearly how managers can use their informational advantage over other stakeholders including creditors and auditors and makes it necessary to creditors to engage in higher monitoring costs.

Evidence on the probably most comparable country is provided by Lazzem and Jilani (2018) who analyzed the impact of leverage on AE in the case of listed French firms indexed in the CAC All-Tradable. Contrary to the Brazilian case they came to the conclusion that leverage has a significant positive effect on AE and hence represents an incentive for managers to engage in earnings management. Due to this observation the authors argue debt loses its disciplining effect on companies does not lead to a reduction in agency costs. In particular, the study found out that leverage increasing companies show a higher likelihood of engaging in AE than companies that were already highly levered in the beginning of the sample period.

2.6 Hypothesis development

As can be seen above there is no general answer to the question whether there is a significant positive or negative or even any relation at all between leverage and earnings management. This study contributes to the literature by analyzing the relation between earnings management and leverage in Germany, which has not been done before. While there is some research on this topic in other jurisdictions there is only very limited research on a European code-law country with companies that report under IFRS. Furthermore, most of the existing studies around this relationship only investigate one specific type of earnings management, while this study researches both types simultaneously, which adds additional value.

Since covenants are based on accounting figures and breaching them can be highly costly for companies, the first hypothesis to be investigated is:

H1: There is a positive relation between leverage and income increasing earnings management.

As described above, real earnings manipulation is more difficult to detect for relevant stakeholders such as debt- and equity-investors or auditors than accrual-based earnings management leading to the second hypothesis:

H2: Highly levered firms prefer income increasing real earnings manipulation over accrual-based earnings management.

At this point it must be underlined that this study does not investigate the relationship between earnings management and covenant violations. As shown above, past literature only suggests that not breaching covenants is a potential motivation for managers to engage in earnings management.

3. Data and Methodology

3.1 Sample

The sample of the study includes all listed German companies included in the Prime Standard of Deutsche Börse AG excluding financial and insurance companies due to their different financial reporting activities and, as outlined by Peasnell et al. (1999), due to the fact that existing models do not capture their completely deviating accrual processes. This leads to a total number of 283 German non-financial firms observed.

The observed time frame is from fiscal years 2010 until 2019. This represents the time frame from after the global financial crisis until the most recent available complete set of financial information filed by the used companies.

Companies listed in the Prime Standard segment have to fulfill higher requirements in terms of disclosures and transparency levels. According to Deutsche Börse AG these are the highest transparency standards in Europe. These requirements include, among others, quarterly publication of financial reports, annual analyst conferences, reporting in German and English language as well as the immediate publication of ad-hoc news and director´s dealings. In addition to that, being in the Prime Standard is a requirement for companies to be listed in one of Germany´s leading stock market indices DAX, MDAX, TecDAX as well as SDAX. Furthermore, Deutsche Börse AG calculates and publishes an index comprising all Prime Standard included companies, the Prime All Share.

Earnings, balance sheet as well as cash flow and market value data used in this study is retrieved from Datastream provided by Thomson Reuters. In addition to that, this study makes use of Datastream´s industry allocation for the companies in the sample, which is important for the regressions described below to capture earnings management. This is key to not distort the results through industry-specific effects and extreme values in earnings or balance sheet data. Due to the relatively small sample size, a high level industry classification from Datastream is used. This leads to a total of four different industries used.

3.2 Methodology

To achieve comparability with prior studies but also to achieve more robust results I conduct several regressions using various models to analyze the level of earnings management of each company. For AE I use models suggested by Dechow et al. (1995), Kothari et al. (2005) as well as Raman and Shahrur (2008). For RM I use models suggested by Roychowdhury (2006) as well as Cohen and Zarowin (2010). More information regarding how to apply each model and how to interpret the values follows below. While a positive coefficient implies income-increasing earnings management activities in most of the models, this does not hold true for every model presented.

While several previous studies on earnings management viewed earnings management unsigned and just observed absolute values, this study uses signed results in order to determine the relationship with leverage. This is necessary since the first hypothesis states that higher leverage levels come along with income increasing earnings management. If I used absolute values, this would not be observable.

3.2.1 Accrual-based earnings management

This section includes the models that capture potential earnings management through discretionary accruals management. Managers can engage in accruals management after the fiscal year end, however, before the audit and have hence the possibility to manage earnings after the accounting period. The applied means to engage in accruals management have no direct impact on cash flow.

3.2.1.1 Modified Jones Model – Dechow et al. (1995)

The first model used to determine the level of accrual earnings management is the Modified Jones Model, which is based on the often used Jones Model, however, mitigating the effect of not detecting discretionary earnings management, when being conducted over revenues. Accounting for revenues does net yet require the company to receive a payment in cash or cash equivalents from the customer. Through extended payment terms managers might hence accelerate revenue generation, however, only create accruals through the booking of accounts receivables. The regressions are estimated cross-sectionally and are set up as follows:

$$\frac{TA_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \beta_1 \frac{(\Delta REV_{i,t} - \Delta AR_{i,t})}{A_{i,t-1}} + \beta_2 \frac{PPE_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t}$$

Where:

$TA_{i,t}$: Total accruals using the cash flow approach defined as the difference between net income of the period and operating cash flow

$A_{i,t-1}$: Total assets at the beginning of the period. All items in the regression are lagged by one period

$\Delta REV_{i,t}$: Absolute change in revenues to the previous period

$\Delta AR_{i,t}$: Absolute change in accounts receivables to the previous period

$PPE_{i,t}$: Absolute value of property, plant and equipment in the current period

$\varepsilon_{i,t}$: Error term

The error terms resulting from the cross-sectionally estimated regressions are used as proxies for accrual-based earnings management activities. Going forward, this will be denoted as the dependent variable $DAC_{i,t}$ for accrual-based earnings management.

A positive value indicates that management is engaging in income-increasing earnings management through the discretionary creation of accruals.

3.2.1.2 Kothari et al. (2005)

Kothari et al. base their model on the Jones Model as well and included a performance measure into the regression. The regressions are estimated cross-sectionally and are set up as follows:

$$\frac{TA_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \beta_1 \frac{\Delta REV_{i,t}}{A_{i,t-1}} + \beta_2 \frac{PPE_{i,t}}{A_{i,t-1}} + \beta_3 ROA_{i,t-1} + \varepsilon_{i,t}$$

Where:

$ROA_{i,t-1}$: Return on assets defined as net income over total assets of the previous period

All other variables remain unchanged.

A positive value indicates that management is engaging in income-increasing earnings management through the discretionary creation of accruals.

3.2.1.3 Raman and Shahrur (2005)

Raman and Shahrur base their model on Kothari et al.´s adjusted Jones Model and incorporate a growth component of the company into it. The regressions are estimated cross-sectionally and are set up as follows:

$$\frac{TA_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \beta_1 \frac{\Delta REV_{i,t}}{A_{i,t-1}} + \beta_2 \frac{PPE_{i,t}}{A_{i,t-1}} + \beta_3 ROA_{i,t-1} + \beta_4 BM_{i,t} + \varepsilon_{i,t}$$

Where:

$BM_{i,t}$: Growth component defined as total assets of the current period over total assets of the current period less book value of equity and plus market value of equity

All other variables remain unchanged.

A positive value indicates that management is engaging in income-increasing earnings management through the discretionary creation of accruals.

3.2.2 Real earnings management

Based on Roychowdhury (2006) and Cohen and Zarowin (2010) I will apply three measures to capture real earnings management activities. The applied methods will analyze abnormal cash flow from operations, abnormal production costs as well as abnormal discretionary expenses. These models are intended to identify discretionary earnings management with real and cash-effective underlying transactions. In contrast to the above-mentioned accruals management, managers can only engage in real earnings management during the accounting period.

The error terms resulting from the cross-sectionally estimated regressions are used as proxies for real earnings manipulation activities. This is executed in the same way as with the accrual-based models. Hence going forward, the resulting error terms will be denoted as the dependent variable $REM_{i,t}$ for real earnings management.

3.2.2.1 Abnormal cash flow from operations through sales boosts

Abnormal cash flow from operations are used as a way to determine RM since managers might engage in accelerated sales through granting customers a significant price discount for its products or services in order to reach sales targets. The regressions are estimated cross-sectionally and are set up as follows:

$$\frac{CFO_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \beta_1 \frac{REV_{i,t}}{A_{i,t-1}} + \beta_2 \frac{\Delta REV_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t}$$

Where:

$CFO_{i,t}$: Cash flow from operations in the current period

$REV_{i,t}$: Revenue in the current period

All other variables remain unchanged.

A positive value indicates that management is engaging in income-increasing earnings management through real transactions affecting sales. This might, however, negatively affect cash flow from operations.

3.2.2.2 Abnormal production costs

Strongly increased production costs through overproduction can be used as a way of engaging in RM since it reduces the production costs per product through economies of scale. This has a positive effect on the companies´ margins since only the costs of goods sold are considered in the profit and loss statement and not total costs for products produced. The regressions are estimated cross-sectionally and are set up as follows:

$$\frac{PROD_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \beta_1 \frac{REV_{i,t}}{A_{i,t-1}} + \beta_2 \frac{\Delta REV_{i,t}}{A_{i,t-1}} + \beta_2 \frac{\Delta REV_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t}$$

Where:

$PROD_{i,t}$: Production costs defined as cost of goods sold in the current period plus the change in inventories

$\Delta REV_{i,t-1}$: Change in revenue between the last period and the second last period

All other variables remain unchanged.

A positive value indicates that management is engaging in income-increasing earnings management through real transactions affecting COGS. While this is income-increasing through the improved margins, it negatively affects cash flow from operations through higher investments in working capital.

3.2.2.3 Abnormal discretionary expenses

Abnormally strong reductions in selling, general & administrative as well as R&D expenses by managers in order to achieve earnings targets for the period. The regressions are estimated cross-sectionally and are set up as follows:

$$\frac{DISEXP_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \beta_1 \frac{REV_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t}$$

Where:

$DISEXP_{i,t}$: Discretionary expenses defined as selling, general and administrative expenses. Due to limited availability of research & development data in Thomson Reuters Datastream, this item was excluded from the calculation

$REV_{i,t-1}$: Revenue in the last period

All other variables remain unchanged.

In this special case, a negative value indicates that management is engaging in income-increasing earnings management through real transactions affecting discretionary expenses. A negative value means management cuts discretionary expenses, which in turn is income-increasing and has a positive effect on cash flow from operations

3.2.3 Definition of leverage and highly levered firms

For the purpose of this study, the definition of the independent variable, leverage, is of utmost importance. I define leverage as the ratio between total liabilities and total assets, which is in line with Sweeney (1994) as well as Dichev and Skinner (2002).

To test the second hypothesis, I have to divide the sample into highly levered and non-highly levered firms. In this study, highly levered firms are defined as the upper half of firms ranked by leverage.

3.2.4 Estimation model and control variables

Hypothesis 1 states that there is a positive relationship between leverage and earnings management, which is why the coefficient of LEV, β_1, of the equations below is of interest.

$$DAC_{i,t} = \alpha_1 + \beta_1 LEV + \beta_2 ROA + \beta_3 SIZE + \beta_4 MTOB + \varepsilon_{i,t}$$

$$REM_{i,t} = \alpha_1 + \beta_1 LEV + \beta_2 ROA + \beta_3 SIZE + \beta_4 MTOB + \varepsilon_{i,t}$$

The control variables are defined as:

ROA: Return on assets of the current period. Kothari et al. (2005) found a negative relationship between current firm performance and earnings management, which indicates that managers of poorly performing companies try to hide poor performance through earnings management.

SIZE: Logarithm of total assets of the current period. Cohen et al. (2008) found a significant relation between size and earnings management.

MTOB: Market to book value of the current period defined as market capitalization over shareholder´s equity. The variable is used in line with Zang (2012), who observed that strongly growing firms have higher incentives not to report losses and hence potentially engage in earnings management.

Hypothesis 2 states that highly levered firms as defined above tend to prefer real earnings management over accrual-based earnings management. To test this, I will apply the same regressions to the highly levered half of the sample and analyze the results regarding sign and significance in the next chapter. Due to the different distribution of the dependent variables, a comparison of the magnitude of the coefficients is not really informative.

Table 1 presents summary statistics of the used whole sample representing the input independent variables for both, the determination of values for accrual-based and real earnings management as well as the independent variables for the following regressions including the selected control variables. The number of observations per item vary depending on the availability of data in Datastream. To calculate earnings management values using the described models, financial information lagged by at least one year are required, making it necessary to include financial information from fiscal year 2009 in the sample. Values that do not makes sense have been excluded from the sample to not distort the results and are hence not included in the table. Due to the limited informativeness of most items as absolute values, the majority of items are scaled by total assets in line with the models used. Mean values for total assets as well as revenues are much higher than the corresponding median values showing that the sample includes a number of companies with extraordinarily high values. This is supported by the skewness. For non-financial firms, negative equity book values do not make it impossible to operate and have hence not been excluded from the sample. While the median and mean value for book equity is very close with approximately 43% of total assets, the negative skewness indicates a tendency to some extraordinarily low values. In contrast to that, a company´s market capitalization cannot be negative, however, can be very low compared to a company´s assets. Due to a number of companies that have a much higher market capitalization than assets, the mean value is extremely higher than the median and the skewness is extremely high with a value of 36. Just like book equity, the mean and median leverage ratios are very close, however, do not exactly add up to 1 when added to book equity values. This is due to the slight difference in the total number of observations for each item. In contrast to book equity, the values in Table 1 indicate that there is a number of companies with an extraordinarily high leverage ratio. Taking into account the extreme values in both directions for book equity as well as market capitalization, it is not surprising that the range between the minimum and the maximum value of the market to book ratio is so large. The average company in the sample is profitable with mean returns on assets of close to 1%. Surprisingly, this is meaningfully lower

than the mean profitability of the French sample of Lazzem and Jilani (2018), who obtained a value slightly above 3%.

Table 1 - Descriptive Statistics of Sample
Data extracted from Datastream for period between 2009 and 2019. Mean, median, standard deviation as well as minimum and maximum of Total Assets and Revenues presented in € millions. Leverage Ratio, Return on Assets and Market to Book Ratio as defined above. All other items are scaled by Total Assets Number of observations varies depending on data availability in Datastream. Intuitively wrong high and low values have been excluded from the sample.

	Observations	Mean	Median	Standard Dev	Min	Max	Skew-ness
Total Assets	2852	9288.6	595.7	33461.3	0.0	470000.0	6.9523
Revenues	2838	6241.1	488.4	20184.8	0.0	250000.0	6.0796
Operating Cash Flow	2844	0.0530	0.0690	0.2014	-3.4411	5.6000	3.6451
Receivables	2829	0.1849	0.1656	0.1262	0.0001	0.9546	1.3635
PPE	2829	0.2287	0.1715	0.2189	0.0001	1.0000	1.5346
Book Equity	2848	0.4210	0.4335	0.4194	-10.2184	1.0703	-13.2365
Market Capitalization	2658	1.3316	0.7977	3.9063	0.0080	175.9459	36.1643
Cost of Goods Sold	2776	0.6169	0.5155	0.5386	-0.0808	4.2797	1.9275
Inventories	2454	0.1445	0.1287	0.1256	0.0000	0.8747	1.3153
SG&A	2766	0.3057	0.2109	0.3422	0.0008	4.8885	4.2811
Leverage Ratio	2851	0.5711	0.5538	0.4206	0.0045	11.2184	13.1684
Return on Assets	2849	0.0113	0.0385	0.2161	-4.1315	3.5123	-3.0733
Market to Book Ratio	2653	2.6133	1.9030	3.8493	-72.2153	69.4092	-1.7257

4. Results

In the results section I will first present summary statistics of the six applied models to capture earnings management. After that, I will present my results regarding the relationship between earnings management and leverage as well as the corresponding interpretations.

Table 2 presents summary statistics of the error terms of the applied models, representing the proxies for earnings management. Mean values for residuals of AE and RM are all positive with the only exception being the Modified Jones model, however, in every case very close to 0, which is not surprising, since the expected average value for error terms is always very close to zero. Looking at the median values of the models, only the Abnormal Expenses model has a negative sign. However, as described above, this also suggests income-increasing activities. As expected, the magnitude of median values differs from zero. While both values are significantly lower than in the existing literature (Lazzem and Jilani, 2018, Zamri et al., 2013), the extreme values are much larger in absolute terms. With the exception of the Abnormal Production model, all models show a very high skewness in one or the other direction. The models

capturing AE all show a highly negative skewness, while the RM models show a highly positive or close to zero skewness value.

Table 2 - Descriptive Statistics of Error Terms
Descriptive statistics of error terms of described models in methodology section to capture levels of earnings management. Number of observations varies depending on data availability in Datastream.

	Obser-vations	Mean	Median	Standard Dev	Min	Max	Skew-ness
Modified Jones	2527	-0.0000	0.0029	0.1800	-5.4284	2.7770	-8.5853
Kothari et al.	2534	0.0000	0.0019	0.1794	-5.5178	2.7622	-8.9660
Raman Shahrur	2415	0.0000	0.0034	0.1771	-5.5498	2.7322	-9.9948
Abnormal CFO	2261	0.0000	0.0053	0.1837	-1.3709	5.5143	11.1854
Abnormal Production	1940	0.0000	0.0326	0.2667	-1.8909	1.6334	-0.5243
Abnormal Expenses	2483	0.0000	-0.0538	0.3454	-3.4209	9.1120	8.0542

Table 3 shows the results of the regressions considering the whole sample. Starting with the first three models that capture AE it can be seen that leverage has a positive sign and is also significant at the 1% level. In addition to that, all of the three models show a relatively high R^2 compared to existing literature with over 0.2, showing that the models explain relatively well the level of earnings management. This is for example more than twice as much as Lazzem and Jilani (2018) found in their results using the sample of the French market.

In contrast to that, the three models capturing the level of RM show less obvious results than the AE models. When interpreting the results of the leverage coefficients of the three models, all indicate an income-decreasing behavior. However, only two of the models are significant. With R^2 values between c. 0.08 and 0.14, these models are less effective in explaining the level of earnings management than the AE models. Nevertheless, existing literature like Zamri et al. (2013) show very well comparable R^2s.

Given that thee of the six models show positive and highly significant results, while two models are significantly negative and the last one not significant at all, the first hypothesis cannot be clearly verified. Although the majority of models show the expected result, the three AE models are rather close to each other with only limited adjustments. The missing robustness makes it necessary to observe the two earnings management types separately.

The results of the presented AE models undoubtedly confirm H1 that leverage is positively related to income increasing earnings management. This is in line with the debt hypothesis of Watts and Zimmerman (1986) that managers tend to make use of accounting choices to move future earnings to the current period in order not to violate debt covenants, which would cause

high costs for the company. The findings are also in line with existing literature on this topic. Lazzem and Jilani (2018) found comparable results in their research on the French market. This is not surprising given that France is also a code-law country and companies are also forced to prepare financial reporting under IFRS.

In contrast to the AE models, the results of the three observed RM models very clearly lead to the rejection of H1. Two of the models show a significant income-decreasing behavior and one a non-significant but still income-decreasing behavior. These results stand in contrast to observations made by Anagnostopulou and Tsekrekos (2017), who found a significant positive relationship between RM and leverage in their study on the US market. In addition to that, the models capturing abnormal cash flow from operations as well as discretionary expenses are in line with observations made by Zamri et al. (2013) in their study using listed companies from the Malaysian market. They found a significant negative relationship between leverage and earnings management through real activities manipulation.

To sum it up, there is no uniform answer to the question, whether earnings management is positively related with leverage in German listed companies. Considering the different results of existing literature globally with significant positive, significant negative but also non-significant results at all, this is not surprising. However, AE viewed separately would undoubtedly confirm the hypothesis, while RM would cause a rejection of H1 due to significant negative as well as non-significant results depending on the RM model applied.

Table 3 - Regression Results of Whole Sample
Number of observations varies depending on data availability in Datastream. t-statistics are presented in parentheses.
*, **, *** significant at the 10%, 5%, and 1% level, respectively

	Modified Jones	Kothari et al.	Raman Shahrur	Abnormal CFO	Abnormal Production	Abnormal Expenses
Leverage	0.041484	0.034270	0.037355	-0.017165	-0.019583	0.035872
	(5.58)***	(4.58)***	(5.00)***	(-2.05)**	(-1.49)	(2.83)***
Return on Assets	0.415997	0.423939	0.417507	0.358690	-0.247354	-0.186444
	(25.13)***	(25.50)***	(25.19)***	(17.93)***	(-7.20)***	(-6.99)***
Log Assets	-0.001514	-0.002081	-0.001239	0.000415	0.019989	-0.025968
	(-1.07)	(-1.46)	(-0.87)	(0.26)	(7.34)***	(-10.71)***
Market to Book	-0.000015	-0.000009	-0.000004	0.000209	-0.000051	-0.000125
	(-0.23)	(-0.14)	(-0.07)	(2.98)***	(-0.48)	(-1.14)
Constant	-0.011387	-0.000181	-0.013411	-0.002646	-0.256756	0.325369
	(-0.58)	(-0.01)	(-0.68)	(-0.12)	(-6.63)***	(9.64)***
Observations	2410	2415	2415	2193	1881	2367
R^2	0.2133	0.2164	0.2138	0.1417	0.0488	0.0828
F Statistic	163.02	166.37	163.86	90.28	24.07	53.31

Table 4 presents the results of the regressions considering only the group of highly levered companies, i.e. the half of the previous sample with the highest leverage ratio. In contrast to the regressions conducted with the whole sample, leverage is significant at least at the 5% level in every model this time. The explanatory power of the used models, given by the R^2 values, is approximately the same as for the whole sample.

As before, all AE model are significant and positive at the 1% level, however, this time the magnitude of the coefficients is much higher. This could imply that managers of highly levered firms are more incentivized to make use of income increasing AE in order not to breach covenants or negotiate better terms when it comes to refinancing existing debt or raising additional debt.

While the signs of the leverage coefficients of the three RM models remained unchanged, they are now all also significant at least at the 5% level and hence all indicate a significant engagement in income-decreasing earnings management activities. Like with the AE models, the magnitude of the coefficients increased significantly.

Considering H2, however, that highly levered firms prefer income increasing RM over AE, must clearly be rejected. While results for income-increasing AE are robust and positive for highly levered companies, all RM models show that managers of the highly levered sample engage in income-decreasing earnings management activities. These results are nearly the opposite to Anagnostopulou and Tsekrekos (2017), who found out that there is a positive relationship between highly levered companies and RM, while they did not observe these results for income increasing AE. This is also surprising because past literature suggests a preference of managers of RM over AE due to the easier observability of AE. (Bruns and Merchant, 1990, Graham et al. 2005)

Table 4 - Regression Results of Highly Levered Sample
Number of observations varies depending on data availability in Datastream. t-statistics are presented in parentheses.
*, **, *** significant at the 10%, 5%, and 1% level, respectively

	Modified Jones	Kothari et al.	Raman Shahrur	Abnormal CFO	Abnormal Production	Abnormal Expenses
Leverage	0.068300	0.060955	0.064939	-0.027430	-0.029300	0.082665
	(6.30)***	(5.55)***	(5.93)***	(-2.34)**	(-2.06)**	(5.98)***
Return on Assets	0.552443	0.557168	0.550690	0.183868	-0.216500	-0.143884
	(21.16)***	(21.09)***	(20.89)***	(5.68)***	(-5.28)***	(-4.48)***
Log Assets	0.001676	0.000515	0.002732	-0.000069	0.056734	-0.046023
	(0.28)	(0.09)	(0.46)	(-0.01)	(6.64)***	(-6.07)***
Market to Book	-0.001407	-0.001146	-0.001320	0.002569	-0.008680	0.003540
	(-1.14)	(-0.92)	(-1.06)	(1.98)**	(-3.90)***	(2.37)**
Constant	-0.069747	-0.059794	-0.075440	0.009883	-0.280779	0.171446
	(-1.72)*	(-1.46)	(-1.85)*	(0.824)	(-4.71)***	(3.31)***
Observations	1158	1158	1158	1053	954	1137
R^2	0.2890	0.2853	0.2832	0.0432	0.0981	0.1084
F Statistic	117.17	115.05	113.86	11.82	25.82	34.40

The regression results for the whole sample as well as the highly levered sub-sample lead to a rejection of both hypotheses. However, for both tests, the models to capture effects of leverage on AE showed positive and significant results. Taking into account the different results of the existing literature on various markets globally, it is not surprising that the example of Germany is not exactly comparable to one of the existing studies on the relationship between earnings management and leverage.

The results obtained from both samples, the whole group of companies and the highly levered half, show that German engage in earnings management activities in both directions in relation to leverage. This phenomenon was in a different article with a different background also detected by Achleitner et al. (2014), who identified a substitutional usage of the two methods in German companies. Furthermore, in both samples, return on assets is always highly significant at the 1% level. Contrary to Kothari et al. (2005) as mentioned in the definition of the control variables, there is a highly positive relation between return on assets and accrual-based earnings management, which suggests that highly profitable tend to engage more in AE activities.

The presented results only show the earnings management activities in relation with leverage so that it cannot be said that German companies in general engage in income-increasing accrual-based earnings management and income-decreasing real earnings management.

5. Conclusion

In this study, I have analyzed the relationship between leverage and both, accrual-based as well as real earnings management. The underlying sample includes German non-financial companies that fulfill Deutsche Börse AG´s Prime Standard requirements, meaning they have the highest publication requirements. This relationship has been subject to various studies in different forms in several countries across the globe, however, there is only very little research on European code-law countries that make use of IFRS as GAAP. In addition to that, there is only a very limited amount of studies investigating both types of earnings management simultaneously. To my knowledge, this makes it the first study to investigate the relationship between earnings management and leverage in Germany.

In line with expectations, accrual-based models for the whole sample indicate a significant positive relationship between leverage and earnings management, while the real earnings management models show a mixed picture with significant income-decreasing as well as insignificant results depending on the model applied. For the highly levered sample, the half of the whole sample with the highest leverage ratio, results were mixed as well. Accrual-based models again show a significant positive relationship, however, this time with an approximately twice as high magnitude. Real earnings management models, on the other, showed only significant income-decreasing earnings management levels so that it cannot be said that managers of listed highly levered firms in German prefer real earnings manipulation over accrual-based earnings management to improve their results.

Due to the strongly varying results in studies on other jurisdictions it is impossible to say, whether my results are in line with existing literature. Nevertheless, the results are in line with the probably best comparable study on accrual-based earnings management and leverage in France by Lazzem and Jilani (2018). France shares most characteristics by being a European code-law country in which companies have to prepare accounts under IFRS.

This study also has some limitations. Due to the relatively small sample size of 283 non-financial companies, only a relatively high-level industry classification has been applied. This leads to the effect that companies from sub-sectors are included in the same industry group, although their characteristics might differ significantly, which might have a distorting effect on the earnings management proxies. Furthermore, as can be seen from the varying number of observations for each item, Datastream has a number of missing accounting and market values. In case there is a pattern in missing data for certain industries or sub-sectors this might lead to a reduction in the explanatory power of the applied models and hence in the results of this work.

Lastly, there are further models existing in the literature that aim to capture accrual-based as well as real earnings management. While using more models does not necessarily increase the validity of the results, other models might have led to differing results. However, the applied models are in line with most of the existing research on other countries.

Based on the results achieved and the work in general there are suggestions for further research. This study investigates the highly Prime Standard segment of Deutsche Börse AG. Besides the Prime Standard, there is also a lower regulated segment for younger growth companies called Scale. Applying this paper on the lower regulated segment is an interesting new field of research when comparing the results to this study due to the potential impact of lower publication requirements. In addition to that, it would be interesting to apply the paper on all listed German companies including Prime Standard and Scale companies. Lastly, one could analyze the relationship between return on assets and earnings management. In this study return on assets is used as a control variable and was in every case significant at the 1% level.

References

Achleitner, A.-K., Günther, N., Kaserer, C., & Siciliano, G. (2014). Real earnings management and accrual-based earnings management in family firms. *European Accounting Review*, *23*(3), 431-461.

Anagnostopoulou, S. C., & Tsekrekos, A. E. (2017). The effect of financial leverage on real and accrual-based earnings management. *Accounting and Business Research*, *47*(2), 191-236.

Ardison, K. M. M., Martinez, A. L., & Galdi, F. C. (2012). The effect of leverage on earnings management in Brazil. *Advances in Scientific and Applied Accounting*, *5*(3), 305-324.

Armstrong, C. S., Guay, W. R., & Weber, J. P. (2010). The role of information and financial reporting in corporate governance and debt contracting. *Journal of accounting and economics*, *50*(2-3), 179-234.

Ball, R., Robin, A., & Wu, J. S. (2003). Incentives versus standards: properties of accounting income in four East Asian countries. *Journal of accounting and economics*, *36*(1-3), 235-270.

Bartov, E. (1993). The timing of asset sales and earnings manipulation. *Accounting Review*, 840-855.

Beyer, A., Cohen, D. A., Lys, T. Z., & Walther, B. R. (2010). The financial reporting environment: Review of the recent literature. *Journal of accounting and economics*, *50*(2-3), 296-343.

[Record #105 is using a reference type undefined in this output style.]

Bruns, W., & Merchant, K. (1990). The dangerous morality of earnings management. *Management Accounting*, *72*(2), 22-25.

Bushee, B. J. (1998). The influence of institutional investors on myopic R&D investment behavior. *Accounting review*, 305-333.

Cazier, R. A. (2011). Measuring R&D curtailment among short-horizon CEOs. *Journal of Corporate Finance*, *17*(3), 584-594.

Chamberlain, T. W., Butt, U. R., & Sarkar, S. (2014). Accruals and real earnings management around debt covenant violations. *International Advances in Economic Research*, *20*(1), 119-121.

Chi, W., Lisic, L. L., & Pevzner, M. (2011). Is enhanced audit quality associated with greater real earnings management? *Accounting horizons*, *25*(2), 315-335.

Cohen, D. A., Dey, A., & Lys, T. Z. (2008). Real and accrual-based earnings management in the pre-and post-Sarbanes-Oxley periods. *The accounting review*, *83*(3), 757-787.

Cohen, D. A., & Zarowin, P. (2010). Accrual-based and real earnings management activities around seasoned equity offerings. *Journal of accounting and Economics*, *50*(1), 2-19.

Dechow, P. M., & Sloan, R. G. (1991). Executive incentives and the horizon problem: An empirical investigation. *Journal of accounting and Economics*, *14*(1), 51-89.

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting earnings management. *Accounting review*, 193-225.

DeFond, M. L., & Jiambalvo, J. (1994). Debt covenant violation and manipulation of accruals. *Journal of accounting and economics*, *17*(1-2), 145-176.

Dichev, I. D., & Skinner, D. J. (2002). Large–sample evidence on the debt covenant hypothesis. *Journal of accounting research*, *40*(4), 1091-1123.

Fung, S. Y., & Goodwin, J. (2013). Short-term debt maturity, monitoring and accruals-based earnings management. *Journal of Contemporary Accounting & Economics*, *9*(1), 67-82.

Goncharov, I., & Zimmermann, J. (2006). Do accounting standards influence the level of earnings management? Evidence from Germany. *Evidence from Germany (December 2006)*.

Graham, J. R., Harvey, C. R., & Rajgopal, S. (2005). The economic implications of corporate financial reporting. *Journal of accounting and economics*, *40*(1-3), 3-73.

Gunny, K. A. (2010). The relation between earnings management using real activities manipulation and future performance: Evidence from meeting earnings benchmarks. *Contemporary accounting research*, *27*(3), 855-888.

Jelinek, K. (2007). The effect of leverage increases on earnings management. *The Journal of Business and Economic Studies*, *13*(2), 24.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American economic review*, *76*(2), 323-329.

Kim, B. H., Lisic, L. L., & Pevzner, M. (2010). Debt covenant slack and real earnings management. *Kertas kerja yang dipublikasikan melalui SSRN*.

Kothari, S. P., Leone, A. J., & Wasley, C. E. (2005). Performance matched discretionary accrual measures. *Journal of accounting and economics*, *39*(1), 163-197.

Lazzem, S., & Jilani, F. (2018). The impact of leverage on accrual-based earnings management: The case of listed French firms. *Research in International Business and Finance*, *44*, 350-358.

Leuz, C., Nanda, D., & Wysocki, P. D. (2003). Earnings management and investor protection: an international comparison. *Journal of financial economics*, *69*(3), 505-527.

McCrum, D. (2020). Wirecard: the timeline. *Financial Times*.

Nikolaev, V. V. (2010). Debt covenants and accounting conservatism. *Journal of Accounting Research*, *48*(1), 137-176.

Peasnell, K. V., Pope, P. F., & Young, S. (1999). Accrual management to meet earnings targets: did Cadbury make a difference?

Raman, K., & Shahrur, H. (2008). Relationship-specific investments and earnings management: Evidence on corporate suppliers and customers. *The Accounting Review*, *83*(4), 1041-1081.

Roberts, M. R., & Sufi, A. (2009). Control rights and capital structure: An empirical investigation. *The Journal of Finance*, *64*(4), 1657-1695.

Rodríguez-Pérez, G., & Van Hemmen, S. (2010). Debt, diversification and earnings management. *Journal of accounting and public policy*, *29*(2), 138-159.

Roychowdhury, S. (2006). Earnings management through real activities manipulation. *Journal of accounting and economics*, *42*(3), 335-370.

Sweeney, A. P. (1994). Debt-covenant violations and managers' accounting responses. *Journal of accounting and Economics*, *17*(3), 281-308.

Toor, I., & Abbas, Z. (2010). Can high leverage control the opportunistic behavior of managers: Case Analysis of textile sector of Pakistan. *International Research Journal of Finance and Economics, ISSN*, *47*, 140-2887.

Van Tendeloo, B., & Vanstraelen, A. (2005). Earnings management under German GAAP versus IFRS. *European Accounting Review*, *14*(1), 155-180.

Watts, R. L., & Zimmerman, J. L. (1986). Positive accounting theory.

Zagers-Mamedova, I. (2009). The effect of leverage increases on real earnings management.

Zamri, N., Rahman, R. A., & Isa, N. S. M. (2013). The impact of leverage on real earnings management. *Procedia Economics and Finance*, *7*, 86-95.

Zang, A. Y. (2012). Evidence on the trade-off between real activities manipulation and accrual-based earnings management. *The accounting review*, *87*(2), 675-703.