Master Thesis II

The Impact of Smoothing on Firm Value
An Industry Analysis

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Abstract

Title:	The Impact of Smoothing on Firm Value – An Industry Analysis
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Keywords:	risk management, cash-flow smoothing, earnings management, income smoothing, value premium, industry analysis
Purpose:	The purpose of this study is to analyse the impact of smoothing on firm value in the US Electricity, Oil & Gas Producers, Pharma & Biotechnology, Retail and Leisure & Tourism Industry.
Theoretical Framework:	The theoretical framework incorporates theories and empirical findings from risk management, such as Miller and Modigliani irrelevance theorem, agency theory, underinvestment, financial distress, debt capacity, debt overhang and asset substitution as well as value creation from cash-flow smoothing in risk management and income smoothing in earnings management.
Empirical Framework:	A sample of 316 firms listed in the US market during 2000-2010
Methodology:	Quantitative approach using multiple regression analysis
Conclusion:	The findings of our empirical analysis show that benefits from smoothing cannot be generalised across industries. Instead the value relevance of smoothing income/earnings has three dimensions which need to be analysed in order to find meaningful results. This is the firm, industry and time dimension. We find that investors value smooth earnings in the Oil & Gas, Electricity & Alternative Energy and Leisure & Tourism Industry. In the Pharma & Biotechnology and Retail industry we do not find smoothing activity to be value relevant. Over the majority of industries we observe time- specific effects.

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1 Introduction

The introductory chapter is aimed to position this paper within the field of strategic finance, or more precisely, within existing research on the value-relevance of cash-flow and income smoothing. We will present the problem discussion, derive our research questions and give an overview over the outline of this paper.

1.1 Background

Warren Buffett says *"It is not easy to predict future cash-flows and this is why I stick to investments in companies that are consistent, well managed, and simple to understand. A company that is hard to understand or that changes frequently does not allow for easy prediction of future earnings and outgoings".* The question is: Are risk averse investors like Warren Buffett willing to pay a premium for firms which demonstrate stable performance and smooth financials? And if so, do investors discriminate between smooth cash-flows from risk management or will simply earnings management do the job?

The answer can be found in one of the forefront studies in the field of firm value creation by Rountree, Weston and Allayannis (2008). They surprised the academic world with their findings and made CEO's reconsider their financial strategy. Investor's value smooth performance and they are happy to pay a premium for it. 1% increase in cash-flow volatility, results in a decrease of firm value of 0.15 percent or in dollar terms $1.4 million (based on the average market cap of the study's sample). Or even more drastic if a firm is able to move from the sample median volatility to the lower quartile it could be rewarded by the market on average with a $76.5 million (8%) in premium.

We could not help but wonder, is this possible for every industry?

1.2 Problem Discussion

Rountree, Weston and Allayannis (2008) propose that smooth performance increases firm value across industries.

In our opinion, however, the issue is much more complex than their findings suggest. Differences in industry and firm characteristics as well as time alter the impact of smoothing and do not allow for generalization based on a simplistic cross-industry sample. Additionally, the prevailing investor preference has to be taken into account. Different industries may attract investors with different risk profiles. Some seek risk while others try to avoid it. In this regard, high volatility might add to the attractiveness of the industry and is part of the investor's strategy to benefit from the upside.

Miller and Modigliani (MM) support the investor‘s preference for cash-flow volatility and find that cash-flow smoothing activities are zero NPV decisions assuming that transaction are costless. In their view, the value of the firm is independent of its capital structure (Miller & Modigliani 1961). This is true if the assumptions of perfect capital markets, symmetric information, given investment strategies and equal access to capital markets hold. Therefore, financial policies and the attempts of management to minimize risks through cash-flow smoothing do not impact the value of the firm. Shareholders, who already own a perfectly diversified portfolio, do not gain from these activities. Thus, smoothing on firm level does not yield a benefit for the individual investor. In the real world however, market imperfections exist which violate the MM assumptions and challenge this theory.

Cash-flow smoothing may also be seen as negative NPV decision when relating it to agency theory and when smoothing is costly to implement. Risk adverse managers whose wealth is directly linked to the firm, try to minimize their personal risk exposure by decreasing the variance in firm value and as a result reducing the volatility of their poorly diversified portfolios (Jensen and Meckling 1976, Nelson, Moffitt and Affleck-Graves 2005). This is diametral to the interest of the shareholder who actually benefits from a higher risk exposure, given that high volatility translates into a higher return. In this case, investors would be reluctant to value smoothing but rather diversify their portfolios themselves.

Ultimately, cash-flow smoothing can also be defined as positive NPV decision, offering a benefit to the investor which she cannot achieve by simply diversifying or hedging her personal

portfolio. This is for example the case when smoothing decreases the probability of financial distress, mitigates the underinvestment problem and increases the debt capacity (Culp 2006).

The majority of studies within this field focus on the scope and size of hedging activities in risk management. Some research is conducted investigating the actual impact of smooth cash-flows on the firm value. Froot, Scharfstein, and Stein (1993) show that cash-flow smoothing increases firm value by decreasing the risk of underinvestment. Allayannis and Weston (2001) discuss the relationship between currency hedging and Tobin's Q, the proxy for firm value, and conclude that hedging increases Q.

The findings from earlier research are mixed. While several studies show that smooth income increase the value of the firm (Kim, Mathur and Nam 2006; Nelson, Moffitt and Afflect-Graves 2005, Rountree, Weston and Allayannis 2008, Allayannis and Simko 2004) others have not found positive effects and report a negative impact on firm value (Michelson *et al* 1995, Sloan 1996, Huang *et al* 2008, Nguyen and Faff 2010, Bandyopadhyay, Huang and Wirjanto 2010 and 2011). Furthermore Rountree, Weston and Allayannis (2008) have examined which component of smooth income adds incremental value to the firm: smooth cash-flows or smoothing with accruals. They found that investors favour smoothing via cash-flows but again other studies contradict their findings and show that investors do actually not discriminate between the different components of smooth income (Allayannis and Simko 2004).

We observed that the research community finds arguments favouring or disregarding smoothing activities to increase firm value. In our opinion reasons for these unclear results can be found within the lack of industry and firm-specific analysis.

It seems that only a few researcher such as Carter, Roger, Simkins (2006) as well as Jin and Jorion (2004) have started to address the problem of cross-industry analysis. Carter, Roger, Simkins (2006) for example, inspect the jet fuel hedging behaviour of firms in the US airline industry and find a positive correlation between fuel hedging and airline firm value, whereas Jin and Jorion (2004) find no relationship between hedging and firm value in oil and gas industry. These findings underline our impression that a generalisation of the benefits of smoothing cannot be substantiated across industries. It may simply be the case that in some industries risk management activities make more sense than in others. Therefore, it rather seems naive and overly simplistic to make a general statement over the value of smoothing activities. We assess

each industry as far too complex and too unique to make such a generalisation and get a clear result that is pointing towards one conclusion.

The combination of ambiguous findings and lack of industry-specific research indicates a knowledge gap in regards to the relationship between smoothing and firm value when explicitly looking at different industries. To our knowledge, none of the existing studies has yet applied a common methodological framework to investigate and compare the effects of smooth income on value creation across industries.

Furthermore, we view the analysis of firm value creation over time critically, given that fact that smoothing strategies are expected to be sensitive to changes in the overall economic environment e.g. during times of crisis. None of the former studies on firm value creation from smoothing activities has incorporated the event of an economic crisis and specifically tested for if.

1.3 Purpose and Research Question

With this paper we aim to explore the dimensions of industry and firm specifics as well as the impact of time. Thereby, we like to explore how investors value smooth earnings. Do investors generally perceive smoothing as beneficial or do they discriminate cash-flow smoothing and smoothing via accruals. What are the industry characteristics that trigger investors to pay a premium for smoothing? Do they differentiate between low or high growth industries, cyclical or non-cyclical, commodity or service products?

Further we like to identify the value of smoothing activities before or within times of crisis. We wonder if these time effects have an impact on which determinants change the firm value.

For that purpose we choose five industries with very different characteristics in terms of financing needs, cyclicality, risk exposure as well as products and services. We examine if these characteristics play a role and if so – to which extend they determine the value creation from smoothing. Additionally, we investigate whether investors differentiate between the value creation stemming either from cash-flow or income smoothing.

We will analyse the following US industries:

Oil & Gas Producers, General Retailer, Travel & Leisure, Pharma & Biotechnology, and Electricity & Alternative Energy

And like to answer the following two questions:

1. ***How does smoothing impact firm value given the different industry characteristics?***

2. ***How does the value of smoothing react to time specific events?***

This paper shall add to the research community by showing that research on value creation through smoothing activities cannot be generalised across all industries. We also would like to further stress that more dimensions of analysis are needed. Researchers need to address the specific characteristics of the industries and firms. Additionally, we aim to show that the macroeconomic environment should be considered and that the choice of the period in time is important to the validity of the result. By providing empirical results, we aim to point out that these are all important perspectives in order to derive meaningful conclusions. We are of the opinion that this approach could lead to a more unified school of research within this field and clarify what we see today, ambiguous conclusions about firm value creation from smoothing. Finally, we hope to motivate the research community and trigger further investigations in this fascinating field of research.

1.4 Delimitations

We are limiting the investigations of our thesis to the examination of firm value enhancement through smoothing of earnings. We aspire to test whether it is more valuable to managers and shareholders to either use accruals or derivative in order to achieve smooth earnings. Thereby we will limit this work by not investigating which particular tool or model of smoothing is the most value enhancing to the firm. From Rountree, Weston Allayannis (2008) we already know that hedging or cash-flow smoothing with derivatives is considered as the most beneficial. However,

Guay and Kothari (2003) show us from their study that companies hedging with interest rate or currency derivatives cannot achieve significant value from their derivative holdings. Our analysis is industries based and we therefore will not show the impact of smoothing on a particular company example but rather analyse the entire industry to investigate if and which smoothing activity is adopted and most beneficial to the particular industry.

1.5 Thesis Outline

In chapter two we first define the terminology that is used throughout this work. We provide an extensive theoretical framework which aims to give the reader an overview over the field of research. We introduce the classical theories and motives behind smooth earnings such as agency problem mitigation, cost of financial distress, underinvestment and tax incentives. A collection of short summaries on empirical evidence, sorted by topics; value creation in risk management, earnings management and industries, can also be found in chapter two. The theory and empirical findings lay out the foundation for the later interpretation of our empirical results in chapter four. Before the results and analysis can be presented, we introduce the methodology and the data in chapter three. Chapter three is a comprehensive overview over the research approach and applied methodology. Finally, we will finish this work with a problem discussion, conclusions and suggestion for further research.

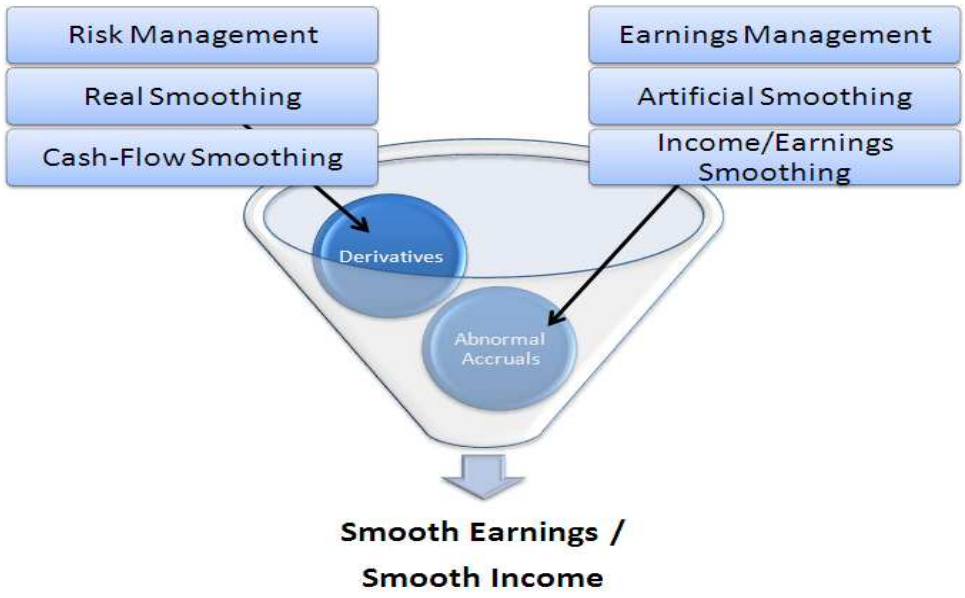
2 Theoretical Background

In the following chapter we first introduce the terminology of risk and earnings management and comment on the coherence between the two. We present the theoretical background to our study and provide an overview of the classical studies as well as recent empirical findings in this field of value creation.

2.1 The Coherence of Risk- and Earnings Management

Over the last 15 years of research in risk management and earnings management many terms and definitions have emerged that may cause confusion to the reader. After carefully screening the landscape of "smoothing" we come to conclude a model, presented in Figure 1 that defines the terminology used throughout this work and sheds light into the darkness of the terminology confusion.

Figure 1: The coherence of Risk- and Earnings Management and Smooth Earnings



Source: Authors

Risk management is a top priority for financial executives (Rawls and Smithson 1990). Risk is the probability or the threat of an uncertain event to occur. Managing risk is the practice of identifying uncertainties related to the business process. A firm faces internal and external risks in all market interactions which influence the performance and objections of the firm. In risk management, the company analyses these risks and classifies whether it is valuable to manage them or not. The variance of cash-flows is a financial risk which most firms desire to smoothen with risk management activities because a shortage in cash-flow reduces the ability of the firm to invest in value enhancing growth opportunities (Culp 2001).

We view the term risk management as an umbrella term that describes the activities of the firm to decrease risk, mainly because management aims to generate stable cash-flows from operations to create a sustainable, profitable business. When a firm's risk management strategy is to not retain nor transferred risk but rather to neutralize it then this can be achieved through the use of derivates *i.e.* hedging financial risk.

Albrecht and Richardson (1990, p. 713) introduce the term "Real Smoothing" and explain: "real smoothing occurs when management takes action to structure the economic revenue generating events of the organization to produce a smooth income stream." Huang *et al.* (2009) clarifies that real smoothing is conducted with the use of derivatives, whereby the income component cash-flow is smoothed via hedging. When we use the term "Cash-Flow Smoothing" throughout this work, we follow Huang *et al.* (2009) and mean the risk management process of using derivatives to smoothen cash-flows as the underlying component of smooth income.

"Earnings management is taking advantage of the flexibility in the choice of accounting treatment to signal the manager's private information on future cash flows." (Ronen and Yari 2008, p. 25). However, investor focus on bottom line income introduces incentives to exploit accounting principles and offset cash-flow shocks by utilizing accruals (Chan *et al*. 2006). Thus, earnings management via accruals might be utilized to conceal true underlying economic profitability of the firm.

Again Albrecht and Richardson (1990, p. 713) define "Artificial Smoothing" by stating: "Artificial smoothing occurs when management manipulates the timing of accounting entries to produce smooth income streams". This is in line with Huang *et al.* (2009) who define "Artificial Smoothing" as smoothing of the accrual component of income through the use of abnormal

accruals. Throughout this text, when we use the term "Earnings Smoothing" we mean the process of managing earnings through the use of accruals to ensure that shocks in cash-flow are leveled out by opposite changes in accruals.

Finally as demonstrated in Figure 1, smooth earnings/income equal the sum of accruals and cash-flows.

2.2 The Irrelevancy of Smooth Earnings

The desire of firms to demonstrate a smooth earnings performance is irrelevant for the maximisation of shareholder value. Miller and Modigliani (1958) explain, with their landmark paper "The cost of Capital, Corporation Finance and the Theory of Investment", two propositions and the assumptions of an ideal capital market. Under the ideal capital market policies to smooth earnings through risk and earnings management should not affect the value of the firm.

The irrelevance proposition by Miller and Modigliani (MM) underlines the unimportance of the firm's capital structure. The market value of the firm cannot be changed by changing the capital structure of the firm. No matter how much debt a firm uses to finance its assets the value will stay the same. Therefore, smoothing earnings to establish a higher credit worthiness or shareholder value percipience is irrelevant for the firm value. Further MM describes the leverage irrelevance. The expected return on the firm's equity is an increasing function of the firm's leverage. This shows again that leverage has no influence on the firm value, especially not on the expected return of the firm's equity to shareholders. It also implies that the firm value is independent of the management's actions to control risks through hedging. (Culp 2001; Odgen, Jen and O'Conner 2003)

M&M base their theory on the following ideal capital market assumptions.

Perfect Capital Markets: In capital markets without frictions, market participants do not encounter any transaction costs, taxes or institutional frictions or costs of bankruptcy.

Symmetric Information: In the MM world, all market participant share homogenous expectations. Valuable information is equally available to everybody and the prospects of a security are equally perceived.

All market participants are atomistic: No single investor can affect the price of a security.

Given Investment Strategy: In an ideal capital market, the firm's financial strategy is assumed to be known.

The firm's financing is fixed: The firm's capital structure does not change.

It goes without saying that these assumptions do not hold in the real world. However, MM present us the foundation to imagine when smoothing of earnings becomes valuable to the shareholders, that is when the assumptions do not hold (Culp 2001; Odgen, Jen and O'Conner 2003).

At the first glance, shareholders agree to MM. They view risk management activities as negative NPV operations because they could easily and more cost effectively manage risks themselves. As discussed above earnings are smoothened partly by lowering the volatility of cash-flows through measures (mainly derivatives) of risk management. However, many investors incorporate the volatility and risk exposure of firms into their portfolio strategy and enjoy the upside return from being exposed. Risk is not always bad especially not if it is business risk because it is the risk that firms are in business with. Handling this risk well is their comparative advantage.

So the question remains: What motivates firms to engage in smoothening and under which circumstances is it considered value creating?

2.3 Managerial Motivations to Smooth Earnings

Corporations engage in risk management by smoothing cash-flows for four main reasons. First, the managers themselves are risk averse and like to protect their own wealth. Second, to maximize shareholder value by increasing the value of the firm, *i.e.* by decreasing the exposure to non-core risks which also investors cannot diversify away (Mayers and Smith 1982, Smith and

Stulz 1985, Mayers and Smith 1987, Bessembinder 1991, Froot, Scharfstein and Stein 1993) and third, to increase the financial flexibility and debt capacity, and to lower the underinvestment and asset substitution (Froot, Scharfstein and Stein 1993). Fourth, firms with tax convexity aim to reduce the tax liability. (Smith and Stulz 1985, Mayers and Smith 1987)

2.3.1 Managerial Wealth and Risk Aversion

A firm is not an individual, it is risk neutral and has no utility function broken down into units of happiness (Culp 2001). Instead, a ”...firm is a nexus of a set of contracting relationships among individuals...” whose purpose is to act as “... a focus for a complex process in which the conflicting objectives of individuals [...] are brought into equilibrium within a framework of contractual relations.” What Jensen and Meckling (1976, p.311) say is; it is the individuals, the managers or agents, for that matter, who give the firm its risk profile. This line of thought comes along with the explanation of agency problems in a firm, where the agent (the manager) chooses her own risk averse motivations over motivations to maximise shareholders wealth.

In a firm it is the manager who encourages the hedging of risk (Smith and Stulz 1985). While the shareholders can diversify their portfolio, the human capital and individual wealth of the risk averse manager is inadequately diversified. Consequently, managers engage in risk management activities to decrease the variance in firm value and lower their personal risk exposure at no personal costs but at the costs of the firm. Culp (2001) encourages letting managers hedge the risk exposure. This way they feel more certain and secure in order to not let risky positive NPV projects bypass. It might also be more beneficial if the managers hedge the firm’s risk because they possess all the insider information (DeMarzo and Duffie 1995).

The solution to managerial risk aversion lies within the construction of a compensation package. Increasing the managerial ownership in the firm aligns the interest of managers with the interests of the shareholders and may lead to a higher firm value (Cooles, Lemmon and Meschke 2003). With a greater stake in the firm, managers are incentivised to create greater productivity. Dechow and Skinner (2000) agree and also stress the positive influence on performance and firm value creation. However, the greater the managerial ownership, the more hedging activities will be undertaken (Tufano 1996).

Risk management activities are generally viewed as beneficial by shareholders but activities related to earnings management are not. The higher the performance based incentives in the compensation package the more managers engage in earnings management to mislead stakeholders about the real economic performance of the firm and to earn a higher managerial compensation and bonuses (Healy and Wahlen 1999).

However, Goel and Thakor (2003) argue that earnings smoothing may be beneficial if it helps to reduce the information advantage of informed investors. Generally, Brennan and Hughes (1991) as well as Schipper (1991) find that analyst coverage for firms with volatile earnings tends to be lower compared to companies with stable earnings. In this school of thoughts, smoother earnings enhance the value of the firm indirectly by reducing existing information asymmetries.

2.3.2 Costs of Financial Distress and Debt Capacity

"Financial distress is defined as a low cash-flow state in which the firm incurs losses without being insolvent" (Purnanandam 2008, p. 707). In a MM world financial distress is not costly. In the real world, firms incur high costs from financial distress. Smoothing cash-flows reduces the probability of financial distress (Smith and Stulz 1985). Mian (1996) tested the hypothesis of Smith and Stulz by investigating in 3,022 firms in 1992 and did not find any evidence in favour of that argumentation.

There are three sources of financial distress that can constrain the financial health of a firm. First, financially distressed firms lose market share and damage their relationship to suppliers and customers. Opler and Titman (1994) empirically analysed 46,799 firm-years from 1972 to 1991 by linking financial distress to corporate performance. They found that especially high leveraged firms in financial distress would significantly lose in market share and gamble their competitive position. Second, financially distressed firms miss to fulfil their obligations and coupon payments and thereby incur deadweight losses from penalties, prolong debt repayments and decrease their operational inflexibility by imaging low credit worthiness. Purnanandam (2008) investigates in 2,000 US firms between 1996 and 1997, and shows that firms with very high leverage have a lower incentive to engage in risk management. However, firms with medium leverage strongly benefit from it. Lowering volatility of cash-flows decreases the probability of bankruptcy which otherwise causes additional exogenous transactions cost, and increases the

debt capacity (Stulz 1996, Leland 1998). Limiting the deadweight losses of bankruptcy, smooth cash-flows can then lead to a decrease in financial distress costs. Third, financially distressed firms are unable to invest in all positive NPV opportunities because of an increased cost of external financing. Smooth cash-flows can decrease the refinancing costs, stabilize the credit rating and ensure a cheaper assess to capital markets (Froot, Scharfstein and Stein 1993, Stulz 1984). Lowering the cost of capital has a direct affect on the firm's investment policies (Minton and Schrand 1999).

The general notion in the research community is that financial distress has a negative impact on the firm's financial viability. Some scholars however, argue that financial distress would increase the firm´s value because it would force managers to make drastic decisions to maximize value (Jensen 1989, Wruck 1990) as well as increase its bargaining power over stakeholders and unions (Bronars and Deere 1991, Perroti and Spier 1993).

2.3.3 Underinvestment, Debt Overhang, and Asset Substitution

Underinvestment is an indirect cost of financial distress (Stulz 1996). The underinvestment problem is also known as the debt overhang problem (Myers 1977). A firm could acquire deadweight costs when it cannot pursue positive NPV opportunities because it has default-risky debt outstanding and these projects can only be pursued when they are financed through additional equity.

Froot, Scharfstein and Stein (1993) show that firms in distress would rather choose to underinvest when internal funds are low, instead of engaging in positive NPV projects by acquiring costly outside financing. Cash-flow smoothing with forward contracts can decrease the underinvestment problem by improving the contract terms and allowing equity holders to capture parts of the value of the new investment. Hedging reduces the incentive to underinvest (Bessembinder 1991). Géczy, Minton, and Schrand (1997) analyzed 372 nonfinancial firms of the fortune 500 companies and found that 41 percent of these firms used derivatives. They also came to the conclusion that most firms that incorporated hedging into their financial strategy had greater growth opportunities but also had been financially more constrained. This suggests that leveraged firms engage in earnings smoothing activities to decrease the probability of an underinvestment. Mian (1996) tested for the arguments of Froot, Scharfstein and Stein (1993)

and Bessembinder (1991) and found no evidence that firms participating in risk management activities also have more growth options from investment opportunities relative to their assets in place.

Minton and Schrand (1999) investigated in 1,287 firms across 36 industries and observe that higher cash-flow volatility leads to lower investments in capital expenditure, R&D and advertising. They also showed that firms with high cash-flow volatility do not use the costly external market to refinance but rather stay underinvested and forego positive NPV opportunities.

The asset substitution (risk shifting) problem is based on the shareholders convex payoff to increase the risk in a firm as soon as it becomes more leveraged and thereby transfer the risk partly to the creditor (Jensen and Meckling 1976). Debt may incorporate deadweight costs if the creditor is aware that the borrower might increase the risk of the firm and thereby exploit the wealth of creditors. The more a firm faces financial distress the more the shareholders will shift risk (Kuerster and Linde 2011). Hedging can reduce the deadweight cost (Campbell and Kracaw 1987). A number of solutions have been found by the research community to mitigate the risk shifting problem; financing with convertibles (Green 1984), including collateral (Bester 1987) or hedging the incentive to shift risk. Kuerster and Linde (2011) give the risk shifting problem a multi-period time dimension. As shown by Meckling and Jensen and others, in a finite short-term investment horizon shareholders are incentivized to shift risk or to hedge when the investment horizon is long. In an infinite investment horizon, young firms with good growth opportunities in the beginning of their life cycle hedge more and mature firms with low growth opportunities hedge less.

2.3.4 Tax Incentives

It is more economically feasible to engage in risk management, the more progressive (convex) the effective tax function is for a firm. Smooth earnings and cash-flows lower the shifting between tax classes and avoid unreasonable high tax obligations (Smith and Stulz 1995, Graham and Smith, 1999). Dolde (1995) investigated in 244 Fortune 500 companies, all using derivatives, and found the relationship between tax loss carry forwards and risk management is positive and significant. Nance, Smith and Smithson (1993) examined 169 firms of which 104

engaged in hedging activities to smoothen cash flows. They also confirmed the results of Smith and Stulz, and further discovered a positive and significant correlation between tax credits and risk management. Mian (1996) confirmed these results.

Further empirical studies have been conducted by Graham and Smith (1999) and by Dionne and Garand (2000) and show that firms benefit from reducing the volatility of cash-flows by decreasing the average tax and expected tax liability. Graham and Smith analysed 80,000 firm year observations and find that 50 percent of the firms face a convex effective tax function and are incentivized to hedge. The rest of the firm sample operates with a linear or concave tax function. The firms with a convex tax function demonstrate measurable tax savings from hedging. "The average saving from five percent reduction in volatility of taxable income are about 5.4 percent of expected tax liabilities; in extreme cases, these savings exceed 40 percent." (Graham and Smith 1999, p. 2241). Dionne and Grand (2000) investigated in the expected tax payments in the gold mining industry. Their result showed that the volatility in taxable income takes a strong influence on the value of tax liability and that it is therefore sensible for mining companies to hedge the gold prices.

Gagnon, Khoury and Landry (2010) are critical about the method undertaken by Graham and Smith (1999) and Dionne and Garand (2000). In their studies, the model was extremely sensitive to the removal of large firms from the sample. Gagnon, Khoury and Landry (2010) explain that the reliance on accounting profits as proxies for taxable income may be rather inconclusive. Therefore, they computed the estimates of coefficients of variation and autocorrelation of taxable income which enabled them to control the payout policy and the effects of the payout function. This way they gained the pure effect of taxable income volatility on corporate tax liability. Under the consideration of this pure effect, a zero-payout strategy and three taxable income levels, they are also able to show that hedging can save taxes and that the after-tax income increase results from the reduction in variation of the coefficient.

2.4 Value Creation from Cash-Flow Smoothing

In 2001, one of the first empirical investigations in firm value creation from cash-flow smoothing has been conducted by Allayannis and Weston. Analysing 720 nonfinancial US firms between 1990 and 1995, they observe that the use of foreign currency derivatives positively impacts the firm market value. This effect is captured by the variable Tobin's Q in univariate tests. The study focuses on two subsamples, one sample with firms gaining from foreign sales and facing exchange rate risk exposure, whereby they differentiated between firms that hedge the exposure or firms which do not. Firms that hedge this exposure have consistently a higher mean and median of Qs compared to firms that do not. The median hedging premium for the above period is economically and statistically significant and amounts to 4.87 percent. In dollar values this equals to $153.1 million per firm based on a median sample firm value of $3.79 billion. The subsample that does not engage in foreign sales also shows a positive hedging premium. (Allayannis and Weston 2001) confirm their results by testing the robustness with a multivariate test to show if their findings hold for controls such as size, profitability, leverage, growth opportunities, ability to assess financial markets, geographic and industrial diversification, credit quality and industry classification. Just like Mian (1996), Allayannis and Weston did also not find a correlation between hedging and high growth opportunities. Additionally, they performed an event study to show if an abnormal return could be achieved by starting or stopping hedging programs. The share price reacted positively when firms started a hedging program and negatively when it was cancelled.

In 2008, again Allayannis together with Rountree and Weston presented the empirical findings that cash-flow volatility is perceived negatively by investors. A one percent increase in cash-flow volatility results in an approximate 0.15 percent decrease in firm value. The decrease in firm value is even more severe, approximately eight percent, if firm moves from the median cash-flow volatility to the lower quartile. Tobin´s Q is used as a proxy for firm value and is negatively and significantly correlated with cash-flow volatility. The study also shows that investors value hedging activities influencing cash-flow volatility positively contrary to smoothing activities via accruals. Rountree, Weston and Allayannis (2008) also agree to the studies by Allayannis and Weston (2001) and Carter, Rogers and Simkins (2006) that the firm value is increased by the use of derivatives.

Kim, Mathur and Nam (2006) show that the way how cash-flows are smoothened takes no influence on the value of the firm. The authors differentiate between operational and financial hedging whereby operational hedging is practiced by corporations to reduce the economic risk exposure and financial hedging influences to reduce the financial exposure. The scholars analyzed a firm sample of 424 companies with half of the firms being operationally hedged and the other half, matched by size and industry, non-operationally hedged. They found out that firms that are non-operationally hedged use more financial hedging relative to their foreign currency risk exposure, whereas operationally hedged firms which operate internationally do not hedge foreign currency exposure as much. The study also shows that hedging increases the firm value. Firms engaging in financial hedging receive a premium of 5.4 percent of increase in firm value and firms with operational hedging activities can increase their value by 4.8 to 17.9 percent.

Nguyen and Faff (2010) build up on the findings of former scholars and additionally identify the type of derivative instrument that increases or decreases the firm value the most, measured by Tobin's Q, They investigated the corporate use of swaps, futures, forwards and options by examining 428 firm years of Australian companies. The results show a discount is imposed on the use of derivatives particular swaps whereas the use of options is not value destroying.

2.5 Value Creation from Income Smoothing

In their survey of more than 400 executives, Graham, Harvey, and Rajgopal (2005) find that CFO focus on earnings instead of cash-flow targets. Their findings correspond well to the rationale behind income smoothing "... management's desire to enhance the value of the firm's stock" as stated by Ronen and Sadan (1981, p. 76). This is in line with findings by Dechow and Skinner (2000) who argue that managerial incentives, linked to firm value, are an important motivation for income smoothing. Hence, a multitude of studies focus on the impact on firm valuation in order to assess benefits and limitations of income smoothing.

Fudenberg and Tirole (1995, p. 75) define income smoothing as "...the process of manipulating the time profile of earnings or earnings reports to make the reported income stream less variable, while not increasing reported earnings over the long run...". Most studies rely on this definition

and compare the variability of earnings with the variability of sales as proxy for smoothing behaviour.[1]

While many studies address the valuation issue indirectly, only a limited number of studies investigate the direct impact of earnings management on the firm value. One of the first studies, Allayannis and Simko (2004) examine whether there exists a positive relationship between smoothing via discretionary accruals and firm value, measured as Tobin's Q. Nondiscretionary accruals are defined by business conditions affecting accruals while discretionary accruals are caused by managerial exploitation of accounting choices. Based on a sample of US firms between 1988 and 2006 they find that firms that exhibit volatile earnings trade at a discount compared to companies with smoother earnings. Thus, the market awards smoother earnings with a valuation premium. Interestingly, the positive impact diminished when information asymmetries are decreased *i.e.* the firm is followed by a high number of analysts. In this case, no significant relationship between earnings smoothing via accruals and firm value exists.

Huang *et al.* (2008) explain that the increase in firm value via smooth income is achieved by real smoothing (derivatives) and artificial smoothing (accruals). Investigating 477 firms from 1994 to 1996, they found that the firm value decreases as smoothing through abnormal accruals increases. Tobin's Q is used as a proxy for firm value. They showed that the magnitude of abnormal accruals is inversely related to the industry-adjusted Q. Additionally, Huang *et al.* (2008) found out that managers tend to smooth earnings more frequently via accruals in companies with weak corporate governance structures.

Both findings indicate that the degree of agency problems and manipulations determine how the market views income smoothing via accruals. In case of high analyst coverage the market is not "fooled" by income smoothing via accruals (Allayannis and Simko 2004) while Huang *et al.* (2008) suggests that that real smoothing increases the informativeness and transparency of firm's earnings. This view is supported by Huang's *et al.* (2008) findings that the actual value from smoothing with derivatives is greater in firms with weak governance structures.

Bandyopadhyay, Huang and Wirjanto (2011) investigate whether firms that consistently report earnings that deviate from cash-flows are punished by the market. In their study on US firms, they use the volatility of accruals to measure the long-term deviation of earnings from underlying

[1] For example see Michelson *et al.* (1995, 2000) and Belkaoui and Picur (1984)

cash-flow. They find that going forward – one-month to five-years – accrual volatility has a negative impact on future stock returns. This is consistent with the findings of Sloan (1996) who first showed that there exists a negative relationship between the level of accruals and future stock returns.

In a previous study, Bandyopadhyay, Huang and Wirjanto (2010) systematically assess the costs and benefits of earnings smoothing. Based on theory they argue that the two components of earnings smoothing – correlation between cash-flows and accruals and accrual volatility – have diametric effects on stock returns. Their finding suggest that while earnings smoothing leads to higher current prices these benefits are more than offset by the long-term deterioration in future returns due to increases in accrual volatility. More precisely, if earnings management decreases the standard deviation in accruals and cash-flow correlation by one while simultaneously increasing the standard deviation in accrual volatility, the net effect on annual returns is a decrease of 0.92 percent. Thus, they conclude that long-term earnings management via accruals is in fact value destroying – with the most negative effect attributed to smoothing via discretionary accruals.

Interestingly, Bandyopadhyay, Huang and Wirjanto (2010) findings confirm the impact of information asymmetry as observed by Allayannis and Simko (2004). They also find that for firms characterized by high information asymmetry, the negative effect of accrual volatility was most dominant.

In their early work Michelson *et al*. (1995) quantify the market reaction to earnings management based on abnormal returns. They find that US firms who smooth income exhibit a higher market value of equity while having lower mean return as well as lower market risk than non-smoothers. Hence, smoothing allows the firms to reduce their perceived riskiness which then – *ceteris paribus* – leads to lower market returns. However, interestingly these findings are challenged by Michelson *et al.* (2000) which show that the market responses positively to income smoothing and smoother have a significantly higher cumulative average abnormal return. Additionally, they find a strong relationship between income smoothing, size and industry variations.

Bao and Bao (2004) differentiate between smoother and non-smoothers while simultaneously taking into account the quality of earnings. Quality of earnings is defined as high if the cash from operating activities as well as primary earnings per share are positive. Additionally, the cash

content of earnings in relation to the total sample mean is taken into consideration. Only considering smoothing vs. non-smoothing, they do not find a higher price-earnings multiple for firms who engage in income smoothing *i.e.* smoother earnings have no relevance to the value of the firm. However, when taking into account the quality of earnings the study shows differences between price-earnings ratios. Smoothers with high quality earning have the highest price-earnings multiple compared to non-smoothers with low quality earnings which exhibit the lowest price-earnings multiple. Thus, their findings suggest that smoothing behavior is not per se value adding but that rather the quality of reported earnings needs to be taken into account when evaluating the value-relevance of earnings.

2.6 Value Creation by Industry Sector

Only a small number of researchers focus their investigations on selected industries. In the following subsection we will present findings with regards to the selected industries in this study.

2.6.1 Airline Industry

Carter, Rogers and Simkins (2006) confirmed the findings of Allayannis and Weston (2001) by demonstrating that jet fuel hedging is positively related to the firm value of airlines and ascertain that this is related to the reduction of the underinvestment costs in this financially constraint industry. The hedging premium accounts to around ten percent and is even greater than five percent documented by Allayannis and Weston (2001). Hoyt and Liebenberg (2011) focused their investigations on the US insurance industry looking at 275 insurers from 1998 to 2005. Unlike former scholars primarily investigating in the relevance of specific forms of hedging or risk management, Hoyt and Liebenberg aimed to explain risk management activities from a broader holistic enterprise perspective of firm value creation. Each firm engaging in enterprise risk management (ERM) was identified manually. Tobin's Q serves as the proxy for firm value. First, they showed with a univariate test that firms participating in ERM activities increase their firm value at a premium of four percent. Firms engaging in ERM also show different firm characteristics, *i.e.* they are larger, less leveraged, primarily owned by institutional investors and exhibit a lower return volatility. By using a maximum-likelihood treatment model including and

including both ERM and Q in the estimation and controlling for value determinants, *i.e.* size, leverage, the value increase from ERM even accounted for a robust and economical significant 20 percent increase in firm value.

2.6.2 Oil and Gas Producers

Pincus and Rajgopal (2002) discovered the interaction between accrual management and hedging in the oil and gas industry. They investigated in a final sample of 236 firm years with a two stage least square regression and a cross-sectional approach with hedging and smoothing ratio as the dependent variable. Their results show that the extent of hedging is a significant determinant for the amount of smoothing via abnormal accruals. Managers first determine how much of the oil prices they hedge through derivatives to then define the residual volatility which will be then smoothened by abnormal accruals.

Lookman (2004) by following the methodology of Allayannis and Weston (2001) ascertained the difference in the value of hedging between diversified and undiversified US oil and gas producer whereby for undiversified companies, with the commodity price as primary risk, hedging is associated with a lower firm value and vice versa. He also finds that hedging could be seen as a proxy to measure the cost of agency with "bad" companies demonstrating higher costs. However, most importantly he fails to measure any significance of hedging being value creating for the companies in his sample.

Jin and Jorion (2006) explored the influence of commodity derivatives on the firm value of 119 US based oil and gas producers. By investigating the relationship between stock return sensitivity to commodity prices and hedging, they find that the betas are negatively correlated to hedging. Testing the proxy for firm value Tobin's Q, the results of their study show that firm value for oil and gas producers is not affected by hedging activities.

2.6.3 Pharma and Biotechnology Industry

Choi, Mao and Upadhyay (2007) investigated a final sample of 74 firms and 221 firm years in a period from 2001 to 2003 following the study of Allayannis and Weston (2001). They examined the financial and operations hedging activities in these firms and find evidence that hedging in

this industry mitigates the underinvestment problem. The use of financial derivatives increases with the R&D spending and advertising. They were also able to show that firm value increases when hedging was used. Pharmaceutical and biotechnological which engaged in financial hedging activities were valued at a five to ten percent premium. This value increase was even greater for underinvested firms with stronger information asymmetries and larger growth opportunities. However, they were not able to measure a value increase for operational hedging activities.

2.7 Literature Review

In the following section we provide a systematic overview of existing studies on the value-relevance of cash-flow and income smoothing.

2.7.1 Summary of previous Empirical Findings

Table 1: Overview Empirical Findings on Value Creation

Authors	Published	Time Period	Region	Industry	Methodology	Value Premium/ Market Reaction	Findings supported by Theory
Value Creation from Cash-Flow Smoothing							
Allayannis and Weston	2001	1990 - 1995	USA		Multivariate Reg. - Tobin's Q	pos. (4.87%)	yes
Kim, Mathur and Nam	2006	1996 - 2000	USA		Multivariate Reg. - Tobin's Q	pos. (5.4 - 17.9%)	yes
Nelson, Moffitt, Affleck-Graves	2005	1995 - 1999	USA		Multivariate Reg - Stock Returns	pos. (4.3%)	yes
Rountree, Weston and Allayannis	2008	1987 - 1997	USA		Multivariate Reg - Tobin's Q	pos.	yes
Nguyen and Faff	2010	1999 - 2000	Australia		Multivariate Reg - Tobin's Q	neg.	no
Value Creation from Income Smoothing							
Michelson *et al*.	1995	1980 - 1991	USA		Multivariate Reg - Abnormal Returns	neg.	yes
Sloan	1996	1962 - 1991	USA		Multivariate Reg - Future Returns	neg.	yes
Michelson *et al*.	2000	1981 - 1991	USA		Multivariate Reg - Abnormal Returns	pos.	no
Allayannis and Simko	2004	1988 - 2006	USA		Multivariate Reg - Tobin's Q	pos.	no
Bao and Bao	2004	1988 - 2000	USA		Multivariate Reg - EPS	none	-
Huang *et al*.	2008	1994 - 1996	USA		Multivariate Reg - Tobin's Q	neg.	yes
Bandyopadhyay, Huang and Wirjanto	2010	1976 - 2007	USA		Multivariate Reg - Future Returns	neg.	yes
Bandyopadhyay, Huang and Wirjanto	2011	1980 - 2008	USA		Multivariate Reg - Future Returns	neg.	yes
Value Creation by Industry Setor							
Pincus and Rajgopal	2002	1993 - 1996	USA	Oil & Gas	Multivariate Reg - Smoothing Ratio	none	no
Jin and Jorion	2006	1998 - 2001	USA	Oil & Gas	Multivariate Reg - Tobin's Q	none	no
Lookman	2004	1999 - 2000	USA	Oil & Gas	Multivariate Reg - Tobin's Q	none	no
Carter, Roger and Simkins	2006	1995 - 1999	USA	Airline	Multivariate Reg - Tobin's Q	pos. (7.3%)	yes
Choi, Mao and Upadhyay	2007	2001 - 2003	USA	Pharma & BioTech	Multivariate Reg - Tobin's Q	pos. (5-10%)	yes

2.7.2 Comments on previous Empirical Findings

Value creation through cash-flow and income smoothing has been in the focus of research only in the last 15 years, making it a relatively young research area within the field of strategic finance. Most empirical studies are focused on US firms which is not surprising, given the high degree of data availability in the US. However, this natural selection presents a bias in interpreting the results. Additionally, the majority of studies do not distinguish between different industries *i.e.* neglecting the influence of unique industry characteristics on the value premium.

Most findings are supported by theory which argues that cash-flow smoothing is value enhancing while earnings management via accruals has a negative impact on firm value and reduces future stock returns. Comparing the obtained value premiums one notices a wide dispersion across the findings, from 4.3 percent to 17.9 percent. These disparities point toward a limit of generalization among the findings and highlight the importance of differentiating between contextual settings in order to increase the validity of the results. Interestingly, the proportion of researchers who do not observe results in line with theory is relatively higher for studies focused on one industry. This gives raise to the question whether industry characteristics do play a larger role in determining the value effect of cash-flow volatility than theory suggests so far. Our aim is to incorporate these value effects and to show that differences among industry exist. We also like to identify what these differences are. Our assumption is that investors value smoothing activities differently depending on the industry and its level of volatility and cyclicality. In order to increase firm value these investor preferences need to be known to maximize firm value.

The majority of studies rely on the same methodology, suggesting that differences in the obtained value premium are caused by variations in time, sample selection and contextual setting. Allayannis and Weston (2001), for example, only included firms with total assets above $500 million, while Kim, Mathur and Nam (2006) limit their sample to firms which have more than $300 million in annual sales. Thus, variations in value premium may stem from differences in sample selection. Therefore, we also like to measure the effects for all companies in one industries. This way we will be able to fully incorporate all characteristics of the industry which are influenced by smaller companies just as much as they are by larger firms. We want to mitigate the selection bias to be able to obtain meaningful results that are valid for the entire industry.

We also assess time as weakness. To our knowledge there is no study that tests for validity of results during times of economic disturbance and compares the results. We expect firm value creation, through smoothing, to be influenced by macroeconomic variables. In this case, value creation should be time bound. Therefore, we propose a sensitivity analysis in our study in order to determine whether structural changes in the economic environment may influence the results.

3 Method

This chapter offers the reader a comprehensive overview over the research approach and applied methodology. Data collection, sample construction and the building of the regression models are described thoroughly. We also present the chosen variables and the underlying theory which lead to our choices. Finally, a critical discussion on the chosen method, reliability and validity is included.

3.1 Research Approach

The value-relevance of cash-flow and earnings volatility is in the center of interest amongst researchers. Practitioners can seek advice from a wide body of empirical studies, investigating both – managerial motives as well as value creation through earnings smoothing.

However, in most cases studies are not taking into account industry-specific determinants and to our knowledge no study directly compares the impact of real and artificial smoothing across different industries. We aim to address this question by relying on theory and applying the method of Rountree, Weston and Allayannis (2008) on selected industries. The proposed research questions are derived from a review of existing literature and nested in a sound theoretical background. Cross-referencing the used methodologies and comparing our findings we position our study in the field of value-relevance and aim to contribute to the research community as well as offering practical guidance on smoothing decisions.

First, we aim to reconfirm the findings of Rountree, Weston and Allayannis (2008) by showing that smoother cash flows lead to higher firm values in US firms during the research period. Given the fact that our study period includes one of the most severe economic crises in history, it remains questionable whether their results also hold during these times of economic turmoil. Reviewing existing literature and empirical findings, the issue whether the impact of cash-flow volatility differs across industries also lacks empirical evidence. Thus, we focus our analysis on five industries. Finally, we aim to build on findings by Rountree, Weston and Allayannis (2008) and Huang *et al.* (2008) in order to investigate differences between the impact of artificial and real income smoothing on firm value.

3.2 Data and Sample Construction

In order to determine whether the impact of cash-flow smoothing differs across industries, a large number of observations - both over time and space - are needed. Thus, our data set consists of time-series and cross-sectional elements which allow us to follow a given sample of firms and obtain annual observations on each firm over the given time horizon (Brooks 2008). Also known as longitudinal or panel data, such datasets possess several advantages over traditional cross-sectional or time-series data. First and foremost, it allows us to take into account the heterogeneity across firms and/or through time by adjusting the intercept in the regression model. Furthermore, the large number of data points utilized when working with panel data improves the efficiency of estimates by increasing the degrees of freedom as well as mitigating the problem of collinearity (Hsiao 1986). By using panel data, one can also limit the problem of omitted variables which are correlated with the explanatory variables and therefore lead to biased results (Brooks 2008). However, the use of panel data also has potential drawbacks. First and foremost, typical panel data only contains view observations over a limited time period (Baltagi 1998). However, given the high number of observation over eleven years we do not assess this as problematic in our sample.

The majority of studies conducted in this field use balance sheet data extracted from the US database Compustat as well as secondary data collected from SEC fillings e.g. annual reports.[2] However, we did not have assess to the Compustat database and alternatively utilized the Thompson Reuters database Datastream in our study. Please view Appendix 2 for a detailed list of data used. Datastream provides balance sheet data on firm level only annually which restricted our study period due to a high number of missing observations prior to 1996. One has to keep in mind these constraints when interpreting our results and comparing with previously conducted studies.

The initial sample for our study consists of all companies included in the respective US industry composites as defined by Datastream: Oil & Gas Producers, General Retailer, Travel & Leisure, Pharma & Biotechnology, and Electricity & Alternative Energy. We obtain a total of 2,818 companies. However, the design of our study imposes strong data requirements on the sample. In

[2] See Rountree, Weston and Allayannis (2001/2008), Carter, Rogers and Simkins (2006), Jin and Jorion (2006) and Nelson, Moffitt and Affleck (2005) for samples based on secondary data available via Compustat and company fillings.

order to ensure consistency within our data sample we require that included companies have non-missing observations for all variables needed to estimate cash-flow, earnings and accrual volatility, dating back until 1996. In order to ensure that the selective nature of our sample does not cause our results to suffer from survival bias we carefully screened the excluded companies to closer investigate the reason for missing observations. As a result we can conclude that the sample was adjusted not only because of bankruptcy but for a variety of reasons e.g. missing Datastream observations, delisting as well as firms newly entering the industry. Therefore, we do not expect our results to be impaired by survival bias.

We obtain an overall final sample which consists of a total of 316 firms, translating into 34,760 firm-year observations over an eleven year period, starting 2000 till 2010. An industries breakdown can be found in Table 2.

Table 2: Overview - Sample

Industry Subsamples	Number of Firms
Oil & Gas Producers	55
General Retailer	107
Travel & Leisure	37
Pharma & Biotechnology	69
Electricity & Alternative Energy	48
Total	**316**

3.3 Regression Model

Utilizing an appropriate regression model allows us quantify the relationship between a set of variables which are assumed to influence the dependent variable. (Brooks 2008). In order to assess the impact of earnings and cash-flow volatility on firm value we therefore use multivariate tests to control for influencing factors which otherwise may bias our results.

Closely following the approach of Rountree, Weston and Allayannis (2008), we begin our analysis with a simple ordinary least square (OLS) model and regress all chosen control variables against Tobin's Q, as proxy for firm value. In doing so we are a) able to confirm whether our

data supports the expected coefficient signs as suggested by theory and b) obtain a basic model which provides us with a basis for future comparison.

$$Q = \alpha + \sum \beta * Control\ Variables + \varepsilon$$

Subsequently, we add our measure of cash-flow and earnings volatility to the basic model to investigate the relationship of both sources of volatility on Tobin's Q.

$$Q = \alpha + \beta_1\ CFPS\ Vol. + \sum \beta * Control\ Variables + \varepsilon$$

$$Q = \alpha + \beta_1\ EPS\ Vol. + \sum \beta * Control\ Variables + \varepsilon$$

In order to distinguish further which component of smooth income/earnings is value adding, we decompose earnings volatility into cash-flow volatility and variations in accruals following our model in Chapter 2.1. The correlation between cash-flow and accruals is used as proxy to which extent a firm engages in earnings smoothing via accruals. Subsequently, each variable is added to the regression which allows us to individually observe the impact of each component on the firm value.

$$Q = \alpha + \beta_1\ CFPS\ Vol. + \beta_2\ APS\ Vol. + Corr[CFPS, APS] \sum \beta * Control\ Variables + \varepsilon$$

Taking into account that cash-flow and accrual volatility suffer from severe multicollinearity, we follow Rountree, Weston and Allayannis (2008) and mitigate the problem by excluding first accrual volatility and later focusing only on the correlation between cash flows and accruals as measure of earnings smoothing via accruals.

$$Q = \alpha + \beta_1\ CFPS\ Vol. + Corr[CFPS, APS] \sum \beta * Control\ Variables + \varepsilon$$

$$Q = \alpha + Corr[CFPS, APS] \sum \beta * Control\ Variables + \varepsilon$$

3.4 Variables

We apply a classical multivariate approach in order to determine to which extent a change in volatility measures translates into changes in firm value. The following variables are included in our regression model.

3.4.1 Tobin's Q

The ratio of the firm's market value to the replacement costs of assets, also known as Tobin's Q, is used in order to approximate the value of the enterprise. First introduced by Tobin (1969), variations of the measure have been widely applied amongst different researchers. Chung and Pruitt (1994) utilize a simple algorithm to calculate Tobin's Q compared to Perfect and Wiles (1994) who rely on initial conditions and "recursive build-up" to calculate replacement costs of fixed assets. However, Allayannis and Weston (2001) show that different measures of Tobin's Q are highly correlated with each other and that a simple market-to-book ratio is a sufficient approximation of the actual firm value. Following Rountree, Weston and Allayannis (2008) we included the log transformation of Tobin's Q, measured by the ratio of firm's market value to the book value of assets, as dependent variable in our regression model.

$$Tobin's\ Q\ = \frac{MV\ of\ Equity + Longterm\ Debt}{Total\ Assets}$$

3.4.2 Source of Value Creation

We expect changes in the following variables to have an influence on firm value, measured as Tobin's Q.

Volatility of Earnings: The studies of Allayannis and Simko (2004) and Huang *et al.* (2008) are pioneering in quantifying a direct relationship between firm value and earnings management. Allayannis and Simko (2004) find a positive relationship between income smoothing and firm value. However, only for firms with low analyst following otherwise there is no significant relationship between the variables. Huang *et al.* (2008) on the other hand report that firm value decreases as smoothing through abnormal accruals increases.

To quantify the impact of earnings volatility on the firm value we adapt Minton and Schrand's (1999) approach and use the coefficient of variation as a measure of a firm's annual earnings volatility over a four-year period prior to the sample year. Thus, the coefficient of variation for the year 2000 is defined as the standard deviation of earnings per share (EPS) over the years 1996 – 1999, divided by the absolute value of the mean over the same period. Given the presence of significant skewness in our measure and as to lower the impact of outliers we take the natural log of the variable.

$$\ln\,(EPS\,Volatility) = \frac{StdDev\,(EPS)}{Absolute\,Mean\,(EPS)}$$

Additionally, we aim to determine whether investors differentiate between two kinds of earnings smoothing – hedging the underlying cash-flow component or utilizing earnings management via accruals. In order to assess both components we therefore decompose the volatility of earnings given the following formula.

$$\sigma^2_{Earnings} = \sigma^2_{Cash\,Flows} + \sigma^2_{Accruals} + 2cov(Cash\,Flows, Accruals)$$

Volatility of Cash-flow: Cash-flow volatility is an important determinant for firm value and in the center of firm-value research. A vast variety of studies have been conducted to investigate the relationship between the two variables.

Following Merton (1974) in his view on equity as a call option on the firm value or if cash-flow volatility stands for the uncertainty of future growth opportunities (Pastor and Veronesi 2003), an increase in volatility could actually be value enhancing. However, the majority of the research community assigns a negative relationship between cash-flow volatility and firm value, measured as Tobin's Q. Studies by Allayannis and Weston (2001), Rountree, Weston and Allayannis (2000) and Carter, Rogers and Simkins (2006) investigate the influence of cash-flow volatility and to which extent hedging can create firm value. Their findings indicate a negative relationship between a decrease in cash-flow volatility and firm value.

On an industry level Lookman (2004) and Jin and Jorion (2006) investigated the impact of commodity hedging in the oil and gas industry and did not find a significant relationship between

volatility of cash flows and firm value. Therefore, we expect the cash-flow volatility to have a negative impact on firm value but also foresee variations by industries.

In order to guarantee the comparability between cash flow and earnings volatility, we follow the same methodology as described in the previous section. The annual coefficient of variation of the cash flow per share (CFPS) is calculated based on four years previous to the sample year. As for earnings volatility we take the natural log to account for skewness in our volatility measure and to reduce the impact of outliers.

$$ln(CFPS\ Volatility) = \frac{StdDev\ (CFPS)}{Absolute\ Mean\ (CFPS)}$$

Volatility of Accruals: Accrual volatility is a measure of the absolute degree of earnings smoothing (Gu, Lee and Rosset 2005). The reason is that accruals are known to offset shocks in cash-flows and therefore the degree of earnings management is directly related to the magnitude of accrual volatility.

According to Leuz, Nanda and Wysocki (2003) and Schipper and Vincent (2003), accrual volatility has a negative impact on firm value. Therefore, we expect accrual volatility to be negatively related to firm value. In fact, our expectations are supported by Huang *et al.* (2008) who finds that firm value decreases as smoothing through abnormal accruals increases. Taken together their findings reconfirm our choice and show us that the variable has indeed an influence on Tobin's Q and is therefore a good measure to be used.

Following the approach by Rountree, Weston and Allayannis (2008), we do not differentiate between discretionary and non-discretionary accruals but rather use the difference between net income and operating cash-flow as proxy for accruals. In order to compare accruals with our measures for earnings and cash-flow volatility we scale the variable by the number of shares outstanding and estimate the volatility as coefficient of variation of the firm's accruals over the four-year period prior to the sample year.

$$Accruals\ per\ Share\ = \frac{Net\ Income - Operating\ CF}{Shares\ Outstanding}$$

$$\ln\,(APS\ Volatility) = \frac{StdDev\ (APS)}{Absolute\ Mean\ (APS)}$$

Given the presence of significant skewness in our volatility measures as well as for lowering the impact of outliers we take the natural log of accrual volatility.

Correlation between Cash-flow and Accruals: The correlation between cash-flow and accruals measures the degree of earnings smoothing relative to cash-flows. Dechow (1994) shows that the relationship between accruals and cash-flow is strongly negative. In other words, accruals tend to be used to artificially smooth earnings and offset shocks to the firms operating cash-flow.

Therefore, we follow Leuz, Nanda and Wysocki (2003) as well as Rountree, Weston and Allayannis (2008) and include the correlation between cash-flow and accruals as proxy for earnings management. This allows us to assess whether the reported earnings reflect the true underlying operational performance of the firm or are rather a product of accounting discretion.

We expect the correlation between cash-flows and accruals to have a positive impact on firm value. This is due to the fact that a more positive correlation signals that the firm engages to a lesser degree in earnings management but that the reported earnings are rather an indicator for true underlying performance.

The correlation is computed based on cash flow and accrual measures over the four years prior to the sample year.

$$Corr\ (CF, Accruals)$$

Please find our expectations in regards to value creation in Table 3 below.

Table 3: Expectation - Value Creation

Variable	Expected Sign
Earnings Volatility	Negative
Cash-flow Volatility	Negative
Accrual Volatility	Negative
Corr [Cash-flow, Accruals]	Positive

3.4.3 Control Variables

The value of a firm is impacted by a variety of different factors. In order to investigate the unique impact of cash-flow smoothing on firm value we therefore need to control for other factors that might have an influence. In line with theory and based on previous studies of Allayannis and Weston (2001/2008) we use the following control variables in our regression model.

Size: While there is no clear evidence that firm size is positively related to profitability empirical findings suggest that it determines the likelihood of hedging (Mueller 1987). Financial distress costs for smaller firms are less than proportional to their size, indicating a higher incentive to engage in risk management (Hakkarainen, Kasanen and Puttonen 2002). However, it seems that the benefits for smaller firms are offset by the high fixed costs associated with cash-flow smoothing. Mian (1996) and Nelson *et al*. (2005) show that large firms are more prone to engage in financial risk management than comparable smaller firms. We therefore include the log of Total Assets to control for differences in firm size.

$$Size = \ln(Total\ Assets)$$

Leverage: In the traditional M&M world, capital structure decisions should be irrelevant for the value of a firm (Modigliani and Miller 1958). However, given market imperfections leverage will most likely affect firm value. First, deductibility of interest payments gives raise to tax advantages which are value enhancing given the fact that they are not offset by the increase in

distress costs (Modigliani and Miller 1963). And second, debt may help to mitigate the existing agency conflict between managers and shareholders (Jensen 1986).

However, empirical research is ambiguous whether a distinct leverage-value relationship exists or if it additionally depends on specific firm characteristics such as high or low growth opportunities (McConnell and Servaes 1995). When controlling for industry effects among US firms Aggarwal and Zhao (2007) find a negative relationship between leverage and firm value – both for high growth and low growth firms. Therefore, we included the ratio of Long-term Debt to Total Assets in order to control for differences in capital structure, following the approach of Rountree, Weston and Allayannis (2008).

$$Leverage = \frac{Long - term\ Debt}{Total\ Assets}$$

Profitability: Profitability is positively related to firm value given the fact that profitable firms tend to trade at a premium. To control for differences in profitability across our sample we include the variable Return on Assets (ROA) as proxy for profitability.

$$ROA = \frac{Net\ Income}{Total\ Assets}$$

Growth Prospects: The value of a firm depends on its investment opportunities as determinants of future growth (Myers 1977, Smith and Watts 1992). In line with the underinvestment motive Froot, Scharfstein and Stein (1993) argue that firms with smoother cash-flows are more likely to have higher investment opportunities. Empirical findings by Géczy, Minton and Schrand (1997) reconfirm theory and show that hedgers indeed have higher investment opportunities, and hence a higher Q.

Therefore, we follow Rountree, Weston and Allayannis (2008) and include both the ratio of Capital Expenditures (CAPEX) to Total Sales as well as Research & Development (R&D) to Total Sales as proxy for future investment opportunities.

$$Growth_1 = \frac{CAPEX}{Total\ Sales}$$

$$Growth_2 = \frac{R\&D}{Total\ Sales}$$

CAPEX or R&D spending may not be of importance for each and every industry – for example R&D spending in retail. Therefore, we equate missing observations with zero in order to maintain a sufficient sample size.

Financial Constraints: Cash in excess of funds needed to pursue all projects with a positive net present value gives raise to severe agency conflicts (Jensen 1986). This is in line with the findings of Lang and Stulz (1994) which indicate a negative relationship between accessibility of external financing and firm value. Capital constrained firms can only pursue investment opportunities with a positive net present value which ultimately translate into a higher value for Q. Firms with substantial free cash-flow or easy access to external funds on the other hand tend to destroy value by overinvesting (Carter, Roger and Simkins 2006).

Fazzari, Hubbard and Petersen (1988) have shown that dividend paying companies are less likely to experience capital constraints. Thus, we include a dividend dummy in our regression in order to assess the accessibility of external funds.

$$Dividend\ Dummy = \begin{cases} 1\ if\ Dividend\ Payment \\ 0\ otherwise \end{cases}$$

However, dividend payouts not only reveal information about the assess to capital markets but also have a strong signaling effect (Odgen, Jen and O'Connor 2003). Cash payouts such as dividends and share repurchases mitigate the information asymmetry problem between managers and shareholders. The commitment to pay out dividends, especially since dividends are known to be "sticky", can be seen as signal to the market in regards to future earnings capacity and hence indicate a higher firm value.

Please find our expectations, according to theory, on the coefficient sign of the included variables in the Table 4 below.

Table 4: Expectation - Control Variables

Variable	Expected Sign
Size	Positive
Leverage	Negative/Positive
Profitability	Positive
Growth Prospects	Positive
Financial Constraints	Negative/Positive

3.5 Methodological Discussion

In conducting our study we closely follow the approach of Rountree, Weston and Allayannis (2008) to measure the value creation through cash-flow smoothing. Their study provides the underlying framework for our regression model and variable selection. Furthermore, we refer to comparable studies on value creation through hedging as well as risk and earnings management in order to cross-reference our approach.

In this section we will subsequently discuss the econometric specifications of the regression model, modifications to the choice of variables and finally comment on the validity and reliability of this study.

3.5.1 Regression Model

In order to meet the requirements of an ordinary least square regression and obtain reliable results a set of underlying assumption must be fulfilled (Brooks 2008). We ensure the validity of our regression model by testing for autocorrelation, heteroscedasticity, normality and specification errors.

The input data for our regression model is specified as balanced panel data consisting of time-series as well as cross-sectional elements. In order to assess whether multicollinearity is present in our sample we calculate the correlation among our independent variables. In none of the

subsamples or the total sample we find correlation exceeding 0.8. Additionally, we account for possible multicollinearity between our volatility measures by subsequently excluding each variable in our regression. Due to the nature of our sample we detect heteroscedasticity and accounted for it through the use of White cross-section standard errors. We adjust for autocorrelation by including one lag of Tobin's Q in our model.

In order to ensure the normality distribution of residuals we pay close attention to possible outliers. Firms exhibiting multiple outliers which cause large misspecifications are removed from the overall sample. Furthermore, we accounted for single observation outlier through the use of a dummy variable. However, in order to not fit the data to our model but maintain the true sample characteristics we limited the outtake of individual observations to two till three per regression.

Testing the data we obtain both period and cross-sectional effects, *i.e.* the firm value is influenced both by time and individual firm characteristics. The Hausman test indicates that a random effect model is not supported by our data. Therefore, our final regressions are estimated using a fixed effect model with both time and cross-sectional fixed effects.

Finally, we also included a sensitivity analysis into our model. Rountree, Weston and Allayannis (2008) include a series of simple cross-sectional regressions in their study to assess whether their results are subject to changes in the economic cycle. By including a dummy variable for the year 2006 into our regression we are able to perform a modification of the Chow breakpoint test. This allows us to divide our data set and assess if the financial crisis might alter our results.

3.5.2 Critical Comments

Most studies in this area use the US database Compustat while we based our sample selection on Datastream. The software does not allow the data to be filtered according to the commonly used US industry SIC codes. Therefore, it was not possible to break down the data into more precise subsamples which may have refined our results. Additionally, the database does not offer quarterly data which influenced the observations used to calculate the volatility of our variables. One has to keep in mind these restrictions when comparing our industry data sample as well as our results with other studies.

The restricted access to data as well as the inclusion of the financial crisis in our sample period has motivated us to modify the calculation of input variables, especially the volatility measures. Instead of the perfect foresight measure as introduced by Rountree, Weston and Allayannis (2008), we utilize the coefficient of variation as applied by Minton and Schrand (1999) to quantify the volatility.

We consider the use of the perfect foresight measure as problematic given the fact that the underlying assumption of the investor's perfect foresight remains highly questionable. Especially if one considers the sample period, which includes one of the worst economic shock of all times. Using the perfect foresight measure as a method to calculate volatility would imply that investors had anticipated the crisis, which was clearly not the case. Therefore, we are of the opinion that the use of the coefficient of variation better reflects the assumption of a rational investor.

Furthermore, we use the last four years prior to the sample year as input for our volatility estimation based on Nissim (2002). We view Rountree, Weston and Allayannis' (2008) usage of quarterly data critical given the fact that a firm's cash flow might simply be influenced by seasonality rather than being per se volatile. Thus we focus on annual data which allows us to mitigate the seasonality and rather investigate the impact of medium-term effects.

3.5.3 Validity

The degree of validity is important to keep in mind when drawing conclusions from empirical studies. Following Rountree, Weston and Allayannis (2008) as well as cross-referencing with a multitude of similar studies, the used methodology is nested in a sound theoretical framework. We therefore classify the used methods as applicable and valid. However, the generalization of our results must be critically discussed.

We like to point out that our study is based on companies and investor behavior in regards to value creation in the US. As many studies and literature from the US are on the forefront of academia throughout the world, we may suggest that this paper may also be used with the same care as other studies stemming from the US. Of course, investors may value smoothing in the various industries much different than in the US. Especially because European markets are known to be more conservative this may serve as a natural argument for more smoothing

activity. We need to stress that differences may exist. However, the main aim of our work is to point out that industry specifics, firm and time specifics are important when researching in this field. This conclusion is very well valid also in other markets than the US.

3.5.4 Reliability

Reliability refers to the consistency of an analysis and to which degree the findings are replicable. In other words, would someone else be able to obtain the exact same results again or are the obtained results subject to measurement errors. In order to ensure a high degree of reliability, both the collected data and the used methodology must be critically examined.

The data used in this study has been collected from the Thomson Reuters database Datastream which can be classified as a reliable source. The process of sample construction is thoroughly described and observations are excluded solely based on objective criteria such as missing observations within the study period. Furthermore, the used items are described in detail in Appendix 2. The econometric analysis is conducted using EViews software, a widely used software tool which guarantees a high degree of reliability in processing the data. All regressions are controlled for normality, autocorrelation, heteroscedasticity and misspecification and if necessary, adjusted for the aforementioned. Thus, we view the results of this study as reliable and in line with commonly accepted research standards.

4 Empirical Findings and Analysis

In the following chapter we present and analyze our obtained results in regards to theory and existing empirical findings. First, we provide an overview over the total sample, show the respective results and critically discuss the use of a cross-industry sample. Finally, we discuss and analyze the obtained results for each industry individually.

4.1 Descriptive Statistics

The descriptive statistics illustrate the nature of or our total sample including all 316 firms across all the five industries. The summary in Table 5 includes the values of the descriptive variables and the measures of risk used in the regression model.

At a first glance it becomes clear that the companies are well spread by size and value across the total sample. The mean (median) of the total assets variable amounts to $7.6 million ($0.857 million) with a standard deviation of $21.5 million. The average (median) firm value measured by equity market value is equal to $9.3 million ($0.819 million) with a standard deviation of $34.7 million. The firms in our sample finance their assets with 27 percent debt on average. However, this capital structure varies a lot which is indicated by our standard deviation of 55.979. On average, the firms in our sample only achieve a negative return on assets of -4,615 percent. Capital expenditures account for 44.6 percent of the sales. Tobin's Q, our proxy for firm value equals 3,252 and the median is 1,277. We obtain a median similar to the value shown in the study of by Rountree, Weston and Allayannis (2008). However, the mean value for Tobin's Q is higher. This indicates that the firms of the industries generally have a higher firm value compared to their study sample.

Table 5: Descriptive Summary - Total Sample

	Mean	Median	Std. Dev
Panel A: Descriptive Variable			
Total Assets (m$)	7,562,152	856,820	21,487,793
Equity market value (m$)	9,282,147	819,225	34,659,866
Return on assets	-4.615	4.720	61.008
Debt-to-asset	26.888	20.035	55.979
CAPX-to-sales	44.626	6.240	553.020
Tobin's Q	3.252	1.277	40.421
Panel B: Measures of risk			
Earnings per share (ESP)	1.121	0.540	2.117
Volatility of EPS (Std. Dev)	3.459	0.501	48.778
Cash-flow per share (CFPS)	2,369	1,570	4,502
Volatility of CFPS (Std. Dev)	1.509	0.501	48.778
Total Earnings	535,157	21,267	2,684,480
Total Cash-Flow	969,443	70,522	3,767,971

To measure our risk we include earnings per share as a measure for our earnings and its volatility as well as cash-flow per share and volatility, total earnings and total cash-flow. The mean of the EPS which our firms achieve is 1.121, the median is 0.54 and the standard deviation is 2.117.

From analyzing our overall sample it becomes visual that the sample distribution is skewed. The total earnings equal to $0.535 million and the total cash-flow equals to $0.969 million on average whereas the median only accounts for $21,267 and $70,522 and a standard deviation of $2.7 million and $3.7million respectively. These values show that our data sample incorporates a great number of small firms with low total earnings, return on investor capital, low EPS and small operating cash-flows, contrary to a few firms with high firm value *etc*.

To further investigate in this matter we observed the statistical descriptive by each industry. A detailed overview of our results is provided in Appendix 1.

Already at the first glance one notices differences between the industries. The Pharmaceutical & Biotechnological industry shows a considerably higher mean of 9.56 for Tobin's Q in comparison to the other industries which exhibit a mean in the average of 1.053 (Electricity & Alternative Energy) and 1.704 (Retail).

Interestingly, the Pharmaceutical & Biotechnology industry – while on average having the highest firm values – employs the lowest amount of total assets equal to $3.8 million. Comparing both the median of total assets in the Pharmaceutical & Biotechnology industry ($118,850) as well as the results for equity value (Mean $10.2 million vs. Median $294,771) we can conclude

that a high number of small cap firms are to be found in this industry. With a mean ROA of 2.60 percent and a median of -13.41 percent we see a high dispersion among the included firms (Std. Deviation 91.08). A high number of firms are not profitable while a relatively small proportion generates attractive returns. This is in line with the industry characteristics of a majority of small, high growth Biotechnology firms and only a handful of large low growth Pharma companies dominating the industry.

Analyzing asset intensity, we observe that the two industries active in the commodity business (Oil & Gas Producer and Electricity & Alternative Energy) exhibit the highest asset intensity of approximately $13 million of total assets. However, the Oil & Gas industry is considerably more profitable with an average ROA of 7.77 percent compared to a negative ROA of 5.88 percent in the Electricity & Alternative Energy industry. Again, as in Pharma & Biotechnology we are under the impression that in the Electricity & Alternative Energy industry a few profitable firms drive the results (Median ROA 4.1 percent).

Both in Retail and Travel & Leisure we observe a high degree of dispersion in regards to size and equity market value, with a standard deviation of $19.2 million (size) and $23.5 million (equity value) for Retail as well as a standard deviation of $7.6 million (size) and $6.3 million (equity value) in the Travel & Leisure industry. Nevertheless, when comparing the overall results to the other industries we are under the impression that both Retail and Travel & Leisure are more homogenous in regards to the measured variables.

In terms of measures of risk we obtain the highest volatility for earnings and cash-flows among Pharma & Biotechnology firms with a mean of 5.82 percent (earnings volatility) and 2.88 percent (cash-flow volatility). Followed by the Electricity & Alternative Energy industry with a mean of 4.88 percent (earnings volatility) and 0.89 percent (cash-flow volatility) respectively. The conservative Travel & Leisure industry on the other hand, exhibits the lowest degree of volatility with a mean of 1.55 percent (earnings volatility) and 0.71 percent (cash-flow volatility). In line with the high risk exposure, the Pharma & Biotechnology is also characterized by the highest standard deviation in ROA 91.09 percent vs. 7.33 percent in Travel & Leisure. These results are not surprising considering the fundamental differences in the nature of the respective industries.

4.2 Results and Analysis – Overall Sample

In Table 6, we present our regression results across the entire data sample. In order to detect the influence of each volatility measure on Tobin's Q, we run the regression in six combinations.

In Set 1 we demonstrate the results from our basic regression with the log-scaled-transformed Tobin's Q as dependent variable. In order to control for other influencing factors such as size and leverage, we included the control variables described in the methodology. Additionally, we included a dummy for extreme outliers and an additional lag variable for our Tobin's Q which shows to be highly significant and also increases the quality of our test result. This suggests that additional to the control variables retrieved from theory, yesterdays firm value impacts today's Tobin's Q.

In Set 2 we include the log transformation for cash-flow volatility in order to assess the impact of cash-flow smoothing on firm value, while Set 3 instead includes a measure for income smoothing.

Additional to the general impact of smoothing, we aim to detect whether investors are able to distinguish between the three underlying components of smooth income: cash-flow volatility, accruals volatility and the correlation between cash-flow and accruals as proxy for the relative degree of earnings management. In order to account for possible multicollinearity between the variables, we add these step by step to our underlying model (Set 4-6).

Table 6: Regression Results - Total Sample

Panel Regression 1: Total Data Sample						
Dependent variable: ln(Tobin's Q) with p-values are in parentheses						
Variables	**Set 1**	**Set 2**	**Set 3**	**Set 4**	**Set 5**	**Set 6**
ln(Cash-flow volatility)		0.0141		0.0141	0.0141	
		(0.1081)		(0.1067)	(0.1084)	
ln(Earnings volatility)			-0.0001			
			(0.9267)			
ln(Accrual volatility)				-0.0021		
				(0.6275)		
Corr(Cash-flow, accruals)				-0.0045	-0.0042	-0.0064
				(0.5839)	(0.6164)	(0.4415)
ln(Total assets)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.7058)	(0.8020)	(0.8096)	(0.8067)	(0.8010)	(0.8083)
Debt-to-total assets	0.0945	0.1029	0.1020	0.1028	0.1029	0.1020
	(0.0093)***	(0.0068)***	(0.0076)***	(0.0068)***	(0.0069)***	(0.0076)***
Profitability	-0.0184	-0.0294	-0.0293	-0.0295	-0.0295	-0.0293
	(0.1478)	(0.0000)***	(0.0001)***	(0.0000)***	(0.0000)***	(0.0001)***
CAPEX-to-sales	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.9279)	(0.7958)	(0.7879)	(0.8461)	(0.8015)	(0.7972)
R&D-to-sales	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0761)*	(0.0597)*	(0.0572)*	(0.0630)*	(0.0619)*	(0.0591)*
Dividend	0.0038	-0.0034	-0.0063	-0.0049	-0.0036	-0.0067
	(0.9430)	(0.9538)	(0.9131)	(0.9347)	(0.9504)	(0.9084)
Dummy1	0.8946	0.9626	0.9710	0.9624	0.9624	0.9708
	(0.6052)	(0.5771)	(0.5741)	(0.5773)	(0.5772)	(0.5742)
ln(Tobin's Q -1)	0.4073	0.4432	0.4427	0.4423	0.4431	0.4426
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
R-squared	0.8144	0.8541	0.8532	0.8542	0.8541	0.8532

Although, we obtain a high R^2 as well as a Durbin-Watson test value of around two, our results based on the total sample seem to be inconclusive. Our results show significant coefficients for the variables leverage and profitability in which the leverage positively influences our firm value and profitability possibly negatively. Theory, however, suggests a significant negative impact in size (total assets) and leverage. Profitability, R&D and CAPEX on the other hand, should be significant and positive. All other variables are insignificant at five percent level and do not influence Tobin's Q.

When analyzing the total data sample, we do not obtain significant results from the volatility measures. Investors do assess neither cash-flow nor income smoothing as important and do not consider it to be value relevant. These results are in line with the ambiguous findings on whether smoothing is a positive and value enhancing or negative NPV decision. We view our lack of significance over the total sample as conformation to our previous stated criticism in regards to cross-industry sample selection.

Additionally, we suspect that time dependence may play an important role when assessing the impact of smoothing on firm value. Thus, we turn our analysis to possible period-specific effects which might alter our results.

Our study period included one of the most severe times of economic turmoil and high market volatility, the financial crisis. Therefore, we include a sensitivity test to measure the macro financial impact on the firm value (Tobin's Q). This is done by splitting the sample period in two subsamples: pre and post financial crisis. The first signs of the real-estate crisis in the United States and the slow-down of the economy became obvious in 2007. Please view Appendix 3 for the development of the GDP growth in the US. Based on this we decided to split our study period at the end of 2006. By doing so, we are determined to find more conclusive results prior to the crisis by measuring the period 2000 until the end of 2006, while at the same time accounting for the extraordinary market conditions during 2007 until 2010. Please find the results of our sensitivity analysis in Table 7.

However, we still do not get a clear picture of how smoothing impacts firm value in our total sample. Prior to the crisis, we obtain significance for the variable profitability with a negative impact. This is highly questionable from a theoretical point of view. All other variables are insignificant at a five percent significance level. Analyzing the results after the break point, a period of economic turmoil, it is not surprising to see that the volatility in cash-flow (0.0412) and earnings (0.0096) is significant. Unlike former studies, volatility has a positive impact on the Tobin's Q.

Concluding from the time specific-period test, in our opinion it is most important to account for the fact that time alters the investors view on smoothing. We clearly observe that the financial crisis had an impact and that our results change, when testing for sensitivity.

This result confirms our presentiment, supported by the results from our descriptive data analysis. We cannot follow the prevailing approach in testing the impact of smoothing across all industries and times.[3] Instead we will have to add more dimensions to efficiently analyze the impact of smoothing on the firm value. In a next step, we therefore split our total sample into the aforementioned industries, conduct individual multivariate regressions and test for time effects.

[3] Please view Rountree, Weston and Allayannis (2008), Allayannis and Weston (2001), Nelson, Moffitt and Affleck-Graves (2005) for a generalization across industries.

Table 7: Period-Specific Effects - Total Sample

Panel Regression 1:
Total Data Sample Adjusted for Period-Specific Effects

Dependent variable: ln(Tobin's Q) with p-values are in parentheses

Variable	Set 1	Set 2	Set 3	Set 4	Set 5	Set 6
ln(Cash-flow volatility)		0.0102		0.0103	0.0102	
		(0.1173)		(0.1237)	(0.1183)	
ln(Earnings volatility)			-0.0009			
			(0.2142)			
ln(Accrual volatility)				-0.0039		
				(0.6489)		
Corr(Cash-flow, accruals)				0.0049	0.0045	0.0013
				(0.7925)	(0.8112)	(0.9451)
ln(Total assets)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.6173)	(0.4444)	(0.4509)	(0.4383)	(0.4519)	(0.5416)
Debt-to-total assets	0.0956	0.1084	0.1074	0.1079	0.1081	0.1049
	(0.1061)	(0.0678)	(0.0721)	(0.0728)	(0.0733)	(0.0826)
Profitability	-0.0336	-0.0349	-0.0348	-0.0348	-0.0348	-0.0348
	(0.5404)	(0.0013)***	(0.0014)***	(0.0014)***	(0.0013)***	(0.0014)***
CAPEX-to-sales	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.2874)	(0.2621)	(0.2721)	(0.2585)	(0.2624)	(0.2664)
R&D-to-sales	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.1280)	(0.1004)	(0.1072)	(0.1015)	(0.1013)	(0.1082)
Dividend	-0.0069	-0.0269	-0.0270	-0.0285	-0.0265	-0.0244
	(0.8786)	(0.5901)	(0.5755)	(0.5773)	(0.6004)	(0.6193)
Dummy1	0.8928	0.9578	0.9730	0.9580	0.9579	0.9742
	(0.6081)	(0.5801)	(0.5745)	(0.5803)	(0.5803)	(0.5744)
ln(Tobin's Q -1)	0.4073	0.4396	0.4433	0.4383	0.4397	0.4441
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
D2006*ln(Cash-flow volatility)		0.0412		0.0408	0.0413	
		(0.0017)***		(0.0024)***	(0.0019)***	
D2006*ln(Earnings volatility)			0.0096			
			(0.0003)***			
D2006*ln(Accrual volatility)				0.0025		
				(0.7739)		
D2006*CORR(Cash-flow, accruals)				-0.0041	-0.0032	-0.0149
				(0.8772)	(0.9052)	(0.5281)
D2006*ln(Total assets)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.4577)	(0.7859)	(0.5724)	(0.7756)	(0.7854)	(0.5353)
D2006*Debt-to- total asset	-0.0326	-0.0405	-0.0476	-0.0372	-0.0391	-0.0399
	(0.7614)	(0.7432)	(0.7162)	(0.7700)	(0.7604)	(0.7674)
D2006*Profitability	0.0180	0.0173	0.0172	0.0172	0.0172	0.0174
	(0.7326)	(0.1945)	(0.1943)	(0.1922)	(0.1916)	(0.1848)
D2006*CAPEX-to-sales	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.2140)	(0.1877)	(0.1972)	(0.1820)	(0.1864)	(0.2055)
D2006*R&D-to-sales	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0530)	(0.1453)	(0.0733)	(0.1516)	(0.1452)	(0.0677)
D2006*Dividend	0.0169	0.0593	0.0421	0.0594	0.0588	0.0306
	(0.7381)	(0.2169)	(0.4034)	(0.1959)	(0.2120)	(0.5201)
R-squared	0.8149	0.8557	0.8540	0.8558	0.8557	0.8538

4.3 Industry Comparison

Considering the inconclusive results in the previous section, we subsequently present and analyze the results for each industry. If necessary we adjusted our sample for outliers by including dummy variables, and included a lag of Tobin's Q to mitigate the problem of autocorrelation. Overall, the results have improved if considering only inter-industry data. Compared to the study of Rountree, Weston and Allayannis (2008) we receive very high R^2 which reflect the better fit of our model due to industry specification of our data.

4.3.1 Results and Analysis – Electricity & Alternative Energy

Table 8 shows the regression results for the Electricity & Alternative Energy industry with the log-scaled-transformed Tobin's Q as the dependent variable.

Analyzing the results from Set 1 we see that profitability has a positive impact (1.4635) on firm value and is significant at the five percent level. This is in line with underlying assumptions on firm valuation and somewhat intuitive.

In regards to the debt-to-total asset ratio, previous research is ambiguous whether debt has per se a positive or negative impact on firm value (McConnell and Servaes 1995). For the Electricity & Alternative Energy industry, we see a strong positive impact from leverage on the firm value. Taking into account the specific characteristics of the industry, for example partial regulation, capital intensity and non-cyclicality we argue that firms generally can afford higher debt levels. Hence, leverage in this industry is viewed as positive.

Additionally, we obtain a significant, positive coefficient of 1.4635 for the dividend dummy. Thus, firms who are less financially constrained benefit from the signalling effect of dividend payouts and experience a higher valuation. In case of the Electricity & Alternative Energy industry, it seems that the positive signalling effect offsets the risk of overinvestment as described by Carter, Roger and Simkins (2002).

When examining the impact of smoothing behaviour, we obtain a negative coefficient for the variable cash-flow volatility of -0.0164 in Set 2. However, while the results are negative they lack significance. Cash-flow smoothing in the Electricity & Alternative Energy industry is of no importance to the shareholder. Earnings volatility, on the other hand, has a significant impact on

firm value. A one percent increase in earnings volatility leads to 3.9 percent decrease in firm value. This is in line with findings by Allayannis and Simko (2004) who find that firms who exhibit volatile earnings tend to trade at a discount compared to companies with smoother earnings.

The results from Set 2 and 3 indicate that investors in the Electricity & Alternative Energy only focus on smooth income and do not pay close attention by which means it is achieved. Nevertheless, we aim to take a closer look on the different components of smooth income to verify our first impression.

Accrual volatility is a measure for the absolute degree of earnings smoothing which has a significant, negative coefficient of -0.0570. This is in line with the findings of Leuz, Nanda and Wysocki (2003) and Schipper and Vincent (2003) stating that accrual volatility has a negative impact on firm value. However, when directly comparing both determinants of smooth income: cash-flow volatility and correlation between accruals and cash-flow, our aforementioned intuition that investors do only seem to care about the final results – smooth income – is confirmed.

The results in Set 6 show that investors do not discount firms which exhibit a higher degree of earnings smoothing relative to cash-flow smoothing, as measured by correlation between accruals and cash-flow. Given the underlying assumption that the correlation between accruals and cash-flow is negative (Dechow 1994) and the coefficient of correlation is negative -0,0736 too, than we observe a net positive impact on firm value. The negative influence of accrual is offset by the positive impact assigned to smoother income.

This confirms our initial findings that investors in the Electricity & Alternative Energy industry do not discriminate between the cash-flow and earnings smoothing. The sole focus on earnings might evoke memories of one of the most prominent accounting scandals – Enron – taking place in the Electricity industry.

Finally, we are interested whether the impact of smoothing might additionally be bound to specific time periods or events. Therefore, we test the sensitivity of our results to the macro-economic environment. Please view Table 9 for detailed results.

Prior to the financial crisis from 2000 until 2006, the significance and influence of the variables on firm value remains unchanged. However, when evaluating our results in times of the financial crisis the negative coefficient for cash-flow volatility (-0.0371) becomes significant while the previously negative impact of earnings volatility turns positive (0.0391). We are cautious to interpret these results given the fact that they might be driven by extraordinary events during this time of economic turmoil.

In summary, we see that investors in the Electricity & Alternative Energy industry value smooth income prior to the crisis and do not particular pay much attention to how it is achieved.

Table 8: Regression Results - Electricity & Alternative Energy

Panel Regression 2:
Industry Data Sample - Electricity & Alternative Energy

Dependent Variable: ln(Tobin's Q) with p-values are in parentheses						
Variable	**Set 1**	**Set 2**	**Set 3**	**Set 4**	**Set 5**	**Set 6**
ln(Cash-flow volatility)		-0.0164		0.0026	-0.0309	
		(0.1481)		(0.8154)	(0.0183)**	
ln(Earnings volatility)			-0.0387			
			(0.0326)**			
ln(Accrual volatility)				-0.0570		
				(0.009)***		
Corr(Cash-flow, accruals)				-0.0821	-0.0951	-0.0736
				(0.0057)***	(0.0079)***	(0.0251)**
ln(Total assets)	-0.1839	-0.1901	-0.2232	-0.2355	-0.2053	-0.1916
	(0.0066)***	(0.0052)***	(0.0014)***	(0.0022)***	(0.0044)***	(0.0062)***
Debt-to-total assets	2.0999	2.1059	2.1475	2.2619	2.1878	2.1591
	(0.0001)***	(0.0001)***	(0.0001)***	(0.0000)***	(0.0000)***	(0.0001)***
Profitability	1.4635	1.5137	1.6788	1.6307	1.5809	1.4811
	(0.0053)***	(0.0046)***	(0.0027)***	(0.0013)***	(0.0037)***	(0.0047)***
CAPEX-to-sales	-0.0030	-0.0030	-0.0029	-0.0035	-0.0034	-0.0033
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
R&D-to-sales	-0.0033	-0.0034	-0.0035	-0.0033	-0.0038	-0.0035
	(0.4965)	(0.4814)	(0.4206)	(0.4799)	(0.4336)	(0.4672)
Dividend	0.3812	0.3757	0.4315	0.4449	0.4144	0.4150
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
Dummy1	-4.1950	-4.1955	-4.2021	-4.1936	-4.2024	-4.2000
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
R-squared	0.8066	0.8073	0.8143	0.8182	0.8119	0.8097

Table 9 Period-Specific Effects - Electricity & Alternative Energy

Panel Regression 2: Industry Sample Adjusted for Period-Specific Effects						
Dependent variable: ln(Tobin's Q) with p-values are in parentheses						
Variable	**Set 1**	**Set 2**	**Set 3**	**Set 4**	**Set 5**	**Set 6**
ln(Cash-flow volatility)		-0.0072		0.0186	-0.0219	
		(0.5305)		(0.2309)	(0.1068)	
ln(Earnings volatility)			-0.0519			
			(0.0116)**			
ln(Accrual volatility)				-0.0680		
				(0.000)***		
Corr(Cash-flow, accruals)				-0.0877	-0.1164	-0.1055
				(0.0011)***	(0.0023)***	(0.0061)***
ln(Total assets)	-0.1870	-0.1965	-0.2251	-0.2234	-0.2109	-0.1930
	(0.0079)***	(0.0063)***	(0.0013)***	(0.0039)***	(0.0056)***	(0.0075)***
Debt-to-total assets	2.0714	2.1112	2.0883	2.2538	2.1792	2.1203
	(0.0001)***	(0.0001)***	(0.0001)***	(0.0000)***	(0.0000)***	(0.0000)***
Profitability	1.0827	1.0952	1.2032	1.2952	1.1736	1.1109
	(0.0197)**	(0.0187)**	(0.0112)**	(0.0079)***	(0.0166)**	(0.0198)**
CAPEX-to-sales	-0.0016	-0.0013	-0.0023	-0.0023	-0.0018	-0.0018
	(0.1396)	(0.2483)	(0.0389)	(0.0442)	(0.1160)	(0.0918)
R&D-to-sales	-0.0058	-0.0059	-0.0069	-0.0053	-0.0060	-0.0058
	(0.3038)	(0.3039)	(0.1092)	(0.3383)	(0.2824)	(0.3036)
Dividend	0.3817	0.3636	0.4291	0.4059	0.4057	0.4150
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
D2006*ln(Cash-flow volatility)		-0.0371		-0.0604	-0.0351	
		(0.0917)*		(0.0447)**	(0.0928)*	
D2006*ln(Earnings volatility)			0.0391			
			(0.0508)*			
D2006*ln(Accrual volatility)				0.0450		
				(0.1137)		
D2006*CORR(Cash-flow, accruals)				0.0115	0.0334	0.0569
				(0.7826)	(0.4000)	(0.1915)
D2006*ln(Total assets)	0.0041	0.0028	-0.0063	0.0039	0.0031	0.0009
	(0.7045)	(0.8049)	(0.5814)	(0.7299)	(0.7853)	(0.9378)
D2006*Debt-to-total asset	0.3095	0.2743	0.3567	0.2630	0.3782	0.3798
	(0.1379)	(0.1753)	(0.0944)*	(0.2261)	(0.0590)*	(0.0632)*
D2006*Profitability	0.8743	0.9932	1.0490	0.7865	0.8641	0.7823
	(0.1454)	(0.0828)*	(0.0402)**	(0.1345)	(0.0881)*	(0.1461)
D2006*CAPEX-to-sales	-0.0044	-0.0048	-0.0038	-0.0039	-0.0049	-0.0045
	(0.0130)**	(0.0115)**	(0.0366)**	(0.0206)**	(0.0144)**	(0.0165)**
D2006*R&D-to-sales	0.0068	0.0063	0.0060	0.0058	0.0059	0.0066
	(0.0649)*	(0.0902)*	(0.1025)	(0.0699)*	(0.0788)*	(0.0566)*
D2006*Dividend	-0.0289	-0.0503	0.0288	-0.0271	-0.0521	-0.0277
	(0.6807)	(0.5174)	(0.6060)	(0.7043)	(0.4930)	(0.6853)
Dummy1	-4.2099	-4.2049	-4.2029	-4.1939	-4.2128	-4.2125
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
R-squared	0.8104	0.8121	0.8216	0.8222	0.8174	0.8143

4.3.2 Results and Analysis – Oil & Gas Producer

According to our earlier assumption, we receive better results when analysing the Oil & Gas industry separately. Please view Table 10. In addition, we also observe time-specific effects with regards to the impact of smoothing.

When analysing the entire period from 2000-2010, we do not receive results that allow for any conclusion. In Set 1 our control variable, profitability is positive but insignificant. The debt-to-total asset ratio is positive and significant (0.3498) at a five percent significance level, indicating that in the Oil & Gas Industry debt increases firm value. Similarly as in the Electricity industry this is explained by the capital intensity as well as non-cyclicality of the industry which allows for high debt ratios. Profitability, on the other hand, decreases firm value which is a highly questionable result.

Set 2 shows a positive coefficient for cash-flow volatility (0.0037) and a negative coefficient for earnings volatility (-0.003). However, both are not significant at a five percent level. It seems that over the entire time period 2000 till 2010 investors did not acknowledge smoothing activities. Our results are in line with the results by Lookman (2004) and Jin and Jorion (2006). Both were also not able to show credible results from studying the Oil and Gas industry during 1998-2001. We suspect that period-specific effect might cause the lack of conclusive results and therefore, we further tested which influence the dimension time has on this industry.

The results in Table 11 show that the oil and gas industry is sensitive to time and disruptive events. Our test results improve when we split the data in the end of the year 2006. During the period prior to the crisis, we observe more significant results. Both cash-flow volatility and earnings volatility are now significant at a five percent level. Set 2 and 3 show that prior to the crisis investors do not mind cash-flow volatility (0.0034) yet value smooth income and discount firms with volatile earnings. Thus, a one percent increase in volatility led to a decrease in firm value of 1.3 percent or in monetary terms $209.000.

Analyzing Set 4 we derive that the investors have no preference by which means earnings are smoothed, they do not discriminate between smoothing via cash-flow and smoothing via accruals.

Interestingly, during the financial crisis our result for earnings volatility is reversed. In the time of economic turmoil it seems that investors do not discount variations in income. However, we assess these results as somewhat "noisy" and inconclusive due to the high degree of possible other factors influencing the firm value, especially in these times of crisis.

This observation may explain why the studies by Lookman (2004) and Jin and Jorion (2006) could not prove any effects of hedging on the firm value in the Oil & Gas industry. They based their findings on a study period which was affected by a crisis, the burst of the IT bubble. These results are interesting in that sense as they may point towards a general difficulty to analyse this industry during times of crisis and also highlight the time dependency in regards of value creation through smoothing.

Table 10: Regression Results - Oil & Gas Producer

Panel Regression 3:
Industry Data Sample - Oil & Gas

Dependent Variable: ln(Tobin's Q) with p-values are in parentheses						
Variable	**Set 1**	**Set2**	**Set 3**	**Set4**	**Set5**	**Set 6**
ln(Cash-flow volatility)		0.0037		0.0037	0.0037	
		(0.0801)*		(0.0811)*	(0.0830)*	
ln(Earnings volatility)			-0.0003			
			(0.5956)			
ln(Accrual volatility)				0.0021		
				(0.2870)**		
Corr(Cash-flow, accruals)				-0.0003	-0.0004	0.0016
				(0.9888)	(0.9871)	(0.9485)
ln(Total assets)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.1716)	(0.1593)	(0.1721)	(0.1680)	(0.1469)	(0.1578)
Debt-to-total assets	0.3498	0.3422	0.3503	0.3464	0.3423	0.3492
	(0.0390)**	(0.0428)**	(0.0385)**	(0.0410)**	(0.0436)**	(0.0397)**
Profitability	0.1697	0.1678	0.1754	0.1636	0.1679	0.1693
	(0.4500)	(0.4575)	(0.4509)	(0.4703)	(0.4628)	(0.4565)
CAPEX-to-sales	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0235)**	(0.0219)**	(0.0252)**	(0.0486)**	(0.0220)**	(0.0238)**
R&D-to-sales	-0.2146	-0.2170	-0.2149	-0.2174	-0.2172	-0.2139
	(0.3417)	(0.3353)	(0.3417)	(0.3514)	(0.3530)	(0.3617)
Dividend	0.0635	0.0635	0.0632	0.0740	0.0634	0.0639
	(0.3995)	(0.3987)	(0.3994)	(0.3133)	(0.3830)	(0.3804)
Dummy1	1.9920	1.9112	1.9914	1.9269	1.9110	1.9928
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000=***
ln(Tobin'sQ-1)	0.3192	0.3214	0.3194	0.3218	0.3214	0.3191
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
R-squared	0.7918	0.7926	0.7918	0.7933	0.7926	0.7918

Table 11: Period Specific Effects - Oil & Gas Producer

Panel Regression 3: Industry Sample Adjusted for Period-Specific Effects

Dependent variable: ln(Tobin's Q) with p-values are in parentheses

Variable	Set 1	Set 2	Set 3	Set 4	Set 5	Set 6
ln(Cash-flow volatility)		0.0034		0.0041	0.0041	
		(0.0096)***		(0.0382)	(0.0406)**	
ln(Earnings volatility)			-0.0013			
			(0.0043)***			
ln(Accrual volatility)				0.0035		-0.0036
				(0.036)***	(0.9051)	
Corr(Cash-flow, accruals)				-0.0155	-0.0103	0.0000
				(0.5954)	(0.7308)	(0.0328)**
ln(Total assets)	0.0000	0.0000	0.0000	0.0000	0.0000	0.3316
	(0.0424)**	(0.0001)***	(0.0386)**	(0.0376)**	(0.0365)**	(0.0272)**
Debt-to-total assets	0.3341	0.4810	0.3404	0.3350	0.3295	0.5742
	(0.0272)**	(0.0005)***	(0.0310)**	(0.0244)**	(0.0273)**	(0.0025)***
Profitability	0.5690	0.7603	0.6018	0.5733	0.5875	0.0006
	(0.0035)***	(0.0000)***	(0.0046)***	(0.0021)***	(0.0026)***	(0.3545)
CAPEX-to-sales	0.0006	0.0020	0.0005	0.0006	0.0006	0.2184
	(0.3441)	(0.0013)***	(0.4008)	(0.3381)	(0.3359)	(0.5643)
R&D-to-sales	0.2237	0.1816	0.2179	0.1985	0.2047	0.0509
	(0.5526)	(0.5730)	(0.5636)	(0.5943)	(0.5853)	(0.5150)
Dividend	0.0505	0.1424	0.0452	0.0725	0.0554	2.0041
	(0.5128)	(0.1266)	(0.5605)	(0.3798)	(0.4823)	(0.000)***
Dummy1	2.0029	-0.0029	2.0104	1.9159	1.9146	0.3003
	(0.0000)***	(0.8731)	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
Ln(Tobin's Q-1)	0.3006	0.0000	0.3048	0.3007	0.3029	0.0162
	(0.0000)***	(0.0057)	(0.0000)***	(0.0000)***	(0.0000)***	(0.7037)
D2006*ln(Cash-flow volatility)		-0.0029		-0.0079	-0.0042	
		(0.8731)		(0.4387)	(0.7861)	
D2006*ln(Earnings volatility)			0.0080			
			(0.0009)***			
D2006*ln(Accrual volatility)				-0.0028		
				(0.0828)*		
D2006*CORR(Cash-flow, accruals)				0.0284	0.0236	0.0162
				(0.4937)	(0.5706)	(0.7037)
D2006*ln(Total assets)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0651)*	(0.0057)***	(0.0604)*	(0.0894)*	(0.0770)*	(0.0599)*
D2006*Debt-to- total asset	-0.0114	0.0149	-0.0486	-0.0529	-0.0393	-0.0063
	(0.9667)	(0.9545)	(0.8446)	(0.8462)	(0.8853)	(0.9811)
D2006*Profitability	-0.6591	-0.6487	-0.7273	-0.6800	-0.6959	-0.6679
	(0.0178)**	(0.0211)**	(0.0075)***	(0.0140)**	(0.0137)**	(0.0151)**
D2006*CAPEX-to-sales	-0.0006	-0.0021	-0.0005	-0.0007	-0.0006	-0.0006
	(0.3275)	(0.0012)***	(0.3800)	(0.3232)	(0.3192)	(0.3374)
D2006*R&D-to-sales	-0.5604	-0.7198	-0.5406	-0.5256	-0.5291	-0.5494
	(0.1085)	(0.0278)**	(0.1236)	(0.1239)	(0.1210)	(0.1080)
D2006*Dividend	0.0431	0.0399	0.0715	0.0345	0.0383	0.0456
	(0.5483)	(0.5276)	(0.3197)	(0.6501)	(0.6031)	(0.5550)
R-squared	0.7982	0.7619	0.8004	0.8002	0.7992	0.7982

4.3.3 Results and Analysis – Pharma & Biotechnology

We have already ascertained from our descriptive statistic analysis that that the Pharma & Biotechnology sample seems to exhibit special characteristics.

Analyzing the regression results in Set 1 we obtain an interesting result. Size as measured by total assets has a highly significant and negative coefficient (-0.3408) thus making smaller more valuable in the Pharma & Biotechnology industry. This is not only in line with the results by Allayannis and Weston (2001) and Rountree, Weston and Allayannis (2008) but we also consider it as quite intuitive, considering the nature of the industry.

As mentioned in our descriptive analysis, the sample consists of a majority of small firms with a low equity market value and low total assets. While a few Big Pharma players cause a skewed distribution of size. Please view Appendix 2. It lays in the nature of this industry that ground breaking inventions can lead to great appreciation in firm value which is driven by expectations rather than fundamentals. It is common that firms are highly valued by the market, yet not generating any cash inflows from product sales.

When turning to the impact of smoothing, Set 2 shows that the coefficient for cash-flow volatility is positive (0.0556) and significant at the ten percent level. We obtain no significant result for earnings volatility. In the Pharma & Biotechnology industry investors do not discount firms with volatile cash-flow or income but are rather prone to risk and enjoy the potential upside.

Taking into consideration that the Pharma industry is non-cyclical and robust in times of crises, we do expect time to have less influence on our variables than in the other industries. This is confirmed when evaluating the results prior and after the crisis. Please view Table 13 for a detailed overview of our results.

Confirming our expectation our results are not fundamentally altered by separately investigating the two subsamples. Neither prior to the crisis nor after the crisis do we observe any significant results for our volatility measures. Independent of time, investors in the Pharma & Biotechnology industry do not regard smoothing activities as value relevant.

Table 12: Regression Results - Pharma & Biotechnology

Panel Regression 4: Industry Data Sample – Pharma and Biotechnology Industry						
Dependent variable: ln(Tobin's Q) with p-values are in parentheses						
Variable	**Set 1**	**Set 2**	**Set 3**	**Set 4**	**Set 5**	**Set 6**
ln(Cash-flow volatility)		0.0241		0.0246	0.0252	
		(0.0556)*		(0.0828)*	(0.0728)*	
ln(Earnings volatility)			-0.0035			
			(0.7528)			
ln(Accrual volatility)				0.0118		
				(0.6130)		
Corr(Cash-flow, accruals)				0.0099	0.0069	-0.0040
				(0.5860)	(0.7118)	(0.8088)
ln(Total assets)	-0.3408	-0.3416	-0.3407	-0.3400	-0.3417	-0.3407
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
Debt-to-total assets	0.0217	0.0256	0.0210	0.0260	0.0262	0.0215
	(0.6215)	(0.5545)	(0.6294)	(0.5483)	(0.5473)	(0.6237)
Profitability	-0.0093	-0.0100	-0.0093	-0.0105	-0.0099	-0.0095
	(0.7207)	(0.6981)	(0.7232)	(0.6857)	(0.7038)	(0.7186)
CAPEX-to-sales	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.6444)	(0.6451)	(0.6499)	(0.6212)	(0.6568)	(0.6449)
R&D-to-sales	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.2665)	(0.2806)	(0.2643)	(0.2583)	(0.2758)	(0.2661)
Dividend	0.0338	0.0485	0.0293	0.0443	0.0490	0.0339
	(0.7599)	(0.6481)	(0.7869)	(0.6913)	(0.6408)	(0.7606)
ln(Tobin's Q-1)	0.4197	0.4194	0.4192	0.4195	0.4194	0.4197
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
R-squared	0.6786	0.6793	0.6786	0.6795	0.6793	0.6786

Table 13: Period-Specific Effects - Pharma & Biotechnology

Panel Regression 4: Industry Sample- Pharmaceutical & Biotechnology Industry Adjusted for Period-Specific Effects

Dependent variable: ln(Tobin's Q) with p-values are in parentheses

Variable	Set 1	Set 2	Set 3	Set 4	Set 5	Set 6
ln(Cash-flow volatility)		0.0142		0.0176	0.0165	
		(0.5921)		(0.5095)	(0.5393)	
ln(Earnings volatility)			-0.0091			
			(0.4939)			
ln(Accrual volatility)				-0.0032		
				(0.9040)		
Corr(Cash-flow, accruals)				0.0296	0.0286	0.0212
				(0.3938)	(0.4259)	(0.5395)
ln(Total assets)	-0.3273	-0.3293	-0.3265	-0.3312	-0.3299	-0.3280
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
Debt-to-total assets	0.0369	0.0421	0.0358	0.0416	0.0416	0.0359
	(0.5809)	(0.5328)	(0.5930)	(0.5307)	(0.5350)	(0.5899)
Profitability	-0.0169	-0.0176	-0.0166	-0.0142	-0.0150	-0.0143
	(0.7594)	(0.7480)	(0.7657)	(0.8025)	(0.7911)	(0.8015)
CAPEX-to-sales	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.8465	0.8398	0.8689	0.8751	0.8976	0.8894
R&D-to-sales	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.2672)	(0.2720)	(0.2671)	(0.2787)	(0.2408)	(0.2341)
Dividend	0.0328	0.0379	0.0244	0.0503	0.0313	0.0190
	(0.8314)	(0.7921)	(0.8719)	(0.7488)	(0.8309)	(0.9033)
ln(Tobin's Q-1)	0.4129	0.4122	0.4109	0.4108	0.4132	0.4143
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
D2006*ln(Cash-flow volatility)		0.0186		0.0118	0.0167	
		(0.5296)		(0.7082)	(0.5937)	
D2006*ln(Earnings volatility)			0.0158			
			(0.4220)			
D2006*ln(Accrual volatility)				0.0384		
				(0.1806)		
D2006*CORR(Cash-flow, accruals)			-0.0281	-0.0368	-0.0493	
				(0.6159)	(0.5134)	(0.3521)
D2006*ln(Total assets)	-0.0189	-0.0172	-0.0196	-0.0155	-0.0180	-0.0198
	(0.5426)	(0.5992)	(0.5191)	(0.6459)	(0.5902)	(0.5255)
D2006*Debt-to-total asset	-0.0763	-0.0865	-0.0737	-0.0750	-0.0823	-0.0757
	(0.5908)	(0.5395)	(0.6038)	(0.5921)	(0.5608)	(0.5953)
D2006*Profitability	0.0119	0.0118	0.0099	0.0077	0.0098	0.0101
	(0.8150)	(0.8162)	(0.8496)	(0.8840)	(0.8517)	(0.8466)
D2006*CAPEX-to-sales	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.4157)	(0.4118)	(0.4621)	(0.5508)	(0.5114)	(0.5312)
D2006*R&D-to-sales	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0005)***	(0.0010)***	(0.0005)***	(0.0018)***	(0.0016)***	(0.0015)***
D2006*Dividend	-0.0194	0.0004	-0.0091	-0.0119	-0.0029	-0.0165
	(0.8658)	(0.9968)	(0.9376)	(0.9067)	(0.9771)	(0.8854)
R-squared	0.6808	0.6816	0.6809	0.6823	0.6818	0.6810

4.3.4 Results and Analysis – Retail Industry

Our results from the regression of the Retail industry are shown in Table 14.

Set 1 shows that in line with economic theory, the coefficient for profitability is positive 0.7598 and strongly significant. Size as measured by the log of total has a significant and negative impact (-0.2443) on firm value. In other words, a larger retailer should have a lower value than its smaller competitors. While in line with theory we find this questionable giving the nature of retail in which economies of scale are considered to be beneficial. We do not obtain significant result for the remaining control variables.

Analyzing Set 2 to 6, we do not obtain any significant results when analyzing the impact of smoothing in the retail industry – regardless of income or cash-flow smoothing. Based on the overall study period investors do not categorize smoothing activities as value relevant. This contradicts the findings *i.a.* by Allayannis and Weston (2001), Nelson, Moffitt and Affleck-Graves (2008) as well as Huang *et al.* (2008). We view these results as conformation that the investor's sentiment towards smoothing is dependent on industry specific characteristics.

Interestingly, when investigating the impact of period-specific effects we obtain significant results in both cash-flow and earnings volatility. Please view Table 15 for detailed results.

Prior to the crisis both cash-flow (0.0475) and earnings volatility (0.0387) have a positive impact on firm value. These findings suggest that in the Retail industry investors generally do not acknowledge smoothing activities on the firm level. However, when comparing our findings prior to the crisis with the coefficient values for the period 2007-2010, the results are reversed.

During the time of the crisis we receive negative coefficients for both variables. However, only cash-flow volatility is significant at a five percent level. A one percent increase in cash-flow volatility would lead to a decrease in firm value in the range of 7-8 percent. We interpret this change in investor preferences as an indicator that the economic turmoil might caused a shift towards more sensitivity in regards to volatility.

In any case, it clearly shows that the impact of smoothing on firm value is not only influenced by industry characteristics but that it is also time dependent.

Table 14: Regression Results – Retail

Panel Regression 5:
Industry Data Sample - Retail Industry

Dependent Variable: ln(Tobin's Q) with p-values are in parentheses

Variable	**Set 1**	**Set 2**	**Set 3**	Set 4	Set 5	Set 6
ln(Cash-flow volatility)		0.0205		0.0196	0.0199	
		(0.2830)		(0.2540)	(0.3055)	
ln(Earnings volatility)			0.0201			
			(0.1456)			
ln(Accrual volatility)				0.0011		
				(0.9507)		
Corr(Cash-flow, accruals)				-0.0019	-0.0020	-0.0050
				(0.8024)	(0.7715)	(0.4906)
ln(Total assets)	-0.2443	-0.2322	-0.2380	-0.2325	-0.2327	-0.2448
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
Debt-to-total assets	0.1073	0.0975	0.1068	0.0982	0.0981	0.1080
	(0.1819)	(0.2282)	(0.1818)	(0.2353)	(0.2343)	(0.1835)
Profitability	0.7598	0.7619	0.7631	0.7625	0.7625	0.7613
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
CAPEX-to-sales	-0.0018	-0.0019	-0.0017	-0.0019	-0.0019	-0.0018
	(0.5722)	(0.5366)	(0.5813)	(0.5368)	(0.5348)	(0.5542)
R&D-to-sales	-0.0148	-0.0147	-0.0159	-0.0145	-0.0144	-0.0141
	(0.1855)	(0.1843)	(0.1251)	(0.1535)	(0.1824)	(0.1981)
Dividend	0.0237	0.0238	0.0294	0.0237	0.0237	0.0233
	(0.2839)	(0.2887)	(0.1781)	(0.2867)	(0.2851)	(0.2836)
Dummy1	0.2967	0.2995	0.2982	0.2992	0.2994	0.2966
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
R-squared	0.8326	0.8329	0.8331	0.8329	0.8329	0.8326

Table 15: Period-Specific Effects - Retail

Panel Regression 5:
Industry Data Sample - Retail Industry

Dependent variable: ln(Tobin's Q) with p-values are in parentheses

Variable	Set 1	Set 2	Set 3	Set 4	Set 5	Set 6
ln(Cash-flow volatility)		0.0475		0.0442	0.0495	
		(0.0014)***		(0.0011)***	(0.0007)***	
ln(Earnings volatility)			0.0387			
			(0.0008)***			
ln(Accrual volatility)				0.0084		
				(0.6219)		
Corr(Cash-flow, accruals)				0.0087	0.0086	0.0001
				(0.3184)	(0.3141)	(0.9922)
ln(Total assets)	-0.2073	-0.2092	-0.2117	-0.2105	-0.2112	-0.2079
	(0.0008)***	(0.0015)***	(0.0012)***	(0.0019)***	(0.0017)***	(0.0009)***
Debt-to-total assets	-0.0129	-0.0121	-0.0209	-0.0119	-0.0124	-0.0125
	(0.8987)	(0.8971)	(0.8337)	(0.9024)	(0.8967)	(0.9029)
Profitability	0.8605	0.8833	0.8847	0.8917	0.8910	0.8621
	(0.0005)***	(0.0004)***	(0.0003)***	(0.0005)***	(0.0004)***	(0.0005)***
CAPEX-to-sales	-0.0044	-0.0031	-0.0040	-0.0028	-0.0030	-0.0044
	(0.1329)	(0.2155)	(0.1769)	(0.2599)	(0.2338)	(0.1295)
R&D-to-sales	0.0016	-0.0007	-0.0002	-0.0019	-0.0012	0.0018
	(0.9253)	(0.9671)	(0.9889)	(0.9107)	(0.9472)	(0.9187)
Dividend	0.0107	0.01248	0.0197	0.0125	0.0134	0.0108
	(0.6368)	(0.5785)	(0.3735)	(0.5779)	(0.5452)	(0.6254)
D2006*ln(Cash-flow volatility)		-0.0810		-0.0695	-0.0844	
		(0.0032)***		(0.0010)***	(0.0035)***	
D2006*ln(Earnings volatility)			-0.0326			
			(0.2252)			
D2006*ln(Accrual volatility)				-0.0298		
				(0.1196)		
D2006*CORR(Cash-flow, accruals)				-0.0179	-0.0156	-0.0032
				(0.2191)	(0.2638)	(0.8244)
D2006*ln(Total assets)	-0.0063	-0.0156	-0.0081	-0.0175	-0.0160	-0.0063
	(0.6540)	(0.2729)	(0.5778)	(0.2075)	(0.2604)	(0.6522)
D2006*Debt-to-total asset	0.2766	0.2675	0.2936	0.2701	0.2675	0.2763
	(0.0198)**	(0.0231)**	(0.0126)**	(0.0256)**	(0.0235)**	(0.0201)**
D2006*Profitability	-0.1645	-0.2183	-0.1912	-0.2250	-0.2229	-0.1645
	(0.5436)	(0.4063)	(0.4774)	(0.3882)	(0.3955)	(0.5441)
D2006*CAPEX-to-sales	0.0029***	0.0021***	0.0029***	0.0013***	0.0019***	0.0029***
	(0.1647)	(0.2926)	(0.1726)	(0.5556)	(0.3505)	(0.1755)
D2006*R&D-to-sales	-0.0128	-0.0111	-0.0110	-0.0106	-0.0108	-0.0128
	(0.2899)	(0.3542)	(0.3432)	(0.3882)	(0.3729)	(0.2930)
D2006*Dividend	0.0354	0.0221	0.0315	0.0221	0.0209	0.0350
	(0.2150)	(0.4337)	(0.1928)	(0.4286)	(0.4495)	(0.2108)
Dummy1	0.2872	0.2882	0.2890	0.2869	0.2877	0.2871
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
R-squared	0.8367	0.8387	0.8379	0.8390	0.8388	0.8367

4.3.5 Results and Analysis – Leisure & Tourism Industry

Our regressions results for the Leisure & Tourism industry are presented in Table 16.

Set 1 shows that only profitability is strongly significant and positive with a coefficient of 1.1082. In line with theory and earlier empirical findings (Allayannis and Weston 2001; Rountree, Weston and Allayannis 2008) size and leverage are negatively impacting firm value. However, the coefficients are not significant.

The results in Set 2 to 6 show no significant results in regards to our volatility measures. Investors in the Leisure & Tourism industry do consider neither cash-flow nor income smoothing as value relevant.

However, the Tourism industry faces a high risks from external events such as terrorist events or health threats and is additionally characterized by a strong correlation with the economic cycle. Therefore, we expect an impact on our dependent variables caused by the financial crisis.

Table 17 provides a detailed overview of our results when splitting the study period in two subsamples. We obtain slightly more significant variables when testing for specific-period effects prior and after the financial crisis. Thus, the results from the Leisure & Tourism also reaffirm our initial criticism in regards to generalization across time as well as industries.

Analyzing Set 3 prior to the crisis we obtain a significant coefficient of -0.0307 for earnings volatility. This indicates that Investors do value smooth income during the period 2000 to 2006. A one percent increase in earnings volatility lowers firm value by approximately 3.1 percent. However, Set 3-6 show us that investors do not distinguish between cash-flow smoothing and smoothing via accruals.

During the period 2007 to 2010 we obtain a positive but not significant coefficient for earnings volatility (0.0442). Additionally no significant results are to be found when analyzing the control variables. In times of economic turmoil investors do not assign value-relevance to smoothing activities.

Based on our results we conclude that investors in the Leisure & Tourism industry do generally value smooth income but do not differentiate whether it is achieved via cash-flow smoothing or via earnings management.

Table 16: Regression Results - Leisure & Tourism

Panel Regression 6:
Industry Data Sample - Leisure & Tourism Industry

Dependent Variable: ln(Tobin's Q) with p-values are in parentheses						
Variable	**Set 1**	**Set 2**	**Set 3**	**Set 4**	**Set 5**	**Set 6**
ln(Cash-flow volatility)		0.0287		0.0254	0.0283	
		(0.2079)		(0.2853)	(0.2085)	
ln(Earnings volatility)			0.0005			
			(0.9681)			
ln(Accrual volatility)				0.0092		
				(0.5236)		
Corr(Cash-flow, accruals)				-0.0173	-0.0189	-0.0197
				(0.5060)	(0.4545)	(0.4412)
ln(Total assets)	-0.0249	-0.0257	-0.0250	-0.0254	-0.0252	-0.0245
	(0.3863)	(0.3655)	(0.3857)	(0.3670)	(0.3788)	(0.4001)
Debt-to-total assets	-0.1251	-0.1224	-0.1247	-0.1124	-0.1089	-0.1109
	(0.1630)	(0.1568)	(0.1565)	(0.2112)	(0.2177)	(0.2212)
Profitability	1.1082	1.1005	1.1088	1.1252	1.1059	1.1137
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
CAPEX-to-sales	-0.0006	-0.0005	-0.0006	-0.0006	-0.0006	-0.0007
	(0.3276)	(0.4414)	(0.3610)	(0.4182)	(0.4124)	(0.3103)
R&D-to-sales	0.0106	0.0147	0.0106	0.0146	0.0152	0.0112
	(0.2753)	(0.1141)	(0.2566)	(0.1672)	(0.1197)	(0.2708)
Dividend	-0.0261	-0.0186	-0.0259	-0.0220	-0.0225	-0.0301
	(0.4934)	(0.6014)	(0.4917)	(0.5372)	(0.5292)	(0.4345)
Dummy1	0.3860	0.3833	0.3863	0.3831	0.3812	0.3838
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
ln(Tobin'sQ-1)	-1.1120	-1.1184	-1.1123	-1.1137	-1.1163	-1.1100
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
R-squared	0.8870	0.8878	0.8870	0.8881	0.8880	0.8873

Table 17: Period-Specific Effects - Leisure & Tourism

Panel Regression 5:
Industry Data Sample - Leisure & Tourism Industry

Dependent variable: ln(Tobin's Q) with p-values are in parentheses

Variable	Set 1	Set 2	Set 3	Set 4	Set 5	Set 6
ln(Cash-flow volatility)		0.0088		0.0095	0.0080	
		(0.6776)		(0.6850)	(0.7021)	
ln(Earnings volatility)			-0.0307			
			(0.0656)**			
ln(Accrual volatility)				-0.0051		
				(0.8067)		
Corr(Cash-flow, accruals)				-0.0174	-0.0236	-0.0272
				(0.6434)	(0.5309)	(0.4707)
ln(Total assets)	-0.0364	-0.0345	-0.0348	-0.0372	-0.0356	-0.0374
	(0.3154)	(0.3576)	(0.3369)	(0.2878)	(0.3441)	(0.3032)
Debt-to-total assets	-0.0838	-0.0825	-0.0419	-0.0774	-0.0729	-0.0729
	(0.4804)	(0.4761)	(0.6991)	(0.5306)	(0.5328)	(0.5412)
Profitability	1.6063	1.5377	1.5264	1.4929	1.5163	1.5724
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
CAPEX-to-sales	-0.0015	-0.0014	-0.0017	-0.0015	-0.0015	-0.0015
	(0.0013)***	(0.0006)***	(0.0005)***	(0.0003)***	(0.0007)***	(0.0015)***
R&D-to-sales	0.0143	0.0156	0.0131	0.0148	0.0150	0.0136
	(0.1623)	(0.1484)	(0.1683)	(0.1750)	(0.1757)	(0.2062)
Dividend	-0.0242	-0.0191	-0.0376	-0.0119	-0.0208	-0.0256
	(0.6018)	(0.6662)	(0.4350)	(0.7656)	(0.6337)	(0.5749)
Dummy1	0.3883	0.3752	0.3585	0.3708	0.3732	0.3844
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
lnTobin's Q-1)	-1.0437	-1.0411	-1.0218	-1.0280	-1.0442	-1.0473
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
D2006*ln(Cash-flow volatility)		0.0198		-0.0080	0.0177	
		(0.4632)		(0.7120)	(0.5132)	
D2006*ln(Earnings volatility)			0.0442			
			(0.1136)			
D2006*ln(Accrual volatility)				0.0436		
				(0.1330)		
D2006*CORR(Cash-flow, accruals)			0.0269	0.0313	0.0390	
				(0.4605)	(0.4079)	(0.2999)
D2006*ln(Total assets)	0.0257	0.0245	0.0257	0.0300	0.0245	0.0254
	(0.1333)	(0.1580)	(0.1383)	(0.0551)	(0.1616)	(0.1412)
D2006*Debt-to- total asset	0.0284	0.0370	-0.0101	0.0443	0.0404	0.0346
	(0.8358)	(0.7886)	(0.9413)	(0.7487)	(0.7658)	(0.7957)
D2006*Profitability	-0.8725	-0.7525	-0.7442	-0.5358	-0.6897	-0.7830
	(0.0522)*	(0.0869)*	(0.1084)	(0.2501)	(0.1106)	(0.0719)
D2006*CAPEX-to-sales	0.0007	0.0008	0.0009	0.0008	0.0007	0.0007
	(0.2171)	(0.2192)	(0.1699)	(0.1835)	(0.2421)	(0.2489)
D2006*R&D-to-sales	0.0125	0.0112	0.0098	0.0123	0.0110	0.0122
	(0.1584)	(0.2236)	(0.2291)	(0.2261)	(0.2461)	(0.1774)
D2006*Dividend	0.0438	0.0450	0.0667	0.0166	0.0389	0.0370
	(0.4489)	(0.4343)	(0.2792)	(0.7403)	(0.4547)	(0.4712)
R-squared	0.8928	0.8934	0.8945	0.8946	0.8937	0.8932

5 Discussion of Results

In this chapter we critically discuss our results, draw conclusion across industries and answer our research questions. We aim to provide a concluding remark which enables the reader to relate our findings to the underlying theory and distinguish our results from previous empirical finding.

Research Question 1:

How does smoothing impact firm value given the different industry characteristics?

First and foremost, we conclude that smoothing is not valuable to each and every industry. The degree of value creation depends on industry specific characteristics, the source of risk and time-effects. Overall, we do not obtain distinct results pointing towards one clear cut conclusion but rather highlight the fact that the industry and time dimension cannot be ignored when evaluating the impact of smoothing activities.

We can group our five industries into two main categories which are defined by two distinct mindsets:

1.) Solely focus on smooth income or

2.) No focus on any type of smoothing activities

1.) We identify one mindset in the Electricity & Alternative Energy, Oil & Gas and Leisure & Tourism industry. In these industries a decrease in earnings volatility will impact the firm value positively. Investors in these industries value smooth income but do not differentiate by which means it is achieved. Both – cash-flow smoothing and earnings management will enhance the firm value.

Investors in the Leisure & Tourism industry value smooth earnings. The industry is characterized by seasonal swings in travel activity as well as high exposure to terrorist threats and catastrophic events. Therefore, operational risk management is important to sustain the financial stability of the firms. Shareholders have difficulties hedging the risk exposure because the ability to manage these risks is essentially the competitive advantage of Leisure & Tourism firms.

The Oil & Gas and Electricity industry on the other hand, are capital intensive and highly levered. Future prospects and growth opportunity depend on the firm's assess to financing. Thus, reflecting creditworthiness is important. In both industries projects for exploration and securing future supply are extremely costly. Shareholders value if the firms undertake any effort to secure access to financing and mitigate the risk of underinvestment. Smoothing cash-flows and earnings is one method to lower this risk and send a positive signal to the market which investors in these industries particularly appreciate. Smooth income signals credibility to the market. As a result of the high capital demand, it is important for the industry to maintain this credibility.

Highly levered firms who experience financial distress are at risk to lose their competitive position and market share. Smoothing cash-flows reduces the probability of distress and increase debt capacity for the high leveraged firms in the Oil & Gas and Electricity industry. Smooth income gives the Electricity and Oil & Gas firms the freedom to operate and pursue capital intensive positive NPV projects.

2.) In the Pharma & Biotechnology and Retail industry investors do not assign any value-relevance to smoothing. This is interesting since these two industries have very different characteristics. One would not dare to compare the two. However, investor do not see how smoothing can create value in these industries for very different reasons.

First, in the Retail industry investors do not see the need for cash-flow smoothing because cash-flows are not as volatile as in many other industries. Earnings in this industry are fairly regular. Fluctuation is driven by consumer confidence and cyclicality. However, these factors are difficult to predict and to hedge because the main drivers are economic fundamentals influencing consumption. Thus, it is difficult to mitigate swings in earnings which are a direct result of overall business conditions rather than stemming from financial strategy. The only source of hedging activity is found in currency hedging. However, investors view these risk management activities as given and already incorporated in firm value and therefore are reluctant to pay an extra premium. Under the assumption that investors prefer "pure play" firms, we argue that the major source of risk stemming from cyclicality in operations might best be managed through individual portfolio diversification at the investor's level. Our empirical results confirm this line

of thought and show that investors prefer to manage the risk themselves and not pay particular attention to smoothing on firm level.

The investors in the Pharma & Biotechnology industries are exposed to high operational risks which they cannot fully observe and understand due to the high information asymmetries. Theory suggests that high information asymmetries are a motivation for hedging and therefore it should be noticeable in our results that investor favor hedging activities. However, we perceive the Pharma & Biotechnology Industry as somewhat unique. As it is the nature of this business, high growth opportunities and high margins can lead to great profitability. However, as much as investor can gain they may also loose. The firm value depends on the constant development of breaking inventions and value creation in this industry is mostly driven by expectations, rather than fundamentals. Concluding from our data shareholders investing in this industry deliberately expose themselves to this risk and do not discount firms with volatile cash flows. Investors in the Pharma & Biotechnology industry are risk lovers and enjoy high returns. Therefore, smoothing activities will not lead to a higher firm value in the Pharma & Biotechnology industry.

In summary, our analysis shows that it is important to take specific industry characteristics into consideration when evaluating the impact of smoothing on the firm value. One can clearly not generalize that smoothing is beneficial for each and every industry.

Question 2:

How does the value of smoothing react to time specific events?

Time affects the value relevance of smoothing. Our analysis shows that time has an influence on regression results in every industry. Ignoring this time dependency will lead to biased results.

From our sensitivity analysis we observed that in most industries our results turn more significant when excluding the financial crisis. We attribute the improvement to the lesser degree of “noise” within our data. Our results have to be interpreted with caution because part of the volatility may be due to exogenous effects which cannot be grasped by the model. The lesson we can learn from obtaining these results, is that researchers should not use periods of crisis to evaluate the determinants of firm value, as for example Lookman (2004), Jin and Jorion (2006)

and Nguyen and Faff (2003) did and if they do their results may not be the ground for generalisation.

During the financial crisis we found that the impact of the volatility measures in the Retail, Electricity & Alternative Energy and Oil & Gas industry is diametrically opposed to the results we obtained prior to the crisis. In the Electricity and Oil & Gas industry, investors stop valuing smooth income and are more willing to accept volatile earnings. In times of market turmoil, hedging of commodities and cash-flow management becomes increasingly difficult and therefore shareholder prefer to not engage in costly smoothing activities which ultimately will only result in sunk costs and no benefits.

On the other hand, investors in the Retail industry do prefer cash-flow smoothing in times of crisis to secure their financial position. One possible explanation is that when the dollar depreciates it becomes increasingly important for US retailers to hedge their currency exposure.

Prior to the financial crisis smooth earnings impacted firm value positively in the Leisure & Tourism industry. Investors were willing to pay a premium for smoothing activities. However, after 2006 investors stopped seeing any benefit in smoothing and did no longer assign an incremental value.

For the Pharma & Biotechnology industry we expected no change in the investor preferences regarding volatility. Confirming our expectations we did not observe any impact of smoothing prior to the crisis nor do we detect an influence on firm value afterwards.

Summarizing our findings, the Pharma & Biotechnology industry is the only industry in our sample which is independent of time in regards to impact of volatility on firm value. This leads us to the conclusion that it is utmost important for future research to include the time dimension.

6 Conclusion and Further Research

We agree with Warren Buffett when he says

"Risk comes from not knowing what you're doing."

Therefore, we aspire to provide new insight in the field of firm value creation through smoothing.

Throughout this work we show that value creation through smoothing depends on industry, firm and time-specifics. This may be the reason for the dispersed conclusions of former studies.

Contrary to Rountree, Weston and Allayannis (2008) we cannot observe that investors value smooth cash-flows. Therefore, we do not recommend managers to smooth earnings with the use of derivatives i.e., cash-flow smoothing. Managers cannot achieve an increase in firm value by implementing a derivative driven risk management strategy in order to reduce volatility in cash flows.

Our results are widespread and industry dependent. We examine in the Electricity & Alternative Energy, Oil & Gas Producers and Leisure & Tourism industry that firm value increases when companies are able to attain smooth earnings. This implies that managers can increase expected returns by smoothing earnings. From our analysis we recommend that companies in these industries implement smoothing techniques to increase shareholder value. However, investors do not care by which methods; cash-flow smoothing or smoothing via accruals, the volatility of earnings is lowered. In the industries Retail and Pharma & Biotechnology investors are willing to take the risk. Therefore managers should not implement a smoothing strategy since it is not valued by the investors No additional firm value can be realized from smoothing activities.

Our study also identifies that the impact of smoothing is bound to time. Our results are affected by the financial crisis in every industry except Pharma & Biotechnology. Throughout time investors change their preference for cash-flow smoothing. In times of crisis, investors in the Retail industry become more risk averse and prefer cash-flow smoothing. Therefore, particularly in these times, managers of retail businesses should implement smoothing strategies to increase

or stabilize stock prizes. Investors in all other remaining industries alter their preference and are willing to accept more volatile earnings in times of overall economic turmoil.

The goal of our work is to provide orientation for future research. We see future research potential in defining the specifics of the three dimensions. Additionally, we ascertain that a further breakdown in industry would be useful to achieve more specific results for the impact of smoothing in different industry settings. With this work we seek to give an overview in this field of research. Our aim was to identify industries that are or particular interest for future research in order to guide managers of international corporations. Personally, we see high potential for in-depth research and meaningful results in the Electricity & Alternative Energy, Oil & Gas and Pharma & Biotechnology industry.

We like to stress that our research is based on an analysis of the US market. However, companies are global and so are crises. Therefore, we suggest further research to investigate similarities between firm value and investor preferences in regards to smoothing across markets.

Appendix

Appendix 1: Descriptive Statistics by Industry

Electricity & Alternative Energy	Mean	Median	Std. Dev
Panel A: Descriptive Variable			
Total Assets (m$)	13.670.228	7.143.226	14.654.513
Equity market value (m$)	5.480.606	2.114.280	7.244.455
Return on assets	-5,876	4,060	53,330
Debt-to-asset	37,773	35,800	49,318
CAPX-to-sales	33,926	14,170	196,222
Tobin's Q	1,052	0,772	1,640
Panel B: Measures of risk			
Earnings per Share (ESP)	1,672	1,570	1,646
Volatility of EPS (Std. Dev)	4,882	0,343	67,474
Cash-flow per share (CFPS)	4,261	4,324	3,450
Volatility of CFPS (Std. Dev)	0,894	0,343	67,474
Total Earnings	295.333	111.553	801.508
Total Cash-Flow	807.701	306.979	1.120.052

Oil and Gas	Mean	Median	Std. Dev
Panel A: Descriptive Variable			
Total Assets (m$)	13.160.553	1.447.058	35.967.571
Equity market value (m$)	16.064.241	429.622	57.727.924
Return on assets	7,770	6,490	53,457
Debt-to-asset	23,083	19,985	20,818
CAPX-to-sales	73,788	31,980	630,975
Tobin's Q	1,420	1,085	1,475
Panel B: Measures of risk			
Earnings per Share (ESP)	1,728	0,520	3,553
Volatility of EPS (Std. Dev)	2,877	0,830	12,815
Cash-flow per share (CFPS)	4,154	2,386	5,908
Volatility of CFPS (Std. Dev)	1,117	0,830	12,815
Total Earnings	1.310.513	11.445	5.134.307
Total Cash-Flow	2.259.200	70.756	7.106.289

Pharma & Biotechnology	Mean	Median	Std. Dev

Panel A: Descriptive Variable			
Total Assets (m$)	3.810.326	118.850	16.112.156
Equity market value (m$)	10.217.203	294.771	31.946.666
Return on assets	2,598	-13,415	91,085
Debt-to-asset	30,808	10,180	93,461
CAPX-to-sales	109,098	5,450	1026,730
Tobin's Q	9,564	2,696	86,344
Panel B: Measures of Risk			
Earnings per Share (ESP)	0,403	0,000	0,806
Volatility of EPS (Std. Dev)	5,820	0,588	82,200
Cash-flow per share (CFPS)	-0,069	-0,132	2,796
Volatility of CFPS (Std. Dev)	2,880	0,588	82,200
Total Earnings	405.032	-7.346	1.606.601
Total Cash-Flow	640.672	-1.600	2.196.159

Retail	**Mean**	**Median**	**Std. Dev**
Panel A: Descriptive Variable			
Total Assets (m$)	5.717.483	893.270	19.156.419
Equity market value (m$)	5.655.447	1.294.031	23.480.303
Return on assets	2,598	7,605	18,780
Debt-to-asset	14,778	13,075	19,484
CAPX-to-sales	4,111	3,410	3,351
Tobin's Q	1,704	1,316	1,475
Panel B: Measures of Risk			
Earnings per Share (ESP)	1,137	0,830	1,142
Volatility of EPS (Std. Dev)	2,267	0,389	23,535
Cash-flow per share (CFPS)	2,301	1,819	2,754
Volatility of CFPS (Std. Dev)	1,380	0,389	23,535
Total Earnings	244.187	58.836	1.241.464
Total Cash-Flow	573.905	120.460	1.982.289

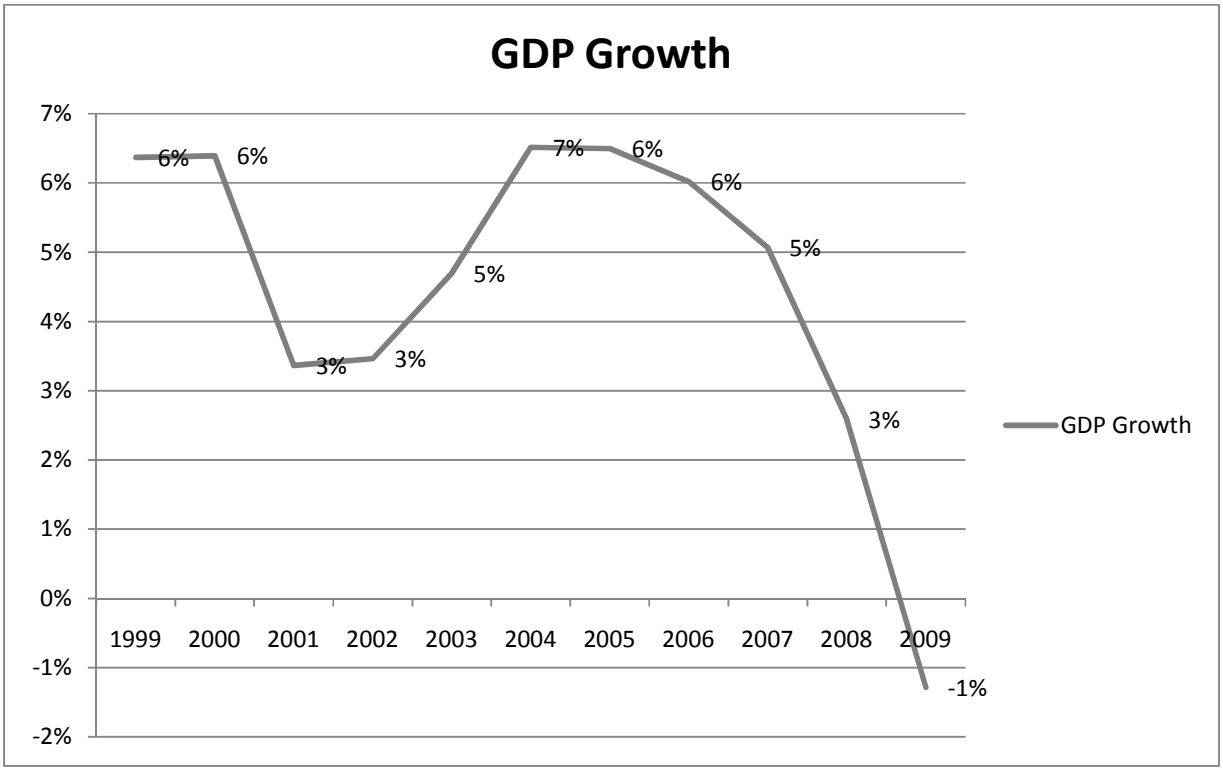
Leisure &Travel	Mean	Median	Std. Dev
Panel A: Descriptive Variable			
Total Assets (m$)	3.697.302	865.509	7.557.343
Equity market value (m$)	2.931.752	863.594	6.279.862
Return on assets	7,164	7,170	7,325
Debt-to-asset	34,405	30,960	23,342
CAPX-to-sales	13,183	8,560	22,468
Tobin's Q	1,574	1,325	1,100
Panel B: Measures of Risk			
Earnings per Share (ESP)	1,338	0,810	2,568
Volatility of EPS (Std. Dev)	1,550	0,415	4,425
Cash-flow per share (CFPS)	3,629	2,443	6,267
Volatility of CFPS (Std. Dev)	0,705	0,415	4,425
Total Earnings	93.051	38.580	457.588
Total Cash-Flow	349.487	124.510	779.369

Appendix 2: Overview Datastream Worldscope Items

Please find below a detailed list of the used variables and respective items in Datastream Worldscope

Total Assets	WC07230
Market Capitalization	WC07210
Return on Assets	WC08326
Debt to Assets	WC08236
Sales	WC07240
Capex to Sales	WC08421
R&D to Sales	WC08341
Book Value of Long-term Debt	WC03251
Total Earnings	WC07250
Operating Cash-flow	WC04860
Number of Common Stock	WC05301

Appendix 3: GDP Growth United States



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