2015-7
Marie Herly
PhD Thesis

Empirical Studies of Earnings Quality

DEPARTMENT OF ECONOMICS AND BUSINESS
AARHUS UNIVERSITY • DENMARK

Empirical Studies of Earnings Quality

by

Marie Herly

A PhD thesis submitted to the School of Business and Social Sciences, Aarhus University, in partial fulfilment of the PhD degree in Economics and Business

April 2015

Supervisors: Frank Thinggaard & Jan Bartholdy

Contents

Acknowledgements

More than 2,000 days have passed since I embarked on my journey as a PhD student. Five years, four offices, three papers, and two children later I ended up with one dissertation. I could never have done it without help.

First of all I want to thank my two supervisors, Frank Thinggaard and Jan Bartholdy. Frank, for his constant dedication, helpfulness, and interest in my research, as well as for being a friend. Jan, for many interesting discussions, helpful comments - and for suggesting me a PhD career in the first place. I also wish to thank the members of the Finance and Accounting Research Groups for many interesting seminars and courses, as well as the administrative staff. A special thank to Karin Vinding for excellent proofreading. It is a real pleasure knowing you all. I am also very grateful to the assessment committee consisting of Professor Juha-Pekka Kallunki, University of Oulu, Professor Thomas Plenborg, Copenhagen Business School, and Professor Claus Holm, Aarhus University, for their careful reading of the dissertation and their constructive comments and suggestions. I truly appreciate their inputs and many of the suggestions have been incorporated in the present version of the dissertation.

During my PhD studies I had the opportunity to spend a semester at Kenan-Flagler Business School, University of North Carolina. I wish to sincerely thank Professor Wayne Landsman for giving me this great chance and for being an excellent host while I was there. The stay truly opened my eyes to the academic world - I learned so much and met so many wonderful people while I was there.

I have been so fortunate to receive two scholarships. From Foreningen af Statsautoriserede Revisorer, FSRs Studie- og Understøttelsesfond, I received a grant to buy access to

the database Compustat Unrestated Quarterly, which was essential to complete my first paper. From Købmand Ferdinand Sallings Mindefond I received a travel scholarship, which funded my research stay at UNC as well as several conference participations. This dissertation would not have been the same without those contributions and I am very grateful to these foundations for their support.

My PhD colleagues have made the past five years a true pleasure. We have shared infinite amounts of coffee, cake, and beer as well as discussed everything ranging from clustered standard errors to dress codes in Klubben. Thank you Jeanne Andersen, Maria Elbek Andersen, Lukas Bach, Tue Christensen, Sune Lauth Gadegaard, Henrik Nørholm, David Sloth Pedersen, and Camilla Pisani. Special thanks to Lene Gilje Justesen for being a wonderful friend ever since we started as bachelor students ten years ago.

Finally, I would of course like to thank my family and friends for always being there for me. Most importantly, my wonderful husband Jesper has been immensely supporting, encouraging, and understanding during my studies. Always ready with a high-five in good times and a hug in bad times. You are everything to me.

Summary

Below are short summaries of each of the three chapters in the thesis.

English Summary

This thesis consists of a literature review as well as three academic papers within the topic accounting quality. The first two papers are concerned with earnings restatements in industrial and financial firms, respectively. A restatement event is defined as a correction of errors or irregularities in one or more previously issued financial statement(s).

The first paper, *Do Restatements Break Bad Habits? Evidence of Earnings Quality in Restating Firms*, examines how a restatement affects the accounting quality of the firm. The prior belief was that a restatement event would have a disciplining role on the firm and hence we expected that the accounting quality would increase after a restatement. When comparing the earnings quality of restating US firms with the quality of a matched control group, we find that the quality of restating firms seems to be poorer than that of the control group, even several years before the restatement. Some of these differences remain after the restatement. Using a difference-in-difference research design we also find that the restating firms improve the quality of their financial statements, but surprisingly not significantly more than the control group. However, when partitioning the sample based on the stock market reaction to the restatement announcement, restating firms in fact improve significantly more than the control group. It thus appears that the restatement event itself does not prompt an improvement, but the punishment of the capital markets does.

The second paper, *Causes and Consequences: The Impact of Bank Restatements on Illiquid-*

ity and Systemic Risk, examines the determinants and consequences of restatements in U.S. banks. The paper shows that risky, poor performing banks with low capital levels and high magnitudes of discretionary loan loss provisions are more likely to restate. I document that banks experience increased cost of equity capital and decreased balance sheet liquidity after a restatement, consistent with the view that banks are being punished for the increased opacity following a restatement. In addition, I show that banks subject to restatements contribute more to systemic risk than other banks and thereby have spillover effects on the financial system.

The third and final paper, *The Effect of Bank Quality on Corporate Customers*, examines how a bank's own quality affects its monitoring and screening role. We particularly study how a bank's quality impacts the performance of its corporate customers and the strength of its relationship with those customers. Bank quality is measured with financial stability, CAMELS ratio, and financial reporting quality. Controlling for the endogenous bank-firm match we do not find an association between bank quality and firm performance. However, we find that bank monitoring is more important when alternative firm monitoring is weak during the financial crisis. This indicates that high quality bank monitoring is more important during times of financial distress and when other monitoring devices fail. We also find clear evidence that firms with high quality banks and poor performance have weaker relationships with their bank. This indicates that high quality banks force weak customers to seek financing elsewhere.

Dansk resumé

Denne afhandling indeholder en literaturoversigt samt tre akademiske artikler inden for emnet regnskabskvalitet. De to første artikler omhandler såkaldte restatements i henholdsvis industrielle og finansielle virksomheder. En restatement er defineret som en korrektion eller ændring af tidligere aflagte regnskaber grundet fejl eller uregelmæssigheder.

Den første artikel, *Do Restatements Break Bad Habits? Evidence of Earnings Quality in Restating Firms*, undersøger hvilken indflydelse en regnskabsændring har på regnskabskvaliteten i de implicerede virksomheder. Vores hypotese var, at selve ændringen ville have en

monitorerende og forbedrende effekt på virksomheden, og derfor forventede vi, at regnskabskvaliteten ville blive forbedret efter en sådan begivenhed. Ved at sammenligne regnskabskvaliteten for amerikanske virksomheder, der har korrigeret deres regnskaber, og en kontrolgruppe der ikke har, finder vi at virksomhederne med korrigerede regnskaber har dårligere regnskabskvalitet end kontrolgruppen op til flere år før selve korrektionen. Efter begivenheden kan nogle af forskellene fortsat påvises. Ved hjælp af et forsøgsdesign baseret på forskelle mellem de to grupper finder vi, at virksomhederne der har korrigeret forbedrer deres regnskabskvalitet efter ændringen, men overraskende nok ikke statistisk signifikant mere end kontrolgruppen i den samme periode. Imidlertid finder vi, at virksomheder der har korrigeret forbedrer sig signifikant mere end kontrolgruppen, når vi alene fokuserer på de virksomheder der oplevede den mest alvorlige negative reaktion på aktiemarkedet efter meddelelsen om korrektionen. Vi kan derfor udlede, at en regnskabsændring i sig selv ikke fører til en forbedring af virksomhedernes regnskabskvalitet, men det gør derimod en alvorlig reaktion fra aktieinvestorerne.

I den anden artikel, *Causes and Consequences: The Impact of Bank Restatements on Illiquidity and Systemic Risk*, undersøger jeg årsager til og konsekvenser af regnskabskorrektioner i den finansielle sektor. Resultaterne viser, at risikable banker med dårlige økonomiske præstationer og lav solvensgrad samt store estimerede hensættelser på lån har større sandsynlighed for at korrigere regnskaberne. Jeg finder også, at bankerne har højere egenkapitalomkostninger og lavere likviditet efter en regnskabsændring, hvilket tyder på, at bankerne bliver straffet for den lavere gennemsigtighed, der er forbundet med en sådan ændring. Slutteligt viser jeg, at banker med regnskabsændringer bidrager mere til den systemiske risiko og dermed har disse banker reel økonomisk indvirkning på hele det finansielle system.

I den tredje og sidste artikel, *The Effect of Bank Quality on Corporate Customers*, undersøges det, hvordan bankens egen kvalitet påvirker dens evner til at monitorere og screene sine kunder. Især undersøges det, om bankens kvalitet har betydning for erhvervskundernes præstation samt for forholdet til disse erhvervskunder. Bankkvalitet bliver målt som en kombination af bankens finansielle stabilitet, CAMELS rating og regnskabskvalitet. Vi kontrollerer for den endogene relationen mellem banken og virksomheden og kan ikke

påvise en direkte sammenhæng mellem bankens kvalitet og kundernes præstation. Til gengæld finder vi, at bankmonitorering bliver endnu vigtigere, når alternativ monitorering af virksomheden er svag under den finansielle krise. Dette tyder på, at bankens monitorering bliver mere vigtig under finansielle kriser, og når andre monitoreringsmekanismer fejler. Vi kan ligeledes påvise svage relationer mellem finansielt trængte virksomheder og deres bank, hvis banken er af høj kvalitet. Dette tyder på, at banker af høj kvalitet presser svage kunder til at søge finansiering andetsteds.

Introduction

Earnings quality relates to the very core of accounting. The most important purpose of financial statements is to reflect the underlying reality of the firm and effectively aid users in making decisions. If the financial statement numbers are of low quality, they are not decision useful and thus do not fulfil their most important purpose. The ability to objectively determine the accounting quality of firms is consequently an extremely important matter and a vital part of financial accounting research. Many research questions in this research area are explicitly or implicitly related to earnings quality. Do investors find financial statement information value relevant (seminal work by Ball and Brown (1968); Beaver et al. (1980))? How do accounting standards influence the usability of financial reporting (Barth et al., 2008)? Do the various earnings components differ in terms of persistence and relevance (Sloan, 1996)? And how does the financial reporting quality influence the firms' access to capital (Francis et al., 2005, 2004)? This research is important, because high quality earnings should be more useful to users and assist them in their resource allocation decisions. Therefore, it is of interest to the firms, investors, standard setters, and regulators to continuously improve earnings quality.

Since earnings quality is such a huge research area this thesis starts with a review of the literature, to set the scene for the remaining three chapters. The next chapters are three self-contained papers that broadly concern earnings quality in industrial firms as well as in banks: *Do Restatements Break Bad Habits? Evidence of Earnings Quality in Restating Firms* (Chapter 2), *Causes and Consequences: The Impact of Bank Restatements on Illiquidity and Systemic Risk* (Chapter 3), and *The Effect of Bank Quality on Corporate Customers* (Chapter 4). Chapter 2 and 3 examine causes and consequences of earnings restatements in U.S. firms.

While earnings restatements are inherently linked to earnings quality because a restatement per se signifies poor earnings quality (Dechow et al., 2010, 2011), the focus of the two papers is different: The research question of the paper *Do Restatements Break Bad Habits? Evidence of Earnings Quality in Restating Firms* is whether restating firms subsequently improve their earnings quality. We were quite surprised not to find any improvements in the base model, only when the restatement was deemed severe by the capital market. Thus, earnings quality is the main area of interest in the first paper. In the paper *Causes and Consequences: The Impact of Bank Restatements on Illiquidity and Systemic Risk*, earnings quality is used as a research tool to examine if the poor earnings quality detected in restating industrial firms is also present in restating banks. I find evidence that it is and my results point at a mechanism where banks manage capital with opportunistic loan loss accounting during a restatement. The paper also examines the consequences of poor earnings quality in banks as proxied by a restatement and finds that restating banks experience increased cost of equity capital and balance sheet illiquidity and contribute more to systemic risk. The final paper, *The Effect of Bank Quality on Corporate Customers*, treats earnings quality as one part of the overall bank quality, which also consists of bank stability, liquidity, and performance. We find that the overall bank quality negatively affects the strength of the bank-firm relationship.

Taken together, the three academic papers in this thesis are all related to earnings quality, either explicitly as the main variable of interest (Chapter 2) or implicitly as a research tool (Chapters 3 and 4). The findings in this thesis have two main implications:

First, the two papers in Chapter 2 and Chapter 3 send an important message to stakeholders concerned with earnings restatements, such as the SEC, auditors, and investors. This message tells us that restatements in both industrial and financial firms can be detected using relatively straightforward measures of earnings quality. These two papers also expand our knowledge on the consequences of restatements, namely that a restatement event by itself does not improve the financial reporting quality of the firm in question and that restatements in banks can have systemic implications.

Second, the two papers in Chapter 3 and Chapter 4 send an important message to U.S. and Danish bank regulators. On the one hand, U.S. regulators should be extra cautious about possible capital management as well as the systemicity of restating banks. On the

other hand, Danish regulators should be aware that the quality of the bank influences its monitoring of its corporate customers in times of financial distress.

Chapter 1

Literature Review:

Earnings Quality

Literature Review: Earnings Quality

Marie Herly

Department of Economics and Business, Aarhus University

Abstract

This paper reviews the literature on earnings quality. First, the various definitions of this multi-faceted concept are outlined; most of them circle around the notion of decision usefulness. I then describe how the different definitions are rooted in the conceptual framework for financial reporting, and how researchers have tried to make the qualitative characteristics empirically tractable. The causes and consequences of accounting quality are also discussed, as well as the notion of earnings management. This concept induces managerial bias in financial reporting and clearly decreases earnings quality.

The next part of the paper outlines some of the widely used metrics to empirically measure earnings quality. I divide these metrics into three groups: the accrual based metrics, metrics based on properties of the earnings stream, and market based metrics. This part of the paper concludes with a discussion of how the metrics are interrelated and how some of them can have opposite effects.

In the final part of the paper I discuss earnings quality specifically in banks and financial institutions. Quality in this industry has to be presented separately because banks have additional incentives compared to industrial firms, namely the incentive to manage regulatory capital. In addition, the nature of banks' financial statements is inherently different. I present an overview of some metrics used to empirically measure quality in this particular industry divided into two groups: Metrics based on banks' loan loss accounting and metrics based on the opportunistic selling of financial securities. The final section concludes.

Keywords: Earnings quality; financial institutions; capital markets.

JEL Classification: M41; G21.

"Higher quality earnings provide more information about the features of a firm's financial performance that are relevant to a specific decision made by a specific decision-maker."

-Dechow et al. (2010, p. 344)

The above definition of earnings quality[1] embraces the idea that high quality financial reporting faithfully represents the features of a firm's fundamental earnings processes that are relevant to users of financial statements. Financial statement users require these statements to reflect the underlying reality of the firm to be effectively aided the users in their decision making. If the financial statements are of low quality, they are not decision useful and thus do not fulfil their most important purpose. Therefore it is of vital interest to investors, standard setters, and regulators to objectively determine firms' accounting quality. As a consequence, numerous papers have been written on how to define and measure accounting quality. This research is important because high quality earnings need to be useful to users and assist them in their resource allocation decisions.

This literature review does not aim at providing an exhaustive overview of the entire body of literature or of all earnings quality metrics. Instead, the review aims at inspiring thoughts about earnings quality.[2] Section 1.1 starts by defining quality of financial reporting, how it is related to the conceptual framework of financial reporting, and outlines causes and consequences of accounting quality in past literature. This section also briefly reviews the literature on earnings management. Section 1.2 summarizes how the multi-faceted concept earnings quality has been measured in the literature. Since two of the academic papers in this thesis deal with quality in banks and financial institutions, Section 1.3 explains why accounting quality has to be measured differently in this industry and presents an overview of the different proxies. Finally, Section 1.4 summarizes and concludes.

[1] In this thesis, accounting and earnings quality will be used interchangeably. However, some previous research suggests that the two are in fact different concepts. See, for instance, Melumad and Nissim (2008) and Francis et al. (2006).

[2] Other literature reviews about earnings quality include Schipper and Vincent (2003), Francis et al. (2006), and Dechow et al. (2010).

1.1 Definition of Earnings Quality

Researchers have thought of accounting quality in a number of different ways which will be described below and summarized in Table 1.1. The notion of *decision usefulness* as an indicator of high earnings quality is widely accepted and has been used by a number of researchers, e.g. Abdelghany (2005), Ball and Shivakumar (2005), and Schipper and Vincent (2003). The latter argue that decision usefulness is the single most important characteristic of high quality earnings, since it captures the intent of standard setters and is empirically tractable. Former chairman of the US Securities and Exchange Commission, Arthur Levitt, states that the key objective of financial information is to provide disclosure to investors on where the company has been, where it is, and where it is going (Levitt, 1998a). To be decision useful, financial reporting must have a number of properties. Naturally, financial reporting is only useful if it accurately reflects the underlying reality of the firm, implying that financial statements must present a *"true and fair view"* of the firm (EU, 1978). Similarly, the financial statements must be *precise* (Francis et al., 2006), *transparent* (Bhattacharya et al., 2003; Barth and Schipper, 2008), *timely* (Ball et al., 2000), *persistent* (Dechow and Dichev, 2002), and *comparable* (Levitt, 1998a).

Dechow and Schrand (2004) define earnings quality broader than decision usefulness, as they view the definition of high quality earnings as threefold: first, the reported earnings number should reflect current performance; second, it should be a good indicator of future operating performance; and, third, accurately annuitize the intrinsic value of the company. Thus, the authors include reliable valuation in the concept of earnings quality, highlighting analysts as very important users. Some researchers focus on financial reporting as the main input to valuation models, and they therefore assess *persistence* and *sustainability* to be the most vital attributes of high quality earnings. Penman and Zhang (2002) define high quality earnings as being sustainable indicators of future earnings, while Comiskey and Mulford (2000) classify high quality financial reporting as the ability to generate sustainable earnings. Since accruals are less persistent than cash flows (Sloan, 1996), the view of persistence as a quality indicator is related to Visvanathan (2006), who uses the notion of closeness-to-cash as a desirable property of earnings; in his view, earnings that are closer to cash flows,

Table 1.1: Definitions of Earnings Quality

Quality Definition	Citation
Closeness-to-cash	Visvanathan (2006)
Comparability	Levitt (1998a)
Conservatism	Beekes et al. (2004); Basu (1997)
Decision usefulness	Schipper and Vincent (2003); Ball and Shivakumar (2005); Abdelghany (2005)
Persistence	Abdelghany (2005); Dechow and Dichev (2002)
Precision	Francis et al. (2006)
Sustainability	Penman and Zhang (2002)
True and fair	(EU, 1978)
Timeliness	Ball et al. (2000)
Transparency	Levitt (1998a); Bhattacharya et al. (2003); Barth and Schipper (2008)

i.e. contain relatively small amounts of accruals, are of higher quality.

Conservatism,[3] in the meaning of prudence, has also been put forward as a characteristic of accounting quality (Basu, 1997). This implies that caution is exercised when estimating assets and income, and liabilities and expenses, such that the former are not overstated, and the latter are not understated.

Barth et al. (2008) define high quality earnings as those that exhibit less earnings management, implying that quality is not an innate characteristic, but rather the absence of manipulation and bias. This is in line with the discussion of Guay et al. (1996), who argue that managerial opportunism reduces information precision and accounting quality. Dechow and Schrand (2004) suggest that by the very nature of their business, some firms will have low quality earnings, even without earnings management. These firms include high-growth firms and firms operating in very volatile environments. Thus, both opportunistic management and the underlying business model of the firm can impact the quality of earnings. In this connection Dechow et al. (2010) stress that earnings quality is a function of both the firm's fundamental performance and the accounting system that measures it. As a consequence, reported earnings consist of both the fundamental earnings process and

[3]Dechow et al. (2010) distinguish between conditional conservatism (more timely recognition of bad news than of good news in earnings) and unconditional conservatism (policy that results in lower book values of assets/higher book values of liabilities in the early periods of asset/liability life time).

the errors induced by the accounting system. The authors note that accounting literature often inadequately distinguishes the impact of fundamental performance on earnings quality from the impact of the measurement system. Similarly, Francis et al. (2006) separate innate and discretionary sources of earnings quality; the former arise from the business model and operating environment, whereas the latter arise from the financial reporting process, such as managerial judgment, governance activities, and the reporting standards.

As Melumad and Nissim (2008) note, some of the earnings quality attributes have contradictory implications. This is not surprising since some of the qualitative characteristics from the Conceptual Framework (FASB, 2008) also have contradictory implications and hence have to be traded off.[4] As an example, earnings that are close to the underlying cash flows, are not necessarily predictable or accurately reflecting future performance. It is also clear that earnings quality as a construct is context-specific, partly because the users, to whom the definition is targeted, differ from situation to situation (Dechow et al., 2010; Schipper and Vincent, 2003); thus, standard setters and managers with compensation contracts tied to earnings may have different perceptions of accounting quality.

1.1.1 Operationalizing the Conceptual Framework

The Conceptual Framework of IASB (IASB, 2010) provides general guidelines for high quality financial reporting. The core aim of financial statements is described as decision usefulness, following the intuition that financial reporting should effectively help users take informed decisions. As a result, financial statements which actually aid in decision making are considered to be of high quality. Two primary qualitative characteristics supporting this aim are relevance and representational faithfulness. Information is relevant if it has predictive or confirmatory value, and can make a difference in the decision making process (IASB, 2010, QC6-7), whereas it is said to faithfully represent the economic phenomena if it is complete, neutral, and free from error (IASB, 2010, QC12). In addition, four enhancing characteristics distinguish more useful information from less useful information: compara-

[4] A well-known example of this is the trade off between relevance and reliability, where the former emphasizes timeliness over precision and the latter emphasizes minimizing measurement errors (Schipper and Vincent, 2003).

bility, verifiability, timeliness, and understandability (IASB, 2010, QC4). These characteristics can be seen as quality attributes and thus high quality financial reporting will comprise the characteristics identified by standard setters.

The characteristics in the Conceptual Framework can all be seen as quality attributes, and thus firms that fulfill the purpose of decision usefulness must have high quality financial reporting. Much accounting quality research has attempted to operationalize the qualitative characteristics described in those conceptual frameworks, thus making them empirically testable in econometric models (Barth et al., 2001). For instance, Krisement (1997) attempts to operationalize the concept of comparability, and Velury and Jenkins (2006) use proxies for representational faithfulness, timeliness, and neutrality to measure earnings quality. Wagenhofer and Ducker (2007) propose proxies for conservatism, predictability, timeliness, and relevance, while Schipper and Vincent (2003) measure predictability. Finally, Barth et al. (2001) measure relevance and reliability combined. The measures of conservatism also stem from IASB's concept of prudence and FASB's concept of conservatism.[5]

To make the conceptual framework operational is easier said than done, though. The empirical measures of earnings quality evaluate only parts of the overall financial reporting quality and therefore it is difficult to attach a single measure to a single qualitative characteristic. According to Francis et al. (2006), accounting researchers have not been able to devise a single measure that captures the qualitative characteristics of the FASB Conceptual Framework. It is also empirically problematic to assess the characteristics separately because there is a degree of trade-off between them, for instance between relevance and reliability (Schipper and Vincent, 2003). In addition, some of the attributes from the conceptual frameworks are difficult, if not impossible, to measure objectively. How does one, for example, measure understandability, neutrality, and comparability? Barth et al. (2001) argue that another issue that complicates the operationalizing of the conceptual framework is the fact that neither relevance nor reliability is a dichotomous attribute, and thus the conceptual frameworks do not specify "how much" relevance or reliability is sufficient to meet

[5]FASB defines conservatism as using the least optimistic estimate, if two outcomes are equally likely (CON 2, para. 95). However, conservatism is not mentioned as a qualitative concept in the joined conceptual framework of the two bodies.

FASB's criteria.[6]

1.1.2 Determinants of Accounting Quality

A very important question in relation to the assessment of earnings quality is, of course, to determine the factors that influence the quality of financial statements. Francis et al. (2006) divide the determinants of earnings quality into two groups, the innate and the reporting sources. The first group consists of the business model and operating environment of the firm, whereas the second group consists of management's financial reporting decisions, the quality of the standards, auditors, and governance activities. This division highlights the fact that poor quality is not necessarily a result of opportunistic behavior. Instead, innate factors of the firm, such as size, variability of cash flows and revenues, and length of the operating cycle, can lead to deteriorating quality, even without earnings management.[7]

It is widely accepted that the quality of standards and the diligence of regulators are important determinants of earnings quality. Soderstrom and Sun (2007) mention the accounting standards, the tax system, and the legal and political systems as drivers of earnings quality. Levitt (1998a) argues that improvement of accounting framework and outside auditing will increase earnings quality. Barth et al. (2008) and Beuselinck et al. (2009) both find increased earnings quality following IFRS adoption, which supports the view that high quality standards have positive effects on earnings quality. Ewert and Wagenhofer (2005) show that tighter accounting standards increases earnings quality, but cannot restrict real earnings management. In addition, internal governance and audit efforts both have positive effects on earnings quality (Doyle et al., 2007; Caramanis and Lennox, 2008).

Capital market forces also impact earnings quality. Soderstrom and Sun (2007) argue that financial market development influences earnings quality, and Ball and Shivakumar

[6]FASB and IASB have in fact addressed the fact that operationalization the conceptual framework is an extremely difficult task: ".. the Boards are unaware of useful means of quantifying either the overall quality of faithful representation or its components and concluded that they should not attempt to develop such means in the proposed framework. In reaching that conclusion, the Boards noted that an inability to quantify characteristics identified as qualitative is not surprising." (FASB, 2008, BC2.24).

[7]According to Francis et al. (2006) innate factors account for 50% to 70% of the variation in earnings quality.

(2005) show that UK public companies have higher accounting quality than private ones, due to the market demand for information. Burgstahler et al. (2006) examine how capital market pressures and institutional factors influence firms' incentives to report accurate earnings.

Some factors of the firm itself also affect the quality of its financial statements. These are, e.g., the capital and ownership structure (Soderstrom and Sun, 2007), the accounting methods chosen by the firm (Altamuro et al., 2005), and firm performance (DeFond and Park, 1997). The internal control regulation and corporate governance mechanisms of the firm also affect the accounting quality (Altamuro and Beatty, 2010). Dechow and Schrand (2004) argue that the nature of the firm as such can also influence the earnings quality. The authors suggest that high growth companies, companies with intangible assets or complex transactions, and companies in volatile business environments can provide earnings numbers that do not accurately reflect firm performance or indicate future cash flows. In these cases, neither earnings management nor poor monitoring is to blame for the low earnings quality.

1.1.3 Consequences of Accounting Quality

Another stream of research deals with the consequences of quality. The costs of both debt and equity capital are widely used proxies for market outcomes of financial reporting quality. In general, empirical evidence suggests a negative relation between earnings quality and the cost of equity capital, such that higher quality is associated with lower capital costs. Francis et al. (2006) view the cost of capital as a summary indicator of investors' resource allocation decisions that is related to earnings quality since high quality financial reporting should assist users in their resource allocation decision. Easley and O'Hara (2004) show that high quality accounting information reduces cost of capital by reducing information risk, which is a non-diversifiable, priced risk factor. Francis et al. (2004) show that firms with the least favorable values of seven attributes of earnings quality generally experience larger cost of equity. Extending this research to the cost of debt as well, Francis et al. (2005) show that firms with poor accruals quality have larger cost of debt and equity capital. They

ascribe this to the fact that higher magnitudes of accruals indicate higher information risk, which leads to higher cost of capital. Similar results are also found by Chen et al. (2007), Lambert et al. (2007), and Bhattacharya et al. (2003). Complete consensus on this issue does not exist, however, since Cohen (2008) suggests that firms providing financial information of higher quality do not necessarily enjoy a lower cost of equity.

Another market outcome is stock prices. Francis et al. (2006) distinguish between the market outcomes from expected returns on the one hand and abnormal returns on the other. They argue that earnings quality will affect the expected return if it is perceived by investors as a proxy for information risk. The correlation between information precision and earnings quality is negative, that is, poorer earnings quality is associated with higher expected return. In contrast, the relation between earnings quality and abnormal returns is U-shaped, due to a large degree of mispricing following low earnings quality; thus, the earnings quality effect on abnormal returns is either positive abnormal returns or negative abnormal returns. Other market outcomes following high accounting quality include reduced bid-ask spread (Francis et al., 2006).

Other outcomes of poor quality include larger analysts' forecast errors (Ashbaugh and Pincus, 2001), worse credit ratings (Francis et al., 2005), and higher likelihood of getting modified audit opinions (Francis and Krishnan, 1999).

1.1.4 Earnings Management

Earnings management clearly decreases earnings literature, and so the two streams of literature are closely related (Dechow and Schrand, 2004). Numerous definitions of earnings management exist and most of them focus on the use of discretion in accounting to achieve a specific goal or letting the financial statement reflect the desires of management rather than the underlying financial performance of the firm (Levitt, 1998b). By definition, earnings management induces an intentional bias in financial reports (Melumad and Nissim, 2008). Healy and Wahlen (1999, p. 368) define earnings management as: "..when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the

company or to influence contractual outcomes that depend on reported accounting numbers."

Financial reporting can be managed in several ways, e.g., by hand-picking accounting methods within GAAP or by applying methods in a way that supports the picture management wishes to display to users (Schipper, 1989). Jiambalvo (1996) describes two ways of manipulating earnings, real decisions and pure accounting decisions. Real decisions could be delays or accelerations of sales or sale of fixed assets to affect gains and losses. Accounting decisions include for example changes in accounting principles and changes in estimates of fixed assets. While most research indicates that investors are not "fooled" by earnings management (Healy and Wahlen, 1999), some studies reach opposite conclusions. For example, Teoh et al. (1998) show that firms with income-increasing abnormal accruals in the year of a seasoned equity offering significantly underperform in the following years, suggesting that earnings management prior to equity issues affects share prices.

The line between earnings management and fraud is fine and earnings management does not necessarily equal fraud. According to Levitt (1998b), earnings management is placed in the gap between legitimate accounting and outright fraud, whereas Melumad and Nissim (2008) term fraud as an extreme case of earnings management. Some cases of earnings management clearly violate GAAP, whereas other cases are within the borders of GAAP. An example of this is aggressive accounting such as understating the provision of bad debts. Dechow and Skinner (2000) suggest that within-GAAP choices can be considered earnings management if they are used to obscure or mask true economic performance. Nelson et al. (2003) divide earnings management in three categories: earnings management consistent with GAAP, earnings management difficult to distinguish from GAAP, and earnings management that is clearly violating GAAP.

Clearly, there are many different incentives to manage earnings. One group of incentives is capital market expectations and valuation, where firms manage earnings to influence short-term stock price performance (Healy and Wahlen, 1999). Examples of this are attempts to increase the share price prior to seasoned equity offerings or decrease it before management buyout (Dechow and Schrand, 2004; Ecker et al., 2006). Burgstahler and Dichev (1997) document an incentive to manage earnings to meet benchmarks, such as

avoiding losses. Often, managers attempt to report positive profits or sustain recent performance and meet analysts' expectations (Degeorge et al., 1999). In a related vein, Dechow and Schrand (2004) suggest that earnings management especially occurs after a period of high growth and increasing performance in booming economies. When the economy slows down, managers find it difficult to meet the expectations set during the boom times and a decline in earnings can compel managers to use aggressive accounting, earnings management, or even fraud. This view is supported by Richardson et al. (2002), who note that a history of previously reported positive earnings force management to manage earnings because they are unwilling to break a string of positive earnings. However, the opposite could also be true, as illustrated by Jones (1991), who documents that firms manage earnings to decrease reported income prior to import relief investigations. Hence, firms can have incentives to manage earnings both upwards and downwards. Another group of incentives are contracts written based on accounting numbers, such as lending (Abdelghany, 2005; Ecker et al., 2006) and compensation (Dechow and Schrand, 2004; Richardson et al., 2002) contracts. Healy and Wahlen (1999) also outline regulatory motivations. These can for example be industry-specific regulations for financial institutions and utilities (Ecker et al., 2006), or anti-trust regulation where firms have incentive to decrease reported net income under anti-trust violations).

According to Melumad and Nissim (2008) there are two types of costs associated with earnings management: the costs associated with undetected earnings management and costs following a detection of earnings management. In the first case, an overstatement of earnings will generally lead to an understatement of future earnings. For example, if a firm has managed earnings by understating bad debts to increase net receivables and thereby overstate current earnings, it will most likely be forced to write-down in the next period, resulting in a large bad debt expense and lower earnings. In the second case, costs incurred when earnings management is detected include negative effects on reputation, stock prices, and increased fees to auditors.

1.2 Earnings Quality Metrics

As described in Section 1.1, accounting quality is a multifaceted concept and thus the measuring of it must be multifaceted as well. A large number of different empirical proxies therefore exist and they all attempt to objectively distinguish the accounting quality of different firms. Because they each measure a specific part of financial reporting quality there is no single superior measure and the metrics should not be seen as substitutes (Dechow et al., 2010). Schipper and Vincent (2003) argue that the trade-off between various quality characteristics from the Conceptual Frameworks is the main obstacle against being able to merge them into one single, empirically testable metric.

The grouping used in this review is loosely adapted from Dechow et al. (2010) and splits the metrics in three groups: the accrual based metrics, metrics based on properties of the earnings stream, and market based metrics.[8] As many of the proxies for quality are tailored to a specific study, the proxies are highly context specific. As a result, they can have somewhat contradictory implications even though most of them are related. A discussion of this is found in the end of this section. The review is by no means an exhaustive overview of all quality metrics and an overview of the proxies discussed can be found in Table 1.2.

1.2.1 Accrual Based Metrics

A large part of the quality metrics examine how accruals directly influence earnings quality. Accruals play an important role in shifting or adjusting the recognition of cash flows over time so the adjusted numbers better measure firm performance (Dechow and Dichev, 2002).[9] Earnings consist of both cash flows and accruals[10] and since accruals are discre-

[8] Francis et al. (2004) divide proxies of accounting quality into two groups, accounting and market based, while Francis et al. (2006) distinguish between those that reflect the innate factors or nature of the firm, and those that reflect the surrounding business environment and accounting choices.

[9] According to IASB (2010, OB17), accrual accounting implies that "...the effects of transactions and other events are recognised when they occur (and not as cash or its equivalent is received or paid) and they are recorded in the accounting records and reported in the financial statements in the periods to which they relate."

[10] Previously, accruals were often defined as non-cash working capital and depreciation, but the FASB statement No. 95 mandated the statement of cash flows to be disclosed, accruals can be found

Table 1.2: Overview of Earnings Quality Proxies

Model	Citation	Intuition
Accrual Based		
Jones Model	Jones (1991)	Separates discretionary and non-discretionary accruals. Large amounts of accruals not explained by property, plant and equipment, and revenue indicate lower earnings quality.
Modified Jones Model	Dechow et al. (1995)	Same as *Jones Model*, but controls for managed revenue.
Performance-matched Jones Model	Kothari et al. (2005)	Same as *Jones Model*, but controls for firm performance.
Dechow-Dichev Model	Dechow and Dichev (2002)	Working capital should map closely into past, current, and future cash flows. High variance of accruals not explained by cash flows indicate lower quality.
Modified Dechow-Dichev Model	McNichols (2002)	Same as *Dechow-Dichev Model*, but controls for PPE and revenue influencing accruals.
Magnitude of Accruals	Bhattacharya et al. (2003), Leuz et al. (2003)	High levels of accruals are an indication of earnings aggressiveness and lower the persistence of earnings.
Change in Accruals	DeAngelo (1986), Schipper and Vincent (2003)	Large changes in accruals can indicate earnings management.
Earnings Properties Based		
Variability of Earnings to Cash Flows	Leuz et al. (2003), Lang et al. (2003), Francis et al. (2004)	Earnings closely related to the underlying cash flows are of high quality, and the variance of the two should move together.
Variability of Earnings	Barth et al. (2008)	Earnings with high variance have not been artificially smoothed and are thus of high quality.
Corr. between Accruals and Cash Flows	Leuz et al. (2003), Bhattacharya et al. (2003)	Large negative correlations between cash flows and accruals suggest that the latter have been used to smooth earnings.
Persistence	Francis et al. (2004)	A persistent earnings stream is of higher quality for valuation purposes.
Predictability	Dichev and Tang (2009)	Earnings that are able to predict themselves are of higher quality.
Earnings Decrease Avoidance	Burgstahler and Dichev (1997)	Firms manage earnings to avoid small earnings decreases. Many small earnings increases are an indication of low quality.
Small Loss Avoidance	Burgstahler et al. (2006)	Firms manage earnings to avoid small losses. Many small profits are an indication of low quality.
Asymmetric Timeliness	Basu (1997)	Under conservative accounting losses are recognized on a more timely basis than profits. This asymmetry indicates higher quality.
Timely Loss Recognition	Lang et al. (2006), Barth et al. (2008)	Large frequency of losses indicate that losses are recognized when they are expected, while gains are reconized when they occur.
Market Based		
Value Relevance	Alford et al. (1993), Francis and Schipper (1999), Bushman et al. (2004)	Earnings that explain stock returns are of high quality.
Conservatism	Basu (1997)	Losses are recognized more timely than gains, indicating high quality.

tionary and based on estimates, pure cash flows are generally considered more reliable than earnings (Dechow, 1994). A large body of literature hypothesizes that earnings are primarily managed via the accruals component (Dechow et al., 2011) and several proxies of earnings quality are based on the view that accruals, ceteris paribus, reduce earnings quality (Francis et al., 2006). Since accruals are by nature subjective judgments, they do open the door for opportunistic, short-term earnings management if accruals are used to hide value-relevant changes in cash flows (Dechow and Schrand, 2004).

However, this does not imply that accruals per se are not decision useful. Research has shown that earnings are more persistent than cash flows alone (Sloan, 1996) and that earnings produce smaller forecast errors than cash flows in valuation models (Penman and Sougiannis, 1998). This suggests that accruals can indeed improve decision usefulness, even if seen in isolation, they have lower persistence than cash flows. Dechow and Schrand (2004) note that accruals used correctly mitigate irrelevant volatility in cash flows, i.e., smooth out value-irrelevant fluctuations in cash flows, and thus improve the decision usefulness of earnings. Similarly, Dechow and Skinner (2000) argue that accrual accounting as such tends to dampen the fluctuations of underlying cash flows, and thereby creates a more useful earnings number than current-period cash flows. In addition, one cannot say that firms with generally high levels of accruals have poor earnings quality. Dechow and Schrand (2004) suggest that some firms can erroneously be classified as having low accruals quality and predictability, due to the nature of the business; these are, e.g., firms with high growth or a large proportion of intangible assets. Jiambalvo (1996) shows that accrual models generate low power test of earnings management even for fairly high levels of earnings management. The line between appropriate exercise of managerial discretion through accruals and earnings management is thus very fine.

Abnormal Accruals

The general view in the abnormal accruals models is that accounting fundamentals, such as revenues and fixed assets, should determine un-manipulated, normal accruals. The objec-

directly as operational cash flows subtracted from earnings (Hribar and Collins, 2002).

tive of accruals models is to divide accruals into two components: Normal, non-discretionary accruals associated with the firm's fundamental earnings process; and abnormal, discretionary accruals, which stem from intentional or unintentional accounting errors. A high level of accruals not associated with the fundamental earnings process of the firm indicates earnings management. The model of discretionary accruals driven by accounting fundamentals was first proposed by Jones (1991).[11]

In the original Jones Model, Jones (1991) develops a framework where normal accruals are driven by property, plant and equipment, and revenue. Large amounts of accruals not explained by these fundamentals could indicate earnings management and hence indicate lower earnings quality:

$$TA_{i,t} = \beta_0 \frac{1}{A_{i,t-1}} + \beta_1 \Delta Rev_{i,t} + \beta_2 PPE_{i,t} + \mu_{i,t} \qquad \textit{Jones Model}$$

Where TA is total accruals scaled by lagged total assets; A is total assets; ΔRev is revenue; PPE is gross property, plant, and equipment scaled by lagged total assets. The prediction error from the above regression, defined as

$$u_{i,t} = TA_{i,t} - (\hat{\beta}_0 \frac{1}{A_{i,t}} + \hat{\beta}_1 \Delta Rev_{i,t} + \hat{\beta}_2 PPE_{i,t})$$

represents the level of discretionary accruals. While the prediction error from the regression is used in the original Jones Model, Schipper and Vincent (2003) argue that unsigned residuals can also be used as a proxy for discretionary accruals.

Dechow et al. (1995) test the ability of existing discretionary accruals models to detect earnings management. They criticize the Jones Model for its implicit assumption of non-discretionary revenues, since they argue that managers can easily opportunistically speed up revenues before financial year end. Such a situation would lead to an increase in revenues and accruals, but also receivables. The accruals attached to this form of earnings management will be classified as non-discretionary accruals in the setting of the Jones Model, causing the estimate of earnings management to be biased towards zero. Therefore,

[11] Previous research had attempted to separate discretionary and non-discretionary accruals (e.g., Healy (1985) and DeAngelo (1986)), but assumed that non-discretionary accruals were constant over time and thus any change in total accruals from one period to the next was caused by change in discretionary accruals.

firms that manage revenue will not be detected in the Jones Model. As a response to this critique, Dechow et al. (1995) extend the model to control for managed revenues, by including accounts receivables when determining non-discretionary accruals:[12]

$$TA_{i,t} = \beta_0 \frac{1}{A_{i,t-1}} + \beta_1(\Delta Rev_{i,t} - \Delta Rec_{i,t}) + \beta_2 PPE_{i,t} + \mu_{i,t} \qquad \textit{Modified Jones Model}$$

Where *Rec* is net receivables scaled by lagged total assets; and other variables are as previously defined. Again, the prediction error from the above regression is the estimate of discretionary accruals.

Based on the intuition that firms with extreme performance are likely to engage in earnings management, Kothari et al. (2005) propose a performance-matched discretionary accrual approach, in which they include ROA as an additional regressor besides sales and PPE, thereby controlling for firm performance on discretionary accruals. The authors describe a non-linear relation between accruals and performance and justify the model with the argument that discretionary accrual models are misspecified under extreme performance. The authors show that misspecification issues are attenuated, albeit not eliminated, when ROA is included:

$$TA_{i,t} = \beta_0 \frac{1}{A_{i,t-1}} + \beta_1 \Delta Rev_{i,t} + \beta_2 PPE_{i,t} + \beta_3 ROA_{i,t} + \mu_{i,t} \quad \textit{Performance-matched Jones Model}$$

Where *ROA* is net income scaled by lagged total assets; and other variables are as previously defined. As with the other models, μ from the above regression is the measure of abnormal accruals.

Albeit widely used, the abnormal accruals models have also been much criticized. Numerous studies have shown misspecifications and low predictive ability in the Jones Model (see, e.g., McNichols (2000)). Francis et al. (2006) question whether the separation in abnormal and normal accruals reflects the true difference between discretionary and non-discretionary accruals. They show that accounting fundamentals such as firm size and standard deviation of sales revenue explain approximately 65 percent of the variation in

[12]The empirical evidence on the Modified Jones Model versus the Jones Model is somewhat ambiguous. Francis et al. (2006) prefer the Modified Jones model over the Jones Model, whereas Subramanyam (1996) and Stubben (2010) find that the Modified Jones Model shows no real improvement in performance compared to the original.

the abnormal accruals. These findings thus do not support that discretionary accruals are in fact an outcome of earnings management since most of them are explained by underlying firm characteristics. The authors suggest that the Jones Model should be used to capture total accrual quality instead of abnormal accrual quality. This view is supported by McNichols (2002), who suggests that a significant part of the discretionary accruals identified by the Jones Model is in fact non-discretionary. She also argues that the model may be misspecified since the lagged and future effects of change in sales are ignored. Bernard and Skinner (1996) suggest that the Jones Model treat some "legitimate" accruals as abnormal. Dechow et al. (2010) note that the approach of Kothari et al. (2005) is likely to add noise to the measure of discretionary accruals and is best applied when correlated performance is in fact an important concern. According to McNichols (2000), the correction by Dechow et al. (1995) results in estimates of non-discretionary accruals that are too small for firms with growing revenues because only part of the change in receivables is discretionary. The adjustment therefore overstates discretionary accruals for firms with growing revenues.

Accruals Quality

Another group of models measure accruals quality as such, where the quality of accruals decreases as the magnitude of accrual estimation errors increase. The interesting issue is the quality of total accruals and thus researchers do not attempt to distinguish between normal and abnormal accruals. Accruals quality is consistent with the view that low-variance firms have high earnings quality (Francis et al., 2006). The first model that introduced accruals quality as a measure of earnings quality was proposed by Dechow and Dichev (2002). The model is based on the fact that accruals shift the recognition of cash flows over time and since accruals are based on estimates, the incorrect estimates must be corrected in future accruals and earnings. Consequently, estimation errors are noise that reduces the beneficial role of accruals. They propose an empirical measure of accruals quality which maps working capital accruals into operating cash flows; a poor match thus signifies low accruals quality. More specifically, the model regresses change in working capital on last year,

present, and next year's cash flows:

$$\Delta WC_{i,t} = \beta_0 + \beta_1 CFO_{i,t-1} + \beta_2 CFO_{i,t} + \beta_3 CFO_{i,t+1} + \mu_{i,t} \qquad \textit{Dechow-Dichev Model}$$

Where WC is working capital less revenues scaled by lagged total assets; and CFO is cash flows from operations scaled by lagged total assets. The error term shows the extent to which accruals map into realized cash flows and the standard deviation hereof is a proxy for accruals quality. High variance in the estimation errors yields non-persistent earnings and is an inverse measure of earnings quality. The idea is that systematically small or large estimation errors do not create problems for users since they can still predict future earnings. Instead, a large variation in the error term is less precise about the mapping of total current accruals into current, previous, and future cash flows. Because the variability of the residuals, not the magnitude, is the measure of accruals quality, it is expected that firms with low accruals quality will also have low earnings persistence. Dechow and Dichev (2002) do not distinguish intentional estimation errors from the unintentional ones, since all errors signify poor accruals quality, regardless of the underlying intent. This is an important difference to the Jones Model.

In her discussion of the Dechow and Dichev (2002) paper, McNichols (2002) argues that measurement errors in the Dechow-Dichev Model may preclude the model from controlling for the fundamental factors influencing accruals. She extends the model to include additional explanatory variables which are important in forming expectations about current accruals:

$$\begin{aligned} \Delta WC_{i,t} =& \beta_0 + \beta_1 CFO_{i,t-1} + \beta_2 CFO_{i,t} + \beta_3 CFO_{i,t+1} \qquad \textit{Modified Dechow-Dichev Model} \\ &+ \beta_4 \Delta Rev_{i,t} + \beta_5 PPE_{i,t} + \mu_{i,t} \end{aligned}$$

Where all variables are as previously defined. As in the original Dechow-Dichev Model, the variance of μ is an inverse measure of earnings quality. The empirical evidence on the performance of the Dechow-Dichev Model and the Modified Dechow-Dichev Model is mixed; Francis et al. (2005) find that the modified version has greater explanatory power, while Kent et al. (2010) find that the two versions of the Dechow-Dichev models perform equally well.

Researchers have questioned whether the Dechow-Dichev Model captures unintentional errors or earnings management. Even though Dechow and Dichev (2002) originally proposed that the model was suited for both settings, it is often used in research designs where manipulation is hypothesized. McNichols (2002) suggests that estimation errors are not independent when earnings management is present and therefore the model is only appropriate to measure accruals quality caused by, for example, unintentional errors. Francis et al. (2005) also find that Dechow-Dichev Model captures the inherent uncertainty in accruals. In addition, Dechow et al. (2010) argue that the accruals quality models suffer from correlated omitted variables bias driving fundamental performance.

According to Dechow et al. (2010), it is an important limitation to the Dechow-Dichev Model that it focuses on short-term working capital since e.g., impairments of goodwill and PPE are likely to reflect earnings management. Barth et al. (2008) criticize the Modified Dechow-Dichev Model for not capturing the perceptions of investors and analysts and the fact that it focuses on current accruals instead of total accruals. Similarly, Ecker et al. (2005) extend the modified Dechow-Dichev model to use total accruals instead of current accruals.[13] The authors acknowledge the practical disadvantages of using total accruals, but propose a practical approach to estimate total accruals quality in which total accruals are estimated by means of total operating accruals, excluding non-current financial liabilities.

Other Accruals Models

A group of proxies examine the level and change of accruals, based on the intuition that extreme accruals are of low quality because they represent a less persistent component of earnings (Dechow et al., 2010).

The sheer magnitude of accruals has been used as a measure of earnings quality. Bhattacharya et al. (2003) expect that the level of accruals increases with earnings aggressiveness

[13] Ecker et al. (2005) argue that the reversal period for total accruals is dependent on for example corporate strategy, growth and management estimates. They find that there are two advantages of using total accruals rather than current accruals; first, since total accruals capture the entire difference between earnings and cash flows, they better capture earnings quality concepts based on this difference. Second, total accruals encompass more judgments and implementation decisions than current accruals, and it might be therefore more powerful in detecting earnings management.

if cash flow realizations are held equal. Following their intuition, opportunistic overstatement of earnings will lead to fewer negative and more positive accruals, which will lead to a overall higher level of accruals. Leuz et al. (2003) also use the magnitude of accruals as a proxy for earnings manipulation and Dechow et al. (2011) document that firms that misstate have unusually high working capital accruals. Bhattacharya et al. (2003) measure earnings aggressiveness as the level of accruals:

$$TA_{i,t} \qquad \textit{Magnitude of Accruals}$$

Where all variables are as previously defined. The higher the ratio, the higher the earnings aggressiveness, a sign of poor quality.

In addition, the change in accruals has been used as a measure of quality, based on the intuition that un-managed accruals should, on average, be constant over time. A significant change in accruals could thus indicate managerial manipulation. Schipper and Vincent (2003) suggest that as long as some portion of accruals is both non-manipulated and approximately constant over time, changes in total accruals could stem from managerial manipulations and provide an inverse measure of earnings quality. Hence, the more accruals change over time, the poorer is the earnings quality. DeAngelo (1986) argues that large accruals as such do not necessarily indicate low earnings quality, but a jump in accruals may indicate that managers have deliberately over- or understated earnings. More specifically, DeAngelo (1986) calculates the following fraction:

$$\Delta TA_{i,t} \qquad \textit{Change in Accruals}$$

Where all variables are as previously defined. A high fraction indicates poor earnings quality.

These two measures of earnings quality are certainly simplistic and are thus rarely used as the only measure of earnings quality. Dechow and Schrand (2004) note that some firms will have higher levels of accruals due to the very nature of their business, despite otherwise honest management. They thus argue that the level and change in accruals cannot be seen independently. In addition, Dechow et al. (2010) argue that fundamental performance is likely to differ for firms with extreme accruals versus less extreme accruals and there-

fore the differences in accruals are very likely to stem from sources other than earnings management.

1.2.2 Metrics Based on Properties of Earnings

A large group of quality models examine the distribution and properties of the earnings stream. Since earnings consist partly of accruals, some of the models are related to the accruals models described above. However, where, for instance, the abnormal accruals models attempted to distinguish between managed and un-managed accruals, the models examining earnings properties make no such attempt. Instead, most of them rely on observations of the earnings stream and how this is related to the underlying cash flows. From these observations the researcher then make assumptions of why the earnings stream looks the way it does.

Smoothing

Two conflicting views on smooth earnings as an indicator of earnings quality exist in the literature: one view reflects the idea that managers artificially smooth out relevant and informative fluctuations in cash flows, which leads to a less timely and informative earnings number. In this view, smooth earnings indicate poor quality earnings. The opposite view reflects the idea that management uses private information to smooth out transitory, value irrelevant fluctuations in cash flows, thereby achieving a more useful and persistent earnings number. In this view, smooth earnings indicate high quality earnings (Francis et al., 2006).

The first view, i.e., that smoothing decreases earnings quality, stems from the idea that management responds to a negative (positive) cash flow stream by increasing (decreasing) accruals (Barth et al., 2008). According to Kirschenheiter and Melumad (2002), managers have several incentives to report smooth earnings. First, the authors argue that the market rewards smooth earnings since they are assumed to be more precise.[14] Second, consistently

[14]Therefore, if a firm reports a large, positive earnings surprise, the positive effect on stock prices might be dampened since investors prefer smooth, unsurprising earnings.

positive earnings may raise the expectations of cash flows to investors, thereby increasing share prices. Managers may also wish to appear less risky to attract inexpensive capital; Francis et al. (2004) suggest that capital market participants reward smoother earnings streams with reduced costs of equity and debt. These findings give managers an incentive to report as smooth earnings as possible. Bhattacharya et al. (2003) use earnings smoothing as a measure of earnings opacity. They argue that if earnings are artificially smooth, they fail to depict the true swings in underlying firm performance, thus increasing earnings opacity.

The second view, i.e., that smoothing increases earnings quality, suggests that smoothing is not necessarily opportunistic, but helps users to assess the firm's true economic performance by moving value irrelevant and transitory fluctuations in cash flows (Subramanyam, 1996; Dechow and Skinner, 2000). Hence, managers use smoothing to reveal private information about the performance of the firm (Francis et al., 2004). In addition, very volatile earnings could be caused by big bath earnings management (Healy, 1985). "Taking big baths" refers to an earnings management technique in which losses from several periods are collapsed and recognized in one period, thereby making it possible to report future profits.[15] Dechow and Schrand (2004) note that accruals should smooth cash flow volatility that does not reflect variation in the underlying firm performance. They also believe that by nature, cash flows are excessively volatile and do not reflect firm performance as well as earnings do. Therefore, accruals can mitigate volatility and negative serial correlation in cash flows which are irrelevant to users.

It is thus an open question whether smooth earnings are in fact a quality indicator. A smooth earnings stream is not necessarily a desirable attribute following the Conceptual Frameworks. But since opportunistic income smoothing seems to be a common practise in many countries (Dechow et al., 2010), most researchers agree that a smooth earnings stream can be an indicator of earnings management.

[15]Healy (1985) notes that managers not necessarily have incentives to solely use income increasing accounting practices from a compensation perspective. The schemes examined in his study typically permit funds to be set aside for compensation awards when earnings exceed a specific threshold. If earnings are so low that this threshold is out of reach, managers have incentives to further reduce current earnings by e.g. deferring revenue or accelerating write-offs, to increase the probability of meeting future earnings targets. This strategy is known as 'taking a bath' or big bath earnings management.

Smoothing is usually measured relative to cash flows because they are non-discretionary to a great extent. Cash flows can hence be thought of as unmanaged earnings (Francis et al., 2006). Leuz et al. (2003), Lang et al. (2003), and Francis et al. (2004), among others, measure smoothing as the ratio of standard deviation of earnings to the standard deviation of cash flows. This proxy suggests that an earnings number that is closely related to the underlying cash flows is of high quality and gives a faithful representation of the firm (Schipper and Vincent, 2003):

$$\frac{\sigma(NI_{i,t})}{\sigma(CFO_{i,t})} \qquad \textit{Variability of Earnings to Cash Flows}$$

Where NI is earnings before extraordinary items scaled by lagged total assets; and other variables are as previously defined. If firms use accruals to manage earnings, the variability of change in operating income should be lower than that of cash flows. Low ratios hence indicate that insiders exercise accounting discretion to smooth reported earnings.

Barth et al. (2008) test the level of earnings smoothing by testing the variability of earnings directly:

$$\sigma(\Delta NI_{i,t}) \qquad \textit{Variability of Earnings}$$

Higher values indicate less smoothing and thus higher accounting quality according to the first view described above.

Dechow (1994) argues that cash flows and accruals are expected to be negatively correlated over time as a natural result of accrual accounting, because accruals reverse over time. However, she also suggests that a large negative correlation between accruals and cash flows could indicate that accruals are used to smooth fluctuations in cash flows, suggesting lower accounting quality. Following this intuition, management responds to low (high) cash flows by increasing (decreasing) accruals, thus boosting (lowering) income. Leuz et al. (2003) and Bhattacharya et al. (2003) use the measure of negative correlation between change in accruals and change in cash flows:

$$\rho(\Delta TA_{i,t}, \Delta CFO_{i,t}) \qquad \textit{Corr. between Accruals and Cash Flows}$$

Barth et al. (2008) assume that high quality firms will exhibit a less negative correlation between accruals and cash flows than low quality firms.

Apart from the obvious critique that it is unclear whether a smooth earnings stream indicates earnings management or not, the smoothing measures have also been criticized for being too simplistic. For instance, Schipper and Vincent (2003) argue that the assumption of unmanaged operational cash flows might be naive. In addition, it is difficult to disentangle if smooth earnings arise from the fundamental earnings process, the accounting rules, or intentional earnings manipulation (Dechow et al., 2010) since the smoothing measures known so far now only measures if the earnings stream is smooth, not why it is. Researchers therefore have to be cautious when interpreting the results of the smoothing measures because a smooth earnings stream is not necessarily a sign of opportunistic earnings management.

Persistence

Persistent earnings are desirable because earnings that are able to predict themselves are more valuable for users since they yield better input to equity valuation models and thus persistent earnings are of higher quality (Dechow et al., 2010). Persistence or sustainability has therefore often been used as a measure of earnings quality, where sustainable earnings are thought to be of higher quality (Francis et al., 2006). Regardless of the sign and magnitude of earnings, persistence captures the extent to which the current period innovation becomes a permanent part of the earnings series (Schipper and Vincent, 2003), i.e., it does not imply low volatility. Schipper and Vincent (2003) note that persistent earnings have been associated with larger investor responses to earnings, which supports the hypothesis that persistent earnings are more useful for users, in particular for valuation purposes (Dechow and Schrand, 2004).

A common measure for persistence is the autocorrelation of earnings where high autocorrelation between present and past income is desirable; a stationary AR1 model is thus considered persistent (Heij et al., 2004). Francis et al. (2004) use an autoregressive model to measure persistence:

$$NI_{i,t} = \beta_0 + \beta_1 NI_{i,t-1} + \mu_{i,t} \qquad \textit{Persistence}$$

Large values of β_1 indicate more persistent earnings.

The main criticism of persistence as a quality attribute is related to the fact that very persistent earnings could also be an indication of opportunistic income smoothing (Dechow et al., 2010). Schipper and Vincent (2003) argue that highly impersistent earnings can be the outcome of a neutral application of accounting standards in volatile economic environments, and thus do not indicate poor accounting quality. Similarly, if the firm's underlying performance is highly impersistent, so is its unmanaged earnings stream, even without earnings management.

Predictability

The concept of earnings predictability as a desirable attribute is closely connected to persistence. According to Schipper and Vincent (2003), predictability is the ability of the financial statements to improve users' abilities to forecast items of interest, i.e., the ability of past earnings to predict future earnings. Following this definition, variability decreases predictability and the term is therefore connected to the smoothing literature.

Predictability can be measured using the same model as was used for measuring persistence. Dichev and Tang (2009) calculate absolute predictability from autoregressive regressions of current on 1-year lagged earnings, i.e., the same AR1 process as above:

$$NI_{i,t} = \beta_0 + \beta_1 NI_{i,t-1} + \mu_{i,t} \qquad \textit{Predictability}$$

The variance of μ is the Dichev and Tang (2009) inverse measure of predictability since the variance of the error term captures the variation in earnings that remains after accounting for the effect of the autoregressive coefficient. Even though the measures of persistence and predictability arise from the same autoregressive regression, they are two separate attributes. For the same level of persistence, the volatility of the error term can be both high and low. Dichev and Tang (2009) argue that if stock prices are defined by a random walk (as assumed under market efficiency), their persistence will always be the same (β_1 around 1) even though the volatilities of the stocks are different. In other words, if the variance persistence is low, the earnings stream is easier to predict.

Schipper and Vincent (2003) mention some empirical difficulties when operationalizing predictability; thus, the choice of time period is not agreed upon in the literature even

though many researchers have used one-year-ahead predictions. However, if earnings are extremely unpredictable two years ahead, this might not be appropriate. Finally, they criticize predictability for suffering the same issues as income smoothing since it has not been clarified whether predictable earnings indicate high quality earnings or opportunistic earnings smoothing. Similarly, if the underlying economics of the firm is hard to predict, unpredictable earnings are not necessarily an indicator of earnings management.

Avoiding Earnings Decreases and Small Losses

The literature on avoidance of earnings decreases and small losses[16] hypothesizes that earnings are unevenly clustered around targets such as small earnings decreases and small positive profits, and that this clustering is caused by earnings management. Hayn (1995) shows that even though the overall distribution of earnings is not significantly different from a normal distribution, there is a point of discontinuity around zero. More specifically, there is a concentration of cases just above zero and fewer than expected of small losses just below zero. She suggests "...that firms whose earnings are expected to fall just below the zero earnings point engage in earnings manipulation to help them cross the 'red line' for the year" (Hayn, 1995, p. 132). Thus, she suggests that the kink in earnings is due to an unwillingness of firms to report losses or earnings decreases. There are a number of incentives for managers to produce steadily increasing earnings numbers. Barth et al. (1999) show that firms with increasing earnings during a longer period enjoy higher price-earnings ratios and higher premiums; these benefits vanish immediately when the line of increasing earnings is broken. These findings have been replicated in later studies and thus there seems to be strong incentives to keep earnings positive and steadily increasing. According to, e.g., Degeorge et al. (1999) and Dechow et al. (2003), just exactly meeting or beating analysts' forecasts also indicates earnings management.

Most of the research is connected with examining the frequency of small increases in earnings or small profits barely over zero. Leuz et al. (2003) note that while one might ar-

[16] Avoidance of small losses and earnings decreases has been used extensively in the research under many different terms; e.g small loss avoidance (Leuz et al., 2003), loss avoidance (Bhattacharya et al., 2003), frequency of small positive earnings (Lang et al., 2003), and managing towards positive earnings Barth et al. (2008).

gue that managers are interested in avoiding all losses and earnings decreases, it is not possible to conceal larger losses or earnings decreases since they only have limited reporting discretion. Therefore, managers may manage earnings to make them seem increasing or above zero only when it is possible.

Burgstahler and Dichev (1997) test the hypothesis of avoiding earnings decreases as follows:

$$\Delta NI_{i,t} \qquad \textit{Earnings Decrease Avoidance}$$

Under the hypothesis of no earnings management, the expected distribution of earnings change would be approximately symmetric and normal, in accordance with Hayn (1995).

To assess the degree of small loss avoidance, Burgstahler et al. (2006) compare the number of firms in each industry with small positive earnings with the number of firms with small negative earnings. This yields the following ratio:

$$\frac{SPNI_{i,t}}{SNNI_{i,t}} \qquad \textit{Small Loss Avoidance}$$

Where $SPNI$ is small positive net income, defined as $\frac{NI_{i,t}}{A_{i,t-1}}$ between 0 and 1%; and $SNNI$ is small negative net income, defined as $\frac{NI_{i,t}}{A_{i,t-1}}$ between 0 and -1%. The higher this ratio, the higher the loss avoidance.

The interpretation that small positive earnings indicate earnings management is somewhat controversial and several researchers have questioned whether earnings management actually explains the kink in earnings. In particular, one cannot determine if a kink in earnings is caused by earnings management or pure chance (Dechow et al., 2010). The main criticism of Dechow et al. (2003) is the fact that firms can take real actions to avoid reporting losses or earnings decreases and thus the overrepresentation of these two incidents is not necessarily evidence of earnings management. One can easily imagine that employees are more motivated when facing a loss and managers may take decisions that increase cash flows and hence earnings, even without earnings management. Coulton et al. (2005) provide similar criticism in their examination of firms that beat a simple benchmark, such as achieving increasing earnings. They show that there is no significant difference between the firms just beating a benchmark and the firms that do not meet the benchmark. They also argue that the kink in earnings is a poor proxy for earnings management and that the kink

could just as well be attributable to the scaling of earnings by, e.g., lagged assets or share price.

Conservatism

Conditional conservatism, or prudence, states that bad news in earnings is recognized more timely than good news (Basu, 1997). According to Dechow et al. (2010) conservatism is needed to combat management's natural optimism. For conservatism to be an indicator of earnings quality, it is assumed that the more timely recognition of losses does, in fact, increase decision usefulness; previous literature suggests that equity markets do perceive asymmetric timeliness as increasing earnings quality (Dechow et al., 2010). As described in Section 1.1, conservatism implies that caution is exercised when estimating assets and income, and liabilities and expenses such that the former are not overstated, and the latter are not understated. Beaver and Ryan (2005) define conservative accounting as writing down book value under sufficiently adverse circumstances, but not up under favorable circumstances. AICPA (1994) emphasizes that conservatism does not include imposing bias in accounting, but simply that conservatism makes it likely that possible errors in measurement will be understatements rather than overstatements of net income and net assets. In this way, future surprises are likely to be positive. Ball et al. (2000) argue that three things are expected to lead to accounting conservatism: First, users find negative information more credible since they know that managers would like to overstate earnings and assets. Second, lenders are important users of financial statements and are more impacted by economic losses than gains. Third, timely incorporation of economic losses plays an important corporate governance role.[17] Below are two econometric models that seek to measure conservatism, namely asymmetric timeliness and timely loss recognition.

The research of asymmetric timeliness hypothesizes that profits and losses are recognized in an asymmetric manner.[18] More specifically, losses are recognized on a more timely

[17] Ball et al. (2000, p. 21) argue that prudence plays a role in corporate governance because reversing bad investment decisions is personally more costly to managers than continuing good ones. Monitoring through effective corporate governance is then a mechanism to force them to take the costs.

[18] Beekes et al. (2004) define timeliness as the length of time taken to reflect information in earn-

basis than profits, leading to less persistent and more reverting negative earnings changes. In other words, losses are recognized when they are expected whereas gains are recognized when they occur (Ball and Shivakumar, 2005).[19] A more timely recognition of losses is often associated with a conservative accounting system. A frequently used measure of asymmetric timeliness is the Basu (1997) measure of timeliness, which is not based on returns:

$$\begin{aligned}\Delta NI_{i,t} =& \beta_0 + \beta_1 NegDum_{i,t-1} + \beta_2 \Delta NI_{i,t-1} \\ &+ \beta_3 (NegDum_{i,t-1} * \Delta NI_{i,t-1}) + \mu_{i,t}\end{aligned} \qquad \textit{Asymmetric Timeliness}$$

Where $NegDum$ is an indicator variable equal to 1 if ΔNI is negative, 0 otherwise; and other variables are as previously defined. Timely recognition of economic losses implies that they are less persistent and tend to reverse faster than profits. This predicts that $\beta_3 < 0$.

The main intuition behind timely loss recognition is the fact that firms with high financial reporting quality recognize losses as they occur, rather than deferring them (Lang et al., 2006). This will lead to a higher frequency of large losses. Such a high frequency also indicates that earnings have not been artificially smoothed; if earnings had been smoothed, large losses should be relatively rare. The opposite can, however, also be true since large losses could indicate big bath earnings management. There is thus a conflict between the two. Lang et al. (2006) and Barth et al. (2008) use the frequency of large losses as an indicator of earnings quality:

$$\frac{NI_{i,t}}{A_{i,t}} \qquad \textit{Timely Loss Recognition}$$

If the ratio is less than -0.2, it is defined as a large loss. A high frequency of high losses is associated with high accounting quality since losses are recognized as they occur.

Dechow et al. (2010) criticize the conservatism literature for having failed to prove that asymmetric timeliness actually improves decision making. In addition, the effect of timely loss recognition on quality is unknown due to the lower persistence during bad news periods than good news periods.

---

ings and argue that it is an important element of high quality financial reporting. The timeliness of income recognition refers to the extent to which current earnings reflect value relevant information.

[19] Following the intuition of Ball and Shivakumar (2005), losses are more likely to be recognized timely as accrued charges, whereas gains are more likely to be recognized when they actually occur, i.e., on cash basis.

1.2.3 Market Based Metrics

Market based quality models are termed as such because they are based on relations between accounting and market data such as stock prices. The assumption in these models is thus that the function of earnings is to reflect economic income as represented by stock returns (Francis et al., 2004). Some of the overall earnings attributes such as conservatism, can be measured both with and without market data. As a consequence, conservatism is described both in Section 1.2.2 and Section 1.2.3.

Value Relevance

The intuition behind value relevance is simply that accounting numbers should explain variations in stock returns. Earnings that have greater explanatory power of stock returns are of higher quality (Francis et al., 2006). Francis et al. (2004) argue that the ability of earnings to explain variations in returns is a direct measure of decision usefulness stemming from the conceptual frameworks, while value relevance measures the combination of relevance and reliability according to Barth et al. (2001). In other words, value relevance is a summary measure of how well accounting amounts reflect a firm's underlying economics (Barth et al., 2008).

Value relevance is typically measured empirically as the explanatory power from a regression of stock returns on core earnings, based on the idea that investors respond to information that has value implications. A higher correlation with share prices implies that earnings better reflect fundamental performance and hence earnings are of higher quality (Dechow et al., 2010). The theoretical prediction stems from Holthausen and Verrecchia (1988), who propose a model where the stock price response increases with the precision of the information. Teoh and Wong (1993) modify this to a model where investors' response to earnings surprise will depend on the perceived credibility of the earnings report.

Francis and Schipper (1999) and Bushman et al. (2004), among others, operationalize value relevance as an explanatory power test of core earnings on stock returns:

$$Ret_{i,t} = \beta_0 + \beta_1 Earn_{i,t} + \beta_2 \Delta Earn_{i,t} + \mu_{i,t} \qquad \textit{Value Relevance}$$

Where *Ret* is the 15-month stock return ending three months after the end of the fiscal year; and *Earn* is earnings before extraordinary items, scaled by lagged total assets. A high explanatory power (R^2 from this regression) indicates value relevant earnings, that is, higher accounting quality.

The empirical measure of value relevance is mainly criticized for not taking into account that accounting numbers are clearly not the sole driver of stock prices and thus the earnings-return regression suffers from correlated omitted variables that affect investor decisions (Dechow et al., 2010). The models using quite long time series of earnings (such as 15 months) are especially affected by this since it is evident that countless other variables apart from earnings influence variations in stock prices. As a consequence, other researchers have used shorter time-periods, for example Visvanathan (2006) who uses quarterly earnings announcements. However, this approach still raises the same concern. In addition, Holthausen and Watts (2001) note that value relevance does not strictly measure relevance and reliability (as posited by, for instance, Barth et al. (2001)), but also verifiability which is not captured in the empirical term value relevance.

Conservatism

As described above, conservatism leads to asymmetry in recognition of gains and losses in such a way that the latter are recognized more timely than the former. Conservatism differs from timeliness in that it reflects the differential ability of accounting earnings to reflect economic losses versus gains (Francis et al., 2004). Apart from the Basu (1997) measure of asymmetric timeliness described in Section 1.2.2, he also proposed a model that measures the extent to which current-period accounting income asymmetrically incorporates economic losses, relative to economic gains. This is done empirically by specifying accounting income as the dependent variable and annual stock market returns as independent variables:

$$EPS_{i,t} = \beta_0 + \beta_1 DR_{i,t} + \beta_2 Ret_{i,t} + \beta_3 DR * Ret_{i,t} + \mu_{i,t} \qquad \textit{Conservatism}$$

Where *EPS* is earnings per share, scaled by price per share; DR is an indicator variable that equals 1 if $Ret < 0$, 0 otherwise; and other variables are as previously defined. A higher

coefficient on β_3 implies more timely recognition of incurred losses since earnings will have higher sensitivity to bad news compared to good news (Givoly and Hayn, 2000).

The empirical model of Basu (1997) is subject to some criticism. Givoly et al. (2007) suggest that relying exclusively on one measure to assess conservatism in firms is likely to create incorrect inferences. They identify certain factors that may influence the measure of conservatism such as economic events and disclosure policy, but are unrelated to accounting conservatism. Another limitation put forward by Givoly and Hayn (2000) is the fact that the Basu (1997) model relies on stock price movements to identify good and bad news. Dietrich et al. (2007) criticize the econometric validity of the conservatism measure since return is endogenous in the reverse regression. They suggest that other research designs such as the build-up of negative non-operating accruals (Givoly and Hayn, 2000), market-to-book ratio (Feltham and Ohlson, 1995), and the change in investments (Easton, 2004), are more suitable for investigations of accounting conservatism. In spite of these critiques the Basu (1997) model of conditional conservatism is still widely used in the literature.

1.2.4 Comparison of Metrics

As could be seen from the review of different proxies presented in the first part of Section 1.2, no single metric captures the broad concept of accounting quality. Instead, each of the metrics measures a distinct part of the concept quality and thus the metrics should not be seen as substitutes. While some proxies measure broadly the same idea, for instance different versions of the abnormal accruals models, other proxies measure different concepts or have different implications, for instance persistence and the measures of income smoothing. The latter is underpinned by the fact that some of the metrics are negatively correlated with each other (see, e.g., Dechow et al. (2010)) and hence they can have contradictory implications. This is not necessarily problematic, but requires that the researcher carefully selects the specific proxies that are suitable for his or her research question.

The different metrics examining different properties of accruals are clearly highly correlated since they all identify how accruals can mask the true economic performance of the firm, whether it is opportunistic or unintentional. For instance, Dechow et al. (2003) show

that the overall level of accruals is highly correlated (more than 80%) with discretionary accruals. Similarly, Dechow and Dichev (2002) note that their model of accruals quality and the sheer level of accruals are both proxies for the same aspect of unobservable "true" accrual quality, namely a measure of earnings persistence. They also note that even if the level of accruals is simple and easy to use, the Dechow-Dichev Model still performs better in capturing the variation in earnings persistence. Accruals quality is related to earnings persistence since firms with low accruals quality have a larger amount of accruals that are unrelated to cash flows, which induces noise and less persistence in earnings. This is natural since more accruals estimation errors will lead to less persistent earnings. Even though abnormal accruals models and accruals quality may seem similar, they do capture fundamentally different angles of quality. Whereas the abnormal accrual models distinguish between normal accruals, driven by accounting fundamentals, and abnormal accruals, a result of managerial discretion, the accruals quality models measure the deviation between earnings and cash flows, independent of opportunistic behavior. Thus, the main difference between the two groups of models is the assumption of managerial bias.

A number of the quality attributes and metrics have opposite implications which are discussed below.

In spite of the fact that persistence and predictability as quality constructs are closely interrelated, they are not necessarily identical. Schipper and Vincent (2003) note a possible contradiction between the persistence and predictive ability of earnings: Highly persistent earnings will have low predictive ability if the variance of a typical shock to the series is large. Consequently, earnings that are of high quality on the persistence dimension may be of low quality on the predictive ability dimension.

A prominent contradiction also exists between persistence and smoothing. On the one hand, highly persistent and predictable earnings are better input for valuation models and are thus often associated with high quality. On the other hand, however, persistence may be achieved by opportunistic income smoothing (Dechow et al., 2010; Schipper and Vincent, 2003). Consequently, the two groups of models have exact opposite definitions of high earnings quality: While a very smooth and steady earnings stream is a sign of high quality in the view of the persistence literature, it is a sign of low quality in the view of the income

smoothing literature (Dichev and Tang, 2009). In other words, artificially smooth earnings increase the persistence and predictability, but weaken the relation between cash flows and earnings (Melumad and Nissim, 2008). In a related vein, smooth earnings are also predictable, but Dechow et al. (2010) argue that predictability is the objective, not smoothness. The authors make a sharp distinction sharply between naturally smooth earnings and artificially smoothed earnings, where the reported earnings have less volatility than the fundamental earnings process. The former increases earnings quality in a valuation context, while the latter decreases earnings quality in a reliability context.

Another contradiction exists between conservatism and persistence. By definition, conservatism posits that negative earnings or return changes are less persistent than positive ones, but the persistence literature does not distinguish between the level of persistence in good vis-a-vis bad times.[20] The asymmetric persistence especially lowers the predictability of earnings. Similarly, if losses are recognized in a timely manner, they will occur relatively often, which is also the case if earnings have not been artificially smoothed (Barth et al., 2008). From this intuition, firms reporting (large) losses on a regular basis have higher quality earnings because they recognize losses as they occur rather than deferring them to future periods and they do not engage in income smoothing. However, one strand of literature (e.g., Abdelghany (2005)) posits that firms "take big baths," i.e., overstate this period's loss to be able to report profits in the next periods. From this view, large losses are an indication of earnings management, which is a totally different view than the one taken by the conservatism and smoothing literature.

The fact that so many of the metrics point in every which way could leave any researcher discouraged. However, the fact that the metrics are not substitutes, and sometimes even opposites, is not necessarily a weakness. Instead it gives researchers an opportunity to measure different angles of the broad accounting quality concept. But it also calls for a very

[20] According to Penman and Zhang (2002), conservatism and persistence have opposite influence on quality if the firm expenses rather than capitalizes increased investments in R&D. This will yield lower earnings, creating unrecorded reserves which give managers the flexibility to report higher income in the future. This will yield unsustainable and low quality earnings. As a consequence, the authors argue that conservative accounting does not necessarily lead to high quality financial reporting. Similarly, Dechow et al. (2010) note that the effect of timely loss recognition on quality is unknown, precisely because conservatism leads to lower persistence during bad news periods than in good news periods.

careful selection of the appropriate quality metrics in order to make sure they are suitable for the research design in question.

1.3 Accounting Quality in Financial Institutions

In the vast majority of the accounting quality studies cited in this review, banks and financial institutions are excluded from the samples of interest. This exclusion arises for two reasons: First, banks are highly regulated and hence have different incentives to manage earnings, and second, bank financial statements are inherently different from those of industrial firms. Bank regulation and the bank specific incentives are described in Section 1.3.1, while Section 1.3.2 describes the different nature of bank financial statements and presents different bank specific earnings quality metrics. An overview of those proxies is shown in Table 1.3.

1.3.1 Bank Regulation and Incentives to Manage Earnings in Banks

The regulation of U.S. banks is divided among several bodies (Greenbaum and Thakor, 2007): Commercial banks are regulated by the Federal Reserve System, the Office of the Comptroller of the Century (OCC), and the Federal Deposit Insurance Corporation (FDIC). Savings and loans associations and mutual savings banks are, together with thrifts/savings institutions, regulated by the Office of Thrift Supervision (OTS), and FDIC provides federal deposit insurance. Finally, credit unions are regulated by the National Credit Union Administration (NCUA), which also provides deposit insurance. Danish banks are regulated by the body Finanstilsynet and are subject to the Basel guidelines (Baldvinsson et al., 2011).

According to Gebhardt and Novotny-Farkas (2011), banks have the same incentives as non-financial firms to manage earnings, i.e., to achieve capital market benefits, beating analysts' expectations, and maximizing compensation packages. The incentive to manage regulatory capital is, however, bank-specific. Beatty et al. (1995) outline three incentives, namely primary capital, earnings incentives, and tax incentives. The first two incentives are

elaborated below.[21] Beatty et al. (1995) note that the conflicting incentives are likely to be traded off and it is assumed that the bank balances off each goal to achieve the optimal level of required capital, net income, and tax payments, respectively. Management can achieve these objectives by the discretionary items loan loss provisions, charge-offs, miscellaneous gains and losses, pension settlement gains, and changes in external funds. It is assumed that the firm must balance off each goal to find the desired level of capital, earnings, and tax, respectively. Gebhardt and Novotny-Farkas (2011, p. 302) note that banks may have different incentives in different periods: "In some periods, they may have an incentive to understate expected losses to boost net income or capital; in other periods, they may have incentives to overstate current loan loss provisions when earnings are high, which will allow them to understate losses in future periods when they have lower earnings."

Capital Incentives

Banking regulation requires that banks satisfy certain capital adequacy requirements that can be written in terms of accounting numbers; this gives rise to the bank-specific incentive to manage income statement and balance sheet variables of interest to regulators in order to achieve the optimal level capital.[22]

Bank capital is a buffer meant to absorb risk and high unexpected losses and banks that do not meet the minimum required capital risk direct intervention (Matten, 2000).[23] When bank management decides on the optimal level of capital, it has to balance the need to keep expensive capital as low as possible, hence optimizing shareholders' return, while at the same time ensuring that regulators have no concerns. In other words, the bank must balance regulatory costs[24] (arising when approaching the minimum) and opportunity costs

[21] Tax incentives cover the incentive to manage earnings to minimize the present value of tax payments. See, for instance, Shackelford (1999) and Scholes et al. (1990).

[22] As noted by Herz (2010), standard setters do not determine the required capital level, bank regulators do. But the determination of regulatory capital starts with accounting numbers.

[23] Banks that approach the minimum required level are first interviewed by regulators. If there is a good reason for the shortfall (for example an acquisition), regulators may choose to let the bank proceed as usual. If the regulators are not satisfied with the explanation given by management, supervisors may take over the management of the bank or force sale or closure of part of the organization.

[24] Scholes et al. (1990) mention three regulatory costs: direct monitoring costs, costs resulting from

(arising when exceeding the minimum). Collins et al. (1995) argue that managers can respond to the demand for regulatory capital by increasing equity, net income, or loan loss reserves.

According to Healy and Wahlen (1999) considerable evidence shows that banks close to the minimum required capital understate loan loss provisions and write-offs, and recognize abnormal realized gains on their securities portfolio. For instance, Moyer (1990) finds that earnings are managed to reduce regulatory costs imposed by capital adequacy ratio regulations. Evidence that banks manage earnings to avoid capital requirement violations is also found by Collins et al. (1995), Moyer (1990), Ahmed et al. (1999), and Scholes et al. (1990).

Earnings Incentives

Earnings incentives cover three alternative explanations for earnings management that aims to either overstate, understate, or smooth earnings: Managing upwards to achieve stock market incentives, downwards to avoid regulatory or political costs, and income smoothing to achieve a steady and smooth earnings stream. The strict regulation of banks is likely to make the second explanation especially pronounced for banks compared to industrial firms. Moyer (1990) argues that the political sensitivity is increasing in bank size.

A large number of studies find evidence of earnings management in banks (Burgstahler et al., 2006; Anandarajan et al., 2007; Beatty and Harris, 1999; Beatty et al., 2002; Cornett et al., 2009). Earnings can be managed using, for instance, loan loss reserves which are directly related to banks' most critical assets and liabilities, are typically very large, and are highly dependent on management's judgment (Healy and Wahlen, 1999). Earnings can also be managed by strategically timing the realization of gains/losses in investment securities, or by relaxing self-imposed credit standards (Gebhardt and Novotny-Farkas, 2011).

---

restrictions on investments activities, and restraints on the issuance of demand deposits.

Table 1.3: Overview of Earnings Quality Proxies in banks

Model	Citation	Intuition
Security Gains and Losses		
Smoothing SGL	Beatty et al. (1995), Beatty and Harris (1999)	Large negative correlations between earnings before SGL and SGL suggest that the latter has been used to smooth earnings.
Discretionary SGL	Beatty et al. (2002), Cornett et al. (2009)	Large portions of securities gains or loss recognitions not explained by accounting fundamentals indicate earnings management.
Loan Loss Accounting		
Smoothing LLP	Ahmed et al. (1999)	Large positive correlations between earnings before LLP and LLP suggest that the latter has been used to smooth earnings.
Discretionary LLP	Beatty et al. (2002), Cornett et al. (2009)	Large portions of loan loss provisions not explained by accounting fundamentals indicate earnings management.
Conservatism LLP	Nichols et al. (2009)	Good news about credit losses is less persistent than bad news under conservative accounting.

1.3.2 Bank Financial Statements and Proxies for Earnings Quality

Banks clearly generate earnings in a different way than non-financial firms and therefore accounting quality must be measured differently in the two groups. The financial statements of banks are different from those of industrial firms on several dimensions (Beaver et al., 1989; Greenbaum and Thakor, 2007; Benninga, 2008).

On the balance sheet, banks hold relatively large quantities of financial claims as assets, primarily loans and interest bearing marketable securities. For a non-financial company, cash and marketable securities are a store of value whereas it is an operating current asset for banks. The liabilities side resembles that of the industrial firms more, although a large part of it consists of deposits. In addition, banks are often highly levered. Banks borrow money both from depositors and other banks, to name a few, and lend it out. One thus has to distinguish between a bank's borrowing for the purpose of making loans and the bank's permanent debt. Therefore, most of the short-term debt items in a bank are operating current liabilities. Zhao and He (2008) also note that off-balance sheet activities are more important in banks than in other firms, for instance provision of line of credit, as well as the securitization and sale of loans.

Bank income statements have five main components (Zhao and He, 2008): Interest in-

come is the result of all interest and dividend earned by banks on interest bearing assets, such as loans and leases. Interest expense is the result of all interest paid to depositors and other creditors. Non-interest income includes fee income, gain on securities transactions, and all other income not originated in interest payments. Non-interest or operating expense includes personnel compensation, legal expenses, office occupancy and equipment expenses. Finally, provisions for loan losses are the amounts charged as operating expense to provide an adequate reserve to cover anticipated losses in the loan portfolio. These charges become part of the reserve for loan losses, a deductive component from the asset on the bank balance sheet, which is then used to charge off loans if they default.

Accruals in industrial firms are mostly driven by, e.g., production and sales whereas accruals in banks are driven by the bank's lending and investment activities. Thus, one of the largest accruals in banks is the loan loss reserve (Altamuro and Beatty, 2010). Therefore the often used abnormal accrual models are not well suited in banks since the regressor property, plant, and equipment (PPE) only has immaterial influence on the accrual component. The same is the case for the accruals quality models which map cash flows from operations into working capital accruals. Whereas the free cash flow for a non-financial company excludes all financial items, the cash flow for a bank has to take explicit account of the financing of the bank's lending activities (Benninga, 2008), making the model unsuited for the financial industry. However, some of the quality metrics described in Section 1.2 can also be used in financial institutions, in particular those that are based on properties of earnings or value relevance. For instance, Beatty et al. (2002) use the Burgstahler and Dichev (1997) measure of small earnings changes, and Abdelghany (2005) measures income smoothing in banks as proposed by Leuz et al. (2003).

Security Gains and Losses

Security gains and losses (SGL) reflect the accounting gain or loss that arise when a bank sells an investment security at a price different from the book value (Warfield and Linsmeier, 1992). Realizing security gains or postponing security losses increase net income and bolster regulatory capital. Since divesting of financial securities is discretionary to a

large extent,[25] bank managers have the ability to influence reported accounting income by timing the sales of securities (Barth et al., 1990). Thus, the bank can use security gains and losses to achieve both capital and earnings benefits. Specifically, a bank that wishes to boost bank capital or net income can accelerate (defer) recognition of security gains (losses).

Management may realize security gains and losses as an earnings management device for two possible reasons: First, to smooth the earnings stream (Barth et al., 1990), and second, to alter the level of regulatory capital or net income (Beatty et al., 2002). These two tools for manipulative realizations of SGL are described below.

Smoothing with security gains and losses can be done if the selling of securities is timed such that the change in earnings before SGL is high, the level of SGL is low, and vice versa. In the case of income smoothing, SGL tends to be relatively high when earnings from other sources are relatively low, which will artificially smooth the earnings stream. Barth et al. (1990) show that managers realize SGL to smooth annual earnings levels using a simple comparison of annual median changes in earnings before security gains and losses and SGL; if they move in opposite directions it may indicate income smoothing. However, Warfield and Linsmeier (1992) do not find evidence of income smoothing and attribute this to the fact that loan loss provisions are a better device for smoothing earnings than realizing security gains and losses.

Beatty et al. (1995) and Beatty and Harris (1999) test the income smoothing hypothesis by estimating the following regression:

$$RSGL_{i,t} = \beta_0 + \beta_1 Size_{i,t} + \beta_2 EBSGL_{i,t} + \beta_3 Capital_{i,t} + \beta_4 USGL_{i,t} + \mu_{i,t} \quad \textit{Smoothing SGL}$$

Where $Capital$ is Tier 1 capital before security gains and losses scaled by total assets; $USGL$ is total unrealized security gains and losses scaled by total assets; and other variables are as previously defined. The measure of smoothing is the coefficient on β_4, where a negative coefficient indicates income smoothing. The intuition proposed by Barth et al. (1990) is that high (low) levels of earnings before SGL result in low (high) levels of security gains and losses.

[25] Beatty and Harris (1999) note that realizations of securities gains and losses are relatively unaudited and unregulated. The realization is assumed to be partly non-discretionary since they are used to manage liquidity and interest rate risk.

An important weakness of the smoothness measure is the fact that income smoothing is not necessarily a result of opportunistic behavior. Artificially smoothing earnings could be the bank signalling or communicating private information to the market, even though most researchers equate smoothing via SGL with poor earning quality (Gebhardt and Novotny-Farkas, 2011). Beatty and Harris (1999) also find support of the smoothing hypothesis.

To test the second possible incentive to sell securities, researchers have attempted to distinguish between SGL realizations arising from the normal course of bank business, and those that are purely discretionary. Large portions of the discretionary part indicate earnings management. The intuition is hence much like the one underlying the abnormal accruals models. In this case the factors size, pre-tax earnings, and regulatory capital are hypothesized to explain the level of realized security gains and losses. Beatty et al. (2002) and Cornett et al. (2009) separate security gains and losses into their discretionary and non-discretionary portions:

$$RSGL_{i,t} = \beta_0 + \beta_1 Size_{i,t} + \beta_2 EBSGL_{i,t} + \beta_3 Capital_{i,t} + \mu_{i,t} \qquad \textit{Discretionary SGL}$$

As in the discretionary accruals literature, the measure of earnings management is the residual from the above regression.

A major point of criticism is the fact that from an academic viewpoint it is very difficult to distinguish between when selling of securities is a normal part of the bank's operations as, e.g., a risk management tool and when the selling has an opportunistic flavor to achieve market or capital benefits.

Loan Loss Accounting

Loan loss accounting is interesting in an earnings management context since it has material effects on banks' income statements and balance sheets and requires a substantial degree of estimation and judgment (Nichols et al., 2009). Expected loan losses are recognized through the expense account loan loss provision (LLP), which then increases the balance sheet account loan loss reserve (LLR). A loan loss provision is hence an expense set aside for bad loans to reflect future losses on the bank's loan portfolio, while a loan loss reserve reflects

the total amount of expected future loan losses in the loan portfolio. When loans at the end of the financial year are deemed uncollectible, they are charged off against the loan loss reserve and hence the bank acknowledges that the receivable no longer exists (Beatty et al., 1995). Additions to loan loss provisions reduce net income, the book value of equity, regulatory capital, and the net loans outstanding by increasing the loan loss reserve (Gebhardt and Novotny-Farkas, 2011). Wahlen (1994) distinguishes between the rather non-discretionary parts of banks' loan portfolio, non-performing loans and charge-offs, and the more discretionary types, namely loan loss provisions. Warfield and Linsmeier (1992) argue that LLP is a better earnings management device than security gains and losses since the first is larger in magnitude, contains a larger discretionary component, and a change in loan loss provisions has no direct effect on future cash flows to it, whereas a sale of investment securities may result in foregone future investments returns. Similarly, Scholes et al. (1990) argue that LLP typically represents a very large fraction of income which makes it especially appropriate in relation to strategic choice of accounting policies.

As was the case with security gains and losses, proxies of earnings management within loan loss accounting are separated in income smoothing via loan loss provisions and discretionary LLP. In addition, loan loss provisions are well suited to measure the conservatism of banks' loan loss accounting. A detailed description is found below.

Ahmed et al. (1999) examine the relation between loan loss provisions and earnings before taxes and assume a positive relation between loan loss provisions and earnings before loan loss provisions, indicating that managers smooth earnings. Thus, when earnings are expected to be low, loan loss provisions are deliberately understated to mitigate adverse effects of other factors on earnings. Specifically, Ahmed et al. (1999) examine the extent to which income before LLP explains the actual loan loss provision. The intuition is that if there is a positive causal relationship between the two, it is an indication of smoothing:

$$\begin{aligned} LLP_{i,t} =& \beta_0 + \beta_1 std(Size)_{i,t} + \beta_2 \Delta NPL_{i,t} \\ &+ \beta_3 Capital_{i,t} + \beta_4 EBLLP_{i,t} + \mu_{i,t} \end{aligned} \qquad \textit{Smoothing LLP}$$

Where LLP is the loan loss provision scaled by lagged total assets; NPL is non-performing loans scaled by lagged total assets; $EBLLP$ is net income before loan loss provision scaled

by lagged total assets; and other variables are as previously defined. A positive coefficient on β_4 indicates income smoothing.

To estimate the non-discretionary portion of loan loss provisions, Beatty et al. (1995) and Beatty et al. (2002) propose a regression to separate discretionary and non-discretionary LLP, respectively. The independent variables drive the normal amount of loan loss provisions:

$$\begin{aligned} LLP_{i,t} =& \beta_0 + \beta_1 Size_{i,t} + \beta_2 \Delta NPL_{i,t} + \beta_3 LLR_{i,t} \\ &+ \beta_4 Loans_{i,t} + \mu_{i,t} \end{aligned} \qquad \textit{Discretionary LLP}$$

Where LLR is reserve for loan losses, scaled by total assets; and $Loans$ is total loans, scaled by total assets; and other variables are as previously defined. The discretionary component of the loan loss provision is the residual, where high magnitudes indicate earnings management.

Loan loss accounting is well-suited for establishing the degree of conservatism in banks, given its discrete nature.[26] Nichols et al. (2009) extend the approach of Ball and Shivakumar (2005) by analyzing the asymmetric persistence of earnings increases and decreases, respectively. For conservative banks, good news about credit losses should have higher persistence, whereas bad news should have lower persistence than is true for less conservative banks. To test this the authors build on the Ball and Shivakumar (2005) model:

$$\begin{aligned} \Delta NI_{i,t} =& \beta_0 + \beta_1 D\Delta NI_{i,t-1} + \beta_2 \Delta EBLLP_{i,t-1} \\ &+ \beta_3 \Delta LLP_{i,t-1} + \beta_4 \Delta EBLLP_{i,t-1} * D\Delta EBLLP_{i,t-1} \\ &+ \beta_5 \Delta LLP_{i,t-1} * D\Delta LLP_{i,t-1} + \beta_6 Size_{i,t} + \mu_{i,t} \end{aligned} \qquad \textit{Conservatism LLP}$$

Where $D\Delta NI$ is an indicator variable equalling 1 if ΔNI is negative, 0 otherwise; $D\Delta EBLLP$ is an indicator variable equalling 1 if $\Delta EBLLP$ is negative, 0 otherwise; and $D\Delta LLP$ is an indicator variable equalling 1 if ΔLLP is negative, 0 otherwise; and other variables are as previously defined. A decrease in LLP reflects good news about credit losses for the loan

[26] According to Nichols et al. (2009), banks with more conservative loan loss accounting recognize loan loss provisions that are larger and more timely, larger loan loss reserves relative to total loans, larger and more timely charge-offs, and smaller and less timely recoveries compared to less conservative banks.

portfolio in the current year and is equivalent to an increase in earnings. Under conditional conservatism, positive earnings changes should be more persistent and less timely than negative ones, corresponding to positive coefficients on β_2 and β_3 and negative coefficients on β_4 and β_5.

As discussed by Wall and Koch (2000), exercising discretion beyond what the standard prescribes is not necessarily manipulation. Building up loan loss reserves during good times and using part of the increase to absorb losses in bad times does not necessarily constitute income manipulation from a regulatory perspective. In fact, it could just be a sign of prudence. Smoothing the income stream could also be a way to communicate private information to the capital markets (Gebhardt and Novotny-Farkas, 2011).[27]

The separation of discretionary and non-discretionary loan loss provisions has also been criticized, since some of the drivers of normal LLP are not necessarily free from managerial bias. In particular, Nichols et al. (2009) argue that non-performing loans can also be managed, resulting in understatement of discretionary loan loss provisions.

1.4 Concluding Remarks

The purpose of this literature review was to give an overview of the definitions, causes, and consequences of earnings quality, and how to measure it, both in industrial and financial firms. There are multiple definitions of earnings quality, but most revolve around the notion of decision usefulness, i.e., financial statements that are useful to users (broadly defined) are of high quality. Some of the quality attributes stem from the Conceptual Frameworks, such as relevance and precision, while others do not, such as smoothness. Several variables influence the accounting quality of a specific firm, for instance characteristics of the firm

[27] Beaver and Engel (1996) also outline a signalling incentive for discretionary behavior in loan loss accounting, namely that strong banks wish to stand out from weaker banks by signalling financial strength to take additional charge-offs. Wahlen (1994) confirms this hypothesis, showing that bank managers increase the discretionary component of LLPs when future cash flow prospects improve. He also documents a positive relation between stock returns and loan loss provisions, indicating that investors think that managers reveal good news when they increase (discretionary) provisions. However, Ahmed et al. (1999) cannot replicate this finding. Similarly, Anandarajan et al. (2007) argue that reduced volatility in earnings is assumed to convey a signal for lower risk, and therefore banks would have incentives to smooth earnings using LLP.

itself, internal controls, auditors, the accounting regime, as well as capital market incentives and regulation. Outcomes of accounting quality include capital costs and stock prices, audit opinions, and litigation risk.

The review divided the measurement of accounting quality in three groups: Those based on accruals, those based on the distribution of earnings, and those with market data as reference construct. All metrics aim to objectively measure the accounting quality empirically. Because they measure different angles of the broad concept financial reporting quality, some of them have opposite implications, such as the smoothing and the persistence literature.

Finally, accounting quality in banks was described separately because of the different incentives of bank managers as well as the different nature of bank financial statements. The incentive to manage bank capital to avoid regulatory costs is bank-specific, while the fact that bank accruals are very different from industrial accruals calls for bank-specific earnings quality proxies. Most of these circle around the selling of securities and loan loss accounting.

Even though this review is not exactly short, it covers but a small fraction of the earnings quality literature. This highlights the importance of this stream of literature and how important it is to a large number of stakeholders. In spite of the fact that earnings quality is vastly researched, we still have no clear and unambiguous answers to two very important questions: What exactly characterizes high quality financial reporting? And how exactly do we measure it? The fact that these questions are still not completely answered in spite of the huge body of literature could discourage any researcher. Instead, I feel it calls for further research. Below we list some shortcomings of the current state of the literature and it would be interesting to get a better understanding of these issues.

First, as noted by Dechow et al. (2010), earnings quality is a function of both the fundamental performance of the firm and the accounting system that measures it and researchers rarely distinguish adequately between the two sources of quality. Similarly, according to Francis et al. (2006) more than half of the variation in earnings quality is caused by innate factors such as size, business risk, volatility of cash flows and sales, and length of the operating cycle. Both observations lead to uncertainty about what drives the earnings quality

measured in different research designs. Is poor quality caused by manipulation or simply by the business model or the accounting standards applied? If researchers fail to control for these factors in research designs, they may very well find evidence of earnings management or poor quality even when it is not there.

Second, many of the quality metrics suffer from the shortcoming that they can only tell us something about how accounting numbers look, not why they look that way. For instance, researchers can only observe that a firm has high accruals, high abnormal accruals, high persistence, or kinked distribution of earnings - not why it has those properties. As noted above, it could be caused by fundamental performance or the accounting system - not necessarily errors or manipulation. It is vital that they carefully consider these options when choosing their research design.

Chapter 2

Do Restatements Break Bad Habits? Evidence of Earnings Quality in Restating Firms

Do Restatements Break Bad Habits? Evidence of Earnings Quality in Restating Firms

Marie Herly, Jan Bartholdy, and Frank Thinggaard

Department of Economics and Business, Aarhus University

Abstract

The objective of this paper is to examine if firms improve their earnings quality following a restatement and thus shed light on the disciplining role of the restatement itself and of capital market forces.

We compare the earnings quality of restating US firms with the quality of a matched control group. Using a wide portfolio of accounting quality metrics grouped by factor analysis, we predict and find that the quality of restating firms seems to be poorer than that of the control group, even several years before the restatement. Some of these differences remain after the restatement. Using a difference-in-difference research design we also find that the restating firms improve the quality of their financial statements, but surprisingly not significantly more than the control group. However, when partitioning the sample based on the stock market reaction to the restatement announcement, restating firms in fact improve significantly more than the control group. It thus appears that the restatement event itself does not prompt an improvement, but the punishment of the capital markets does.

The study contributes to current literature on three dimensions: First, it extends our knowledge about the earnings quality of restating firms before the actual restatement. Second, it extends existing research on the consequences of restatements to the long-term impact on restating firms' earnings quality. Third, the broad measurement and factor analysis of earnings quality metrics provide new insights on how these metrics are related and how they develop before and after a restatement.

Keywords: Earnings restatements; earnings quality; capital markets.

JEL Classification: M41; G14; M48.

We thank Juha-Pekka Kallunki, Wayne Landsman, Valeri Li, Thomas Plenborg, Dorothea Vorndamme, and participants at the 2011 DGPE workshop, 2012 D-CAF Workshop, 2013 EAA Annual Congress, and 2013 AAA Annual Congress for helpful comments. Marie Herly gratefully acknowledges the financial support of FSRs Studie- & Understøttelsesfond to buy access to the Compustat Unrestated Quarterly Database.

2.1 Introduction

This paper examines earnings quality in US firms before and after they restate their financial statements and the disciplining role played by the restatement itself and by the capital markets in the wake of a restatement.

Restatements certainly are material financial reporting events, and several studies have shown that the number of restatements has increased dramatically over the last decade (Scholz, 2008; Valdivia, 2008). While previous research gives interesting insights on some dimensions of earnings quality of restating firms in the actual restatement years (e.g., Jones et al. (2008); Dechow et al. (2011)) and the short-term consequences of the restatements (e.g., Palmrose et al. (2004); GAO (2006b), and Wilson (2008)), little is known about the long-term consequences on earnings quality of a restatement. This paper seeks to fill this gap in the literature.

We compare the earnings quality of restating firms with that of a matched control group ten years before and after the actual restatement event. The firms in our sample have all restated due to material errors or irregularities. The sample contains prominent cases of earnings management, such as Xerox, Bristol-Myers Squibb, and QWest. Each of these restating firms is matched with a control firm with similar size and profitability, within a similar industry. To examine whether the restatement improves the financial reporting of restating firms, we examine the difference in the relative improvement in quality for the two groups to isolate the effect of the restatement event using a difference-in-difference research design. We then partition our sample in two sub-samples, based on the market reaction to the restatement announcement, a proxy for the severity of the restatement and the market discipline following a restatement.

We use 13 different earnings quality metrics that measure abnormal accruals and accruals quality, income smoothing, asymmetric timeliness, and persistence. We then apply factor analysis to group the metrics in meaningful categories, examining several dimensions of quality. We end with three factors that capture the dimensions of quality related to discretionary accruals, accruals quality, and smoothness. Unrestated, original data is used to assure that later changes due to the restatements do not influence the findings.

The difference-in-difference research design allows us to statistically isolate the effect of the restatement event itself on the improvement of earnings quality of restating firms. The partition based on market reaction on the other hand isolates the effect of restatement severity and market discipline on the improvement of quality.

Our results indicate that the earnings quality of restating firms is poorer than that of the control group, already several years before the restatement. The results are less conclusive after the restatement event, but a graphical representation reveals interesting insights into the development in quality of the two groups before and after a restatement. It seems as if the difference in earnings quality between restating and non-restating firms is evident up to nine years after the restatement event, which indicates that restating firms have fundamentally poorer quality than otherwise similar firms.

Using the difference-in-difference research design we find that the restating firms improve the quality of their financial statements, but surprisingly not significantly more than the control group. It is therefore not possible to attribute any improvement to the restatement and we therefore cannot statistically document any disciplining effect of the restatement event alone. Partitioning the sample based on the market reaction to the restatement, we find that there is a significant difference between the improvement of the restaters and non-restaters in the sub-sample with high negative market reaction, but not in the sub-sample with low reaction. This indicates that capital market forces have a disciplining impact on the firms such that negative market reactions increase the incentives of the firms to improve. It is hence possible to isolate the effect of the market reaction on the likelihood of improving, but not the effect of the restatement itself.

Our results are not driven by a positive intra-industry effect such that a restatement by one firms causes other firms in the same industry to tighten their accounting and internal control mechanisms and thereby improve the earnings quality. Our finding that restating firms have poorer quality already in the years before the restatement is not driven by previous restatements if the firms restated several times. Our conclusions also hold even when allowing firms one additional year to improve. We seek alternative explanations for a possible improvement in the quality of restating firms, but the improvement is not driven by fraud, SEC investigation, or type of restatement.

The contributions of this study are threefold: First, it extends the findings of for instance Dechow et al. (2011) and Dechow et al. (1996) on the determinants of restatements, since our study examines whether the restatement can be predicted using a wider portfolio of earnings quality metrics. The paper is also related to research on the quality of restating firms in the actual restatement years (Jones et al., 2008; Dechow et al., 2011). That the poor quality in the restatement year is detectable even several years before is an important finding for users of financial statements who have made resource allocation decisions on the basis of financial statements that do not give a fair presentation of the firm, assuming they are uninformed of the lower quality. This finding is thus relevant for investors who can avoid negative returns after possible restatements, for auditors who can identify possible red flags earlier, and for regulators who can increase investor protection.

Second, it extends current knowledge on the consequences of restatements (e.g., Palmrose et al. (2004) and Scholz (2008)) to include the development in earnings quality specifically after a firm has restated its financial statements on a longer horizon. To our knowledge no prior research has separated the disciplining role of the restatement itself and capital market forces to determine the extent to which the firm actually improves the quality of its financial statements. These findings are particularly relevant for the SEC and auditors who should continue to scrutinize firms who have restated in the past. Thus, the fact that the firm has restated once does not guarantee that the quality of that firm's financial statements have changed fundamentally. This implication further makes this study highly relevant for investors who take resource allocation decisions based on the financial statements of the restating firms.

Third, the factor analysis of the 13 earnings quality metrics gives interesting insights on the interrelation of some of the widely used accounting quality metrics. Therefore, this study is interesting for researchers within accounting quality. The fact that the difference in quality between restating firms and the control group is measurable in our relatively long window (up to ten years before and after the restatement event) suggests that restating firms have fundamentally poorer quality than otherwise similar firms and that restatements do not change this fact. It hence deepens our understanding of restating firms and how their accounting behavior differs from that of other firms.

The remainder of this paper is structured as follows: Section 2.2 reviews previous literature on earnings quality in firms subject to restatements and develops our three hypotheses. In Section 2.3 the sample and matching as well as the specific earnings quality metrics are described. Section 2.4 presents descriptive statistics and the formation of the three quality factors based on the individual quality metrics. Section 2.5 presents the empirical results and robustness checks, while the last section concludes and suggests further research.

2.2 Previous Literature and Hypotheses

2.2.1 Financial Restatements

In this study, a restatement event means a correction of errors or irregularities in the financial statements.[1] The restatements are detected for instance by the firm itself, by auditors or employees, or through SEC's random sampling of US listed firms.

Earnings Quality in Restating Firms

Some research has been done on the earnings quality[2] of firms restating their financial statements.[3] The properties of restatements in an earnings quality context are indeed compelling. First and foremost, an outside source has identified problems with the quality of the

[1]Specifically, we follow the definition from Audit Analytics' restatement database: "We define a restatement as a revision of previously filed financial statements as a result of an error, fraud or GAAP/foreign principle misapplication." This excludes retrospective revisions for comparative purposes, retrospective application of accounting principles, and changes in presentation as a result of mergers/acquisitions.

[2]Many definitions of earnings quality arise from the Conceptual Framework of Financial Reporting of firms (FASB, 2008). Previous research has defined earnings quality as for instance precision (Francis et al., 2006), decision usefulness (Ball and Shivakumar, 2005), persistence (Abdelghany, 2005), closeness-to-cash (Visvanathan, 2006), conservatism (Basu, 1997), and transparency (Bhattacharya et al., 2003).

[3]Throughout this article, the synonyms earnings quality, accounting quality, and financial reporting quality will be used interchangeably. Given that about one third of the restatements do not have income statement effect (AuditAnalytics, 2013), one may argue that these restatements are concerned with the *accounting* quality rather than *earnings* quality. However, it is standard in the literature to use the three terms as synonyms. Restatements, even if not specifically affecting income statement accounts, do reduce decision usefulness (Schipper and Vincent, 2003), precision (Francis et al., 2006), and representational faithfulness (IASB, 2010). All of these are indicators of poor earnings quality as well as poor accounting and financial reporting quality.

financial statements of restating firms (Dechow et al., 2010). Thus, a perceived advantage of restatements is that they are a direct proxy for poor earnings quality (DeFond, 2010).

Although Dechow et al. (2011) do not specifically examine earnings quality in restating years but focus on the detection of misstatements, they do use some of the widely used earnings quality metrics when developing their probability score of restating. More specifically, they compare two versions of the Jones Models (Jones, 1991) and the Dechow and Dichev (2002) measure of accruals quality as well as other measures of total accruals in misstatement and non-misstatement years, respectively. Using time-series analyses of misstating firms they find that the earnings quality, as measured by total accruals, the Jones Model, and the Dechow-Dichev Model, is poorer in misstatement than non-misstatement years. Next, to assess the predictive ability, they compare each firm to itself in misstatement and earlier years. Contrary to their predictions they find that the level of accruals is in fact higher in the year prior to the misstatement. They argue that this last finding could be caused by within-GAAP earnings management before the outside-GAAP violations are detected by the SEC, or because the violation was too difficult to identify by the SEC in previous years. Note that in both of the above settings, Dechow et al. (2011) implicitly assume that the earnings quality as measured by the accruals models is poorer only in the misstatement year.

Jones et al. (2008) examine the ability of different accruals models to detect restatements and find that total accruals as well as two versions of the Dechow-Dichev Model are significantly different in restatement years than in all Compustat years. The authors focus on the restatement year exclusively and only on the accruals dimension of earnings quality.

Causes, Consequences, and Severity of Restatements

Empirical evidence on the causes of earnings restatements is inconclusive. For instance Beneish (1999a) does not find a link between neither leverage nor management compensation and restatements, whereas Burns and Kedia (2006) find that firms with stock option packages are more likely to misreport, and Dechow et al. (1996) show that AAER firms are more likely to violate debt covenants. Other causes of restatements include poor corporate

governance (Farber, 2005), external financing needs (Dechow et al., 1996), and high growth (Beneish, 1999a). Valdivia (2008) suggests that smaller firms are more likely to restate. In addition, Scholz (2008) notes that firms subject to restatements are quite unprofitable; in fact, more than half of the firms in her sample reported a net loss in the year before the restatement. Hence, it does seem as if some of the restatements can be explained by earnings management incentives.

The empirical evidence on the consequences of restatements is somewhat clearer. Outcomes of earnings restatements include increased management turnover (Feroz et al., 1991), cost of capital (Hribar and Jenkins, 2004), and increased focus on corporate governance (Rotenstein, 2011). The restatement itself is costly in terms of auditors and lawyers (Valdivia, 2008), not forgetting the cost of lost investor and customer confidence and bad publicity.

A body of research also examines the market reactions of restatement events. GAO (2006b) finds that stock prices decline significantly in a two-day window using a standard event study. Any long-term impact on stock prices is more difficult to determine, but it is assumed to be negative as well.

Scholz (2008) suggests that the severity of restatements has declined in the past decade, even if the total number of restatements has increased.[4] Since investors react more negatively to severe restatements, the average market reaction to restatements has also decreased in the same period. Wilson (2008) shows that the information content of earnings declines more following restatements with severe negative market reactions, suggesting that these restatements cause greater concerns about the credibility of the financial statements than less severe restatements.

2.2.2 Hypotheses

It is evident that existing literature focuses on very specific parameters of earnings quality (often the accrual component of earnings) and often exclusively in the actual restatement

[4]Scholz (2008) defines severe restatements as those involving fraud or core accounts, such as restatements correcting revenue recognition issues.

year. It is thus often assumed that the poor earnings quality is either only present or measurable in the actual restatement year.

We hypothesize that the poor quality of earnings is not limited to the actual restatement year, but that the restating firms have had continuously poor earnings quality in the years prior to the restatement(s). However, the opposite could also be true, such that the poor quality predicted in the restatement years is either only detectable or measurable in these exact years. As assumed by for instance Dechow et al. (2011), firms may only exercise improper discretion in the restatement years. It could also be the case that firms manage earnings within the boundaries of GAAP before they are detected by the SEC, but the earnings quality metrics we apply cannot actually detect this.[5] We hence test if the restating firms have poorer earnings quality than a matched control group of non-restating firms in the pre-restatement period (stated in the alternative form):

> *H1a: Restating firms have poor accounting quality compared to non-restating firms prior to a restatement event*

Given the severe market reactions after a restatement and the high costs attached to it, we expect that restating firms conform following a restatement event, and thus improve accounting quality after the actual restatement. We therefore compare the accounting quality of restaters and the control group in the post-restatement period. Under the assumption that the restatement has an improving effect, it is expected that accounting quality is improved for the restaters, and thus we predict no difference in quality between the two groups in the post-restatement period.

> *H1b: Restating and non-restating firms have similar accounting quality after a restatement event*

To isolate the effect of the restatement event, we compare the change in earnings quality over the periods for both groups. Following Hypotheses 1a and 1b, we expect that restating firms improve their quality relatively more than the control group following a restatement. It is possible to find reverse results, though. Some firms restate more than once which could

[5] See discussion of possible measurement errors in Section 2.3.

indicate a lack of immediate improvement. Again, it is also possible that the metrics we use are not able to measure a possible improvement. Thus, we test if the educative role of the restatement event can be measured directly in the earnings quality of restating firms by a difference-in-difference research design (stated in the alternative form):

> *H2: Restating firms improve accounting quality relatively more than non-restating firms following a restatement event*

According to Wilson (2008), the earnings response coefficient of restating firms is likely to differ depending on the severity of the restatement, as measured by the stock price reaction to the announcement. This implies that investors are more concerned about the financial statement quality of these firms. Given this finding, we hypothesize that firms have greater incentives to improve their financial reporting when investors are concerned with the quality of it and hence we expect that firms with severe negative stock price reaction following a restatement announcement are more likely to improve.[6] To test the third hypothesis we partition the sample contingent on the stock market reaction to the restatement announcement and again use a difference-in-difference research design in the two sub-samples.

> *H3: Restating firms are more likely to improve accounting quality if there is a severe negative stock price reaction to the restatement announcement*

2.3 Research Design and Measures of Earnings Quality

Each restating firm is identified through Audit Analytics' Non-Reliance Database, and the financial statement information is from Compustat Unrestated Quarterly. Each restating firm is then matched in the restatement year with a similar firm that has not restated in the entire sample period, based on size, ROA, and industry. 13 different earnings quality metrics are then estimated and factor analysis is applied to find common components among

[6] See a test of other measures of restatement severity in Section 2.5.4.

the quality measures. The sample is then split in a pre- and a post-restatement period which is ten years before the (last) restatement event and three to ten years after, respectively. To test Hypotheses 1a and 1b we compare the quality of the two groups directly, while Hypothesis 2 exploits a difference-in-difference research design to compare relative changes in quality. When testing the final hypothesis we partition the restating firms based on the magnitude of the stock market reaction to the restatement announcement and repeat the difference-in-difference test in the split samples.

2.3.1 Sample Selection

We identify restatements from Audit Analytics (AA), a database available through WRDS. The restatement data set from AA covers all US SEC registrants that have restated since January 1st 2001.[7] Scholz (2008) notes that the Audit Analytics database contains nearly all the restatements present in the GAO Database and other Lexis-Nexis searches.[8] The sample contains Form 8-K and 8-K/A filings under the title "4.02: Non-Reliance on Previously Issued Financial Statements or a Related Audit Report or Completed Interim Review". Thus, restatements caused by for instance mergers and acquisitions and many unintentional errors are excluded, and only material restatements are included in the sample. AA provides detailed information on which year(s) each firm has restated, the date the restatement became publicly known, and the reason for the restatement as filed by the company. Each restating firm from Audit Analytics is matched with its financial statement information in Compustat Unrestated Quarterly by the company name.[9] The Audit Analytics restatement

[7] See http://www.auditanalytics.com/doc/dd-restatements.pdf

[8] Other sources for identifying restatements have been used in previous research. For instance the GAO Database (available from http://www.gao.gov/special.pubs/gao-06-1079sp/toc.html) identifies restatements by searching Lexis-Nexis, SEC filings, and company web sites. The list consists of restatements following accounting fraud and accounting errors, by GAO termed aggressive accounting issues (GAO, 2006a). We do not use the GAO Database for two reasons: First, apart from fraud and material errors the database also contains retrospective changes of accounting principles unrelated to accounting quality, which has been subject to some criticism (Dechow et al., 2010; Hennes et al., 2008). Second, there is a time-lag from the time when the restatement is detected until it becomes public. This span varies greatly from case to case.

[9] We perform a fuzzy merge using the SAS function COMPGED(), which returns the generalised edit distance between two distances, i.e., the dissimilarity between the two. A COMPGED score of 0 indicates perfect match (e.g., BIODEL INC = BIODEL INC), whereas a COMPGED score of 90

database includes 7,325 unique restating firms of which 3,817 were matched with their financial statement information in Compustat.

The financial statement information is taken from Compustat's Unrestated Quarterly database.[10] This contains both the original, unrestated data value and the backfilled, restated data value for each item. Even though some researchers (e.g., Dechow et al. (2011)) have used restated data values, we prefer using the original values for several reasons: First, according to Standard & Poor's,[11] the number of firms in Compustat with restated data values is as high as 35 percent. Second, the sign and magnitude of the difference between the restated and unrestated data values vary enormously and independently on each of the three dimensions: from firm to firm, from time period to time period, and from data item to data item. Thus, it is not possible a priori to predict which data values will differ and in which direction. Third, the difference between the two values is material for some data items, which can influence results. Untabulated comparisons of restated and original line items show that original values of net income and revenue are significantly larger than the restated values, indicating that firms boost income via the accrual component and erroneously recognize revenue (Scholz, 2008).[12]

Furthermore, all data values have been winsorized at the 1st and the 99th percentile.

2.3.2 Matching Procedure

Following previous research (e.g., Dechow et al. (1996); Beneish (1999a)) each restating firm is matched in the restatement year with a Compustat firm which has not been required to restate in the entire sample period. The Compustat firm must have financial statement information in the restatement year, have the same 1-digit SIC code, and have total assets

indicates a nearly perfect match (e.g., RVB HOLDINGS LTD = R.V.B. HOLDING, LTD). To be certain that the firm from Compustat is in fact identical to the restating firm from Audit Analytics, we accept the match if the distance between the two strings is less than 100, which is a low COMPGED score.

[10]Since Compustat Unrestated Quarterly is given in quarterly data, we convert it to annual data by using the fourth quarter amount for balance sheet amounts and by summarizing the four quarters for each year to one year for the income statement and cash flow amounts.

[11]http://www.charteroaksystems.com/data_products/compustat/unrestated.html

[12]Significantly larger values for original compared to restated values are also found on cost of goods sold, R&D expenses and operational cash flows. The latter is likely to be attributable to classification errors (Scholz, 2008).

Table 2.1: Sample Selection Process

	N of Firms	N of Restatements
Number of AAER restatements in Audit Analytics 2000-2010	7,330	11,574
Less 3,513 firms not matched on name in Compustat	3,817	6,201
Less 2,187 firms that did not obtain a unique match on 1-digit SIC code and ± 40% total assets and ROA	1,630	1,988
Less 307 firms within SIC 6000-6999	1,323	1,625
Total sample size 1,323 restaters matched with 1,323 non-restaters	**2,646**	

and ROA within ± 40 percent of the restating firm.[13] We match broadly to maximize the sample size[14] and to alleviate concerns about restatements clustering by industry (see discussion below). If a restater has more than one match, the combined absolute difference between assets and ROA is minimized. Financial institutions (SIC 6000-6999) are excluded since earnings quality is measured differently in these firms. Of the 3,817 restating firms, 1,630 obtain a unique match. That is, each restating firm has one exact match in the control group of non-restating firms. Table 2.1 summarizes the sampling and matching procedure.

The sample is split into two periods: before and after the restatement and non-restatement years. The *pre-restatement* period consists of ten years before the actual restatement event. If a firm has restated multiple times, the last restatement ends the pre-restatement sample. The *post-restatement* period is a minimum of three and a maximum of ten years after the last restatement/non-restatement event. A three-year period is the minimum period we require to calculate the earnings quality metrics. The sample thus consists of firm years from 1990 (ten years before the first recorded restatement event in 2000) to 2010.

The underlying assumption behind this research design is that the non-restating control group on average has higher earnings quality and/or manages earnings less than the restating firms. If the firms in the control group also have poor earnings quality or have

[13] We do not use, for instance, propensity score matching (Rosenbaum and Rubin, 1983), since the likelihood of restating is exogenous and thus randomly assigned. Even though some restatements are detected and/or initiated by the firm it self, we do not believe that specific factors systematically determine the choice to restate.

[14] Matching on 2-digit SIC code and total assets and ROA within ± 20 percent decreases the sample dramatically with over 60 percent.

similar incentives to manage earnings as firms in the treatment group but are simply not detected by the SEC, it will seriously influence the conclusions (Kothari et al., 2005; Dechow et al., 2010). In particular, Dechow et al. (2010) argue that earnings manipulation and earnings quality issues appear to cluster by industry. Since the SEC mostly pursuits larger firms, the matching on size partly controls for this problem as the control group is likely to have been scrutinized and approved by the SEC. The fact that we match very broadly on industry (1-digit SIC code) partly mitigates the industry clustering, even though it remains a concern that has to be taken into account when interpreting the results. If both of the above concerns impact the results, it will increase the likelihood of maintaining the hypothesis of no difference in earnings quality between the two groups, that is, type II errors.

2.3.3 Earnings Quality Metrics

We include a wide portfolio of earnings quality metrics which all measure a distinct dimension of each firm's earnings quality. This is common in the literature since the concept of earnings quality is multi-faceted, and so must the empirical measures of it be. As Melumad and Nissim (2008) note, some of the attributes of earnings quality have contradictory implications. Similarly, Abdelghany (2005) finds that different metrics come to different conclusions on the quality of the same set of firms. These findings suggest firstly that the different metrics do capture different constructs of the overall reporting quality (Schipper and Vincent, 2003) and secondly that each metric is likely to measure the overall, complete quality with considerable error. Against this background we hence use 13 different quality metrics. We measure earnings quality within the dimensions of discretionary accruals, accruals quality, other accruals models, asymmetric timeliness, smoothness, and persistence. We only use accounting-based metrics as opposed to market-based. This selection is made for two reasons: First, market-based metrics are based on the relation between accounting earnings and market prices or returns. Since prior research has shown that the average market reaction to a restatement is negative, the restatement event itself could have an effect on this relation, and it is hard to disentangle this negative market reaction from the perceived change of quality in market-based earnings quality metrics. Second, it is unlikely that in-

Table 2.2: Estimation of Variables

Variable	Variable	Calculation
Total Assets	A	Total Assets (6)
Operational Cash Flows	CFO	Operating Cash Flows (308)/Lagged Total Assets (6)
Cost of Goods Sold	COGS	Cost of Goods Sold (41)
Long-Term Debt	LTD	Long-Term Debt (9)
NegDum Dummy	NegDum	Indicator variable that equals 1 if Δ NI is less than 0
Net Income	NI	Net income (172)/ Lagged Total Assets (6)
Property, Plant, and Equipment	PPE	Gross property, Plant, and Equipment (7)/Lagged Total Assets (6)
R & D Expense	RD	Research and Development Expense (46)
Receivables	Rec	Receivables (2)/Lagged Total Assets (6)
Revenue	Rev	Sales (12)/Lagged Total Assets (6)
Return on Assets	ROA	Net Income (172)/Total Assets (6)
Short-Term Debt	STD	Debt in Current Liabilities (34)
Total Accruals	TA	(Income bef. Ex Items (123)-(Operating Cash Flows (308)-Ex. items (124)))/Lagged Total Assets (6)
Change in Working Capital	ΔWC	-(Δ Acc. Receivables (302) + Δ Inventory (303) + Δ Acc. Payables (304) + Δ Taxes Accrued (305) + Δ Other Assets and Liabilities (307))/Lagged Total Assets (6)

All variables are from Compustat Unrestated Quarterly. Compustat item in parentheses.

vestors would have known about a later restatement up to ten years before it actually took place, and therefore the market-based metrics are less suited for a predictive setting.

The way each metric is estimated is described below. Variables are described in Table 2.2 and metrics are summarized in Appendix A.

Discretionary Accruals Models We examine three different models within the discretionary accruals models, namely the Jones Model (Jones, 1991), the Modified Jones Model (Dechow et al., 1995), and the Performance-matched Jones Model (Kothari et al., 2005). The objective of the discretionary accruals models is to divide accruals into two components: Normal, non-discretionary accruals associated with the accounting fundamentals; and abnormal, discretionary accruals which stem from intentional or unintentional accounting errors (Dechow et al., 2010). High levels of accruals which are not explained by changes in property, plant and equipment, and revenue, are a sign of reduced quality of earnings. The discretionary accruals models have been used to detect earnings management or fraud, and we

hypothesize that they are also powerful in detecting the earnings management or fraud present in restating firms. Different variants of the discretionary accruals models have been used previously to detect AAERs, see for example Jones et al. (2008) and Dechow et al. (2011).

$$\begin{aligned} TA_{i,t} =& \beta_0 \frac{1}{A_{i,t-1}} + \beta_1 \Delta Rev_{i,t} + \beta_2 PPE_{i,t} \\ &+ \beta_3 \rho(CFO_{i,t}) + \beta_4 TA_{i,t-1} + \mu_{i,t} \end{aligned} \tag{2.1}$$

$$\begin{aligned} TA_{i,t} =& \beta_0 \frac{1}{A_{i,t-1}} + \beta_1 (\Delta Rev_{i,t} - \Delta Rec_{it}) \\ &+ \beta_2 PPE_{i,t} + \beta_3 \rho(CFO_{i,t}) + \beta_4 TA_{i,t-1} + \mu_{i,t} \end{aligned} \tag{2.2}$$

$$\begin{aligned} TA_{i,t} =& \beta_0 \frac{1}{A_{i,t-1}} + \beta_1 \Delta Rev_{i,t} + \beta_2 PPE_{i,t} \\ &+ \beta_3 ROA_{i,t} + \beta_4 \rho(CFO_{i,t}) + \beta_5 TA_{i,t-1} + \mu_{i,t} \end{aligned} \tag{2.3}$$

The Jones Model and other discretionary accruals models measure abnormal accruals in one year only and hypothesize income decreasing earnings management, thereby having an a priori expectation of the direction of the accruals. Our research design is different on these two parameters. First, the interest lies in estimating abnormal accruals over a longer time period, and second, we have no hypothesis concerning the direction of the earnings management, and therefore abnormal accruals can take on both positive and negative values. We therefore alter the discretionary accruals models in two ways to deal with these issues. To solve the first issue, namely finding the abnormal accruals in the two time periods (pre- and post-restatement periods), we estimate the Jones Model as panel regressions in each of the 48 Fama-French industries.[15] Under this approach we assume that the unobserved heterogeneity influencing the level of accruals is fixed over time in each FF industry. Thus, only time-varying unobserved factors remain in the error term which allows us to

[15] Available from http://staff.washington.edu/edehaan/pages/Programming/Siccodes48.txt.

examine how discretionary accruals for each firm in each of the 48 industries change over time. To solve the second issue, we use the solution proposed in the methodological paper by Hribar and Nichols (2007), who suggest to add the volatility of the operating cash flows of each firm as an additional regressor to control for operating volatility.[16] Our measure of accruals stems from Hribar and Collins (2002), who estimate accruals as earnings less operating cash flows from continuing operations. They suggest that this method produces less measurement error than the balance sheet approach. In accordance with prior research (e.g., Louis and White (2007)), we include lagged accruals in the regression to control for the mean reversion of accruals. Consistent with for instance Francis et al. (2005), we estimate discretionary accruals directly as the residuals, rather than using a two-stage approach.

Our measures of *Jones*, *ModJones*, and *PerformJones* are thus the absolute magnitude of the residuals from the Equation 2.1, 2.2, and 2.3. We expect that restating firms have higher levels of discretionary accruals than the control group.

Accruals Quality Models Another group of accruals models consists of the accruals quality models, from which we measure the Dechow-Dichev (Dechow and Dichev, 2002) and Modified Dechow-Dichev Model (McNichols, 2002). The accruals quality models are based on the intuition that earnings that map closely into cash flows are of high quality. Dechow and Dichev (2002) predict that the quality of accruals and earnings decreases when the magnitude of estimation errors increases and propose an empirical measure of accruals quality which maps working capital into operating cash flows. The accruals quality models have previously been used to detect earnings restatements (Jones et al., 2008; Dechow et al., 2011). However, as Dechow et al. (2011) note, the accruals quality models are not well-suited for a predictive setting since they use future cash flows. We include the accruals quality, though, since our study is not intended to capture the predictive ability, but

[16] They note that using the absolute rather than the signed value of discretionary accruals obviously changes the distribution of residuals since they are truncated at 0. They also show that unsigned discretionary accruals have a different probability function than signed discretionary accruals, in which the expected value of absolute discretionary accruals is an increasing function of the residual variance. They suggest that the driver of the residual variance is controlled for in research designs.

rather to give insights on the evolvement of earnings quality in the course of a restatement.

$$\begin{aligned}\Delta WC_{i,t} =& \beta_0 + \beta_1 CFO_{i,t-1} \\ &+ \beta_2 CFO_{i,t} + \beta_3 CFO_{i,t+1} + \mu_{i,t}\end{aligned} \tag{2.4}$$

$$\begin{aligned}\Delta WC_{i,t} =& \beta_0 + \beta_1 CFO_{i,t-1} + \beta_2 CFO_{i,t} \\ &+ \beta_3 CFO_{i,t+1} + \beta_4 \Delta Rev_{i,t} + \beta_5 PPE_{i,t} + \mu_{i,t}\end{aligned} \tag{2.5}$$

The model proposed by Dechow and Dichev (2002) is constructed as a regression of the change in working capital accruals on last year, present, and future cash flows. We estimate working capital accruals using the approach of Dechow and Dichev (2002). The panel regressions for both the original and the modified Dechow-Dichev Model are estimated with firm-fixed effects. For the accruals quality models we require at least six years of observations to estimate the regressions. This obviously minimizes the post-restatement sample considerably.

The standard deviations of the residuals from the regressions 2.4 and 2.5 are inverse measures of earnings quality, and our measure of *DD* and *ModDD*, respectively. We predict that restaters have higher variation in the residuals than non-restaters, hence lower accruals quality.

Other Accruals Models We also examine two different properties of accruals, namely the magnitude and change in total accruals. The first has been used as a measure of earnings quality. For instance Bhattacharya et al. (2003) and Leuz et al. (2003) argue that the sheer level of accruals increases with earnings aggressiveness if cash flows are held constant. The second has been used by for example Schipper and Vincent (2003) and DeAngelo (1986), who suggest that as long as some portion of accruals is both non-manipulated and approximately constant over time, changes in total accruals could stem from managerial manipulations and may provide an inverse measure of earnings quality. Hence, large accruals as such do not necessarily indicate low earnings quality or earnings management behavior, but a jump in accruals might indicate that managers have deliberately over- or understated

earnings. The different properties of accruals have been used in restatement settings before (see e.g., Dechow et al. (2011)).

$$TA_{i,t} \tag{2.6}$$

$$\Delta TA_{i,t} \tag{2.7}$$

We again estimate accruals directly using the approach of Hribar and Collins (2002).

In accordance with Dechow and Dichev (2002), the absolute magnitude of accruals (Equation 2.6) is our measure of *MagnitudeAccruals* and the annual change in accruals (Equation 2.7) is our measure of Δ*Accruals*, and we expect that restaters have both higher levels and changes of accruals than non-restaters.

Asymmetric Timeliness We use one measure of conservatism not based on returns. The research of asymmetric timeliness hypothesizes that profits and losses are recognized in an asymmetric manner. Specifically, losses are recognized on a more timely basis than profits, leading to less persistent and more reverting negative earnings changes. For asymmetric timeliness to be an indicator of earnings quality, it is assumed that more timely recognition of losses in fact increases decision usefulness. According to Ball and Shivakumar (2005) timely loss recognition increases the value relevance of financial reporting. Since different variants of asymmetric timeliness have been used in an earnings management context (Lang et al., 2006) and within a restatement setting (Ettredge et al., 2012), it is expected that the metric is also powerful in detecting poor earnings quality with restating firms.

$$\begin{aligned}\Delta NI_{i,t} = \beta_0 + \beta_1 NegDum_{i,t-1} + \beta_2 \Delta NI_{i,t-1} \\ + \beta_3 (NegDum_{i,t-1} * \Delta NI_{i,t-1}) + \mu_{i,t}\end{aligned} \tag{2.8}$$

We estimate the Basu (1997) measure of timeliness not based on stock returns as a panel regression with firm-fixed effects in both groups and time periods, and thus follow the approach of Ball and Shivakumar (2005).

Timely recognition of economic losses implies that losses are less persistent and tend to reverse faster than profits, and hence β_3 from Equation 2.8 is the measure of *Timely*. This implies that restaters are expected to have smaller values of *Timely* than non-restaters.

Smoothness We also measure the difference in earnings quality between the two groups on the smoothness dimension. This dimension of quality reflects the view that managers artificially smooth out relevant fluctuations, resulting in a less timely and informative earnings number. In this view management responds to a negative (positive) cash flow stream by increasing (decreasing) accruals, and thus smooth earnings indicate poor quality earnings (Barth et al., 2008).[17] However, the opposite could be true as well, since a different view on smoothness exists. This view reflects the idea that management uses private information to smooth out transitory, value irrelevant fluctuations in earnings, thereby achieving a more useful earnings number. In this view, smooth earnings indicate high quality earnings (Francis et al., 2006). Given that different variants of smoothing have been used as a proxy for earnings management, we believe that the smoothness measures are well-suited for measuring earnings quality in restating firms. We follow, for example, Barth et al. (2008) and Lang et al. (2006) who view smooth earnings as a sign of earnings management.

Following Leuz et al. (2003) and Lang et al. (2003), our first smoothness measure is the ratio of annual, firm-level standard deviations of earnings to the standard deviation of cash flows, *VarNICFO*:

$$\frac{\sigma(NI_{i,t})}{\sigma(CFO_{i,t})} \tag{2.9}$$

If firms use accruals to manage earnings, the variability of operating income should be lower than that of cash flows. Low ratios indicate that insiders exercise accounting discretion to smooth reported earnings and we therefore expect that restating firms have lower values of this smoothness measure.

Barth et al. (2008) evaluate the level of earnings smoothing by testing the variability of earnings directly as seen in Equation 2.10.

[17] Firms can have incentives to report a smooth earnings stream, since it is rewarded by capital markets and raises expectations to future cash flows (Kirschenheiter and Melumad, 2002) and can lead to reduced cost of capital (Francis et al., 2006).

$$\sigma(\Delta NI_{i,t}) \tag{2.10}$$

Higher values of *VarNI* indicate less smoothing and thus higher accounting quality and we therefore expect non-restaters to have higher values than restaters.

Dechow (1994) argues that cash flows and accruals are expected to be negatively correlated over time as a natural result of accrual accounting because accruals reverse over time. However, she also suggests that a large negative correlation between accruals and cash flows could indicate that accruals are used to smooth fluctuations in cash flows, suggesting lower accounting quality. Following this intuition, management responds to low (high) cash flows by increasing (decreasing) accruals, thus boosting (lowering) income.

$$|\rho(\Delta TA_{i,t}, \Delta CFO_{i,t})| \tag{2.11}$$

Leuz et al. (2003) and Bhattacharya et al. (2003) use the measure of negative correlation between changes in accruals and cash flows, and hence Equation 2.11 is our third smoothness metric, *CorrTACFO*. We expect restaters to have higher correlations than the control group.

Persistence Our last measures of earnings quality are persistence and predictability. Regardless of the sign and magnitude of earnings, persistence captures the extent to which the current period innovation becomes a permanent part of the earnings series (Schipper and Vincent, 2003). Persistent earnings can be viewed as desirable since predictable earnings are more useful for valuation purposes. Persistence or sustainability has therefore been used often as a measure of high earnings quality (Francis et al., 2006). The concept of earnings predictability as a desirable attribute is closely connected with persistence. According to Schipper and Vincent (2003), predictability is the ability of the financial statements to improve the users' possibilities to forecast items of interest, that is, the ability of past earnings to predict future earnings. Persistence may reflect the underlying fundamentals of the firm rather than short-term opportunistic earnings management. However, innate characteristics of earnings quality are as interesting to this study as discretionary sources.

$$NI_{i,t} = \phi_0 + \phi_1 NI_{i,t-1} + \mu_{i,t} \tag{2.12}$$

In accordance with Francis et al. (2004), a one-order autoregressive regression is estimated for each firm using maximum likelihood estimation, in the before and after period, respectively (see Equation 2.12). The parameter estimate on ϕ is the measure of *Persist*, while the standard deviation of residuals from the same equation is our measure of *Predict*. We therefore expect that restating firms have lower earnings quality on average, hence less persistent (lower values of *Persist*) and predictable (higher values of *Predict*) earnings than non-restating firms.

2.4 Descriptive Statistics and Factor Analyses

2.4.1 Descriptive Statistics

Table 2.3, Panel A shows the frequency of all restatements (left-hand side) and our final sample of restating firms matched with non-restating firms (right-hand side). As can be seen, our sample represents the overall frequency of restatements quite well. The 1,323 firms in the matched sample had 1,625 restatement events and thus each firm on average restated 1.2 times. It can also be seen that the number of restatements increased significantly in the mid-2000s. This could be caused by changes in SEC's identification procedure and the enactment of the Sarbanes-Oxley Act in 2002.[18] Scholz (2008) argues that firms in financial distress are more likely to restate and hence the downturn in the American economy in the beginning of the new millennium might explain the peak in the mid 2000s. Conversely, the drop in the number of restatements from 2006 to 2008 can be explained by the booming economy in those years. However, it is not clear whether the financial crisis from 2008 and onwards had a similar impact. The decline late in the sample period can also be caused by

[18]See (Scholz, 2008, p. 10-12) for an in-depth discussion of the financial reporting and market development related to restatements in the sample period.

new materiality guidance by the SEC in August 2008, stressing that errors are material only if they are relevant to current investors.[19]

Panel B of Table 2.3 shows the accounting reasons for our sampled restating firms as disclosed in Audit Analytics.[20] The majority of the firms outline several reasons for restating.[21] The most frequent reason for restating is core expenses which could be income statement effects from estimation and correction of assets and liabilities as well as lease-related issues. A smaller percentage of firms in our sample restate because of revenue recognition issues compared to other studies (e.g., Dechow et al. (2011)). Scholz (2008) notes how the relative frequency of this issue drops considerably over time. Since our sample is more recent than both the samples of Dechow et al. (2011) and Scholz (2008), this might explain the difference. Apart from this divergence, the sample used in this study resembles that of other studies (Scholz, 2008).

Table 2.3, Panel C presents a comparison of restating firms in our sample to all Compustat firms. The wholesale and retail industries seem to be over-represented while public administration is slightly under-represented. Apart from these variations, the restatement sample resembles the Compustat sample quite well. Compared to previous research our restatement sample shows no over-representation of the computer industry (part of manufacturing in Table 2.3, Panel C) as was the case in the study of Dechow et al. (2011). The reason is likely to be that their sample is earlier than ours (1982-2005), and they are therefore likely to capture the burst of the IT bubble. This burst is scarcely in our sample.

Table 2.4 tabulates results for the earnings quality metrics for the restaters and non-restaters, in the pre- and post-restatement period, respectively. Lower values indicate lower quality for the variables *Timely*, *VarNICFO*, *VarNI*, and *Persist*, but higher quality for the remaining quality metrics.[22] In the pre-restatement period, seven of the quality metrics

[19]See the report from SEC's Ponzen Committee: http://www.sec.gov/about/offices/oca/acifr/acifr-finalreport.pdf

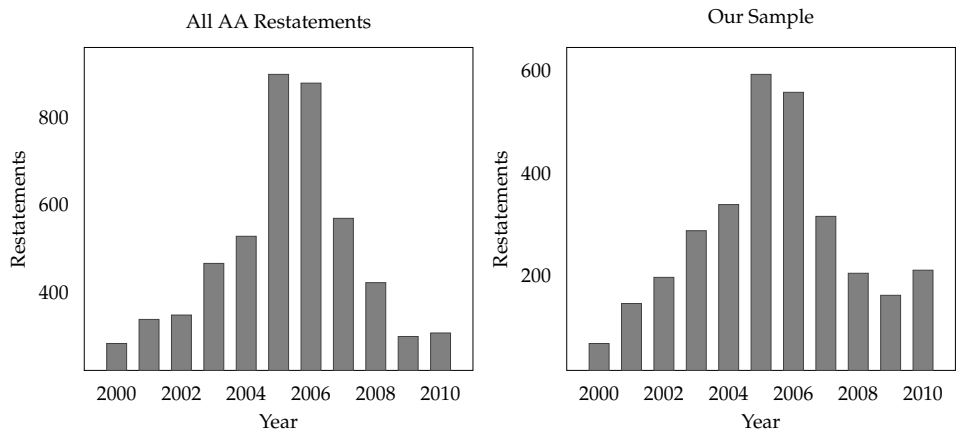
[20]The classification is adapted from Scholz (2008). The firm can disclose the cause of the restatement through several different channels, for instance press releases or Form 8 or 10K.

[21]While the average (median) number of categories per unique restatement in the sample is 2.37 (2), 25 firms outline more than ten categories and one firm outlines 16 different reasons.

[22]There is considerable variation in the number of observations for several reasons. The metrics in other accruals models, timeliness, smoothness, and *Persist* are all estimated on the overall firm-level, whereas the rest are estimated on firm-year level. The low number of observations for

Table 2.3: Description of Restatements and Restating Firms

Panel A: Distribution of Restatements



Panel B: Reason for Restatements

Restatement Reason	Number	Percent
Revenue Recognition	499	8%
Core Expenses	2,108	33.6%
Non-core Expenses	1,480	23.6%
Reclassification and Disclosure	913	14.5%
Underlying Events	1,025	16.3%
Other	250	4%
Total	6,275	100%

Panel C: Industry

Industry	SIC-Code	% Restaters	Compustat
Agriculture, Forestry, and Fishing	01-09	0.1	0.5
Mining and Construction	10-17	8.2	8.5
Manufacturing	20-39	41.4	42.8
Transportation, Communications, Electric, Gas, and Sanitary Services	40-49	12.3	12.0
Wholesale and Retail Trade	50-59	15.8	11.2
Services	70-89	21.9	23.0
Public Administration	91-99	0.4	2.1
		100%	100%

The left-hand side of Panel A shows the frequency of all restatement events from AA matched with GVKEY from Compustat Unrestated Quarterly, before matching with non-restaters. The right-hand side shows the final sample, after matching with non-restaters. The classification in Panel B is adapted from Scholz (2008). Note that one restatement event typically has several different reasons for restating.
Panel C compares the restating firms in the final sample with all available firms except SIC 6000-6999 from Compustat from 1990 to 2010.

show significantly lower earnings quality for restaters than for non-restaters, namely the three discretionary accruals models and two other accruals models, as well as *CorrTACFO* and *Persist*. One metric, *VarNI*, shows the opposite result. The remaining metrics indicate no significant differences. This finding is consistent with Dechow et al. (2011) who also find that restating firms have reduced earnings quality already in the years before the actual restatement. In the post-restatement period, six metrics still show significantly lower quality for restaters than for non-restaters: the three discretionary accruals models, the two other accruals models, and *Timely*. Two metrics now show the opposite, namely two of the smoothing measures. On balance the results from Table 2.4 suggest that the firms that restate indeed do have poorer earnings quality than the matched control group in the periods before and after a restatement event.

Correlation matrices for the restaters and non-restaters, respectively, are shown in Appendix B. To avoid negative values for any of the quality metrics, the absolute values of *Timely* and *CorrTACFO* are tabulated. Thus, for the variables *VarNICFO*, *VarNI*, *CorrTACFO*, and *Persist* higher values indicate higher quality, but lower quality for the remaining variables. As expected, each of the metrics within the groups of discretionary accruals, accruals quality and other accruals models are highly correlated with each other. There are also positive significant correlations across these three groups, but less so than within groups. In particular for the non-restaters, where the discretionary accruals and accruals quality models are only just significant. Hence, the discretionary accruals and accruals quality models do seem to capture different dimensions of the accrual process. As also expected, the three smoothness measures move together. It is also noteworthy that *Persist* and *Predict* stand out as being insignificantly correlated to many of the other measures, indicating that they capture a distinct side of quality. In particular *Persist* for the restating firms does not move together with any of the other quality metrics, not even with *Predict*; thus, the two metrics do capture different dimensions of quality, even though they stem from the same model. This is, however, not the case for the non-restaters.

In sum, the descriptive statistics indicate that restaters indeed do have lower accounting

---

the two accruals quality models is caused by tighter data restrictions (a minimum of six years of observations, see Section 2.3)

Table 2.4: Earnings Quality for Restaters and Non-Restaters

	Metric	Pre-restatement Period					Post-restatement Period				
		N	Restaters (*i*)	N	Non-Restaters (*ii*)	Difference (*i-ii*)	N	Restaters (*i*)	N	Non-Restaters (*ii*)	Difference (*i-ii*)
Discretionary Accruals	*Jones*	5,052	0.2225	4,977	0.2034	0.0191*	3,691	0.1832	3,291	0.1698	0.0134**
	ModJones	5,011	0.2268	4,925	0.2049	0.0219**	3,678	0.1871	3,267	0.1721	0.0151***
	PerformJones	5,052	0.2226	4,977	0.2039	0.0187*	3,691	0.1827	3,291	0.1702	0.0125***
Accruals Quality	*DD*	983	0.0133	989	0.0154	-0.0021	199	0.0126	190	0.0102	0.0021
	ModDD	983	0.0151	987	0.0188	-0.0037	199	0.0140	190	0.0112	0.0028
Other Accruals	*MagnitudeAccruals*	1,190	0.2499	1,190	0.2360	0.0140**	1,037	0.2707	988	0.2437	0.0270*
	Δ*Accruals*	1,137	0.2011	1,122	0.1625	0.0385***	1,032	0.2037	980	0.1569	0.0469*
Timeliness	*Timely*	1,134	-0.0790	1,053	-0.0482	-0.0308	1,079	-0.0404	953	-0.0329	-0.0075**
Smoothness	*VarNICFO*	1,099	0.8658	1,090	0.9301	-0.0643	955	1.0354	808	0.7835	0.2519*
	VarNI	1,244	0.2841	1,148	0.2095	0.0745*	955	0.1980	823	0.1235	0.0744*
	CorrTACFO	1,097	-0.8248	1,088	-0.8624	0.0376***	887	-0.8161	807	-0.8249	0.0088
Persistence	*Persist*	661	0.3313	636	0.3598	-0.0285**	475	0.2460	504	0.2752	-0.0292
	Predict	1,111	0.7841	1,046	0.7957	-0.0116	909	0.7478	802	0.7159	0.0319

The table tabulates results for the earnings quality metrics (see Appendix A) for restaters and non-restaters, respectively. Pre-restatement period is ten years before the (last) restatement event, whereas the post-restatement period is three to ten years after the (last) restatement event.
For the variables *Jones*, *ModJones*, *PerformJones*, *DD*, *ModDD*, *MagnitudeAccruals*, *CorrTACFO*, and *Predict*, higher values indicate lower quality. For the variables *Timely*, *VarNICFO*, *VarNI*, and *Persist*, lower values indicate lower quality.
*, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively, with two-sample t-test.

quality than the matched control group. The differences can be measured up to ten years before and after the actual restatement event. In addition, Appendix B show some interesting insights on the relation between the different earnings quality metrics. For instance, all models using some properties of accruals are positively correlated, but to very different extents, while persistence seems to capture a distinct dimension of quality not caught by other metrics. The underlying structure of the different quality metrics is further examined in the next section.

2.4.2 Factor Analyses

We use factor analysis to identify the common underlying dimensions of the different earnings quality measures. In factor analysis, variables are grouped by their correlations so variables in one factor have high correlations with each other. The principal component analysis considers the total variance between the variables and is mainly a data reduction tool.

As shown in Table 2.4, significant differences exist between restaters and non-restaters and thus the two groups are heterogeneous with respect to the underlying structure of the quality metrics. We therefore conduct factor analysis independently in the two groups, as suggested by Hair et al. (2005).[23] Before conducting the factor analysis, we compute Kaiser's measure of sampling adequacy, MSA, and follow Hair et al. (2005) in deleting variables with an MSA below 0.5. As a consequence, *Persist* was not retained in the analysis. Factors with an eigenvalue above 1 are retained. The orthogonal factor rotation, VARIMAX, is used to ease interpretation. As described in Section 2.4, some of the quality metrics are estimated on the firm-level (no time variation), while other are estimated at the firm-year level (annual variation). One data point per firm is needed in the factor analyses and we

[23]Since the research question in this article rests on the assumption that one group in the sample (restaters) improve their accounting quality over time, while the other group does not (non-restaters), one may argue that the factor analyses should also have been done separately in the pre- and post-restatement periods. We have not done so for two reasons: First, the pre- and post-restatement period vary for different firms since the restatements occur in different years. Second, a procedure as described would end up with four different factors, which would seriously question the comparability of these factors.

average the metrics with annual variation (*Jones*, *ModJones*, *PerformJones*, *DD*, *ModDD*, and *Predict*) to get this firm-specific data point.

The result of the factor analysis is presented in Table 2.5. Consistent with Hair et al. (2005), factor loadings above ± 0.50 are required for practical significance. Focusing on the rotated factor patterns, note that only one variable has cross-loading, which is practical significance on more than one factor, namely *VarNI* for the non-restaters.[24] The choice of factor on this variable does not impact the results. It is clear that factor 1 depends heavily on the three versions of the Jones Model. Since all these models essentially capture the same notion, namely the separation of normal and abnormal accruals, it is expected that they belong to the same factor. We term this factor *DiscretionaryAccruals*. Factor 2 consists of another dimension of accruals, the accruals quality models *DD* and *ModDD*, as well as *Timely*. In addition, *DeltaAccruals* also loads for the non-restaters. We therefore label factor 2 *AccrualsQuality*. Note that even if the discretionary accruals and accruals quality models both capture some dimension of the accrual process they are indeed different in the factor analysis, which justifies the existence of both groups of accrual models in the analysis. Finally, factor 3 depends on the smoothing measures as well as *MagnitudeAccruals* and *DeltaAccruals* for the restaters. In the context of earnings smoothing, increasing (decreasing) accruals is a tool to opportunistically increase (decrease) earnings and it therefore makes intuitive sense that the smoothness measures and properties of accruals capture the same notion of earnings quality in restating firms. We therefore term the last factor *Smoothness*. *Predict* loads on the third factor for the non-restaters, but not at all for the restaters, so it is not included to assure reasonable comparability between the two groups.

In total, the economic intuition behind these factors is reassuring. The two first factors capture two distinct notions of the firm's accruals, the discretionary part as well as the overall quality. The last factor captures the smoothness and accruals of the firm's earnings. The fact that there is a small difference between the factors *AccrualsQuality* and *Smoothness* reassures us that the choice to perform the factor analyses separately in the two groups was correct. However, since these two factors do resemble each other greatly, they are still comparable. In addition, all three factors are based on metrics that measure the same notion

[24] 0.6121 on factor 2 and 0.5704 on factor 3, respectively.

Table 2.5: Factor Analysis of Earnings Quality Metrics

Panel A: Restaters

	Factor Pattern			Rotated Factor Pattern		
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
Jones	0.8592	-0.2359	-0.3433	0.9531	0.2169	0.1756
ModJones	0.8746	-0.2156	-0.3276	0.9403	0.2426	0.1983
PerformJones	0.8463	-0.2423	-0.3732	0.9565	0.2245	0.1402
DD	0.7926	0.1568	-0.1739	0.3826	0.8074	0.2586
ModDD	0.7585	-0.2256	0.1273	0.3931	0.7951	0.1919
MagnitudeAccruals	0.7875	0.2065	0.2868	0.3902	0.2731	0.7275
Δ*Accruals*	0.7449	0.3176	0.4648	0.2400	0.2349	0.8794
Timely	0.4193	-0.1442	0.0580	0.0722	0.6370	0.0501
VarNICFO	0.2459	-0.1627	0.6901	0.0071	-0.2082	0.6113
VarNI	0.6243	0.3099	0.5912	0.0705	0.2159	0.8845
CorrTACFO	-0.1675	0.6623	-0.4032	-0.1186	0.0028	-0.0984
Predict	0.0029	-0.5390	0.3550	-0.1006	0.1049	-0.0179
Eigenvalues	5.25	1.87	1.23	3.28	2.68	2.02
Total Communality: 10.45						
Kaiser's Measure of Sampling Adequacy, MSA: 0.75						

1, DiscretionaryAccruals: Jones, ModJones, PerformJones
2, AccrualsQuality: DD, ModDD, Timely
3, Smoothness: MagnitudeAccruals, ΔAccruals, VarNICFO, VarNI

Panel B: Non-Restaters

	Factor Pattern			Rotated Factor Pattern		
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
Jones	0.8384	-0.3596	0.3819	0.9655	0.2130	0.0241
ModJones	0.8416	-0.3555	0.3681	0.9585	0.2257	0.0213
PerformJones	0.8358	-0.3685	0.3776	0.9653	0.2119	0.0139
DD	0.7916	0.0133	-0.5371	0.2722	0.9096	-0.1157
ModDD	0.7789	0.0120	-0.5371	0.2637	0.9007	-0.1199
MagnitudeAccruals	0.7396	-0.0531	0.0064	0.5558	0.4835	0.0085
Δ*Accruals*	0.8096	0.1603	-0.1493	0.4263	0.6934	0.2023
Timely	0.4604	0.3943	-0.1958	0.0464	0.5491	0.3196
VarNICFO	0.1442	0.6591	0.3667	0.0020	0.0164	0.7678
VarNI	0.6295	0.5723	-0.0535	0.1631	0.6121	0.5704
CorrTACFO	-0.1545	-0.6107	-0.2554	0.0283	-0.0874	-0.6735
Predict	0.1404	0.4789	0.3242	0.0578	-0.0036	0.5923
Eigenvalues	5.22	1.99	1.37	3.43	3.21	1.95
Total Communality: 8.59						
Kaiser's Measure of Sampling Adequacy, MSA: 0.80						

1, DiscretionaryAccruals: Jones, ModJones, PerformJones
2, AccrualsQuality: DD, ModDD, ΔAccruals, Timely
3, Smoothness: VarNICFO, VarNI, CorrTACFO

The table presents factor analyses for the earnings quality metrics (see Appendix A) for restaters and non-restaters, respectively, in the entire sample period from 1990 to 2010.
For the variables *Jones*, *ModJones*, *PerformJones*, *DD*, *ModDD*, *MagnitudeAccruals*, *Timely* and *Predict*, higher values indicate lower quality. For the variables *VarNICFO*, *VarNI*, *CorrTACFO*, and *Persist*, lower values indicate lower quality.
The first column is raw factor patterns, whereas the second is the varimax rotated solution. Factors with eigenvalues greater than one are retained.

of earnings quality and therefore the factors are comparable by construction.

For the remaining analyses in this paper, we construct new variables based on the factor analysis by calculating summated scales of the variables that load on each factor (Hair et al., 2005), such that each factor is an average of its underlying quality metrics.[25] For factor 3, *MagnitudeAccruals* and *DeltaAccruals* are multiplied with -1 and the signed value of *CorrTACFO* is used, such that higher values indicate higher earnings quality for this factor. The interpretation for factors 1 and 2 remains the same, namely that higher levels indicate lower quality. The expectation is therefore that restaters have higher values of factors 1 and 2 and lower values of factor 3.

The factors *DiscretionaryAccruals*, *AccrualsQuality*, and *Smoothness* all capture a specific dimension of the firm-specific earnings quality. As noted above it was necessary to perform separate factor analyses in the two groups, restaters and non-restaters, to meet the underlying assumption of homogeneous underlying structure. Given our hypotheses and previous literature (e.g., Dechow et al. (2011), Jones et al. (2008)) we clearly expect the earnings quality of restating and non-restating firms to be fundamentally different. Pooling them in one factor analysis would therefore violate the homogeneity assumption. As a consequence, factors 2 and 3 are slightly differently constructed for the two groups. Note, however, that the empirical findings presented in Section 5 have also been calculated with the individual earnings quality metrics and they all give the same results as with the three factors. For instance, note that Table 2.4 gives very much the same picture as Table 2.6. Hence the results are not driven by the construction of the factor analysis which is merely a data reduction tool.

[25] Specifically, for the restaters the factors are constructed as follows: Factor 1 is the average of *Jones*, *ModJones*, and *PerformJones*; factor 2 is the average of *DD*, *ModDD*, and *Timely*; factor 3 is the average of *MagnitudeAccruals*, *DeltaAccruals*, *VarNICFO*, and *VarNI*.

For the non-restaters the factors are constructed as follows: Factor 1 is the average of *Jones*, *ModJones*, and *PerformJones*; factor 2 is the average of *DD*, *ModDD*, *DeltaAccruals*, and *Timely*; factor 3 is the average of *VarNICFO*, *VarNI*, and *CorrTACFO*.

2.5 Empirical Results

2.5.1 Test of H1: Pre-restatement and Post-restatement Periods

Table 2.6 shows the results for the three quality factors in the pre- and post-restatement periods. Recall that high levels of *DiscretionaryAccruals* and *AccrualsQuality* indicate poor quality, whereas high levels of *Smoothness* indicate high quality. The first hypothesis, H1a, suggests that restating firms have poorer quality already in the years before the actual restatement. As seen from Panel A, two of the three factors support the hypothesis, since restaters have significantly poorer quality as measured by *DiscretionaryAccruals* and *Smoothness*. The third factor shows no significant difference. The poorer earnings quality found in previous research in the actual restatement year thus seems to be evident several years before the actual restatement event.[26]

It is expected that the negative consequences of a restatement lead to an improvement in the earnings quality and the second hypothesis, H1b, predicts that the restating firms and the matched control group have similar earnings quality after a restatement event, implying that the restaters have improved after the restatement. Panel B of Table 2.6 depicts the ambiguous result. Measured with *DiscretionaryAccruals*, the restating firms continue to have poorer quality than the control group, whereas *AccrualsQuality* shows the opposite result, namely that the restaters in fact have higher quality than the control group. It is therefore hard to maintain the second hypothesis that the two groups have identical quality after a restatement.

To further disentangle the development of quality over our relatively long sample period, the difference in quality between the restating firms and the control group is presented in Figure 2.1. The factors have been estimated in six three year windows, three before and three after the actual restatement event,[27] and the figure depicts the absolute difference be-

[26]There is large variation in sample sizes as described in Footnote 22. For the factor *DiscretionaryAccruals*, the number of observations increases over time because there are fewer non-missing observations late in the sample period. On the contrary, the number of observations in the factor *AccrualsQuality* decreases over time because the estimation of *DD* and *ModDD* requires a time-series of at least six years, as described on page 66. For restatements late in the sample period such a long time-series is of course not available.

[27]In untabulated estimations we also included the (last) restatement event in the pre-restatement

Table 2.6: Factor Analysis of Earnings Quality for Restaters and Non-Restaters

Panel A: Pre-restatement Period						
Factor	N	Restaters (*i*)	N	Non-Restaters (*ii*)	Difference (*i-ii*)	Prediction H1a (*i-ii*)
DiscretionaryAccruals	1,138	0.2238	4,977	0.2046	0.0192*	+
AccrualsQuality	4,977	-0.0256	1,068	-0.0099	-0.0157	+
Smoothness	1,291	0.0101	1,148	0.1033	-0.0932***	-
Panel B: Post-restatement Period						
Factor	N	Restaters (*i*)	N	Non-Restaters (*ii*)	Difference (*i-ii*)	Prediction H1b (*i-ii*)
DiscretionaryAccruals	3,691	0.1843	3,291	0.1707	0.0136***	=
AccrualsQuality	1,079	-0.0338	953	-0.0273	-0.0065**	=
Smoothness	1,113	0.0464	823	0.0293	0.0171	=

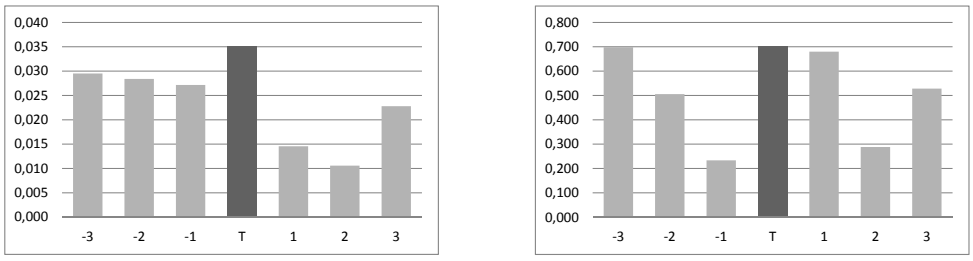
The table tabulates results for the earnings quality factors (see Table 2.5) for restaters and non-restaters, respectively. Pre-restatement period is ten years before the (last) restatement event, whereas the post-restatement period is three to ten years after the (last) restatement event. The prediction in Panel A follows H1a that restaters have poorer quality than non-restaters in the pre-restatement period, while the prediction in Panel B follows H1b that the two groups have similar quality in the post-restatement period. For the factors *DiscretionaryAccruals* and *AccrualsQuality* higher values indicate lower quality, whereas higher values indicate higher quality for the factor *Smoothness*.
*, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively, with two-sample t-test.

tween restaters and non-restaters, respectively. Hence, high (low) bars indicate that the difference in quality between the restaters and the control group is high (low) in the three year period. Note that since a full time series is required to estimate the variables *DD*, *ModDD*, and *Timely* factor 2 could not be estimated.

Recall from Table 2.6 that we maintain H1a and find that there are differences between the two groups in the pre-restatement period. Figure 2.1 confirms this result as it seems that there is quite a large difference between the two groups in the three windows before the restatement. Interestingly, the effect actually seems to be more pronounced in the first period (7-9 years before the restatement), emphasizing that any later restatements may be detectable even quite long before they actually occur. Focusing on the post-restatement period, recall that results from Table 2.6 were quite ambiguous, such that factor 1 still showed significant differences between the two groups while factor 3 did not. For the *Discretionary-Accruals* factor it actually seems that this effect is mainly driven by a peak in difference in

period. Results are similar to those tabulated in Figure 2.1.

Figure 2.1: Development of Differences in Earnings Quality Factors



(a) Factor 1 *DiscretionaryAccruals* (b) Factor 3 *Smoothness*

The figure depicts the absolute differences in earnings quality between restaters and non-restaters measured with each of the three factors, estimated in three year windows. Time T is the restatement year, -3 is 7-9 years before T, -2 is 4-6 years before T, and -1 is 1-3 years before T. 1 is 1-3 years after T, 2 is 4-6 years after T, and 3 is 7-9 years after the restatement. Factor 2 could not be estimated since *DD*, *ModDD*, and *Timely* all require longer time-series than three years.

the last period, while the difference in quality seems to diminish in the first six years after the restatement. Surprisingly, the difference in quality actually increases in the first year after the restatement measured with the *Smoothness* factor, which contradicts our predictions from H1b that the restatement itself has a disciplining role and hence should lead to a spontaneous improvement. The pattern from factor 1 is, however, replicated in the years 7-9 after the restatements. The peak in difference in the last period (3) on both factors suggests that the difference in quality between the two groups is innate and that the restating firms have fundamentally different (i.e., lower) accounting quality than the matched control group.

Since the restatements occur over a ten-year period the differences are unlikely to be driven by time or macroeconomic factors. However, the differences may be driven by innate differences between the two groups that are not captured in the matching process. To control for any such differences we next apply a difference-in-difference research design where each firm acts as its own control, thereby alleviating some of the concerns often attached to matching.[28]

[28]Kothari et al. (2005) and Dechow et al. (2010) discuss a serious concern related to a matched sample in accounting quality studies, namely that firms in the control group have similar incentives

2.5.2 Test of H2: Difference-in-Difference Test

The results in Table 2.6 suggest that we can maintain the first hypothesis that restaters have lower earnings quality than non-restaters on some metrics even in the years before the restatement. It is harder to maintain the second hypothesis that the two groups have identical quality after a restatement. Thus, so far it does not seem that we can deduce that firms improve their earnings quality as a direct consequence of a restatement. Despite the strengths of the matched sample design outlined above, the design does not fully control for differences between the two groups and in the economic environment. We therefore test whether the firms improve relatively more than the matched control group, consistent with the H2. If restating firms actually reform their earnings quality relatively more than a set of similar firms in the same time period, it is likely that the restatement event itself caused this improvement. We use a difference-in-difference research design to attempt to isolate the effect of the restatement. In this difference-in-difference setting each firm acts as its own control which also means that each restatement firm and its control are affected equally by outside factors.

Table 2.7 shows the results of the difference-in-difference tests. H2 predicts that restaters improve earnings quality following a restatement so we expect that the change towards higher earnings quality is larger for restaters than for non-restaters. On all three dimensions of earnings quality, restaters have improved. However, this is also the case for most of the non-restaters and the difference between the two groups is not significantly different from 0 on any dimension. Hence restaters do not improve their quality of earnings significantly more than non-restaters on any of the dimensions of earnings quality and therefore the influence on earnings quality of a restatement event, surprisingly, cannot be statistically documented.

The lack of difference in improvement could be attributable to at least three different things. First, it seems as if accounting quality has improved over the period for both groups, which can be attributed to a number of factors.[29] For instance, Singer and You (2011) find

to manage earnings as firms in the treatment group, but may not have been detected. In particular, Dechow et al. (2010) argue that earnings manipulation and earnings quality issues appear to cluster by industry.

[29]In the robustness analyses we examine whether the improvement of non-restaters is driven by

Table 2.7: Difference-in-Difference

Factor	N	After-Before: Restaters (*i*)	N	After-Before: Non-Restaters (*ii*)	Difference (*i-ii*)	Prediction (*i-ii*)
DiscretionaryAccruals	628	-0.0354**	608	-0.0343**	0.0011 (0.96)	-
AccrualsQuality	961	-0.0156*	857	-0.0130***	-0.0026 (0.78)	-
Smoothness	1,081	0.0343**	761	-0.0229	-0.0572 (0.11)	+

The table tabulates results for change in earnings quality factors (see Table 2.5) for restaters and non-restaters, respectively. Pre-restatement period is ten years before the (last) restatement event, whereas the post-restatement period is three to ten years after the (last) restatement event.
For the factors *DiscretionaryAccruals* and *AccrualsQuality* higher values indicate lower quality, whereas higher values indicate higher quality for the factor *Smoothness*. The prediction follows H2 that restaters improve earnings quality relatively more than non-restaters after a restatement event.
Restater vs. non-restater tested with two-sample t-test, before vs. after with paired t-test. *, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively. P-value in parentheses. Differences to Table 2.6 are due to missing observations.

that earnings quality improves after the enactment of SOX which could influence the results. Macro economic factors or the economic downturn in the middle of the period could also change the earnings quality. Finally, anecdotal and empirical evidence (Scholz, 2008) suggest that while the number of restatements has increased, their severity has decreased. This could also be due to SOX, increased scrutiny by the SEC in the post-Enron period, or to the fact that firms generally are less concerned about market reactions to restatements.

Second, the earnings quality metrics or factors may not sufficiently capture the parameters on which the restating firms actually improve. However, we do not believe this to be the case since the factors in this study measure three distinct dimensions of quality that have proved to be associated with restatements in previous research. In addition, the difference-in-difference test was conducted with all specific quality metrics (not tabulated) and on none of the 13 metrics did the restating firms improve more than the control group.

A third explanation is that restating firms cannot or do not have the incentives to improve. The former is the case if the dimensions of quality we measure are innate rather than discretionary and slow and/or difficult to change. Francis et al. (2006) define innate determinants of earnings quality as, for instance, deriving from the business model and operating environment. These factors are indeed slow to change relative to the more discretionary sources of quality such as accounting choices and auditing. Since the firms in our sample have up to ten years to improve, we do not believe that this causes our finding. The latter is the case if the restatement itself does not create incentives to improve. This explanation is further examined below.

2.5.3 Test of H3: Difference-in-Difference Test in Sub-Sample

As can be seen from Table 2.7 the educative role of the restatement surprisingly cannot be statistically documented. One explanation for this may be that the restatement itself does not create sufficient incentives for the firm to improve. If this is the case, it is likely that capital market forces instead create the necessary incentives. Specifically, our last hypothesis, H3, predicts that firms whose restatements were considered to be severe by investors, that

a positive intra-industry effect. This is not the case, see Section 2.5.4.

is, where the restatement announcement was followed by a very negative stock price reaction, are more likely to improve after the restatement. This follows the intuition that these restatements are deemed serious by the market. As a result, firms are more likely to allocate the necessary resources to actually reform their financial reporting after these servere restatements.

We test H3 with a standard event study framework, where the cumulative abnormal return (CAR) is estimated as the difference between the actual return and the market return in the three-day event window around the restatement announcement. The sample is then partitioned according to the size of CAR such that firms with CAR less than the median are placed in the sub-sample High Negative Market Reaction and firms with CAR greater than the median are in the sub-sample Low Negative Market Reaction.[30] The unique matched firms of each of these firms are then placed in the same sub-sample.

The results of the difference-in-difference test in the partitioned sample are in Table 2.8. Panel A tabulates the results for the sub-sample with high negative market reaction. On the *DiscretionaryAccruals* and *Smoothness* factors, restaters have improved significantly after the event which is not the case for the non-restaters. In fact, the restaters improve significantly more than the control group (p-value 0.02). On the *AccrualsQuality* dimension there is no difference between the two groups. Thus, on two out of three quality factors the restaters improve more than the non-restaters if the market reaction to the restatement announcement is severe. Panel B depicts the difference-in-difference test for the sub-sample with the weakest market reaction, that is, the restatements that were deemed less important by investors. The results here are different from those in Panel A; specifically, on no dimension of quality do the restaters improve more than the non-restaters. That is, the results from Table 2.7 still hold.

The results in Table 2.7 suggest that the actual restatement event does not incentivize the restating firms to improve their earnings quality. However, the results in Table 2.8 suggest that capital market forces instead discipline firms to improve, since the firms that ex-

[30]With value-weighted market returns, the mean (median) CAR is -9.04% (-2.93%). With equal-weighted returns the mean (median) CAR is -12.83% (-8.49%). Both of these are consistent with findings in previous research, such as Wilson (2008).

Table 2.8: Difference-in-Difference in Sub-sample Partitioned on CAR

Panel A: High Negative Market Reaction						
Factor	N	After-Before: Restaters (*i*)	N	After-Before: Non-Restaters (*ii*)	Difference (*i-ii*)	Prediction (*i-ii*)
DiscretionaryAccruals	349	-0.0924*	143	0.0228	-0.1152* (0.02)	-
AccrualsQuality	125	-0.0224	50	-0.0265	0.0040 (0.85)	-
Smoothness	626	0.0341	168	-0.1069	0.1410* (0.02)	+
Panel B: Low Negative Market Reaction						
Factor	N	After-Before: Restaters (*i*)	N	After-Before: Non-Restaters (*ii*)	Difference (*i-ii*)	Prediction (*i-ii*)
DiscretionaryAccruals	243	-0.0195	463	-0.0504**	0.0309 (0.26)	-
AccrualsQuality	51	0.0011	90	-0.0025*	0.0036 (0.17)	-
Smoothness	457	0.0175**	593	0.0017	0.0157 (0.62)	+

The sample is partitioned after cumulative abnormal return (CAR). CAR is measured as $R_{i,t} - E(R_{i,t})$ in the three-day event window surrounding the restatement announcement, where $R_{i,t}$ is the return on stock i and $E(R_{i,t})$ is the market return. Firms with CAR less than the median, i.e. more negative, and their unique matched firms are in Panel A, whereas firms with less negative market reactions are in Panel B.
The table tabulates results for change in earnings quality factors (see Table 2.5) for restaters and non-restaters, respectively, from the *before* (ten years before the last restatement event) to the *after* period (three to ten years after the last restatement event).
For the factors *DiscretionaryAccruals* and *AccrualsQuality* higher values indicate lower quality, whereas higher values indicate higher quality for the factor *Smoothness*. The prediction follows H3 that restaters improve earnings quality relatively more than non-restaters after a restatement event if the stock price reaction to the restatement announcement was severe.
Restater vs. non-restater tested with two-sample t-test, before vs. after with paired t-test. *, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively. P-value in parentheses. Differences to Table 2.6 are due to missing observations.

perienced very negative stock price reactions to their restatement announcements seem to improve more than the control group. This is not the case for firms that were not punished by the market in the same manner. Hence, the findings provide evidence that market forces discipline firms subject to restatements more than the actual restatement and regulatory intervention.

Assuming that the market reaction to a restatement is an indication of the severity of the restatement, one may argue that firms are more likely to improve following a restatement because of stronger incentives. However, this is not necessarily the case for two reasons. First, a more severe restatement may be more complex, making a subsequent improvement more costly and difficult. Second, as noted in Section 2.2, Wilson (2008) finds that the loss of information content is longer for firms that restate because of perceived severe reasons (revenue recognition) and for firms with severe negative market reactions following the announcement, implying that even if those firms have larger incentives to improve, it is not necessarily an easy task. Additional analyses in the robustness section test other severity proxies.

2.5.4 Robustness Tests

Firms that are subject to restatements do not seem to improve their earnings quality significantly more than a matched control group after the SEC intervention. In this section, we seek alternative explanations for this somewhat surprising result and examine if changes in the research design alter the results.

First, the fact that the matched control group has improved its earnings quality as much as the treatment group may be caused by a positive industry contagion effect as suggested by for instance Tan et al. (2006). Gleason et al. (2008) show how misstatements in one firm increases investor concern of the credibility of other firms in the same industry. It would influence our results if peer firms in the same industry as the one subject to a restatement anticipate this mechanism and improve their quality correspondingly by tightening up their accounting and internal control mechanisms. If this is indeed the case, our results can be interpreted as the restatement being very efficient, in fact improving the quality of the en-

tire industry. Though, for two reasons we do not believe that an industry spillover effect is driving the results: First, our industry match is very broad (1-digit SIC code), and second, we have matched the control group in the same year as the restatement took place and one would expect that a spillover effect would be delayed by at least one year. To entirely rule out the explanation of industry contagion, we create a new control group in which we match the restating firms with firms with similar size and profitability, as described in Section 2.3.2, but not in the same 1-digit SIC code industry. If the restaters improve significantly more than the new matched control group, a positive contagion effect as explained above might drive our results. If, however, the two groups improve equally, we maintain our conclusion that the restatement itself does not cause an improvement in quality. Table 2.9, Panel A, tabulates results from this first sensitivity analysis. Note that the first column, the change for restaters, is not identical to results from Table 2.7 since the restating firms from the first match have not necessarily found a match in the new group. Restaters have improved more than the new control group on the factor *AccrualsQuality*, but this is not the case for the remaining factors which actually move in the opposite direction than expected. Therefore the lack of difference found in Table 2.6 does not seem to be driven by a positive intra-industry effect. Panel A thus reveals that the improvement on some of the earnings quality metrics is merely a trend, rather than a consequence of the restatements and we maintain our conclusion that the intervention alone indeed cannot be statistically documented.

Second, another concern is whether the poor quality detected in the years before the restatement is driven by any restatements in the pre-restatement sample. Recall, that if a firm has restated several times, we use the last year as cut-off year and thus the pre-restatement sample also includes restatement years for some of the firms. We therefore remove any previous restatement for firms with several restatements to control for the concern that these early restatements drive our conclusion of H1a. Results are tabulated in Table 2.9, Panel B. Comparing with Table 2.7 it is evident that seen in isolation the restaters still improve, thus have better quality in the post-restatement than in the pre-restatement period. It can now be ruled out that this improvement is caused by poor quality driven by any previous restatements and thus we maintain our conclusion that restaters have poorer quality

Table 2.9: Robustness Tests: Difference-in-Difference Tests

Panel A: New Industry Matching						
Factor	N	After-Before: Restaters (*i*)	N	After-Before: Non-Restaters (*ii*)	Difference (*i-ii*)	Prediction (*i-ii*)
DiscretionaryAccruals	677	-0.0203*	883	-0.0195	0.0008	-
AccrualsQuality	1,016	-0.0163	974	-0.0431***	-0.0269**	-
Smoothness	1,145	0.0771	857	0.0523**	-0.0248	+
Panel B: Remove Restatement Years in Pre-Restatement Sample						
Factor	N	After-Before: Restaters (*i*)	N	After-Before: Non-Restaters (*ii*)	Difference (*i-ii*)	Prediction (*i-ii*)
DiscretionaryAccruals	508	-0.0387*	608	-0.0343**	-0.0044	-
AccrualsQuality	950	-0.0200**	857	-0.0130***	0.0069	-
Smoothness	1081	0.0388***	761	-0.0229	0.0617*	+
Panel C: Remove First Year in Post-Restatement Sample						
Factor	N	After-Before: Restaters (*i*)	N	After-Before: Non-Restaters (*ii*)	Difference (*i-ii*)	Prediction (*i-ii*)
DiscretionaryAccruals	513	-0.0392**	454	-0.0408**	-0.0016	-
AccrualsQuality	781	-0.0323***	690	-0.0213***	0.0109*	-
Smoothness	881	0.0667**	588	0.00406	-0.0627	+

Panel A depicts results from difference-in-difference tests of the restating firms matched with firms in the same year, with ROA and total assets within $\pm$ 40 % and not within the same 1-digit SIC code industry.
Panel B depicts results from difference-in-difference tests with the original sample, in which we remove any restatement years in the pre-restatement sample.
Panel C depicts results from difference-in-difference tests with the original sample, in which we remove the first years after the last restatement year.
The table tabulates results for change in earnings quality factors (see Table 2.5) for restaters and non-restaters, respectively, from the *before* (ten years before the last restatement event) to the *after* period (three to ten years after the last restatement event).
For the factors *DiscretionaryAccruals* and *AccrualsQuality* higher values indicate lower quality, whereas higher values indicate higher quality for the factor *Smoothness*. The prediction follows H3 that restaters improve earnings quality relatively more than non-restaters after a restatement event if the stock price reaction to the restatement announcement was severe.
Restater vs. non-restater tested with two-sample t-test, before vs. after with paired t-test. *, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively. P-value in parentheses.

in the pre-restatement period, even when earlier restatements. This also fits well with the graphical representation in Figure 2.1.

Third, it is possible that there is a time lag before the improvement takes place or before it can actually be measured. Anecdotal evidence suggests that correcting the errors and/or irregularities leading to a restatement is both a lengthy and expensive process (Valdivia, 2008); it might be that firms require more than one financial year to improve their financial statements. To examine this possible explanation we remove the first year after the last restatement in the post-restatement sample to see whether this affects our results. Results are shown in Table 2.9, Panel C. On one factor, *AccrualsQuality*, non-restaters have in fact improved significantly more than restaters, whereas the remaining factors do not show any difference. It therefore does not seem to be the case that restaters improve relatively more when allowing a longer time horizon. This is further confirmed by Figure 2.1 which plotted the development in quality over time. On those plots it also seemed as if the difference in quality actually increased over time, implying that the quality of restating firms is inherently different from that of other firms.

In H3 we investigate whether firms' incentives to improve increase with the severity of the restatements, measured as the stock price reaction to the restatement announcement. We also measure severity in three additional ways: Whether the restatement was associated with fraud or a SEC investigation, or was caused by revenue recognition issues. Since these severity indicators are likely to be negatively associated with abnormal stock returns, they may also reveal the specific mechanisms that drive the larger improvement demonstrated in H3. We expect that restatements associated with fraud or a SEC investigation are more likely to lead to an improvement, since for instance Palmrose et al. (2004) and Scholz (2008) find that these restatements lead to larger negative market reactions.[31] We also predict that restatements caused by revenue recognition issues will lead to a larger improvement in firms' accounting quality than other restatement categories, following previous research of, for instance, Palmrose and Scholz (2004), Palmrose et al. (2004), Scholz (2008), and Plumlee

[31]The opposite could, however, also be the case if a SEC investigation is a sign of purely technical matters or judgment disagreements between the firm and SEC, which would not increase the incentives to improve (Palmrose et al., 2004).

and Yohn (2010).[32]

To test these alternative proxies for restatement severity prediction the following regression is estimated for the restating firms with standard errors clustered by industry:[33]

$$\begin{aligned} Improvement_{i,t} =& \alpha_0 + \alpha_1 Fraud_{i,t} + \alpha_2 SECInvest_{i,t} \\ &+ \alpha_3 RevenueRecognition_{i,t} + \alpha_4 CoreExpense_{i,t} \\ &+ \alpha_5 NonCoreExpense_{i,t} + \alpha_6 Reclassification_{i,t} \\ &+ \alpha_7 UnderlyingEvents_{i,t} + \alpha_8 Size_{i,t} + \alpha_9 ROA_{i,t} + \mu_{i,t} \end{aligned} \tag{2.13}$$

where Improvement is the relative improvement (difference between restaters and non-restaters as post-restatement less pre-restatement, i.e., difference-in-difference) of the factors *DiscretionaryAccruals*, *AccrualsQuality*, or *Smoothness*; *Fraud*, *SECInvest*,[34] *RevenueRecognition*, *CoreExpense*, *NonCoreExpense*, *Reclassification*, *UnderlyingEvents* are indicator variables that equals 1 if the restatement is caused by the category specified, 0 otherwise; *Size* is the natural logarithm of assets; *ROA* is net income divided by total assets.

The result of Equation 2.13 is tabulated in Table 2.10. To ease interpretation, *DiscretionaryAccruals* and *AccrualsQuality* have been multiplied with -1 such that an increase indicates an improvement for all factors. Our expectations outlined above therefore predict positive coefficients on *Fraud*, *RevenueRecognition*, and *SECInvest*, respectively. However, the firms only seem to improve more following an SEC investigation measured with the factor *AccrualsQuality* and not on any of the other factors or severity measures, fraud, and revenue recognition issues. It hence does not seem as if the association between negative stock returns and improvement is driven by any of these three factors. As only a smaller part of CAR in restatement studies is explained,[35] it must be the unexplained part that drives the improvement found in Section 2.5.3. This unexplained part is likely to be related

[32]Other categories that are likely to be perceived as less severe are, for instance, classification issues and reclassifications.

[33]The classification of restatement categories is adapted from Scholz (2008).

[34]8% of the restatements in our sample include an SEC investigation. See http://www.sec.gov/news/newsroom/howinvestigationswork.html

[35]In an untabulated regression CAR was regressed on the three severity measures, Fraud, SECInvest, and RevenueRecognition. As expected all were significantly negatively related to the stock market reaction, but the explanatory power was only 2.6%. In a more elaborated model, Palmrose et al. (2004) explain between 17% and 26% of two-day CAR.

Table 2.10: Robustness Tests: Determinants of Improvement

	Dependent Variables		
Variable	*DiscretionaryAccruals*	*AccrualsQuality*	*Smoothness*
Fraud	-0.0029	-0.0013	0.0179
	(-0.04)	(-0.10)	(1.36)
SECInvest	0.0259	0.0129**	-0.0267
	(0.91)	(2.68)	(-1.88)
RevenueRecognition	-0.0521	0.0048	0.0550
	(-1.13)	(0.16)	(1.34)
CoreExpense	0.0236	0.0098	0.0351*
	(0.88)	(0.71)	(1.91)
NonCoreExpense	0.0142	-0.00174	0.0394
	(0.88)	(-1.43)	(1.11)
Reclassification	0.0018	0.0063	0.0142
	(0.05)	(0.57)	(1.02)
UnderlyingEvents	0.0122	0.0225	-0.0279
	(0.30)	(1.88)	(-0.81)
Size	-0.0099	-0.0025	0.0025
	(-1.84)	(-0.71)	(0.44)
ROA	0.8249***	0.0770	0.4645
	(9.87)	(0.65)	(1.64)
Intercept	0.0234	0.0141	-0.0635
	(0.36)	(0.66)	(-1.36)
N	659	1,245	1,392
R^2	15.11%	0.53%	2.31%

The table depicts regression results from Equation 2.13. Standard errors are clustered by industry. For all factors, an increase indicates an improvement. The classification of restatement categories is adapted from Scholz (2008)

Improvement is the relative improvement (difference between restaters and non-restaters as post-restatement less pre-restatement, i.e. difference-in-difference) of the factors *DiscretionaryAccruals*, *AccrualsQuality*, or *Smoothness*; Fraud is an indicator variable that equals 1 if the restatement identified financial fraud, 0 otherwise; SECInvest is an indicator variable that equals 1 if the restatement was SEC investigated, 0 otherwise; RevenueRecognition is an indicator variable that equals 1 if the restatement was attributable to an issue with revenue recognition, 0 otherwise; CoreExpense is an indicator variable that equals 1 if the restatement was attributable to an issue with core expense, 0 otherwise; NonCoreExpense is an indicator variable that equals 1 if the restatement was attributable to an issue with non-core expense, 0 otherwise; Reclassification is an indicator variable that equals 1 if the restatement was attributable to an issue with reclassification, 0 otherwise; Underlying Events is an indicator variable that equals 1 if the restatement was attributable to an issue with underlying events, 0 otherwise; Size; ROA is net income divided by total assets.

*, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively. T-value in parentheses.

to restatement and firm specific characteristics that are unobservable in this study such as the specific Form 8 or 8-K filing or firm and management credibility. The specific drivers of the improvement is left for future research.

When working with restatements in an accounting quality context a common concern is the fact that endogeneity issues might be present. This is the case if the SEC also uses some of the earnings quality metrics to identify the restaters which might lead to reversed causality, so that the likelihood of restating influences the outcome of the earnings quality metric. Even though this explanation cannot be entirely ruled out, it is strongly impeded by the large amount of earnings quality metrics included in the tests. Given that they measure different aspects of earnings quality, they are likely to measure some underlying construct of the quality of financial statements when aggregated. Another concern may be that the restating firms have incentives to change their corporate governance mechanisms following a restatement which may not be the case for the control firms (Ettredge et al. (2012) and Farber (2005)). However, assuming that improved corporate governance leads to an enhancement of quality through less earnings management, a difference in corporate governance between the restating and non-restating firms would lead to a comparatively larger improvement in earnings quality for the restaters than for the non-restaters. And since we cannot document this relatively larger improvement, differences in corporate governance are less likely to influence our conclusions. In addition, Rotenstein (2011) argues that a restatement is not necessarily followed by improved corporate governance since managers do not always fully understand the value of this.

The fact that the restatement events happen in different calender years (from 2000 until 2010) mitigates a possible effect from changes in macro economic variables and the overall economic environment. These effects are further controlled for by using the difference-in-difference design.

2.6 Conclusion

This paper examines the earnings quality of firms before and after they restated their financial statements and whether the quality improved as a consequence of the restatement. Us-

ing a broad portfolio of earnings quality metrics combined via factor analysis and a sample of firms required to restate matched with a control group, we find the following: Our results indicate that the poor earnings quality in the restatement year detected in previous studies is evident up to ten years before the actual restatement. We do not find that the two groups have identical quality after the restatement, though. We also show with a difference-in-difference research design that restaters surprisingly do not improve relatively more than non-restaters. It is therefore not possible to attribute the improvement to the actual restatement event itself. However, when partitioning the sample based on the magnitude of the market reaction to the restatement announcement, firms who experienced severe negative drops in stock prices are more likely to improve than the control group. Hence, our findings indicate that while the restatement and regulatory intervention itself do not seem to incentivize firms to improve the quality of their financial statements, capital market forces seem to create the necessary incentives to do. The results are robust to several alternative research designs. Thus, the results are not caused by a positive intra-industry contagion effect and hold even when allowing firms an extra year to improve their earnings quality.

To our knowledge, this is the first study conducted to examine the disciplining role of a restatement event, measured on the accounting quality of restating firms. The fact that we cannot statistically isolate the effect of the restatement event itself in the quality of earnings is quite surprising. In particular, the severe market reactions to restatements clearly prove that the financial markets take restatements very seriously. Yet, this does not lead to a general measurable improvement in the earnings quality of restating firms, but only for those firms who actually experience significant declines in stock price as a result of the restatement announcement. Assuming that the metrics we apply accurately measure accounting quality, our results indicate that the restatement event itself does not necessarily lead to a change in the behavior of the restating firms, but that capital market forces do. This point is further underlined by the fact that several of the firms in the sample restate more than once.

This paper complements previous research on the consequences of restatements (e.g., Palmrose et al. (2004); Dechow et al. (1996, 2011)) and adds further to our knowledge on how firms behave after a restatement event. In particular, this paper sheds new light on the

long-term behavior of restating firms after a restatement. From our results and graphical representation of the development of earnings quality in the pre- and post-restatement periods we document that restating firms do not improve as a consequence of the restatement. It seems as if these firms have permanently poorer quality than similar firms, indicating that restatement events do not alter the fundamentally different nature of these firms. The paper also elaborates on research on the quality of financial statements in the actual restatement year (Jones et al., 2008; Richardson et al., 2002).

The practical implications of these findings are of particular importance to two groups of financial statement users, investors and regulators.

The finding that poorer quality can be detected among restating firms several years before the actual restatement is certainly relevant to investors, since it implies that resource allocation decisions have been taken on financial statements not giving a fair presentation of the firm. It also implies that restatements can be predicted which is important to investors, since they may avoid the negative returns associated with restatements. The fact that the earnings quality of restating firms does not seem to improve after a restatement also has implications for investor confidence after a restatement.

That the poor earnings quality present in the restatement year can be measured several years before the actual restatement is important to regulators. This knowledge could improve the detection mechanism of the SEC when identifying restatements and thus enhance investor protection. Second, the fact that several of the restating firms restate more than once and do not improve the quality of earnings significantly more than a group of similar firms, calls for a continuation of the surveillance of restating firms even in the years after they restate. As such, a previous restatement should act as a "red flag" for regulators and auditors for several years after the restatement.

The findings of this paper open up to a number of interesting research questions. Suggestions for further research include an examination of how firms behave on other parameters than earnings quality after a restatement, such as investor confidence and corporate governance. The specific drivers of any possible improvement are also unexplored in this paper and could be very interesting to examine further.

Chapter 3

Causes and Consequences: The Impact of Bank Restatements on Illiquidity and Systemic Risk

Causes and Consequences: The Impact of Bank Restatements on Illiquidity and Systemic Risk

Marie Herly

Department of Economics and Business, Aarhus University

Abstract

This paper examines the determinants and consequences of restatements in U.S. banks. First, the causes of restatements in banks are examined. I find that risky, poor performing banks with low capital levels and high magnitudes of discretionary loan loss provisions are more likely to restate.

Second, the consequences of restatements in banks are examined. I document that banks experience increased cost of equity capital and decreased balance sheet liquidity after a restatement, consistent with the view that banks are being punished for the increased opacity following a restatement. In addition, I show that banks subject to restatements contribute more to systemic risk than other banks and thereby have spillover effects on the financial system.

Overall, this paper shows firstly, that banks manage capital with loan loss provisions to avoid regulatory costs prior to a restatement. Secondly, it shows that capital providers demand a higher risk premium to compensate for the higher uncertainty following a restatement and that this has material effects on the financial system through higher balance sheet illiquidity and higher contribution to systemic risk.

Keywords: Earnings restatements; banks and banking; systemic risk; accounting quality.

JEL Classification: G21; M41; G10; G32.

I thank Steven Rock, Hollis A. Skaife, and participants at the 2013 EAA Doctoral Colloquium, and the 2013 Humboldt Financial Accounting Summer School for helpful comments.

3.1 Introduction

The purpose of this paper is to analyze the causes and consequences of earnings restatements in banks.[1] I find that earnings in banks are managed prior to a restatement and that banks experience higher cost of capital and balance sheet illiquidity as a result of the increased uncertainty about their financial reporting after a restatement. I also document that these bank-specific consequences spread to other banks and have systemic implications, since restating banks contribute more to systemic risk than other banks.

Existing knowledge about restatements in industrial firms is not directly transferable to the financial industry, because the industry is highly regulated and therefore banks are driven by incentives that differ from those of industrial firms. As a consequence, our knowledge about what drives restatements in banks and what the outcomes are is very limited. However, research on restatements in banks is just as important; in fact, one may argue that it is even more important given the higher perceived opacity of banks' financial statements (Morgan, 2002) and the important role they play in the functioning of capital markets (Diamond, 1997). The opaque nature of banks' financial statements and the importance of the financial sector for the entire economy call for high quality information to financial statement users and therefore we need to understand restatements in banks better.

First, the paper examines the causes of restatements in banks; the determinants are likely to be different from those in industrial firms (Dechow et al., 2011; Ettredge et al., 2010; Jones et al., 2008) because the financial industry is highly regulated and bank financial statements are inherently different. Three groups of explanatory variables are considered to determine restatements: bank characteristics and performance, financial robustness, and accounting quality. I find that banks with poor performance, low capital ratios, and large portions of discretionary loan loss provisions are more likely to restate. These findings show that banks that restate are under pressure on the performance dimension. The fact that restating banks both have low capital ratios and high values of discretionary loan

[1] A restatement event in this paper is defined as a correction of errors or irregularities in the financial statements. Violations could include financial and accounting fraud, market manipulation, providing false or misleading information, and selling securities without proper registration (GAO, 2009). Thus, irregularities cover both fraud and earnings management that violate GAAP.

loss provisions points at a mechanism where banks manipulate loan loss estimations when approaching the minimum required capital. This adds to our knowledge of how banks manage earnings to avoid regulatory costs (Anandarajan et al., 2007; Collins et al., 1995).

Second, the paper examines two consequences of restatements in banks. Firstly, I examine if banks that restate are penalized with increased cost of equity capital as documented in industrial firms (Hribar and Jenkins, 2004; Kravet and Shevlin, 2010). The effect is likely to be different in banks because banks are often highly levered. Classical corporate finance theory suggests that the cost of equity is increasing in leverage, which may alter the sensitivity of cost of equity to the lower information quality surrounding a restatement (Modigliani and Miller, 1958; Lambert et al., 2007). I find clear evidence that restatements do indeed increase the ex ante cost of equity capital. Secondly, apart from higher cost of equity capital, a restatement can also manifest itself in funding constraints stemming from harder access to external capital, i.e., balance sheet illiquidity. A restatement can lead to increased balance sheet illiquidity because the restatement event creates uncertainty about the financial reporting of the bank in question (Graham et al., 2008), which in turn increases the information asymmetry about the repayment ability of that bank. This uncertainty may lead to credit rationing in the interbank market and hence restating banks can experience credit crunches afterwards. I also find support for this hypothesis. Collectively, these results suggest that the (perceived) opacity of a bank's financial reporting increases after a restatement, causing capital providers (equity holders and the interbank market) to require a higher risk premium.

Finally, the last hypothesis of this paper posits that the funding constraints of restating banks documented above can spread to other banks and hence have systemic implications. In other words, restating banks are expected to contribute more to systemic risk than other banks in two ways. First, liquidity shocks in banks are contagious (Allen and Gale, 2000), and second, they can be passed on to customers in terms of reduced loan supply (Khwaja and Mian, 2008). Both of these mechanisms would lead to increased contribution of systemic risk. Controlling for the fact that restatement events may be endogenous, I document that restating banks do in fact contribute more to systemic risk than non-restating banks do. This extends our current knowledge about what causes banks to be systemic and highlights

the innate risky nature of restating banks.

This paper describes the determinants of bank restatements and shows that the restatements can have real effect on the economy via the liquidity shock and contribution to systemic risk. These findings are of interest to the SEC and to auditors who are concerned with assuring that financial statements present a true and fair view of the firm and consequently want to minimize the number of errors and irregularities. The finding that restating banks are more systemic by nature also has implications for banking regulators both within and outside the United States.

The sample consists of 369 U.S. banks that restated from 2000 to 2014. Included in the sample are prominent restatement cases such as the 2012 JPMorgan Chase restatement after an attempt to hide loan losses, as well as Santander's 2006 restatement following mortgage loan accounting issues. I document that restatements are less frequent in banks than in industrial firms, indicating that bank regulation has a positive impact on the frequency of errors and irregularities. I show that the causes of bank restatements are more heterogeneous and quite different from those of industrial firms; for instance, one fifth of the restatements in the sample are caused by erroneous accounting for loan losses.

The remainder of this paper is structured as follows: Section 2 describes previous literature and motivates the four hypotheses. Section 3 presents the sample selection as well as descriptive statistics comparing restatements in banks vis-a-vis industrial firms. The determinants of restatements are described in Section 4, while Sections 5 and 6 present methodology and results of the restatement effect on cost of equity capital and balance sheet liquidity, and contribution to systemic risk, respectively. Section 7 concludes the paper.

3.2 Motivation and Hypotheses Development

3.2.1 Determinants of Restatements

The first hypothesis examines the causes of restatements in the financial sector. The characteristics of industrial firms that restate earnings have been extensively researched. As a research tool they have compelling properties since an outside source has identified a prob-

lem with the "quality" of the financial statements of the firms involved (Dechow et al., 2010). Some of the common characteristics of restating firms include high growth prior to restatements (Beneish, 1999b), executive compensation contracts (Burns and Kedia, 2006), poor accounting quality (Dechow et al., 2011; Richardson et al., 2002), high leverage and high likelihood to violate debt covenants (Dechow et al., 1996), and poor corporate governance (Farber, 2005; Dechow et al., 1996). In addition, small and unprofitable firms are more likely to restate (Valdivia, 2008; Scholz, 2008). These studies all exclude banks and their findings are not necessarily generalizable to the financial industry. The determinants of restatements are likely to be different in banks as compared to industrial firms for at least two reasons:

First, the banking industry is highly regulated which creates different incentives to manage earnings.[2] There are two possible outcomes of regulation on the frequency and magnitude of restatements: On the one hand, regulation may lead to fewer restatements since managers could respond to regulatory intervention by focusing on avoiding errors in financial statements and preventing earnings management because the likelihood of being detected is higher. Maletta and Wright (1996) and Kreutzfeldt and Wallace (1986) document that financial firms have significantly lower incidence of errors than firms in non-regulated industries. On the other hand, regulation may lead to more restatements because banks are regulated partly based on financial statement information, creating additional incentives for banks to manage earnings (Beatty et al., 2002; Adams et al., 2009).[3] Cheng et al. (2011) argue that the increased incentives to manage earnings stem from the particularly high regulatory costs in the financial industry. In support of this argument, several studies find evidence of earnings management in the financial industry: Beatty et al. (1995) and Ahmed et al. (1999) find evidence of banks managing regulatory capital, while Collins et al. (1995) find evidence of income smoothing behavior. In addition, regulated industries

[2]There are several levels of regulation for U.S. banks. Generally, the banks can be regulated by one or more of the following organizations: Federal Deposit Insurance Corporation, FDIC (deposit insured banks), Office of the Comptroller of the Currency, OCC (national-chartered banks), and Federal Reserve Board, FRB (state-chartered banks).

[3]Financial stability, not detecting earnings management, is the main objective of banking regulation. But if a bank is close to the minimum capital ratios and hence risks potential regulatory costs, its financial reporting is subject to increased scrutiny by, for instance, regulators and the SEC. This increases the likelihood of detecting any earnings management (Cheng et al., 2011).

are particularly subject to the political cost theory, which creates incentives to smooth or understate net income (Key (1997) and Healy and Wahlen (1999)). Banks have incentives to manage earnings to achieve capital, earnings, and tax goals (Beatty et al., 1995). While industrial firms also have the two latter incentives, the incentive to manage regulatory capital to avoid regulatory costs is bank specific (Gebhardt and Novotny-Farkas, 2011). Collins et al. (1995) argue that managers can respond to increased demand for regulatory capital by increasing equity, net income, or loan loss allowances, thus balancing regulatory costs (arising when approaching the minimum) and opportunity costs (arising when exceeding the minimum). Since some of the three incentives listed above are opposite, the direction of the possible earnings management in banks is harder to predict than in industrial firms. Beatty et al. (1995) note that the conflicting incentives are likely to be traded off and they assume that the bank balances off each goal to achieve the optimal level of required capital, net income, and tax payments, respectively.

Second, the nature of banks' financial statements is inherently different from that of industrial firms. In particular, some of the accounting quality metrics that have been applied as determinants of restatements in industrial firms (Dechow et al., 1995; Richardson et al., 2002; Dechow et al., 2011), cannot be applied to banks, whose accruals are fundamentally different.[4]

In the following I will describe why I hypothesize that three classes of bank variables are likely to determine restatements in banks and financial institutions: Bank characteristics and performance, financial robustness, and accounting quality.

Bank Characteristics and Performance Previous research shows that banks exercise discretion over *loan charge-offs* to alter the capital ratio (Moyer, 1990; Wahlen, 1994). Loan charge-offs are accounting adjustments that reflect losses on loans deemed uncollectible (Gebhardt and Novotny-Farkas, 2011); decreasing charge-offs increase primary capital adequacy ratio (Beatty et al., 1995). Given the impact of charge-offs on regulatory capital, I predict a negative relation between charge-offs and restatements, hypothesizing that banks decrease

[4] Accruals in industrial firms are mostly driven by, e.g., production and sales, whereas accruals in banks are driven by the bank's lending and investment activities, making for instance the Jones Model (Jones, 1991) and other accrual models unsuitable for the financial industry.

charge-offs to increase their capital ratios to avoid regulatory intervention. To examine how banks' risk influences the likelihood of restating, I include a widely used measure of bank risk, value-at-risk (*VaR*). The value-at-risk is the worst possible loss for a given time horizon that will not be exceeded with a high probability (Hillier et al., 2008). VaR is interesting in an earnings restatement context because previous research suggests that high-risk firms have higher likelihood of restating (Kerstein and Kozberg, 2013; Eilifsen and Messier Jr., 2000), and because banks are regulated based on VaR (Basel, 2011). With this in mind, banks with extreme values of VaR may arouse the interest of the Securities and Exchange Commission (SEC), which increases the likelihood of restating. *Size* is included as a control for bank size. Evidence from non-financial firms is mixed on how size influences the likelihood of restating: Some studies find that smaller firms are more likely to restate (Turner and Weirich, 2006; Valdivia, 2008), whereas others find the opposite (Cathy Zishang et al., 2012; Dechow et al., 1996). Beneish (1999b) finds that restating firms have high growth rates so I include a bank-specific measure of growth, namely *change in total loans*. Besides being an indication of growth, high growth rates in lending also increase the focus on meeting regulatory capital requirements, which would increase the incentives to manage capital.

One incentive for industrial firms to manage earnings is to conceal deteriorating performance (Cathy Zishang et al., 2012; Dechow et al., 2011). For instance, Beatty et al. (2002) find that banks manage earnings via loan loss provisions and security gain realizations to avoid earnings declines, thereby disguising poor performance. I therefore expect that unprofitable banks are more likely to restate, measured with return on equity (*ROE*) and a bank-specific performance measure, *net interest margin*.

Financial Robustness Banks also have incentives to mask poor financial robustness and I therefore expect that banks with lower financial robustness are more likely to restate. Specifically, Herz (2010) describes that banks close to the minimum required capital overstate loan loss provisions, understate loan write-offs, and recognize abnormal realized gains on securities portfolio to boost required capital. The *capital ratio* is therefore hypothesized to have a negative relation to the probability of restating. Another measure of robustness, *leverage*, is likely to increase the likelihood of restating because it captures the incentive to attract inexpensive capital (Beneish, 1999b) and because highly levered firms have incen-

tives to boost financial performance both to avoid covenants and to raise new debt on more favorable terms (Dechow et al., 2011; Beneish, 1997). Finally, the ratio of *deposits to loans* is included to capture part of the soundness of the bank's business. I expect that banks with low soundness are more likely to restate.

Accounting Quality Previous research shows that some measures of accounting quality explain the likelihood of earnings restatements in industrial firms; for instance, Jones et al. (2008) and Dechow et al. (2011) show that accruals and accruals quality models can detect restatements. This is likely to be the case in financial institutions as well. Two measures of accounting quality in banks have been widely examined in the literature, namely using loan loss provisions (LLP) and realizing security gains and losses (SGL). LLP is one of the largest accruals in a bank's financial statements.[5] Loan loss accounting is interesting in an earnings management context since it has material effects on the banks' earnings and balance sheet amounts and requires a substantial degree of estimation and judgement (Nichols et al., 2009). Moyer (1990) and Scholes et al. (1990) both find evidence of banks using LLP by inflating loan loss reserves when capital requirements were close to the minimum, an indication of capital management, and Collins et al. (1995) and Anandarajan et al. (2007) both find evidence of earnings management using LLP. SGLs reflect the accounting gain or loss that arises when a bank sells an investment security at a price different from the book value (Warfield and Linsmeier, 1992).[6] Since divesting of financial securities is discretionary to a large extent,[7] bank managers have the ability to influence reported accounting income by timing the sales of securities (Barth et al., 1990). Thus, when a bank is close to its minimum capital requirement, the bank may have the incentive to accelerate (defer) recognition of

[5]The purpose of loan loss provisions is to adjust the banks' loan loss reserves to reflect expected future losses on their loan portfolios; an increase in LLPs decreases assets and earnings (Gebhardt and Novotny-Farkas, 2011). According to US GAAP, the recognition of loan loss provisions is regulated by SFAS No. 5, Accounting for Contingencies, and SFAS No. 114, Accounting by Creditors for Impairment of a Loan. Credit losses must be charged to income when it is probable that that an asset is impaired or a liability is incurred and the amount can be reasonable estimated. Hence, US GAAP operates with an expected loss model, different from the incurred loss model enforced by the IASB (Gebhardt and Novotny-Farkas, 2011; El Sood, 2012).

[6]Realizing security gains and/or postponing security losses increases net income and bolsters regulatory capital.

[7]Beatty and Harris (1999) note that realizations of securities gains and losses are relatively unaudited and unregulated. The realization is assumed to be partly non-discretionary, since they are used to manage liquidity and interest rate risk.

security gains (losses) to avoid regulatory costs. For both loan loss provisions and security gains and losses it is expected that banks that exercise large discretion not explained by accounting fundamentals over these items (large portions of *discretionary LLP and discretionary SGL*, respectively) have higher likelihood of restating.

Collectively I expect that the bank variables described here are able to determine restatements, translating into the first hypothesis:

> *H1: Bank characteristics and performance, robustness, and accounting quality determine restatements*

3.2.2 Restatement Effect on Cost of Capital and Liquidity

The following hypotheses examine the consequences of restatements in the financial sector. Previous research has shown that industrial firms that restate are often penalized with increased cost of capital, both on the debt and the equity side (see, e.g., Kravet and Shevlin (2010); Parthasarathy and Newberry (2007)). According to Hribar and Jenkins (2004) and Graham et al. (2008) there are two reasons why cost of capital would increase after a restatement. First, since restatements often result in downward adjustments compared to the originally reported financial statements, the past time series is negatively affected, thus altering projections on future expected earnings. In this case the restatement creates uncertainty about future cash flows (wealth effect). Second, even if the restatement itself reduces uncertainty about a particular account or transaction, it may increase uncertainty about the bank's financial reporting as a whole, leading to higher perceived opaqueness. In this case the restatement creates uncertainty about the bank's financial reporting (information effect). Both of these channels lead to a higher expected risk premium and thus higher cost of equity capital.

Chen et al. (2013) find that firms rely more on debt and less on equity financing after a restatement. They attribute this finding to the fact that firms' financing choices are affected by the information asymmetry between outside investors and insiders. In particular, since (private) debt holders can obtain information through private channels, they are less

affected by information asymmetry than equity holders, who only have public information to rely on. Equity holders are therefore more suspicious about the public information available and therefore information asymmetry is (perceived) higher; as a result, equity holders demand a higher rate of return following restatements. Even though the paper by Chen et al. (2013) focuses on industrial firms, their main contribution extends to the financial industry as well, namely that equity holders are more sensitive to changes in public information than debt holders are. Therefore, I focus only on the equity side of the capital costs[8] and predict that the cost of capital penalties following restatements that have been documented in industrial firms is also present in the banking sector:

H2a: Restatements in banks are associated with subsequent higher cost of equity capital

Apart from the higher cost of equity capital hypothesized above, a restatement can also manifest itself in funding constraints stemming from harder access to external capital, i.e., balance sheet illiquidity. The reason is that the cost of capital and internal financing constraints are positively associated (Campbell et al., 2012). A restatement event creates uncertainty about the financial reporting of the bank in question which in turn increases the information asymmetry about the repayment ability of that bank. This uncertainty may lead to credit rationing in the interbank market and hence restating banks can experience credit crunches subsequently (Freixas and Jorge, 2008). In particular, Rochet and Vives (2004) term the drying up of liquidity in the interbank market a modern form of bank runs, where large, well-informed investors refuse to renew their credit on the interbank market.[9] They argue that these modern bank runs can stem from events that put in doubt the repayment capacity of an intermediary, such as a restatement, given the increased risk and perceived opacity about a bank's financial reporting following the restatement (Graham et al., 2008).

In addition, there may also be a mechanical relation between restatements and liquidity if the restatement is caused by bad loans (which is the case for about 20% of the restate-

[8]It is important to remember that, on average, banks are highly levered and therefore equity capital only finances a small part of total bank assets. As a result, the proportionate part of the cost of equity in the overall cost of capital is relatively small (Gup and Kolari, 2005).

[9]As observed by Baglioni (2012), liquidity constrained banks prefer to borrow short term. They are therefore more likely to take out new debt and the cost of this new debt is priced higher as a product of the higher uncertainty and risk of the restatement.

ments in this sample, see Table 3.2). Earnings management prior to a restatement typically attempts to overstate earnings,[10] which can be done by understating loan loss provisions (Gebhardt and Novotny-Farkas, 2011). A restatement that corrects such an error will increase loan loss provisions, hence decreasing net income bank capital which causes the bank to need cash (Tirole, 2011). Income decreasing restatements of bad loans are therefore likely to have direct effect on the bank's demand for cash. Note, however, that changes in expected and realized loan losses are charged off against the loan loss provision and loan loss allowance, respectively, and hence do not lead to restatements per se.

The two mechanisms described above both contribute to a higher liquidity risk in banks upon a restatement, translating into the following hypothesis:[11]

H2b: Restatements in banks are associated with subsequent lower balance sheet liquidity

Note that H2a and H2b are likely to be at play jointly since the cost of capital and liquidity are inherently connected (see, e.g., Ng (2011)). I therefore do not hypothesize causality from cost of capital to liquidity or vice versa, only that restatements are likely to increase both cost of equity capital and balance sheet illiquidity simultaneously.

3.2.3 Contribution to Systemic Risk

As explained above, I hypothesize that restating banks experience higher cost of equity capital and lower balance sheet liquidity after the restatement. The fourth and final hypothesis of this paper posits that this nudge to the restating banks' access to external financing can spread to other banks and hence have systemic implications. As a consequence, restating banks are expected to contribute more to systemic risk than other banks. There are at least two possible channels through which restatements can have systemic effects:

First, the shock of the restatement can spread to other banks. In particular, Allen and Gale (2000) show how liquidity shocks in banks are contagious, such that even small shocks

[10] It is well described in the literature that most restatements are income decreasing (see, e.g., Graham et al. (2008) and Scholz (2008)). Income decreasing restatements mean restatements that reduce previously reported earnings, revealing that firms perform worse than first reported.

[11] Liquidity risk is defined here as the bank-specific risk of being unable to meet short-term financial demands (Greenbaum and Thakor, 2007), not to be confused with the stock market liquidity risk introduced by Pastor and Stambaugh (2003).

that initially affect only a few institutions spread to the rest of the financial sector and then infect the general economy. One channel of this contagion is the overlapping claims that the banks have on one another through the interbank market. Even though contagious liquidity shocks can be alleviated in several ways,[12] Rochet and Vives (2004) argue that liquidity problems may provoke the insolvency of an initially solvent bank. As a result, restating banks may contribute more to systemic risk because the liquidity shock following the restatement can dissipate to other banks. In addition, the restatement event itself can also have a negative effect on the interbank market and the banking industry as such. Specifically, Gleason et al. (2008) show that restatements are contagious as they create uncertainty about the financial reporting quality not only for the actual restating firm, but also for its industry peers. This evidence shows that a restatement in one bank may have negative externalities to other banks as well. In a related vein, restatements can also have negative effects on the interbank market since they fray existing contracting relationships as documented by Karpoff et al. (2008). This is especially perilous for banks that rely heavily on the interbank market (Gup and Kolari, 2005).

Second, the restatement can also have a direct output effect since previous research shows that liquidity shocks and bank-specific funding constraints can be passed directly on to customers in the form of reduced loan supply. Khwaja and Mian (2008) document that banks pass on liquidity shocks to firms and Cornett et al. (2011) find that banks with more illiquid assets on their balance sheet reduce lending. Similarly, Holmstrom and Tirole (1997) suggest that banks' capital constraints can affect loan supply and Raunig et al. (2014) show that increased uncertainty can lead to reduced supply of bank loans. These mechanisms, liquidity shocks, capital constraints, and uncertainty, are all possible outcomes of restatements and therefore it is likely that restatements can have severe effects on bank loan supply. Likewise, banks may pass on higher funding costs to customers in the form of higher loan prices as documented in the "credit crunch"-literature (Berger and Udell (1994) and Kishan and Opiela (2000), among others). The increased cost of equity capital increases

[12]Three mechanisms are designed to limit the possible externalities of individual bank liquidity problems, namely the lender of last resort, deposit insurance, and reserve requirements (Freixas and Rochet, 2008, p. 274).

bank funding costs too. Recall from Section 3.2.2 that even though the proportionate part of cost of equity in the overall cost of capital is relatively small because banks are highly levered, changes in the cost of equity are still important in determining the loan price (Gup and Kolari, 2005). In turn, the loan supply can have critical spillover effects on the economy as a whole. For instance, Bernanke (1983) describes how problems in the financial system have output effect on the real economy. In particular, it is suggested that (mainly small) bank-dependent firms cannot substitute bank loans with other sources of financing and thus experience financial constraints if the financial system is in distress. Berger et al. (2001) also examine how bank distress influences the likelihood of lending and they note that stakeholders such as regulators, depositors, investors, and risk-averse managers may require distressed institutions to reduce their risk profile in general and their risk from lending in particular.[13] A restatement and possible higher subsequent capital cost are certainly signs of a bank in distress, which in turn may have output effect on loan growth[14]. If this is the case, a distressed, restating bank is riskier to the financial system because it leads to more firms experiencing financial constraints. Therefore, if the increase in capital costs following a restatement is passed on to the overall economy as decreased lending activity, this is likely to increase systemic risk. It particularly follows that restating banks transfer additional risk to the overall financial system via their negative effect on output.[15]

These two consequences of restatements, the contagion to other banks and the effect on loan supply, are predicted to have systemic implications, hence contributing to the systemic risk. This translates into the third and final hypothesis:

H3: Banks subject to restatements contribute more to systemic risk than other banks

[13]The effect of bank distress on loan output cannot be documented in all studies (see, e.g., Driscoll (2004) and Ongena et al. (2003).

[14]On the spillover effect from cost of equity to possible new loan, Greenbaum and Thakor (2007, p. 235) note: "Consider a bank that has the necessary deposits but would need to raise additional capital to satisfy a loan request. The additional cost of raising this capital, relative to that of raising money from other sources, will then be a charge against the bank's profit from making the loan. If this additional cost is sufficiently high, the bank may prefer to invest the available deposits in marketable securities rather than loans."

[15]As noted by, for instance, Paravisini (2008), lending opportunities foregone by distressed banks may be arbitraged away by other unconstrained banks. Even if this is the case, each restating bank may still have influence on the risk of the financial system because not all firms can easily switch bank due to for instance low repayment ability or high switching costs.

3.3 Research Design

3.3.1 Sample Selection

The sample is a quarterly panel data set of 256 banks and bank holding companies with SIC codes 6000-6200 that have restated from January 2000 to August 2014. The banks are identified through Audit Analytics' Non-Reliance Database and have been found based on Form 8-K and 8-K/A filings under the title "4.02: Non-Reliance on Previously Issued Financial Statements or a Related Audit Report or Completed Interim Review". The 256 restatement banks have together restated 369 times which means that each bank has an average of 1.4 restatement events. These restating banks are pooled with 1,138 banks within the same SIC code range such that the sample comprises a total of 1,394 banks. Table 3.1, Panel A shows the sample selection process.

Table 3.1: Sample Selection

	Restatement Firms	Restatement Events
Restatement firms with SIC codes 6000-6200 identified through AA	590	876
Less firms without Compustat Bank information	334	
Sample	256	369

Audit Analytics contains detailed information on which year(s) each firm has restated, the date on which the restatement became publicly known, and the reason for the restatement. The financial statement information is taken from Compustat Bank.[16] Finally, all data values have been winsorized at the 1st and the 99th percentile, respectively.

[16]I match each bank in Audit Analytics to its financial statement information in Compustat by the company name as follows: A fuzzy merge is performed using the SAS function COMPGED(), which returns the dissimilarity between two names. To be certain that the firm from Compustat is in fact identical to the restating firm from Audit Analytics, the match is accepted if the distance between the two strings is less than 100. A COMPGED score of 0 indicates a perfect match (e.g., BIODEL INC = BIODEL INC), whereas a COMPGED score of 90 indicates a nearly perfect match (e.g., RVB HOLDINGS LTD = R.V.B. HOLDING, LTD.) as suggested by WRDS.

3.3.2 Descriptive Statistics

Table 3.2 shows the distribution of restatements across years and the reason for restating as disclosed by the firm for the final sample of 369 banks.[17] Panel A displays the frequency of restatements for banks and shows that there was a steadily increasing trend in the 2000s which peaked in 2010 with 38 restatements (10% of the restatements in the sample). The trend declines after this peak and it seems as if the recent number of restatements is back at the same level as in the beginning of the sample period. The frequency trend for banks resembles those for industrial firms, as shown in e.g. Scholz (2008). The increase and peak in the mid-2000s could be caused by a change in SEC's identification procedure,[18] the downturn in the American economy in the beginning of the new millennium, and the Sarbanes-Oxley Act (Scholz, 2008). The decline in the end of the period could be attributable to the boom in the world economy since it is well-known that firms with solid performance are less likely to restate (Scholz, 2008). Compared to other papers using slightly older data than this study (Scholz (2008) uses data from 1997-2006, Dechow et al. (2011) from 1982-2005), it is clear that the trend of a steadily growing number of restatements has been broken. GAO (2013) also documents this recent decline for industrial firms.

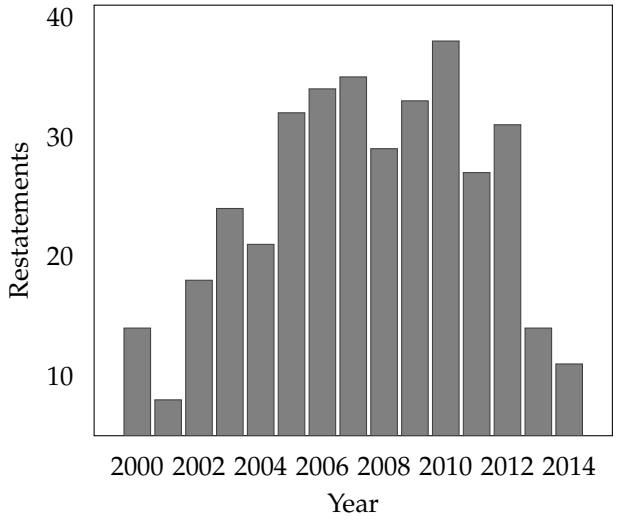
Panel B shows the most prevailing reasons for restatements in the sample (see Appendix C for more detailed explanations). Most restatements in the sample are categorized as issues with either reclassification or disclosure. The main driver of this category is errors or irregularities in loans and accounts receivables, with more than 20% of all restatements being (partly) attributable to this category. These restatements typically lead to revisions of balance sheet and income statement items. This may be explained by the fact that errors and irregularities in accounting for bad loans and loans receivables are likely to be prevalent in the sample, which is supported by Kreutzfeldt and Wallace (1986) who note that banks in particular have issues with valuation for allowance of bad debts. The rest of the restatements in the category reclassification and disclosure typically do not have income statement

[17] The firm can disclose the cause of the restatement through several different channels, including for instance press releases or Forms 8 or 10K.

[18] According to Scholz (2008), the quite dramatic peak in 2005-2006 is partly attributable to the fact that in early 2005 the SEC clarified that errors in lease accounting should lead to accounting restatements.

Table 3.2: Details on Restatements

Panel A: Distribution of Restatement Events



Panel B: Disclosed Reason for Restating

Reclassification and disclosure	36.3%
Core expenses	17.7%
Non-core expenses	13.5%
Underlying events	12.9%
Classification	11.1%
Other	5.6%
Revenue recognition	2.9%

Panel A depicts the distribution of the 369 restatement events shared among 256 banks between 2000 and 2014. Panel B depicts the causes of restatements as a percentage of the 369 restatements in the sample as disclosed in Audit Analytics. Elaboration on each cause is given in Appendix C. Note that one restatement can have several reasons.

effect. The next two categories, core and non-core expenses, include corrections of ongoing and non-recurring activities, respectively. In the latter category, errors in accounting for financial instruments result are the main driver, which is intuitive given banks' large holding of financial instruments. Comparing with previous studies such as Scholz (2008), Palmrose et al. (2004), and Dechow et al. (2011), it is also clear that the reasons for restating in banks are very different from those that apply for industrial firms. For instance, some of the industrial firms do restate receivables items, but not in the scale documented for banks. In addition, the three mentioned studies all report that most restatements in industrial firms

are caused by revenue recognition issues, which is clearly not the case in banks, with only 2.9% of the bank restatements being caused by this category. Finally, the banks in the sample disclosed almost 40 different categories, which indicate that restatements in banks are quite heterogeneous.

Table 3.3: Descriptive Statistics

Variable	Restating Banks	Non-restating Banks	Difference
Beta	0.8687	0.7329	0.1358***
Capital	0.0196	0.0268	-0.0072***
ChargeOffs	-0.0019	-0.0015	0.0005***
DiscLLP	0.0012	0.0009	0.0003***
DiscSGL	0.0003	0.0003	0.00003**
ΔCoVaR	-0.0754	-0.0751	-0.00025
ΔLoans	141.2	188.8	-47.68
Deposits	1.1976	1.2177	-0.0201***
Leverage	0.0954	0.0972	-0.0018*
Liquidity	0.0036	0.0055	0.0019***
MarketSize	6.0280	5.9278	0.1003***
Mismatch	-0.0272	-0.0162	-0.0111***
NIM	3.7502	3.6782	0.0719***
OJ	0.0661	0.0530	0.0131***
PEG_BotosanPumlee	0.0543	0.0438	0.0105***
PEG_Easton	0.0593	0.0454	0.0139***
ROA	0.0014	0.0018	-0.0004***
ROE	-0.0008	0.0151	-0.0159**
Total assets	20,224	30,079	-9,855***
VaR	-0.9487	-0.9432	-0.0055

The table compares means for all firm-quarters for restating and non-restating banks, respectively. Variable description in Table 3.4. All data values have been winsorized at the 1st and the 99th percentile, respectively.
*, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively.

Descriptive statistics of the variables used (see Table 3.4) are depicted in Table 3.3. General observations on the difference between banks that restate and those that do not include that the former are significantly smaller measured with total assets and less profitable than the latter, measured with both ROA and ROE. This is not the case when focusing solely on the bank's net interest margin, though.

Focusing on the variables used to answer Hypothesis 1, it is clear that restating banks charge off more uncollectible loans and have significantly lower capital ratios than other banks. Contrary to our prediction, restating banks do in fact have lower levels of leverage

than other banks, but in line with the prediction they do have fewer deposits. Finally, restating banks have higher levels of discretionary loan loss provisions and security gains and losses, respectively, indicating that these banks may have managed earnings in connection with a restatement.

Hypotheses 2a and 2b predict that banks that restate have higher cost of equity capital and lower balance sheet liquidity, respectively. The univariate statistics in Table 3.3 seem to support these hypotheses. In particular, all three measures of cost of equity capital, OJ, PEG_BotosanPlumlee, and PEG_Easton, are significantly higher for restating banks than for non-restating banks. In addition, balance sheet liquidity is significantly lower for restating banks, indicating that banks that restate have higher capital costs and more liquidity constraints.

Finally, when we look at the variables used to examine how restating banks contribute to systemic risk in Hypothesis 3, it is clear that beta of restating banks is higher, indicating that their stocks are more volatile. The average beta for both groups is below 1, though. There is no significant difference between the ΔCoVaR for the two groups, even though it is slightly more negative for banks that restate, as anticipated.

Table 3.4: Estimation of Variables

Variable	Estimation	Source
3MTBill	Δ3 month Treasury bill	Bloomberg
beta	β from regression of bank *i's* return on S&P 500 Index (using monthly data)	CRSP
Capital	Tier 1+2 capital	Compustat Bank
ChargeOffs	Charge offs/Total loans	Compustat Bank
CoVaR	Equation 3.12	
CreditSpread	BAA bond rate-10 year Treasury Bill	Bloomberg
Deposits	Total deposits/Total loans	Compustat Bank
DiscLLP	Equation 3.1	Compustat Bank
DiscSGL	Equation 3.2	Compustat Bank
DPS	Cash dividends/Shares outstanding	Compustat Bank
EBSGL	Income before extraordinary items	Compustat Bank
EPS	Mean analysts' EPS forecast	I/B/E/S
Leverage	Long term debt/Total assets	Compustat Bank
LiqSpread	GC Repo-3 month Treasury bill	Bloomberg

Continues on next page

– continued from previous page

Variable	Estimation	Source
Liquidity	Marketable securities scaled by total assets	Compustat Bank
LLP	Loan loss provision/Total assets	Compustat Bank
LLR	Loan loss reserve/Total assets	Compustat Bank
Loans	Total loans	Compustat Bank
Size	Ln(Total assets)	Compustat Bank
MarketSize	Ln(Stock price*Shares outstanding)	Compustat Bank
Mismatch	(Current liabilities-Cash)/Total liabilities	Compustat Bank
MRet	Equal-weighted equity market return	CRSP
MVA	Total assets*Market-to-book	Compustat
NIM	Net interest margin	Compustat Bank
NPL	Δ(Non-performing assets/Total assets)	Compustat Bank
OJ	Equation 3.6a	Compustat Bank, CRSP, I/B/E/S
P	Closing stock price	CRSP
PEG_BotosanPlumlee	Equation 3.5	CRSP, I/B/E/S
PEG_Easton	Equation 3.4	CRSP, I/B/E/S
RealEstateRet	Equal-weighted real estate (SIC 6500-6600) return - Equal-weighted equity market return	CRSP Daily
RestatementActivity	Number of restatements/number of firms per state per year	Audit Analytics
Restater	Indicator variable: 1 if restatement quarter, 0 otherwise	
Restatbank	Indicator variable: 1 if the firm restated during the entire sample period, 0 otherwise	
Risk free rate	1 month Treasury bill	WRDS
ROA	Income/Total assets	Compustat Bank
ROE	Income/Total equity	Compustat Bank
VaR	Equation 3.11	Bloomberg, Compustat Bank, CRSP
VIX	Chicago Board Options Exchange (CBOE) Volatility Index	Bloomberg
YieldSlope	10 year Treasury bill-3 month Treasury bill	Bloomberg

Since banks are often excluded from restatement studies, we know little about the frequency and severity of the restatements in this particular industry. Table 3.5 attempts to shed light on this gap by comparing the restatements in the banking industry to all

other restatements. Panel A shows the annual percentages of restatements of all firms, divided between banks and industrial firms, respectively.[19] As also identified in Table Table 3.2, the trend for both groups is similar, namely a steady increase in the early 2000s that breaks around 2006-2007.[20] Across all years, it is also evident that fewer banks restate compared to the population than non-financial firms. This is consistent with early findings by Kreutzfeldt and Wallace (1986) and Maletta and Wright (1996) and indicates that the tight regulation of banks does prevent errors and irregularities. Panel B of Table 3.5 tabulates original and restated values of specific accounting items for both banks and non-financial firms. As expected, both net income and revenue drop slightly when restated, which is in good keeping with the conventional wisdom that earnings management is generally income increasing and therefore restatements are generally income decreasing. Similarly, earnings per share (EPS) drop by 2% for banks and by 1.2% for industrial firms. As also expected, revenue has on average been overstated such that the restatements decrease this item. This effect is more pronounced for banks. Depreciation and amortization are also dramatically understated for banks, which is not the case for industrial firms. Recall from Table 3.2 that a large part of the restatements were caused by loans and accounts receivables. However, it seems as if the magnitude of these restatements is not particularly large since Table 3.5 reveals that, for instance, the items provision for loan losses and accounts receivables only change marginally.[21] Overall, the same pattern emerges for banks and non-financial firms, although it seems as if the restatement magnitudes of the former are slightly larger.

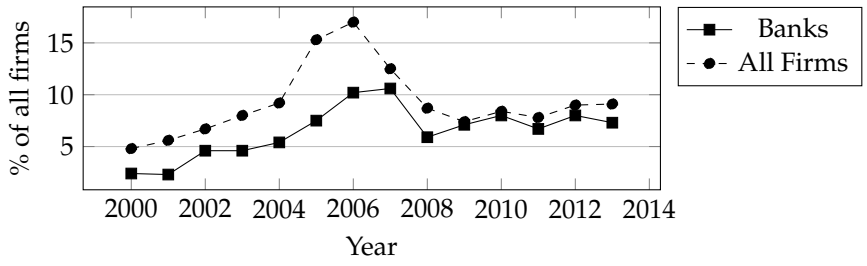
[19]While Panel 1 of Table 3.5 shows all restatements before matching on name and financial data from Compustat, Table 3.2 shows the final sample of the 369 banks.

[20]The change in the handling of errors in lease accounting described above is likely to impact industrial firms more than financial firms.

[21]The data to Panel B, Table 3.5 is from the Compustat Unrestated Quarterly Database which only has very few bank specific data items. It is therefore not possible to make a similar comparison of original and restated values on bank specific items.

Table 3.5: Comparison of Restatements

Panel A: Distribution of Restatement Events Across Years



Panel B: Comparison of Original and Restated Items

	Banks		Industrial Firms	
Item	Restated	Original	Restated	Original
Accounts payable	2680.60	2697.34	185.66	184.54
Accounts receivable	4832.02	4839.38	348.59	347.60
Depreciation and amortization	204.12	168.45	95.26	94.68
EPS incl. extraordinary items	1.50	1.53	2.55	2.58
Interest expense	13347.85	12940.73	543.64	512.00
Interest income	1673.77	1681.71	-	-
Loan loss provision	30.23	30.29	-	-
Loan loss reserve	202.96	202.96	-	
Long-term debt	7037.23	7032.13	591.50	591.84
Net charge offs	-92.75	-92.94	-	-
Net income	202.66	204.00	104.20	105.36
Net interest margin	14.81	14.81	-	-
Non-performing assets	105.38	105.38	-	-
Revenue	2060.62	2194.05	1762.22	1785.81
Short-term debt	6605.40	6609.96	116.88	116.86
Stockholders' equity	10933.00	10918.15	3287.58	3304.87
Total assets	11615.19	11543.39	2554.11	2549.86
Total liabilities	30492.79	30538.05	2037.70	2066.76

Panel A depicts all restatement events identified through Audit Analytics as a percentage of all firms identified through Compustat, divided among banks (SIC codes 6000-6200) and industrial firms, respectively, before matching on name and accounting information. That is, all available Item 4.02 restatements are considered.
Panel B shows restated and original values of accounting items, taken from Compustat Unrestated Quarterly Database.

3.4 Determinants of Restatements

3.4.1 Methodology

The first hypothesis examines the causes of restatements in banks. Three classes of explanatory variables are considered to determine restatements in banks: Bank characteristics and performance, financial robustness, and accounting quality. All variables are defined in Table 3.4. For the quality variables, I follow Beatty et al. (2002) and Cornett et al. (2009) in estimating the discretionary portion of loan loss provisions and security gains and losses, respectively. Specifically, I estimate the following two regressions, with standard errors clustered by year:

$$LLP_{i,t} = \alpha_0 + \alpha_1 Size_{i,t} + \alpha_2 \Delta NPL_{i,t} + \alpha_3 LLR_{i,t} + \alpha_4 Loans_{i,t} + \mu_{i,t} \tag{3.1}$$

Where LLP is provision for loan losses scaled by total assets; $Size$ is the natural logarithm of total assets; ΔNPL is the quarterly change in non-performing assets scaled by total assets; LLR is reserve for loan losses scaled by total assets; and $Loans$ is total loans. The absolute values of the residuals from Equation 3.1 are the measures of $DiscLLP$.

$$RSGL_{i,t} = \alpha_0 + \alpha_1 Size_{i,t} + \alpha_2 EBSGL_{i,t} + \alpha_3 Capital_{i,t} + \mu_{i,t} \tag{3.2}$$

Where $RSGL$ is realized gains or losses on investment securities scaled by total assets; $EBSGL$ is income before extraordinary items scaled by total assets; and $Capital$ is Tier 1 and 2 capital. Again, the absolute values of the residuals from Equation 3.2 are the measures of $DiscSGL$.

The model of determinants of restatements in banks is estimated as the following logistic regression with standard errors clustered by bank and year, comparing restatement bank-quarters to all other bank-quarters in Compustat Bank:

$$\begin{aligned} P(Restater)_{i,t} =& \alpha_0 + \alpha_1 ChargeOffs_{i,t} + \alpha_2 VaR_{i,t} + \alpha_3 Size_{i,t} \\ &+ \alpha_4 ROE_{i,t} + \alpha_5 NIM_{i,t} + \alpha_6 \Delta Loans_{i,t} \\ &+ \alpha_7 Capital_{i,t} + \alpha_8 Leverage_{i,t} + \alpha_9 Deposits_{i,t} \\ &+ \alpha_{10} DiscLLP_{i,t} + \alpha_{11} DiscSGL_{i,t} + \mu_{i,t} \end{aligned} \tag{3.3}$$

Where *Restater* is an indicator variable equaling 1 if the bank restated in quarter t, 0 otherwise; $ChargeOffs$ is loans charge-offs scaled by total loans; VaR is the bank's value-at-risk with respect to weekly changes in market-valued total bank assets (see Equation 3.11); ROE is net income scaled by equity; NIM is net interest margin; $\Delta Loans$ is the quarterly change in total loans; *Leverage* is long term debt scaled by total assets; *Deposits* is total deposits scaled by total loans; *DiscLLP* is the discretionary portion of loan loss provisions (see Equation 3.1); and *DiscSGL* is the discretionary portion of security gains and losses (see Equation 3.2), and other variables are as previously defined.

H1 predicts that banks with poor performance, financial robustness, and accounting quality are associated with higher likelihood of restating.

3.4.2 Results

Table 3.6 tabulates the results from Equation 3.3 on the determinants of restatements in banks. Recall that H1 predicts that banks with poor performance, financial robustness, and accounting quality are more likely to restate. The first thing to be noticed is that the explanatory power of the model is modest, predicting correctly about 58% of the restatement quarters. The predictive ability of this model is therefore slightly less powerful than those presented in previous research; for instance, the model of Dechow et al. (2011) correctly predicts 63-64% of the misstatements in their sample and the model of Ettredge et al. (2010) has an explanatory power around 2-3%. One reason for this is the fact that the restatements are highly heterogeneous, as shown in Section 3.3.2. Altogether it is clearly quite complex to predict restatements and many of the restatements are still left unexplained.

As expected, banks with solid performance measured with ROE and robust capital levels are less likely to restate.[22] Or put differently, banks with poor performance and low capital ratios are more likely to restate, indicating that banks may attempt to conceal deteriorating performance and financial stability by managing earnings, which in turn increases the likelihood of restating. This interpretation is supported by the fact that banks with high

[22]The results hold for a different specification of performance, namely ROA instead of ROE.

Table 3.6: Determinants of Restatements

Variable	Prediction	Estimate	Std. Error	Wald χ^2
Intercept		-2.8012	1.1881	5.5587**
ChargeOffs	+	17.5681	14.5621	1.4555
VaR	-	1.1067	0.5030	4.0278**
Size	?	-0.1512	0.1112	1.8479
ROE	-	-0.2532	0.1044	5.8851**
NIM	-	0.0064	0.1403	0.0021
Δ Loans	+	-0.00003	0.000042	0.5224
Capital	-	-22.7352	10.8117	4.4219**
Leverage	+	0.4877	1.1523	0.1792
Deposits	+	0.0361	0.2223	0.0263
DiscLLP	+	92.3590	29.2561	9.9661***
DiscSGL	+	31.3291	26.4031	1.4079
N				13,381
Percent concordant				57.7%
Max-rescaled R^2				2.79%

The table tabulates the results of Equation 3.3, answering H1 that bank characteristics, performance, robustness, and accounting quality determine the likelihood of restating. Variables are defined in Table 3.4.
Standard errors are clustered by year.
*, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively.

levels of discretionary loan loss provisions are more likely to restate.[23] It is not surprising that the level of required capital as well as discretionary loan loss provisions predict restatements since capital and loan loss provisions are mechanically linked. The findings in Table 3.6 hence suggest a mechanism where banks decrease the estimations of future loan losses when approaching the minimum of required capital, thereby boosting net income and capital.[24] There is no evidence that banks sell securities opportunistically before a restatement,

[23]Recall that *DiscLLP* distinguish the part of loan loss provisions that is explained by accounting and loan fundamentals (non-discretionary portion) from the part that is not (discretionary portion). This is unrelated to the sheer magnitude of loan loss provisions, which only shows very little difference between original and restated values in Table 3.5b. In other words, banks can easily manage provisions without actually restating them.

[24]Recognition of expected loan losses occurs through loan loss provisions; increases in loan loss provisions reduce both net income and regulatory capital (Gebhardt and Novotny-Farkas, 2011, p. 293-294). Warfield and Linsmeier (1992) argue that loan loss provisions are a better earnings management device than security gains and losses (which are insignificant in explaining bank restatements), since the first is larger in magnitude, contains a larger discretionary component, and a change in loan loss provisions has no direct effect on future cash flows to it, whereas a sale of investment securities may result in foregone future investments returns.

as the coefficient on *DiscSGL* is statistically insignificant, although it move as expected.

Surprisingly, the value-at-risk has a positive impact on restating; recall that VaR is defined such that more negative values indicate higher risk and the interpretation of the sign is therefore that higher risk levels are associated with lower restatement probabilities.

Although not significant, the coefficient on *Size* is negatively related to restating, indicating that smaller firms are more likely to restate as suggested by Valdivia (2008) and Scholz (2008). Un-tabulated robustness checks reveal that another measure of risk, namely return volatility, is positively associated with restating, although insignificantly so.

3.5 Restatement Effect on Cost of Capital and Balance Sheet Liquidity

3.5.1 Methodology

I now turn to the consequences of restatements. Recall from Section 3.2.2 that H2a predicts that banks are penalized with higher cost of equity following the lower information quality of a restatement. To answer this hypothesis I estimate the ex ante cost of capital using three different models defined in previous literature to alleviate concerns on measurement errors and then I collapse them into one, average measure. The basic idea in these approaches is to estimate the cost of equity capital as the internal rate of return that equates the current stock price and expected earnings derived from analysts' forecasts (Francis et al., 2005), and all three are based on the abnormal earnings growth model described in Ohlson and Juettner-Nauroth (2005).[25]

The first two measures are two versions of the price-earnings growth (PEG) ratio, the price-earnings ratio divided by the short-term earnings growth. The PEG ratio is a tool to compare the valuation of stocks where small (large) values indicate that the stock is

[25]Analysts' forecasts are obtained from I/B/E/S. To link forecasts from I/B/E/S to stock prices in CRSP I merge the two databases based on primary identifiers (IBES TICKER and CRSP PERMNO) as suggested by WRDS. To obtain financial statement information the firms are matched (CRSP PERMNO and Compustat GVKEY) with Compustat Bank via the CRSP/Compustat Merged Database. All three models require earnings forecasts that are positive and increasing.

undervalued (overvalued), and it implicitly compares the expected rates of returns. Easton (2004) isolates the bank-specific cost of equity capital as the square root of the inverse PEG ratio:

$$PEG\_Easton = \sqrt{\frac{EPS_2 - EPS_1}{P_0}} \tag{3.4}$$

Where EPS_1 and EPS_2 are the one- and two-quarter ahead mean analysts earnings forecast per share, respectively; and P is current stock price.

Using a longer time horizon, Botosan and Plumlee (2005) estimates cost of equity capital as:

$$PEG\_BotosonPlumlee = \sqrt{\frac{EPS_5 - EPS_4}{P_0}} \tag{3.5}$$

Where EPS_4 and EPS_5 are the four- and five-quarter ahead mean analysts earnings forecast per share, respectively; and other variables are as previously defined.

The third and final measure of cost of equity capital is presented by Ohlson and Juettner-Nauroth (2005), in which cost of equity capital is a function of the forward EPS to price ratio and two measures of growth (short- and long-term) in expected EPS:

$$OJ = A + \sqrt{A^2 + \frac{EPS_1}{P_0}(g_2 - (\gamma - 1))} \tag{3.6a}$$

Where

$$A = (\frac{1}{2})((\gamma - 1) + DPS_1/P_0) \tag{3.6b}$$

$$g_2 = (EPS_2 - EPS_1)/EPS_1 \tag{3.6c}$$

$$(\gamma - 1) = r_f - 2.5\% \tag{3.6d}$$

DPS is the dividend per share for the following quarter, assumed to continue at the same level as in the current quarter; r_f is the risk-free rate; the constant 2.5% controls for inflation (Gode and Partha, 2003); and other variables are as previously defined.

The measure of cost of equity capital, COEC, is then the average of the three different models, PEG_Easton, PEG_BotosanPlumlee, and OJ.[26] COEC is the dependent variable in

[26]The approach of collapsing different cost of capital measures into one, average measure is consistent with prior research, such as Hail and Leuz (2006) and Callahan et al. (2012). The three measures are highly correlated with each other, as expected. Interestingly, *PEG_Easton* is more correlated with *OJ* than with *PEG_BotosanPlumlee*, indicating that it is the time-horizon of analysts' forecast rather than the specific model that determines the magnitude of the estimated ex ante cost of equity capital.

Equation 3.7 which seeks to explain if restating banks have higher cost of equity capital than other banks. Control variables are adapted from Baginski and Rakow (2012), Callahan et al. (2012), and Baker and Wurgler (2013), and the following regression is estimated with standard errors clustered by bank and year:

$$\begin{aligned} COEC_{i,t} =& \alpha_0 + \alpha_1 Restater_{i,t-1} + \alpha_2 MarketSize_{i,t-1} \\ &+ \alpha_3 beta_{i,t-1} + \alpha_4 Leverage_{i,t-1} + \alpha_5 Capital_{i,t-1} + \mu_{i,t} \end{aligned} \tag{3.7}$$

COEC is the average of the three ex ante cost of capital measures PEG_Easton (Equation 3.4), PEG_BotosanPlumlee (Equation 3.5), and OJ (Equation 3.6a); *MarketSize* is the natural logarithm of market value of equity; *beta* is β from a regression of bank *i's* return on the market return (S&P 500 Index) using monthly data; and other variables are as previously defined.

The variable of interest is the coefficient on α_1, where Hypothesis 2a predicts a positive coefficient such that a restatement is associated with higher capital costs.

As argued in Section 3.2.2, Hypothesis 2b predicts that restating banks have lower balance sheet liquidity because the lower information quality surrounding a restatement may lead to credit constraints. Kashyap and Stein (2000) and Loutskina (2011) are followed in calculating balance sheet liquidity. Cash is not included in the measure of liquidity since Loutskina (2011) argues that a large portion of cash in vaults is stored for purposes of reserve requirements.[27] As control variables I include maturity mismatch (see, e.g., Adrian and Brunnermeier (2009)) to control for the reliance on short-term funding sources and total loans because Cornett et al. (2011) find that banks that hold more loans tend to increase holdings of liquid assets. In addition I include bank-specific controls from Aspachs et al. (2005) and the following regression is estimated with standard errors clustered by bank and year:

$$\begin{aligned} Liquidity_{i,t} =& \alpha_0 + \alpha_1 Restater_{i,t-1} + \alpha_2 Mismatch_{i,t-1} + \alpha_3 Size_{i,t-1} \\ &+ \alpha_4 Loans_{i,t-1} + \alpha_5 ROA_{i,t-1} \alpha_6 NIM_{i,t-1} + \mu_{i,t} \end{aligned} \tag{3.8}$$

[27] In particular, the authors note that a large part of a bank's cash is tied for regulatory liquidity requirements and is therefore in fact not available for use. This view is supported by Tirole (2011).

Where *Liquidity* is marketable securities scaled by total assets; *Mismatch* is current liabilities less cash, scaled by total liabilities; *ROA* is net income scaled by total assets; and other variables are as previously defined.

The variable of interest is the coefficient on α_1, where Hypothesis 2b predicts a negative coefficient, such that a restatement is associated with less balance sheet liquidity.

3.5.2 Results

The second set of hypotheses predicts that banks subject to restatements are penalized with subsequent higher cost of equity (Hypothesis 2a) and lower balance sheet liquidity (Hypothesis 2b).

Table 3.7, Panel A shows the results of Hypothesis 2a. The sample size drops dramatically because only half of the firms in the sample have analysts' forecast data. Recall that a positive coefficient is predicted on *Restater*, indicating that restatements are associated with higher cost of capital. A positive and statistically significant coefficient is indeed observed, showing that banks that restate are penalized with higher cost of equity capital subsequently. The effect is economically significant since a restatement leads to a cost of equity that is 1.34%-point larger than the banks that do not restate. Hypothesis 2a can hence be maintained. As expected, more risky banks (measured with beta) have higher capital costs. Interestingly, large banks measured with market value of equity (*MarketSize*) have lower cost of equity capital, while large banks measured with total assets (*Size*) in fact have higher cost of capital. Financial theory predicts a negative association between size and cost of equity capital, because large firms are more stable, but that only holds for *MarketSize*. It may simply be that market value of equity is a better proxy for size than the book value of assets. Untabulated results show that while all three measures of cost of equity capital are positively associated, the significance is mainly driven by *PEG_Easton* and *OJ*. As described in Footnote 26, the time-horizon of analysts' forecast seem to play a bigger role in estimating cost of equity than the specific model. Recall that *PEG_Easton* and *OJ* use one- and two quarter ahead forecasts, while *PEG_BotosanPlumlee* use four- and five quarter ahead forecasts. Note also that that the measure of cost of capital is related as expected

Table 3.7: Restatement Effect on Cost of Capital and Balance Sheet Liquidity

Panel A: Restatement Effect on Cost of Equity Capital			
Dependent Variable: COEC			
Variable	Estimate	Std. Error	t-stat
Intercept	-0.1097	0.0211	-5.2055***
Restater	0.0134	0.0048	2.8094***
MarketSize	-0.0743	0.0117	-6.3537***
beta	0.0102	0.0054	1.8844*
Leverage	-0.0310	0.0240	-1.2911
Size	0.0744	0.0111	6.6847***
Capital	-0.0416	0.1357	-0.3066
N			607
R^2			19.44%
Panel B: Restatement Effect on Balance Sheet Liquidity			
Dependent Variable: Liquidity			
Variable	Estimate	Std. Error	t-stat
Intercept	-0.0234	0.0060	-3.8846***
Restater	-0.0020	0.0011	-1.8084*
Mismatch	0.0038	0.0102	0.3765
Size	0.0060	0.0011	5.3640***
Loans	-0.0095	0.0069	-1.3844
ROA	0.0107	0.0555	0.1930
NIM	-0.0031	0.0011	-2.6484***
N			1,050
R^2			27.19%

Panel A tabulates the results of Equation 3.7, answering H2a that restatements in banks are associated with higher cost of equity capital. Panel B tabulates results of Equation 3.8, answering H2b that restatements in banks are associated with lower balance sheet liquidity. Variables are defined in Table 3.4.
Standard errors are clustered by firm and year. To obtain unbiased estimates in finite samples, the clustered standard errors are adjusted by $(N-1)/(N-P)G/(G-1)$, where N is the sample size, P is the number of independent variables, and G is the number of clusters (Petersen, 2009; Ma, 2014).
*, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively.

to commonly known risk factors identified in previous research (Fama and French, 1992, 1993). In particular, cost of equity is negatively related to market value of firm size and positively related to beta. This reassures that the average of the three different cost of equity measures based on analysts' forecasts indeed captures the underlying cost of equity capital. Equation 3.7 was also estimated with a measure of cost of equity based on the capital asset pricing model adapted from Da et al. (2012). *Restater* is still positively related to cost of equity capital, although barely significant.

Panel B of Table 3.7 shows the results of Hypothesis 2b which predicts a negative coefficient on *Restater*, indicating that banks that restate experience subsequent funding constraints measured by balance sheet illiquidity. The hypothesis does seem to hold since a negative and significant (p-value 6.5%) coefficient is observed on *Restater*.[28] The regression also reveals that large banks have higher levels of liquidity, whereas the opposite is the case for banks with high net interest margins (NIM). The latter may be caused by the fact that excess liquidity is expensive for banks since cash is tied up rather than working to create profit for the bank. Although insignificant, the coefficient on *Loans* indicate that banks with high portions of loans outstanding have less balance sheet liquidity, indicating that they lend out all available cash rather than storing it.

3.6 Contribution to Systemic Risk

3.6.1 Methodology

The final hypothesis, H3, predicts that restating banks contribute more to systemic risk than other banks because the restatement shock is contagious to the interbank market and because the restatement can have a negative effect on loan supply, thereby affecting the entire economy. To test this hypothesis I use the conditional value-at-risk measure, CoVaR, introduced by Adrian and Brunnermeier (2009). Conceptually, CoVaR analyzes how risk is

[28] In an additional robustness test, cash was included in the liquidity measure. The effect of *Restater* on liquidity is still negative, but in fact the significance disappears. This indicates that cash in banks is in fact tied because of liquidity requirements as described in Footnote 27, and so a restatement even has no influence on the level of stored cash.

transferred from the individual financial institution to the overall financial system, hence how the risk of the system is conditional on the risk of each institution (Bernal et al., 2014). In other words, it examines the systemicity of each bank. CoVaR is based on the widely used risk measure value-at-risk (VaR) and has previously been used by, for instance, Bushman et al. (2013), who find that banks with higher perceived competition contribute more to systemic risk. Bernal et al. (2014) uses the CoVaR measure to examine how distress in different financial sectors spills over on the whole system. The authors find that the banking industry has a smaller contribution to systemic risk than insurance companies in the U.S, while the opposite is the case in the Eurozone.

I follow Adrian and Brunnermeier (2009) and Bushman et al. (2013) in estimating VaR and CoVaR, respectively. To estimate each bank's contribution to systemic risk, I first calculate the value-at-risk of each bank. Recall that value-at-risk is the maximum loss for a given time horizon that will not be exceeded with a confidence level (1-α) (Bernal et al., 2014). Note also that VaR(α) defined for the confidence level (1-α) corresponds to the α-quantile of the expected distribution of returns over the given time horizon. This link is exploited when estimating CoVaR in quantile regressions. Specifically, if X^i is the percentage change in bank $i's$ total assets and q is a given probability, VaR is defined as (Girardi and Tolga Ergun, 2013):

$$Probability(X^i \leq VaR_q^i) = q$$

Quantile regressions are used to estimate time varying VaR. If q is 0.01, for instance, $VaR_{0.01}^i$ is the 1^{st} quantile of the distribution of total bank assets. Adrian and Brunnermeier (2009) then define CoVaR as the VaR of the financial system conditional on the VaR of bank i being in financial distress, i.e., its return being at its VaR:

$$CoVaR_q^{System|X^i=VaR_q^i} = VaR_q^{System}|VaR_q^i$$

As a starting point, I first calculate the weekly percentage change in market-valued total assets for each bank i (Equation 3.9a) and the system (Equation 3.9b):

$$X_t^i = \frac{MVA_t - MVA_{t-1}}{MVA_{t-1}} \tag{3.9a}$$

$$X_t^{System} = \frac{MVA_t - MVA_{t-1}}{MVA_{t-1}} \tag{3.9b}$$

Where MVA is the book value of assets multiplied by the market to book ratio. Equation 3.9b is computed based on an equal-weighted rate of all listed banks (SIC 6000-6200) in the economy.[29]

To obtain weekly data to allow for time variation in the macro state variables on which the conditional CoVaR is based, the quarterly data values are linearly interpolated.[30] The following quantile regressions are then estimated:

$$X_t^i = \alpha^i + \beta^i M_{t-1} + \mu_t^i \tag{3.10}$$

Where M is a vector of systematic state variables which captures variations in risk not directly related to financial system risk exposure: 1) VIX is the weekly CBOE Volatility Index. 2) $LiqSpread$ is a measure of short-term liquidity risk, measured as the difference between the 3-month general collateral repo and the 3-month bill rate. 3) $\Delta 3MTBill$ is the weekly change in the 3-month T-Bill rate. 4) $YieldSlope$ is the weekly yield curve slope spread between the 10-year and 3-month T-Bill. 5) $\Delta CreditSpread$ is the weekly spread between bond rated 'BAA' and the 10-year T-Bill. 6) $MRet$ is the equal-weighted equity market return, extrapolated from daily to weekly data. 7) $RealEstateRet$ is the equal-weighted real estate market return (SIC 6500-6600) in excess of the value-weighted equity market return, extrapolated from daily to weekly data. Using coefficients from Equation 3.10, weekly VaR is estimated as follows:

$$VaR_{q\%,t}^i = \hat{\alpha}^i + \hat{\beta}^i M_{t-1} \tag{3.11}$$

The quarterly VaR measure is then obtained by summing the weekly VaR. I follow Bushman et al. (2013) in using the 1% VaR as the measure of VaR used in the prediction model (Equation 3.3), where more negative values indicate higher value-at-risk.

Based on the VaR of each bank, the CoVaR can now be estimated. According to Adrian and Brunnermeier (2009), the CoVaR of an institution is defined as the value-at-risk of the financial system conditional on the state (for instance, normal or distressed state) of that

[29] Using value-weighted market return instead yields identical results.

[30] Interpolated values are computed only between a maximum of two consecutive quarters of missing data and only banks with more than 260 weekly time series are included in the analysis.

specific institution.[31] To capture the marginal contribution of a specific bank to systemic risk, $\Delta CoVaR$ is estimated as the difference between the CoVaR of the system j when bank i is in distress (i.e., 1% VaR) and the CoVaR of the system j when bank i is in its normal state (i.e., at the median). In other words, $\Delta CoVaR$ captures the effect on the financial system when one institution moves from the normal, median state (50% quantile) to a distressed situation (1% quantile).

$$\Delta CoVaR_t = CoVaR_t^{i=VaR_{1\%}} - CoVaR_t^{i=VaR_{50\%}} \tag{3.12}$$

To compute $\Delta CoVaR$ I first estimate Equation 3.10 in both the 1st and 50th quantile, respectively. Equation 3.13 is then estimated in the 1st quantile and extends Equation 3.10 to the financial system and conditions the change in assets of the system (X^{System}) on asset change of each bank (X^i):

$$X_t^{System} = \gamma_1 + \gamma_2 M_{t-1} + \gamma_3 X_t^i + \mu_t^{System} \tag{3.13}$$

Using the predicted values from Equation 3.10 (q=1% and q=50%) I compute the value-at-risk of each bank at these two states as described in Equation 3.11. The CoVaR of the system, conditional on bank i being in the median or distressed state, is then specified as follows, using the predicted values from Equation 3.13:

$$CoVaR_{1\%,t} = \hat{\gamma}_1 + \hat{\gamma}_2 M_{t-1} + \hat{\gamma}_3 VaR_{1\% or 50\%,t}^i \tag{3.14}$$

From Equation 3.14 above I now have the two necessary input variables and can thus calculate $\Delta CoVaR$ as specified in Equation 3.12. The weekly $\Delta CoVaR$ are then summed to quarterly values and the interpretation is that more negative values indicate that bank *i's* shift from a normal state to a distressed state results in a larger marginal contribution to the systemic risk of the system.[32]

To answer Hypothesis 3 on how restating banks contribute to systemic risk I first control for the possibility that restatements may be endogenous. This endogeneity stems from

[31] Specifically, the CoVaR of institution i corresponds to the covariance between the financial system and institution i (Adrian and Brunnermeier, 2009, p. 2).

[32] $\Delta CoVaR$ is negative by construction because it is computed from the worst 1% total asset change of the system (Bernal et al., 2014).

two sources: First, Hypothesis 3 predicts restating banks are more systemic by nature, but it may be that systemic banks per se attract attention from, e.g., regulators and the SEC, resulting in a higher likelihood of restating. If that is the case, the causality is reversed such that systemic banks are more likely to restate. Second, restating banks and SEC targets are not random firms (Kedia and Rajgopal, 2011). In particular, the banks that restate have all either violated GAAP or made a material error which is detected by, e.g., the bank itself, its auditor, or the SEC. Subsequently, the bank may or may not restate its financial statements. Both of these sources of endogeneity, the reversed causality and the sample selection bias, can lead to inconsistent estimates (Heij et al., 2004). While the latter concern, i.e., the sample selection bias, is present throughout the paper, the first concern, i.e., the reversed causality, is only present in H3. Since the reversed causality is the most serious issue, it is explicitly controlled for only in H3. A two-stage Heckman model is estimated to control for the endogeneity (Heckman, 1979; Maddala, 1983). For the first stage regression, one needs an instrumental variable that explains the likelihood of restating, but is not associated with the systemic risk. Finding such an instrument is not straightforward since a restatement event can be triggered by a number of different players and the processes that lead to a restatement are generally not observable. According to Karpoff et al. (2008), the restatement can be initiated by, for instance, self-disclosure of malfeasance, auditors, whistleblower charges, or routine reviews by the SEC. The SEC afterwards conducts an informal and confidential investigation of the bank which results in either a formal, public investigation or an abandonment of the case. Clearly, one cannot observe all investigations undertaken by the SEC since data on informal investigations that did not eventually result in a formal SEC enforcement is not publicly available. Instead, one has to rely on the publicly available SEC enforcement actions to proxy for the SEC's policing efforts. I use an instrumental variable suggested by Kedia and Rajgopal (2011), namely the concentration of SEC enforcement activity in each of the US states as a control for the likelihood of restating. The restatement activity in the home state of the bank is associated with each bank's propensity to restate because it reveals if regulators have been especially diligent in this state. In addition, a restatement in an adjacent bank may prompt auditors and employees to be even more aware of possible errors. At the same time, the state-specific restatement

activity is not associated with the systemic risk of the restating banks, making it an obvious instrumental variable.[33] In particular, the instrument is constructed as the annual number of restating firms in each state divided by the annual number of all firms in that state.[34] Hence, the first stage regression looks as follows, with standard errors clustered by year:

$$\begin{aligned} Restatbank_i =& \alpha_0 + \alpha_1 Size_{i,t} + \alpha_2 ROA_{i,t} + \alpha_3 Mismatch_{i,t} \\ &+ \alpha_4 Leverage_{i,t} + \alpha_5 VaR_{i,t} + \alpha_6 Restatement Activity_{i,t} + \mu_{i,t} \end{aligned} \tag{3.15a}$$

Where *Restatbank* is an indicator variable equaling 1 if the bank restated during the entire sample period, 0 otherwise; *RestatementActivety* is the number of restatements scaled by the number of all firms per state per year; and other variables are as previously defined.

To answer Hypothesis 3 on how banks that restate contribute to systemic risk, the following second stage regression is estimated with standard errors clustered by both firm and year. I exclude the instrument *RestatementActivity* and include the Inverse Mills ratio from Equation 3.15a, effectively controlling for the two sources of endogeneity described above:

$$\begin{aligned} \Delta CoVaR_{i,t} =& \alpha_0 + \alpha_1 Restatbank_i + \alpha_2 Size_{i,t-1} + \alpha_3 ROA_{i,t-1} \\ &+ \alpha_4 Mismatch_{i,t-1} + \alpha_5 Leverage_{i,t-1} + \alpha_6 VaR_{i,t-1} \\ &+ InvMills_{i,t-1} + \mu_{i,t-1} \end{aligned} \tag{3.15b}$$

Where $\Delta CoVaR$ is from Equation 3.12; *InvMills* is the Inverse Mills Ratio from Equation 3.15a; and other variables are as previously defined. The control variables are adapted from Adrian and Brunnermeier (2009), Girardi and Tolga Ergun (2013), and Bushman et al. (2013).[35] Recall that the dependent variable $\Delta CoVaR$ is increasingly negative for banks that

[33] I also tested a different instrumental variable suggested by Kedia and Rajgopal (2011), the distance from the restating banks to the SEC headquarters and regional offices. However, it did not have significant explanatory power of the decision to restate and is therefore considered an unfit instrument in this banking sample.

[34] The instrument compares the number of restatements in firms in all industries to the number of all firms in all industries. To check whether the state-specific restatement activity is different in the banking industry I also estimated Equation 3.15a and Equation 3.15b with a similar instrument using only banks. The results are the same.

[35] Leverage is included to control for the possible mechanical relation between restatements caused by loan losses and loan supply, the latter being a possible channel of the contribution to systemic risk. In particular, income decreasing restatements of loan losses decrease bank capital, which may in turn decrease the loan supply (see Section 3.2.2).

contribute more to systemic risk. I therefore expect a negative coefficient on the main variable of interest *Restatbank*, implying that banks that restate contribute more to systemic risk. Note that *Restatbank* is not time varying so the research design does not assume causality between a unique restatement event and contribution to systemic risk. This is intended since there is no reason to expect that the restatement itself prompts increased systemic risk. Instead, it is expected that banks that restate at some point in time are inherently more systemic than other banks.

3.6.2 Results

Recall that Hypothesis 3 predicts that restating banks contribute more to systemic risk than other banks do. Since the dependent variable $\Delta CoVaR$ is negative by construction, this would be the case if a negative coefficient is found on the variable *Restatbank*. Results of Hypothesis 3 are tabulated in Table 3.8. Panel A shows the results of the first stage regression (Eq. 3.15a), determining the endogenous variable *Restatbank*. The instrumental variable, $RestatementActivity$, is positive as expected, indicating that the likelihood of restating increases with the number of restatements in the bank's state. This could be caused by increased scrutiny by the SEC or other stakeholders who can prompt restatements, e.g., auditors and employees. Note that the explanatory power is fairly small, 1.56%, confirming that restatements in banks are indeed hard to forecast as also seen in the first hypothesis in Table 3.6.

In the second stage regression depicted in Panel B, the instrumental variable is excluded and the Inverse Mills Ratio from the first stage regression is included in accordance with the exclusion restriction (Lennox et al., 2012). As evident, H3 is maintained showing that banks that have restated at some point in the sample period are indeed more systemic to the financial system than non-restating banks. Hence, it seems as if restating banks innately impose a larger risk on the system, suggesting that there is a spillover effect from banks that restate to the overall financial system. Note also that size is insignificant in explaining ΔCoVaR, which confirms the result of Barth and Schnabel (2013) that size alone is an insufficient proxy for contribution to systemic risk. The positive coefficient on *Size* indi-

Table 3.8: Contribution to Systemic Risk

Panel A: First Stage Restatement Regression			
Dependent Variable: Restatbank			
Variable	Estimate	Std. Error	t-stat
Intercept	-1.467938	0.091179	-16.10***
Size	0.0925	0.0081	11.36***
ROA	-17.1065	2.3512	-7.28***
Mismatch	-1.1982	0.1540	-7.78***
Leverage	-0.2354	0.1559	-1.51
VaR	-0.13592	0.0632	-2.15**
RestatementActivity	0.7665	0.2445	3.14***
N			709
R^2			1.56%
Panel B: Second Stage Systemic Risk Regression			
Dependent Variable: ΔCOVaR			
Variable	Estimate	Std. Error	t-stat
Intercept	-0.5126	0.19	-2.6987***
Restatbank	-0.0013	0.0006	-2.2257**
Size	0.011	0.0082	1.3423
ROA	-0.2008	0.6872	-0.2922
Mismatch	-0.2482	0.1777	-1.3968
Leverage	-0.1156	0.0709	-1.6289
VaR	0.6971	0.142	4.9106***
InvMills	0.1282	0.1104	1.161
N			630
R^2			64.25%

Panel A tabulates the results of Equation 3.15a, the first stage selection model which models the likelihood of restating. Panel B tabulates the results of Equation 3.15b, answering H3 that restating banks contribute more to systemic risk. Variables are defined in Table 3.4.
Standard errors are clustered by firm and year. To obtain unbiased estimates in finite samples, the clustered standard errors are adjusted by $(N-1)/(N-P)G/(G-1)$, where N is the sample size, P is the number of independent variables, and G is the number of clusters (Petersen, 2009; Ma, 2014).
*, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively.

cates that large banks in fact contribute less to systemic risk, which is a bit surprising in the light of the too big to fail doctrine, in spite of the abovementioned findings by Barth and Schnabel (2013). One reason for this finding could be, as argued by Barth and Schnabel (2013), that the interconnectedness of banks is more important to systemic risk than the size of the bank. Another reason could be that our measure of size, the natural logarithm of total assets, does not adequately capture bank size. To examine this possibility, *Size* was replaced with *MarketSize* in an additional test to measure size with the market value of equity instead. The coefficient is negative as would be expected, although insignificantly so. Although all insignificant, the coefficients in the remaining variables make intuitive sense. In particular, banks with high performance measured with *ROA* contribute more to systemic risk, indicating that the higher return on assets comes with higher risk. In addition, banks with higher liquidity mismatch and leverage also contribute more to systemic risk.

As described in Section 3.2, a restatement can be a sign of poor financial reporting quality. This rises the concern in this research design that the earnings quality of restating firms is a correlated omitted variable. In particular, it may be that restating banks contribute more to systemic risk simply because they have poor earnings quality and therefore are more opaque and harder to control. To address this I have added the two measures of earnings quality, *DiscLLP* and *DiscSGL*, to Equation 3.15b. Most importantly, this regression revealed that *RestatBank* still significantly increases the contribution to systemic risk. In addition, high levels of *DiscLLP* (*DiscSGL*) decreases (increases) the contribution to systemic risk. One explanation of this finding is that while loan loss provisions only affect each specific bank, the selling of securities may affect other banks as well, because a large sale of securities can make the bank price setter.

3.7 Conclusion

This paper examines the causes and consequences of restatements in U.S. banks. As a start, it identifies a number of common characteristics of these restatements and demonstrates that restatements in banks are less frequent then restatements in industrial firms, which could be caused by the highly regulated nature of the financial industry (Kreutzfeldt and

Wallace, 1986; Maletta and Wright, 1996). Bank restatements also seem to be considerably more heterogeneous than their non-financial counterparts. A logistic regression reveals that banks with low value at risk, poor performance and capital ratios, as well as higher levels of discretionary loan loss provisions are more likely to restate. This shows that restating banks are under pressure on the performance dimensions, which is also the case for restating industrial firms (Scholz, 2008). In addition, it shows that banks may act on this pressure by using loan loss provision to manage earnings, as previously documented by Anandarajan et al. (2007), Ahmed et al. (1999), and Collins et al. (1995).

The paper also shows two direct consequences of bank restatements, namely higher cost of equity capital and lower balance sheet liquidity. The first finding shows that market consequences of restatements in banks resemble those in industrial firms (see e.g., Hribar and Jenkins (2004)) even though the capital structure and generation of capital are very different in banks compared to non-financial firms. Hence, a restatement is considered a very serious event and consequently the bank is perceived as more risky after the restatement, which results in a higher risk premium by equity capital providers. The second finding shows that in connection with the higher perceived risk and cost of capital, restating banks experience funding constraints. This is ironic since it has previously been documented that one of the motivations for managing earnings is to attract inexpensive external financing (Dechow et al., 1996). Finally, it is shown that restatements in banks are associated with higher contribution to systemic risk, even when controlling for the fact that restatements may be endogenous. This relation is not causal in a strict sense, but rather indicates that banks that restate at some point in the sample period (2000-2014) are more systemic in nature than banks that do not. The relation could arise from the fact that restating banks are perceived as more risky by the capital markets as shown by the higher cost of equity capital that follows a restatement. The paper suggests two possible theory-based channels for the restating banks' higher contribution to systemic risk, namely that a restatement can act as a contagious liquidity shock (Allen and Gale, 2000) and that this shock can have output effects on bank loan supply (Khwaja and Mian, 2008). However, this paper does not test those channels empirically and the specific drivers of the systemic risk are hence left for future research.

To the best of my knowledge, this is the first paper to thoroughly examine the features of earnings restatements in banks. Since the financial sector is highly regulated, the incentives for earnings management differ between banks and industrial firms, which means that our knowledge about restatements in industrial firms may not apply to the financial industry. This paper is therefore of interest to the SEC and to auditors whose concern it is to assure that financial statements present a true and fair view of the firm and consequently want to minimize the number of errors and irregularities. The finding that restating banks are more systemic in nature also has implications for banking regulators both within and outside the United States.

Chapter 4

The Effect of Bank Quality on Corporate Customers

The Effect of Bank Quality On Corporate Customers

Marie Herly and Lene Gilje Justesen

Department of Economics and Business, Aarhus University

Abstract

This paper examines how a bank's own quality affects its monitoring and screening role. We particularly study the way a bank's quality impacts the performance of its corporate customers and the strength of its relationship with those customers.

Bank quality is measured with financial stability, CAMELS ratio, and financial reporting quality. Controlling for the endogenous bank-firm match we do not find an association between bank quality and firm performance. However, we find that bank monitoring is more important when alternative firm monitoring is weak during the financial crisis. This indicates that high quality bank monitoring is more important during times of financial distress and when other monitoring devices fail. We also find clear evidence that firms with high quality banks and poor performance have weaker relationships with their bank. This indicates that high quality banks force weak customers to seek financing elsewhere.

The paper sheds new light on how bank monitoring differs with their own quality and how the effect differs with alternative firm monitoring and the business cycle. The paper also extends current knowledge on how bank characteristics influence lending relationships.

Keywords: Relationship banking; firm performance; accounting quality.

JEL Classification: G21; M41; L14; L25.

We thank Florian Eugster, Vasso Ioannidou, Steven Ongena, and workshop participants at the 2014 Nordic Accounting Conference for helpful comments.

4.1 Introduction

Given their role as delegated monitors and essential capital providers in the economy, the quality of banks is of vital importance. In the aftermath of the financial crisis, the stability, performance, and financial reporting quality of banks are as critical as ever. We wish to understand how the quality of banks impacts the performance of and relation to their corporate customers.

This paper has two main research questions that focus on the consequences of bank quality: First, we are interested in how bank quality impacts the performance of their corporate customers. Second, we want to know how the strength of the bank-firm relationship is affected by the bank's quality.

One important role for banks is to monitor borrowers, but the ability to monitor borrowers is likely to differ across banks (Diamond, 1984; Fama, 1985). The true characteristics and abilities of borrowers are unobservable to the bank because of information asymmetries, but through pre-loan screening and post-loan monitoring they can assess the observable quality of each firm. However, monitoring is costly and only high quality banks are assumed to possess the ability and resources to carry out the necessary screening (Chemmanur and Fulghieri, 1994). Therefore high quality banks can certify the quality of current and possible future borrowers (Bushman and Wittenberg-Moerman, 2012; Ross, 2010). In addition, previous literature has shown that bank quality can lead to higher firm performance for at least three reasons: First, firms in close banking relationships have easier access to capital (Degryse and Ongena, 2001), second, bank loans from a high quality lender should serve as a monitoring device (Billett et al., 1995), and third, bank-specific funding constraints can be passed on directly to customers in terms of reduced loan supply (Khwaja and Mian, 2008). We link these two strands of literature, how bank quality affects monitoring and how monitoring affects firm performance, and hypothesize that the quality of a particular bank directly affects the performance of its corporate customers.

Based on the notion that a high quality lender serves as a monitoring device for borrowers (Billett et al., 1995; Lee and Sharpe, 2009), we wish to understand how this monitoring differs with alternative monitoring mechanisms. We build our prediction on the gover-

nance substitution theory proposed by Williamson (1983), who suggests that demand for one governance mechanism increases when other governance mechanisms are weak. Following this intuition we predict that bank monitoring is more important when alternative monitoring mechanisms are weak such that the effect of bank quality on performance increases when agency costs are high. To our knowledge this is the first study to explicitly test the governance substitution hypothesis in banks, even though banks play an important role as monitors.

The pros and cons of relationship lending are widely described (see, e.g., Boot (2000)) and so are the different features of these relationships. For instance, several papers examine the determinants and outcomes of bank multiplicity and the duration of the lending relationship.[1] However, the vast majority of these studies focus on firm-specific causes and consequences of relationship banking (a notable exception includes Detragiache et al. (2000)). Since the firm and the bank jointly determine the lending relationship, we attempt to fill this gap by linking bank characteristics to relationship lending. Specifically, we examine whether high quality banks have stronger or weaker relationships with their corporate customers.

We exploit unique Danish data that link each bank to its portfolio of corporate customers, to examine the monitoring and certifying role of banks over their customers. When answering our research questions we use an instrumental variable two-stage approach to alleviate the selection issues inherent in the research design, thereby effectively controlling for the non-random bank-firm match. We propose two instruments to control for the inherent endogeneity in our research design, namely the number of banks in the firm's area and the distance between the firm and its bank. Both instruments powerfully explain the bank-firm match.

Our main variable of interest, bank quality, is defined broadly as bank stability, performance, and financial reporting quality. Our measure of bank quality consists of three components: First, a risk measure developed by the Danish Financial Supervisory Author-

[1] Articles examining bank multiplicity include Carletti (2004), Farinha and Santos (2002), Foglia et al. (1998), Ioannidou and Ongena (2010), while Degryse and Van Cayseele (2000), Gambini and Zazzaro (2013), Ongena and Smith (2001) examine duration of bank-firm relationships.

ity specifically to Danish banks, focusing on growth and diversification of lending, funding, and liquidity coverage. Second, a proxy for the regulatory CAMELS ratio, which captures bank capital, asset quality, and performance. Third, two measures of bank financial reporting quality, namely discretionary loan loss provisions and security gains and losses, respectively. The three measures of bank quality should not be considered substitutes as they capture three distinct features of the overall quality of Danish banks.

Contrary to expected, we do not find an association between bank quality and the performance of their corporate customers and hence cannot document that bank monitoring differs with the bank's own quality. In initial tests we also cannot show that bank monitoring substitutes poor alternative firm monitoring. However, when we partition the sample in before and after the financial crisis (cut off year 2008), we find robust evidence that governance substitution does occur in the crisis period. In particular, we find that firms with poor internal monitoring measured with CEO/chair duality, low management ownership share, multiple banks, and change in auditor have significantly greater benefit of bank quality on their performance. In other words, a firm with high agency costs due to weak internal monitoring benefits more from having a high quality bank whose monitoring in turn lowers agency costs. This indicates that high quality bank monitoring is more important during times of financial distress and when other monitoring mechanisms fail.

Turning to our tests of the association between bank quality and the strength of the bank-firm relationship, we find clear and robust evidence that firms with high quality banks have weaker banking relationships, measured as several, short-term relationships. Additionally, poorly performing firms also have weaker bank relationships. These findings point at a mechanism where high quality banks force weak customers away and as a result financially constrained firms have several relationships and switch banks more often. The results also indicate that high quality banks have superior screening and monitoring, even when they do not benefit from a close relationship with their borrowers.

We contribute to the literature by linking two vast strands of literature, namely the monitoring role of banks on the one hand and the effect of bank monitoring on firm performance on the other hand. This mechanism is often hard to observe empirically because of data restrictions. We also shed new light on the way a banking relationship serves as a monitoring

tool when alternative monitoring mechanisms fail. Finally, this paper is related to literature on determinants of relationship lending and we present evidence of how the quality of the bank influences this relationship. Our results are hence particularly interesting for stakeholders who are worried about agency costs between banks and their corporate customers, because we show that high quality banks serve as a powerful monitoring tool in times of financial distress. This study is also of interest to bank regulators, because it shows that the capital and liquidity ratios that banks are regulated on have a time- and firm-varying real effect on the bank's customers.

The remainder of this paper is structured as follows: Section 4.2 outlines related literature and develops our two sets of hypotheses, while Section 4.3 presents the sample, calculation of key variables, and descriptive statistics. Our main research questions concerning the association between bank quality and firm performance and strength of bank-firm relationship are tested in Sections 4.4 and 4.5, respectively. The final section concludes.

4.2 Previous Literature and Hypotheses Development

4.2.1 Relation Between Bank Quality and Firm Performance

In relationship banking the bank obtains firm-specific information under the bank's pre-loan screening and post-loan monitoring.[2] Since some of this information is proprietary, banks possess private information about their customers' performance and future prospects that is not readily accessible from publicly available sources (Boot and Thakor, 2000). As a consequence, banks have superior information about their customers and hence have high potential for assessing the true quality of these customers and actively select those with good performance.

The monitoring role of banks over their customers has been examined extensively.[3]

[2]Relationship lending or banking is defined as the provision of financial services repeatedly to the same customer (Goddard et al., 2007, p. 1923).

[3]Freixas and Rochet (2008) define monitoring broadly as screening projects before loan giving (adverse selection), preventing opportunistic behavior during the realization of the project (moral hazard), and punishing or auditing a borrower who fails to meet contractual obligations (costly state verification).

Banks have a comparative advantage in monitoring and therefore the bank acts as a delegated monitor on behalf of the lenders (Diamond, 1984). Diamond (1984) argues that monitoring is costly, but the benefits in terms of making good loans and preventing loan losses outweigh these costs. Akhigbe and McNulty (2011) shows empirically that bank's monitoring efforts are value enhancing, such that banks that allocate large resources to monitoring customers are more profit efficient. In other words, it is worth the while for banks to monitor customers. A related stream of literature documents that the monitoring effects differ across banks. For instance, theoretical work by Chemmanur and Fulghieri (1994) shows that the quality of the lender is important for certifying borrowers. Similarly, empirical work related to this stream of literature has found that the market reaction to bank loan agreements is on average positive. For instance, Billett et al. (1995) shows that the borrower's abnormal stock return is higher if the lender has higher credit ratings, suggesting that a high quality bank relation is positively valued by investors. Lee and Sharpe (2009) find similar results in a later study. The implications of these studies are that high quality lenders act as a quality stamp and enhance the firm value of their borrowers.

There are at least three reasons why a high quality bank would lead to higher performance for their customers. First, previous research suggests that firms with a close bank connection have easier access to capital, because close bank-firm relationships decrease agency costs, thus improving the performance of firms (Degryse and Ongena, 2001; Fama, 1985). Agarwal and Elston (2001) and Kang and Stulz (2000), among others, find that firms with close ties to a bank perform better than independent firms.[4] In other words, the bank of a firm has a direct impact on the performance of that firm. Second, previous research also shows that the quality of the lender can have a direct effect on the borrower, implying that high quality bank loans as a monitoring device should improve firm performance. For instance, Fok et al. (2004) argue that high quality banks should be able to monitor borrowing firms more effectively, which in turn would lead to improved performance. They show that reputation and loan ratios of the lending bank are important factors explaining firm per-

[4] Agarwal et al. (2007) attribute these findings both to the fact that bank-dependent firms in close relationships have easier access to capital, and to the fact that a close bank connection serves as a signal to outside investors and results in a certification effect, which makes it easier for firms to attract additional equity.

formance. In other words, the quality of a bank impacts the performance of its customers. Third, liquidity shocks and bank-specific funding constraints can be passed directly on to customers in terms of reduced loan supply (Khwaja and Mian, 2008; Cornett et al., 2011). This would mean that low quality banks in terms of funding and liquidity have negative externalities on the performance of its customers. These three reasons all lead us to believe that the quality of a bank has a direct effect on the performance of their customers. However, bank monitoring does not necessarily lead to higher firm performance. For example, Rajan (1992) shows that a close bank-firm relationship could result in the bank extracting rents, and Weinstein and Yafeh (1998) cannot document that firm performance or growth improves as a consequence of a close bank connection.

The two abovementioned streams of literature shape our hypothesis: first, that banks as delegated monitors have access to private information to evaluate the true quality and that the evaluation of customers is likely to differ with the bank's own quality, and second, that high quality bank monitoring leads to higher customer performance. We therefore predict that the ability of a bank to certify its borrowers is positively associated with its own quality. Specifically, high quality banks are superior in the pre-loan screening and post-loan monitoring and hence their corporate customers have higher performance. Stated formally:

1a: High quality banks have corporate customers with high performance

The relation between high quality banks and firm performance predicted in H1a rests on the assumption that high quality banks have better screening and monitoring skills than low quality banks. In other words, bank monitoring is one way to lower agency costs (Ang et al., 2000). In the next hypothesis we examine whether the effect of monitoring on firm performance differs with the level of the firm's other monitoring sources. This prediction rests on the substitution theory proposed by Williamson (1983), who argues that governance structures arise as a result of the individual needs of each organization. Specifically, if a certain governance mechanism is limited, a demand for other governance mechanisms arises. Similarly, Kang and Shivdasani (1999) document that the need for bank monitoring is smaller when agency costs are low. Using this argument we expect that the need for bank monitoring is higher when other monitoring or governance mechanisms are weak,

i.e., when agency costs are high. In particular, when a firm's other governance mechanisms are weak, the effect of bank quality on firm performance is more pronounced. Governance substitution is especially likely in our sample that consists of small firms mostly financed by bank debt, because banks have increased incentives to monitor management through their role as concentrated debt holders (Hillier et al., 2008). We therefore expect that a firm with high agency costs benefits more from having a high quality bank, whose monitoring in turn lowers agency costs. This intuition converts into our second hypothesis:

> *1b: The effect of high quality banks on firm performance is more pronounced for firms with poor alternative monitoring*

We consider four alternative monitoring mechanisms beyond bank lending, namely CEO/chair duality, management ownership, multiple banking relationships, and change in auditor. Below, we elaborate on the expected reasons why they impact the effect of bank quality on firm performance.

CEO and Chairman of the Board Duality As described by Fama and Jensen (1983), boards must be independent to be effective monitors of the management. If not, agency costs may rise because the decision management and the decision control process are consolidated (Pi and Timme, 1993). This is the case if the CEO is also chairman of the board. Extensive research has suggested that concentration of power resulting from CEO/chair duality increases agency conflicts (Booth et al., 2002). We therefore predict that firms with CEO/chair duality have lower internal monitoring and therefore gain more from bank monitoring; as a consequence, the effect predicted in H1a is more pronounced for these firms.

However, the opposite may also be possible. In particular, Brickley et al. (1997) suggest that CEO/chair duality may also be beneficial, because there are several costs associated with splitting the roles, among others agency costs of controlling the behavior of the chairman, information costs, and costs of inconsistent decision making with shared authority.

Management Ownership The convergence of interest hypothesis proposed by Jensen and Meckling (1976) suggests that managers who own a large portion of a firm will act more in the interest of shareholders. In other words, if the manager owns the entire firm, there are no agency costs because the cost of deviating from value-maximization declines as manage-

ment ownership rises (Morck et al., 1988). This relation has been widely documented (see, e.g., Ang et al. (2000)) and as a result we expect that firms with low management ownership gain more from bank monitoring and hence perform better.

However, the effect of management ownership on bank monitoring efforts may in fact be the opposite as predicted by the entrenchment hypothesis (Morck et al., 1988; Weisbach, 1988), which hypothesizes that managers gain so much power as majority owners that they use the firm to promote their own interests rather than the interest of other shareholders.

Multiple Banks The number of bank relationships is also likely to determine the degree of additional monitoring and thus to impact the effect of bank quality on firm performance. Castelli et al. (2012) show that fewer bank relations reduce agency problems and Carletti (2004) argues that the bank's incentives to monitor depends on whether it is the sole lender to a firm. If not, two-bank lending suffers from duplication of efforts which may lead to free-riding such that multiple banking relationships in fact result in less monitoring of the firm. They attribute this finding to the fact that single-bank relationships have lower information asymmetries and hence single banks can more easily withstand agency costs (Rajan, 1992). Similarly, Foglia et al. (1998) and Carletti et al. (2007) describe how multiple banking relationships weaken the discipline exercised by the banks because of free-riding problems. Finally, considerable evidence shows that firm profitability decreases as the number of bank relationships increases (Degryse and Ongena, 2001; Castelli et al., 2012). Taken together, the evidence outlined above leads us to expect that the performance of firms with multiple banks is more affected by bank quality.[5]

However, the opposite could also be true. In particular, firms with multiple banks may just have higher performance as documented by, e.g., Weinstein and Yafeh (1998). In addition, multiple bank relationships could also mitigate hold-up problems (banks obtains information monopoly and consequently charge non-competitive loan rates (Rajan, 1992)) and soft-budget constraints (banks extend credit because they hope to get current receivables back which may give borrowers undesirable incentives (Bolton and Scharfstein, 1996)).

Auditor change Our final measure of firm monitoring is a change in auditor.[6] An auditor

[5]Note that this hypothesis does not take into account the quality of the second bank.

[6]Unfortunately, our data does not allow us to distinguish between auditor resignations and au-

change can erode financial reporting because firm managers may choose auditor opportunistically (opinion shopping), and the auditor change could be caused by irregularities within the firm (Bockus and Gigler, 1998). Previous research generally suggests that auditor changes are associated with increased auditor litigation risk (Krishnan and Krishnan, 1997), higher firm risk (Johnstone, 2000), and income increasing earnings management (DeFond and Subramanyam, 1998). This evidence suggests that firms that change auditor are troubled and hence could benefit from the increased monitoring of a high quality bank. We therefore predict that the performance of firms that change auditor is more affected by a high quality bank than firms that do not change auditor.

4.2.2 Relation Between Bank Quality and the Bank-Firm Relationship

The benefits of relationship banking are well described in the literature (see Boot (2000) for a review). The proximity between bank and borrower facilitates monitoring and screening and can overcome problems of asymmetric information. Therefore incumbent banks have an advantage over new banks (Boot, 2000). However, some notable drawbacks also exist. The most prominent examples are the soft-budget constraint and the hold-up problem described above. Our final hypothesis, H2, predicts that there is an association between the bank quality and the strength of the banking relationship. We define a strong bank-firm relationship as a long relationship with only one bank. There are two possible outcomes of bank quality on the strength of the banking relationship and hence we make no prediction on the direction:

H2: Bank quality affects the strength of the bank-firm relationship

We elaborate on the two opposite effects below:

One the one hand, high quality banks may have stronger relations with their customers. Relationship lending has many advantages for the bank and therefore a bank will invest in

ditor dismissals. Resignations are generally found to be more associated with risky and unprofitable firms than dismissals (Catanach et al., 2011).

relationship lending if the benefits exceed the costs (Freixas and Rochet, 2008). Although information production is costly, it may be worthwhile because the bank has stricter control of the borrower and the information is reusable (Boot, 2000). If high quality banks are better in assessing these benefits and weighing them off against the drawbacks, they will be more likely to form close relationships with their customers. The benefits of relationship lending from the view of the bank include lower information production costs (Petersen and Rajan, 1994), higher probability of future loans (Bharath et al., 2007), and lower information asymmetry (Petersen and Rajan, 1995). In addition, relationship lending facilitates several contractual features, such as flexibility and discretion, extensive use of covenants, inclusion of collaterals, and intertemporal flexibility. Detragiache et al. (2000) find that firms with large and fragile banks are more likely to have multiple relationships, i.e., weak bank relationships.[7]

On the other hand, high quality banks may have weaker relations with their customers, because relationship lending is also costly for the bank. These costs arise from at least two sources. First, it is costly for banks to obtain proprietary information (Boot, 2000; Berger and Udell, 2006), and second, loan prices may decrease in close relationships (Berger and Udell, 1995).[8] Degryse and Ongena (2001) argue that firms in financial distress face credit rationing in their (main) bank and are hence forced to seek financing elsewhere, either by switching bank or by taking on additional banking relationships.[9] Similarly, Gopalan et al. (2011) show that firms form new bank relationships to expand credit availability because a strong banking relationship may exacerbate firms' financial constraints. As a consequence, high quality banks may force weak customers away which would result in financially con-

[7]Detragiache et al. (2000) measure fragility as banks with high propensity to experience liquidity shortage and high ratios of non-performing loans to total assets. However, Ongena and Smith (2000) cannot replicate their result and argue that the relation between bank fragility and multiplicity is non-monotonic. These mechanisms would lead to high quality banks having stronger lending relationships.

[8]While Berger and Udell (1995) find that interest rates decrease and less collateral is pledged on relationship banking, Degryse and Van Cayseele (2000) find that loan prices increase with duration, and Elsas and Krahnen (1998) cannot find any affect on loan prices from relationship lending.

[9]This argument has also been put forward by Ongena and Smith (2001) and Farinha and Santos (2002), who outline the bank diversification hypothesis which describes how banks for risk diversification purposes refuse to increase exposure to low credit quality borrowers and thus force firms to approach other banks. This would suggest that distressed firms that do not live up to the standards of a high quality bank must either switch bank or initiate additional banking relationships.

strained firms having several relationships and switching banks more often. According to Degryse and Ongena (2001) this mechanism particularly affects SMEs, which make up most of our sample. As explained above, a close relationship is a tool for the bank to obtain private information about a particular firm. It may be that high quality banks are more qualified in processing even outside firm-specific information and hence do not have to form close relationships with their customers to obtain information. These mechanisms would lead to high quality banks having weaker lending relationships.

4.3 Research Design

4.3.1 Sample Selection

We use a unique Danish panel data set which links each of the Danish banks to its corporate customers. The sample consists of 264 banks in the entire sample period from 2000 until 2011. The number of banks is decreasing in time because the Danish market has experienced several bank mergers over the last decade. Hence there were 190 banks in 2000 and 127 in 2011. The accounting information from these banks is from Bankscope. The link to the corporate customers is Experian's database of Danish firms, mainly SMEs. This dataset contains financial statement information as well as the name of each firm's bank(s). The sample selection process is displayed in Table 4.1.

Table 4.1: Sample Selection Process

Selection criteria	No. of firms
Initial sample	188,411
Less 52,805 sole proprietorships	135,606
Less 41,690 firms without financial statements	93,916
Less 31,134 firms with less than DKK 1,000,000 in total assets	62,782
Less 975 firms with possible errors in financial statements*	61,807
Less 13,898 firms with less than three active years between 2000-2011	47,909
Final sample	47,909

*Possible errors in financial statements include negative values in net sales, fixed assets, intangible assets, PPE, financial assets, current assets, inventories, and trade debtors.

4.3.2 Measuring Bank Quality

The main variable of interest is bank quality. We wish to measure this concept broadly and we therefore include three components of quality: Financial stability, CAMELS ratings, and accounting quality. These three components are described in detail below. All bank quality variables are defined in Table 4.2.

Financial Stability The Danish Financial Supervisory Authority (Finanstilsynet) has outlined thresholds within five risk areas that banks should not exceed, the so-called Supervisory Diamond (Tilsynsdiamant). Since 2011 all Danish banks have been required to issue statements on how they relate to these thresholds and the supervisory authority then publishes them on their homepage (Finanstilsynet, 2014). The five thresholds are: 1) Sum of large exposures cannot exceed 125% of eligible capital. 2) Annual lending growth cannot exceed 20%. 3) Ratio of real estate loans to total loans cannot exceed 25%. 4) Funding ratio cannot exceed 1. 5) Liquidity coverage cannot fall under 50%. If one of these five thresholds is violated, the financial supervisory authority issues an enforcement action.[10] Since our sample period ends in 2011 we cannot use the actual numbers published by the banks and instead we have to estimate them based on the guidelines of the supervisory authority. Because of data restrictions, we cannot estimate the first component, the sum of large exposures. For the last four, we compare our estimations from 2011 with those reported by the supervisory authority to see if they are similar. Our estimations and the numbers reported by the supervisory authority resemble each other and so we are confident that our proxy for the Supervisory Diamond largely captures the same underlying bank quality. The Supervisory Diamond is a powerful proxy for bank quality in our sample because it has been constructed by the Danish Financial Supervisory Authority and hence customized to the Danish bank market.

The four relevant variables of the Supervisory Diamond are constructed as follows:

$$LoanGrowth_{i,t} = \frac{Loans_{i,t} - Loans_{i,t-1}}{Loans_{i,t-1}} \tag{4.1a}$$

[10] An enforcement action (Tilsynsreaktion) could be an enforcement notice, information of risk, a fine, or a police report (https://www.finanstilsynet.dk/da/Tal-og-fakta/Statistik-noegletal-analyser/Tilsynsdiamanten.aspx).

$$RealEstateExposure_{i,t} = \frac{MortgageLoans_{i,t}}{Loans_{i,t}} \tag{4.1b}$$

$$FundingRatio_{i,t} = \frac{Loans_{i,t}}{Deposits_{i,t} + Equity_{i,t}} \tag{4.1c}$$

$$LiquidityCoverage_{i,t} = \frac{CashAndEquivalents_{i,t}}{Deposits_{i,t} + CurrentLiabilities_{i,t}} \tag{4.1d}$$

Since the Danish Financial Supervisory Authority judges these four variables independently, we choose to do the same instead of collapsing them into one composite measure. Low (high) values of *LoanGrowth*, *RealEstateExposure*, *FundingRatio* (*LiquidityCoverage*) indicate high quality.

CAMELS Ratings Our second measure of quality is a proxy for the CAMELS ratings, which is inspired by Duchin and Sosyura (2014). This regulatory rating system rates banks on six dimensions: **C**apital adequacy, **A**sset quality, **M**anagement, **E**arnings, **L**iquidity, and **S**ensitivity to market risk.

$$CAMELS = C + (A * -1) + ME + L + S \tag{4.2}$$

Where C is total capital ratio; A is non-performing loans scaled by net loans; ME is net income scaled by total assets; L is cash scaled by total deposits; and S is current assets less current liabilities scaled by total assets. Higher values of CAMELS indicate higher bank quality.

Accounting Quality Our final measures of bank quality are two accounting quality measures, namely discretionary loan loss provisions (LLP) and security gains and losses (SGL), respectively. Loan loss provisions arise from bank managers' estimation of loan losses on the balance sheet date and are recognized as an expense account (Gebhardt and Novotny-Farkas, 2011). Loan loss accounting is interesting in an earnings management context since it has material effects on banks' earnings and balance sheet amounts and requires a substantial degree of estimation and judgement (Nichols et al., 2009).[11]. We follow Beatty et al.

[11]Previous research has found evidence of both capital management, i.e., increasing LLP to boost regulatory capital (Moyer (1990), Scholes et al. (1990), and Ahmed et al. (1999)) and earnings management, i.e., increasing (decreasing) LLP to lower (boosting) earnings (Collins et al. (1995) and Anandarajan et al. (2007)) As discussed by Wall and Koch (2000), exercising discretion beyond what the standard prescribes is not necessarily manipulation. Building up loan loss allowance during good times and using part of the increase to absorb losses in bad times is not necessarily to income manipulate from a regulatory perspective.

(2002) and Cornett et al. (2009) in separating the discretionary and non-discretionary parts of LLP as follows, with standard errors clustered by year:

$$\begin{aligned} LLP_{i,t} =& \beta_0 + \beta_1 SizeBank_{i,t} + \beta_2 \Delta NPL_{i,t} \\ &+ \beta_3 LLR_{i,t} + \beta_4 Loans_{i,t} + \mu_{i,t} \end{aligned} \tag{4.3}$$

Where *LLP* is the loan loss provision scaled by gross loans; *SizeBank* is the natural logarithm of bank assets; *NPL* is non-performing loans scaled by gross loans; *LLR* is the loan loss reserve scaled by gross loans; and *Loans* is the natural logarithm of gross loans; and other variables are as previously defined. The absolute value of the residual from Equation 4.3 is the measure of discretionary LLP and thus captures the amount of loan loss provisions not explained by non-performing loans, loan loss reserve, and total loans. High values of discretionary LLP indicate low bank quality.

Our second measure of quality is the discretionary realization of security gains and losses (SGL). SGLs reflect the accounting gain or loss that arises when a bank sells an investment security at a price different from the book value (Warfield and Linsmeier, 1992). Realizing security gains and/or postponing security losses increases net income and bolsters regulatory capital. Since divesting of financial securities is discretionary to a large extent, bank managers have the ability to influence reported accounting income by timing the sales of securities (Barth et al., 1990). We again follow Beatty et al. (2002) and Cornett et al. (2009) in separating SGLs in their discretionary and non-discretionary part in estimating the following regression (standard errors clustered by year):

$$RSGL_{i,t} = \beta_0 + \beta_1 SizeBank_{i,t} + \beta_2 USGL_{i,t} + \mu_{i,t} \tag{4.4}$$

Where *RSGL* is unrealized security gains and losses scaled by total assets; *SizeBank* is the natural logarithm of total assets; and *USGL* is unrealized security gains and losses scaled by total assets. As was the case above, the absolute magnitude of the residual from Equation 4.4 is the measure of discretionary SGL, where higher values indicate lower bank quality.

To obtain a composite measure of bank quality we create annual percentile ranks for all measures and then average them, in accordance with previous literature (e.g., Bushman et al. (2004)). In particular, each of the seven variables (*CAMELS*, *LoanGrowth*, *RealEstate-Exposure*, *FundingRatio*, *LiquidityCoverageRatio*, *DiscretionaryLLP*, and *Discretionary SGL*) are

Table 4.2: Estimation of Bank Quality Measures

Bank Quality	Variables	Estimation
Supervisory Diamond	Loan Growth	Annual %-change in loans
	Real Estate Exposure	Mortgage Loans/Loans
	Funding Ratio	Loans/(Deposits+Equity)
	Liquidity Coverage	Cash/(Deposits+Curr. Liabilities)
CAMELS	Capital Adequacy	Capital Ratio
	Asset Quality	Non-performing loans/Total loans
	Management, Earnings	Net income/Total assets
	Liquidity	Cash/Deposits
	Sensitivity to risk	(Curr. assets-Curr. liabilities)/Total assets
Accounting Quality	Discretionary LLP	Equation 4.3
	Discretionary SGL	Equation 4.4

The table shows how each of the three parts of the overall composite measure bank quality is estimated.

divided in percentile ranks each year such that higher values indicate higher quality on all metrics.[12] Our overall measure of bank quality, *BankQuality*, is then the annual averages of these ranks for each bank. In other words, *BankQuality* is a composite measures of the annual estimates of the three measures of bank quality, Supervisory Diamond, CAMELS, and accounting quality. These three measures should not be considered substitutes since they capture three distinctive features of bank quality. We acknowledge that the three measures of bank quality may not fully capture the overall quality of the bank with relation to our hypothesis that good banks select the good customers due to the inherent problems of measuring the screening and monitoring carried out by the banks. Our proxies of quality therefore rely on an assumption of a spill-over effect of "good banks" in terms of financial robustness and accounting quality on their corporate customers.

4.3.3 Descriptive Statistics

Table 4.3 tabulates simple descriptive statistics for the firms in our sample, divided in the lower and higher median of *BankQuality*. Bank quality and bank size are positively associ-

[12] That is, ranks are descending in absolute values of *LoanGrowth*, *RealEstateExposure*, *FundingRatio*, *DiscretionaryLLP*, and *DiscretionarySGL*.

ated such that large banks on average are of higher quality. With this in mind, we see that our sample confirms previous evidence that small banks mostly lend to small firms and and large banks lend to large firms (Berger et al., 2005; Carter et al., 2004), since the corporate customers of high quality banks are larger than those of low quality banks measured both with total bank assets and number of bank employees. Customers of high quality banks also seem to perform better, but this is likely to be correlated with the size differences. Also note that the corporate customers on average have negative growth, which is, however, due to huge annual fluctuations as also evident from the large standard errors. Recall that the firms in the sample are mainly SMEs and for such small firms a single event, such as a new client or a lost order, can have major impact.

Table 4.3: Sample Description

	High Quality Bank			Low Quality Bank		
	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median
Assets	50,047	144,141	9,016	35,413	112,367	7,558
Revenue	157,755	400,506	14,222	84,567	285,347	5,212
ROA	0.0527	0.1520	0.0461	0.0466	0.1525	0.0396
ROE	0.2047	0.7997	0.1384	0.1822	0.7711	0.1124
DebtAssets	0.5651	0.3137	0.5982	0.5205	0.3393	0.5619
DebtEquity	2.8368	7.7631	1.3308	2.8835	8.0280	1.1081
Growth	-0.0583	5.8290	-0.2052	-0.1530	6.0687	-0.2727
Employees	44.7	260.2	11.0	32.8	225.5	9.0

Statistics for all firms in the entire sample period. All variables except employees have been winsorized at the 1st and 99th percentile, respectively. In millions EUR.
Assets is total firm assets; *Revenue* is total revenue; *ROA* is net income scaled by total assets; *ROE* is net income scaled by total equity; *DebtAssets* is the sum of short- and long-term debt scaled by total assets; *DebtEquity* is the sum of short- and long-term debt scaled by total equity; *Growth* is the annual change in firm net income; *Employees* is the number of employees.

Table 4.4 shows annual correlations between the ranked bank quality proxies. Recall from Section 4.3.2 that we do not expect those measures to be substitutes, instead they each capture distinct components of the overall quality. Therefore it is not surprising that some of the metrics are negatively correlated. For instance, the negative correlation between *FundingRatio* and *LiquidityCoverage* points at the well-known trade-off between cash holding and loan output (see, e.g., Holmstrom and Tirole (1997)), while the negative correlation between *RealEstateExposure* and *CAMELS* implies that growth in lending stems from other sources

than mortgage. Note also that the two measures of accounting quality, *DiscSGL* and *DiscLLP* are negatively correlated with each other, confirming that it gives the best picture of bank quality to include them separately in the composite measure. Discretionary loan loss provisions is positively correlated with two other quality measures from the Supervisory Diamond measuring the lending level (*RealEstateExposure* and *FundingRatio*), but not *LoanGrowth*. This shows that high levels of lending per se do not lead to low accounting quality measured with discretionary loan loss provisions. The reason is that the level of loans is effectively controlled for in the expectation model of loan loss provisions (Equation 4.3). So if the level of lending is high (which is the case if *LoanGrowth* is high) and loan loss provisions not overstated, the residual from Equation 4.3 is small, indicating high accounting quality. Overall, the fact that the seven different quality measures are not perfectly aligned reassure us that we are right in including several measures of the overall bank quality since they do indeed capture different components of this broad concept.

Table 4.4: Correlations of Bank Quality Measures

	Loan-Growth	RealEstate-Exposure	Funding-Ratio	Liquidity-Coverage	CAMELS	DiscSGL	DiscLLP
LoanGrowth	1	-0.4964	0.1076	0.0158	0.1709	0.0027	-0.1831
RealEstateExposure		1	0.5895	0.4787	-0.5759	-0.4979	0.9665
FundingRatio			1	-0.2021	-0.2126	-0.4699	0.5484
LiquidityCoverage				1	0.6208	0.2985	0.6769
CAMELS					1	0.4003	-0.1235
DiscSGL						1	-0.9580
DiscLLP							1

LoanGrowth is the annual percentage change in total loans; *RealEstateExposure* is mortgage backed up loans scaled by total loans; *FundingRatio* is total loans scaled by total equity; *LiquidityCoverage* is cash and equivalents, scaled by current liabilities; *CAMELS* is from Equation 4.2; *DiscLLP* is from Equation 4.3; and *DiscSGL* is from Equation 4.4. All variables are ranked values and Pearson correlations are annual.
All values are winsorized at the 1st and 99th percentile, respectively.

4.4 Relation Between Bank Quality and Firm Performance

4.4.1 Methodology

Recall that H1a predicts that firms with a high quality bank have higher performance, because high quality banks have better monitoring skills. To test the relation between bank quality and firm performance we estimate the following regression with firm fixed effects and year controls:

$$\begin{aligned} FirmROA_{i,t} =& \beta_0 + \beta_1 BankQuality_{i,t} + \beta_2 FirmSize_{i,t} + \beta_3 FirmGrowth_{i,t} + \\ & \beta_4 FirmLev_{i,t} + \beta_5 BankSize_{i,t} + \beta_6 BankROA_{i,t} + \beta_7 BankLev_{i,t} + \\ & \beta_8 Crisis_{i,t} + \mu_{i,t} \end{aligned} \tag{4.5}$$

Where *FirmROA* is firm net income scaled by total firm assets; *BankQuality* is the composite measure of bank quality, consisting of the average ranked values of Supervisory Diamond (Equations 4.1a to 4.1d), CAMELS rating (Equation 4.2), and accounting quality (Equations 4.3 and 4.4); *FirmSize* is the natural logarithm of firm assets; *FirmGrowth* is the annual percentage change in firm net income; *FirmLev* is the sum of short- and long-term firm debt scaled by total firm assets; *BankSize* is the natural logarithm of bank assets; *BankROA* is bank net income scaled by total bank assets; *BankLev* is bank long-term debt scaled by bank equity; *Crisis* is an indicator variable equalling 1 if the year is 2008 and after, 0 otherwise.

The coefficient on β_1 is the variable of interest in Hypothesis 1a. Following the intuition outlined in Section 4.2 we expect a positive coefficient, such that higher bank quality is associated with higher firm performance. We follow Fok et al. (2004) and use ROA to measure firm performance because it is independent of the firm's liability structure and is a better performance measure than ROE, which is more suitable for all-equity firms.[13] The remaining variables are included to control for other factors that influence firm performance. Beyond standard firm-specific variables such as growth and leverage we also

[13] We have also used an alternative performance measure, RONA, which is defined as net income divided by fixed assets and net working capital. This yielded similar results.

include bank-specific variables, because our research question rests on the assumption that bank characteristics have directly impacts firm performance.[14] Dass and Massa (2011) and Gambini and Zazzaro (2013), among others, also include bank variables in firm performance regressions. Firm-fixed effects control for stationary firm-specific effects influencing performance. Finally, we include the indicator variable *Crisis* as an additional control for the financial crisis beyond our year controls.

When isolating the effect of bank quality on their customers' performance our main concern is that the match between a firm and a bank is non-random. In particular, the independent variables in Equation 4.5 may determine firm performance and at the same time be associated with the bank-firm match, for instance if firms with better prospects choose high quality banks. If this is the case, the variable bank quality is endogenous which can lead to inconsistent estimates (Heij et al., 2004).[15] Our research design attempts to alleviate this endogeneity. To address this concern we apply an instrumental variable (IV) approach, where we need instrumental variables that determine the bank-firm match, but are independent of the firm's future performance, i.e., are correlated with the endogenous variable (*BankQuality*), but uncorrelated with the variable of interest (*FirmROA*). We choose two instruments based on previous literature (e.g., Knyazeva and Knyazeva (2012); Bushman and Wittenberg-Moerman (2012); Ross (2010), namely the proximity of the firm to the bank head quarters (*Local*) and the concentration of banks in the firm's local area (*NBanks*). These two variables are suitable instruments for two reasons: First, the bank-firm match is likely to be dependent on the proximity between the firm and its bank, as well as on the supply of banks, i.e., the bank concentration, in the firm's local area.[16] Second, it is highly unlikely that each firm's proximity to its bank or the concentration of banks in the firm's area determines its future performance. The instrumental variables are constructed as follows: A

[14]Even though we include a number of different bank-specific variables, there is no multicollinearity in the equation. The mean variance inflation factor (VIF) is 2.39 and no individual VIF exceeds 6.4.

[15]A Hausman test shows that the variable *BankQuality* is indeed endogenous.

[16]Unfortunately, our data does not allow us to determine if the collaboration between a firm and its bank occurs at head quarters or local branch level. However, we still believe that the proximity instrument sufficiently explains part of the bank-firm match. Gambini and Zazzaro (2013) use an identical instrumental variable.

bank is considered *Local* if it is located in the same or an adjacent four-digit zip code region,[17] while the number of banks in the firm's area, *NBanks*, is the number of banks within the same one-digit zip code scaled by the total number of banks in that year.

To model the bank-firm match, the following first stage regression is estimated with the two instruments included as regressors to determine bank quality:

$$\begin{aligned} BankQuality_{i,t} = &\beta_0 + \beta_1 FirmSize_{i,t} + \beta_2 FirmGrowth_{i,t} + \beta_3 FirmLev_{i,t} + \\ &\beta_4 BankSize_{i,t} + \beta_5 BankROA_{i,t} + \beta_6 BankLev_{i,t} + \\ &\beta_7 Crisis_{i,t} + \beta_8 NBanks_{i,t} + \beta_9 Local_{i,t} + \mu_{i,t} \end{aligned} \tag{4.6}$$

Where *NBanks* is the number of banks in the firm's area scaled by the total number of banks in year t; *Local* is an indicator variable equalling 1 if the firm and its banks are located within the same region, 0 otherwise; and other variables are as previously defined.

The right-hand side of Equation 4.6 consists of two parts: First, the factors that determine the bank-firm match and at the same time may be associated with the firm's future performance (β_1 to β_7). For instance, the growth of a firm determines the performance of the firm and may also determine which bank the firm chooses. Second, the factors that determine the bank-firm match, but are independent of the firm's future performance (β_8 to β_9). The predicted values from the first stage regression (Equation 4.6) are then included in the second stage regression (Equation 4.5) which excludes the two instruments, thus effectively controlling for the endogenous bank-firm match.

To test Hypothesis 1b, that the effect of bank quality on firm performance is more pronounced for firms with poor alternative monitoring, we re-estimate Equation 4.6 four times, including the four different measures of monitoring described in Section 4.2. The regressions are still based on the predicted values from the first stage regression (Equation 4.6) to

[17] Specifically, a local bank is located either in the exact same four-digit zip code or within $\pm$ 5% of that zip code.

effectively control for the endogenous bank-firm match.[18]

$$\begin{aligned} FirmROA_{i,t} =& \beta_0 + \beta_1 BankQuality_{i,t} + \beta_2 Monitoring_{i,t} + \beta_3 Monitoring* \\ & BankQuality_{i,t} + \beta_4 FirmSize_{i,t} + \beta_5 FirmGrowth_{i,t} + \\ & \beta_6 FirmLev_{i,t} + \beta_7 BankSize_{i,t} + \beta_8 BankROA_{i,t} + \\ & \beta_9 BankLev_{i,t} + \beta_{10} Crisis_{i,t} + \mu_{i,t} \end{aligned} \tag{4.7}$$

Where *Monitoring* is one of four measures of monitoring: *Duality* is an indicator variable equaling 1 if the CEO of the firm is also chairman of the board, 0 otherwise; *SmallOwnership* is an indicator variable equaling 1 if the CEO of the firm owns no more than 50% of the firm, 0 otherwise; *Multiplicity* is an indicator variable equaling 1 if the firm has multiple banks, 0 otherwise; $\Delta Auditor$ is an indicator variable equaling 1 if the firm changes auditor, 0 otherwise; and other variables are as previously defined.

H1b predicts a positive coefficient on β_3, the interaction term between *Monitoring* and *BankQuality*, indicating that the effect of bank quality on firm performance is exacerbated if alternative monitoring of the firm is weak.

Since our panel data set is unbalanced, an additional concern is that sample selection bias exists. Sample selection bias arises if the observations in the dataset are not random, for example if firms that fall out of the sample are only poor performing firms. We test formally for this as suggested by Verbeek and Nijman (1992) and find that there is no sample selection bias in the sample.[19]

4.4.2 Results

The result of the first stage regression, Equation 4.6, is tabulated in Panel A of Table 4.5, which instruments the bank-firm match with two instruments, *NBanks* and *Local*. We note that both instruments are significantly related to bank quality, indicating that they are strong instruments. This is underlined by the two specification tests, the F-statistic of weak

[18] Results of the first stage regressions are not tabulated for H1b.

[19] Specifically, all regressions are estimated with three different additional regressors: A variable counting the time-series of each firm, as well as two indicator variables showing whether the time-series of each firm starts (stops) later (earlier) than the entire sample period.

instruments and the Sargan-Hansen Test, which show that the instruments are both jointly and separately (untabulated) significant in explaining the bank-firm match.[20] Turning to the signs of the instruments we can see that both are negative. This implies that if there are many banks in the firm's area (*NBanks*) or if the bank is located close to the firm (*Local*), it is less likely that a firm has a high quality bank. Both of these signs make intuitive sense: If there is a high concentration of banks in the firm's area, the competition is higher and as a result some banks offer more favorable terms to the firm. These terms are likely to be more important to the firm than the quality of the bank. Similarly, a firm may value physical proximity of the bank over the quality of the bank.

The result of the second stage performance regression, Equation 4.5, is tabulated in Panel B of Table 4.5. Recall that a positive coefficient was predicted on *BankQuality*, implying that high quality banks have customers with higher performance. However, we cannot maintain H1 since the coefficient on *BankQuality* is insignificant and in fact negative. We propose two alternative explanations for this. First, it may be that bank quality as we measure it, namely a composite measure of financial stability, CAMELS ratings, and accounting quality, inadequately captures a bank's monitoring efforts. Second, it could also be that our measure of bank quality does in fact measure bank monitoring efforts correctly, but that bank monitoring does not explain the performance of their customers. This could be because banks care more about other firm characteristics, such as repayment ability. If this is the case, ROA inadequately captures the dimension of firm performance that engage banks. We cannot disentangle these alternative explanations. In addition, the sample period 2000 to 2011 was marked by large instabilities in the financial sector, which may influence the results. This possibility is further examined when testing Hypothesis 1b below.

The result of H1b is tabulated in Table 4.6 (result of the first stage regression is the same as Panel A, Table 4.5). Recall that we expected a positive coefficient on the interaction between *BankQuality* and each of the four proxies for monitoring, implying that the effect of bank quality on firm performance is boosted when alternative monitoring is weak. While we do observe positive signs, the effects on firm performance are insignificant and hence

[20] A third instrument measuring the extent to which small (large) banks have small (large) customers was jointly, but not separately, significant and was therefore excluded from the model.

Table 4.5: Relation between Bank Quality and Firm Performance *(H1a)*

Panel A: First stage regression			
	Estimate	Robust Std.Err.	t-stat
FirmSize	0.208*	0.113	1.84
FirmGrowth	-0.001	0.001	-0.58
FirmLev	-0.093	0.067	-1.39
BankSize	-0.843***	0.137	-6.19
BankROA	-267.789***	3.88	-69.02
BankLev	0.648***	0.057	11.48
Crisis	-1.131***	0.272	-4.16
NBanks	-0.184***	0.013	-15.02
Local	-3.957***	0.527	-7.52
Joint F-test			147.07
Sargan-Hansen p-value			28.61%
R^2			5.53%
Firm years			162,421
Panel B: Second stage regression			
	Estimate	Robust Std.Err.	t-stat
BankQuality	-0.004	0.003	-1.25
FirmSize	0.092***	0.019	4.95
FirmGrowth	0.001*	0.001	1.85
FirmLev	-0.147*	0.081	-1.82
BankSize	0.003	0.004	0.62
BankROA	-0.663	0.686	-0.97
BankLev	-0.002	0.003	-0.63
Crisis	-0.049***	0.009	-5.89
R^2			2.18%
Firm years			162,421

Panel A shows the results of the first stage regression Equation 4.6 instrumenting *BankQuality* with the two exclusionary instruments *NBanks* and *Local*. Panel B shows the results of the second stage regression Equation 4.5 answering H1a that high bank quality is positively associated with high firm performance.
Firm fixed effects, year controls, and robust standard errors clustered by firm.
*, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively.

Table 4.6: The Effect of Monitoring on the Relation between Bank Quality and Firm Performance *(H1b)*

	Estimate (Std.Err.)	Estimate (Std.Err.)	Estimate (Std.Err.)	Estimate (Std.Err.)
BankQuality	-0.004	-0.005	-0.004	-0.003
	(0.003)	(0.003)	(0.003)	(0.002)
Duality	-0.202*			
	(0.117)			
Duality*BankQuality	0.003			
	(0.003)			
SmallOwnership		-0.216		
		(0.149)		
SmallOwnership*BankQuality		0.005		
		(0.004)		
Multiplicity			-0.2	
			(0.136)	
Multiplicity*BankQuality			0.004	
			(0.003)	
ΔAuditor				-0.144
				(0.109)
ΔAuditor*BankQuality				0.003
				(0.003)
FirmSize	0.088***	0.089***	0.089***	0.082***
	(0.02)	(0.02)	(0.02)	(0.02)
FirmGrowth	0.001***	0.001**	0.001***	0.001**
	(0.001)	(0.001)	(0.001)	(0.001)
FirmLev	-0.132*	-0.132*	-0.132*	-0.292***
	(0.077)	(0.077)	(0.077)	(0.071)
BankSize	-0.002	-0.003	-0.001	-0.003
	(0.006)	(0.006)	(0.005)	(0.006)
BankROA	-0.986	-0.824	-0.977	-0.804
	(0.776)	(0.63)	(0.749)	(0.672)
BankLever	-0.001	0.001	-0.001	0.001
	(0.004)	(0.004)	(0.003)	(0.004)
Crisis	-0.052***	-0.051***	-0.053***	-0.051***
	(0.009)	(0.009)	(0.009)	(0.009)
R^2	1.74%	1.65%	1.74%	3.69%
Firm years	149,257	149,257	149,257	143,373

The table shows the results of Equation 4.7 answering H1b that the effect of bank quality on firm performance is exacerbated by poor alternative monitoring.
Firm fixed effects, year controls, and robust standard errors (in parentheses) clustered by firm.
*, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively.

we also cannot maintain H1b.

While we could not maintain H1b, we observe that the indicator variable *Crisis* is negative and strongly significant in all four model specifications, showing that firm performance is lower in the crisis period as expected. To dig deeper into this finding we partition the sample according to the crisis period and re-estimate Equation 4.7 in these two subsamples, 2000-2007 and 2008-2011. We do this because the effect of bank quality on firm performance is likely to be affected by the change in macroeconomic factors and the supply of capital in the bank market during the financial crisis. A situation with sufficient capital (pre-crisis) or scarce capital (during the crisis) may influence the bank-firm relationship. In addition, low availability of liquidity during a crisis may also force firms to seek alternative financing sources.[21] The period before the crisis (2000 to 2007) shows similar results as those tabulated in Table 4.6 and is therefore not shown. However, the crisis period (2008 to 2011) shows some very interesting insights which are tabulated in Table 4.7. Specifically, the four alternative monitoring effects we hypothesized are all clear and economically significant in the crisis period, suggesting that in times of economic distress the trade-off between different monitoring mechanisms is stronger.[22] There are two possible channels through which bank quality becomes more important for firms with poor alternative monitoring mechanisms in the financial crisis, namely bank and firm specific channels. We elaborate on the two channels below.

First, it is natural to expect that banks behave differently in times of financial turmoil. For instance, bank profitability (Bolt et al., 2012; Fahlenbrach et al., 2012) and liquidity (Allen and Carletti, 2010) drop significantly in crisis periods, which may in turn lead to an increased focus on efficiency and customers' repayment ability. This would boost the banks' monitoring efforts. In addition, Marini (2013) shows that the value of banking relationships increases for banks with increased bankruptcy risk, which could be the case for several of the banks in the crisis period. It is therefore likely that the banks were more

[21] Such as trade credit, see Petersen and Rajan (1997).

[22] Recall that the regression is estimated controlling for year effects and therefore the results are not driven by macroeconomic factors influencing the variables such as the bank quality being consistently worse in the crisis period. We have also explicitly tested for survivorship bias which is not present in our sample and hence does not drive the results either.

Table 4.7: The effect of Monitoring on the Relation between Bank Quality and Firm Performance, Crisis Period only *(H1b)*

	Estimate (Std.Err.)	Estimate (Std.Err.)	Estimate (Std.Err.)	Estimate (Std.Err.)
BankQuality	-0.008*	-0.013**	-0.009*	-0.009**
	(0.004)	(0.006)	(0.005)	(0.005)
Duality	-0.456**			
	(0.219)			
Duality*BankQuality	0.01**			
	(0.005)			
SmallOwnership		-0.665**		
		(0.314)		
SmallOwnership*BankQuality		0.014**		
		(0.007)		
Multiplicity			-0.437*	
			(0.248)	
Multiplicity*BankQuality			0.01*	
			(0.006)	
ΔAuditor				-0.492**
				(0.246)
ΔAuditor*BankQuality				0.01**
				(0.005)
FirmSize	0.175***	0.176***	0.175***	0.175***
	(0.032)	(0.032)	(0.033)	(0.035)
Firmgrowth	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
FirmLev	-0.486***	-0.487***	-0.486***	-0.487***
	(0.085)	(0.084)	(0.085)	(0.086)
BankSize	0.018**	0.015**	0.021**	0.016**
	(0.008)	(0.007)	(0.009)	(0.007)
BankROA	-0.086	-0.058	-0.113	0.014
	(0.168)	(0.163)	(0.178)	(0.161)
BankLev	-0.016**	-0.015***	-0.018**	-0.015**
	(0.007)	(0.005)	(0.008)	(0.006)
R^2	9.05%	6.10%	8.34%	8.58%
Firm years	71,792	71,792	71,792	68,255

The table shows the results of Equation 4.7 estimated in the crisis period only (2008-2011) answering H1b that the effect of bank quality on firm performance is exacerbated by poor monitoring.
Firm fixed effects, year controls, and robust standard errors (in parentheses) clustered by firm.
*, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively.

diligent about their customers in that period, which in turn leads to better performance for these customers.

Second, firms were on average more levered during the crisis (Allen and Carletti, 2010), which increases the incentives for a large debt holder like a bank to monitor the management (Hillier et al., 2008). In addition, Lee and Mullineaux (2004) find that loan syndicates increase monitoring efforts when borrowers are in financial distress and Fok et al. (2004) show that bank-firm relationships become tighter during a crisis and therefore the governance substitution effect may be stronger in 2008 to 2010. Collectively, the previous literature listed here points at a mechanism where lenders monitor borrowers more closely in times of financial turmoil.

The signs on the monitoring indicators alone are negative, which is natural as firms with great agency problems do not perform well (Core et al., 1999). Another interesting observation is the fact that the explanatory power of the model is considerably larger in the crisis period, rising from an average of just over 2% in the full sample period to over 8% in the crisis period. One reason is that the booming period before 2008 was characterized by extreme firm performances that are not explained by the accounting fundamentals in our model.

4.5 Relation Between Bank Quality and the Bank-Firm Relationship

4.5.1 Methodology

To test the final hypothesis that bank quality affects the strength of the bank-firm relationship, we first delete all observations involving a bank merger, an acquisition, or a bank failure. We do this because these three instances are purely exogenous bank changes beyond the control of both the bank and the firm. Instead, we attempt to isolate how the quality of a particular bank affects the likelihood of a firm forming a relationship with that bank. Using the number and length of bank relation as proxies for the strength of the banking

relationship, we test H2 with the following two logistic regressions:[23]

$$\begin{aligned} P(Multiplicity)_{i,t} =& \beta_0 + \beta_1 BankQuality_{i,t} + \beta_2 FirmROA_{i,t} + \beta_3 FirmSize_{i,t} + \\ & \beta_4 FirmGrowth_{i,t} + \beta_5 FirmAge_{i,t} + \beta_6 FirmEmployees_{i,t} + \\ & \beta_7 BankSize_{i,t} + \beta_8 BankROA_{i,t} + \beta_9 BankLev_{i,t} + \\ & \beta_{10} BankNPL_{i,t} + \beta_{11} \Delta BankAssets_{i,t} + \mu_{i,t} \end{aligned} \tag{4.8a}$$

$$\begin{aligned} P(Duration)_{i,t} =& \beta_0 + \beta_1 BankQuality_{i,t} + \beta_2 FirmROA_{i,t} + \beta_3 FirmSize_{i,t} + \\ & \beta_4 FirmGrowth_{i,t} + \beta_5 FirmAge_{i,t} + \beta_6 FirmEmployees_{i,t} + \\ & \beta_7 BankSize_{i,t} + \beta_8 BankROA_{i,t} + \beta_9 BankLev_{i,t} + \\ & \beta_{10} BankNPL_{i,t} + \beta_{11} \Delta BankAssets_{i,t} + \mu_{i,t} \end{aligned} \tag{4.8b}$$

Where *Multiplicity* is an indicator variable equaling 1 if the firm has more than one bank, 0 otherwise; *Duration* is an indicator variable equaling 1 if the firm has a bank relationship that has lasted longer than the annual average relationship for the entire sample, 0 otherwise; *FirmAge* is the natural logarithm of firm age; *FirmEmployees* is the natural logarithm of the number of firm employees; *BankNPL* is non-performing loans scaled by gross loans; Δ*BankAssets* is the annual percentage change in bank assets; and other variables are as previously defined.

The variables of interests are the coefficients on β_1 in Equations 4.8a and 4.8b. Recall that we made no prediction on the sign of the effect between bank quality and the strength of the banking relationship, but defined a strong bank-firm relationship as a long (*Duration* equal to 1) and single (*Multiplicity* equal to 0) relationship. As a result, a negative (positive) coefficient on *BankQuality* in Equation 4.8a (4.8b) implies that firms with high quality banks form stronger relationships to their banks, and vice versa.

We include several control variables that may determine the decision to take on an additional bank and the length of the bank-firm relationship. Firm age is likely to influence

[23] Dass and Massa (2011) measure the strength of bank-firm relationship as the proximity between the firm and the bank as well as the specific loan size. We do not replicate their research design because first, we treat bank-firm proximity as exogenous and use it as an instrumental variable, and second, we unfortunately do not have access to specific loan data.

both the number of bank relationships and the length of the relationships, because first, more profitable firms are more likely to survive, and second, older firms may have lower communication costs (Degryse and Ongena, 2001). In addition, Farinha and Santos (2002) find that older and larger firms measured with the number of employees are more likely to have multiple banks.[24] Non-performing loans and growth in bank assets are included to proxy for bank fragility (Detragiache et al., 2000; Farinha and Santos, 2002). We are again concerned that the bank-firm match is non-random, which would make *BankQuality* endogenous. This is the case if the same unobserved effects that lead to a specific bank-firm match also determine the likelihood of several bank connections or the length of the connection. As an example, a distressed firm may choose a low quality bank because the firm knows its own true performance and may also decide to take on an additional bank to avoid hold-up problems. We attempt to control for these unobserved effects by again using the same two instrumental variables that determine the bank-firm match, but are unrelated to the number and length of bank relationships, namely *NBanks* and *Local*. Hence, we again use a two-stage IV regression, where the first stage is estimated as follows:

$$\begin{aligned} BankQuality_{i,t} =& \beta_0 + \beta_1 FirmROA_{i,t} + \beta_2 FirmSize_{i,t} + \beta_3 FirmGrowth_{i,t} + \\ & \beta_4 FirmAge_{i,t} + \beta_5 FirmEmployees_{i,t} + \beta_6 BankSize_{i,t} + \\ & \beta_7 BankROA_{i,t} + \beta_8 BankLev_{i,t} + \beta_9 BankNPL_{i,t} + \\ & \beta_{10} \Delta BankAssets_{i,t} + \beta_{11} NBanks_{i,t} + \beta_{12} Local_{i,t} + \mu_{i,t} \end{aligned} \tag{4.9}$$

Where all variables are as previously defined. We again estimate the first stage regression (Equation 4.9) and then use the predicted values in the second stage regressions (Equations 4.8a and 4.8b) while excluding the instruments.

4.5.2 Results

The result of the first stage matching regression is shown in Table 4.8. Recall that the sample is different from the one used in the first set of hypotheses because all bank defaults,

[24] While *FimSize* and *FirmEmployees* are of course positively correlated, the correlation coefficient is not high enough to create concerns about multicollinearity (ρ = 0.28).

Table 4.8: First Stage Regression *(H2)*

	Coef.	Robust Std. Err.	t-stat.
FirmROA	0.038	0.17	0.22
FirmSize	0.041	0.032	1.26
FirmGrowth	0.001	0.001	0.47
FirmAge	0.016	0.054	0.28
FirmEmployees	0.01	0.038	0.26
BankSize	-2.668***	0.176	-15.18
BankROA	-361.413***	15.638	-23.11
BankLev	1.809***	0.075	24.09
NPL	-207.738***	4.831	-43.00
ΔBankAssets	-0.003***	0.001	-2.95
NBanks	0.016***	0.006	3.01
Local	-2.526***	0.177	-14.29
Joint F-test			102.15
R^2			17.26%
Firm years			67,560

The table shows the results of the first stage regression Equation 4.9 instrumenting *BankQuality* with the two exclusionary instruments *NBanks* and *Local*.
Firm fixed effects, year controls, and robust standard errors (in parentheses) clustered by firm.
*, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively.

mergers, and acquisitions are deleted, which explains the large drop in the number of observations. It could also explain that the first instrumental variable measuring the number of banks in the firm's area, *NBanks*, has in fact now switched sign and is positively related to the likelihood of a firm having a high quality bank. The interpretation of this is that a firm is more likely to have a high quality bank if there are many banks in the firm's local area. *Local* has the same sign as before and both instruments are still both jointly and independently significant in determining the bank-firm match.

The results of the second stage regressions answering our final hypothesis are tabulated in Table 4.9. We see that firms with a high quality bank are more likely to have several banks (positive and significant coefficient of *BankQuality* on *Multiplicity*) and less likely to have a long-term relationship with their bank (negative and significant coefficient of *BankQuality* on *Duration*). Both of these significant findings hence suggest that firms with high quality banks have weaker bank-firm relationships. We also observe that poor performing firms

Table 4.9: The Effect of Bank Quality on Bank Multiplicity and Duration *(H2)*

	Multiplicity			Duration		
	Coef.	Std. Err.	t-stat.	Coef.	Std. Err.	t-stat.
BankQuality	0.085*	0.047	1.81	-0.091***	0.032	-2.87
FirmROA	-0.118	0.083	-1.41	0.17***	0.065	2.6
FirmSize	0.363***	0.021	17.09	-0.021	0.022	-0.97
FirmGrowth	0.001	0.001	0.23	0.001*	0.001	1.47
FirmAge	0.276***	0.035	7.85	2.695***	0.038	72.74
FirmEmployees	0.088***	0.024	3.72	-0.143***	0.025	-5.71
BankSize	0.360***	0.130	2.77	-0.18**	0.085	-2.12
BankROA	3.673	18.499	0.2	-31.321**	12.307	-2.54
BankLev	-0.089	0.088	-1.01	0.243***	0.060	4.11
NPL	3.978	9.987	0.4	-17.915***	6.758	-2.65
ΔBankAssets	0.001**	0.001	2.55	-0.009***	0.001	-25.66
Firm years			67,560			67,560
McFadden R^2			76.51%			82.85%

The table shows the results of Equations 4.8a and 4.8b answering H2a and H2b that bank quality affects the likelihood of having multiple banks and the length of the banking relationship.
Firm fixed effects, year controls, and robust standard errors (in parentheses) clustered by firm.
*, **, *** denote significant difference from 0 at the 10%, 5%, and 1% levels, respectively.

have weaker banking relationships, i.e., more banks (negative coefficient on *Multiplicity*) and shorter relationships (positive coefficient on *Duration*). These findings point at a mechanism where high quality banks force weak customers away and as a result financially constrained firms have several relationships and switch bank more often as suggested by Ongena and Smith (2001) and Farinha and Santos (2002). As noted by Boot (2000), a strong relation between the bank and the borrower facilitates monitoring and screening and can overcome problems of asymmetric information. The fact that high quality banks have weaker relations with their customers indicates that high quality banks do not need the proximity of relationship lending to assess the true quality of firms. In other words, their screening and monitoring are of high quality even though they do not have strong (single, long-lasting) relationships with their customers.

As expected, large and old firms are more likely to have multiple banks (according to Farinha and Santos (2002), Detragiache et al. (2000), and Degryse and Ongena (2001)).

Previous research has shown that relationship lending is usually offered by small banks (Berger et al., 2001), and since small banks have lower quality on average, this could explain part of the results.[25] However, we control explicitly for bank size and so this interpretation does not drive the entire result.

To test how sensitive our results are to the composite measure *BankQuality* we have estimated Equations 4.8a and 4.8b with each of the three individual portions of *BankQuality*, the Supervisory Diamond, CAMELS, and accounting quality. Across all estimations the results remain unchanged. It does seem as if the significance is mainly driven by the Supervisory Diamond, which we find reassuring since these metrics are tailored to the Danish banks of this study.

4.6 Conclusion

This paper examines the spill-over effect of banks on their corporate customers, in particular how the bank's own quality influences first, the performance of its customers and second, the relationship strength with its customers. We exploit unique Danish data that links each bank to its corporate customers to observe this mechanism.

In the first part of the paper we cannot document an association between bank quality and the performance of the corporate customers. This could either be because our measure of bank quality inadequately captures bank monitoring effects or because bank monitoring effects do not have a direct output effect on the customers. However, these monitoring effects become in fact very significant when alternative monitoring mechanisms are weak and when the economy is in distress, which tells us that bank monitoring is not static. Instead, it seems as if banks adapt their monitoring effects both across firms and across time such that monitoring effects are increased when agency costs are high and when the economy is in recession.

In the second part of the paper we provide clear evidence that bank quality influences the lending relationship between the bank and its customers. In particular, firms with high

[25] Because the tacit knowledge obtained about individual firms at branch level cannot be transferred to other parts of the banking organization.

quality banks are more likely to have several banks and shorter lending relationships. The same is the case for poorly performing firms, indicating that distressed firms may be forced away from high quality banks. This suggests that bank quality may contribute to the funding constraints of distressed firms, since high quality banks may decline new loans or only grant them at excessive costs.

The findings in this paper are of particular interest for bank regulators. The first part of this paper demonstrated a time- and firm-varying real effect on bank customers from the financial statement numbers used for bank regulation (e.g., capital and liquidity ratios). The second part of this paper extended our knowledge of the way in which banks contribute to the funding of small and medium sized firms.

Our inability to find a statistically significant relation between bank monitoring and firm performance, measured by return on assets, might be due to a situation where the banks focus their interest on outcomes other than pure performance when monitoring customers. As debt holders, banks are more concerned about a firm meeting its obligations and not defaulting rather than about the performance. It would therefore be quite interesting to test if bank quality explains other firm characteristics such as repayment ability or default probability. It would also be interesting to investigate the extent to which bank quality affects loan pricing and loan supply as previous research has given mixed results as to whether relationship lending increases or decreases loan rates. We leave these issues for future studies.

Appendix A

Earnings Quality Metrics

Metric	Estimation	Measure
The Jones Model *JONES*	$TA_{i,t} = \beta_0 \frac{1}{A_{i,t-1}} + \beta_1 \Delta REV_{i,t} + \beta_2 PPE_{i,t} + \beta_3 \rho(CFO_{i,t}) + \beta_4 TA_{i,t-1} + \mu_{i,t}$	$\lvert\mu\rvert$
The Modified Jones Model *MOD_JONES*	$TA_{i,t} = \beta_0 \frac{1}{A_{i,t-1}} + \beta_1 (\Delta REV_{i,t} - \Delta REC_{it}) + \beta_2 PPE_{i,t} + \beta_3 \rho(CFO_{i,t}) + \beta_4 TA_{i,t-1} + \mu_{i,t}$	$\lvert\mu\rvert$
The Performance-matched Modified Jones Model *PERFORM_JONES*	$TA_{i,t} = \beta_0 \frac{1}{A_{i,t-1}} + \beta_1 \Delta REV_{i,t} + \beta_2 PPE_{i,t} + \beta_3 ROA_{i,t} + \beta_4 \rho(CFO_{i,t}) + \beta_5 TA_{i,t-1} + \mu_{i,t}$	$\lvert\mu\rvert$
Dechow-Dichev Model *DD*	$\Delta WC_{i,t} = \beta_0 + \beta_1 CFO_{i,t-1} + \beta_2 CFO_{i,t} + \beta_3 CFO_{i,t+1} + \mu_{i,t}$	$\sigma(\mu)$
Modified Dechow-Dichev Model *MOD_DD*	$\Delta WC_{i,t} = \beta_0 + \beta_1 CFO_{i,t-1} + \beta_2 CFO_{i,t} + \beta_3 CFO_{i,t+1} + \beta_4 \Delta REV_{i,t} + \beta_5 PPE_{i,t} + \mu_{i,t}$	$\sigma(\mu)$
Magnitude of Accruals *MAG_ACC*	TA_{it}	
Change in Accruals *DELTA_ACC*	ΔTA_{it}	
Asymmetric Timeliness *TIMELY*	$\Delta NI_{i,t} = \beta_0 + \beta_1 NEGDUM_{i,t-1} + \beta_2 \Delta NI_{i,t-1} + \beta_3 (NEGDUM_{i,t-1} * \Delta NI_{i,t-1}) + \mu_{i,t}$	β_3
Variability of Earnings to Cash Flows *VAR_NI_CFO*	$\frac{\sigma(NI_{i,t})}{\sigma(CFO_{i,t})}$	

Continues on next page

Table A.1: Calculation of Earnings Quality Metrics - Continued from previous page

Metric	Estimation	Measure
Variability of Earnings *VAR_NI*	$\sigma(\Delta NI_{i,t})$	
Correlation between Accruals and Cash Flows *CORR_TA_CFO*	$\lvert\rho(\Delta TA_{i,t}, \Delta CFO_{i,t})\rvert$	
Persistence *PERSIST*	$NI_{i,t} = \phi_0 + \phi_1 NI_{i,t-1} + \mu_{i,t}$	$\lvert\phi\rvert$
Predictability *PREDICT*	$NI_{i,t} = \phi_0 + \phi_1 NI_{i,t-1} + \mu_{i,t}$	$\sigma(\phi)$

Appendix B

Correlation Matrices

Table B.1: Correlation Matrix of Earnings Quality Metrics for Restaters

	JONES	*MOD_ JONES*	*PERFORM_ JONES*	*DD*	*MOD_ DD*	*MAG_ ACC*	*DELTA_ ACC*	*TIMELY*	*VAR_NI_ CFO*	*VAR_NI*	*CORR_TA_ CFO*	*PERSIST*	*PREDICT*
JONES	1.0000 -	0.9629 (<.0001)	0.9985 (<.0001)	0.5567 (<.0001)	0.5504 (<.0001)	0.5008 (<.0001)	0.4172 (<.0001)	0.2467 (<.0001)	0.0421 (0.1606)	0.2828 (<.0001)	-0.0584 (0.0516)	-0.0060 (0.8429)	-0.0627 (0.0393)
MOD_JONES	0.9629 (<.0001)	1.0000 -	0.9609 (<.0001)	0.5881 (<.0001)	0.5808 (<.0001)	0.5225 (<.0001)	0.4292 (<.0001)	0.2515 (<.0001)	0.0393 (0.1907)	0.2748 (<.0001)	-0.0659 (0.0283)	-0.0084 (0.7834)	-0.0707 (0.0203)
PERFORM_JONES	0.9985 (<.0001)	0.9609 (<.0001)	1.0000 -	0.5570 (<.0001)	0.5505 (<.0001)	0.4821 (<.0001)	0.3970 (<.0001)	0.2494 (<.0001)	0.0272 (0.3648)	0.2595 (<.0001)	-0.0519 (0.0836)	-0.0067 (0.8273)	-0.0666 (0.0287)
DD	0.5567 (<.0001)	0.5881 (<.0001)	0.5570 (<.0001)	1.0000 -	0.9412 (<.0001)	0.5415 (<.0001)	0.5298 (<.0001)	0.3407 (0.5269)	0.0193 (<.0001)	0.4015 (0.2405)	-0.0393 (0.3247)	-0.0305 (0.2402)	-0.0363
MOD_DD	0.5504 (<.0001)	0.5808 (<.0001)	0.5505 (<.0001)	0.9412 (<.0001)	1.0000 -	0.5029 (<.0001)	0.4871 (<.0001)	0.2956 (<.0001)	0.0018 (0.9529)	0.3142 (<.0001)	-0.0443 (0.1471)	-0.0325 (0.2935)	-0.0455 (0.1406)
MAG_ACC	0.5008 (<.0001)	0.5225 (<.0001)	0.4821 (<.0001)	0.5415 (<.0001)	0.5029 (<.0001)	1.0000 -	0.7896 (<.0001)	0.2393 (<.0001)	0.1205 (<.0001)	0.6092 (<.0001)	-0.0736 (0.0101)	-0.0147 (0.6103)	0.0001 (0.9973)
DELTA_ACC	0.4172 (<.0001)	0.4292 (<.0001)	0.3970 (<.0001)	0.5299 (<.0001)	0.4871 (<.0001)	0.7896 (<.0001)	1.0000 -	0.1593 (<.0001)	0.1466 (<.0001)	0.8006 (<.0001)	-0.1008 (0.0004)	-0.0079 (0.7842)	0.0298 (0.3052)
TIMELY	0.2467 (<.0001)	0.2515 (<.0001)	0.2494 (<.0001)	0.3407 (<.0001)	0.2956 (<.0001)	0.2393 (<.0001)	0.1593 (<.0001)	1.0000 -	0.1558 (<.0001)	0.2799 (<.0001)	-0.1352 (<.0001)	0.0404 (0.1648)	0.0599 (0.0394)
VAR_NI_CFO	0.0421 (0.1606)	0.0393 (0.1907)	0.0272 (0.3648)	0.0193 (0.5269)	0.0018 (0.9529)	0.1205 (<.0001)	0.1466 (<.0001)	0.1558 (<.0001)	1.0000 -	0.2264 (<.0001)	-0.1534 (<.0001)	0.0069 (0.8114)	0.0629 (0.0302)
VAR_NI	0.2828 (<.0001)	0.2748 (<.0001)	0.2595 (<.0001)	0.4015 (<.0001)	0.3142 (<.0001)	0.6092 (<.0001)	0.8006 (<.0001)	0.2799 (<.0001)	0.2264 (<.0001)	1.0000 -	-0.1386 (<.0001)	-0.0045 (0.8748)	-0.0362 (0.2022)
CORR_TA_CFO	-0.0584 (0.0516)	-0.0659 (0.0283)	-0.0519 (0.0836)	-0.0358 (0.2405)	-0.0443 (0.1471)	-0.0736 (0.0101)	-0.1008 (0.0004)	-0.1352 (<.0001)	-0.1534 (<.0001)	-0.1386 (<.0001)	1.0000 -	-0.0227 (0.4357)	-0.2186 (<.0001)
PERSIST	-0.0060 (0.8429)	-0.0084 (0.7834)	-0.0067 (0.8273)	-0.0305 (0.3247)	-0.0325 (0.2935)	-0.0147 (0.6103)	-0.0079 (0.7842)	0.0404 (0.1648)	0.0069 (0.8114)	-0.0045 (0.8748)	-0.0227 (0.4357)	1.0000 -	-0.0326 (0.2515)
PREDICT	-0.0627 (0.0393)	-0.0707 (0.0203)	-0.0666 (0.0287)	-0.0363 (0.2402)	-0.0455 (0.1406)	0.0010 (0.9973)	0.0298 (0.3052)	0.0599 (0.0394)	0.0629 (0.0302)	0.0362 (0.2022)	-0.2186 (<.0001)	-0.0325 (0.2515)	1.0000 -

The table tabulates correlations for the earnings quality metrics (see Appendix A) for restaters in the entire sample period from 1990 to 2010. Pearson correlation coefficient in parentheses. For the variables *JONES*, *MOD_JONES*, *PERFORM_JONES*, *DD*, *MOD_DD*, *MAG_ACC*, *TIMELY* and *PREDICT*, higher values indicate lower quality. For the variables *VAR_NI_CFO*, *VAR_NI*, *CORR_TA_CFO*, and *PERSIST*, lower values indicate lower quality.

Table B.2: Correlation Matrix of Earnings Quality Metrics for Non-Restaters

	JONES	*MOD_ JONES*	*PERFORM_ JONES*	*DD*	*MOD_ DD*	*MAG_ ACC*	*DELTA_ ACC*	*TIMELY*	*VAR_NI_ CFO*	*VAR_NI*	*CORR_TA_ CFO*	*PERSIST*	*PREDICT*
JONES	1.000 -	0.9879 (<.0001)	0.9993 (<.0001)	0.0963 (0.0026)	0.0763 (0.0171)	0.4789 (<.0001)	0.2741 (<.0001)	0.2039 (<.0001)	0.0307 (0.3169)	0.3066 (<.0001)	-0.0359 (0.2410)	0.0761 (0.0145)	-0.0089 (0.7737)
MOD_JONES	0.9879 (<.0001)	1.0000 -	0.9871 (<.0001)	0.0962 (0.0026)	0.0757 (0.0179)	0.4703 (<.0001)	0.2577 (<.0001)	0.1945 (<.0001)	0.0336 (0.2734)	0.3117 (<.0001)	-0.0357 (0.2452)	0.0713 (0.0220)	-0.0086 (0.7832)
PERFORM_JONES	0.9993 (<.0001)	0.9871 (<.0001)	1.0000 -	0.0925 (0.0038)	0.0725 (0.0235)	0.4652 (<.0001)	0.2600 (<.0001)	0.2004 (<.0001)	0.0242 (0.4302)	0.2936 (<.0001)	-0.0253 (0.4099)	0.0784 (0.0118)	-0.0137 (0.6597)
DD	0.0963 (0.0026)	0.0961 (0.0026)	0.0925 (0.0038)	1.0000 -	0.9988 (<.0001)	0.0277 (0.3655)	0.0652 (0.0328)	0.3637 (<.0001)	-0.0206 (0.5015)	0.3224 (<.0001)	0.0159 (0.6025)	0.1204 (<.0001)	-0.0383 (0.2177)
MOD_DD	0.0763 (0.0171)	0.0757 (0.0179)	0.0725 (0.0235)	0.9988 (<.0001)	1.0000 -	0.0048 (0.8751)	0.0357 (0.2434)	0.3407 (<.0001)	-0.0184 (0.5482)	0.3029 (<.0001)	0.0170 (0.5782)	0.1636 (<.0001)	-0.0367 (0.2373)
MAG_ACC	0.4789 (<.0001)	0.4703 (<.0001)	0.4652 (<.0001)	0.0277 (0.3655)	0.0048 (0.8751)	1.0000 -	0.7792 (<.0001)	0.2254 (<.0001)	-0.0087 (0.7652)	0.4219 (<.0001)	-0.0683 (0.0182)	0.0208 (0.4798)	0.0229 (0.4354)
DELTA_ACC	0.2741 (<.0001)	0.2577 (<.0001)	0.2600 (<.0001)	0.0652 (0.0328)	0.0357 (0.2434)	0.7792 (<.0001)	1.0000 -	0.1837 (<.0001)	0.0126 (0.6635)	0.4497 (<.0001)	-0.0620 (0.0322)	0.0304 (0.3028)	0.0149 (0.6130)
TIMELY	0.2039 (<.0001)	0.1945 (<.0001)	0.2004 (<.0001)	0.3637 (<.0001)	0.3407 (<.0001)	0.2254 (<.0001)	0.1837 (<.0001)	1.0000 -	0.1497 (<.0001)	0.4695 (<.0001)	-0.1740 (<.0001)	-0.0851 (0.0045)	0.0939 (0.0017)
VAR_NI_CFO	0.0307 (0.3169)	0.0335 (0.2734)	0.0242 (0.4302)	-0.0206 (0.5015)	-0.0184 (0.5482)	-0.0087 (0.7652)	0.0126 (0.6635)	0.1497 (<.0001)	1.0000 -	0.2427 (<.0001)	-0.1586 (<.0001)	-0.0402 (0.1754)	0.0674 (0.0224)
VAR_NI	0.3066 (<.0001)	0.3117 (<.0001)	0.2936 (<.0001)	0.3224 (<.0001)	0.3029 (<.0001)	0.4219 (<.0001)	0.4497 (<.0001)	0.4695 (<.0001)	0.2427 (<.0001)	1.0000 -	-0.2603 (<.0001)	-0.0110 (0.7066)	0.1737 (<.0001)
CORR_TA_CFO	-0.0359 (0.2410)	-0.0357 (0.2452)	-0.0253 (0.4099)	0.0159 (0.6025)	0.0170 (0.5782)	-0.0683 (0.0182)	-0.0620 (0.0322)	-0.1740 (<.0001)	-0.1586 (<.0001)	-0.2603 (<.0001)	1.0000 -	0.1105 (0.0002)	-0.1353 (<.0001)
PERSIST	0.0761 (0.0145)	0.0713 (0.0220)	0.0784 (0.0118)	0.1204 (<.0001)	0.1636 (<.0001)	0.0208 (0.4798)	0.0304 (0.3028)	-0.0851 (0.0045)	-0.0400 (0.1754)	-0.0110 (0.7066)	0.1105 (0.0002)	1.0000 -	-0.1057 (0.0003)
PREDICT	-0.0089 (0.7737)	-0.0086 (0.7832)	-0.0137 (0.6597)	-0.0383 (0.2177)	-0.0367 (0.2373)	0.0229 (0.4354)	0.0149 (0.6130)	0.0939 (0.0017)	0.0674 (0.0224)	0.1737 (<.0001)	-0.1353 (<.0001)	-0.1057 (0.0003)	1.0000 -

The table tabulates correlations for the earnings quality metrics (see Appendix A) for non-restaters in the entire sample period from 1990 to 2010. Pearson correlation coefficient in parentheses.
For the variables *JONES*, *MOD_JONES*, *PERFORM_JONES*, *DD*, *MOD_DD*, *MAG_ACC*, *TIMELY* and *PREDICT*, higher values indicate lower quality. For the variables *VAR_NI_CFO*, *VAR_NI*, *CORR_TA_CFO*, and *PERSIST*, lower values indicate lower quality.

Appendix C

Restatement Categories

Reclassification and disclosure (36.3%)

- Approach and calculation of loans receivables and allowance for uncollectibles
- Cash flow statement classification errors
- Errors or irregularities with ratios and earnings per share calculations, as well as income statement classification issues
- Footnote and segment disclosure issues
- Balance sheet classification of assets issues

Core expenses (17.7%)

- Expense recording issues, e.g., payroll, SGA, etc.
- Liabilities, payables, reserves and accrual estimation failures
- Deferred, stock-based and/or executive compensation issues
- Lease, legal, contingency and commitment issues
- Pension and other post-retirement benefit issues
- Depreciation and amortization errors
- Capitalization of expenditures issues
- Debt and/or equity classification issues
- Inventory, vendor and/or cost of sales issues
- Audit and auditor related restatements

Non-core expenses (13-5%)

- Errors in recording of debt or equity accounts
- Financial derivative instruments and hedging accounting issues
- Gain or loss of assets, interests, entities, or liabilities recognition issues

Underlying events (12.9%)

- Acquisitions, mergers, disposals, reorganization accounting issues
- Foreign, related party, affiliated, or subsidiary issues
- Consolidation of subsidiaries, off balance sheet arrangements, and entities issues

Classification (11.1%)

- Tax expense and benefit issues
- Recording in assets, goodwill, intangibles issues

Other (5.6%)

- Intercompany and investment in subsidiaries/affiliate issues
- Unspecified restatements
- Comprehensive income issues
- Errors connected to GAAP changes
- Capital adequacy and calculation issues
- Registration and security issuance issues
- Deferred, stock based compensation
- Retrospective restatements to make previous years' financial statement numbers consistent with later years'

Revenue recognition (2.9%)

- Revenue recognition

Bibliography

Abdelghany, K. E. (2005). Measuring the Quality of Earnings. *Managerial Auditing Journal 20*(8-9), 1001–1015.

Adams, B., K. A. Carow, and T. Perry (2009). Earnings Management and Initial Public Offerings: The Case of the Depository Industry. *Journal of Banking and Finance 33*(12), 2363–2372.

Adrian, T. and M. K. Brunnermeier (2009). CoVaR. *SSRN eLibrary*. Working paper.

Agarwal, R. and J. A. Elston (2001). Bank-firm Relationships, Financing and Firm Performance in Germany. *Economics Letters 72*(2), 225–232.

Agarwal, S., S. Chomsisengphet, C. Liu, and S. Ghon Rhee (2007). Earnings Management Behaviors under Different Economic Environments: Evidence from Japanese Banks. *International Review of Economics and Finance 16*(3), 429–443.

Ahmed, A. S., C. Takeda, and S. Thomas (1999). Bank Loan Loss Provisions: A Reexamination of Capital Management, Earnings Management and Signaling Effects. *Journal of Accounting and Economics 28*(1), 1–25.

AICPA (1994). *Improving Business Reporting - a Customer Focus: Meeting the Information Needs of Investors and Creditors*. New York.

Akhigbe, A. and J. E. McNulty (2011). Bank Monitoring, Profit Efficiency and the Commercial Lending Business Model. *Journal of Economics and Business 63*(6), 531–551.

Alford, A., J. Jones, R. Leftwich, and M. Zmijewski (1993). The Relative Informativeness of Accounting Disclosures in Different Countries. *Journal of Accounting Research 31*, 183–223.

Allen, F. and E. Carletti (2010). An Overview of the Crisis: Causes, Consequences, and Solutions. *International Review of Finance 10*(1), 1–26.

Allen, F. and D. Gale (2000). Financial Contagion. *Journal of Political Economy 108*(1), 1.

Altamuro, J. and A. Beatty (2010). How does Internal Control Regulation affect Financial Reporting? *Journal of Accounting and Economics 49*(1-2), 58–58.

Altamuro, J., A. L. Beatty, and J. Weber (2005). The Effects of Accelerated Revenue Recognition on Earnings Management and Earnings Informativeness: Evidence from SEC Staff Accounting Bulletin No. 101. *Accounting Review 80*(2), 373–401.

Anandarajan, A., I. Hasan, and C. McCarthy (2007). Use of Loan Loss Provisions for Capital, Earnings Management and Signalling by Australian Banks. *Accounting and Finance 47*(3), 357–379.

Ang, J. S., R. A. Cole, and J. W. Lin (2000). Agency Costs and Ownership Structure. *Journal of Finance 55*(1), 81–106.

Ashbaugh, H. and M. Pincus (2001). Domestic Accounting Standards, International Accounting Standards, and the Predictability of Earnings. *Journal of Accounting Research 39*(3), 417–434.

Aspachs, O., E. Nier, and M. Tisset (2005). Liquidity, Banking Regulation and the Macroeconomy. *Working Paper*.

AuditAnalytics (2013). *2012 Financial Restatements: A Twelve Year Comparison*.

Baginski, S. and K. Rakow (2012). Management Earnings Forecast Disclosure Policy and the Cost of Equity Capital. *Review of Accounting Studies 17*(2), 279–321.

Baglioni, A. (2012). Liquidity Crunch in the Interbank Market: Is it Credit or Liquidity Risk, or Both? *Journal of Financial Services Research 41*(1/2), 1–18.

Baker, M. and J. Wurgler (2013). Do Strict Capital Requirements Raise the Cost of Capital? Banking Regulation and the Low Risk Anomaly. *National Bureau of Economic Research Working Paper Series No. 19018*.

Baldvinsson, C., T. Bender, K. Busck-Nielsen, and F. T. Rasmussen (2011). *Dansk Bankvæsen* (6th ed.).

Ball, R. and P. Brown (1968). An Empirical Evaluation of Accounting Income Numbers. *Journal of Accounting Research 6*(2), 159–178.

Ball, R., S. P. Kothari, and A. Robin (2000). The Effect of International Institutional Factors on Properties of Accounting Earnings. *Journal of Accounting and Economics 29*(1), 1–51.

Ball, R. and L. Shivakumar (2005). Earnings Quality in UK Private Firms: Comparative Loss Recognition Timeliness. *Journal of Accounting and Economics 39*, 83–128.

Barth, A. and I. Schnabel (2013). Why Banks are not too Big to Fail - Evidence from the CDS Market. *Economic Policy 28*(74), 335–369.

Barth, M. E., W. H. Beaver, and W. R. Landsman (2001). The Relevance of the Value Relevance Literature for Financial Accounting Standard Setting: Another View. *Journal of Accounting and Economics 31*(1-3), 77–104.

Barth, M. E., W. H. Beaver, and M. A. Wolfson (1990). Components of Earnings and the Structure of Bank Share Prices. *Financial Analysts Journal 46*(3), 53–61.

Barth, M. E., J. A. Elliott, and M. W. Finn (1999). Market Rewards Associated with Patterns of Increasing Earnings. *Journal of Accounting Research 37*(2), 387–413.

Barth, M. E., W. R. Landsman, and M. H. Lang (2008). International Accounting Standards and Accounting Quality. *Journal of Accounting Research 46*, 467–498.

Barth, M. E. and K. Schipper (2008). Financial Reporting Transparency. *Journal of Accounting, Auditing and Finance 23*(2), 173–190.

Basel (2011). Basel III: A Globalregulatory Framework for more Resilient Banks and Banking Systems. Technical report, Basel Committee.

Basu, S. (1997). The Conservatism Principle and the Asymmetric Timeliness of Earnings. *Journal of Accounting and Economics 24*(1), 3–37.

Beatty, A., S. L. Chamberlain, and J. Magliolo (1995). Managing Financial Reports of Commercial Banks: The Influence of Taxes, Regulatory Capital, and Earnings. *Journal of Accounting Research 33*(2), 231–261.

Beatty, A. and D. G. Harris (1999). The Effects of Taxes, Agency Costs and Information Asymmetry on Earnings Management: A Comparison of Public and Private Firms. *Review of Accounting Studies 4*(3-4), 299–326.

Beatty, A. L., B. Ke, and K. R. Petroni (2002). Earnings Management to Avoid Earnings Declines across Publicly and Privately Held Banks. *Accounting Review 77*(3), 547–570.

Beaver, W., C. Eger, S. Ryan, and M. Wolfson (1989). Financial Reporting, Supplemental Disclosures, and Back Share Prices. *Journal of Accounting Research 27*(2), 157–178.

Beaver, W., R. Lambert, and D. Morse (1980). The information content of security prices. *Journal of Accounting & Economics 2*(1), 3–28.

Beaver, W. H. and E. E. Engel (1996). Discretionary behavior with respect to allowances for loan losses and the behavior of security prices. *Journal of Accounting & Economics 22*(1-3), 177–206.

Beaver, W. H. and S. G. Ryan (2005). Conditional and Unconditional Conservatism: Concepts and Modeling. *Review of Accounting Studies 10*(2/3), 269–309.

Beekes, W., P. Pope, and S. Young (2004). The Link Between Earnings Timeliness, Earnings Conservatism and Board Composition: Evidence from the UK. *Corporate Governance: An International Review 12*(1), 47–59.

Beneish, M. D. (1997). Detecting GAAP Violation: Implications for Assessing Earnings Management among Firms with Extreme Financial Performance. *Journal of Accounting and Public Policy 16*(3), 271–309.

Beneish, M. D. (1999a). Incentives and Penalties Related to Earnings Overstatements That Violate GAAP. *Accounting Review 74*(4), 425–457.

Beneish, M. D. (1999b). The Detection of Earnings Manipulation. *Financial Analysts Journal 55*(5), 24.

Benninga, S. (2008). *Financial Modeling* (3rd ed.). The MIT Press.

Berger, A. N., L. F. Klapper, and G. F. Udell (2001). The Ability of Banks to lend to Informationally Opaque Small Businesses. *Journal of Banking and Finance 25*(12), 2127–2167.

Berger, A. N., N. H. Miller, M. A. Petersen, R. G. Rajan, and J. C. Stein (2005). Does Function follow Organizational Form? Evidence from the Lending Practices of Large and Small Banks. *Journal of Financial Economics 76*(2), 237–269.

Berger, A. N. and G. F. Udell (1994). Did Risk-Based Capital Allocate Bank Credit and Cause a "Credit Crunch" in the United States? *Journal of Money, Credit and Banking 26*(3), 585–628.

Berger, A. N. and G. F. Udell (1995). Relationship Lending and Lines of Credit in Small Firm Finance. *Journal of Business 68*(3), 351.

Berger, A. N. and G. F. Udell (2006). A more Complete Conceptual Framework for SME Finance. *Journal of Banking and Finance 30*(11), 2945–2966.

Bernal, O., J.-Y. Gnabo, and G. Guilmin (2014). Assessing the Contribution of Banks, Insurance and other Financial Services to Systemic Risk. *Journal of Banking and Finance 47*, 270–287.

Bernanke, B. S. (1983). Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression. *American Economic Review 73*(3), 257.

Bernard, V. L. and D. J. Skinner (1996). What Motivates Managers' Choice of Discretionary Accruals? *Journal of Accounting and Economics 22*, 313–325.

Beuselinck, C., P. Joos, I. K. Khurana, and S. Van der Meulen (2009). Mandatory IFRS reporting and Stock Price Informativeness. Working paper.

Bharath, S., S. Dahiya, A. Saunders, and A. Srinivasan (2007). So what do I get? The Bank's View of Lending Relationships. *Journal of Financial Economics 85*(2), 368–419.

Bhattacharya, U., H. Daouk, and M. Welker (2003). The World Price of Earnings Opacity. *Accounting Review 78*(3), 641–678.

Billett, M. T., M. J. Flannery, and J. A. Garfinkel (1995). The Effect of Lender Identity on a Borrowing Firm's Equity Return. *Journal of Finance 50*(2), 699–718.

Bockus, K. and F. Gigler (1998). A theory of auditor resignation. *Journal of Accounting Research 36*(2), 191–208.

Bolt, W., L. de Haan, M. Hoeberichts, M. R. C. van Oordt, and J. Swank (2012). Bank Profitability during Recessions. *Journal of Banking and Finance 36*(9), 2552–2564.

Bolton, P. and D. S. Scharfstein (1996). Optimal Debt Structure and the Number of Creditors. *Journal of Political Economy 104*(1), 1.

Boot, A. W. A. (2000). Relationship Banking: What Do We Know? *Journal of Financial Intermediation 9*(1), 7–25.

Boot, A. W. A. and A. V. Thakor (2000). Can Relationship Banking Survive Competition? *Journal of Finance 55*(2), 679–713.

Booth, J. R., M. M. Cornett, and H. Tehranian (2002). Boards of Directors, Ownership, and Regulation. *Journal of Banking and Finance 26*(10), 1973–1996.

Botosan, C. A. and M. A. Plumlee (2005). Assessing Alternative Proxies for the Expected Risk Premium. *Accounting Review 80*(1), 21–53.

Brickley, J. A., J. L. Coles, and G. Jarrell (1997). Leadership structure: Separating the CEO and Chairman of the Board. *Journal of Corporate Finance 3*(3), 189–220.

Burgstahler, D. C. and I. D. Dichev (1997). Earnings Management to Avoid Earnings Decreases and Losses. *Journal of Accounting and Economics 24*(1), 99–126.

Burgstahler, D. C., L. Hail, and C. Leuz (2006). The importance of reporting incentives: Earnings management in european private and public firms. *The Accounting Review 81*(5), 983–1016.

Burns, N. and S. Kedia (2006). The Impact of Performance-based Compensation on Misreporting. *Journal of Financial Economics 79*(1), 35–67.

Bushman, R., Q. Chen, E. Engel, and A. Smith (2004). Financial Accounting Information, Organizational Complexity and Corporate Governance Systems. *Journal of Accounting and Economics 37*(2), 167–201.

Bushman, R. M., B. E. Hendricks, and C. D. Williams (2013). Perceived Bank Competition: Operational Decision-Making and Bank Stability. *SSRN eLibrary*. Working paper.

Bushman, R. M. and R. Wittenberg-Moerman (2012). The Role of Bank Reputation in Certifying Future Performance Implications of Borrowers' Accounting Numbers. *Journal of Accounting Research 50*(4), 883–930.

Callahan, C. M., R. E. Smith, and A. Wheeler Spencer (2012). An Examination of the Cost of Capital Implications of FIN 46. *Accounting Review 87*(4), 1105–1134.

Campbell, J. L., D. S. Dhaliwal, and W. C. Schwartz (2012). Financing Constraints and the Cost of Capital: Evidence from the Funding of Corporate Pension Plans. *Review of Financial Studies 25*(3), 868–912.

Caramanis, C. and C. Lennox (2008). Audit Effort and Earnings Management. *Journal of Accounting and Economics 45*(1), 116–138.

Carletti, E. (2004). The Structure of Bank Relationships, Endogenous Monitoring, and Loan Rates. *Journal of Financial Intermediation 13*(1), 58.

Carletti, E., V. Cerasi, and S. Daltung (2007). Multiple-bank Lending: Diversification and Free-riding in Monitoring. *Journal of Financial Intermediation 16*(3), 425–451.

Carter, D. A., J. E. McNulty, and J. A. Verbrugge (2004). Do Small Banks have an Advantage in Lending? An Examination of Risk-adjusted Yields on Business Loans at Large and Small Banks. *Journal of Financial Services Research 25*(2-3), 233–252.

Castelli, A., G. P. Dwyer, and I. Hasan (2012). Bank Relationships and Firms' Financial Performance: The Italian Experience. *European Financial Management 18*(1), 28–67.

Catanach, A., J. H. Irving, S. P. Williams, and P. L. Walker (2011). An Ex Post Examination of Auditor Resignations. *Accounting Horizons 25*(2), 267–283.

Cathy Zishang, L., B. J. Rowe, and W. Ya-Fang (2012). The Impact of Restatements on Credit Ratings and the Enron Industry-Peer Effect. *Journal of Accounting and Finance 12*(1), 20–30.

Chemmanur, T. J. and P. Fulghieri (1994). Investment Bank Reputation, Information Production, and Financial Intermediation. *Journal of Finance 49*(1), 57–79.

Chen, S., T. Shevlin, and H. Tong Yen (2007). Does the Pricing of Financial Reporting Quality Change Around Dividend Changes? *Journal of Accounting Research 45*(1), 1–40.

Chen, X., Q. Cheng, and A. K. Lo (2013). Accounting Restatements and External Financing Choices. *Contemporary Accounting Research 30*(2), 750–779.

Cheng, Q., T. Warfield, and M. Ye (2011). Equity Incentives and Earnings Management: Evidence from the Banking Industry. *Journal of Accounting, Auditing and Finance 26*(2), 317–349.

Cohen, D. A. (2008). Does Information Risk Really Matter? An Analysis of the Determinants and Economic Consequences of Financial Reporting Quality. *Asia Pacific Journal of Accounting and Economics 15*(2), 69–90.

Collins, J. H., D. A. Shackelford, and J. M. Wahlen (1995). Bank Differences in the Coordination of Regulatory Capital, Earnings, and Taxes. *Journal of Accounting Research 33*(2), 263–291.

Comiskey, E. and C. W. Mulford (2000). *Guide to Financial reporting and Analysis*. John Wiley & Sons.

Core, J. E., R. W. Holthausen, and D. F. Larcker (1999). Corporate Governance, Chief Executive Officer Compensation, and Firm Performance. *Journal of Financial Economics 51*(3), 371–406.

Cornett, M. M., J. J. McNutt, P. E. Strahan, and H. Tehranian (2011). Liquidity Risk Management and Credit Supply in the Financial Crisis. *Journal of Financial Economics 101*(2), 297–312.

Cornett, M. M., J. J. McNutt, and H. Tehranian (2009). Corporate Governance and Earnings Management at large U.S. Bank Holding Companies. *Journal of Corporate Finance 15*(4), 412–430.

Coulton, J., S. Taylor, and S. Taylor (2005). Is 'Benchmark Beating' by Australian Firms Evidence of Earnings Management? *Accounting and Finance 45*(4), 553–576.

Da, Z., R.-J. Guo, and R. Jagannathan (2012). CAPM for estimating the cost of equity capital: Interpreting the empirical evidence. *Journal of Financial Economics 103*(1), 204–220.

Dass, N. and M. Massa (2011). The Impact of a Strong Bank-firm Relationship on the Borrowing Firm. *Review of Financial Studies 24*(4), 1204–1260.

DeAngelo, L. E. (1986). Accounting Numbers as Market Valuation Substitutes: A Study of Management Buyouts of Public Stockholders. *The Accounting Review 61*(3), 400–421.

Dechow, Patricia, M., G. Sloan, Richard, and P. Sweeney, Amy (1995). Detecting Earnings Management. *Accounting Review 70*(2), 193–225.

Dechow, P., W. Ge, and C. Schrand (2010). Understanding Earnings Quality: A Review of the Proxies, their Determinants and their Consequences. *Journal of Accounting and Economics 50*(2-3), 344–401.

Dechow, P. M. (1994). Accounting Earnings and Cash Flows as Measures of Firm Performance - The Role of Accounting Accruals. *Journal of Accounting and Economics 18*(1), 3–42.

Dechow, P. M. and I. D. Dichev (2002). The Quality of Accruals and Earnings: The Role of Accrual Estimation Errors. *Accounting Review 77*, 35–59.

Dechow, P. M., W. Ge, C. R. Larson, and R. G. Sloan (2011). Predicting Material Accounting Misstatements. *Contemporary Accounting Research 28*(1), 17–82.

Dechow, P. M., S. A. Richardson, and I. Tuna (2003). Why Are Earnings Kinky? An Examination of the Earnings Management Explanation. *Review of Accounting Studies 8*(2/3), 355–384.

Dechow, P. M. and C. M. Schrand (2004). *Earnings Quality*. CFA Institute.

Dechow, P. M. and D. J. Skinner (2000). Earnings Management: Reconciling the Views of Accounting Academics, Practitioners, and Regulators. *Accounting Horizons 14*(2), 235–250.

Dechow, P. M., R. G. Sloan, and A. P. Sweeney (1996). Causes and Consequences of Earnings Manipulation: An Analysis of Firms Subject to Enforcement Actions by the SEC. *Contemporary Accounting Research 13*(1), 1–37.

DeFond, M. L. (2010). Earnings Quality Research: Advances, Challenges and Future Research. *Journal of Accounting and Economics 50*(2-3), 402–409.

DeFond, M. L. and C. W. Park (1997). Smoothing Income in Anticipation of Future Earnings. *Journal of Accounting and Economics 23*(2), 115–139.

DeFond, M. L. and K. R. Subramanyam (1998). Auditor Changes and Discretionary Accruals. *Journal of Accounting and Economics 25*(1), 35–67.

Degeorge, F., J. Patel, and R. Zeckhauser (1999). Earnings Management to Exceed Thresholds. *Journal of Business 72*(1), 1–33.

Degryse, H. and S. Ongena (2001). Bank Relationships and Firm Profitability. *Financial Management 30*(1), 9.

Degryse, H. and P. Van Cayseele (2000). Relationship Lending within a Bank-Based System: Evidence from European Small Business Data. *Journal of Financial Intermediation 9*(1), 90–109.

Detragiache, E., P. Garella, and L. Guiso (2000). Multiple versus Single Banking Relationships: Theory and Evidence. *Journal of Finance 55*(3), 1133–1161.

Diamond, D. W. (1984). Financial Intermediation and Delegated Monitoring. *Review of Economic Studies 51*(166), 393.

Diamond, D. W. (1997). Liquidity, Banks, and Markets. *Journal of Political Economy 105*(5), 928.

Dichev, I. D. and V. W. Tang (2009). Earnings Volatility and Earnings Predictability. *Journal of Accounting and Economics 47*(1-2), 160–160.

Dietrich, J. R., K. A. Muller, and E. J. Riedl (2007). Asymmetric Timeliness Tests of Accounting Conservatism. *Review of Accounting Studies 12*(1), 95–124.

Doyle, J. T., G. Weili, and S. McVay (2007). Accruals Quality and Internal Control over Financial Reporting. *Accounting Review 82*(5), 1141–1170.

Driscoll, J. C. (2004). Does Bank Lending Affect Output? Evidence from the U.S. States. *Journal of Monetary Economics 51*(3), 451–471.

Duchin, R. and D. Sosyura (2014). Safer Ratios, Riskier Portfolios: Banks' Response to Government Aid. *Journal of Financial Economics 113*(1), 1–28.

Easley, D. and M. O'Hara (2004). Information and the Cost of Capital. *Journal of Finance 59*(4), 1553–1583.

Easton, P. D. (2004). PE Ratios, PEG Ratios, and Estimating the Implied Expected Rate of Return on Equity Capital. *Accounting Review 79*(1), 73–95.

Ecker, F., J. Francis, I. Kim, P. M. Olsson, and K. Schipper (2006). A Returns-Based Representation of Earnings Quality. *The Accounting Review 81*(4), 749–780.

Ecker, F., J. Francis, M. Olsson Per, and K. Schipper (2005). Comparing Total and Current Accruals Quality. *SSRN eLibrary*. Working paper.

Eilifsen, A. and W. F. Messier Jr. (2000). The Incidence and Detection of Misstatements: A Review and Integration of Archival Research. *Journal of Accounting Literature 19*, 1.

El Sood, H. A. (2012). Loan loss provisioning and income smoothing in us banks pre and post the financial crisis. *International Review of Financial Analysis 25*(0), 64–72.

Elsas, R. and J. P. Krahnen (1998). Is Relationship Lending Special? Evidence from Credit-file data in Germany. *Journal of Banking and Finance 22*(10/11), 1283–1316.

Ettredge, M., Y. Huang, and W. Zhang (2012). Earnings Restatements and Differential Timeliness of Accounting Conservatism. *Journal of Accounting and Economics 53*(3), 489–503.

Ettredge, M., S. Scholz, K. R. Smith, and S. Lili (2010). How Do Restatements Begin? Evidence of Earnings Management Preceding Restated Financial Reports. *Journal of Business Finance and Accounting 37*(3/4), 332–355.

EU (1978). Fourth Council Directive 78/660/EEC of 25 July 1978 based on Article 54 (3) (g) of the Treaty on the Annual Accounts of Certain Types of Companies.

Ewert, R. and A. Wagenhofer (2005). Economic Effects of Tightening Accounting Standards to Restrict Earnings Management. *The Accounting Review 80*(4), 1101–1124.

Fahlenbrach, R., R. Prilmeier, and R. M. Stulz (2012). This Time Is the Same: Using Bank Performance in 1998 to Explain Bank Performance during the Recent Financial Crisis. *Journal of Finance 67*(6), 2139–2185.

Fama, E. F. (1985). What's different about Banks? *Journal of Monetary Economics 15*(1), 29–39.

Fama, E. F. and K. R. French (1992). The Cross-Section of Expected Stock Returns. *Journal of Finance 47*(2), 427–465.

Fama, E. F. and K. R. French (1993). Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics 33*(1), 3–56.

Fama, E. F. and M. C. Jensen (1983). Separation of Ownership and Control. *Journal of Law and Economics 26*(2), 301–326.

Farber, D. B. (2005). Restoring Trust after Fraud: Does Corporate Governance Matter? *The Accounting Review 80*(2), 539–561.

Farinha, L. A. and J. A. C. Santos (2002). Switching from Single to Multiple Bank Lending Relationships: Determinants and Implications. *Journal of Financial Intermediation 11*(2), 124.

FASB (2008). Exposure Draft: Conceptual Framework for Financial Reporting.

Feltham, G. A. and J. A. Ohlson (1995). Valuation and Clean Surplus Accounting for Operating and Financial Activities. *Contemporary Accounting Research 11*(2), 689–732.

Feroz, E. H., K. Park, and V. S. Pastena (1991). The Financial and Market Effects of the SEC's Accounting and Auditing Enforcement Releases. *Journal of Accounting Research 29*(3), 107–143.

Finanstilsynet (2014). Vejledning om tilsynsdiamanten for pengeinstitutter. Available from www.finanstilsynet.dk.

Foglia, A., S. Laviola, and P. Marullo Reedtz (1998). Multiple Banking Relationships and the Fragility of Corporate Borrowers. *Journal of Banking and Finance 22*(10âĂŞ11), 1441–1456.

Fok, R. C. W., C. Yuan-Chen, and L. Wan-Tuz (2004). Bank Relationships and Their Effects on Firm Performance around the Asian Financial Crisis. *Financial Management 33*(2), 89–112.

Francis, J., R. Lafond, P. Olsson, and K. Schipper (2005). The Market Pricing of Accruals Quality. *Journal of Accounting and Economics 39*, 295–327.

Francis, J., R. LaFond, P. M. Olsson, and K. Schipper (2004). Costs of Equity and Earnings Attributes. *The Accounting Review 79*(4), 967–1010.

Francis, J., P. Olsson, and K. Schipper (2006). Earnings Quality. *Foundations and Trends in Accounting 1*(4), 259–340.

Francis, J. and K. Schipper (1999). Have Financial Statements Lost Their Relevance? *Journal of Accounting Research 37*(2), 319–352.

Francis, J. R., I. K. Khurana, and R. Pereira (2005). Disclosure Incentives and Effects on Cost of Capital around the World. *Accounting Review 80*(4), 1125–1162.

Francis, J. R. and J. Krishnan (1999). Accounting Accruals and Auditor Reporting Conservatism. *Contemporary Accounting Research 16*(1), 135–165.

Freixas, X. and J. Jorge (2008). The Role of Interbank Markets in Monetary Policy: A Model with Rationing. *Journal of Money, Credit and Banking 40*(6), 1151–1176.

Freixas, X. and J.-C. Rochet (2008). *Microeconomics of Banking* (2nd ed.). MIT Press.

Gambini, A. and A. Zazzaro (2013). Long-lasting Bank Relationships and Growth of Firms. *Small Business Economics 40*(4), 977–1007.

GAO (2006a). Financial Restatement Database. Technical report, United States Government Accountability Office.

GAO (2006b). Financial Restatements: Update of Public Company Trends, Market Impacts, and Regulatory Enforcement Activities. Technical report, United States Government Accountability Office.

GAO (2009). Greater Atttention Needed to Enhance Communication and Utilization of Resources in the Division of Enforcement. Technical report, United States Goverment Accountability Office.

GAO (2013). Internal Controls: SEC Should Consider requiring Companies to Disclose Whether They Obtained and Auditor Attestation.

Gebhardt, G. and Z. Novotny-Farkas (2011). Mandatory IFRS Adoption and Accounting Quality of European Banks. *Journal of Business Finance and Accounting 38*(3-4), 289–333.

Girardi, G. and A. Tolga Ergun (2013). Systemic Risk Measurement: Multivariate GARCH estimation of CoVaR. *Journal of Banking and Finance 37*(8), 3169–3180.

Givoly, D. and C. Hayn (2000). The Changing Time-series Properties of Earnings, Cash Flows and Accruals: Has Financial Reporting become more Conservative? *Journal of Accounting and Economics 29*(3), 287–320.

Givoly, D., C. K. Hayn, and A. Natarajan (2007). Measuring Reporting Conservatism. *The Accounting Review 82*(1), 65–106.

Gleason, C. A., N. T. Jenkins, and W. B. Johnson (2008). The Contagion Effects of Accounting Restatement. *Accounting Review 83*(1), 83–110.

Goddard, J., P. Molyneux, J. O. S. Wilson, and M. Tavakoli (2007). European Banking: An Overview. *Journal of Banking and Finance 31*(7), 1911–1935.

Gode, D. and M. Partha (2003). Inferring the Cost of Capital Using the Ohlson-Juettner Model. *Review of Accounting Studies 8*(4), 399–431.

Gopalan, R., G. F. Udell, and V. Yerramilli (2011). Why do Firms Form new Banking Relationships? *Journal of Financial and Quantitative Analysis 46*(5), 1335–1365.

Graham, J. R., S. Li, and J. Qiu (2008). Corporate Misreporting and Bank Loan Contracting. *Journal of Financial Economics 89*(1), 44–61.

Greenbaum, S. I. and A. V. Thakor (2007). *Contemporary Financial Intermediation* (2nd ed.). Academic Press Advanced Finance Series.

Guay, W., S. P. Kothari, and R. L. Watts (1996). A Market-Based Evaluation of Discretionary Accrual Models. *Journal of Accounting Research 34*, 83–105.

Gup, B. E. and J. W. Kolari (2005). *Commercial Banking -The Management of Banks* (3rd ed.). Wiley.

Hail, L. and C. Leuz (2006). International differences in the cost of equity capital: Do legal institutions and securities regulation matter? *Journal of Accounting Research 44*(3), 485–531.

Hair, J., W. Black, B. Babin, and R. Anderson (2005). *Multivariate Data Analysis* (6th ed.). Pearson Education.

Hayn, C. (1995). The Information Content of Losses. *Journal of Accounting and Economics 20*(2), 125–154.

Healy, P. M. (1985). The Effect of Bonus Schemes on Accounting Decisions. *Journal of Accounting and Economics 7*(1-3), 85–107.

Healy, P. M. and J. M. Wahlen (1999). A Review of the Earnings Management Literature and its Implications for Standard Setting. *Accounting Horizons 13*(4), 365–383.

Heckman, J. J. (1979). Sample Selesction Bias as a Specification Error. *Econometrica 47*(1), 153–161.

Heij, C., P. de Boer, P. H. Franses, T. Kloek, and H. K. van Dijk (2004). *Econometric Methods with Applications in Business and Economics* (1st ed.). Oxford University Press.

Hennes, K. M., A. J. Leone, and B. P. Miller (2008). The Importance of Distinguishing Errors from Irregularities in Restatement Research: The Case of Restatements and CEO/CFO Turnover. *Accounting Review 83*(6), 1487–1519.

Herz, R. H. (2010). Accounting Standards and Bank Regulation. *International Journal of Disclosure and Governance 7*(2), 97–107.

Hillier, D., M. Grinblatt, and S. Titman (2008). *Financial Markets and Corporate Strategy*. McGraw-Hill.

Holmstrom, B. and J. Tirole (1997). Financial Intermediatio, Loanable Funds, and the Real Sector. *Quarterly Journal of Economics 112*(3), 663–691.

Holthausen, R. W. and R. E. Verrecchia (1988). The Effect of Sequential Information Releases on the Variance of Price Changes in an Intertemporal Multi-Asset Market. *Journal of Accounting Research 26*(1), 82–106.

Holthausen, R. W. and R. L. Watts (2001). The Relevance of the Value-relevance Literature for Financial Accounting Standard Setting. *Journal of Accounting and Economics 31*(1-3), 3–75.

Hribar, P. and D. W. Collins (2002). Errors in Estimating Accruals: Implications for Empirical Research. *Journal of Accounting Research 40*(1), 105–134.

Hribar, P. and N. T. Jenkins (2004). The Effect of Accounting Restatements on Earnings Revisions and the Estimated Cost of Capital. *Review of Accounting Studies 9*(2-3), 337–356.

Hribar, P. and C. D. Nichols (2007). The Use of Unsigned Earnings Quality Measures in Tests of Earnings Management. *Journal of Accounting Research 45*(5), 1017–1053.

IASB (2010). Conceptual Framework for Financial Reporting 2010.

Ioannidou, V. and S. Ongena (2010). "Time for a Change": Loan Conditions and Bank Behavior when Firms Switch Banks. *Journal of Finance 65*(5), 1847–1877.

Jensen, M. C. and W. H. Meckling (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics 3*(4), 305–360.

Jiambalvo, J. (1996). Discussion of "Causes and Consequences of Earnings Manipulation: An Analysis of Firms Subject to Enforcement Actions by the SEC". *Contemporary Accounting Research 13*(1), 37–48.

Johnstone, K. M. (2000). Client-Acceptance Decisions: Simultaneous Effects of Client Business Risk, Audit Risk, Auditor Business Risk, and Risk Adaptation. *Auditing: A Journal of Practice and Theory 19*(1), 1–25.

Jones, J. (1991). Earnings Management During Import Relief Investigations. *Journal of Accounting Research 29*(2), 193–229.

Jones, K. L., G. V. Krishnan, and K. D. Melendrez (2008). Do Models of Discretionary Accruals Detect Actual Cases of Fraudulent and Restated Earnings? An Empirical Analysis. *Contemporary Accounting Research 25*(2), 499–531.

Kang, J.-K. and A. Shivdasani (1999). Alternative Mechanisms for Corporate Governance in Japan: An Analysis of Independent and Bank-affiliated Firms. *Pacific-Basin Finance Journal 7*(1), 1–22.

Kang, J.-K. and R. M. Stulz (2000). Do Banking Shocks Affect Borrowing Firm Performance? An Analysis of the Japanese Experience. *Journal of Business 73*(1), 1.

Karpoff, J. M., D. S. Lee, and G. S. Martin (2008). The Cost to Firms of Cooking the Books. *Journal of Financial and Quantitative Analysis 43*(3), 581–611.

Kashyap, A. K. and J. C. Stein (2000). What Do a Million Observations on Banks Say About the Transmission of Monetary Policy? *American Economic Review 90*(3), 407–428.

Kedia, S. and S. Rajgopal (2011). Do the SEC's Enforcement Preferences affect Corporate Misconduct? *Journal of Accounting and Economics 51*(3), 259–278.

Kent, P., J. Routledge, and J. Stewart (2010). Innate and Discretionary Accruals Quality and Corporate Governance. *Accounting and Finance 50*(1), 171–171.

Kerstein, J. and A. Kozberg (2013). Using Accounting Proxies of Proprietary FDIC Ratings to Predict Bank Failures and Enforcement Actions During the Recent Financial Crisis. *Journal of Accounting, Auditing and Finance 28*(2), 128–151.

Key, K. G. (1997). Political Cost Incentives for Earnings Management in the Cable Television Industry. *Journal of Accounting and Economics 23*(3), 309–337.

Khwaja, A. I. and A. Mian (2008). Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market. *American Economic Review 98*(4), 1413–1442.

Kirschenheiter, M. and N. D. Melumad (2002). Can "Big Bath" and Earnings Smoothing Co-Exist as Equilibrium Financial Reporting Strategies? *Journal of Accounting Research 40*(3), 761–796.

Kishan, R. P. and T. P. Opiela (2000). Bank Size, Bank Capital, and the Bank Lending Channel. *Journal of Money, Credit and Banking 32*(1), 121–141.

Knyazeva, A. and D. Knyazeva (2012). Does being your Banks Neighbor Matter? *Journal of Banking and Finance 36*(4), 1194–1209.

Kothari, S. P., A. J. Leone, and C. E. Wasley (2005). Performance Matched Discretionary Accrual Measures. *Journal of Accounting and Economics 39*(1), 163–197.

Kravet, T. and T. Shevlin (2010). Accounting Restatements and Information Risk. *Review of Accounting Studies 15*(2), 264–294.

Kreutzfeldt, R. W. and W. A. Wallace (1986). Error Characteristics in Audit Populations: Their Profile and Relationship to Environmental Factors. *Auditing 6*(1), 20.

Krisement, V. (1997). An Approach for Measuring the Degree of Comparability of Financial Accounting Information. *European Accounting Review 6*(3), 465–485.

Krishnan, J. and J. Krishnan (1997). Litigation Risk and Auditor Resignations. *Accounting Review 72*(4), 539.

Lambert, R., C. Leuz, and R. E. Verrecchia (2007). Accounting Information, Disclosure, and the Cost of Capital. *Journal of Accounting Research 45*(2), 385–420.

Lang, M., J. S. Raedy, and W. Wilson (2006). Earnings Management and Cross Listing: Are Reconciled Earnings Comparable to US Earnings? *Journal of Accounting and Economics 42*(1-2), 255–255.

Lang, M., J. S. Raedy, and M. H. Yetman (2003). How Representative Are Firms That Are Cross-Listed in the United States? An Analysis of Accounting Quality. *Journal of Accounting Research 41*(2), 363–386.

Lee, K.-W. and I. G. Sharpe (2009). Does a BankâĂŹs Loan Screening and Monitoring Matter? *Journal of Financial Services Research 35*(1), 33–52.

Lee, S. W. and D. J. Mullineaux (2004). Monitoring, Financial Distress, and the Structure of Commercial Lending Syndicates. *Financial Management 33*(3), 107–130.

Lennox, C. S., J. R. Francis, and Z. Wang (2012). Selection Models in Accounting Research. *Accounting Review 87*(2), 589–616.

Leuz, C., D. Nanda, and P. D. Wysocki (2003). Earnings Management and Investor Protection: An International Comparison. *Journal of Financial Economics 69*(3), 505–527.

Levitt, A. (1998a). The Importance of High Quality Accounting Standards. *Accounting Horizons 12*(1), 79–82.

Levitt, A. (1998b). The "Numbers Game". Speech given at NYU Center For Law And Business.

Louis, H. and H. White (2007). Do Managers Intentionally use Repurchase Tender Offers to Signal Private Information? Evidence from Firm Financial Reporting Behavior. *Journal of Financial Economics 85*(1), 205–233.

Loutskina, E. (2011). The Role of Securitization in Bank Liquidity and Funding Management. *Journal of Financial Economics 100*(3), 663–684.

Ma, M. S. (2014). Are We Really Doing What We Think We Are Doing? A Note on Finite-Sample Estimates of Two-Way Cluster-Robust Standard Errors. *SSRN eLibrary*. Working paper.

Maddala, G. S. (1983). *Limited-dependent and Qualitative Variables in Econometrics*. Cambridge University Press.

Maletta, M. and A. Wright (1996). Audit Evidence Planning: An Examination of Industry Error Characteristics. *Auditing 15*(1), 71–86.

Marini, F. (2013). Bankruptcy Litigation and Relationship Banking. *Journal of Business Finance and Accounting 40*(1/2), 272–284.

Matten, C. (2000). *Managing Bank Capital* (2nd ed.). John Wiley & Sons, LTD.

McNichols, M. F. (2000). Research Design Issues in Earnings Management Studies. *Journal of Accounting and Public Policy 19*(4-5), 313–345.

McNichols, M. F. (2002). Discussion of Quality of Accruals and Earnings: The Role of Accrual Estimation Errors. *The Accounting Review*, 61–69.

Melumad, N. and D. Nissim (2008). Line-Item Analysis of Earnings Quality. *Foundations and Trends in Accounting 3*(4), 87–221.

Modigliani, F. and M. H. Miller (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *American Economic Review 48*(3), 261.

Morck, R., A. Shleifer, and R. W. Vishny (1988). Management Ownership and Market Valuation: An Empirical Analysis. *Journal of Financial Economics 20*(0), 293–315.

Morgan, D. P. (2002). Rating Banks: Risk and Uncertainty in an Opaque Industry. *American Economic Review 92*(4), 874–888.

Moyer, S. E. (1990). Capital Adequacy Ratio Regulations and Accounting Choices in Commercial Banks. *Journal of Accounting and Economics 13*(2), 123–154.

Nelson, M. W., J. A. Elliott, and R. L. Tarpley (2003). How Are Earnings Managed? Examples from Auditors. *Accounting Horizons 17*, 17–36.

Ng, J. (2011). The Effect of Information Quality on Liquidity Risk. *Journal of Accounting and Economics 52*(2/3), 126–143.

Nichols, D. C., J. M. Wahlen, and M. M. Wieland (2009). Publicly Traded versus Privately Held: Implications for Conditional Conservatism in Bank Accounting. *Review of Accounting Studies 14*(1), 88–122.

Ohlson, J. and B. Juettner-Nauroth (2005). Expected EPS and EPS Growth as Determinants of Value. *Review of Accounting Studies 10*(2/3), 349–365.

Ongena, S. and D. C. Smith (2000). What Determines the Number of Bank Relationships? Cross-Country Evidence. *Journal of Financial Intermediation 9*(1), 26–56.

Ongena, S. and D. C. Smith (2001). The Duration of Bank Relationships. *Journal of Financial Economics 61*(3), 449–475.

Ongena, S., D. C. Smith, and D. Michalsen (2003). Firms and their Distressed Banks: Lessons from the Norwegian Banking Crisis. *Journal of Financial Economics 67*(1), 81.

Palmrose, Z.-V., V. J. Richardson, and S. Scholz (2004). Determinants of Market Reactions to Restatement Announcements. *Journal of Accounting and Economics 37*(1), 59–89.

Palmrose, Z.-V. and S. Scholz (2004). The Circumstances and Legal Consequences of Non-GAAP Reporting: Evidence from Restatements. *Contemporary Accounting Research 21*(1), 139–180.

Paravisini, D. (2008). Local Bank Financial Constraints and Firm Access to External Finance. *Journal of Finance 63*(5), 2161–2193.

Parthasarathy, K. and K. Newberry (2007). The Impact of Financial Restatements on Debt Markets. *SSRN eLibrary*. Working paper.

Pastor, L. and R. F. Stambaugh (2003). Liquidity Risk and Expected Stock Returns. *Journal of Political Economy 111*(3), 642–685.

Penman, S. H. and T. Sougiannis (1998). A Comparison of Dividend, Cash Flow, and Earnings Approaches to Equity Valuation. *Contemporary Accounting Research 15*(3), 343–383.

Penman, S. H. and X.-J. Zhang (2002). Accounting conservatism, the quality of earnings, and stock returns. *Accounting Review 77*(2), 237–264.

Petersen, M. A. (2009). Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. *Review of Financial Studies 22*(1), 435–480.

Petersen, M. A. and R. G. Rajan (1994). The Benefits of Lending Relationships: Evidence from Small Business Data. *The Journal of Finance 49*(1), 3–37.

Petersen, M. A. and R. G. Rajan (1995). The Effect of Credit Market Competition on Lending Relationships. *Quarterly Journal of Economics 110*(2), 407.

Petersen, M. A. and R. G. Rajan (1997). Trade Credit: Theories and Evidence. *Review of Financial Studies 10*(3).

Pi, L. and S. G. Timme (1993). Corporate Control and Bank Efficiency. *Journal of Banking and Finance 17*(2-3), 515–530.

Plumlee, M. and T. L. Yohn (2010). An Analysis of the Underlying Causes Attributed to Restatements. *Accounting Horizons 24*(1), 41–64.

Rajan, R. G. (1992). Insiders and Outsiders: The Choice between Informed and Arm's-Length Debt. *Journal of Finance 47*(4), 1367–1400.

Raunig, B., J. Scharler, and F. Sindermann (2014). Do Banks Lend Less in Uncertain Times? *Working Papers* (194), 1–35.

Richardson, S. A., A. I. Tuna, and M. Wu (2002). Predicting Earnings Management: The Case of Earnings Restatements. *SSRN eLibrary*. Working paper.

Rochet, J.-C. and X. Vives (2004). Coordination Failures and the Lender of Last Resort: Was Bagehot Right After All? *Journal of the European Economic Association 2*(6), 1116–1147.

Rosenbaum, P. R. and D. B. Rubin (1983). The Central Role of the Propensity Score in Observational Studies for Causal Effects. *Biometrika 70*(1), 41–55.

Ross, D. G. (2010). The Dominant Bank Effect: How High Lender Reputation Affects the Information Content and Terms of Bank Loans. *Review of Financial Studies 23*(7), 2730–2756.

Rotenstein, A. (2011). Corporate Governance Changes Following Earnings Restatements: A Research Tool. *Journal of Applied Business Research 27*(1), 123–140.

Schipper, K. (1989). Commentary on Earnings Management. *Accounting Horizons 3*(4), 91–103.

Schipper, K. and L. Vincent (2003). Earnings Quality. *Accounting Horizons 17*, 97–111.

Scholes, M. S., G. P. Wilson, and M. A. Wolfson (1990). Tax Planning, Regulatory Capital Planning, and Financial Reporting Strategy for Commercial Banks. *Review of Financial Studies 3*(4), 625–650.

Scholz, S. (2008). *The Changing Nature and Consequences of Public Company Financial Restatements*. The Department of the Treasury.

Shackelford, D. A. (1999). Discussion of "The Effects of Taxes, Agency Costs and Information Asymmetry on Earnings Management: A Comparison of Public and Private Firms". *Review of Accounting Studies 4*(3-4), 327–329.

Singer, Z. and H. You (2011). The Effect of Section 404 of the Sarbanes-Oxley Act on Earnings Quality. *Journal of Accounting, Auditing and Finance 26*(3), 556–589.

Sloan, R. G. (1996). Do Stock Prices Fully Reflect Information in Accruals and Cash Flows about Future Earnings? *Accounting Review 71*(3), 289–315.

Soderstrom, N. and K. J. Sun (2007). IFRS Adoption and Accounting Quality: A Review. *European Accounting Review 16*(4), 675–702.

Stubben, S. R. (2010). Discretionary Revenues as a Measure of Earnings Management. *The Accounting Review 85*(2), 695–717.

Subramanyam, K. R. (1996). The Pricing of Discretionary Accruals. *Journal of Accounting and Economics 22*(1-3), 249–281.

Tan, X., M. Najand, and D. Ziegenfuss (2006). Intra-Industry Effects of Earnings Restatements Due to Accounting Irregularities. *Journal of Business Finance and Accounting 33*(5/6), 696–714.

Teoh, S. H., I. Welch, and T. J. Wong (1998). Earnings Management and the Long-Run Market Performance of Initial Public Offerings. *Journal of Finance 53*(6), 1935–1974.

Teoh, S. H. and T. J. Wong (1993). Perceived Auditor Quality and the Earnings Response Coefficient. *Accounting Review 68*(2), 346–366.

Tirole, J. (2011). Illiquidity and All Its Friends. *Journal of Economic Literature 49*(2), 287–325.

Turner, L. E. and T. R. Weirich (2006). A Closer Look at Financial Statement Restatements. *CPA Journal 76*(12), 12–23.

Valdivia, V. (2008). Restatements at Financial Institutions: Lessons Learned. *Bank Accounting and Finance 21*(4), 3–10.

Velury, U. and D. S. Jenkins (2006). Institutional Ownership and the Quality of Earnings. *Journal of Business Research 59*(9), 1043–1051.

Verbeek, M. and T. Nijman (1992). Can Cohort Data Be Treated as Genuine Panel Data? *Empirical Economics 17*(1), 9–23.

Visvanathan, G. (2006). An Empirical Investigation of 'Closeness to Cash' as a Determinant of Earnings Response Coefficients. *Accounting and Business Research 36*(2), 109–120.

Wagenhofer, A. and H. Ducker (2007). Die Messung von "Earnings"-Qualität. *Journal für Betriebswithschaft 57*(3-4), 263–297.

Wahlen, J. M. (1994). The Nature of Information in Commercial Bank Loan Loss Disclosures. *Accounting Review 69*(3), 455–478.

Wall, L. D. and T. W. Koch (2000). Bank Loan-Loss Accounting: A Review of Theoretical and Empirical Evidence. *Economic Review 85*(2), 1.

Warfield, T. D. and T. J. Linsmeier (1992). Tax Planning, Earnings Management, and the Differential Information-content of Bank Earnings Components. *Accounting Review 67*(3), 546–562.

Weinstein, D. E. and Y. Yafeh (1998). On the Costs of a Bank-Centered Financial System: Evidence from the Changing Main Bank Relations in Japan. *Journal of Finance 53*(2), 635–672.

Weisbach, M. S. (1988). Outside directors and CEO Turnover. *Journal of Financial Economics 20*(C), 431–460.

Williamson, O. E. (1983). Organization Form, Residual Claimants, and Corporate Control. *Journal of Law & Economics 26*(2), 351–366.

Wilson, W. M. (2008). An Empirical Analysis of the Decline in the Information Content of Earnings Following Restatements. *Accounting Review 83*(2), 519–548.

Zhao, R. and Y. He (2008). International Variation in Bank Accounting Information Content. *Journal of International Financial Management and Accounting 19*(3), 236–260.

DEPARTMENT OF ECONOMICS AND BUSINESS

AARHUS UNIVERSITY
SCHOOL OF BUSINESS AND SOCIAL SCIENCES
www.econ.au.dk

PhD Theses since 1 July 2011

2011-4 Anders Bredahl Kock: Forecasting and Oracle Efficient Econometrics

2011-5 Christian Bach: The Game of Risk

2011-6 Stefan Holst Bache: Quantile Regression: Three Econometric Studies

2011:12 Bisheng Du: Essays on Advance Demand Information, Prioritization and Real Options in Inventory Management

2011:13 Christian Gormsen Schmidt: Exploring the Barriers to Globalization

2011:16 Dewi Fitriasari: Analyses of Social and Environmental Reporting as a Practice of Accountability to Stakeholders

2011:22 Sanne Hiller: Essays on International Trade and Migration: Firm Behavior, Networks and Barriers to Trade

2012-1 Johannes Tang Kristensen: From Determinants of Low Birthweight to Factor-Based Macroeconomic Forecasting

2012-2 Karina Hjortshøj Kjeldsen: Routing and Scheduling in Liner Shipping

2012-3 Soheil Abginehchi: Essays on Inventory Control in Presence of Multiple Sourcing

2012-4 Zhenjiang Qin: Essays on Heterogeneous Beliefs, Public Information, and Asset Pricing

2012-5 Lasse Frisgaard Gunnersen: Income Redistribution Policies

2012-6 Miriam Wüst: Essays on early investments in child health

2012-7 Yukai Yang: Modelling Nonlinear Vector Economic Time Series

2012-8 Lene Kjærsgaard: Empirical Essays of Active Labor Market Policy on Employment

2012-9 Henrik Nørholm: Structured Retail Products and Return Predictability

2012-10 Signe Frederiksen: Empirical Essays on Placements in Outside Home Care

2012-11 Mateusz P. Dziubinski: Essays on Financial Econometrics and Derivatives Pricing

2012-12 Jens Riis Andersen: Option Games under Incomplete Information

2012-13 Margit Malmmose: The Role of Management Accounting in New Public Management Reforms: Implications in a Socio-Political Health Care Context

2012-14 Laurent Callot: Large Panels and High-dimensional VAR

2012-15 Christian Rix-Nielsen: Strategic Investment

2013-1 Kenneth Lykke Sørensen: Essays on Wage Determination

2013-2 Tue Rauff Lind Christensen: Network Design Problems with Piecewise Linear Cost Functions

2013-3 Dominyka Sakalauskaite: A Challenge for Experts: Auditors, Forensic Specialists and the Detection of Fraud

2013-4 Rune Bysted: Essays on Innovative Work Behavior

2013-5 Mikkel Nørlem Hermansen: Longer Human Lifespan and the Retirement Decision

2013-6 Jannie H.G. Kristoffersen: Empirical Essays on Economics of Education

2013-7 Mark Strøm Kristoffersen: Essays on Economic Policies over the Business Cycle

2013-8 Philipp Meinen: Essays on Firms in International Trade

2013-9 Cédric Gorinas: Essays on Marginalization and Integration of Immigrants and Young Criminals – A Labour Economics Perspective

2013-10 Ina Charlotte Jäkel: Product Quality, Trade Policy, and Voter Preferences: Essays on International Trade

2013-11 Anna Gerstrøm: World Disruption - How Bankers Reconstruct the Financial Crisis: Essays on Interpretation

2013-12 Paola Andrea Barrientos Quiroga: Essays on Development Economics

2013-13 Peter Bodnar: Essays on Warehouse Operations

2013-14 Rune Vammen Lesner: Essays on Determinants of Inequality

2013-15 Peter Arendorf Bache: Firms and International Trade

2013-16 Anders Laugesen: On Complementarities, Heterogeneous Firms, and International Trade

2013-17	Anders Bruun Jonassen: Regression Discontinuity Analyses of the Disincentive Effects of Increasing Social Assistance
2014-1	David Sloth Pedersen: A Journey into the Dark Arts of Quantitative Finance
2014-2	Martin Schultz-Nielsen: Optimal Corporate Investments and Capital Structure
2014-3	Lukas Bach: Routing and Scheduling Problems - Optimization using Exact and Heuristic Methods
2014-4	Tanja Groth: Regulatory impacts in relation to a renewable fuel CHP technology: A financial and socioeconomic analysis
2014-5	Niels Strange Hansen: Forecasting Based on Unobserved Variables
2014-6	Ritwik Banerjee: Economics of Misbehavior
2014-7	Christina Annette Gravert: Giving and Taking – Essays in Experimental Economics
2014-8	Astrid Hanghøj: Papers in purchasing and supply management: A capability-based perspective
2014-9	Nima Nonejad: Essays in Applied Bayesian Particle and Markov Chain Monte Carlo Techniques in Time Series Econometrics
2014-10	Tine L. Mundbjerg Eriksen: Essays on Bullying: an Economist’s Perspective
2014-11	Sashka Dimova: Essays on Job Search Assistance
2014-12	Rasmus Tangsgaard Varneskov: Econometric Analysis of Volatility in Financial Additive Noise Models
2015-1	Anne Floor Brix: Estimation of Continuous Time Models Driven by Lévy Processes
2015-2	Kasper Vinther Olesen: Realizing Conditional Distributions and Coherence Across Financial Asset Classes
2015-3	Manuel Sebastian Lukas: Estimation and Model Specification for Econometric Forecasting
2015-4	Sofie Theilade Nyland Brodersen: Essays on Job Search Assistance and Labor Market Outcomes
2015-5	Jesper Nydam Wulff: Empirical Research in Foreign Market Entry Mode

2015-6 Sanni Nørgaard Breining: The Sibling Relationship Dynamics and Spillovers

2015-7 Marie Herly: Empirical Studies of Earnings Quality

ISBN: 9788793195158