

**Essays on Risk Disclosure and Banking Regulation:
Empirical Studies on Climate Risk, IFRS 9 and
Financial Stability**

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List of Abbreviations

Δ CoVaR	Delta Conditional Value at Risk
ABDC	Australian Business Deans Council
ABS	Chartered Association of Business Schools
AFAANZ	Accounting and Finance Association of Australia and New Zealand
ANOVA	Analysis of Variance
BAFA	British Accounting & Finance Association
BaFin	Bundesanstalt für Finanzdienstleistungsaufsicht
BCBS	Basel Committee on Banking Supervision
BHC	Bank Holding Company
BIS	Bank for International Settlement
CARF	CARF Luzern Controlling - Accounting - Risiko - Finanzen
CDP	Carbon Disclosure Project
CDS	Credit Default Swap
CDSB	Climate Disclosure Standard Board
CECL	Current Expected Credit Losses
COSO	Committee of Sponsoring Organization of the Treadway Commission
COVID-19	Coronavirus SARS-CoV-2
CRD	Climate Risk Disclosure
CRD-IV	Capital Requirements Directive
CRR	Capital Requirements Regulation
CSR	Corporate Social Responsibility
CTA	Capital Transitional Arrangement
DCC	Dynamic Conditional Correlation
DiD	Difference-in-Difference
DLLP	Discretionary Loan Loss Provisions
EAA	European Accounting Association
EBA	European Banking Authority
EBES	Eurasia Business and Economics Society
EBRD	European Bank for Reconstruction and Development
ECB	European Central Bank
ECL	Expected Credit Loss
EDTF	Enhanced Disclosure Task Force
ERD	Environmental Risk Disclosure

ERM	Enterprise Risk Management
ESG	Environmental, Social, Governance
ESMA	European Securities and Markets Authority
Esp.	Especially
EU	European Union
EUFIN	European Financial Reporting
EZB	Europäische Zentralbank
FASB	Financial Accounting Standards Board
FEBS	Financial Engineering & Banking Society
FRR	Financial Reporting Regulation
FSB	Financial Stability Board
G-SIIs	Global Systemically Important Institutions
G20	Group of Twenties
GAAP	Generally Accepted Accounting Principles
GARCH	Generalized Autoregressive Conditional Heteroskedastic
GAS	German Accounting Standard
GDP	Gross Domestic Product
GIPSI	Acronym for Portugal, Italy, Greece, and Spain
GLS	Generalized Least Squares
GMM	Generalized Methods of Moments
GRI	Global Reporting Initiative
H	Hypothesis
HGB	Handelsgesetzbuch
I	Interest Rate
I/B/E/S	Institutional Brokers' Estimate System
IAS	International Accounting Standards
IAS 39	International Accounting Standard 39 Financial Instruments: Recognition and Measurement
IASB	International Accounting Standard Board
ICAEW	Institute of Chartered Accountants in England and Wales
ICL	Incurred Loss Model
IDW	Institut der Wirtschaftsprüfer in Deutschland e.V.
IFRS	International Financial Reporting Standards

IFRS 7	International Financial Reporting Standard 7: Financial Instruments Disclosure
IFRS 9	International Financial Reporting Standard 9: Financial Instruments
IIRC	International Integrated Reporting Council
IR	International Integrated Reporting Framework
KWG	Kreditwesengesetz
LBBW	Landesbank Baden-Württemberg
LCR	Liquidity Coverage Ratio
LGD	Loss Given Default
LLA	Loan Loss Allowance
LLP	Loan Loss Provisions
LR	Leverage Ratio
LT	Lifetime
LTEL	Lifetime Expected Credit Loss
M&A	Mergers & Acquisitions
MaRisk	Mindestanforderungen an das Risikomanagement
MATLAB	Programming Language and Software Tool, Matrix Laboratory
MAXQDA	Qualitative Data Analysis Tool
MENA	Acronym for Middle East and North Africa
MES	Marginal Expected Shortfall
NPL	Non-Performing Loans
NR	Narrative Review
OECD	Organization for Economic Co-operation and Development
ORQ	Overall Research Questions
P	Paper
PD	Probability of Default
PIGS	Portugal, Italy, Greece, and Spain
PLS-SEM	Partial Least Squares-Structural Equation Modelling
R	Program Language
R ²	R-Squared
RD	Risk Disclosure
RQ	Research Question
RR	Recovery Rate
RS	Research Synthesis

RWA	Risk Weighted Assets
SASB	Sustainability Accounting Standards Board
SEC	United States Securities and Exchange Commission
SLR	Systematic Literature Review
SSM	Single Supervisory Mechanism
STATA	Statistical Software Tool
TC	Total Citations
TCFD	Task Force on Climate-related Financial Disclosures
UAE	United Arab Emirates
UK	United Kingdom
UNEP	United Nations Environment Programme
VHB	German Academic Association of Business Research
VOSViewer	Tool for visualizing bibliometric networks
WBCSD	World Business Council for Sustainable Development
WGI	Worldbank Governance Indicators
ZfU	Zeitschrift für Umweltpolitik und Umweltrecht

Chapter 1: Introduction and Research Design

“Novarum rerum cupidus”

Caius Iulius Caesar, de bello Gallico (I), 18, 3

1.1 Introduction and Motivation

“Nevertheless, strengthened, transparent disclosure is good for markets, because it helps investors make more informed decisions. It is good for prudential supervision, because it helps to make banks more accountable, both to supervisors and investors. And it is good for the stability of the system as a whole, because it reduces the chance that unexpected events will cause major system-wide disruptions.”

Jaime Caruana (2011, p. 2), Bank for International Settlements

Disclosure of banks has persistent relevance both in academic literature (Acharya & Ryan, 2016; Bischof et al., 2022; Ryan, 2018) and from the practical perspective, especially through ongoing regulatory initiatives (Basel Committee on Banking Supervision [BCBS], 2015a, 2021b; European Banking Authority [EBA], 2017b). Increased relevance arises, on the one hand, as a direct response to the criticism of financial reporting in the wake of the 2008 global financial crisis (Financial Stability Board [FSB], 2009; G 20, 2009), which led to an adjustment of regulatory disclosures (BCBS, 2017a) and accounting standards (International Accounting Standard Board [IASB], 2014a, 2014b) and on the other hand by the changing relevance of new types of risks.¹ Also, mandatory and additional voluntary disclosures in the context of stress tests by bank supervisors are still relevant for generating transparency (Bischof & Daske, 2013; Goldstein & Leitner, 2018; Goldstein & Sapra, 2014; Lazzari et al., 2017; Petrella & Resti, 2013).

In academic literature, banks are sometimes argued to be opaque due to their business model (Blau et al., 2020; Flannery et al., 2013; Jones et al., 2012, 2013; Jungherr, 2018; Morgan, 2002). Financial reporting is, therefore – at least from a theoretical perspective – suitable for reducing information asymmetries by creating transparency (Healy & Palepu, 2001; Verrecchia, 2001). Healy and Palepu (2001) argued that “the credibility of management disclosures is enhanced by regulators, standard setters, auditors and other capital market intermediaries“ (p. 406). Tadesse (2006) also found evidence that financial markets are more resilient in countries “that require more comprehensive, more informative, more timely and more credible disclosure” (p. 34). In addition to the annual financial reporting, risk reporting plays a particularly exposed role for banks and financial service firms (Linsley & Kajuter, 2008; Linsley & Shrives, 2005; Oliveira, Lima Rodrigues, et al., 2011; Oliveira, Rodrigues, et al., 2011). According to the regulatory principle of market discipline, regulatory risk disclosure requirements should enable supervisory authorities, rating

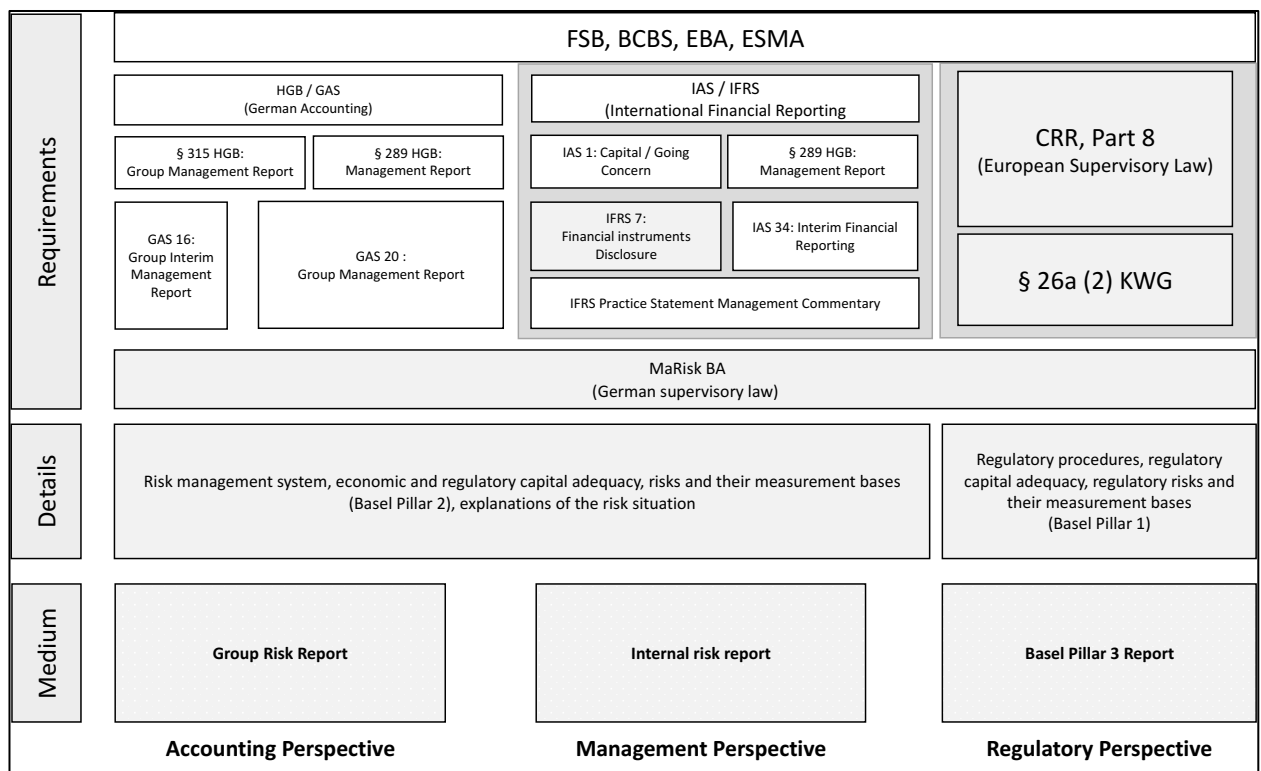
¹ In recent history, these have included contributions to credit risk (Frolov, 2006; Khambata & Bagdi, 2003), market price risk (Jorion, 2002; Liu et al., 2004; Pérignon & Smith, 2010; Woods et al., 2008), operational risk (Barakat & Hussainey, 2013; Helbok & Wagner, 2006), reputational risk (Heidinger & Gatzert, 2018), and currently the increasing relevance of climate-related risks due to changes in disclosure requirements (CDSB & SASB, 2019; TCFD, 2017a, 2017b).

agencies, and central banks to derive impacts on the financial situation of the institution and to take corrective measures (European Central Bank, 2005). Improved risk reporting further supports investors in assessing the quality of the underlying enterprise, in risk management, and in making investment decisions (Institute of Chartered Accountants in England and Wales [ICAEW], 2011). The quality of financial reporting is therefore crucial for establishing efficient market discipline that influences how banks manage their debt and risk exposures during economic cycles (Acharya & Ryan, 2016). Empirical studies with a focus on the 2008 financial crisis suggest that banks' disclosure of relevant risks and accounting for loan loss provisions or write-downs were delayed, with negative consequences for financial market stability (Barth & Landsman, 2010; Bischof et al., 2021; Laux, 2012; Vyas, 2011).

According to Schierenbeck et al. (2014), the business model of banks is in a constant conflict of objectives between a profit-oriented growth strategy and a profit-oriented risk strategy under the primacy of profitability. The acceptance of potential earning opportunities per se implies a willingness to bear risks. This so-called risk-opportunity model serves as a maxim for the performance-oriented management of the bank as a whole (Schierenbeck et al., 2008; Wiedemann & Wiechers, 2013). In addition to these business decision-making rationales, banking regulations and the requirements of bank accounting are becoming increasingly relevant for banks' integrated performance and risk management (Wiedemann et al., 2021). Modern bank management in the sense of "comprehensive banking" (Hinze et al., 2017, p. 110) can be characterized by a banking triad that combines the (risk) management, the regulatory, and the accounting perspective (Hinze et al., 2017; Menk & Warkentin, 2014). The close integration of group-wide risk management with accounting and regulatory requirements is the cornerstone of efficient and transparent capital market communication in line with the management approach (Weber, 2009, 2010a, 2010c). The increasing regulatory requirements in the wake of the global financial crisis – specifically through Basel III – necessitate a stronger reflection of these requirements on bank management. Furthermore, revised accounting standards for the recognition of financial instruments such as the IFRS 9 of the International Accounting Standards Board (IASB, 2014a) and Current Expected Credit Losses (CECL) (Financial Accounting Standards Board [FASB], 2016) requires deeper anchoring with the risk management component of a bank. In particular, the revised IFRS 9 impairment model for credit risk requires a stronger alignment of the accounting policies with the logic of a bank's risk management through the switch from the backward-looking incurred loss model to the forward-looking expected credit loss model (EY, 2018; IASB, 2014b; KPMG, 2017).

The Financial Stability Board (FSB) of the G20 also recognized the high relevance of disclosure for banks in 2012 and launched the so-called recommendations of the Enhanced Disclosure Task Force (EDTF). Based on the defined recommendations, the disclosure quality of banks should be enhanced and the solvency of the entire financial market should be strengthened (EDTF, 2012). In 2015, the EDTF recommendations for risk reporting were further specified in the wake of the change from the impairment model to the ECL model. To improve risk reporting, banks should disclose information on the implementation status of the ECL model and the model assumptions from 2015 until the implementation date of the ECL model in 2018 and beyond (EDTF, 2015). The regulatory requirements for risk reporting by banks are complex and regulated by a variety of legislations, directives, and bylaws. Figure 1.1 provides an overview of the risk reporting requirements for banks in Germany. In addition to German supervisory law, German banks are subject to supranational regulation by the European Union (EU) and, depending on their capital market orientation, to different accounting, and thus disclosure requirements:

Figure 1.1: Requirements for risk reporting by banks in Germany, updated and extended presentation following Weber (2009) and Weber and Menk (2014)



This figure provides an overview of the regulatory requirements for risk reporting in Germany.

The internal risk reporting of CRR institutions in accordance with Section 1 of the German Banking Act (KWG) is specified in German banking supervisory law in BT 3 of the Minimum Requirements for Risk Management (MaRisk). The actual MaRisk is currently available as a consultation version in the seventh amendment (BaFin, 2022). In MaRisk, BT 3.1, para. 1, the directive codifies

the obligation for management to obtain reports on the business and risk situation at “appropriate frequencies”. In addition to the requirements regarding the timeliness of risk data, the MaRisk has established regular reporting cycles to inform the management and the supervisory body of a bank on current risk situations (MaRisk, BT 3.1, para. 4 f.). The overall risk report must further include results of stress tests, the risk coverage potential, capital adequacy statements, as well as the underlying assumptions and results of material types of risk (MaRisk, BT 3.2, para. 2). These include counterparty risks (MaRisk, BT 3.2, para. 3), market price risks (MaRisk, BT 3.2, para. 4), liquidity risks (MaRisk, BT 3.2, para. 5) and significant loss events from operational risks (MaRisk, BT 3.2, para. 6). Since the seventh amendment, additional ESG risks must also be included in the management reporting (MaRisk, BT 3.1, para. 1).

The requirements for regulatory risk disclosure in terms of market discipline have been published in the form of disclosure standards since the end of 2019 (BCBS, 2021b). The disclosure standards summarize the BCBS letters that have been circulating. In the past, significant changes in regulatory disclosure were initiated by amendments to the Basel Accord.² In the EU, the regulatory disclosure requirements under Basel Pillar 3 result from Part 8 of Regulation (EU) No. 575/2013 of June 26, 2013 (Capital Requirements Regulation[CRR]). Applying Article 435 CRR, credit institutions are obliged to disclose externally the risk management objectives and the risk policies of all material risk types. The main types of risk for a bank include liquidity risk (Article 435 CRR), counterparty credit risk (Article 439 CRR), credit risk and dilution risk (Article 442 CRR), market risk (Article 445 CRR), operational risk management (Article 446 CRR) and interest rate risk (Article 448 CRR). The content of the quantitative and qualitative disclosure requirements was further specified in the "Guidelines on disclosure requirements under Part 8 of Regulation (EU) No. 575/2013" of the European Banking Authority (EBA, 2017a).

Depending on the capital market orientation of the bank, external disclosure under commercial law in Germany is governed by the German Commercial Code (HGB) or by the International Financial Reporting Standards (IFRS). In addition, German Accounting Standard (GAS) 20 “Group Management Report” provides a dedicated framework for the content of risk reporting by banks as part of the management report (Deutsches Rechnungslegungs Standards Committee [DRSC], 2017). In the context of international financial reporting, IFRS 7: Financial Instruments Disclosure is of particular importance for external disclosure. In addition to disclosures on the accounting

² Key regulatory disclosure changes included Basel II Pillar 3, Basel II.5 Pillar 3, and Basel III.

treatment of financial instruments, the accounting standard codifies the disclosures on credit risk (IFRS 7.35A–38), liquidity (IFRS 7.39), and market price risks (IFRS 7.40–42).

Overarching guidelines were further issued by the FSB through disclosure initiatives such as the EDTF recommendations (EDTF, 2012, 2015), the Bank for International Settlement (BIS) with BCBS recommendations (BCBS, 2021b) and the EBA (2014, 2017a) with specifics on CRR requirements and the implementation of European stress tests, and the European Securities and Markets Authority (ESMA) with further disclosure guidelines (ESMA, 2022).

Based on the regulatory framework, three reporting structures exist: The group risk report, the internal risk report, and the Basel Pillar 3 risk report. Although all three types of reports have the same underlying substance – namely, a bank’s risk management system – they differ in terms of structure, content, and scope, as well as the audience to which they are addressed (Bischof et al., 2022; Giner et al., 2020; Weber, 2010a, 2010b).

The purpose of this dissertation is to investigate the interaction of different disclosure regimes in the banking environment with bank management and financial stability. Therefore, this dissertation will follow the discussion initiated by the Basel Committee of Banking Supervision to investigate the interplay of accounting and disclosure regulation on bank behavior (BCBS, 2015b, 2017b). Based on empirical studies, this dissertation aims to investigate whether (I.) the measures introduced by policymakers and regulators in the aftermath of the financial crisis are suitable to mitigate the existing criticism of banks’ risk disclosure, and (II.) whether these reforms are suitable to stabilize the financial system and make it more resilient. In addition, (III.) the interplay of the different layers of disclosure regulation on the behavioral steering of a bank is to be investigated. For this, the following overall research questions (ORQs) will be addressed:

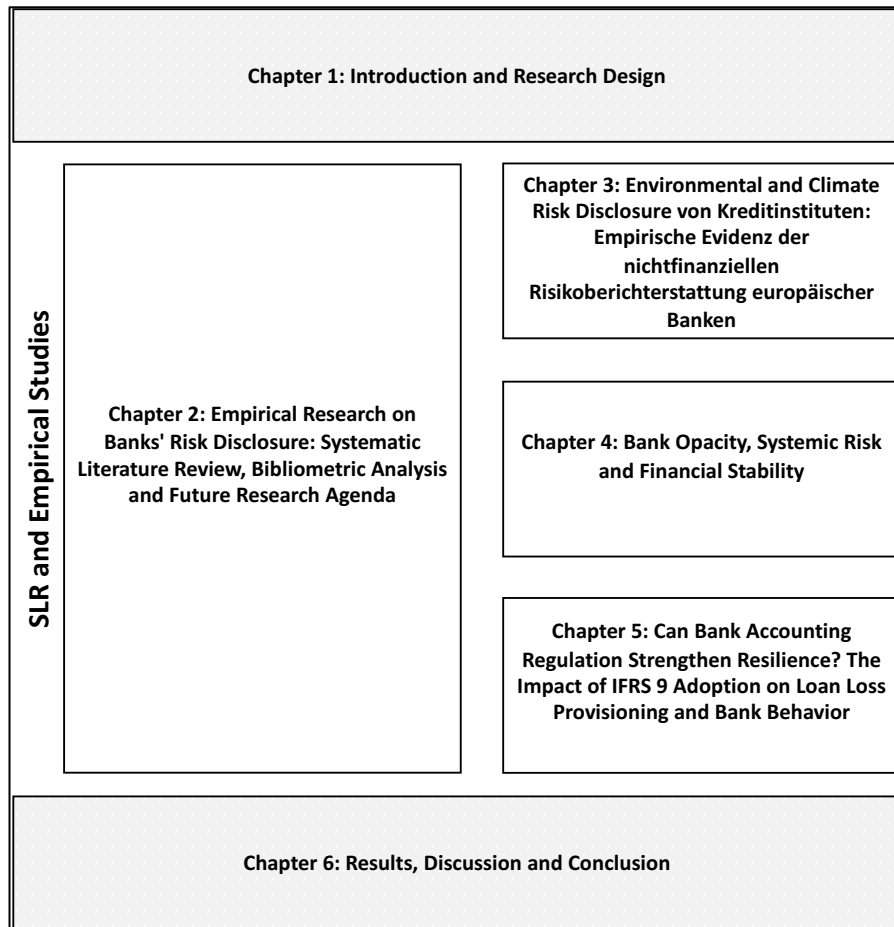
ORQ 1: *What are the current developments and drivers in risk reporting by banks?*

ORQ 2: *What is the influence of risk reporting on the financial stability of banks?*

ORQ 3: *What influence does the interplay of accounting and regulation have on the behavioral management of banks?*

The remainder of the dissertation is organized as follows: the following sections in Chapter 1 first describe the structure of each study and present the overall research design and methodology. Chapter 1 concludes with a summary of each paper's key findings and primary research questions. Chapters 2 through 5 present the four papers in the dissertation. Chapter 6 concludes with a summary of findings, discussion, and conclusions.

Figure 1.2: The Structure of the Dissertation



This figure describes the structure of this dissertation, which consists of a framework and a main part consisting of the SLR and three empirical studies.

1.2 Structure and Description of the Studies

This Ph.D. thesis consists of four essays and addresses several facets of the influence of bank regulation and bank accounting on risk-related disclosures. The first paper, *Empirical Research on Banks' Risk Reporting: Systematic Literature Review, Bibliometric Analysis and Future Research Agenda* provides an overview of the current state of research on banks' risk reporting based on a systematic literature review. The paper is single-authored and was presented at CARF Lucerne 2021 (Lucerne, Switzerland), the annual conference of the British Accounting & Finance Association (BAFA 2022, Nottingham, United Kingdom), the 44th Annual Congress of the European Accounting Association (EAA, Bergen, Norway), and in a doctoral colloquium at the University of Siegen.

The second paper, *Environmental and Climate Risk Disclosure von Kreditinstituten: Empirische Evidenz der nichtfinanziellen Risikoberichterstattung europäischer Banken*, examines climate risk disclosure by systemically important European banks (G-SIBs). The paper was co-authored with Michael Torben Menk. The article has been published in *ZfU - Zeitschrift für Umweltpolitik & Umweltrecht* (VHB JQ: B). The paper was presented at CARF Lucerne 2019 (Lucerne,

Switzerland) and was awarded with the "Förderpreis für den wissenschaftlichen Nachwuchs des Vereins zur Förderung der Fakultät Wirtschaftswissenschaften, Wirtschaftsinformatik und Wirtschaftsrecht der Universität Siegen e.V".

The third paper, *Bank Opacity, Systemic Risk, and Financial Stability*, discusses the impact of bank opacity on financial stability, measured as the marginal expected shortfall and delta conditional value at risk. Using a panel data set, the impact of accounting and supranational regulatory measures on bank opacity, and the impact on financial stability are investigated. The paper is single-authored and has been published in the Journal of Financial Stability (VHB: A; ABDC: A; ABS: 3). This article was also presented at CARF Lucerne 2020 (Lucerne, Switzerland), the 34th EBES Conference (Athens, Greece), the 1st Virtual Annual Congress of the European Accounting Association (EAA), the 10th International Conference of the Financial Engineering and Banking Society (FEBS, Lille, France), and in a Ph.D. colloquium at the University of Siegen.

The fourth essay, *Can Bank Accounting Regulation Strengthen Resilience? The Impact of IFRS 9 Adoption on Loan Loss Provisioning and Bank Behavior*, deals with the impact of the first-time adoption of IFRS 9 on the management behavior and market valuation of global banks. The paper was co-authored with Michael Torben Menk and was presented at CARF Lucerne 2021 (Lucerne, Switzerland), the Annual Conference of the Accounting & Finance Association of Australia and New Zealand (AFAANZ 2022 Conference, Melbourne, Australia), the 15th Edition of the Annual Meeting of The Risk, Banking and Finance Society (IRMC 2022, Bari, Italy), the World Finance Conference 2022 (Turin, Italy), the 17th Workshop on European Financial Reporting in collaboration with EAA's journal Accounting in Europe (EUFIN Workshop 2022, Lisbon, Portugal), the Annual Conference of the British Accounting & Finance Association (BAFA 2023, Sheffield, United Kingdom), the 45th Annual Congress of the European Accounting Association (EAA, Helsinki-Espoo, Finland) and the 2nd Management Research Colloquium 2023, University of Siegen. In addition, the paper was accepted at the 11th International Conference of the Financial Engineering and Banking Society (FEBS, Portsmouth, United Kingdom) and the 29th Annual Global Finance Conference (Braga, Portugal).

1.3 Research Framework and Methodology

As a research methodology, this doctoral thesis uses a mixed-methods approach, based on quantitative and qualitative methods of analysis. A systematic literature review (SLR) based on Tranfield et al. (2003), supplemented by a bibliometric analysis, serves as the basis for the empirical studies. Based on a thematic clustering of the relevant research streams, research gaps were identified, and future research questions and opportunities were derived to be addressed in the empirical studies. Based on the research gaps identified in *PI: Mies (2022a): Empirical Research on Bank' Risk*

Reporting: Systematic Literature Review, Bibliometric Analysis and Future Research Agenda, this dissertation aims to answer the following selected research questions and opportunities:

Table 1.1: Identified Research Gaps based on Mies (2022a)

Cluster	Future Research Questions and Opportunities	Paper
Risk Categories	<ul style="list-style-type: none"> Does the level and quality of environmental and climate risk disclosure evolve over time? Which determinants influence the disclosure of environmental and climate risk? 	P2: <i>Mies & Menk (2019): Environmental and Climate Risk Disclosure von Kreditinstituten: Empirische Evidenz der nichtfinanziellen Risikoberichterstattung europäischer Banken</i>
Banking Regulation	<ul style="list-style-type: none"> What influence does risk reporting have on global financial stability and thus on systemic risk measures (e.g., MES, Delta Co-Var)? Which impact has the revised Basel Pillar 3 Framework on risk disclosure? What influence do the EDTF recommendations have on the disclosure behavior of risks, especially credit risks? 	P3: <i>Mies (2022b): Bank Opacity, Systemic Risk and Financial Stability</i> P3: <i>Mies (2022b): Bank Opacity, Systemic Risk and Financial Stability</i> P4: <i>Mies & Menk (2023): Can Bank Accounting Regulation Strengthen Resilience? The Impact of IFRS 9 Adoption on Loan Loss Provisioning and Bank Behavior</i>
Accounting	<ul style="list-style-type: none"> Which influence has the revised IFRS 9 and IFRS 7 on the risk disclosure behavior of Banks? Does the quality and level of financial instrument disclosure evolve over time esp. due to amended accounting standards (IFRS 9 and CECL) 	P3: <i>Mies & Menk (2023): Can Bank Accounting Regulation Strengthen Resilience? The Impact of IFRS 9 Adoption on Loan Loss Provisioning and Bank Behavior</i>

This table describes the identified Research Gaps based on the SLR.

P2: *Mies and Menk (2019): Environmental and Climate Risk Disclosure von Kreditinstituten: Empirische Evidenz der nichtfinanziellen Risikoberichterstattung europäischer Banken* analyzes the level of environmental and climate risk disclosure over a selected time frame. In addition, relevant determinants are considered. **P3:** *Mies (2022b): Bank Opacity, Systemic Risk and Financial Stability* addresses issues from the Banking Regulation cluster. In addition to the impact on financial stability, the influence of the Basel Pillar 3 framework is considered.

Lastly, from the accounting cluster, **P4:** *Mies and Menk (2023): Can Bank Accounting Regulation Strengthen Resilience? The Impact of IFRS 9 Adoption on Loan Loss Provisioning and Bank Behavior* examines the impact of the amended IFRS 9 on banks' disclosure behavior.

As further research methodologies, the empirical studies apply multivariate analysis methods based on panel data sets and difference-in-difference approaches. Different disclosure proxies are used to measure the quality of disclosure (Beattie et al., 2004). In addition to market-based methods and binary coding (**P3**, **P4**), a self-generated disclosure index (**P2**) is used. In the following subsections, the research questions and research designs of the individual papers will first be summarized, and then the main results of the studies will be outlined.

Table 1.2: Structure and Research Design of the Studies

Author(s)	Research Topic	Methodology, Data	Contribution of Author(s)	Presentations and Submissions
Paper 1: Empirical Research on Bank' Risk Reporting: Systematic Literature Review, Bibliometric Analysis and Future Research Agenda				
Mies, Michael	<ul style="list-style-type: none"> Determining the status quo of empirical research on risk reporting by credit institutions Identification of trends, clustering of results, identification of research gaps, and derivation of a research agenda 	<ul style="list-style-type: none"> Systematic Literature Review according to Tranfield et al. (2003) and bibliometric analysis by the R application Bibliometrix 3.0 (Aria & Cuccurullo, 2017) and VOSviewer (van Eck & Waltman, 2010, 2021) based on the Clarivate Web of Science database Sample: N = 68 articles over the period 2002–2022 	<ul style="list-style-type: none"> Single Author Publication 	<p>Earlier version presented at:</p> <ul style="list-style-type: none"> CARF Lucerne 2021, Lucerne (Switzerland), September 09–10, 2021 BAFA 2022, Annual Conference of the British Accounting & Finance Association, Nottingham (United Kingdom), April 12–13, 2022. 44th Annual Congress of the European Accounting Association (EAA), Bergen (Norway, May 11–13, 2022 <p>Working paper, available at SSRN: Mies, M. (2022a): Empirical Research on Banks' Risk Disclosure: Systematic Literature Review, Bibliometric Analysis and Future Research Agenda (November 1, 2022). Available at SSRN: https://ssrn.com/abstract=4299377</p> <p>Paper submitted to: <i>International Review of Financial Analysis (VHB: B; ABDC: A; ABS: 3)</i>, under review with revise and resubmit).</p>
Paper 2: Environmental and Climate Risk Disclosure von Kreditinstituten: Empirische Evidenz der nichtfinanziellen Risikoberichterstattung europäischer Banken				
Mies, Michael Menk, Michael Torben	<ul style="list-style-type: none"> Brief overview of banks' non-financial disclosure requirements Survey of disclosure quality and analysis of influencing factors 	<ul style="list-style-type: none"> Content analysis using MAXQDA, a self-created Environmental and Climate Risk Disclosure Index Quantitative, Multivariate analysis (panel data analysis with random effects) 	<ul style="list-style-type: none"> Responsible for conducting and evaluating the literature review and hypotheses development Independent design of the Environmental and Climate 	<p>Earlier version presented at:</p> <ul style="list-style-type: none"> CARF Lucerne 2019, Lucerne (Switzerland), September 05–06, 2019 <p>Published in: <i>ZfU - Zeitschrift für Umweltpolitik & Umweltrecht (VHB: B)</i>, 2019, S. 405–444</p>

Author(s)	Research Topic	Methodology, Data	Contribution of Author(s)	Presentations and Submissions
		<ul style="list-style-type: none"> ▪ Database: Refinitiv Datastream, Annual Reports and CSR Reports ▪ Sample: N = 38 banks over the period 2014–2017 	<ul style="list-style-type: none"> ▪ Risk Disclosure Index and coding of the reports ▪ Carrying out the empirical analysis, analysis and interpretation of the results, discussion and results 	
Paper 3: Bank Opacity, Systemic Risk and Financial Stability				
Mies, Michael	<ul style="list-style-type: none"> ▪ Research on the Impact of Bank Opacity on the Financial Stability of European Banks ▪ Investigation of the Impact of Accounting and Prudential Regulatory Measures on Financial Market Stability 	<ul style="list-style-type: none"> ▪ Quantitative, multivariate analysis (panel data analysis with fixed effects and generalized method of moments (GMM)) ▪ Delta Conditional Value at Risk and Marginal Expected Shortfall as Systemic Risk Proxies based on a MATLAB Routine ▪ Database: Refinitiv Datastream ▪ Sample: N = 90 banks over the period 2002–2018 	<ul style="list-style-type: none"> ▪ Single Author Publication 	<p>Earlier version presented at:</p> <ul style="list-style-type: none"> ▪ <i>CARF Lucerne 2020</i>, Lucerne, Switzerland, September 03–04, 2020 ▪ <i>34th EBES Conference</i>, University of Piraeus, Athens (Greece), January 06–08, 2021 ▪ <i>1st Virtual Annual Congress of the European Accounting Association (EAA)</i>, May 26–28, 2021 ▪ <i>10th International Conference of the Financial Engineering and Banking Society (FEBS)</i>, IAE Lille University School of Management, Lille (France), September 30 – October 3, 2021 <p>Working Paper, available at SSRN: Mies, M. (2022b): Bank Opacity, Systemic Risk and Financial Stability (October 30, 2022). Available at SSRN: https://ssrn.com/abstract=3723044 or http://dx.doi.org/10.2139/ssrn.3723044</p> <p>Published in: <i>Journal of Financial Stability (VHB: A; ABDC: A; ABS: 3)</i>, Vol. 70, 2024, 101211, https://doi.org/10.1016/j.jfs.2023.101211</p>

Author(s)	Research Topic	Methodology, Data	Contribution of Author(s)	Presentations and Submissions
Paper 4: Can Bank Accounting Regulation Strengthen Resilience? The Impact of IFRS 9 Adoption on Loan Loss Provisioning and Bank Behavior				
Mies, Michael Menk, Michael Torben	<ul style="list-style-type: none"> ▪ Effect of IFRS 9 Adoption on Earnings Management, Bank Risk Taking and Value Relevance 	<ul style="list-style-type: none"> ▪ Quantitative, multivariate analysis (Difference-in-Difference) ▪ Database: Refinitiv Datastream ▪ Sample: N = 478 banks over the period 2016–2019 	<ul style="list-style-type: none"> ▪ Independent execution and evaluation of the literature review and formation of hypotheses ▪ Carrying out the empirical analysis, evaluation, and interpretation 	<p>Earlier version presented at:</p> <ul style="list-style-type: none"> ▪ CARF Lucerne 2021, Lucerne (Switzerland), September 09–10, 2021 ▪ Annual Conference of the Accounting & Finance Association of Australia and New Zealand (AFAANZ 2022), Melbourne (Australia), July 3–5, 2022 ▪ 15th Edition of the Annual Meeting of the Risk, Banking, and Finance Society, Free Mediterranean University (LUM Giuseppe Degennaro), Bari (Italy), July 4–5, 2022. ▪ World Finance Conference, Turin (Italy), August 1–3, 2022. ▪ 17th Workshop on European Financial Reporting in collaboration with EAA’s journal accounting in Europe, Católica Lisbon School of Business and Economics, Lisbon (Portugal), September 1–2, 2022 ▪ Annual Conference of the British Accounting & Finance Association (BAFA 2023, Sheffield, United Kingdom), April 17–19, 2023 ▪ 45th Annual Congress of the European Accounting Association (EAA, Helsinki-Espoo, Finland). <p>Earlier version submitted and accepted at:</p> <ul style="list-style-type: none"> ▪ 11th International Conference of the Financial Engineering and Banking Society (FEBS), University of

Author(s)	Research Topic	Methodology, Data	Contribution of Author(s)	Presentations and Submissions
				<p>Portsmouth, Portsmouth, UK, June 10–12, 2022</p> <ul style="list-style-type: none"> ▪ 29th Annual Global Finance Conference, Braga, Portugal, June 20–22, 2022 <p>Working Paper, available at SSRN: Mies, M. & Menk, M. T., Can Accounting Regulation Strengthen Resilience? The Impact of IFRS 9 Adoption on Loan Loss Provisioning and Bank Behavior (June 17, 2023). Available at SSRN: https://dx.doi.org/10.2139/ssrn.4497602</p>

Table 1.2 summarizes the main bibliographic contents of the studies in this dissertation.

1.4 Research Questions of the Studies and Summary of Major Findings

1.4.1 Empirical Research on Banks' Risk Reporting: Systematic Literature Review, Bibliometric Analysis and Future Research Agenda

1.4.1.1 Research Questions and Design

The purpose of this paper was to identify the state of academic research on risk reporting by banks and to discuss possible research gaps. In terms of methodology, the literature review followed a triangulated approach: in addition to a qualitative content analysis based on SLR according to Tranfield et al. (2003), a quantitative bibliometric analysis using scientific visualization techniques was used. For this purpose, the R application Bibliometrix 3.0 (Aria & Cuccurullo, 2017) and VOSviewer (van Eck & Waltman, 2010, 2021) based on the Clarivate Web of Science database were applied. The literature review answered the following research questions:

***RQ 1:** How has the empirical literature evolved over time in terms of both its content and methodology?*

***RQ 2:** What are the regulatory and influencing factors affecting bank risk-reporting research?*

***RQ 3:** Where is the need for further research in the coverage of this research field?*

Table 1.3: Conducting the SLR: Sample Selection Process (Source: Mies, 2022a)

Filter	Description	Elsevier Science Direct	EBSCO Business Source Complete	Springer Link	Clarivate Web of Science	Total
Step 1	Articles based on keyword search (adjusted for articles in books, reviews, editorials)	612	363	254	70	1299
	After merging the search results from the different databases (adjusted for duplicates)					1011
Step 2	After the analysis of the abstracts, titles and bibliographic data					206
Step 3	After text analysis					74
Step 4	After quality gate (ABDC / ABS / VHB)					64
Step 5	Hand Searching and Citation Tracking					5
Final Sample for Content Analysis						69

This table describes the individual steps for selecting the final sample. A keyword search in the above-mentioned databases serves as the basis for deriving the population.

The content analysis was based on a keyword search of the Elsevier ScienceDirect, EBSCO Business Source Complete, Emerald Insight, SpringerLink, and Clarivate Web of Science databases in

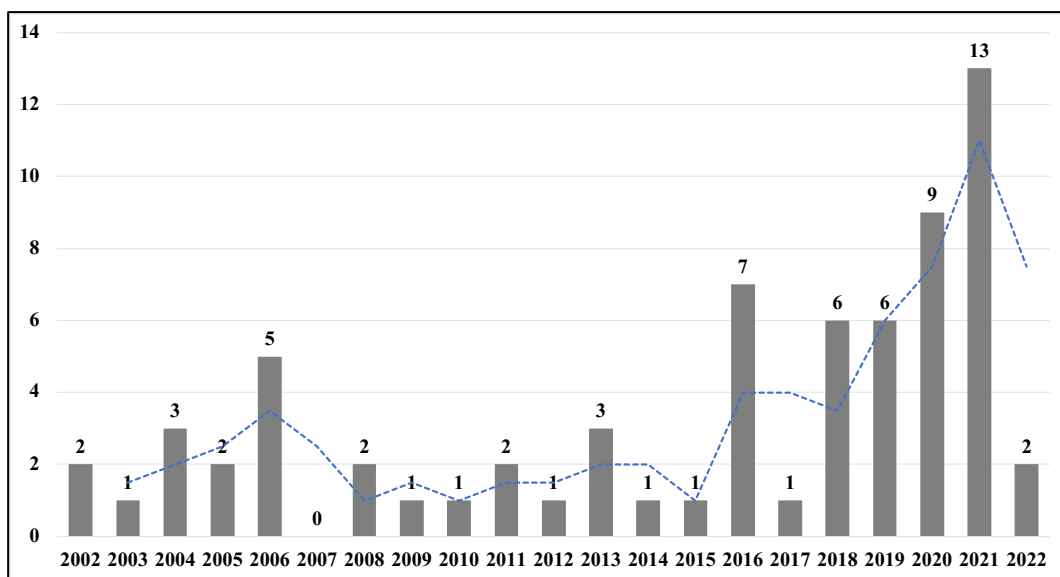
November 2021. After applying the filters and quality gates shown in Table 1.3, a total of 69 articles were identified.

In contrast to the content analysis, the bibliometric analysis was based on the Clarivate Web of Science database. Again, an initial keyword search was performed, which was manually extended by additional matches from the SLR search process. A total of 47 articles were identified, which represents a coverage of 69.57% of the SLR sample.

1.4.1.2 Results and Contribution

In the analyzed period 2002–2022, a total of 69 contributions were identified (see Figure 1.2). These are distributed across the following risk types: General Risk Disclosures (30 articles), Market & Interest Rate Risk Disclosure (11 articles), Operational Risk Disclosure (10 articles), Credit Risk Disclosure (10 articles), Counterparty Risk Disclosure (6 articles), and Liquidity Risk Disclosure (2 articles).

Figure 1.3: Published Articles over the Time Frame from 2002-2022 (Source: Mies, 2022a)



The papers examined, with a focus on accounting regulation, primarily analyzed related research on the Accounting Standards IFRS 7 of the IASB and FRR No. 48 of the SEC. In terms of content, the studies primarily assessed the impact of the first-time adoption of accounting standards on disclosure quality – both domestically and cross-regionally. Studies with a regulatory approach focused primarily on the impact of the voluntary and mandatory adoption of the Basel Pillar 3 Framework for bank stress testing. Within the management approach, contributions to corporate governance, risk governance, and Sharia governance dominated. Based on the thematic clusters, the following potential research questions and opportunities for future academic research can be outlined in Table 1.4.

Table 1.4: Avenues for Future Research (Source: Mies, 2022a)

Cluster	Future Research Questions and Opportunities
Research Design and Methodology	<p>What additional insights do mixed method approaches provide when researching risk reports?</p> <p>How can modern methods like text mining or machine learning change traditional risk disclosure research and which implications can be derived?</p> <p>What evidence does the application of novel methods such as text mining provide for risk reporting analysis?</p> <p>What influence do market-based risk disclosure proxies (Bid-Ask-Spread, Liquidity) have on the analytical quality of empirical research designs? Do they add value to traditional content analysis?</p>
Risk Categories	<p>How is risk reporting evolving in light of the COVID-19 pandemic and global macroeconomic and political crises?</p> <p>Does the level and quality of environmental and climate risk disclosure evolve over time?</p> <p>Which determinants influence the disclosure of environmental and climate risk?</p> <p>How does the level and quality of reputational risk disclosure evolve over time?</p> <p>How is the disclosure practice of liquidity risks and in particular illiquidity risks evolving in light of the COVID-19 pandemic and global macroeconomic and political crises?</p>
Accounting	<p>Which influence has the revised IFRS 9 and IFRS 7 on the risk disclosure behavior of Banks?</p> <p>Does the quality and level of financial instrument disclosure evolve over time esp. due to amended accounting standards (IFRS 9 and CECL)</p>
Regulation	<p>Which impact has the revised Basel Pillar 3 Framework on risk disclosure?</p> <p>What influence does the EDTF recommendations have on the disclosure behavior of risks, especially credit risks?</p> <p>What influence does risk reporting have on global financial stability and thus on systemic risk measures (e.g., MES, Delta CoVaR)?</p>
Management	<p>How can board diversity change risk disclosure behavior in banks?</p> <p>Which influence do findings from management neuroscience research have on the risk reporting of banks?</p>

The exclusive focus of this literature review on banks takes into account the regulatory characteristics of this industry and is intended to provide recommendations for regulators, supervisors and financial accountants. Through the identification of research gaps and the formulation of a research agenda, the paper also has the purpose of assisting academics in advancing the field of risk disclosure research, particularly for banks.

1.4.2 Environmental and Climate Risk Disclosure von Kreditinstituten: Empirische Evidenz der nichtfinanziellen Risikoberichterstattung europäischer Banken

1.4.2.1 Research Questions and Design

In order to address climate change and to comply with the Paris Climate Agreement, the European Commission published the action plan "Financing Sustainable Growth" in 2018, which addressed, in particular, the management of environmental and climate risks of financial institutions (Europäische Kommission, 2018). Banks are directly and indirectly affected by the consequences of climate change and the transition to a lower-carbon economy through their role as financial intermediaries. Emerging damages from climate change affect the value of financial assets in the loan book (Bank of England, 2018). The transition of entire economic sectors to a lower-carbon economy will lead to adjustments in the financial assessment of their portfolio, with consequences for financial market stability (Joint Committee of the European Supervisory Authorities, 2018). From an academic research perspective, there is a need for further research in the area of climate and environmental risk disclosure in banks.

In the context of this paper, co-authored with Michael Torben Menk, the voluntary disclosure of sustainability risks in the banking sector and its influencing determinants were investigated by content analysis. In addition to the development of the disclosure quality of environmental and climate risks over time, the following influencing factors were investigated in the context of the econometric study:

I. Bank-specific Factors

Among the bank-specific factors, in particular, the influence of loan loss provisioning and capital adequacy on non-financial disclosure behavior was analyzed. For example, the study of Wu and Shen (2013) already showed a negative significant relationship between CSR activity and non-performing loans. This led to the formation of the following hypotheses:

***H1a:** Banks with a high proportion of non-performing loans have a higher quality of Environmental Risk Disclosure (Climate Risk Disclosure).*

***H1b:** Banks with a high proportion of loan loss provisions have a higher quality of Environmental Risk Disclosure (Climate Risk Disclosure).*

***H2:** The capital adequacy of a credit institution has a significant influence on the quality of the Environmental Risk Disclosure (Climate Risk Disclosure).*

II. Constitutive Factors

The influence of frameworks on the behavior of banks is the subject of several studies. For example, signatories of the UNEP Declaration of the United Nations show a higher level of implementation in the integration of environmental risks in the credit management process than non-signatories (Weber et al., 2008). Furthermore, there is empirical evidence that for banks in developed countries, the adoption of the Equator Principles is associated with an increase in financing activity and the share of interest income (Finger et al., 2018). Other significant influences on CSR reporting quality are the country of residence (Scholtens, 2009; Sethi et al., 2015) and the legal environment (La Porta et al., 1997; La Porta et al., 1998). This led to the formation of the following hypotheses:

H3: The signing of a voluntary framework such as the Equator Principles has a significant impact on the quality of the Environmental Risk Disclosure (Climate Risk Disclosure).

H4: The legal factors of the legislation of the bank's country of residence have a significant influence on the quality of the Environmental Risk Disclosure (Climate Risk Disclosure).

III. Environmental, Social, and Assurance Factors

In the third section, we followed studies on the effect of ESG factors on the risk behavior of companies (Mishra & Modi, 2013; Orlitzky & Benjamin, 2001; Sassen et al., 2016) and derived implications for disclosure behavior. Finally, the influence of a voluntary audit by an assurance service provider [so-called CSR assurance, see in particular Cohen & Simnett (2015); Velte & Stawinoga (2017)] on the ERD and CRD quality was examined:

H5a: Corporate environmental performance has a significant influence on the quality of Environmental Risk Disclosure (climate risk disclosure).

H5b: Corporate social performance has a significant influence on the quality of Environmental Risk Disclosure (Climate Risk Disclosure).

H6: The voluntary audit of CSR reporting (CSR assurance) has a significant impact on the quality of Environmental Risk Disclosure (climate risk disclosure).

The study was based on a dataset of systemically important listed European banks over the period 2014–2017. The sample included all institutions that were supervised by the European Central Bank or classified as global systemically important institutions (G-SIIs) by the European Banking Authority as of August 2018. The final sample covered 38 systemically important banks from Austria, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom. The fundamental data used for the econometric analysis

were taken from the Thomson Reuters Worldscope database and the Thomson Reuters ASSET4 database.

The econometric analysis on the determinants of the quality of non-financial risk reporting was applied on the basis of a random effects panel data model (GLS). The data collection of the environmental and climate risk disclosure quality was based on manual content analysis using a self-generated disclosure index. For this purpose, the annual financial reports and CSR reports were manually downloaded from the websites of the various banks and were coded in MAXQDA 2018 using a binary coding framework.

1.4.2.2 Results and Contribution

Figure 1.4 provides an overview of the development of ERD and CRD over the time period. Although the disclosure quality of climate-related risks has risen consistently over the period under review, the average quality of the ERD and CRD is comparatively low. It is noticeable that in particular, the mandatory application of the European CSR Directive in the 2017 fiscal year has a demonstrable influence on the level of disclosure quality. In terms of content, reporting is predominantly rudimentary and limited to individual qualitative disclosures. Overall, the risk reporting on non-financial risks of the banks considered were extremely heterogeneous – comparable with empirical results on CSR reporting (e.g., Holder-Webb et al. 2009).

At the level of bank-specific factors that influence the disclosure quality of non-financial risks, we focused on loan-loss provisions (LLPs) and non-performing loans (NPLs). We found that LLPs have a strong significant negative effect on ERD ($\beta=-1.639$ with $p<0.05$) and a highly significant negative effect on CRD ($\beta=-1.137$, with $p<0.01$). Banks with high LLPs seem to disclose less information on climate-related risk management activities and vice versa. Instead, NPLs do not have statistical significance as an influencing determinant. This leads to the rejection of **H1a** and confirmation of **H1b**.

In **H2**, we examined the influence of regulatory capital on disclosure. The CET2 ratio has a significant impact on ERD alone ($\beta=1.164$, with $p<0.05$). However, no statistical significance can be demonstrated on the level of CRD. Thus, the hypothesis can only be confirmed for ERD.

Both the voluntary signing of the voluntary framework of the Equator Principles and the national legislation of the countries in which the banks are headquartered have no statistical significance for the quality of the environmental and climate risk disclosure. This leads to a rejection of **H3** and **H4**.

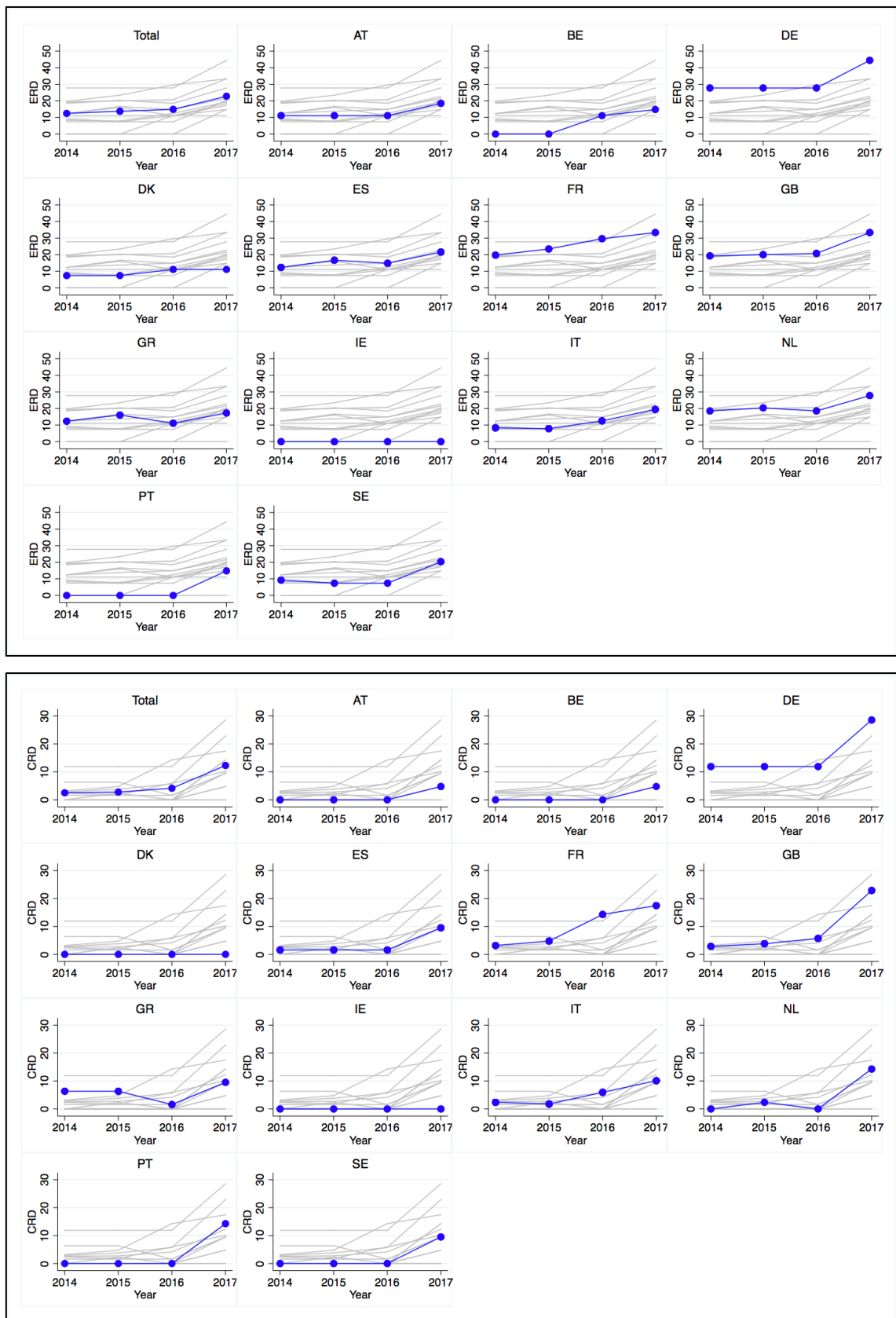
In the following, the influence of environmental and social performance on disclosure quality will be assessed. Environmental performance (ENVSCO) shows a significant negative effect on the quality of environmental risk disclosure ($\beta=-0.135$, with $p<0.05$), in contrast to social performance

(SOCSCO). Both variables do not have a statistical significance on the quality of Climate Risk Disclosure. This leads to partial confirmation of **H5a** and rejection of **H5b**.

Hypothesis 6 analyzed the effect of voluntary CSR assurance on the dependent variables. The CSRA has a significant positive effect on Environmental Risk Disclosure ($\beta=5.440$, with $p<0.1$) and a highly significant positive effect on Climate Risk Disclosure ($\beta=7.588$, with $p<0.01$). This leads to the validation of **H6**. Banks that have their sustainability reporting voluntarily audited in the form of a limited or reasonable assurance have a higher disclosure quality in our sample.

This paper provides the first empirical evidence on the disclosure of climate-related risks by systemically important banks. While it can be shown that non-financial risks are becoming more relevant in the disclosure of banks, the scope of the disclosure is mainly limited to rudimentary information and is very heterogeneous across institutions. In addition, the contribution of banking supervisors and standard setters provides initial implications on the status quo of disclosure practice. Last but not least, the paper encourages large banks to integrate non-financial risks more strongly into their economic and regulatory capital concepts and to disclose them transparently.

Figure 1.4: Development of Environmental and Climate Risk Disclosure over time 2014-2017 (Source: Mies and Menk, 2019).



The chart shows the environmental and climate risk disclosure over the period 2014-2017 for systemically important credit institutions from Austria (AT), Belgium (BE), Germany (DE), Denmark (DK), Spain (ES), France (FR), the United Kingdom (GB), Greece (GR), Ireland (IE), Italy (IT), the Netherlands (NL), Portugal (PT) and Sweden (SE).

1.4.3 Bank Opacity, Systemic Risk, and Financial Stability

1.4.3.1 Research Questions and Design

Banks are generally considered opaque in nature due to their business model, which has a negative impact on the stability of financial markets as a whole (Morgan, 2002), as it is difficult for capital market participants to assess risk behavior (Jungherr, 2018), most notably in times of financial crisis (Flannery et al., 2013). The purpose of this paper was to examine the impact of bank opacity on the systemic risk of the financial system and its interaction with banking regulations and enforcement mechanisms. Prior research has demonstrated an economic relationship between financial stability (Fosu et al., 2017) and the impact of regulatory intervention on bank opacity (Gallemore, 2022). An integrated analysis of opacity, systemic risk, and disclosure requirements, however, has not yet been discussed in the literature. Furthermore, with few exceptions (e.g., Iannotta, 2006), most studies focus on the United States. The purpose of this empirical paper was to fill this research gap and to focus on European-listed banks.

Bank opacity fosters the formation of financial bubbles, with negative consequences for financial stability (Jones et al., 2012). In addition, opacity increases the risk of bankruptcy for credit institutions (Fosu et al., 2017). This led to the formation of the following hypothesis:

***H1:** Bank opacity has a significant impact on the systemic risk of banks and thus on financial stability.*

Banking regulation has an impact on the competitiveness of banks and leads to a decrease in abnormal accruals of loan loss provisions. In addition, the emerging competition reduces bank opacity (Jiang et al., 2016). Accurate disclosure of information, as well as internal and external control mechanisms, are suitable instruments for strengthening financial stability (Barth et al., 2006). Banking systems in countries with stricter disclosure and transparency requirements are also more resilient (Tadesse, 2006). This led to the formulation of the following hypothesis:

***H2a:** Accounting regulation (IFRS 7) has a mitigating effect on bank opacity and reduces the systemic risk of banks.*

***H2b:** Market discipline (Basel Pillar 3 regulation) has a mitigating effect on bank opacity and reduces the systemic risk of banks.*

***H3:** The quality of the external enforcement mechanism (e.g., external audit or banking supervision) has a mitigating effect on bank opacity and reduces the systemic risk of banks.*

***H4:** Disclosure regulation and external enforcement mechanisms have a mitigating effect on bank opacity and reduce the systemic risk of banks.*

This study was based on a dataset of listed European banks over the period 2002–2018. For the analysis, fundamental data from the Refinitiv Eikon database and analyst forecasts from the Institutional Brokers' Estimate System (I/B/E/S) were taken. First, all banks listed in the "Euro Stoxx Total Banks" index were taken as the population. On this basis, 99 banks were identified. In the second step, eight subsidiaries were excluded. One bank was also excluded due to a lack of market data. In total, the final sample comprised 90 banks from Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

The econometric analysis of the impact of bank opacity on European financial stability was applied on the basis of a fixed effects panel data model. As systemic risk measures, the study used Delta Conditional Value at Risk (ΔCoVar_{it}) according to Adrian and Brunnermeier (2016), and Marginal Expected Shortfall (MES_{it}) according to Acharya et al. (2017).

ΔCoVar_{it} and MES_{it} were calculated using a daily time series from 2002 to 2018 with a confidence level α of 95% and a holding period of 252 days. Following Brownlees and Engle (2017), I used a generalized autoregressive conditional heteroskedastic (GARCH) model to estimate the volatility of stock price returns and a dynamic conditional correlation (DCC) model to estimate the correlations. The calculations were performed following the MATLAB routine of (Belluzzo, 2020). To measure bank opacity, this paper followed the approach of Fosu et al. (2017) and Flannery et al. (2004) and used analysts' forecast errors and analysts' forecast dispersions as proxies.

1.4.3.2 Results and Contribution

The purpose of this paper was to examine the impact of bank opacity on European financial stability and the potential impact of accounting and banking regulation on disclosure. Based on a panel dataset, it can be seen that bank opacity has a significant positive effect on the measured systemic risk $\Delta\text{Conditional Value at Risk}$ and Marginal Expected Shortfall. This leads to a confirmation of hypothesis **H1**.

IFRS 7 and Basel Pillar 3 measures both lead to a significant reduction in opacity and systematic risk metrics. Furthermore, it has been shown that the quality of country-specific auditor regulation also has a significant weakening effect on the interaction term at the 1% level for ΔCoVaR and MES. This leads to a confirmation of **H2a-H3**.

The effect of disclosure regulation and enforcement measures will be investigated as a further research question (**H4**). It can be shown that the interaction term $\text{Opacity}_{it} * \text{RD\&E}_{it}$ has a significant negative effect on ΔCoVaR and MES.

1.4.4 Can Bank Accounting Regulation Strengthen Resilience? The Impact of IFRS 9 Adoption on Loan Loss Provisioning and Bank Behavior

1.4.4.1 Research Questions and Design

This article was dedicated to the replacement of the International Accounting Standard 39 Financial Instruments: Recognition and Measurement (IAS 39) by International Financial Reporting Standard 9 Financial Instruments (IFRS 9). Based on a global sample of 478 banks from 64 countries over the period 2016–2019, the impact of the revised accounting standard on bank behavior and capital market adoption was investigated.

The banking literature argues that the discretionary use of loan loss provisions favors earnings management, especially earnings smoothing (Kanagaretnam et al., 2003) and capital management (Ahmed et al., 1999; Collins et al., 1995). The empirical literature also found that the incurred loss model under IAS 39 was understating changes in credit risk and only taking effect when the loss event occurred ("too little, too late"), which had a reinforcing procyclical effect (BCBS, 2015b, 2021c; Laeven & Majnoni, 2003). This led to the formulation of the following research hypotheses:

H1: The adoption of IFRS 9 has a significant impact on the timeliness of Loan Loss Provisions.

H2: The adoption of IFRS 9 has a significant effect on banks' capital management.

H3: The adoption of IFRS 9 has a significant impact on the decrease in earnings management esp. income smoothing.

The financial resilience of banks has increased due to a number of macroprudential regulatory initiatives adopted since the last global financial crisis in 2008 (BCBS, 2021a). There is still a broad scientific understanding in academic literature that the enforcement of accounting standards has a significant negative effect on banks' risk-taking behavior (Dal Maso et al., 2020). This led to the following hypothesis:

H4: The adoption of IFRS 9 has a positive effect on asset quality and thus on bank resilience.

In the context of the following research question, we follow the assumption that the disclosure of credit risk information on loan loss provisions also has a significant impact on banks' external

market valuation (Ahmed et al., 1999; Beaver & Engel, 1996; Wahlen, 1994). This led to the following hypothesis:

***H5:** The adoption of IFRS 9 has a positive impact on the valuation of loan loss provisions on the capital market.*

The empirical analysis of the IFRS 9 implementation effect was carried out on a difference-in-differences approach over the reporting years, 2016–2019. The final sample included a total of 478 banks from 64 countries. For the empirical analysis, fundamental data from the Refinitiv Eikon Worldscope database and macroeconomic control variables from the World Bank and the OECD were taken. In addition, the Worldwide Governance Indicators (WGI) were used to control for country-specific governance and regulation (Kaufmann et al., 2010).

To study the impact on bank resilience, we followed Imbierowicz et al. (2018) to measure banks' asset quality and used the dependent variables, $\Delta\text{Capital Ratio}_{it}$, $\text{Capital growth}_{it}$, $\text{Tier 1 Capital growth}_{it}$, $\text{Capital Buffer}_{it}$ and $\Delta\text{Asset Risk}_{it}$ as proxies. As an additional measure of banks' soundness and risk-taking behavior – and their contribution to financial stability—we followed prior studies and use the z_score_{it} (Berger et al., 2009; Fosu et al., 2017; Laeven & Levine, 2009). In our analysis of the value relevance of IFRS 9, we follow the approach of Beaver and Engel (1996) and use the Ohlson model (Feltham & Ohlson, 1995; Ohlson, 1995) as a market-based valuation model.

1.4.4.2 Results and Contribution

On the basis of our analysis, we found empirical evidence for an improvement in LLP timeliness and reduced income smoothing due to the implementation of IFRS 9. Moreover, we found no evidence of increased use of active capital management in the wake of the IFRS 9 adoption. This led to a confirmation of hypotheses **H1** and **H3** and to a rejection of hypothesis **H2**.

In the context of our study on the impact of IFRS 9 on the resilience capacity of banks, we identified a significant negative effect on $\Delta\text{Capital Ratio}_{it}$ and $\text{Capital growth}_{it}$ at the 5% level and a significant negative effect on $\text{T1 Capital growth}_{it}$ at the 10% level. We also found a significant negative effect on $\Delta\text{Asset Risk}_{it}$ ($\beta_1 = -0.034$; $p < 5\%$) and a positive effect on the Z-score ($\beta_1 = 91.51$; $p < 5\%$). This led to a confirmation of hypothesis **H4**.

In **H5** we analyzed the effect of the IFRS 9 implementation on the capital market valuation.

Following Beaver and Engel (1996) we split our analysis into discretionary and non-discretionary components. The analyzed interaction term $LLP \times IFRS \times IFRS9$ had a highly significant positive effect on MVS at the 1% level. In contrast, the discretionary LLPs have a significant negative effect at the 10% level (Model 1) and a highly significant negative effect at the 1 % level on MVS. In the context of answering the hypothesis, this led to a split decision. The non-discretionary loan loss provisions lead to an improvement in bank valuation and to confirmation of **H5**. However, the discretionary component is discounted by the market, which leads to a falsification of **H5**.

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Chapter 2: Empirical Research on Banks' Risk Disclosure: Systematic Literature Review, Bibliometric Analysis and Future Research Agenda

Empirical Research on Banks' Risk Disclosure: Systematic Literature Review, Bibliometric Analysis and Future Research Agenda

Michael Mies

Abstract

The purpose of this paper is to outline the current state of empirical research on banks' risk reporting. In addition to the development of the research field over time, regulatory trends and drivers for academic research on risk reporting will be derived. The review follows a triangulated approach: In addition to a qualitative content analysis based on the SLR, a quantitative bibliometric analysis using the scientific visualization techniques bibliometrix and VOSviewer will serve as a robustness check. The sole focus of this SLR on banks reflects the regulatory specificity of the financial services industry and serves to derive recommendations for action for regulators, supervisors, and auditors. The article follows the tenor of macro- and micro-prudential banking regulation, which has raised market discipline to a new level through the implementation of regulatory disclosure standards in the context of the Basel III amendment, with a deliberate clustering of the research area according to risk types. By identifying research gaps and conceptualizing a research agenda, this paper continues to serve the academia to broaden the research field of risk disclosure, esp. for banks.

Keywords: risk disclosure, systemic literature review, banking regulation, IFRS7, Basel Pillar 3

JEL: M1, M41, G21, G18

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2.1 Introduction

As financial intermediaries, credit institutions play a key role in the market through their deposit business and original lending activities (e.g., Allen & Santomero, 2001; European Central Bank, 2022). Especially, the use of financial instruments opacifies bank balance sheets per se, making it particularly difficult for external parties to assess the underlying risk exposure (Morgan, 2002; Dewally & Shao, 2013; Jiang et al., 2016). To mitigate this opaqueness, risk disclosure as an element of market discipline (Stephanou, 2010) can be an essential information carrier for decision-making (Tadesse, 2006) and reducing information asymmetries, especially for capital market participants (Solomon et al. 2000). Due to the direct impact of disclosure on the capital market and investor perceptions (Verrecchia, 2001), discretionary disclosure of material information also plays an important role for the management in aspects of capital market communication (Jorgensen & Kirschenheiter, 2003; Verrecchia, 2001, 1990). Disclosure of financial information has generally positive effects, such as on the cost of capital (Heinle & Smith, 2017) or market liquidity (Leuz & Verrecchia, 2000; Smith, 2019). However, disclosure in the banking environment can also have some negative side effects, with implications for financial stability (Goldstein & Yang, 2019). Depending on market expectations, excessive or improper disclosure can lead to a potential loss of trust among market participants, which increases the risk of a bank run in addition to a correction on the capital market (Goldstein & Sapra, 2014; Homölle, 2009; Jungherr, 2018). As a result, the high level of criticality of bank' disclosure to the systemic stability of the financial system has received attention from regulators and policymakers, resulting in numerous regulatory requirements.

In contrast to the corporate sector, banks still have the specific characteristic that external risk-reporting is not mandatory only at the level of accounting standards (e.g., IFRS 7). Furthermore, banks must disclose an additional regulatory risk report, the so-called Basel Pillar 3 report (BCBS, 2021) as an element of regulatory market discipline. While the principle of decision usefulness, esp. in the management report under commercial law, is taken up by the international accounting standards (International Accounting Standard Board [IASB], 2018),³ the regulatory principle of market discipline – codified in Basel Pillar 3 (Basel Committee on Banking Supervision [BCBS], 2021) – also focuses on the usefulness of the disclosed risk information (Bliss & Flannery, 2002; Stephanou, 2010). In addition to both forms of external disclosure, internal risk-reporting serves the management and the board as a key source of information for risk-oriented control (e.g., Committee of Sponsoring Organization of the Treadway Commission [COSO], 2016).

³ The IASB (2018) Conceptual Framework addresses, for example, the usefulness of financial information in its objectives.

The scope of this paper is to outline the current state of empirical research on risk-reporting by banks. In contrast to earlier literature reviews in the research field (e.g., Ryan, 2012; Beatty & Liao, 2014; Acharya & Ryan, 2016; Elshandidy et al., 2018; Tahat et al., 2019; Mbithi et al., 2022; Ibrahim et al., 2022), a systematic literature review (SLR) by Tranfield et al. (2003) will be applied, and only contributions on risk disclosure by banks will be included. The review follows a triangulated approach: In addition to a qualitative content analysis based on the SLR, a quantitative bibliometric analysis using scientific visualization techniques will serve as a robustness check.

In this paper, a total of 69 empirical articles were analyzed based on an SLR covering the period from 2002 to 2022. Applying a content analysis, the papers were clustered according to regulatory risk categories in the field of banking – as well as according to regulatory and constitutive drivers. Empirical contributions with a holistic view of risk-reporting – without restriction to one risk type – predominate with a total of 30 papers. Among the papers with a focus on one risk type, market and interest rate risks, operational risks and credit risk disclosures dominate. The most popular research fields were studies of the quality and level of disclosure, cost of capital, and bank performance throughout all risk types. Contributions with a regulatory focus on accounting regulation primarily address research on IFRS 7 of the IASB and FRR No. 48 of the SEC (United States Securities and Exchange Commission). Evaluating the impact of accounting standards on risk reporting is controversial in the empirical literature. On the one hand, an improvement in disclosure quality can be concretized by the first-time application of accounting standards, on the other in some cases country-specific factors counteract this effect. Furthermore, the disclosure of derivative financial instruments has potential for improvement – regardless of the standard setters. The contributions to banking regulation primarily examined the effect of bank stress testing on disclosure behavior, as well as compliance with Basel Pillar 3 requirements. From the management perspective, as a bank-specific constitutive characteristic, it can be showcased that corporate governance criteria significantly influence reporting quality. In addition to the characteristics and composition of the board of directors, sharia governance significantly influences risk-reporting, especially in the Islamic world. Furthermore, the risk governance of the bank significantly affects the design of the disclosure.

This paper is part of a growing body of literature that examines the impact of risk disclosure as an element of corporate financial reporting. In line with the high relevance of the research field, numerous literature reviews have been published in the last 10 years. Table 2.1 follows Ibrahim et al. (2022) and provides an overview of the research design of previous papers in the research field. In contrast to the previous reviews, the journal rankings of the Chartered Association of Business Schools (ABS), the Australian Business Deans Council (ABDC) and the German Academic Association of Business Research (VHB) are used as a quality gate threshold. In addition

to rigorous and top-ranked scientific journals, the high practical relevance of risk reporting for the user is to be recognized by the inclusion of practitioner-oriented articles. By reviewing the empirical literature and contextualizing their outcome, it makes further three contributions to the literature. First, unlike earlier systemic review articles in the research field, the regulatory specificity of the financial services industry is addressed and only papers with banks as the subject of study are considered. Banks have been subject to a variety of regulatory efforts by national and international regulators, not least since the 2008 financial crisis. By taking a broad view over the period from 2002 to 2022, these various regulatory activities will be considered. Second, from a methodological perspective, the literature review is based on a SLR following Tranfield et al. (2003), supplemented by a bibliometric analysis as a robustness test. In addition to the traditional content analysis within the SLR, the use of bibliometric visualizations can achieve objectification and quantitatively show coherences between the reviewed articles. Third, the sole focus of this SLR on banks satisfies the regulatory specificity of the financial service industry and serves to derive recommendations for action by regulators, supervisors and accountants. By identifying research gaps and conceptualizing a research agenda, this paper continues to serve the academia and practitioner to broaden the research field of risk disclosure, esp. for banks.

Table 2.1: Previous Literature Reviews in the Research Field of Banking

Characteristics	Ryan 2012	Beatty and Liao 2014	Acharya and Ryan 2016	Elshandidy et al. 2018	Tahat et al. 2019	Mbithi et al. 2022	Ibrahim et al. 2022	Current Study
Sample, Period	N/A	N/A	N/A	32, 1997-2006	19, 1998-2018	59, 2004 - 2021	104, 1999-2019	69, 2002-2022/1
Journal Quality Gate	N/A	N/A	N/A	ABS, 3-4*	ABS, 3-4*	N/A	ABS, 4*	ABS, 2-4* ABDS, A-C VHB, A-C
Sectors	FS	FS	FS	FS and Non-FS	FS and Non-FS	FS and Non-FS	FS and Non-FS	FS
Methods according to Massaro et al., 2016	NR	NR	NR	RS	SLR	SLR	SLR	SLR, Bibliometric Analysis

The table closely follows Ibrahim et al. (2022) and describes selected studies in the broader field of risk disclosure research. The following abbreviations are used: Narrative Review (NR), Research Synthesis (RS), Systemic Literature Review (SLR).

The remainder of this paper is structured as follows: Chapter 2.2 will first present the methodological research design and the criteria used to select the sample. Chapter 2.3 addresses the results of the literature review. In this context, descriptive and bibliometric analyses are conducted, and the literature is clustered into three thematic areas: risk categories-based drivers of disclosure, constitutive and regulatory drivers of disclosure, and textual characteristics based on bibliometrics and network analysis. Chapter 2.4 will highlight research gaps and potential needs for further academic research, and the paper ends with a conclusion and limitations in Chapter 2.5.

2.2 Review Methods and Sample Selection

2.2.1 Identification of the Relevant Articles

To capture the state-of-the-art of the empirical literature, this paper uses the methodology of an SLR (Booth et al. 2016). In contrast to the traditional author-based literature review, an SLR is based on a rule-based approach (Massaro et al., 2016), with the objective of an evidence-based, unbiased, and valid selection of relevant articles (Tranfield et al., 2003; Booth et al., 2016; Massaro et al., 2016).

Following Tranfield et al. (2003) an SLR can be conducted based on a three-stage approach:

- Stage 1: Planning the review,
- Stage 2: Conducting the review,
- Stage 3: Reporting and distribution.

Stage 1 “Planning the review” includes the determination of the scope and motivation for conducting an SLR (Tranfield et al., 2003, p. 214). As outlined in Chapter 2.1, this paper aims to gather and develop the current state of empirical literature on risk-reporting by banks and to identify potential research gaps. Three main research questions will be addressed:

***RQ 1:** How has the empirical literature evolved over time in terms of both its content and methodology?*

***RQ 2:** What are the regulatory and influencing factors affecting bank risk-reporting research?*

***RQ 3:** Where is the need for further research in the coverage of this research field?*

Stage 2 “Conducting the review” involves the identification, selection, quality review and data preparation of relevant articles (Tranfield et al., 2003, p. 214). The relevant literature is identified based on a literature search in electronic databases (Elsevier ScienceDirect, EBSCO Business Source Complete, Emerald Insight, SpringerLink and Clarivate Web of Science) at the end of November 2021. For this paper, various combinations of the search terms “risk reporting*”, “risk disclosure*”, “credit risk reporting*”, “liquidity risk reporting”, “market risk reporting”, “operational risk reporting”, “credit risk disclosure*”, “liquidity risk disclosure*”, “market risk disclosure*”, “operational risk disclosure*” and “bank*” were used.

Table 2.2: Conducting the SLR: Sample Selection Process

Filter	Description	Elsevier Science Direct	EBSCO Business Source Complete	Springer Link	Clarivate Web of Science	Total
Step 1	Articles based on keyword search (adjusted for articles in books, reviews, editorials)	612	363	254	70	1299
	After merging the search results from the different databases (adjusted for duplicates)					1011
Step 2	After the analysis of the abstracts, titles and bibliographic data					206
Step 3	After text analysis					74
Step 4	After quality gate (ABDC / ABS / VHB)					64
Step 5	Hand Searching and Citation Tracking					5
Final Sample for Content Analysis						69

This table describes the individual steps for selecting the final sample. A keyword search in the above-mentioned databases serves as the basis for deriving the population.

For the analysis, the metadata of the search results were first downloaded from the publisher's pages in BibTeX format and imported into a Microsoft Excel template. The search results were first corrected for articles in books, reviews, editorials and duplicates. To identify relevant articles, a pre-selection was performed by reviewing the titles, abstracts and bibliographic information. For further text analysis, the PDF version of the pre-selection was imported into the Mendeley database and analyzed. All relevant articles up to January 2022 were included in the sample. Additionally, the references of the selected essays were manually searched for additional sources probably relevant to the present work – so-called “snowballing” (Hiebl, 2023, p. 7). To ensure sample quality, the ranking of the academic journal of the article was added as a quality criterion: articles were included only if ranked in the ABDC Journal Quality List 2019 of the Australian Business Deans Council,⁴ Academic Journal Guide (AJG 2021) of the Chartered Association of Business Schools⁵ or the VHB-JOURQUAL 3 of the German Academic Association for Business Research (VHB).⁶

The initial database search includes 1299 possible hits from English-language articles. After merging the results from the individual databases and adjusting for duplicates, 1011 articles were initially analyzed based on title, bibliographic information and abstract. This step also excluded articles that did not primarily address risk-reporting by banks and journals unrelated to the subject,

⁴ ABDC (2019): <https://abdc.edu.au/research/abdc-journal-quality-list>.

⁵ CABS (2021): <https://chartereddabs.org/academic-journal-guide-2021>.

⁶ VHB (2015): <https://vhbonline.org/vhb4you/vhb-jourqual/vhb-jourqual-3>.

such as medicine, psychology and computer science. A total of 206 articles were included in the final text analysis. On the basis of a manual evaluation of the texts, a total of 74 essays can be identified. After analyzing and considering quality gates for quality assurance, leading to an outscoping of 10 papers, 5 were added based on the analysis of references. Applying the filters shown in Table 2.2, these procedures collectively resulted in a total sample of 69 articles, which forms the basis for the results of the content analysis of the SLR presented in Section 2.3.

2.2.2 Bibliometric Analysis

As a robustness check to validate the results of the SLR and to increase the quality of the evaluation, in addition, a quantitative bibliometric analysis using data analytics was performed. Bibliometric analyses are becoming increasingly popular across multiple disciplines for deriving a structured and evidence-based grounding for the research field (e.g., Merediz-Solà & Bariviera, 2019; Aracil et al., 2021; Khatib et al., 2022). The following data analytics are performed using the R application Bibliometrix 3.0 (Aria & Cuccurullo, 2017) and VOSviewer (van Eck & Waltman, 2010, 2021) based on the Clarivate Web of Science database (WoS).⁷

An initial keyword search in the Clarivate Web of Science database identified 70 articles. After analysis of abstracts, titles, bibliographic data, and text analysis, 35 articles were ascertained. Additionally, the results obtained in the sample selection process of the SLR were again retrogradely searched manually in the WoS database. Thus, the dataset could be expanded to 48 articles. In a nutshell, the bibliometric analysis covers 69.57% of the SLR sample.⁸

⁷ Bibliometrix supports the analysis of the databases Web of Science, Scopus, Pubmed, Cochrane Library and Dimensions.

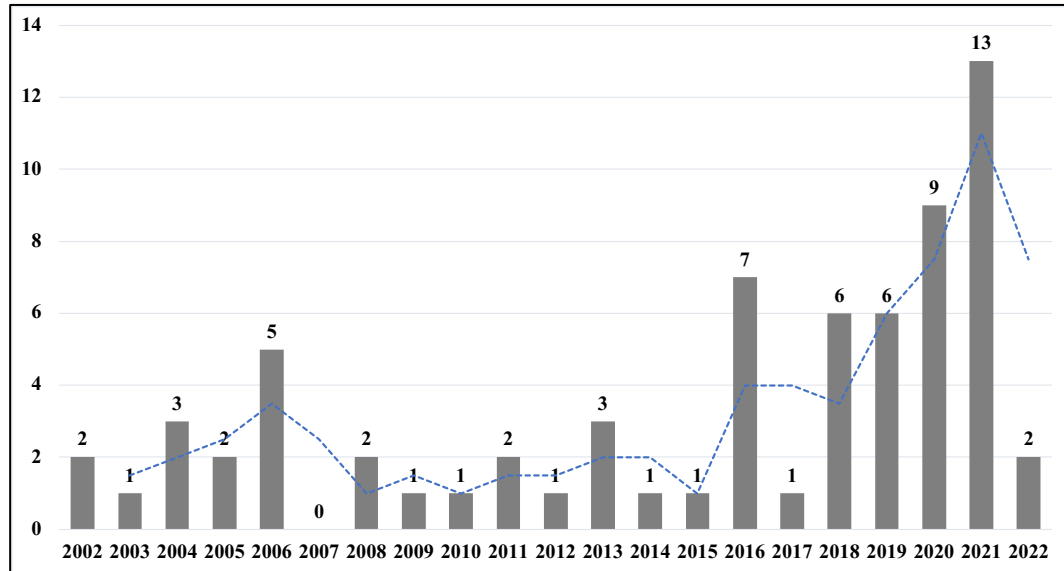
⁸ The percentage deviation of the sample from the SLR is explained by the fact that not all journals are indexed in WoS.

2.3 Results of the SLR and the Bibliometric Analysis

2.3.1 Descriptive Analysis

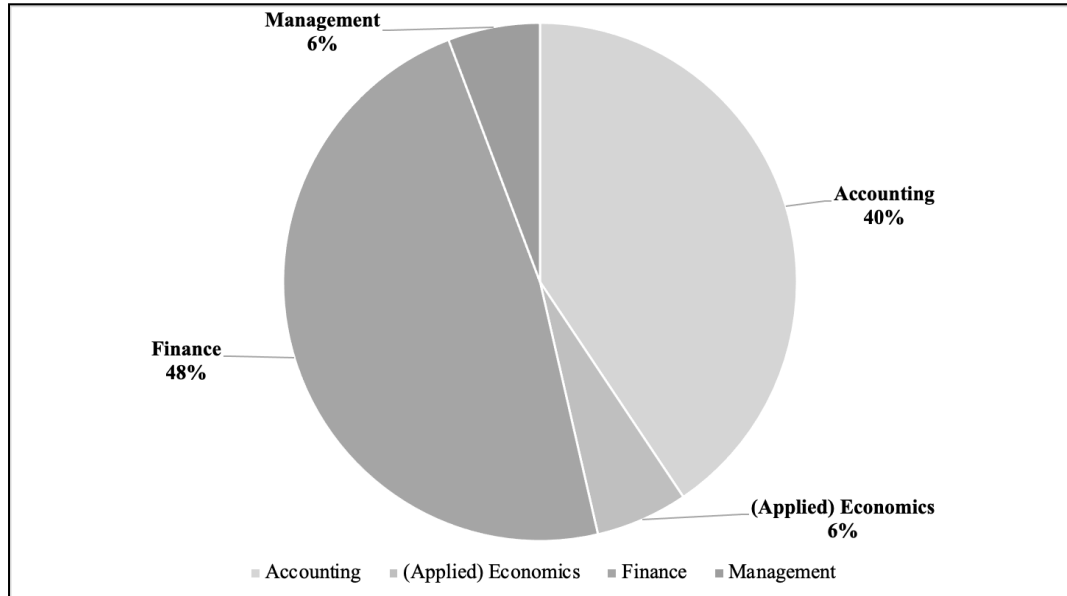
2.3.1.1 Characterization and Development Body of Literature

Figure 2.1: Published Articles over the Time Frame from 2002-2022.



In the period from 2002 to 2022,⁹ 69 papers were published in 45 different journals. The most popular include the *Journal of Banking Regulation* (three papers), *Journal of Financial Regulation & Compliance* (four), *Accounting in Europe* (three), *International Journal of Accounting & Information Management* (three), *International Journal of Finance & Economics* (three) and *Journal of Banking & Finance* (three). On the basis of the clustering of Australia Business Deans, a total of 48% of the sample belongs to the finance category, 40% to accounting, 6% to management and 6% to (applied) economics (see Figure 2.1 and Appendix 2.1).

⁹ Two articles previously published as online-first articles were published in print in 2021 and are listed in the overview in 2021. For better comparability, the print date is decisive for grouping and not the first time of publication on the publisher's or journal's site.

Figure 2.2: Distribution of Journals by Categories

2.3.1.2 Keyword Analysis

The most frequently used Author-Keywords and Keywords-Plus are outlined in Table 2.2. These include “risk disclosure” (13), corporate governance (7), disclosure (5), market risk (5), Islamic banks (4) and risk management (4). Fig. 3 and 4 plot the keywords used in a word cloud. It is notable that “corporate governance”, “market risk” and “operational risk disclosure” predominate in the authors’ keywords. Among the keywords-plus of Web of Science, economical categories such as “cost information”, “firm”, “information” and “determinants” dominate.

Table 2.3: Top 10 - Most frequent Keywords according to Clarivate Web of Science

Author Keywords (DE)	Frequency	Keywords-Plus (ID)	Frequency
risk disclosure	13	corporate governance	13
corporate governance	7	cost	11
disclosure	5	firm	10
market risk	5	management	10
islamic banks	4	information	8
risk management	4	ownership	8
banking	3	determinants	6
derivatives	3	impact	5
ifrs 7	3	level	5
operational risk disclosure	3	earnings management	4

This table describes the most frequent used Author-Keywords and Keywords-Plus according to Clarivate Web of Science Database using bibliometrix.

Figure 2.3: Word Cloud Author-Keywords (DE)



Figure 2.4: Word Cloud Keyword-Plus (ID)



2.3.1.3 Methodological Information

In the subsequent section, the research design of the analyzed sample will be outlined, referring to the presentation format of Klein et al. (2020) and Mochkabadi and Volkmann (2020). In the analyzed sample, 71.01% of the papers applied a quantitative and 24.64% a qualitative research design. Only 4.35% of the selected sample used a mixed methods approach.

As the most dominant method of disclosure analysis, manual content analysis is applied to 73.91% of the articles. Furthermore, 10.14% of the articles used digital analysis methods such as text mining. Only three articles used case studies/interviews, and two articles used the research design of

an event study. In the entire sample, 68.12% of the papers used regression analysis. Most frequently, articles applied (Pooled) OLS (33.33%), Panel Data Models such as Fixed and Random Effects (15.94%), GMM, (10.14 %), Two-Stage Least Squares (2SLS, 7.25 %), Feasible/(Pooled) GLS (7.25%) and Three-Stage Least Squares (3SLS, 5.8 %) methods.

The selection of the disclosure proxy significantly impacts the research design for analyzing the quality or level of disclosure. The most common risk disclosure proxy in this sample includes the disclosure index (52.17%), sentence count (13.04%), page count (4.35 %), word count (4.35 %) and the use of market-based approaches, e.g., in the form of bid-ask spreads (4.35 %).

As a basis for conducting research, 68.12% of the studies used the annual report, 10.14% databases Bankscope or EIKON, and 14.49% a combination of the annual report and the Basel Pillar 3 Report. Only 7.25% of the selected sample is based on the Pillar 3 Report stand-alone.

Table 2.4: Research Design and Methodology

Typology	Total (Abs.)	Total (%)	Research Methodology	Total (Abs.)	Total (%)
Empirical / Quantitative	49	71.01%	Content Analysis	51	73.91%
Empirical / Qualitative	17	24.64%	Regression Analysis	47	68.12%
Mixed Methods	3	4.35%	Descriptive Analysis	13	18.84%
Source			Univariate Analysis	7	10.14%
Annual Report	47	68.12%	Text Mining/Textual Analysis	7	10.14%
Pillar 3	5	7.25%	Case Study/ Interview	3	4.35%
Annual Report AND Pillar 3 Report	10	14.49%	Event Study	2	2.90%
Database (Thomson Reuters, Bloomberg, Bankscope etc.)	7	10.14%	Regression Types	Total (Abs.)	Total (%)
Sample Characteristics			(Pooled) OLS	23	33.33%
Cross-Sectional	21	30.43%	Random Effects / Fixed Effects	11	15.94%
Longitudinal	48	69.57%	Logistic Hazard Model, Logistic Regression	7	10.14%
Sample Size Min	1		GMM	7	10.14%
Sample Size Max	729		Two-Stage Least Squares (2SLS)	5	7.25%
Sample Size Mean	99.25		Feasible /(Pooled) GLS	5	7.25%
Sample Size Median	57		Three-Stage Least Squares (3SLS)	4	5.80%
Covered Years Min	1		Pooled seemingly unrelated regression (SUR)	2	2.90%
Covered Years Max	13		GARCH	2	2.90%
Covered Years Mean	5.5		Difference-in-Difference Design	2	2.90%
Covered Years Median	6		PSM	2	2.90%
Risk Disclosure Proxy	Total (Abs.)	Total (%)	RMMA	2	2.90%
Disclosure Index	36	52.17%	Hierarchical Linear Model (HLM)	1	1.45%
Sentence Count	9	13.04%	OLS with Newey-West Estimators	1	1.45%
Page Count	3	4.35%	Fama-MacBeth Two-Step Regression	1	1.45%
Word Count	3	4.35%			
Binary Variable	3	4.35%			

Typology	Total (Abs.)	Total (%)	Research Methodology	Total (Abs.)	Total (%)
Bid-Ask Spread	3	4.35%			
Key Word in Context (KWIC)	1	1.45%			

This table describes an overview of the methodology used in the overall sample (n=69) to analyze risk reporting at banks.

Table 2.5 and Figure 2.5 describes the countries covered by the empirical studies. The most frequently analyzed jurisdictions include Italy (21), the UK (20), France (19), Germany (19) and Spain (17).

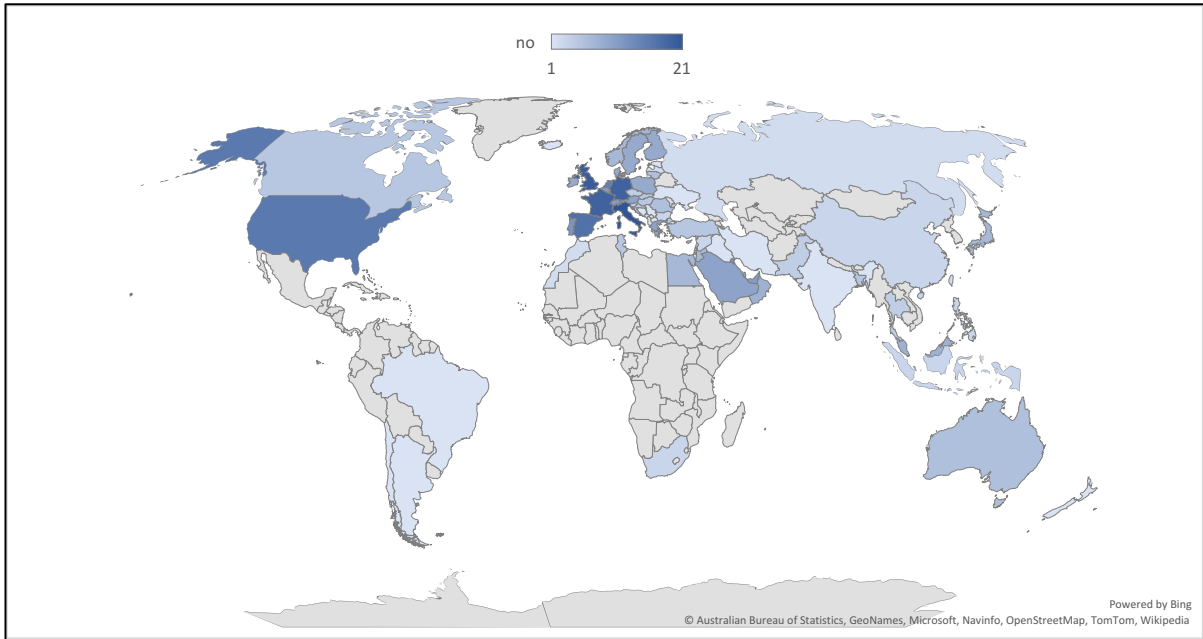
Noticeably, in addition to the USA, among the most common 20 countries analyzed, 13 contributions are from the old pre-Brexit European Union and three from the MENA region.

Table 2.5: Sample Characteristics: Country of Research

Country	No.	Country	No.	Country	No.	Country	No.
Italy	21	Malaysia	8	Slovenia	4	Dubai	1
UK	20	Oman	8	Thailand	4	Estonia	1
France	19	Cyprus	7	Bulgaria	3	Chile	1
Germany	19	Egypt	7	China	3	Iceland	1
Spain	17	Japan	7	Europe	3	India	1
USA	16	Jordan	7	Indonesia	3	Iran	1
Netherlands	15	Norway	7	Lebanon	3	Iraq	1
Kuwait	12	Australia	6	Lichtenstein	3	Israel	1
Portugal	12	Lithuania	6	Luxembourg	3	Macedonia	1
Belgium	11	Malta	6	Philippines	3	Mauritius	1
Qatar	11	Romania	6	South Africa	3	New Zealand	1
Switzerland	11	Bangladesh	5	Syria	3	North America	1
UAE	11	Canada	5	Latvia	2	Palestine	1
Austria	10	Croatia	5	Morocco	2	Serbia	1
Bahrain	10	Hungary	5	Russia	2	Ukraine	1
Greece	10	Singapore	5	Taiwan	2		
Saudi Arabia	10	Slovakia	5	Abu Dhabi	1		
Denmark	9	Tunisia	5	Argentina	1		
Finland	9	Turkey	5	Asia	1		
Ireland	9	Czech Republic	4	Barbados	1		
Poland	9	Hong Kong	4	Bosnia-Herzegovina	1		
Sweden	9	Pakistan	4	Brazil	1		

This table describes the analyzed countries in the total sample (n=69).

Figure 2.5: Country of Research



2.3.1.4 Citation Classics

Table 2.6 provides an overview of the top 20 most cited papers listed in the Clarivate Web of Science database and Google Scholar.¹⁰ Frequently cited papers include Nier and Baumann (2006), Pérignon and Smith (2010), Jorion (2002), Barakat and Hussainey (2013), and Al-Hadi et al. (2016). Among the most cited papers, contributions to coding frameworks for creating a disclosure index predominate. Nier and Baumann (2006), for example, used an index built on the Bankscope database to assess market discipline. In their articles, Pérignon and Smith (2010) and Jorion (2002) provided an index to evaluate the quality of value-at-risk disclosures. Barakat and Hussainey (2013) used a self-generated Operational Risk Disclosure Index and Al-Hadi et al. (2016) a Market Risk Disclosure Index.

Table 2.6: Top 20 Citations according to WoS and Google Scholar (Status: May 15, 2023)

Author, Journal	DOI	Total Citations WoS	TC per Year WoS	Total Citations Google Scholar
Nier and Baumann (2006), J FINANC INTER-MED	10.1016/j.jfi.2006.03.001	252	14	920
Pérignon and Smith (2010), J BANK FINANC	10.1016/j.jbankfin.2009.08.009	165	11.78	479
Jorion (2002), ACCOUNT REV	10.2308/accr.2002.77.4.911	107	4.86	437
Barakat and Hussainey (2013), INT REV FINANC ANAL	10.1016/j.irfa.2013.07.002	104	9.45	299
Al-Hadi et al. (2016), CORP GOV-OXFORD	10.1111/corg.12115	71	8.88	179
Elamer et al. (2019), ACCOUNT FORUM	10.1080/01559982.2019.1576577	55	11	97

¹⁰ Appendix 2.2 also provides an overview of the most frequently local cited references according to the bibliometric analysis.

Author, Journal	DOI	Total Citations WoS	TC per Year WoS	Total Citations Google Scholar
Liu et al. (2004), REV ACCOUNT STUD	10.1023/B:RAST.0000028190.48665.d0	37	1.85	98
Elamer et al. (2020), GLOB FINANC J	10.1016/j.gfj.2019.100488	35	8.75	80
Wei et al. (2019b), ACCOUNT FINANC	10.1111/acfi.12453	35	7	57
Bischof and Daske (2013), J ACCOUNT RES	10.1111/1475-679X.12029	35	3.18	133
Neifar and Jarboui (2018), RES INT BUS FINANC	10.1016/j.ribaf.2017.09.006	34	5.67	109
Nahar et al. (2016c), MANAG AUDIT J	10.1108/MAJ-02-2015-1158	28	3.5	90
Elamer et al., (2020), INT J FINANC ECON	10.1002/ijfe.1849	20	5	29
Heidinger and Gatzert (2018), J BANK FINANC	10.1016/j.jbankfin.2018.04.004	19	3.17	55
Grassa et al. (2021a), JFRA	10.1108/JFRA-02-2020-0036	16	4	36
Grassa et al. (2021b), INT J FINANC ECON	10.1002/ijfe.2122	15	3.75	22
Giner et al. (2020), ACCOUNT EUR	10.1080/17449480.2020.1730921	15	3.75	30
Al-Hadi et al. (2019)	10.1016/j.qref.2017.11.008	13	2.6	31
Wei et al. (2019a), N AM J ECON FINANC	10.1016/j.najef.2019.101016	12	2.4	21
Grassa et al. (2020) PACIFIC BASIN FINANCE J.	10.1016/j.pacfin.2020.101327	11	2.75	21

This table provides an overview of the Citations Classics based on the Clarivate Web of Science (WOS) database and Google Scholar.

2.3.2 Content Analysis

2.3.2.1 Theme 1: Risk Categories-based Drivers for Disclosure Research

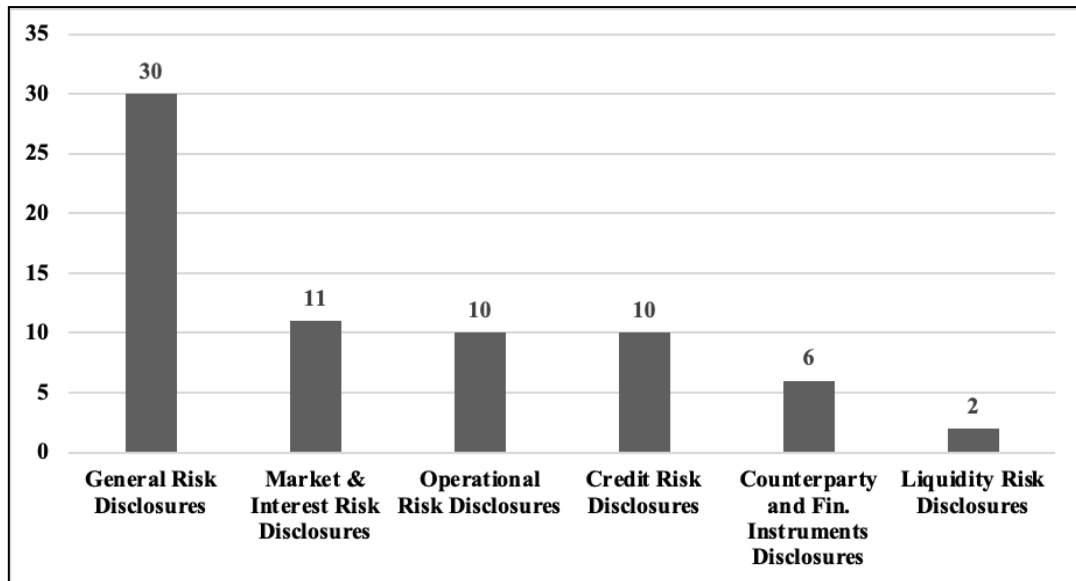
2.3.2.1.1 Overview and Thematic Cluster

In the following chapter, the analyzed articles of the selected sample will be classified according to the risk categories covered. For this purpose, the risk categories of the disclosure requirements of the Basel Pillar 3 framework (BCBS, 2021) generally serve as a classification scheme. The categorized risk types include *credit risk* (BCBS, 2021, DIS 40), *market price risk* (BCBS, 2021, DIS 50), *operational risk* (BCBS, 2021, DIS 60) and *liquidity risk* (BCBS, 2021, DIS 85). In the category “*Counterparty and Financial Instruments Disclosure*”, the corresponding Basel categories of *counterparty credit risk* (BCBS, 2021, DIS 42) and *securitization* (BCBS, 2021, DIS 43) are included in addition to the disclosures on *financial instruments and derivatives*. As a large body of research considers numerous risk types and the effect of risk-reporting more holistically without a Basel classification, the clustering also employs the category “*General Risk Disclosure without specific risk type*”. For the sake of simplicity, I also subsume contributions to the disclosure of *risk factors* as defined in SEC Regulation S-K Item 105 (SEC, 2020).

The analyzed sample is distributed in total according to the following categories: research on General Risk Disclosures without specific risk type (30 articles), Market & Interest Risk Disclosures (11 articles), Operational Risk Disclosures (10 articles), Credit Risk Disclosures (10 articles), Counterparty and Financial Instruments Disclosures (6 articles) and Liquidity Risk Disclosures (2

articles). The following subsections summarize the key findings of the studies, which are broken down by risk type.

Figure 2.6: Distribution of the Sample by Risk Category



2.3.2.1.2 General Risk Disclosure Research without Specific Risk Types

This subsection is intended to summarize contributions with a focus on General Risk Disclosure Research. In contrast to a focus on a single type of risk, this section primarily adopts a more holistic or more aggregated view of banks' risk disclosures. The contributions in this sample can be divided into the following sub-clusters:¹¹

I. Research on Reporting Quality and Level

Empirical studies on disclosure quality primarily considered the impact of accounting and regulatory standards on disclosure behavior (Linsley et al., 2006; Bischof, 2009; Oliveira et al., 2011b; Nahar et al., 2016c) and the differences in reporting between Basel Pillar 3 and IFRS 7 (Maffei et al., 2014). Furthermore, two studies in this sub-cluster showcased the impact of the global financial crisis on the level of disclosure (Fiechter & Zhou, 2016; Maingot et al., 2018). Maingot et al. (2018) revealed a slight increase in the disclosure level in the wake of the 2007–2008 global financial crisis, while Fiechter and Zhou (2016) found evidence for an increase in the risk management section in the financial statements of European banks in the wake of the Greek sovereign debt crisis. On the basis of 35 interviews in Bangladesh, Azim and Nahar (2021) concluded “that risk disclosure practices are still at a low level, but they are gradually increasing” (Azim & Nahar, 2021, p. 6). Azim and Nahar (2021) cited the lack of professionalization of the risk management

¹¹ See Appendix 2.3 for a tabular overview of General Risk Disclosure research in a chronological order.

function as the main driver for this development, as well as the lack of regulatory pressure to establish formalized reporting systems.

Altunbaş et al. (2021) examined the impact of the European Banking Union (BU) and noted an increase in risk-reporting over time. They also showed that the BU effect is robust for less profitable banks and GIPSI countries.¹²

Based on the guided SLR, determinants of risk disclosure quality and level can further be identified. In particular, bank size (Linsley et al., 2006; Samanta & Dugal, 2016; Grassa et al., 2021b), profitability (Nahar et al., 2016c; Samanta & Dugal, 2016; Haddad & Alali, 2022), leverage ratio (Nahar et al., 2016b, 2020), corporate governance characteristics (Nahar et al., 2016b; Elamer et al., 2019; Grassa et al., 2021b), risk governance (Nahar et al., 2016b, 2020), and Islamic Banks (Grassa et al., 2021a, 2021b; Elamer et al., 2019), are key factors influencing the quality or level of risk disclosure of banks in academic research.

II. Research on the Cost of Capital

Studies on the cost of capital primarily addressed the impact of the level of disclosure on the cost of equity capital (Poshakwale & Courtis, 2005) or the impact of disclosure quality on the cost of debt capital (Fiechter & Zhou, 2016; Nahar et al., 2016a). The study by Poshakwale and Courtis (2005), based on 135 banks from Australia, Europe and the United States over the period 1995–1999 discovered that the level of risk disclosure is associated with a decrease in the cost of equity capital. Fiechter and Zhou (2016) analyzed the disclosure of stress test participants in the European Union in the wake of the sovereign debt crisis. On the basis of a sample of 172 banks, they showed an increase in the length of the risk management section over time. Thereby, the level of risk disclosure is positively associated with the cost of capital (Fiechter & Zhou, 2016). Focusing on Bangladesh, Nahar et al. (2016a) evaluated 30 banks and indicated a negative association between the cost of capital and the quality of risk-reporting. Furthermore, they found a lower quality of risk-reporting for banks with higher performance (measured as ROA) and vice versa.

III. Research on Bank Performance and Bank Valuation

Investigating the impact of risk disclosure on bank performance and bank valuation is the subject of five papers in the sample. As shown in Nahar et al. (2016a), in a further study, Nahar et al. (2016c) indicated a positive impact of risk-reporting and risk governance characteristics on accounting and market-based performance measures. The study by Elbannan and Elbannan (2015) based on Egyptian banks showed a positive relationship between the level of disclosure and operational firm performance and market valuation. Using the Ohlson model, Giner et al. (2020)

¹² The GIPSI countries includes Greece, Ireland, Portugal, Spain and Italy.

studied European banks over the period 2007–2014 and observed a positive and significant relationship between financial risk disclosure and capital market valuation. On the basis of a global sample, Nahar and Jahan (2021) showed a positive association between risk disclosure and bank performance. In their study, they also found evidence for a moderating role of the risk committee. The study by Haddad and Alali (2022) on 30 banks located in the MENA Region identified a positive association between the level of risk disclosure and the return on assets and return on equity for investment banks in their sample. Further, they found an increase in the risk disclosure, measured in sentence count, over the time period.

On the basis of a study of commercial banks in Barbados, Weekes-Marshall (2020) examined the impact of risk governance disclosures and found a positive relationship between risk disclosure and bank performance. According to them, the extent of risk governance disclosures increased, however, the external disclosure was very generic and general without considering the individual governance characteristics of the reviewed banks (Weekes-Marshall, 2020).

IV. Research on Market Discipline

Building on their self-constructed disclosure index by using the Bankscope database, Nier and Baumann (2006) investigated the impact of market discipline based on a global sample. They found a positive effect of disclosure on market discipline, through higher capital buffers. Furthermore, they argued that market discipline is most effective in countries with a strong competitive environment (Nier & Baumann, 2006). On the basis of a global sample, Bischof et al. (2022) analyzed the adoption of Basel Pillar 3 and IFRS 7. They found evidence for an increased risk disclosure especially if banks are supervised by central banks “and bank regulators are equipped with more supervisory resources but are less pronounced if the securities market regulator is an independent entity” (Bischof et al., 2022, p. 1). Additionally, Bischof et al. (2022) found a positive association between market liquidity and an increase in risk disclosure after Basel Pillar 3 adoption and enforcement by bank regulators.

V. Research on Risk Factor Disclosures

The analysis of risk factor disclosures under SEC Regulation S-K Item 105 (SEC 2020) is performed for all three papers in the sample using software-assisted content analysis via semi-supervised text-mining. Wei et al. (2019a) scrutinized the forward-looking narratives of 153 banks over the period 2010–2017 and stated that banks overestimated their risks in 2010–2013 and underestimated them in subsequent years. In another study, Wei et al. (2019b) investigated the prevalence of individual risk factors in SEC 10-K reporting and showed that “non-financial risk factors, i.e., regulation, strategy and management operation” (Wei et al., 2019b, p. 1553) possessed the highest relevance. Shabestari et al. (2020) noted an increase in the absolute level of disclosure of risk

factors by U.S. banks after the financial crisis (2008–2009). Additionally, they observed a negative tonality in the disclosed information during the same analysis period.

Wang et al. (2020) assessed the risk-taking and disclosure behavior of 90 Chinese banks over the period 2010–2015 and found evidence that compliance with disclosure requirements of banking regulation sensitizes banks' risk-taking behavior. Additionally, they showed that especially “risk compensation components” significantly impact bank behavior (Wang et al., 2020).¹³ Guillemín and Semenova (2020) studied 179 Russian banks based on a Standard & Poors' Disclosure Transparency Index and found evidence that larger and riskier banks disclose more information.

2.3.2.1.3 Market Risk and Interest Rate Risk Disclosure Research

This subsection is intended to summarize contributions with a focus on *Market Risk and Interest Rate Disclosure Research*. The articles primarily cover the following sub-clusters:¹⁴

I. Research on Reporting Quality and Level

On the basis of a global sample in the reporting year 2008, the study by Savvides and Savvidou (2012) observed country differences in disclosure practices. Anglo-Saxon banks from the United Kingdom and the United States disclose relatively better qualitative and quantitative information (Savvides & Savvidou 2012). Scannella and Polizzi (2018) also arrived at similar results based on a European sample over the period 2012–2015, also showing a high heterogeneity in quantitative and qualitative disclosure of market price risks. In another study, Polizzi and Scannella (2020) evaluated the disclosure of 10 Italian banks and found a high redundancy of information between the Management Commentary of the Annual Report and Basel Pillar 3 reporting. Bank size (Savvides & Savvidou, 2012), corporate governance (Al-Hadi et al. 2019) and risk governance characteristics (Al-Hadi et al., 2016) can be identified as relevant determinants of the quality and level of disclosure of market price risks.

II. Research on Value-at-Risk-Disclosures

On the basis of a sample of U.S. banks, Jorion (2002) and Liu et al. (2004) examined the predictive power of VaR disclosures in determining the variance of trading revenues. VaR disclosures provide financial analysts with useful information for deriving the institutions' risk profile (Jorion, 2002). Liu et al. (2004) confirmed these findings and postulated that the predictive power of trading returns increased as a function of the “technical sophistication” of the VaR models employed

¹³ As “risk compensation components,” Wang et al. (2020) used the following KPIs from the Bankscope database: “loan loss reserves/Gross loans, Basel III leverage ratio, total capital, Tier 1 regulatory capital ratio, total regulatory capital ratio, core Tier 1 regulatory capital ratio, cap funds/liabilities, liquidity coverage ratio, loan loss reserves, long-term funding, credit impairment reserves, net interest income/average earning assets, loan loss provisions” (Wang et al. 2020, p. 975).

¹⁴ See Appendix 2.4 for a tabular overview of Market Risk and Interest Rate Risk Disclosure Research in a chronological order.

by banks (Liu et al., 2004, p. 265). Among these, Chipalkatti and Datar (2006) used an event study to examine the market reaction to published trading value at risk disclosures (TVaR) in 1998 and found no empirical evidence for abnormal returns and changes in trading volumes. Furthermore, they showcased a lower decision usefulness of the disclosed information, especially in possible crisis scenarios (Chipalkatti & Datar, 2006). Over the period 1996–2005, the level of VaR disclosure has increased, but no improvement in the disclosure quality can be observed (Pérignon & Smith, 2010). The study by Campbell et al. (2021), based on an Australian sample over the time frame 2005–2014, found “that the actual VaR estimates produced by banks are generally rejected by standard backtesting procedures” (Campbell & Smith, 2021, p. 1). Further, Campbell et al. (2021) observed an excess of VaR in normal scenarios and underestimated VaR in periods of high volatility.

III. Research on Interest Rate Disclosures

As the only contribution in the sample with a focus on interest rate risks, Ahmed et al. (2004) analyzed interest rate gap disclosures over the 1990–1997 period and indicated that “tabular disclosures are finer than maturity-gap data” (Ahmed et al., 2004, p. 223).

2.3.2.1.4 Operational Risk Disclosure Research

Featuring in total 11 articles, *Operational Risk* represents 18.97% of the analyzed sample. In addition to the origin Basel Operational Risk Category (BCBS, 2021, DIS, 60), this cluster also covers papers on non-financial and reputational risk.¹⁵ The articles can be divided into the following sub-clusters:¹⁶

I. Research on Reporting Quality and Level

The study by Helbok and Wagner (2006) analyzed 59 banks over the period 1998–2001 and found a significant increase in the level and disclosure quality of operational risk over time. Additionally, they showcased a negative relationship between the equity ratio and profitability on operational risk disclosure (Helbok & Wagner, 2006). On the basis of a content analysis of 111 banks in Portugal, Oliveira et al. (2011a) found evidence for bank size, stock market listing, age, deposits and regulatory capital adequacy as key determinants.

II. Research on Corporate Governance Characteristics

A broad number of studies analyze the influence of governance characteristics (see for detailed overall analysis also chapter 2.3.3.) Evidence for the impact of corporate governance characteristics on operational risk disclosures (ORD) is found by Barakat and Hussainey (2013), Neifar and Jarboui (2018) and Elamer et al. (2020). From a European sample of 85 banks, Barakat and Hussainey (2013) reported a positive association between outside directors and the audit

¹⁵ In a narrower sense, operational risk belongs to the group of non-financial risks.

¹⁶ See Appendix 2.5 for a tabular overview of research on Operational Risk Disclosure in a chronological order.

committee on ORD. In a sample from the MENA region, Neifar and Jarboui (2018) indicated a positive association between independent directors, the implementation of a Shariah board, and audition by the Big4.

Following the Disclosure Index of Helbok and Wagner (2006) and Barakat and Hussainey (2013), Elamer et al. (2020) investigated the influence of sharia governance characteristics on the quality of ORD in the MENA region. They found evidence for a positive influence of the Sharia Supervisory Board, block ownership, board independence and country-level governance (Elamer et al. 2020).

Focusing on risk management characteristics, Karyani et al. (2019) indicated a positive impact of the risk governance quality of Asian banks on ORD. In their study, they used both a self-constructed risk governance index and an operational risk index as a proxy, following Helbok and Wagner (2006) and Barakat and Hussainey (2013). In a further study, Karyani et al. (2021) indicated a moderating effect of market competition “which could reduce the adverse consequences of weak risk governance practices” (Karyani et al., 2021, p. 61).

III. Research on Bank Performance

Using software-supported content analysis, Adelopo (2017) investigated the impact of qualitative reporting on performance indicators. He showed that forward-looking disclosures in particular – as opposed to historical disclosures – had a positive significant effect on bank performance.

IV. Research on Reputational Risk

Two papers in the sample thematized the effect and the reporting of reputational risk in banks’ annual reports. In an earlier study, Linsley and Kajuter (2008) examined the disclosure behavior of the Allied Irish Bank in the wake of an event risk as part of a case study. They found that disclosure is not very effective in regaining legitimacy. Heidinger and Gatzert (2018) analyzed reputational risk disclosure at 52 banks in the U.S. and Europe over the period 2006–2015 and found an increase in the level of disclosure over the period under scrutiny. Additionally, they found evidence for a positive impact of reputational risk on bank valuation.

2.3.2.1.5 Credit Risk Disclosure Research

This subsection is intended to summarize contributions with a focus on *Credit Risk Disclosure Research*. The contributions in this sample can be divided into the following sub-clusters:¹⁷

I. Research on Reporting Quality and Level

¹⁷ See Appendix 2.6 for a tabular overview of Credit Risk Disclosure research in a chronological order.

Contributions to credit risk disclosure primarily address compliance with Basel Pillar 3, the development of disclosure quality and the voluntary additional disclosure of stress test participants. Further articles address the predictive power of disclosure for rating and asset quality. A special characteristic is the research design of Jones et al. (2018), focusing their analysis on the information content of risk graphs in financial statements. Khambata and Hirche (2002) and Khambata and Bagdi (2003) evaluated the regulatory disclosure of credit risk. No bank in the European (Khambata & Hirche, 2002) and Japanese samples had followed all the regulatory requirements for credit risk disclosure under Basel Pillar 3 (Khambata & Bagdi, 2003). In another study of Japanese banks, Frolov (2006) found a high degree of homogeneity in risk disclosure practices. In principle, he argued that the financial statements provided the recipients with sufficient information on expected losses, but they do not offer dedicated forward-looking information on non-impaired assets. Focusing on Italy, Scannella and Polizzi (2021) showcased an increase in credit risk disclosure quality over the period 2012–2017, with bank size and the business model as key determinants. Bischof and Daske (2013) analyzed the disclosure of EU stress test participants in the wake of the sovereign debt crisis in the Eurozone. Their study showed an increase in voluntary disclosure of sovereign risks and a significant positive capital market reaction after the publication of the 2011 stress test results (Bischof & Daske 2013). In a subsequent study, Bischof et al. (2021), showcased banks' rudimentary risk disclosures of relevant credit risk during the financial crisis. Jones et al. (2018) analyzed the decision usefulness of risk graphs at 47 European banks over the period 2006–2010. They found evidence that credit institutions with higher risk profiles are comparatively less likely to use risk graphs, and institutions with higher credit risk exhibit significantly higher accuracy in graphing. Similarly, they pointed out that credit risk graphs provide the reader with “incremental information” and are therefore useful for decision-making (Jones et al., 2018, p. 161).

II. Research on the Predictive Power of Disclosure for Rating and Asset Quality

The study by Abbassi and Schmidt (2018) based on supervisory data to analyze the asset quality of 38 German banks showcased that IRB banks disclose lower credit risks when facing higher market price risks. Elamer et al. (2021) analyzed the disclosure in the MENA region and indicated a predictive capability of risk-reporting to infer credit ratings. Acheampong and Elshandidy (2021) argued “that the text-based credit risk (soft) measure explains a substantial portion of the variation in NPLs, O-score, Z-score and credit rating downgrades” (Acheampong & Elshandidy, 2021, p. 1).

2.3.2.1.6 Counterparty Risk and Disclosure of Financial Instruments Research

The majority of articles in the sample on the disclosure of counterparty risks and financial instruments are related to the following topics:¹⁸

I. Research on Reporting Quality and Level

Woods and Marginson (2004) assessed the disclosure of derivative financial instruments under FRS 13 in the United Kingdom and observed that the disclosed information lacked decision usefulness. Similar results are also found by Yong et al. (2005) and Scannella and Polizzi (2019) based on their investigation of country differences in derivatives disclosure. The average level of disclosure is only 35% in 2002 in Asia and Oceania (Yong et al. (2005). In their study, Scannella and Polizzi (2019) investigated credit institutions based on a European sample over the period 2012–2017 and observed low disclosure quality, in both annual reports and Pillar 3 reports. On the basis of a content analysis of U.S. banks, Trapp and Weiss (2016) indicated empirical evidence of equity tail risks with a high intensity of the use of derivatives and loan securitizations.

II. Research on the Cost of Capital

In their study, Elshandidy and Acheampong (2021) found evidence that textual hedge disclosure is a significant negative associated with banks' cost of capital (cost of equity and cost of debt). In a further study, Yamani et al. (2021) pointed out, IFRS 7 compliance is also negatively associated with the cost of equity capital. In summary, both findings suggest that risk disclosure reduces the cost of capital.

2.3.2.1.7 Liquidity Risk Disclosure Research

I. Research on Reporting Quality and Level

Empirical studies on liquidity risks are underrepresented in the sample in comparison to other risk types. Overall, two papers in total considered liquidity risk disclosures stand alone.¹⁹ Boussanni et al. (2008) analyzed regulatory liquidity risk disclosures at 21 banks in Europe and observed high heterogeneity in the level and quality of disclosure. On the basis of qualitative content analysis, Asongu (2013) examined the disclosure of 20 international banks in 2010 and discovered that only 25% of the institutions disclose liquidity risk management information.

2.3.3 Theme 2: Regulatory and Constitutive Drivers of Disclosure

The external and internal disclosure of risks is subject to different regulatory and constitutive disclosure regimes, depending on the selected target recipient. On the basis of the content analysis,

¹⁸ See Appendix 2.7 for a tabular overview of Counterparty Risk and Disclosure of Financial Instruments Research in a chronological order.

¹⁹ See Appendix 2.8 for a tabular overview of Liquidity Risk Disclosure Research in a chronological order.

three main drivers for conducting academic research on banks' risk disclosure can be identified, which will be presented below: the *accounting approach*, the *regulatory approach* and the *management approach*.

As the primary provider of information to the capital markets, external financial reporting has historically been highly relevant for the disclosure of risks. Contributions to the *accounting approach* primarily have focused on the first-time and ongoing adoption of accounting standards and their impact on the disclosure behavior of banks. Table 2.7 presents the results grouped by sub-clusters. In all, 11 articles addressed the influence of the International Accounting Standard Board (IASB) on the risk-reporting practice of banks. The effect of the first-time adoption of IFRS 7 on reporting is controversially discussed in the literature. For example, Bischof (2009) and Nahar et al. (2016c) found evidence for an increase in disclosure quality during the first-time adoption of IFRS 7. Oliveira et al. (2011b) reached different conclusions based on a plain Portuguese sample. They stated no empirical evidence for improved transparency in the disclosure of risks in annual reports. In their study, Scannella and Polizzi (2019) came to similar conclusions. Especially, the reporting quality of derivatives and financial instruments in the IFRS 7 annual reports had potential for improvement (Scannella and Polizzi 2019). Woods and Marginson (2004) already reached similar findings based on a study of FRS 13 "Derivatives and other Financial Instruments: Disclosures" by the UK Accounting Standard Board (ASB). They pointed out that the disclosure of financial instruments was widely generic and incomplete and provides only limited guidance for deriving the risk profile of banks in their sample.

Eight empirical papers deal with Financial Reporting Release No. 48 (SEC, 1997) and Regulation S-K Item 105 "Risk Factors" of the United States Securities and Exchange Commission (SEC 2020). Focusing on Value at Risk disclosures, Jorion (2002) and Liu et al. (2004) found evidence of the strong decision usefulness of FRR No. 48 for predicting trading VaR. However, the contributions of Ahmed et al. (2004), Chipalkatti and Datar (2006), and Pérignon and Smith (2010) reached more differentiated conclusions. While the application of FRR No. 48 increased the amount of disclosure of trading VaR, an improved quality of the disclosed information cannot be observed (Ahmed et al., 2004; Pérignon & Smith, 2010). Particularly, VaR disclosures do not provide decision-useful information in crisis situations (Chipalkatti & Datar, 2006).

In line with increasingly relevant non-financial risk factors over time (Wei et al., 2019b), Wei et al. (2019a) showcased that forward-looking textual risk disclosures can mislead the derivation of banks' total risk exposure. Furthermore, Shabestari et al. (2020) also found evidence of a significant increase in the level of disclosed risks. Additionally, they reported a negative tonality in the risk section over the period 2008 to 2009 (Shabestari et al., 2020).

Table 2.7: Accounting Approach: Summary of Findings

Sub-Cluster	Finding	No.	Authors, Year
IASB			
IFRS 7	Enhancement of disclosure quality due to IFRS 7 first time adoption	2	Bischof (2009); Nahar et al. (2016b)
	No increased transparency through the adoption of IFRS 7 in Portugal	1	Oliveira et al. (2011b)
	Low reporting quality of derivatives in the annual reports	1	Scannella and Polizzi (2019)
	Enhancement of disclosure quantity following Greek sovereign debt crisis	1	Fiechter and Zhou (2016)
	No enhancement of IFRS 7 compliance in the period 2011-2017 in the GCC region	1	Yamani et al. (2021)
	IFRS 7 compliance has a reducing effect on cost of equity capital	1	Yamani et al. (2021)
	Information in the notes in the annual report provides more detailed information than Basel Pillar 3 Report	1	Maffei et al. (2014)
	High amount of redundancy between AR and P3 reduces comparability and relevance	1	Polizzi and Scannella (2020)
	Enhancement of credit risk disclosure quality in the period 2012-2017 (including IFRS9 preliminary effects)	1	Scannella and Polizzi (2021)
IFRS 9	RD has a reducing effect on cost of capital	1	Elshandidy and Acheampong (2021)
ASB			
FRS 13	Generic and incomplete disclosure of financial instruments impairs the derivation of banks' risk profile.	1	Woods and Marginson (2004)
SEC			
FRR No. 48	No Enhancement of disclosure quality due to SEC market risk disclosure tableau	1	Ahmed et al. (2004)
	Informativeness of Value at Risk Disclosures (FRR No. 48) for Trading Value at Risk Prediction	2	Jorion (2002), Liu et al. (2004)
	Enhancement of quantity, but no improvement of Value at Risk Disclosures quality esp. missing informativeness of future volatility in Historical Simulations	1	Pérignon and Smith (2010)
	VaR Disclosures do not provide useful information in banking crisis situations	1	Chipalkatti and Datar (2006)
Risk Factors	Increasing relevance of NFR Risk Factor disclosures	1	Wei et al. (2019b)
	Forward-looking textual risk disclosures leads to a misleading derivation of banks' total risk exposure	1	Wei et al. (2019a)
	Significant increase in the number of published risks, increase in A negative tonality over the 2008-2009 timeframe.	1	Shabestari et al. (2020)

This table describes the summary of findings of articles clustered to the accounting approach.

Empirical research on the *regulatory approach* focuses primarily on the voluntary and mandatory application of the Basel Pillar 3 regulation and disclosure behavior during bank stress tests. In addition, contributions on banking supervision and country regulation are subsumed in this cluster. Empirical studies showed that participants in stress tests conducted by banking supervisors voluntarily disclosed more information than non-stress-test participants in the control group (Bischof & Daske, 2013; Fiechter & Zhou, 2016). Moreover, the supplemental disclosure of results is evaluated positively by the capital market (Bischof & Daske, 2013).

The Basel Committee's Basel Pillar 3 Framework serves as the recognized international framework for regulatory disclosure. Empirical studies have found insufficient compliance with the Pillar 3 disclosure requirements (Khambata & Hirche, 2002; Khambata & Bagdi, 2003; Asongu, 2013). Furthermore, the reporting quality on individual risk types is very heterogeneous across the respective sample (Boussanni et al., 2008; Samanta & Dugal, 2016). In addition to IFRS 7 disclosure, Scannella and Polizzi (2019) also examined reporting in the Basel Pillar 3 report and found

low disclosure quality of derivative financial instruments. Focusing on the amended Basel III Pillar 3 framework, Scannella and Polizzi (2021) found significant improvement in the disclosure quality for credit risk. Two papers in the sample examined the voluntary adoption of BCBS recommendations (Helbok & Wagner, 2006) and Basel 2 Pillar 3 and IFRS 7 on reporting, respectively (Nahar et al., 2016b). In addition to an increase in disclosure quality in the wake of voluntary Basel Pillar 3 adoption (Nahar et al., 2016b), Helbok and Wagner (2006) observed an increase in the level and quality of banks' operational risk disclosure in 1998–2001.

In addition to the Basel framework, banking supervision and the respective country-specific regulation represent an influencing factor in risk-reporting. On the basis of a dataset from the German Bundesbank, Abbassi and Schmidt (2018) found that IRB banks with higher risks in the trading book disclose lower Probability of defaults (PDs) in Pillar 3 reporting. Country-specific anti-corruption prevention (Elamer et al., 2019) also significantly influences the level of disclosure, similar to country-level governance (Elamer et al., 2020). By comparison, Islamic banks disclose fewer risks than conventional ones do (Grassa et al., 2020, 2021a, 2021b).

Table 2.8: Regulatory Approach: Summary of Findings

Sub-Cluster	Finding	No.	Authors, Year
Stress testing	Increase in voluntary disclosure by stress test participants and positive capital market reaction after publication of results	1	Bischof and Daske (2013)
	Increase in voluntary disclosure by stress test participants	1	Fiechter and Zhou (2016)
Basel Pillar 3 Compliance	Inadequate Basel Pillar 3 compliance	2	Khambata and Hirche (2002); Khambata and Bagdi (2003); Asongu (2013)
	Low quality in the disclosure of derivatives in the Pillar 3 Report	1	Scannella and Polizzi (2019)
	Enhancement of credit risk disclosure quality in the period 2012-2017 (including Basel III Pillar 3 effects)	1	Scannella and Polizzi (2021)
	Enhancement of disclosure quality due to Basel Pillar 3 adoption	2	Nahar et al. (2016b); Bischof et al. (2022)
	Heterogeneity in the disclosure of individual risks	2	Boussanni et al.(2008); Samanta and Dugal (2016)
Voluntary BCBS/ Pillar 3 Adoption	Increase of level und quality of banks' operational risk disclosure in 1998-2001	1	Helbok and Wagner (2006)
	Legitimacy Theory esp. reputation and public visibility is a driver for operational risk disclosure in 2006 for Portuguese banks'		Oliveira et al. (2011a)
Banking Su- pervision	Banking Supervision has a positive effect on ORD	1	Barakat and Hussainey (2013)
	Central banks and the supervisory resources have a positive effect on RD	1	Bischof et al. (2022)
	National supervised banks provide higher RD compared to SSM-supervised Entities	1	Altunbas et al. (2021)
	IRB Banks: Banks with higher risk in the trading book publish comparatively lower PDs in regulatory reporting		Abbassi and Schmidt (2018)
Country Regulation	Country wide regulation of corruption is positively associated with the level of risk disclosure	1	Elamer et al. (2019)
	Increase in risk disclosure following European Banking Union		Altunbas et al. (2021)
	Lower level of disclosure by Islamic banks compared to conventional banks	3	Grassa et al. (2020, 2021a, 2021b)
	Japanese Banking Law: Homogeneous CRD, but rudimentary disclosure of forward-looking information on non-impaired assets.	1	Frolov (2006)
	Country Level Governance has a positive effect on risk disclosure quality	1	Elamer et al. (2020)
	Governance support has a reducing effect on market discipline	1	Nier and Baumann (2006)

This table describes the summary of findings of articles clustered to the regulatory approach.

Within the theme of the *management approach*, specific governance characteristics are subsumed. In addition to the influence of corporate governance in general, individual contributions examined the influence of risk governance and – particularly in Islamic countries – the sharia governance. The quality of a bank's corporate governance system positively influences the level of risk disclosure (Al-Hadi et al., 2019). Empirical evidence indicates that the characteristics of the board of directors especially impact the quality of disclosure and thus the usefulness of the disclosed information (Barakat & Hussainey, 2013; Neifar & Jarboui, 2018; Elamer et al., 2019, 20120; Grassa et al., 2021b). The main determinants identified in the literature were further the board independence (Grassa et al., 2021b; Elamer et al., 2020), board size (Elamer et al., 2021; Grassa et al., 2021b; Nahar et al., 2016b), the percentage of foreign directors (Grassa et al., 2021b), the number of outside directors and the audit committee meeting frequencies (Barakat & Hussainey, 2013).

Furthermore, the local management significantly influences the constitutive disclosure behavior, especially in jurisdictions with a low regulatory density (Azim & Nahar, 2021).

In addition to the overall corporate governance system, the literature also found empirical evidence for the influence of the risk governance framework on disclosure behavior. Both the existence of a risk committee and the qualifications of its members influence the disclosure of risks (Al-Hadi et al., 2016; Karyani et al., 2019, 2021; Nahar et al., 2020). Additionally, the risk governance moderates the effect between risk disclosure and bank performance (Nahar & Jahan, 2021). Basically, it can be stated that risk governance positively influences bank performance (Nahar et al., 2016c). These findings go hand in hand with the theoretical idea of regulatory market discipline. Accordingly, the market disciplines banks to adhere to an appropriate and effective risk management system (Bliss & Flannery, 2002; Stephanou, 2010). Contributions to the mere disclosure of risk governance are underrepresented in the sample. Only one contribution addresses the disclosure of risk governance and states that risk governance disclosure was generic and general, without considering individual governance characteristics (Weekes-Marshall, 2020).

Since 2018, there have been scattered contributions dedicated to the influence of sharia governance in the MENA Region, whereby sharia governance can be understood as a variation from the traditional corporate governance system. Particularly, the characteristics of the Sharia Supervisory Board significantly influence the level (Elamer et al., 2019, 2020; Neifar & Jarboui, 2018) and the usefulness of the information disclosed (Elamer et al., 2020).

Table 2.9: Management Approach: Summary of Findings

Sub-Cluster	Finding	No.	Authors, Year
Corporate Governance	Board characteristics (esp. board independence, board size, foreign directors, outside directors, audit committee meeting freq.) is positive associated with level, quality or the informativeness of risk disclosure	5	Elamer et al. (2020, 2021); Barakat and Hussainey (2013); Grassa et al. (2021b); Neifar and Jarboui (2018)
	Strength of Corporate Governance is positive associated with the level of disclosure	1	Al-Hadi et al. (2019)
	Top Management has a positive effect on RD	1	Azim and Nahar (2021)
Risk Governance	Risk Governance Characteristics (esp. risk committee, qualification, size etc.) is positive associated with level or quality of risk Disclosure	5	Nahar et al. (2020); Al-Hadi et al. (2016); Karyani et al. (2019, 2021)
	Risk Committee has a moderating effect between RD and bank performance	1	Nahar and Jahan (2021)
	RG is positive associated with firm performance	1	Nahar et al., (2016c)
	RGD were generic and general, without considering individual governance characteristics	1	Weekes-Marshall (2020)
	Sharia supervisory board characteristics is positive associated with level or informativeness of disclosure	3	Elamer et al. (2019a; 2020; 2021); Neifar and Jarboui (2018)

This table describes the summary of findings of articles clustered to the management approach.

2.3.4 Theme 3: Textual Characteristics with Bibliometric Analysis and VOSviewer

As an additional robustness check of the performed content analysis and to quantify and visualize the research field (Cobo et al., 2011), I apply bibliometric analysis methods in the subsequent section. Bibliometric methods, according to Zupic and Čater (2015), are suitable as “a measure of objectivity into the evaluation of scientific literature and hold the potential to increase rigor and mitigate researcher bias in reviews of scientific literature by aggregating the opinions of multiple scholars working in the field” (Zupic & Čater, 2015, p. 429).

As a first scientific mapping method, the research field will be analyzed by a longitudinal co-word analysis to derive thematic clusters (Cobo et al., 2011). The visualization is based on a thematic map using the R-tool bibliometrix by Aria and Cuccurullo (2017). The assignment of the keywords to the clusters is calculated based on the criteria Callon’s Centrality and Callon’s Density. Callon’s Centrality describes the degree of relevance of a network covered in the literature, measured as the degree of external network interaction. Callon’s Density describes the level of development of a topic area and essentially measures the strength of keywords in relation to each other internally (Cobo et al., 2011).

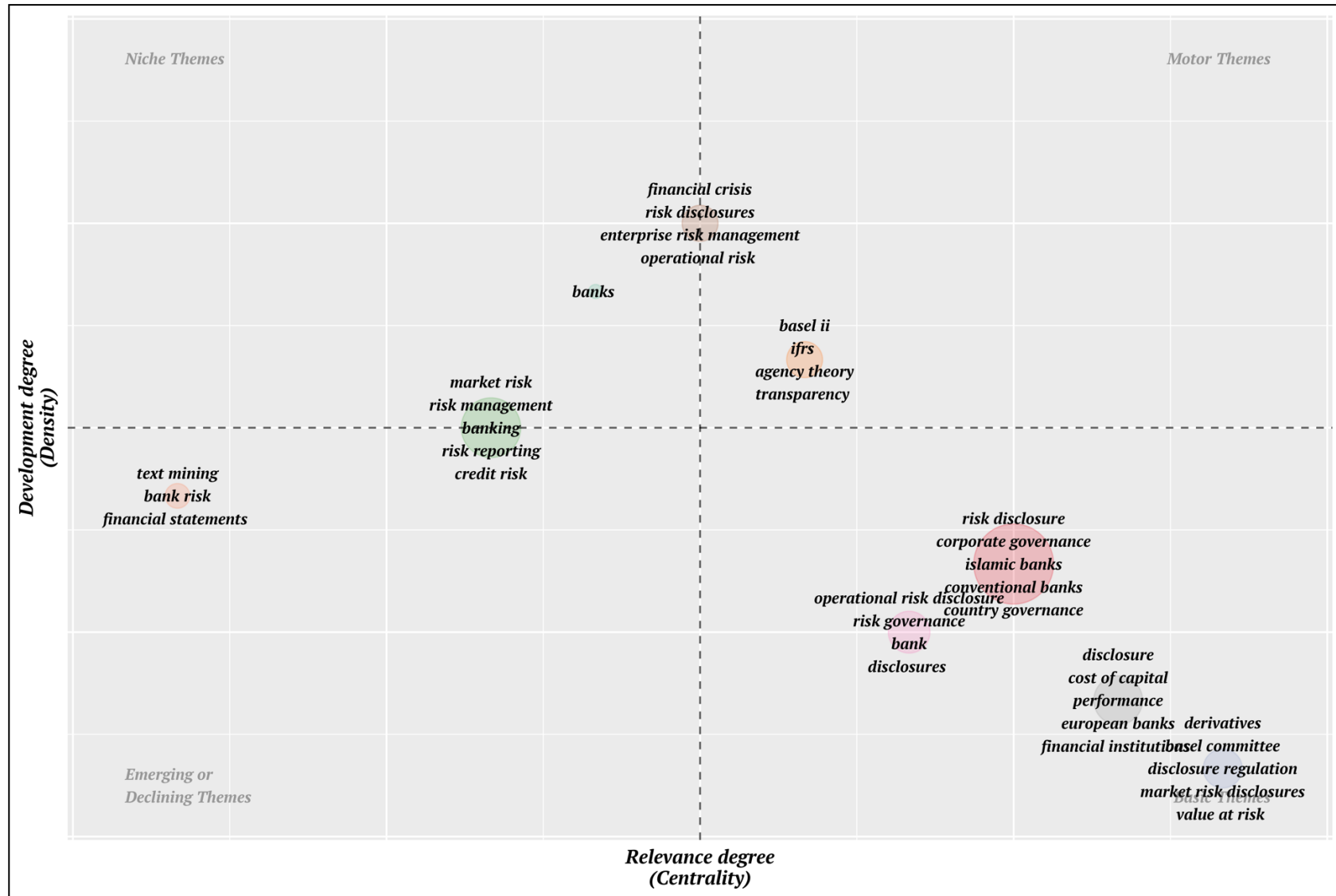
Using bibliometrix, a total of nine clusters can be assigned to a four-field matrix for mapping the research field (see Figure 2.7 and Appendix 2.9):

- Contributions with the author-keywords “risk disclosure”, “disclosure”, “operational risk disclosure” and “derivatives” can be identified as *basic themes*. The identified clusters can be further drilled down to a lower level. The predominant topics in the “risk disclosure” thematic

network was “corporate governance”, “islamic banks”, “conventional banks” and “country governance”. The thematic area of “disclosure” contains articles on the “cost of capital”, “bank performance” and “European banks”. The “derivatives” cluster has the highest relevance degree. This cluster chiefly comprises contributions on issues relating to the “Basel Committee”, “disclosure regulation”, “market risk disclosure” and “value at risk”.

- Contributions to “Basel II” can be identified as the *motor theme* of risk-reporting by banks. In this topic area, contributions on “IFRS 7”, the “agency theory” and “transparency” predominate.
- The financial crisis cluster represents a *highly developed topic* area between a *motor theme* and a *niche theme*. In addition to the keyword enterprise risk management, the keyword operational risk is also subsumed here.
- Studies on “text-mining“ can be identified as an *emerging or declining theme*. This goes hand in hand with the content analysis results. Articles on text-mining have been published sporadically since 2020 with the primary focus on risk factor disclosures in our analyzed sample.
- The cluster market risk with the thematic keywords risk management, banking, risk-reporting and credit risk represents a *medium-developed topic* area between a *niche theme* and an *emerging theme*.

Figure 2.7: Thematic Map based on Author's Keywords



For further analysis of the sample, I follow the literature (e.g., Farrukh et al., 2020; Khatib et al., 2022; Goyal & Kumar, 2021) and use VOSviewer (van Eck & Waltman, 2010, 2021) applying co-occurrence, bibliometric coupling and co-citation analysis.

The keyword co-occurrence analysis is used to examine the frequency of the occurrence of keywords with others over time. Table 2.10 overviews the selection criteria Author Keywords, Keywords-Plus and a combination of both. On the basis of the selection of Author Keywords and Keywords Plus from the WoS database, the following keywords dominate the analysis: corporate governance, risk disclosure, cost, management and firm. Figure 2.8 illustrates the co-occurrence analysis of Author Keywords and Keywords Plus over the timespan to 2022.²⁰ On the basis of the presented scientific maps, the contexts of the individual keywords and indications for the development of the research field over time can be illustrated. Particularly, academic research on derivatives and market price risks dominates until 2014, while research on corporate governance and esp. the connectivity with Operational Risk gained in importance from 2018. It is also noticeable that corporate reputation has no network connection to the other nodes.

Bibliometric coupling is based on the principle of creating pairs of publications, each of which cites a third publication (Kessler, 1963). Table 2.11 and Figure 2.9 shows the bibliometric coupling over time until 2022. The main contributions include the study on market discipline by Nier and Baumann (2006), the contributions on value at risk disclosure by Pérignon and Smith (2010) and Jorion (2002), and the study by Barakat and Hussainey (2013) on operational risk. All of these studies have in common a self-created risk disclosure index.

Figure 2.10 provides an overview of the co-citations of this sample based on the Web of Science database. The prerequisite for inclusion in the co-citations map was at least four citations of a single reference in the sample. The thickness of the individual nodes is related to the frequency of citations. The publications of Barakat et al. (2013) on the topic of operational risk, Aebi et al. (2012) on bank performance and Jorion (2002) on the disclosure of Value at Risk Disclosures represent a significant center of a cluster.

²⁰ Additionally, Appendix 2.10 and Appendix 2.11 will illustrate the co-occurrence for Keyword-Plus and Author-Keywords stand alone.

Figure 2.8: VOSviewer Co-Occurrence Author-Keywords and Keywords Plus Analysis

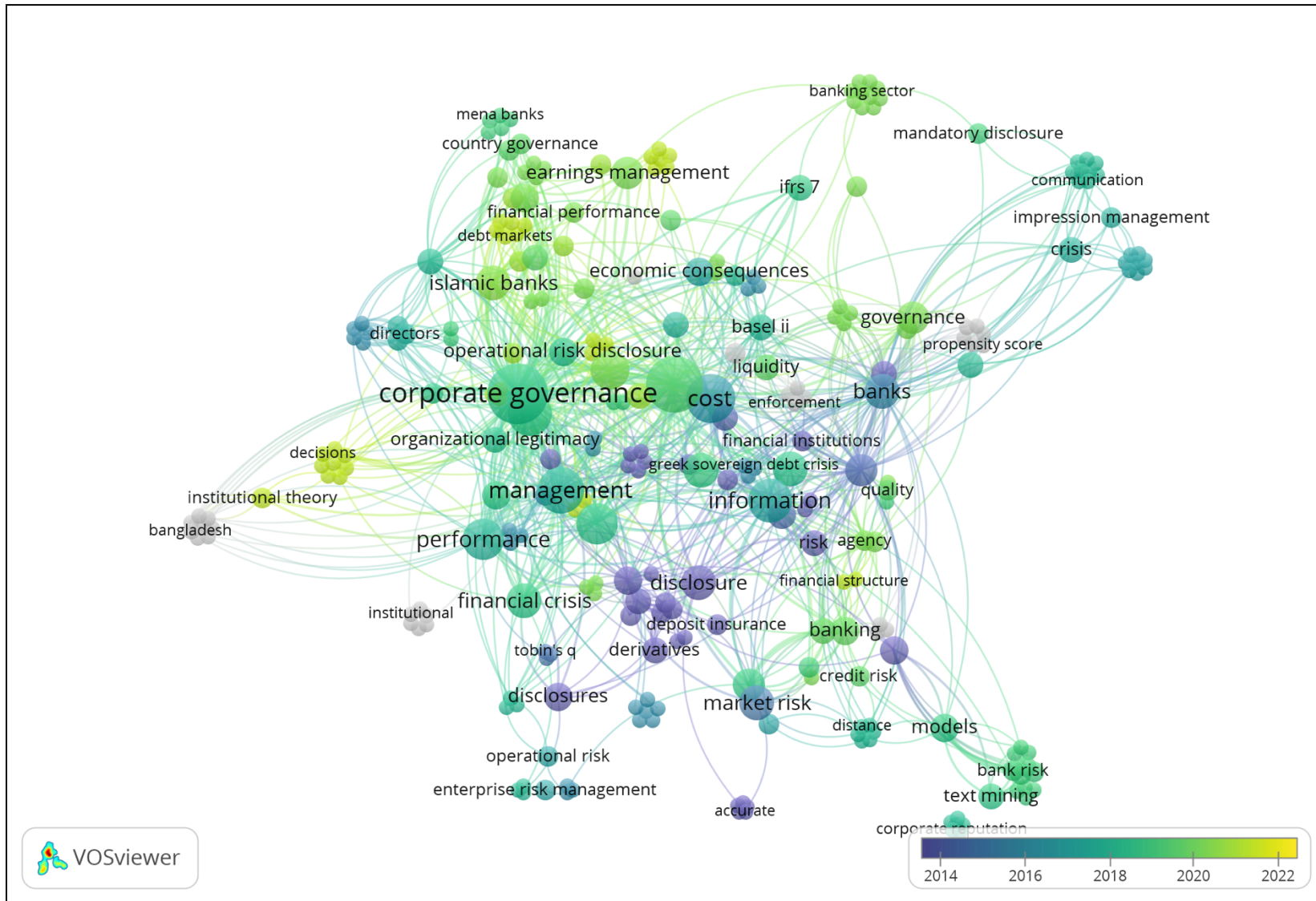


Table 2.10: VOSviewer Co-Occurrence Analysis

Id	Author-Keywords			Keywords-Plus			Author-Keywords and Keywords-Plus		
	Keyword	Occurrences	Total link strength	Keyword	Occurrences	Total link strength	Keyword	Occurrences	Total link strength
1	risk disclosure	17	76	corporate governance	18	123	corporate governance	21	240
2	corporate governance	8	28	cost	13	81	risk disclosure	18	206
3	risk management	5	25	management	12	89	cost	13	134
4	market risk	5	24	firm	10	70	management	12	143
5	islamic banks	5	23	information	10	60	firm	10	118
6	banks	5	22	ownership	9	71	information	10	105
7	disclosure	5	19	determinants	8	65	ownership	9	102
8	banking	4	20	impact	6	38	performance	9	93
9	operational risk disclosure	4	16	level	6	34	determinants	8	101
10	risk governance	4	14	performance	6	38	islamic banks	6	79
11	risk disclosures	3	15	earnings management	5	45	banks	6	72
12	risk reporting	3	15	governance	5	43	financial crisis	6	68
13	derivatives	3	14	association	4	20	impact	6	66
14	ifrs 7	3	14	competition	4	30	disclosure	6	54
15	basel ii	3	13	economic consequences	4	24	level	6	53
16	financial crisis	3	13	market	4	26	market risk	6	52
17	text mining	3	11	models	4	17	earnings management	5	67
18	performance	3	10	board composition	3	27	governance	5	67
19	cost of capital	3	8	crisis	3	20	competition	5	62
20	financial regulation	2	11	exposure	3	11	risk management	5	38

This table describes the co-occurrence analysis of Author-Keywords and Keywords-Plus based on the VOSviewer Analysis.

Table 2.11: VOSviewer Results Bibliometric Coupling

No.	Document	Citations	Total link strength	No.	Document	Citations	Total link strength
1	Nier (2006)	219	34	21	Al-hadi (2019)	5	192
2	Perignon (2010)	147	25	22	Jones (2018)	4	130
3	Jorion (2002)	99	28	23	Giner (2020)	4	154
4	Barakat (2013)	74	216	24	Nahar (2020)	4	213
5	Al-hadi (2016)	53	260	25	Grassa (2021b)	3	275
6	Liu (2004)	35	47	26	Adelopo (2017)	2	72
7	Elamer (2019)	32	221	27	Abbassi (2018)	2	15
8	Bischof (2013)	27	69	28	Polizzi (2020)	2	195
9	Neifar (2018)	21	170	29	Grassa (2020)	2	171
10	Nahar (2016b)	20	202	30	Grassa (2021a)	2	374
11	Wei (2019a)	20	37	31	Scannella (2021)	2	337
12	Nahar (2016c)	19	242	32	Samanta (2016)	1	127
13	Elamer (2020)	16	126	33	Fiechter (2016)	1	62
14	Nahar (2016a)	13	259	34	Maingot (2018)	1	48
15	Elbannan (2015)	11	58	35	Shabestari (2020)	1	78
16	Heidinger (2018)	9	12	36	Karyani (2019)	0	123
17	Elamer (2021)	9	199	37	Scannella (2019)	0	219
18	Wei (2019b)	8	36	38	Guillemin (2020)	0	45
19	Trapp (2016)	6	73	39	Weekes-marshall	0	182
20	Scannella (2018)	6	127	40	Wang (2020)	0	22

This table describes the results of bibliometric coupling based on the VOSviewer Analysis.

Figure 2.9: VOSviewer Bibliometric Coupling

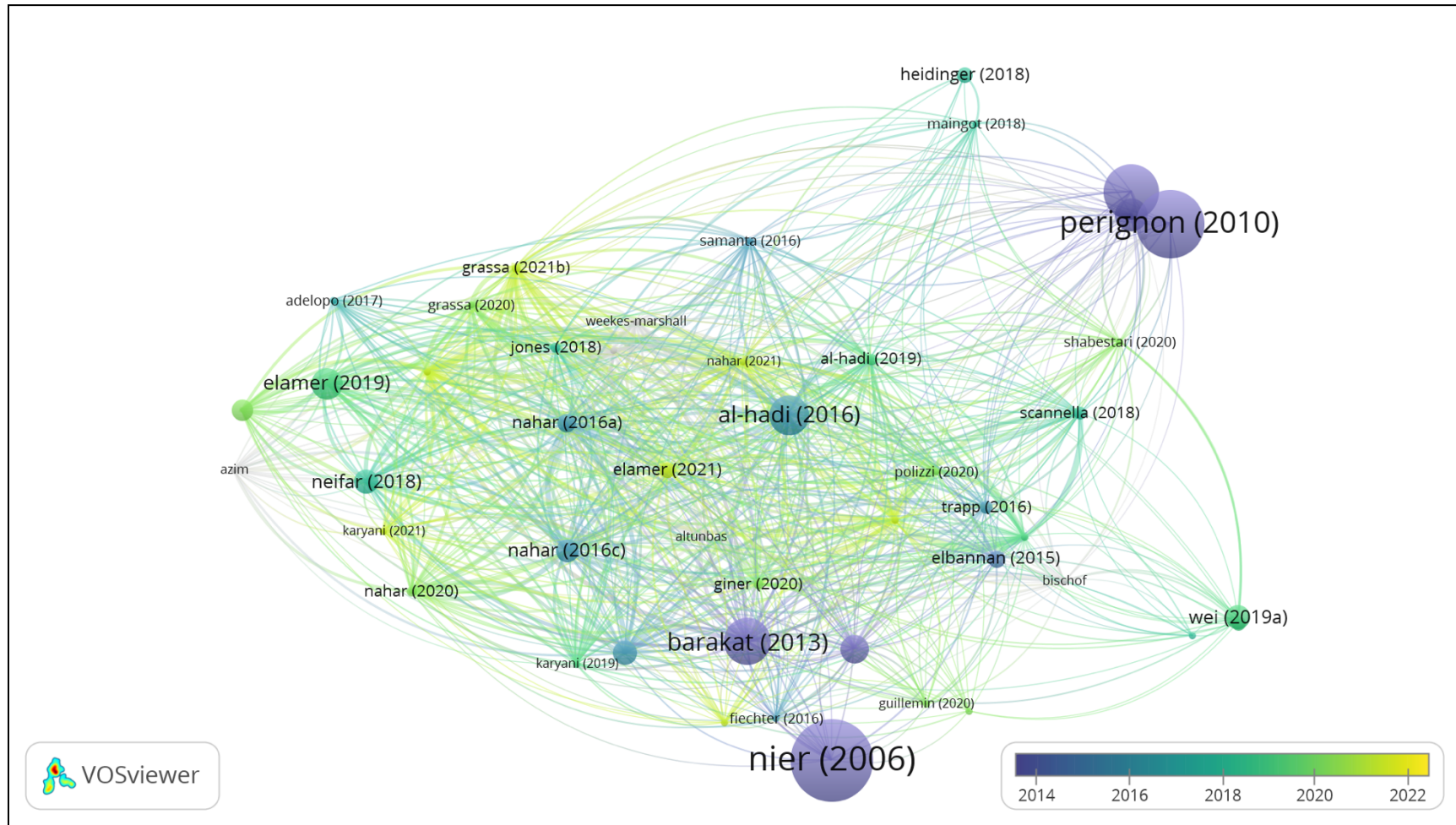
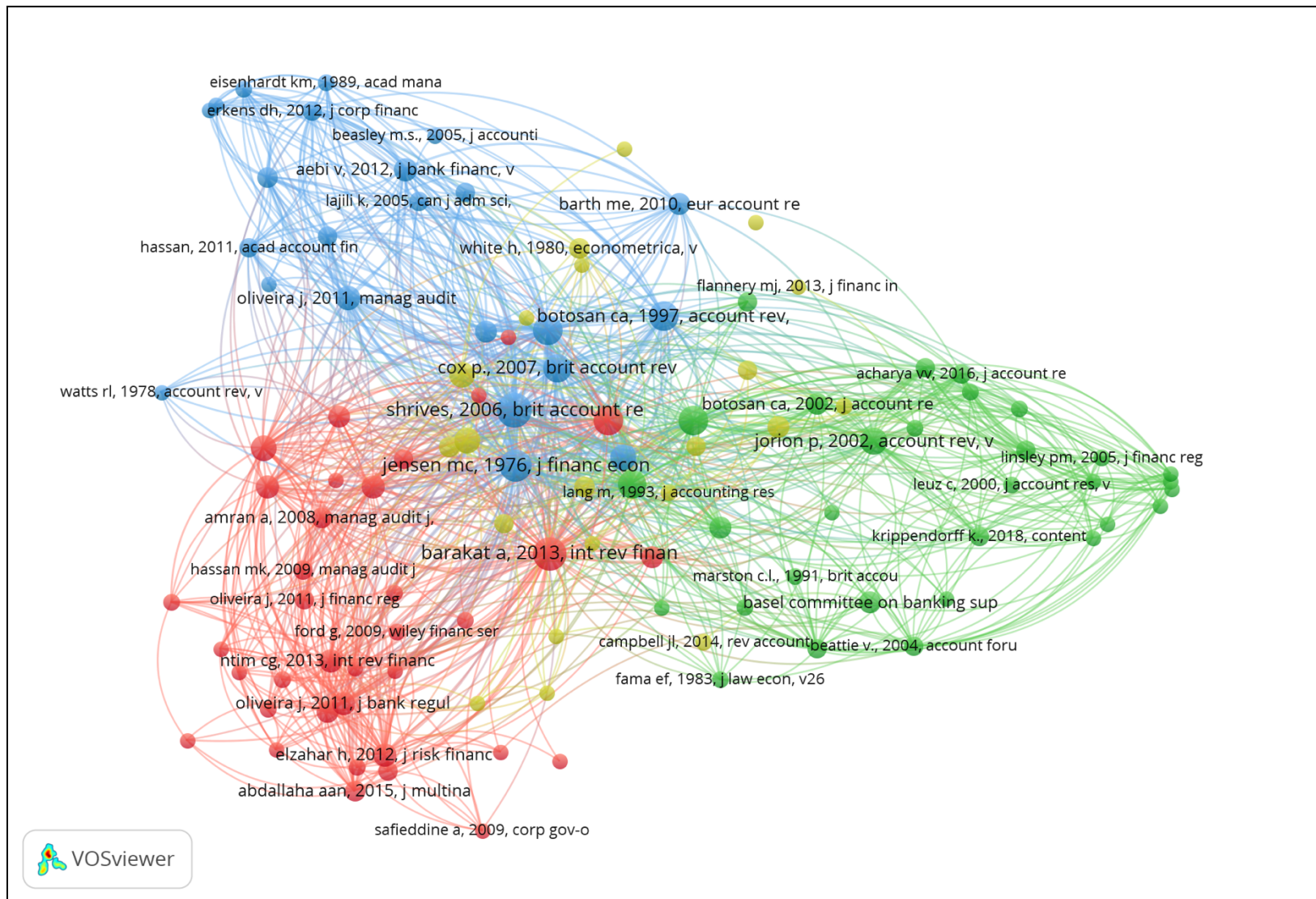


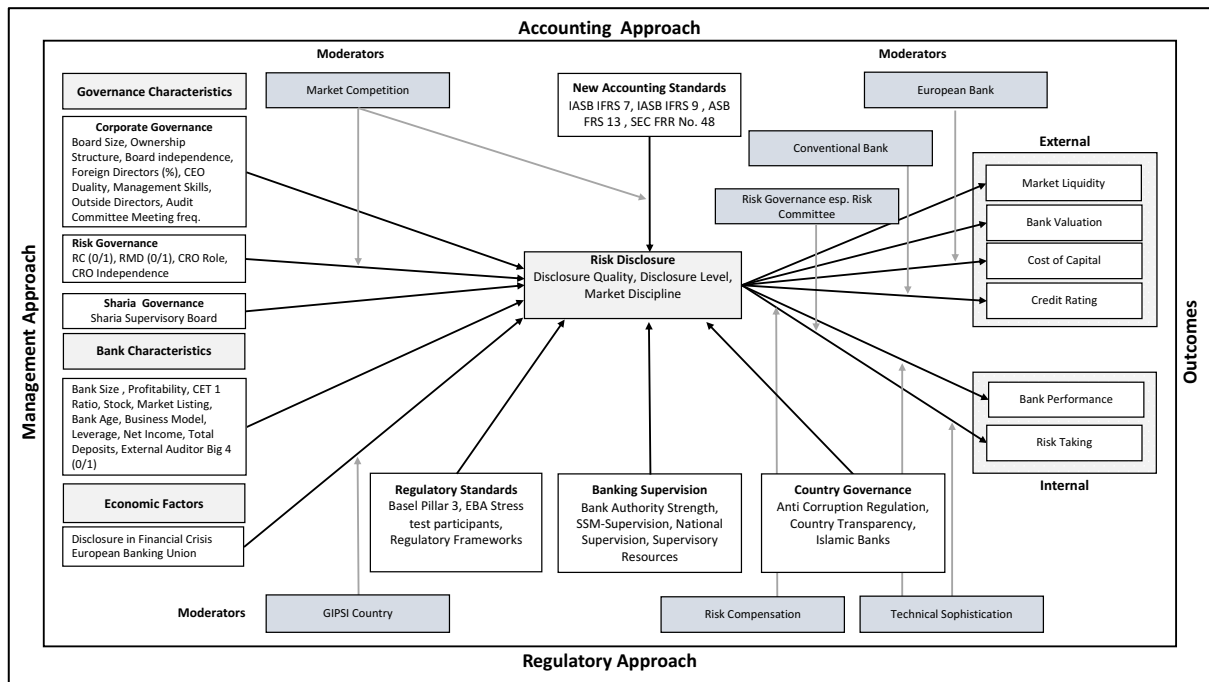
Figure 2.10: VOSviewer Co-Citation Analysis



2.4 Discussion and Avenues for Further Research

Figure 2.11 summarizes the results of the previous chapters in the form of an overarching research framework. The findings are intended to serve as a starting point for further research projects in the area of risk reporting by banks.

Figure 2.11: Framework for Further Research on Risk Disclosure in Banks



Research on risk-reporting appreciates an increasing relevance. Anyway, some research topics are still unexplored or under-researched in the analyzed sample. In this chapter, I am following prior literature reviews in the research field of accounting (Hiebl, 2018; Ndemewah et al., 2019; Feldermann & Hiebl, 2020; Hiebl & Li, 2020; Ndemewah & Hiebl, 2022) and discuss potential avenues for further academic research. Relevant research gaps shall be presented – based on the formed clusters as well as the bibliometric analysis – and potential research opportunities and research questions for future empirical research will be developed.

On the basis of a broad analysis of the applied methodology, it can be stated that a majority of the empirical articles used quantitative methods. Therefore, a fourth of the sample uses qualitative approaches, and only three articles employ a mixed methods approach. Content analysis predominates in the methodology applied, with an increasing number of contributions using text mining as a method, especially from 2019 onwards. However, the articles included in the sample are primarily limited to the USA and focus on risk factor disclosures in accordance with Regulation S-K Item 105 “Risk Factors” (Wei et al., 2019a, 2019b; Shabestari et al., 2020).

Empirical contributions to machine-assisted textual analysis in the context of risk-reporting outside the U.S. are still underrepresented, at least in the banking sector, based on the findings of this SLR.²¹ Further research is needed for the banking sector in the area of the potential impact of natural language processing methods such as readability analysis (Loughran & McDonald, 2014, 2016) and the application of machine learning (e.g., Li, 2010).

Table 2.12: Avenues for Future Research

Cluster	Future Research Questions and Opportunities
Research Design and Methodology	What additional insights do mixed methods approaches provide when researching risk reports? How can modern methods like text mining or machine learning change traditional risk disclosure research and which implications can be derived? What evidence does the application of novel methods such as text mining provide for risk reporting analysis?
Risk Categories	What influence do market-based risk disclosure proxies (Bid-Ask-Spread, Liquidity) have on the analytical quality of empirical research designs? Do they add value to traditional content analysis? How is risk reporting evolving in light of the COVID-19 pandemic and global macroeconomic and political crises? Does the level and quality of environmental and climate risk disclosure evolve over time? Which determinants influence the disclosure of environmental and climate risk? How does the level and quality of reputational risk disclosure evolve over time? How is the disclosure practice of liquidity risks and in particular illiquidity risks evolving in light of the COVID-19 pandemic and global macroeconomic and political crises?
Accounting	Which influence has the revised IFRS 9 and IFRS 7 on the risk disclosure behavior of Banks? Does the quality and level of financial instrument disclosure evolve over time esp. due to amended accounting standards (IFRS 9 and CECL)
Banking Regulation	Which impact has the revised Basel Pillar 3 Framework on risk disclosure? What influence does the EDTF recommendations have on the disclosure behavior of risks, especially credit risks? What influence does risk reporting have on global financial stability and thus on systemic risk measures (e.g., MES, Delta CoVar)?
Management	How can board diversity change risk disclosure behavior in banks? Which influence do findings from management neuroscience research have on the risk reporting of banks?

This table describes potential avenues for further academic research in the field of risk disclosure of banks'.

As risk disclosure proxies, the “traditional” instruments of disclosure research,²² consisting of disclosure index, sentence, page and word count, predominate. Market-based disclosure proxies, such as the bid-ask spread, are underrepresented with only three studies. The average sample size is comparatively small with 99 banks. To increase the sample size, it is recommended to use market-based methods.

On the basis of the content analysis of risk categories, it can further be stated that non-financial risk disclosures do not yet consider emerging risks such as climate risk and environmental risk.

²¹ Elshandidy et al. (2018) also concluded similar in their literature review focusing on risk reporting by corporates in the period 1997–2016.

²² See for an overview of the analysis of narratives in disclosures and the selection of proxies, in particular, the papers by Beattie et al. (2004), Beretta and Bozzolan (2004, 2008) and Hassan and Marston (2019).

The analysis of reputational risks is also noticeably underrepresented. Only one article in the sample specifically examines the influence of the disclosure behavior of reputational risks (Heidinger & Gatzert, 2018). The regulation of climate risk disclosure is currently becoming increasingly relevant in banking supervision. Especially, the TCFD Recommendations (TCFD 2017a, b) are a key driver in this regard. Anglo-Saxon banks such as Barclays and Lloyds have already reacted and published stand-alone TCFD reports.²³ A broad analysis of the adaptation of sustainability risks in the risk report, based on the current regulatory requirements, is still pending at the time of the completion of this SLR.

Grounded on the analysis of the regulatory drivers, it can be observed that the articles primarily analyzed the annual report in accordance with IFRS 7 or the disclosure requirements under Basel II Pillar 3. Studies that explicitly look at the amendment of IFRS 9 and the impact on risk-reporting are also still unexplored, as with articles on the amended of Basel III Pillar 3 Framework.

As a result of the management approach, it can be showcased that corporate governance criteria significantly influence disclosure. In addition to the characteristics and composition of the board, Sharia governance significantly influences risk-reporting, especially in the Islamic world. I see a need for further research, particularly in studies of the impact of diversity (e.g., Burns et al., 2014; Lachmann et al., 2017) on risk disclosure and bank behavior. Furthermore, the articles in this sample do not investigate behavioral or neuroscience (e.g., Tank & Farrell, 2022) related influences on disclosure behavior.

2.5 Conclusion and Limitations

Empirical research on risk-reporting by banks is of continuously increasing relevance, not least due to regular amendments of the accounting standard setters and banking regulation. In this paper, a total of 69 empirical articles were analyzed based on an SLR covering the period from 2002 to 2022. The primary objective of this “State of the Art Article” was obtaining an evidence-based, unbiased selection of relevant papers in the research field of risk disclosure of banks. Using a triangulated approach with a qualitative SLR and quantitative scientific mapping based on bibliometrix and VOSviewer, this article generated new insights about the

²³ See for example Barclays (2021): <https://home.barclays/content/dam/home-barclays/documents/investor-relations/reports-and-events/annual-reports/2021/Barclays-TCFD-Report-2021.pdf> or Lloyds (2021): <https://www.lloydsbankinggroup.com/assets/pdfs/investors/financial-performance/lloyds-banking-group-plc/2021/q4/2021-lbg-climate-report.pdf>.

development of the risk disclosure literature over a wide timespan of more than 20 years of empirical research.

Applying a content analysis, the papers were clustered according to typical risk categories in the field of banking – as well as according to regulatory and constitutive drivers for research motivation.

With a total of 30 papers, empirical contributions with a broad holistic view of risk-reporting –without restriction to one risk type – predominate in the sample. Among the papers with a single focus on one risk category, market and interest rate risks disclosures (11 paper) predominate before operational risk disclosures (10 paper) and credit risk disclosures (10 paper). Articles on liquidity risks are underrepresented in the sample with a total of two contributions.

The papers examined, with a focus on accounting regulation, primarily analyzed related research on the International Accounting Standards Board's IFRS 7 and the SEC's FRR No. 48. The empirical literature regarding the assessment of the impact of accounting standards on risk-reporting is controversial. First, an improvement in disclosure quality can be specified by the first-time application of accounting standards, although in some cases country-specific factors counteract this effect. Moreover, an improvement in the disclosure of derivative financial instruments is needed- regardless of the standard setters.

Studies focusing on the regulatory approach primarily investigated the impact of the voluntary and mandatory adoption of the Basel Pillar 3 Regulation. In summary, a very heterogeneous disclosure practice can be observed. Especially, early studies showed low compliance in disclosure with the BCBS standards and low disclosure quality in general. Studies on bank stress testing can be identified as a further key theme of regulatory studies. Particularly in Europe, it can be observed that stress test participants voluntarily disclose more information than non-stress test participants.

As a result of the management approach, it can be showcased that corporate governance criteria significantly influence disclosure. In addition to the characteristics and composition of the board of directors, Sharia governance significantly influences risk-reporting, especially in the Islamic world.

The results of the content analysis can be validated on a quantitative basis using bibliometric analysis. The results of both the thematic map and the co-occurrence analysis reveal a high degree of validation. Here, too, corporate governance is identified as a *motor theme*. For further scientific research, it should be noted that new types of disclosure analyses using text-mining were identified as an emerging theme. Further research is needed on the impact of revised accounting standards such as IFRS 9 and the amended Basel Pillar 3 framework. In addition to

the use of innovative methods such as text-mining, it is also advisable to look at current regulatory trends such as sustainable finance and the resulting risks, including the impact on risk-reporting.

The procedure of an SLR is also subject to various limitations. In addition to the keywords chosen as part of the search strategy, the selected databases can also bias the results. Although the common economic databases and a snowball search were used, complete coverage of the literature cannot be guaranteed – even with this strategy. Following Tranfield et al. (2003) and Booth et al. (2016), only journals that have been listed as at least C in the VHB and ABDC or 2 in the ABS ranking are included. Additionally, the literature review does not consider “grey literature.” By choosing alternative rankings or by waiving the quality threshold, the sample could be increased.

As an additional analysis step, the paper employs a bibliometric analysis using the R application Bibliometrix based on the Clarivate Web of Science database. This selection is also subject to restrictions. In a follow-up study, it is recommended to perform the search based on the Elsevier Scopus database.

Primary field of journal, journal title	ABS	ABDC	VHB	2002	2003	2004	2005	2006	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
The International Journal of Accounting	3	A	B			1											1							2
International Journal of Business & Society	/	C	/																	1				1
International Journal of Disclosure and Governance	2	B	/																1					1
Journal of Corporate Accounting & Finance (Wiley)	/	B	/																	1				1
Applied Economics																								1
The North American Journal of Economics and Finance	2	B	/																	1				1
Economics																								3
Journal of Financial Economics	4*	A*	A+																			1		1
Managerial and Decision Economics	2	B	B				1																	1
Quarterly Review of Economics and Finance	2	B	B																	1				1
Finance																								33
Annals of Finance	/	B	/																		1			1
Global Finance Journal	/	A	/																		1			1
International Journal of Finance & Economics	3	B	/																		1	2		3
International Journal of Financial Services Management	/	C	/						1															1
International Review of Finance	/	A	/																		1			1
International Review of Financial Analysis	3	A	/											1								1		2
Journal of Banking & Finance	3	A*	A								1						1		1					3

Primary field of journal, journal title	ABS	ABDC	VHB	2002	2003	2004	2005	2006	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
Journal of Banking Regulation (formerly: Journal of International Banking Regulations)	2	C	/	1	1			2				1							1			1		7
Journal of Financial Intermediation	4	A*	A					1											1					2
Journal of Financial Regulation & Compliance	1	C	/					1				1					1				1			4
Journal of International Financial Markets, Institutions and Money	3	A	n.R.																			1		1
Journal of Operational Risk	2	C	/																			1		1
Journal of Risk	2	B	B					1																1
Pacific-Basin Finance Journal	2	A	/																		1			1
Qualitative Research in Financial Markets	1	B	n.R.											1										1
Research in International Business and Finance	2	B	/																1					1
Review of Quantitative Finance & Accounting	3	B	B																		1	1		2
Management																								4
Corporate Governance (Oxford)	/	A	C														1							1
Public Money & Management	2	B	C																			1		1
International Business and Economics Research Journal	/	/	C						1															1
International Journal of Organizational Analysis	1	B	/										1											1
Total				2	1	3	2	5	2	1	1	2	1	3	1	1	7	1	6	6	9	13	2	69

This table describes the bibliographic distribution of each paper by journal and year. The journals are ranked according to ABS, ABDC and VHB.

Appendix 2.2 summarizes the most frequently cited references in the sample of the bibliometric analysis. With a total of 17 citations, the paper on overall risk-reporting by Linsley and Shrives (2006) is the most frequently cited article. The article on operational risk by Barakat and Hussainey (2013) and the article on principal-agent theory by Jensen and Meckling (1976) follow it with a total of 15 citations.

Appendix 2.2: Top 20 – Most Local Cited References according to Bibliometric Analysis

Cited References	DOI	Citations
Linsley and Shrives (2006), BRIT ACCOUNT REV	10.1016/J.BAR.2006.05.002	17
Barakat and Hussainey (2013), INT REV FINANC ANAL	10.1016/J.IRFA.2013.07.002	15
Jensen and Meckling (1976), J FINANC ECON	10.1016/0304-405X(76)90026-X	15
Nier and Baumann (2006), J FINANC INTERMED	10.1016/J.JFL.2006.03.001	13
Beretta and Bozzolan (2004), INT J ACCOUNTING	10.1016/J.INTACC.2004.06.006	12
Abraham and Cox (2007), BRIT ACCOUNT REV	10.1016/J.BAR.2007.06.002	11
Healy and Palepu (2001), J ACCOUNT ECON	10.1016/S0165-4101(01)00018-0	11
Linsley et al. (2006a), J BANK REGUL	10.1057/PALGRAVE.JBR.2350032	11
Botosan (1997), ACCOUNT REV	www.jstor.org/stable/248475	10
Helbok and Wagner (2006), J RISK	10.21314/JOR.2006.140	9
Jorion (2002), ACCOUNT REV	10.2308/ACCR.2002.77.4.911	9
Linsmeier et al. (2002), ACCOUNT REV	10.2308/ACCR.2002.77.2.343	9
Ntim et al. (2013), INT REV FINANC ANAL	10.1016/J.IRFA.2013.07.001	9
Pérignon and Smith (2010), J BANK FINANC	10.1016/J.JBANKFIN.2009.08.009	9
Aebi et al. (2012), J BANK FINANC	10.1016/J.JBANKFIN.2011.10.020	8
Bischof (2009a), ACCOUNT EUR	10.1080/17449480903171988	8
Cabedo and Tirado (2004), ACCOUNT FORUM	10.1016/J.ACCFOR.2003.10.002	8
Dobler (2008), INT J ACCOUNT	10.1016/J.INTACC.2008.04.005	8
Dobler et al. (2011), J INT ACCOUNT RES	10.2308/JIAR-10081	8
Haniffa and Cooke (2002), ABACUS	10.1111/1467-6281.00112	8

This table describes the most frequent local cited references in the selected sample based on the Clarivate Web of Science database using bibliometrics.

Appendix 2.3: General Risk Disclosure in Chronological Order

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Poshakwale and Courtis (2005)	Managerial and Decision Economics	Disclosure → Cost of equity capital	Content analysis, self-created disclosure index (risk management as a sub-element) and hypothesis testing based on OLS regression	135 Banks, 1995-1999	Australia, USA, Europe,	<ul style="list-style-type: none"> - level of disclosure esp. risk disclosure is associated with a decrease in cost of equity capital - stronger effect due to higher disclosure levels at European banks
Linsley et al. (2006a)	Journal of Banking Regulation	Risk Disclosure → Decision usefulness	Content Analysis, coding scheme in accordance with Basel Pillar 3 (sentence Count) and univariate hypothesis testing	18 Banks, 2001	Canada, UK	<ul style="list-style-type: none"> - „positive association between levels of risk disclosure and both bank size and the number of risk definitions“ (Linsley et al., 2006a, p. 280) - „quantitative and future risk information, are disclosed much less often than qualitative and past information.“ (Linsley et al., 2006a, p. 280)
Nier and Baumann (2006)	Journal of Financial Intermediation	Market Discipline → Bank risk taking incentives	Self-constructed disclosure index based on Bankscope database, regression analysis based on two-stage least squares regression (2SLS) and FGLS	729 Banks, 1993-2000	Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, Finland, France, Germany, Greece, Hong Kong, Indonesia, Ireland, Israel, Italy, Japan, South Korea, Malaysia, Netherlands, Norway, Poland, Portugal, Singapore, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, UK, USA	<ul style="list-style-type: none"> - „Our results suggest that government safety nets result in lower capital buffers and that stronger market discipline resulting from uninsured liabilities and disclosure results in larger capital buffers, all else equal. While our results therefore point to the effectiveness of market discipline mechanisms in general, we also find that the effect of disclosure and uninsured funding is reduced when banks enjoy a high degree of government support. Our results finally suggest that while competition leads to greater risk taking incentives, market discipline is more effective in curbing these incentives in countries where competition among banks is strong.“ (Nier & Baumann, 2006, p. 332)

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Bischof (2009a)	Accounting in Europe	Risk Disclosure → First-time adoption effect of IFRS 7; disclosure quality	Content analysis, page numbers as proxy for disclosure quality, univariate analysis	171 Banks, 2006-2007	Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK	<ul style="list-style-type: none"> - increase in the total level of disclosure in the year of first-time adoption of IFRS 7 - „the focus of disclosures has shifted from market risk exposures to credit risk exposures “ (Bischof, 2009, p. 167) - increase in voluntary disclosure of operational risk
Oliveira et al. (2011b)	Journal of Banking Regulation	Risk Disclosure → Decision usefulness	Content analysis, self-constructed disclosure index, descriptive analysis	190 Banks, 2006	Portugal	<ul style="list-style-type: none"> - no increased transparency due to application of IFRS 7 in Portugal - weaknesses in disclosures on mandatory minimum disclosures on market risk, liquidity risk and risk management objectives and policies, as well as in voluntary disclosures on operational risk, capital structure and capital adequacy - only credit risk disclosure meets minimum disclosure requirements - high heterogeneity in risk disclosure reduces the possibility of cross-sector comparability
Maffei et al. (2014)	Managerial Auditing Journal	Risk Disclosure → Decision usefulness, differences between annual report and Pillar 3 risk reporting	Content analysis, sentence count, hypothesis testing based on OLS regression	66 Banks, 2011	Italy	<ul style="list-style-type: none"> - „Italian banks formally comply with the Bank of Italy’s instructions, but there is discretion to choose the characteristics of the information provided. Despite different risk categories to disclose in each report, disclosure is quite uniform, although banks tend to provide denser information in the notes to the financial statements and the difference in the economic signs between the two reports decreases as the level of risk increases.“ (Maffei et al., 2014, p. 621)

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Elbannan and Elbannan (2015)	Journal of Accounting, Auditing & Finance	Risk Disclosure → Operational performance and market valuation	Content analysis, self-constructed CRD, LRD, MRD, IRD risk disclosure index and an aggregated risk disclosure index following Nier and Baumann (2004), hypothesis testing, and regression analysis based on OLS and a two-stage least squares regression (2SLS)	50 Banks, 2002-2008, and 32 Banks 2009-2011	Egypt	- „higher risk disclosure is associated with higher operating performance and market valuation in a sample of Egyptian banks.“ (Elbannan & Elbannan, 2015, p. 181)
Fiechter and Zhou (2016)	International Journal of Accounting	Disclosure → Greek Sovereign Debt Crisis, Cost of Capital, Stress Test Participation	Content analysis, page count, Hypotheses testing and regression analysis (OLS)	172 Banks, 2009-2011	Austria, Belgium, Bosnia-Herzegovina, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, UK	- „First, we find that European banks increase the length of their annual reports from 2009 to 2011, in particular, the risk reporting section. The increase in risk disclosure is mainly attributable to enhanced disclosure on credit risk, including information about any direct exposure to the European sovereign debt crisis. Our cross-sectional results show that the increase in length of either the annual report or the risk report is positively associated with the bank-specific cost of capital shock. Second, we find that the increase in risk disclosure mitigates the cost of capital shock, whereas the increase in the length of the annual report does not help reduce the cost of capital.“ (Fiechter & Zhou, 2016, p. 85)
Nahar et al. (2016a)	International Journal of Accounting & Information Management	Risk disclosure → Cost of capital and bank performance	Content analysis, self-constructed risk disclosure index based on IFRS 7 and Basel II: Pillar 3, hypothesis testing based on three-stage least-squares (3SLS) regression	30 Banks, 2006-2012	Bangladesh	- Negative association between the cost of capital and the quality of risk disclosure - lower quality of risk reporting at banks with high performance (measured as ROA) et vice versa

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Nahar et al. (2016b)	Asian Review of Accounting	Risk Disclosure → Determinants	Content analysis, self-constructed disclosure index (disclosure of sub-indices: MRD, CRD LRD, ORD, ERD), hypothesis testing based on Pooled OLS Regression	30 Banks, 2007-2012	Bangladesh	<ul style="list-style-type: none"> - “implementation of IFRS 7 and Basel II: market discipline standards in a non-mandated environment raised the extent of risk disclosure in every category of financial institution risk (market, credit, liquidity, operational and equities“ (Nahar et al., 2016b, p. 426) - significant determinants for RD: number of risk committees (+), leverage (+), risk management department (0/1) (+), board size (+) and Big4 (0/1) (+)
Nahar et al. (2016c)	Managerial Auditing Journal	Risk Governance → Accounting- and market-based performance	Content analysis, self-constructed disclosure index, Risk disclosure as risk governance proxy, Hypothesis testing based on pooled OLS regression	30 Banks, 2006-2012	Bangladesh	<ul style="list-style-type: none"> - significant determinants for accounting-based (ROA, ROE) and market-based performance measures (Tobin’s Q): risk disclosures (+), number of risk committees (+) and risk management department (0/1) (+)
Samanta and Dugal (2016)	Journal of Financial Regulation and Compliance	Basel II Risk Disclosure → Disclosure Quality, bank performance and risk governance	Content Analysis, Sentence Count of Basel II Disclosure Reports and Correlation Analysis	38 Banks, 2012-2013	India	<ul style="list-style-type: none"> - „The assessment shows that while the majority of the disclosure across banks focuses on credit risk and capital adequacy ratios, the total quantity of disclosure varies significantly across banks. Of the three broad risk categories (market, credit and operational), operational risk disclosure is the least, with minimal to no disclosure on several key aspects of operational risk, suggesting that operational risk issues are likely to emerge as an area of concern among Indian banks.“ (Samanta & Dugal, 2016, p. 453) - significant determinants for regulatory disclosures: asset size (+), net income (+)
Maingot et al. (2018)	International Journal of Disclosure and Governance	Level of Risk Disclosure → Financial Crisis	Content Analysis and descriptive analysis	118 Banks, 2007-2008	Canada, USA	<ul style="list-style-type: none"> - small increase in the level of risk disclosure from 2007-2008 - small level of disclosure of risk management strategy

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Elamer et al. (2019)	Accounting Forum	Risk Disclosure → Sharia Supervisory and Corporate Governance	Self-constructed disclosure index and hypothesis testing (Fixed Effects, 3SLS, GMM)	100 Banks, 2006-2013	Bahrain, Egypt, Jordan, Iraq, Kuwait, Lebanon, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Syria, Tunisia, UAE	- significant determinants for level of RD: sharia supervisory board (+), ownership structure (+), Anti-Corruption Regulation (+)
Wei et al. (2019a)	The North American Journal of Economics and Finance	Forward Looking Textual Risk Disclosure → Bank Risk Aggregation	Content analysis, semi-supervised text mining analysis of Risk Factor Disclosures, descriptive analysis	153 Banks, 2010-2017	USA	- the analysis of forward-looking textual risk disclosures leads to a misleading derivation of the risk exposure in the sample - „In comparing total risks with and without forward-looking textual risk disclosures, our empirical results show that disregarding forward-looking textual risk disclosures overestimates the total risk of 2010–2013 while under-estimating the total risk of 2014–2017“ (Wei et al., 2019a, p. 1)
Wei et al. (2019b)	Accounting & Finance	Risk Factor Analysis → Identification and Importance	Content analysis, semi-supervised text mining analysis of Risk Factor Disclosures, descriptive analysis	2189 SEC 10-K, 2010-2016	USA	- „we found that the top 3 most important risk factors whose cumulative importance approached 50 percent are non-financial risk factors, i.e. regulation, strategy and management operation. Moreover, by analysing the annual change in risk factor importance, our empirical results show that the risk factors of strategic, political and reputation have become increasingly important, which reflects that practitioners and regulators should put more emphasis on the management of these risk factors.“ (Wei et al., 2019b, p. 1553)

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Grassa et al. (2020)	Pacific-Basin Finance Journal	Risk Disclosure → Credit Rating	Content analysis sentence count, hypothesis testing, and regression analysis (ordered logit)	169 Banks, 2009-2014	Bahrein, Egypt, Jordan, Saudi Arabia, Kuwait, Malaysia, Pakistan, Qatar, Tunisia, Turkey, UAE, Oman	- "banks with high credit rating scores were keen to preserve an upper level of credit risk transparency when compared to banks with lower credit ratings. Moreover, the positive association between credit rating and risk disclosure is more pronounced for conventional banks than for Islamic banks. When compared to conventional banks, Islamic banks disclose less risk information due to the risk nature of their businesses, which affect in turn their credit ratings." (Grassa et al., 2020, p. 1)
Nahar et al. (2020)	International Journal of Accounting and Information Management	Risk Disclosure → Risk Governance Characteristics	Content analysis, self-constructed risk disclosure index, hypothesis testing and regression analysis (Pooled OLS)	30 Banks, 2006-2015	Bangladesh	- significant risk governance determinants for level of RD: number of risk committees (+), risk management department (0/1)(+)
Wang et al. (2020)	International Review of Finance	Risk Disclosure → banks' risk taking and disclosure behavior	Content analysis, Self-constructed risk disclosure index, hypothesis testing and regression analysis (OLS)	90 Banks, 2010-2015	China	- "compliance with the Regulation through a higher risk disclosure index improves bank soundness. We also find that the component of the risk disclosure index associated with risk compensation is the main driving factor of our findings." (Wang et al., 2020, p. 973)
Giner et al. (2020)	Accounting in Europe	Risk Disclosure → Value Relevance for Investors	Content analysis, self-constructed risk disclosure index according to IFRS 7 und Basel Pillar 3, hypothesis testing and regression analysis (OLS and Hierarchical Linear Model)	509 Bank Year Observations, 2007-2014	France, Germany, Italy, Spain, UK	- „Our results confirm a significant and positive association between financial risk disclosure and market prices, implying that this information is value relevant. Furthermore, it is important to highlight that only when disclosure is included in the model does risk measures obtained from the main financial statements become relevant. In other words, risk disclosure enhances the value relevance of traditional risk measures. Besides, our results suggest that investors pay attention to the strength of the bank authority when using bank risk disclosures." (Giner et al., 2020, p. 131)

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Guillemín and Semenova (2020)	Annals of Finance	Risk Disclosure → Interbank Market	Disclosure Index based on S&P Database; hypothesis testing based on GMM regression	179 Banks, 2004-2013	Russia	- “larger but riskier banks—at least in terms of credit risk—behave more transparently and disclose more” (Guillemín and Semenova, 2020, p. 219)
Shabestari et al. (2020)	Review of Quantitative Finance & Accounting	Risk Factor Analysis → Characteristics	Content analysis, textual analysis with Python-Script, 10K-Forms	134 Banks, 2006-2012	USA	- „We find that the average number of risk factors disclosed by the national commercial banks increased significantly from 2008 to 2009 as compared to the increase from 2006 to 2007. Additional analysis indicates that the tone of Item 1A become much more negative from 2008 to 2009 whereas there was little change between 2007 and 2008.“ (Shabestari et al., 2020, p. 649)
Weekes-Marshall (2020)	International Journal of Finance & Economics	Risk Governance Disclosure → Bank Performance	Content analysis, self-constructed risk governance disclosure index, descriptive analysis, hypothesis testing based on a non-parametric test	2 Banks, 2007-2016	Barbados	- „Disclosures were found to be general and non-standardized. Company-specific disclosures were infrequent, and annual disclosures were repetitive and symbolic. No significant relationships were discovered between corporate governance disclosures and performance. However, but bank performance indicators were found to be positively related to risk disclosures.“ (Weekes-Marshall, 2020, p. 1)
Altunbas et al. (2021)	Review of Quantitative Finance and Accounting	Risk Disclosure → European Banking Union and EU Single supervisory Mechanism (SSM)	Content analysis, quantitative disclosure index (coding based on self-created financial dictionary), Hypothesis testing based on Difference-in-Difference	225 Banks (75 SSM, 150 Control Group), 2012-2017	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, UK	- “The main findings are that bank risk disclosure increased overall following BU but there was a weakening of disclosure by SSM-supervised banks relative to banks supervised by national authorities. We also find that the over-all positive effect of the BU on bank disclosure is stronger for less profitable banks and in the most troubled economies of the Eurozone (GIPSI countries), while the negative effect on centrally supervised banks is stronger if bank CEOs act also as chairmen (CEO duality).” (Altunbas et al., 2021, p. 1)

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Azim and Nahar (2021)	Public Money & Management	Risk Disclosure → Government-Ownership	Qualitative Interviews	35 Interviews	Bangladesh	- "our interview data demonstrated that risk disclosure practices are still at a low level, but they are gradually increasing. Management had a positive attitude to risk disclosure. The interviewees stated a lack of professionalism among various government institutions leading to a low level of risk disclosure. Evidence shows that both formal and informal coercive pressures can be the driving force for risk disclosure practices." (Azim & Nahar, 2021, p. 6)
Grassa et al. (2021a)	Journal of Financial Reporting and Accounting	Risk Disclosure → Ownership	Content analysis, self-constructed risk disclosure index based on sentence counts and hypothesis testing based on GLS and GMM regression	71 Banks, 2009-2014	Bahrain, Egypt, Jordan, Kuwait, Malaysia, Pakistan, Qatar, Saudi Arabia, Tunisia, Turkey, UAE	- „the level of risk disclosure is lower for Islamic banks with higher ownership concentration, leveraged bank, listed banks and Islamic banks. However, risk disclosure is higher for Islamic banks with higher concentration of profit sharing investment account (PSIA) and higher foreign ownership, large Islamic banks, aged banks, Islamic banks operating in country with higher country transparency index, positively correlated to gross domestic products and Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) adoption.“ (Grassa et al., 2021a, p. 369)
Grassa et al. (2021b)	International Journal of Finance & Economics	Risk Disclosure → Determinants	Content analysis, sentence count, Coding Grid: Categories based on IFRS 7, Basel 2 Pillar 3, AAOIFI and IASB standards, hypothesis testing and regression analysis (3SLS)	169 Banks, 2009-2014	Bahrain, Jordan, Kuwait, Malaysia, Pakistan, Qatar, Saudi Arabia, Tunisia, Egypt, Turkey and United Arab Emirates	- "The RRD index shows that Islamic banks disclose less information about risk comparing to conventional banks. " (Grassa et al., 2021b, p. 1) - significant determinants for RD: Listed banks (+), bank size (+), bank age (+), Block holders (-), foreign ownership (-) and board size (-), board independence (+), foreign directors % (+), Tier1 capital (-)

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Nahar and Jahan (2021)	Accounting in Europe	Risk Disclosure → Bank Performance; and the Moderating Effect of Risk Committee	Content Analysis, Self-Constructed Risk Disclosure Index, Hypothesis Testing based on OLS, Random Effects, 3SLS	160 Banks, 2006-2016	Global (no specific)	- „we find that risk disclosure and risk committees are associated with a bank’s overall performance. In addition, the findings suggest that the composition of a risk committee moderates the relationship between risk disclosure and bank performance.” (Nahar & Jahan, 2021, p. 378)
Bischof et al. (2022)	Contemporary Accounting Research	Risk Disclosure → IFRS 7 and Pillar 3 Compliance	Content Analysis, Self-constructed Risk Disclosure Index and Bid-Ask Spreads, Difference-in-Difference Regression Analysis and Event Study	216 Banks, 2005-2009	Australia, Austria, Bahrain, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Kuwait, Lichtenstein, Lithuania, Malta, Mauritius, Netherlands, Norway, Oman, Poland, Portugal, Romania, Saudi Arabia, Singapore, Slovakia, South Africa, Spain, Sweden, Switzerland, United Arab Emirates, United Kingdom, Barbados, China, Croatia, Georgia, Iceland, Jamaica, Jordan, Kazakhstan, Kenya, Lebanon, Moldova, Qatar, Russia, Saint Kitts and Nevis, Serbia, Togo, Turkey	- “We find that banks substantially increase their formal risk disclosures upon the adoption of Pillar 3 even if they already had to comply with the same requirements under IFRS 7. The effects are stronger if the central bank is responsible for bank supervision and bank regulators are equipped with more supervisory resources, but are less pronounced if the securities market regulator is an independent entity. In turn, banks facing more market pressures are more compliant with the rules. We further find persistent liquidity benefits of the increased risk disclosures but only after Pillar 3 became effective and its compliance was enforced by the banking regulator. Our results suggest that formal and material compliance with risk disclosure regulation are a function of both the resources of the supervisory agency and its incentive alignment with the regulated firms. In our setting, the banking regulator seems more effective in fulfilling this role.” (Bischof et al., 2022, p. 1)

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Haddad and Alali (2022)	Journal of Islamic Accounting and Business Research	RD → Level of RD; and Financial Performance	Content Analysis, Sentence Count, hypotheses testing based on univariate test and Random Effects Panel Data Model	30 Banks, 2007-2014	Kuwait, Qatar, Saudi Arabia, UAE, Bahrain	- “The study shows no significant differences between the RD reported in the annual reports of CBs and that of IBs. On average, a CB reported 234 sentences while an IB disclosed 244 sentences of RD in its annual report. The authors also find that both types of banks had an upward trend over the periods. While the means of RD reported by CBs have significantly improved over the period, the RD reported by IBs has not. Similar results are also found when the authors compared the RD pre- and post-financial crisis period. Finally, the authors find that there is a significant association between RD and both models of financial performance (ROA and ROE) for IBs, after controlling other variables. However, RD has a significant association with only ROE for CBs.” (Haddad & Alali, 2022, p. 54)

This table describes publications within the sub-cluster *General Risk Disclosure* in chronological order.

Appendix 2.4: Market Risk and Interest Risk Disclosure in Chronological Order

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Findings
Jorion (2002)	The Accounting Review	VaR Disclosure → Predictive power of disclosed information (trading revenues)	Value at Risk data from annual reports converted to quarterly data; regression analysis (Pooled OLS/GLS and Seemingly Unrelated Regression, Fama-MacBeth Two-Step Regression)	8 Banks, 1995Q1-2000 Q3	USA	- „VAR disclosures are informative in that they predict the variability of trading revenues. Thus, analysts and investors can use VAR disclosures to compare the risk profiles of banks' trading portfolios.“ (Jorion, 2002, p. 911)
Ahmed et al., (2004)	The International Journal of Accounting	MRD → Interest Rate Gap disclosures in bank call reports	Interest Rate Gaps, regression analysis (OLS)	Archival, 1990-1997	USA	- „tabular disclosures are finer than maturity-gap data, our findings mitigate concerns about the usefulness of the SEC's market-risk-disclosure requirements“ (Ahmed et al., 2004, p. 223)
Liu et al. (2004)	Review of Accounting Studies	VaR Disclosure → Predictive Power of disclosed information (trading revenues)	VaR Model according to Jorion (2004), regression analysis (OLS)	17 Banks, 1997 Q1 – 2002 Q2	USA	- „banks' trading VaRs have predictive power for trading income variability that increases with bank technical sophistication and over time. We find that banks' trading VaRs have predictive power for a bank-wide measure of total risk, return variability, and for two bank-wide measures of priced risk, beta and realized returns.“ (Liu et al., 2004, p. 265)
Chipalkatti and Datar (2006)	Journal of Financial Regulation and Compliance	VaR Disclosure → Abnormal Returns and Trading Volume	Trading Value at Risk data from annual reports, event study and hypothesis testing based on a pooled seemingly unrelated regression (SUR)	13 Banks, 1998	USA	- „no association between the TVAR disclosed by a bank and the magnitude of the abnormal returns and volume reaction.“ (Chipalkatti & Datar, 2006, p. 183) - „The evidence indicates that these disclosures do not provide useful information to average investors in times of a banking crisis and will not help moderate panic reactions by investors in such times“ (Chipalkatti & Datar, 2006, p. 183)

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Findings
Pérignon and Smith (2010)	Journal of Banking and Finance	VaR Disclosure → Disclosure Level and accuracy	Self-constructed Value at Risk Disclosure Index, descriptive analysis and GARCH models of daily trading revenues	50 Banks, 1996-2005	USA, Canada, UK, Switzerland, France, Germany, Netherlands, Italy, Japan, China, Spain, Hong Kong, Australia	<ul style="list-style-type: none"> - „we find an overall upward trend in the quantity of information released to the public. We also find that Historical Simulation is by far the most popular VaR method.“ (Pérignon & Smith, 2010, p. 362) - „Unlike the level of VaR disclosure, the quality of VaR disclosure shows no sign of improvement over time. We find that VaR computed using Historical Simulation contains very little information about future volatility.“ (Pérignon & Smith, 2010, p. 362)
Savvides and Savvidou (2012)	International Journal of Organizational Analysis	MRD → Disclosure Quality and Determinants	Content analysis, self-constructed risk disclosure index, hypothesis testing based on regression analysis (OLS)	30 Banks, 2008	USA, Canada, UK, Germany, Japan, Italy, Netherlands, France, Greece and Cyprus	<ul style="list-style-type: none"> - „there are still significant differences across banks in different countries, meaning that there is no harmonization in disclosure practices; that the banks in the Anglo-Saxon countries (UK and USA) are consistently better in their overall risk reporting practices; that the banks that are “good” in reporting qualitative information are also “good” in reporting quantitative information on risk types; OLS regression analysis and correlation analysis point to a positive association between bank size (as measured by the market capitalization) and the level of risk reporting.” (Savvides & Savvidou, 2012, p. 379)
Al-Hadi et al. (2016)	Corporate Governance (Oxford)	Corporate Governance → MRD	Content Analysis, self-constructed Market Risk Disclosure Index, hypothesis testing based on regression analysis (OLS, 2SLS)	298 Banks, 2007-2011	Bahrain, KSA, Kuwait, Oman, Qatar, UAE	<ul style="list-style-type: none"> - existence of a risk committee has a positive association on the level of MRD, esp. for mature stage firms - qualification and size of the risk committee has a positive association on MRD
Scannella Polizzi (2018)	Journal of Banking Regulation	Market Risk Disclosure → Quantitative and qualitative Disclosure	Content Analysis, self-constructed disclosure index, descriptive analysis	4 Banks, 2012-2015	Spain, France, Germany, Italy	<ul style="list-style-type: none"> - high heterogeneity in disclosure of quantitative and qualitative information in the sample - Over the sampling period, there has been an alignment in the disclosure of market price risk

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Findings
Al-Hadi et al. (2019)	Quarterly Review of Economics and Finance	Corporate Governance → MRD	Content Analysis, self-constructed Market Risk Disclosure Index according to Pérignon/Smith (2010), hypothesis testing and regression analysis (OLS, Fixed Effects)	2007-2011, 596 firm-year observations	Bahrain, KSA, Kuwait, Oman, Qatar, UAE	- „the level of market risk disclosure is positively and significantly associated with the strength of a firm’s corporate governance structure. “ (Al-Hadi et al., 2019, p. 136)
Polizzi and Scannella (2020)	Journal of Financial Regulation and Compliance	Market Risk Disclosure → Disclosure quality	Content Analysis, self-constructed disclosure index, descriptive analysis	10 Banks, 2012-2015	Italy	- „The results show that banks do not fully exploit the potentialities of management commentary and Pillar 3 disclosure report. Various areas of information overlapping between the different financial reports worsen the overall comprehensibility and relevance of bank risk reporting. “ (Polizzi & Scannella, 2020, p. 465)
Campbell et al. (2021)	Accounting & Finance	VaR Disclosure → Disclosure level and quality	VaR Disclosure Index according to Pérignon and Smith (2010), descriptive and univariate, analysis and GARCH models	4 Banks, 2005-2014	Australia	- “We find that the actual VaR estimates produced by banks are generally rejected by standard backtesting procedures. During quiet periods bank VaRs are too high, while during high volatility stress periods bank VaRs are too low.” (Campbell & Smith, 2021, p. 1)

This table describes publications with the sub-cluster *Market and Interest Risk Disclosure* in chronological order.

Appendix 2.5: Operational Risk Disclosure in Chronological Order

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample	Country of Research	Main Findings
Helbok and Wagner (2006)	Journal of Risk	ORD → Voluntary Disclosure and Determinants	Content analysis, self-constructed disclosure index, word and page Count; hypothesis testing based on regressions analysis (Random Effects) Ordered logit Model	59 Banks, 1998-2001	Asia, Europe, North America	<ul style="list-style-type: none"> - significant increase of level und quality of banks' operational risk disclosure - significant determinants for level and quality of ORD: equity ratio (-), profitability (-)
Linsley and Kajuter (2008)	International Journal of Financial Services Management	Reputational Risk → Legitimacy Theory	Content analysis and case study	1 Bank 2001	UK	<ul style="list-style-type: none"> - „the findings from the case analysis also indicate that the disclosures made by Allied Irish Banks plc were not wholly effective in re-establishment legitimacy and thereby demonstrate the need for effective internal control and risk management systems that reduce the likelihood of risk events occurring in the first place.” (Linsley & Kajuter, 2008, p. 65)
Oliveira et al. (2011a)	Journal of Financial Regulation & Compliance	Voluntary ORD → Determinants	Content analysis, self-constructed disclosure index based on the sum of OpRisk, capital structure and capital adequacy sentence count and hypothesis testing based on regression analysis (OLS) and Difference in Means)	111 Banks, 2006	Portugal	<ul style="list-style-type: none"> - According to the legitimacy theory, „public visibility“ and „reputation“ (Oliveira et al., 2011a, p. 284) can be used as explanatory approaches for the disclosure of risk management reports. - significant determinants for level of ORD: size (+), bank listing (+), bank age (+), total deposits (+), regulatory capital adequacy ratio (+)
Barakat and Hussainey (2013)	International Review of Financial Analysis	ORD → Governance, Supervision	Content analysis, self-constructed operational risk disclosure index; hypothesis testing based on 2SLS,	85 Banks, 2008-2010,	Austria, Belgium, Bulgaria, Cyprus, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Malta, Netherlands, Poland, Portugal, Spain, Sweden, UK, and Lithuania.	<ul style="list-style-type: none"> - significant determinants for quality of ORD: outside directors (+), executive ownership (-), audit committee meeting freq. (+)

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample	Country of Research	Main Findings
Adelopo (2017)	Australasian Accounting Business & Finance Journal	Non-Financial Reporting → Bank Performance	Software supported Content analysis (KWIC Analysis); hypotheses testing based on Random Effects Panel Data Regression	4 Banks, 1998-2008	United Kingdom	- „significant negative relationship between extent of historic narrative disclosures and current and future firm performance, and a significant positive relationship between forward looking narrative risk disclosures and both current and future firm performance. Additional analysis shows that optimistic and pessimistic narrative risk disclosures are not significant in explaining current and future firm performance for these firms.“ (Adelopo, 2017, p. 23)
Neifar and Jarbouï (2018)	Research in International Business and Finance	ORD → Corporate Governance	Content analysis, self-constructed disclosure index following Helbok and Wagner (2006) and Barakat and Hussainey (2013), hypothesis testing based on GLS Panel Data Regression	34 Banks, 2008-2014	Abu Dhabi, Bahrain, Dubai, Iran, Jordan, Kuwait, Malaysia, Qatar, Saudi Arabia, UAE, Malaysia	- significant CG determinants for level of ORD: independent directors (+), Shariah Supervisory Board (+) and Big4 (0/1) (+)
Heidinger and Gatzert (2018)	Journal of Banking & Finance	Reputational Risk Disclosure → Determinants and Firm Valuation	Text mining approach, regression analysis based on Cox hazard, logistic regression and fixed effects	52 Banks, 30 Insurers, 2006-2015	USA, Europe	- „the awareness of reputation risk (management) as reflected in annual reports has increased during the last ten years and that it has gained in importance relative to other risks. Furthermore, we provide the first empirical study of the determinants and value of reputation risk management. Our results show that larger firms, as well as firms that are located in Europe and have a higher awareness of their reputation, are significantly more likely to implement a reputation risk management program. Finally, we obtain initial indications of the value-relevance of reputation risk management.“ (Heidinger & Gatzert, 2018, p. 106).

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample	Country of Research	Main Findings
Karyani et al. (2019)	International Journal of Business & Society	Operational Risk Disclosure → Risk Governance	Content analysis, self-constructed Operational Risk Disclosure Index according to Helbok and Wagner (2006) and Barakat and Hussainey (2013) and Risk Governance Index; hypothesis testing based on Feasible Generalized Least Squares (FGLS).	57 Banks, 2010-2014	Indonesia, Malaysia, Philippines, Singapore, and Thailand	- risk governance is positive associated with operational risk disclosure
Elamer et al. (2020)	Global Finance Journal	Operational Risk Disclosure → Corporate Governance esp. Sharia Supervisory Board	Content analysis, self-constructed operational risk disclosure Index according to Helbok and Wagner (2006) and Barakat and Hussainey (2013). Hypothesis testing based on Fixed Effects Panel Data Models, 2SLS and Dynamic System GMM	63 Banks, 2006-2013	Bahrain, Egypt, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, and the UAE)	- significant determinants for level of ORD: SSB (+), block ownership (+), board independence (+), country-level governance (+).
Karyani et al. (2021)	Journal of Operational Risk	Operational Risk Disclosure → Risk Governance; and market competition	Content Analysis, self-constructed operational risk disclosure Index according to Helbok and Wagner (2006) and Barakat and Hussainey (2013). Hypothesis testing based on OLS	57 Banks, 2010-2014	Indonesia, Malaysia, Philippines, Singapore, and Thailand	- “The results of our panel data analysis show that there is a substitution effect of competition, which could reduce the adverse consequences of weak risk governance practices. However, governance factors – such as the chief risk officer’s (CRO’s) role and independence, and the risk communication system – decrease voluntary ORD quality. These findings have implications for the role of the financial regulator in using market competition as an effective mechanism to replace banks’ weak risk governance, thus encouraging banks to improve their ORD quality.” (Karyani et al., 2021, p. 61)

This table describes publications with the sub-cluster *Operational Risk Disclosure* in chronological order.

Appendix 2.6: Credit Risk Disclosure in Chronological Order

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Khambata and Hirsche (2002)	Journal of Banking Regulation	CRD → Basel Pillar 3 Compliance	Content analysis, descriptive analysis	20 Banks, 2000	Belgium, France, Germany, Italy, Netherlands, Spain, Switzerland, UK	- No bank in the sample meets all Basel Committee disclosure requirements
Khambata and Bagdi (2003)	Journal of Banking Regulation	CRD → Basel Pillar 3 Compliance	Content analysis, descriptive analysis	20 Banks, 2002	Japan	- No bank in the sample meets all Basel II credit risk disclosure requirements - Low counterparty risk disclosures between Japanese banks
Frolov (2006)	Journal of Banking Regulation	CRD → Quality of Information	Content analysis, descriptive analysis	270 Banks, 2002	Japan	- Homogeneous CRD at Japanese Banks - “generally supply market participants with sufficient information about the magnitude of losses expected from impaired credit assets. “(Frolov, 2006, p. 238) - rudimentary disclosure of forward-looking information on non-impaired assets
Bischof and Daske (2013)	Journal of Accounting Research	EU stress tests and the Eurozone sovereign debt crisis → Supervisory disclosure	Binary Risk Disclosure Proxy and Log (Bid-Ask Spread), hypotheses testing based on regression analysis (Discrete Time Logit, Fixed Effects Logit, Cox proportional hazard regression, OLS)	273 Banks and 87 Insurance, 2009 Q1-2012 Q2	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Rep., Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK	- significant increase in voluntary disclosure of sovereign risk exposures by stress test participants - positive capital market reaction (significant increase in bid-ask spreads) after publication of 2011 results

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Abbassi and Schmidt (2018)	Journal of Financial Intermediation	CRD → Asset Quality	mRWA and Credit RWA as risk reporting proxy, regression analysis (Fixed-Effects-Regression)	38 Banks, 2008 Q1 – 2012 Q4	Germany	- "We find that IRB banks report lower PDs when they have more risk exposure in their trading book (as compared to banks with lower market risk). This result is especially strong for banks that face regulatory capital constraints." (Abbassi & Schmidt, 2018, p. 82 f.)
Jones, et al. (2018)	Journal of Applied Accounting Research	CRD → Usefulness of graphical reporting	Content analysis, self-created graphical accuracy index and log (number of graphs), hypothesis testing and regression analysis (Random-Effects-Regression)	47 Banks, 2006-2010	France, Germany, Italy, Spain, UK	- Credit risk graphs „provide incremental information“ (p. 161) for users of financial statements and are therefore useful for decision-making. - banks with a higher risk profile are comparatively „less likely to use risk graphs“ (Jones et al., 2018, p. 161) - banks with a higher credit risk have a significantly higher accuracy in the presentation of the graphs
Elamer et al. (2021)	International Journal of Finance & Economics	Risk Disclosure → Credit Rating	Content analysis, self-created credit risk disclosure index, hypothesis testing based on Ordered Logistic Regression	95 Banks, 2006-2013	Bahrein, Egypt, Jordan, Lebanon, Morocco, Syria, Saudi Arabia, Kuwait, Malaysia, Pakistan, Qatar, Tunisia, Turkey, UAE, Oman	- „First, we find that risk disclosures have a predictive effect on banks' credit ratings. Second, we find that the relationship between risk disclosures and BCRs is contingent on the quality of governance structures.“ (Elamer et al., 2020a, p. 1) - significant determinants for Credit Rating informativeness: board size (+), greater independence (+), government ownership (+), Shariah supervisory board (+), block ownership (-), foreign ownership (-), CEO duality (-)

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Acheampong and Elshandidy (2021)	Journal of International Financial Markets, Institutions and Money	Credit Risk → Usefulness of textual information	Textual analysis based on supervised machine learning algorithm (LDA Model); hypothesis testing based on Repeated Measures Multi-level Analysis, OLS, Logistic Regression, GMM, Propensity Score Matching Score	145 Banks, 2005-2017	Austria, Belgium, Croatia, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, United Kingdom	- “Based on 1885 firm-year observations, we find that the text-based credit risk (soft) measure explains a substantial portion of the variation in NPLs, O-score, Z-score, and credit rating downgrades. We also find that bank-level characteristics and country-level characteristics are highly important for explaining variations in non-performing loans, O-score, and credit rating downgrades, as compared to Z-score.” (Acheampong & Elshandidy, 2021, p. 1)
Bischof et al. (2021)	Journal of Financial Economics	Credit Risk → Financial Disclosure	Textual Analysis of 8K-Fillings, and CDS-Spreads, graphical analysis, OLS and Fixed Effects Regression	20 Banks (10 USA, 10 Europe), 2007-2009	USA, Italy, Greece, Germany, Austria, France, Portugal, Netherlands	- “We show that, going into the financial crisis, banks’ disclosures about relevant risk exposures were relatively sparse. Such disclosures came later after major concerns about banks’ exposures had arisen in markets. The recognition of loan losses also was slow and delayed relative to prevailing market expectations. Among the possible explanations for this evidence, our analysis indicates that banks’ reporting incentives played a key role, which has important implications for bank supervision and the new expected loss model for loan accounting. We also provide evidence that shielding regulatory capital from accounting losses through prudential filters can dampen banks’ incentives for corrective actions.” (Bischof et al., 2021, p. 1188)
Scannella and Polizzi (2021)	Journal of Banking Regulation	CRD → Disclosure Quality	Content Analysis, self-created Credit Risk Disclosure Quality Index and Correlation-based Network Analysis	10 Banks, 2012-2017	Italy	- “the enhancements of bank credit risk disclosure scores in the period 2012–2017 are related to bank size and business model.” (Scannella & Polizzi, 2021, p. 88)

This table describes publications within the sub-cluster *Credit Risk Disclosure* in chronological order.

Appendix 2.7: Counterparty Risk and Disclosure of Financial Instruments in Chronological Order

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Woods and Marginson (2004)	European Accounting Review	Derivatives and Financial Instruments Disclosure → Usefulness of Information / Disclosure Quality	Content analysis, word count; descriptive analysis	9 Banks, 1999	UK	- „reporting practice under FRS 13 make it difficult for users to assess the nature, scope and significance of an entity’s involvement in derivatives’ activity. The reasons for this include the generic nature of the narrative disclosures, the incompleteness and lack of comparability of the numerical data, and the difficulties of combining both types of information in order to assess the banks’ risk profile.“ (Woods & Marginson, 2004, p. 374)
Yong et al. (2005)	Asian Review of Accounting	Derivatives Disclosure → Disclosure Quality and Cross-country differences	Content analysis, self-constructed disclosure index according to (BCBS and IOSCO 1999) „ <i>Recommendations for public disclosure of trading and derivatives activities of banks and securities firms</i> “; descriptive analysis	146 Banks, 2002	Australia, Hong Kong, Japan, Malaysia, New Zealand, Philippines, Singapore, South Korea, Taiwan, Thailand	- the average level of disclosure is only 35% in the sample - country differences in the level of disclosure (Max: Hong Kong; Min: Philippines)

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Trapp and Weiß (2016)	Journal of Banking and Finance	Derivatives and Securitization Disclosure → Equity Tail Risk	Content analysis, several risk disclosures proxies: derivatives intensity (number of used derivative types), VaR disclosure index according to Pérignon and Smith (2010), interest rate derivatives (0/1), foreign exchange derivatives (0/1), loan securitization (0/1); regression analysis based on OLS with Newey-West Estimators	472 Banks, 2006	USA	- „Stocks of banks that had previously disclosed a more extensive use of financial derivatives and loan securitization were more likely to experience extreme losses. Our findings are consistent with investors viewing banks that used derivatives for non-hedging purposes as highly vulnerable to the crisis. Moreover, banks which had significant securitization activities and were thus potentially exposed to under-capitalized risks from conduits possess a higher vulnerability of their equity to market downturns.“ (Trapp & Weiß, 2016, p. 183)
Scannella and Polizzi (2019)	Journal of Corporate Accounting & Finance (Wiley)	Derivatives disclosure → Disclosure quality and cross-country differences	Content analysis, self-created disclosure index; descriptive analysis	4 Banks, 2012-2017	France, Germany, Italy, Spain	- low quality in the disclosure of derivative in the Annual Reports and Pillar 3 Reports - „room for improvement in the explanations of derivative use and hedging strategies, the connections between risk exposures, hedging instruments, and strategies, as well as the effects on the financial statements.“ (Scannella & Polizzi, 2019, p. 32).

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year(s)	Country of Research	Main Finding(s)
Elshandidy and Acheampong (2021)	International Review of Fi- nancial Analy- sis	RD → Cost of capital	Content Analysis, Textual Analysis based on wordlist and Keyword Search, hy- potheses testing based on RMMA, PSM and GMM	145 Banks, 2005-2017	Austria, Belgium, Croatia, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Nor- way, Netherlands, Poland, Portugal, Romania, Spain, Sweden, Switzer- land, United King- dom	- “Our empirical evidence suggests that textual hedge disclosure significantly reduces overall banks’ cost of capital (WACC), cost of equity and cost of debt. This suggests that a significant variation in all cost of capital measures across countries within and between banks over the chosen period can be explained by our proposed measure of textual hedge disclosure. At the country level, we find that financial stress over time has significantly higher explanatory power over all cost of capital measures. Second, during the IFRS 9 period, the negative association between cost of capital and hedge disclosure remains unchanged, suggesting that the direct association found between these two variables is strengthened by the IFRS 9 period. These results suggest that hedge disclosure contain economically significant information relevant in explaining the cost of capital structure of banks.” (Elshandidy & Acheampong, 2021, p. 2)
Yamani et al. (2021)	International Journal of Ac- counting and Information Management	FI Risk Disclosure→ Cost of equity capital	Content Analysis, Self-constructed In- dex, hypotheses test- ing based on OLS, Tobit, FE, GMM	56 Banks, 2011-2017	Saudi Arabia, Ku- wait, Oman, Qatar, Bahrain, UAE	- “The authors find that the compliance level with IFRS 7 does not improve from 2011 until 2017 in the GCC banks. The authors also find that compliance with IFRS 7 disclosures reduces the COEC. “(Yamani et al., 2021, p. 528)

This table describes publications within the sub-cluster *Counterparty Risk and Disclosure of Financial Instruments* in chronological order.

Appendix 2.8: Liquidity Risk Disclosure in Chronological Order

Author(s), Year	Journal	Research Focus	Research Design, Risk Disclosure Proxy	Sample, Year	Country of Research	Main Findings
Boussanni et al. (2008)	International Business and Economics Research Journal	Basel Pillar 3 Liquidity Risk Disclosure → Level of disclosure and usefulness	Content analysis, scoring based on the "Key Liquidity Risk Management Factors (KLF)" according to (BCBS 2006); descriptive analysis	21 Banks, 2004	Belgium, Denmark, France, Germany, Italy, Netherlands, Spain, Switzerland, UK	- heterogeneity in the quality and level of liquidity risk disclosures.
Asongu (2013)	Qualitative Research in Financial Markets	Liquidity risk disclosure → Basel Pillar 3 Regulation	Qualitative content analysis and case study	20 Banks, 2010	China, France, Germany, Italy, Japan, Netherlands, Spain, Switzerland, UK, USA	- „Only 25 per cent of sampled banks provide publicly accessible liquidity risk management information “(Asongu, 2013, p. 65)

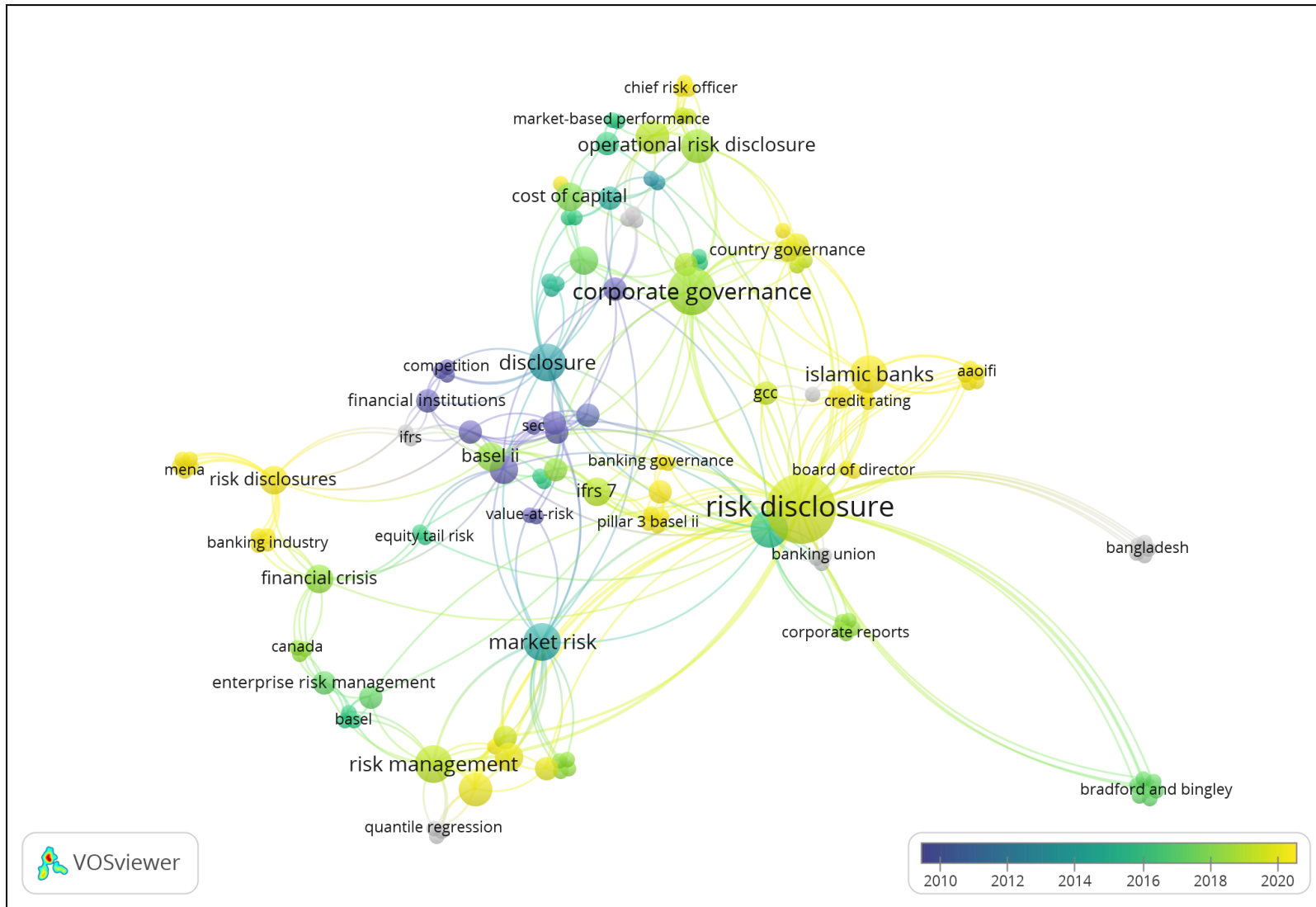
This table describes publications within the sub-cluster *Liquidity Risk Disclosure* in chronological order.

Appendix 2.9: Thematic Map based on Author's Keywords

Cluster	Callon's Centrality	Callon's Density	Rank Centrality	Rank Density
risk disclosure	3.936323529	299.4629156	9	4
market risk	1.955490196	346.8444444	4	6
basel II	2.809885621	351.1111111	7	7
financial crisis	2.800408497	428.3625731	6	9
operational risk disclosure	3.216911765	285.9375	8	3
disclosure	4.351323529	269.3055556	10	2
banks	2.586666667	383.6363636	5	8
text mining	0	333.3333333	1	5
derivatives	5.344199346	248.3333333	11	1

This table describes the thematic map based on Authors' Keywords following the bibliometrix algorithm.

Appendix 2.11: VOSviewer Co-Occurrence Author Keywords



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**Chapter 3: Environmental and Climate Risk
Disclosure von Kreditinstituten: Empirische
Evidenz der nichtfinanziellen Risikobericht-
erstattung europäischer Banken**

Environmental and Climate Risk Disclosure von Kreditinstituten: Empirische Evidenz der nichtfinanziellen Risikoberichterstattung europäischer Banken²⁴

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Abstract

Die Berücksichtigung von Nachhaltigkeitsrisiken im Risikomanagement von Kreditinstituten erfährt im Zuge der Sustainable-Finance-Bestrebungen der Europäischen Kommission eine steigende Aufmerksamkeit bei nationalen und internationalen Regulatoren sowie bei Instituten. Im Rahmen dieses Beitrages soll die freiwillige Offenlegung von Nachhaltigkeitsrisiken im Bankensektor und deren Einflussdeterminanten untersucht werden. Auf Grundlage einer ökonomischen Untersuchung werden europäische systemrelevante Banken über den Zeitraum von 2014–2017 näher betrachtet. Auf Basis der Zeitreihenanalyse zeigt sich, dass die Offenlegungsqualität von klimabezogenen Risiken (Climate Risk Disclosure) konstant angestiegen ist. Insbesondere im Geschäftsjahr 2017 kann einhergehend mit der verpflichtenden Anwendung der europäischen CSR-Richtlinie ein länderübergreifender Anstieg im Umfang der Offenlegung festgestellt werden. Im Rahmen der Untersuchung der Einflussdeterminanten lässt sich konstatieren, dass die Bildung der bilanziellen Kreditrisikovorsorge (Loan Loss Provisions) und die Umweltperformance einen negativen Einfluss auf den Umfang der Environmental Risk Disclosure-Qualität besitzt. Einen positiven Effekt auf die Environmental Risk Disclosure besitzt das Ergänzungskapital (CET2) und die Prüfung der Nachhaltigkeitsberichterstattung durch eine CSR Assurance-Leistung. Auf die Qualität der Climate Risk Disclosure besitzt ebenfalls die bilanzielle Kreditrisikovorsorge (Loan Loss Provisions) einen höchst signifikanten negativen Effekt, die Prüfung der Nachhaltigkeitsberichterstattung einen starken signifikanten Effekt.

As part of the European Commission's Sustainable Finance efforts, national and international regulators and institutions are paying increasing attention to the consideration of sustainability risks in the risk management of credit institutions. This paper examines the voluntary disclosure

²⁴ Dieser Beitrag wurde prämiert mit dem Förderpreis für den wissenschaftlichen Nachwuchs 2020 des Vereins zur Förderung der Fakultät III der Universität Siegen e.V.

of sustainability risks in the banking sector and their determinants. On the basis of an econometric study, European systemically important banks are examined in more detail over the period 2014-2017. The time series analysis shows that the disclosure quality of climate-related risks has risen constantly. In the 2017 financial year in particular, the mandatory application of the European CSR Directive has led to a cross-border increase in the scope of disclosure. The analysis of the determinants shows that the development of loan loss provisions and environmental performance have a negative impact on the extent of environmental risk disclosure quality. The supplementary capital (CET2) and the evaluation of sustainability reporting by a CSR assurance have a positive effect on environmental risk disclosure. Loan loss provisions also have a highly significant negative effect on the quality of Climate Risk Disclosure, while the CSR assurance has a strong significant effect.

Declaration: The authors of the paper, hereby declare that this paper's first author, Michael Mies, was responsible for conceptualization, methodology, investigation, data collecting and analyzing most of the data and writing most of the paper.

3.1 Einleitung

Der fortschreitende Klimawandel und die Eindämmung der Erderwärmung stellt die internationale Gemeinschaft vor zahlreichen Herausforderungen. Zur Einhaltung des Pariser Klimaschutzübereinkommens hat die Europäische Kommission den Aktionsplan „Finanzierung nachhaltigen Wachstums“ veröffentlicht und dabei den Fokus auf das Finanzwesen gelenkt. Neben einer besseren Kapitalallokation zu nachhaltigen Investitionen, adressiert der Aktionsplan insbesondere den Umgang mit Umwelt- und Klimarisiken von Finanzinstitutionen (Europäische Kommission, 2018). Banken sind durch ihre Rolle als Finanzintermediär unmittelbar und mittelbar von den Folgen des Klimawandels und dem Übergang zu einer CO₂-ärmeren Wirtschaft betroffen. Entstehende Schäden aus ungesicherten Extremwittersituationen beeinflussen die Werthaltigkeit der Financial Assets im Kreditbuch (Bank of England, 2018). Der Übergang ganzer Wirtschaftszweige zu einer CO₂-ärmeren Wertschöpfung führt unweigerlich zu Anpassungen in der finanziellen Beurteilung des Portfolios, mit zum aktuellen Stand noch unerforschten Folgen für die Finanzmarktstabilität (Joint Committee of the European Supervisory Authorities, 2018). Darüber hinaus versuchen Finanzinstitute durch Sustainable-Finance-Bestrebungen einen gesellschaftlichen Beitrag zur Veränderung in eine nachhaltige Wirtschaft zu leisten (BaFin, 2018).

Für den Kapitalmarktdressaten stellt insbesondere die Risikoberichterstattung einer Bank einen wesentlichen Informationsbaustein zur Ermittlung der Werthaltigkeit dar. Während klassische finanzielle Risiken, wie beispielsweise Marktpreisrisiken (Jorion, 2002; Pérignon & Smith, 2010), Zinsänderungsrisiken (Ahmed et al., 2004) und operationelle Risiken (Barakat & Hussainey, 2013; Helbok & Wagner, 2006) in der Fachliteratur einen hohen Stellenwert einnehmen, erscheint im Bereich der Erforschung der Offenlegung von Klima- und Umweltbezogenen Risiken noch Bedarf. Einer hohen Akzeptanz erfreuen sich aktuell die Empfehlungen der Task Force on Climate-related Financial Disclosures (TCFD, 2017) zur Offenlegung von klimabezogenen Risiken. So orientiert sich die Europäische Kommission (European Commission, 2019) und die Europäische Bank für Wiederaufbau und Entwicklung (European Bank for Reconstruction and Development (EBRD, 2019) im Rahmen ihrer aktuellen Verlautbarungen an der Definition und Systematisierung der TCFD.

Im Kontext dieses Beitrages soll die freiwillige Offenlegung von Nachhaltigkeitsrisiken im Bankensektor und deren Einflussdeterminanten unter Anwendung einer Content-Analyse untersucht werden. Auf Basis einer ökonometrischen Untersuchung werden europäische systemrelevante Banken über den Zeitraum von 2014–2017 betrachtet. Mit dem vorliegenden Beitrag wird die Forschungslücke dahingehend geschlossen, als die Offenlegung von Umwelt- und

Klimarisiken auf Homogenität, Ursächlichkeit und Kausalität speziell für kapitalmarktorientierte Banken analysiert und ausgewertet wird. Schließlich muss kritisch hinterfragt werden, ob dem (potenziellen) Investor ausreichende und vor allem vergleichbare Informationen über Klima-bezogene und damit womöglich risikoreiche Investments einer Bank vorliegen, um Entscheidungen zugunsten einer Beteiligung treffen zu können. Zudem sollen die anstehenden Forschungen und Resultate externen Standardsetzern eine Einschätzung darüber ermöglichen, ob die bestehenden Offenlegungsvorgaben der Dringlichkeit des Klimawandels gerecht werden, oder ob zusätzlicher Handlungsbedarf besteht. Nicht zuletzt kann der Beitrag Großbanken dazu animieren, nicht-finanzielle Risiken wesentlich stärker in ihre ökonomischen wie regulatorischen Kapitalkonzepte zu integrieren und diese transparent offenzulegen.

Der Beitrag ist dabei folgendermaßen untergliedert: In Kapitel 3.2 werden zunächst klimabezogene Risiken definiert und abgegrenzt. Anschließend soll ein Überblick über interne und externe Anforderungen an die klimabezogene Risikoberichterstattung gegeben werden und eine Einordnung in die traditionelle Risikoberichterstattung von Banken erfolgen. Kapitel 3.3 widmet sich der empirischen Analyse der nichtfinanziellen Risikoberichterstattung. Zunächst erfolgt die Bildung von Hypothesen zur Analyse der Einflussfaktoren. Im Anschluss soll das Forschungsdesign und die Untersuchungsmethodik dargestellt werden. Kapitel 3.4 stellt die im Rahmen der quantitativen Analyse gewonnenen Resultate dar. In Kapitel 3.5 erfolgt eine kritische Würdigung der wesentlichen Ergebnisse und eine Zusammenfassung.

3.2 Nichtfinanzielles Risikomanagement und Risikoberichterstattung von Banken

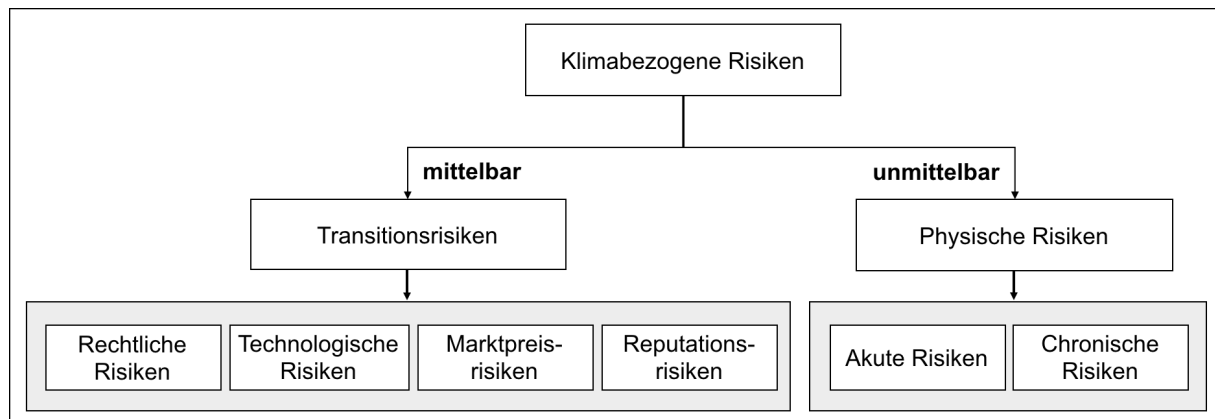
3.2.1 Definition und Management von klimabezogenen Risiken

Basierend auf der Abgrenzung der Task Force on Climate-related Financial Disclosures (TCFD, 2017) des Financial Stability Boards²⁵ können klimabezogene Risiken in Transitionsrisiken und Physische Risiken unterschieden werden. Unter Transitionsrisiken – auch Übergangsrisiken genannt – werden unmittelbare Folgen des Übergangs in eine CO₂-ärmere Volkswirtschaft verstanden. Hierunter werden rechtliche Risiken durch Veränderungen in der Gesetzgebung, technologische Risiken verursacht durch technologischen Fortschritt mit der Folge der Überalterung bestehender Technologien, Marktpreisrisiken durch veränderte Angebots- und Nachfragepräferenzen und Reputationsrisiken subsumiert. Physische Risiken beschreiben die entstehenden Schäden als Folge des Klimawandels. Die Task Force führt hierzu eine

²⁵ Das Financial Stability Board wurde als Nachfolgeorganisation des Financial Stability Forums von den G20-Staaten beauftragt, um das globale Finanzsystem zu überwachen und Empfehlungen zur Sicherstellung der globalen Finanzmarktstabilität abzugeben. Siehe hierzu insbesondere (Financial Stability Board, 2019).

Differenzierung – vergleichbar mit einer medizinischen Indikation – in Akute und Chronische Risiken durch. Akute Risiken resultieren aus den direkten Schäden von Extremwittersituationen, wie beispielsweise Hurrikans, Hagel und Flut. Chronische Risiken beschreiben die langfristigen Folgen von Klimaveränderung bezüglich des Anstiegs des Meeresspiegels und des Entstehens von Hitzewellen und Dürren (TCFD, 2017).

Figure 3.1: Systematisierung klimabezogener Risiken in Anlehnung an TCFD (2017)



Basierend auf einer Befragung des Bankensektors des Vereinigten Königreichs untersucht die Prudential Regulation Authority der Bank of England (2018) den klimabezogenen Einfluss auf bestehende Risikoarten und konstatiert einen Anstieg von Kredit-, Markt- und operationellen Risiken in der Bankbilanz (Bank of England, 2018). Physische Risikofaktoren wie Extremwittersituationen beeinflussen im Rahmen des Kreditrisikos zahlreiche quantitative Bewertungsparameter. Der unbesicherte Schadensfall, bspw. durch einen Elementarschaden im Zuge einer Flut oder eines Starkregens, kann neben einem Anstieg der Ausfallwahrscheinlichkeit (PD) des Kreditnehmers zusätzlich zu einer Erhöhung der Verlustquote (LGD) führen (Bank of England, 2018). Insbesondere bei Immobiliendarlehen, wo die Kreditsicherheiten häufig über eine Sach-sicherheit in Form einer Hypothek abgedeckt werden (Hartmann-Wendels et al., 2019), kann ein Schadensereignis zusätzlich die Güte der Sicherheiten und somit die Verwertungsquote (Recovery Rate) negativ beeinflussen.

Für das Kreditportfolio entstehen weiterhin Transitionsrisiken durch strengere Regulierungsmaßnahmen, insbesondere im Energie-, Agrar- und Automobilssektor, sowie in Sektoren mit Bezug zur Kohle. Regulierungsmaßnahmen mit direktem Einfluss auf das Wachstum und die Profitabilität von Unternehmen beeinflussen zusätzlich das institutsspezifische Marktpreisrisiko. Zusätzlich können Auswirkungen des Klimawandels auf das makroökonomische Umfeld

die modifizierte Bepreisung von Anlageklassen und Wertpapiere beeinflussen und zu einer Neubepreisung von Finanzinstrumenten und Derivaten führen (Bank of England, 2018).

Auf Ebene des operationellen Risikos sind die Folgen von Klimaschäden auf die Unternehmensfortführung zu nennen (Bank of England, 2018). Zusätzlich entstehen Reputationsrisiken durch die kritische Bewertung von Finanzierungsentscheidungen wesentlicher Stakeholder (Weber et al., 2008), mit der Folge der öffentlichen Kritik und negativen Kundenreaktionen (Thompson & Cowton, 2004).

3.2.2 Überblick über externe und interne Anforderungen an die Risikoberichterstattung klimabezogener Risiken

3.2.2.1 Europäische und nationale Regelungen

Die externe Nachhaltigkeitsberichterstattung von Unternehmen und Banken hat im letzten Jahrzehnt an Relevanz deutlich zugenommen. Die Anzahl der CSR-Berichterstatter im Sample der 250 weltweit umsatzstärksten Fortune 500 Unternehmen ist von 35% im Jahr 1999 auf 93% in 2017 angewachsen (KPMG, 2017). Auf Basis einer Analyse von 4.900 Abschlüssen, konstatiert die KPMG in ihrer “Survey of Corporate Responsibility Reporting 2017” weiterhin, dass 28% Prozent der Unternehmen das finanzielle Risiko aus dem Klimawandel im Rahmen ihres Geschäftsberichts berücksichtigen. Eine Beschreibung des Risikos erfolgt bei 63% auf Basis narrativer Angaben, eine Quantifizierung des Risk Exposures erfolgt nur bei 2% (KPMG, 2017). Die rechtliche Verpflichtung zur Berichterstattung über wesentliche Umweltrisiken ergibt sich de facto aus der EU Richtlinie 2014/95 „Angabe nichtfinanzieller und die Diversität betreffender Informationen“.²⁶ Im Zusammenhang des CSR-Richtlinien-Umsetzungsgesetzes²⁷ verpflichtet der deutsche Gesetzgeber in § 289c Abs. 3 Nr. 4 HGB den Anwenderkreis im Kontext der nichtfinanziellen Erklärung zur Offenlegung wesentlicher Risiken,²⁸ die sehr wahrscheinlich schwerwiegende negative Auswirkungen auf die Umweltbelange der Gesellschaft besitzen.²⁹ Auf eine nähere Spezifikation über den Umfang und Inhalt der daraus erwachsenden Risikoberichterstattung verzichtet der Gesetzgeber im HGB. Eine Ableitung der Anforderungen an die Risikoberichterstattung ergibt sich jedoch indirekt durch die in § 289d S. 1 HGB

²⁶ Richtlinie 2014/95/EU des Europäischen Parlaments und des Rates vom 22. Oktober 2014, Amtsblatt der Europäischen Union L 330/1 vom 15.11.2014.

²⁷ Gesetz zur Stärkung der nichtfinanziellen Berichterstattung der Unternehmen in ihren Lage- und Konzernlageberichten (CSR-Richtlinie-Umsetzungsgesetz) v. 11.04.2017, BGBl. I, S. 802.

²⁸ Für einen Überblick und eine kritische Betrachtung der Berichtsinhalte der nichtfinanziellen Erklärung, siehe insbesondere Hinze und Freidank (2018).

²⁹ Neben Umweltbelangen erwächst auch eine verpflichtende Angabe zu Arbeitnehmerbelangen, Sozialbelangen, Achtung der Menschenrechte und Bekämpfung von Korruption und Bestechung, § 289c Abs. 2 HGB i. V. m. § 289 Abs. 3 Nr. 4 HGB i. d. F. vom 10.7.2018.

kodifizierte verpflichtende Angabe auf Anwendung eines fakultativen Rahmenwerks.³⁰ Im Sinne des bereits aus der Corporate-Governance-Berichterstattung bekannten *Comply-or-Explains*-Ansatzes (z. B. Steinat, 2005), müssen Unternehmen erklären, ob ein Rahmenwerk Anwendung gefunden hat bzw. bei Nichtanwendung eine Begründung abgeben (§ 289d S. 2 HGB).

3.2.2.2 Internationale Rahmenwerke und Empfehlungen

Im Bereich der Standardsetzung für die Nachhaltigkeitsberichterstattung haben sich eine Vielzahl von internationalen Rahmenwerken und Empfehlungen etabliert, die heterogene Anforderungen an die Offenlegung von Klimarisiken legen (siehe hierzu Appendix 3.1). Zu den in der Praxis beliebtesten Frameworks gehören die Richtlinien der Global Reporting Initiative (GRI), die insbesondere in der Fassung GRI G4 (2013) eine hohe Adaption bei den Berichterstellern gefunden haben (KPMG, 2017). Formelle Anforderungen an die umweltbezogene Risikoberichterstattung über das Management von Umweltrisiken erfolgen überwiegend auf generischer Basis. Anwender der GRI G4 sollen über Maßnahmen der Unternehmensleitung zur Identifikation und Steuerung von ESG-Risiken und -Chancen, sowie über durchgeführte Stakeholder-Befragungen berichten (GRI G4-45). Zusätzlich erwartet der Standardsetter eine Angabe zur Wirksamkeit des ESG-Risikomanagementsystems durch die Unternehmensleitung (GRI G4-46). In den GRI-Standards (2016a) werden diese Mindestangaben um die Auswirkungen von Nachhaltigkeitsrisiken auf die Unternehmensperformance erweitert (GRI 102-15, Tz. 2.2.6). Die wesentlichen Chancen und Risiken sollen zusätzlich priorisiert und, wenn möglich, neben qualitativen Angaben, quantifiziert werden (GRI 102-15, Tz. 2.2.9). Für das Management von Nachhaltigkeitsrisiken sollen zusätzlich die Governance-Mechanismen aufgezeigt werden (GRI 102-15, Tz. 2.2.12). Auf eine begriffliche Definition der erwarteten Governance-Mechanismen,³¹ sowie detaillierte Angaben zu den erwarteten Mindestinhalten verzichten die GRI-Standards. Im Zuge der Offenlegung soll der Berichtsersteller den Einfluss der Chancen und Risiken des Klimawandels auf die Unternehmenstätigkeit und die Ertragslage darstellen. Hierzu erwartet der GRI-Standard 201(2016b) unter anderem eine finanzielle Bewertung der

³⁰ Der Gesetzgeber ermöglicht hierbei die Anwendung von nationalen, europäischen oder internationalen Rahmenwerken, § 289d S. 1 HGB i. d. F. vom 10.7.2018.

³¹ In Anlehnung an der in der Praxis geläufigen Governance-Systeme können z. B. Angaben zum Risikomanagement, Compliance, Internes Kontrollsystem (IKS) und Interne Revision erfolgen. Siehe hierzu insbesondere die Ausführungen von (KPMG, 2016) und die in 2017 veröffentlichten Prüfungsstandards zur Angemessenheit und Wirksamkeit des jeweiligen Governance-Systems des Instituts der Wirtschaftsprüfer in Deutschland (IDW): IDW PS 980, IDW PS 981, IDW PS 982 und IDW PS 983.

Risiken und Chancen auf Bruttoebene, eine Angabe zur Methodik im Rahmen des Managementansatzes und eine Darstellung der Kosten der Managementaktivität (GRI 201-2).

Mit der Zielsetzung dem Abschlussadressaten entscheidungsnützliche Informationen über nachhaltigkeitsrelevante Themenbereiche zu geben, hat das SASB insgesamt 77 branchenspezifische Sustainability Accounting Standards veröffentlicht (SASB, 2018). Sowohl für Geschäftsbanken als auch für Investmentbanken und Brokerage-Firmen wurden spezifische Anforderungen kodifiziert. Für die Risikoberichterstattung ist insbesondere die Integration von ESG-Faktoren in die Kreditrisikoanalyse und das systematische Risikomanagement von Relevanz. Neben der Nennung relevanter Richtlinien, soll der Einfluss von ESG-Faktoren auf die erwarteten Kreditverluste und verwendete Modellparameter und Quantifizierungsmethoden offengelegt werden (SASB.FN-CB-410a.2).

Neben den etablierten Rahmenwerken existieren zusätzlich freiwillige Initiativen wie die Equator Principles oder die Verlautbarungen der Vereinten Nationen. Für Kreditinstitute stellen die Equator Principles (2013) eine freiwillige Verpflichtung zur Bewertung und Management von Umwelt- und Sozialrisiken im Zusammenhang von Projektfinanzierungen dar. Die teilnehmenden Kreditinstitute verpflichten sich zur Einhaltung von zehn prinzipienbasierten Mindeststandards im Rahmen solcher Projektfinanzierungen, um eine nachhaltige Risikoentscheidung zu treffen (Equator Principles, 2018). Neben Kriterien für die Durchführung des Risk Assessments bei der Kreditvergabe werden Anforderungen an die Etablierung eines Environmental and Social Management Systems und des Kredit-Monitorings beschrieben (Equator Principles, 2013). Die Anwender verpflichten sich weiterhin zur jährlichen Berichterstattung über die Anwendung der Prinzipien (Equator Principles, 2013).

Ergänzend zu den zehn Prinzipien des UN Global Compact (2019) können sich Finanzinstitutionen im Zuge der UNEP FI Erklärung zu einer freiwilligen Implementierung von Environmental und Social Risks in den Risikomanagementprozess verpflichten. Die Angaben zur UNEP-Erklärung beschränken sich hierzu auf die Risikoidentifikation und Quantifizierung im Rahmen des Risk Assessments (United Nations Environment Programme Finance Initiative, 2011, para. 2.3).

Ein weiteres Rahmenwerk, dem vor allem in der wissenschaftlichen Accounting-Forschung eine hohe Beachtung beigemessen wird (de Villiers et al., 2014; de Villiers et al., 2017; Dumay et al., 2015; Velte & Stawinoga, 2017a) ist das International Integrated Reporting Framework <IR> des International Integrated Reporting Councils (IIRC). Das IR-Rahmenwerk besitzt die Intention, den Abschlussadressaten über die generierte Wertschöpfung im Zeitablauf zu informieren. Hierzu sollen finanzielle und nichtfinanzielle Informationen genutzt werden, um über

die Unternehmensstrategie, Governance, Leistung und Perspektiven im Kontext des externen Unternehmensumfeldes zu berichten (IIRC, 2013). Im Hinblick der Environmental Risk Disclosure verzichtet der prinzipienorientierte Ansatz hierbei auf die Benennung spezifischer Risikoberichtsinhalte. Berichtersteller sollen vielmehr wesentliche Risiken und Chancen offenlegen, welche Einfluss auf die Wertschöpfung des Unternehmens nehmen (IIRC, 2013). In der Praxis führt dies dazu, dass in der integrierten Berichterstattung bspw. auf Offenlegungsanforderungen der GRI referenziert wird.³²

Eine Erweiterung zum COSO Enterprise Risk Management Framework stellt die gemeinsam vom Committee of Sponsoring Organization of the Treadway Commission (COSO) und World Business Council for Sustainable Development (WBCSD) entwickelte Guideline “Enterprise Risk Management Applying enterprise risk management to environmental, social and governance-related risks” dar (COSO & WBCSD, 2018). Aufbauend auf dem 2017 novellierten ERM-Framework (COSO, 2017) beabsichtigen beide Organisationen ESG-relevante Risiken in das unternehmensweite Risikomanagement zu integrieren.³³ Die Risikokommunikation wird in der fünften Komponente „Information, Communication & Reporting for ESG-related Risk“ betrachtet. Neben Leitlinien zur Identifikation wesentlicher Informationen sind entscheidungsnützliche Informationen sowohl für interne und externe Stakeholder zeitnah zu berichten und transparent offenzulegen (COSO & WBCSD, 2018). Das COSO empfiehlt hierzu eine Orientierung an bekannten Rahmenwerken der externen Offenlegung, wie bspw. die TCFD Recommendations, GRI oder SASB (COSO & WBCSD, 2018).

3.2.2.3 Task Force on Climate-Related Financial Disclosures

Konkrete Empfehlungen an die klimabezogene Risikoberichterstattung liefert die vom Financial Stability Board beauftragte Task Force on Climate-Related Financial Disclosures (2017). Auch diese orientieren sich an der Prämisse der Entscheidungsnützlichkeit, den Adressaten über klimabezogene Chancen und Risiken zu unterrichten. Es erfolgt eine Unterteilung in vier Kernelemente, welche in Figure 3.2 dargestellt werden (TCFD, 2017, p. IV f.):

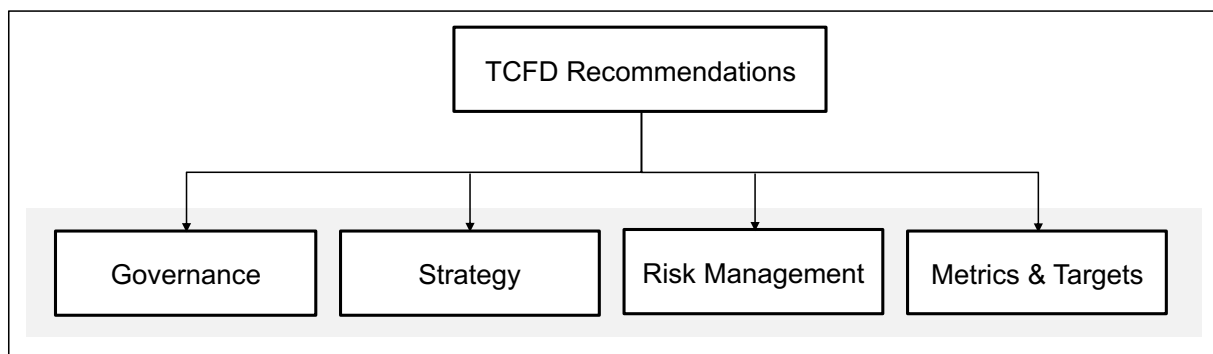
Im Element „Governance“ sollen Informationen zur Governance-Struktur im Hinblick auf klimabedingte Risiken und Chancen offengelegt werden. Neben Angaben zur Überwachungsfunktion des Aufsichtsrates sind die Rollen des Managements zur Bewertung klimabezogener

³² Siehe hier z. B. das Integrated Reporting der UniCredit (2017).

³³ Das COSO und WBCSD greifen hierzu auf die folgenden fünf Komponenten zurück: “Governance & Culture for ESG-related Risk”, “Strategy & Objective-Setting for ESG-related Risk”, “Performance for ESG-related Risk”, “Review & Revision for ESG-related Risk” und “Information, Communication & Reporting for ESG-related Risk” (COSO & WBCSD, 2018, p. 9).

Risiken darzustellen. Unter dem Element „Strategy“ sind die materiellen Auswirkungen wesentlicher klimabedingter Risiken und Chancen auf die Geschäftstätigkeit, Unternehmensstrategie und Finanzplanung sowohl ex post als auch ex ante offenzulegen. Explizite Angaben zum Risikomanagementprozess, unterteilt in Identifizierung, Bewertung und Steuerung klimabezogener Risiken, sind Bestandteil des Kernelements „Risk Management“. Weiterhin sollen wesentliche Metriken und Ziele („Metrics and Targets“), die zur Bewertung und zum Management relevanter klimabezogener Risiken und Chancen verwendet werden, veröffentlicht werden (TCFD, 2017, p. 14).

Figure 3.2: Kernelemente der TCFD Recommendations (2017)



3.2.3 Einordnung in die Risikoberichterstattung von Banken

Die Risikoberichterstattung in der Gesamtbanksteuerung unterliegt den Anforderungen des Banken-Trias, bestehend aus Management-, Regulierungs- und Bilanzierungsperspektive (Hinze et al., 2017). Während das Management primär die Etablierung interner Berichtswege im Sinne der Risk Governance forciert (COSO, 2016; Mies et al., 2018), um die generierten Informationen zu internen Steuerungszwecken zu verwenden, liefert die Bankenregulierung und Bilanzierungsstandardsetter Anforderungen an die Offenlegung. Die interne Risikoberichterstattung von CRR-Instituten nach § 1 Kreditwesengesetz (KWG) erfährt in BT 3 der Mindestanforderungen an das Risikomanagement (kurz: MaRisk) eine hinreichende Konkretisierung im deutschen Bankenaufsichtsrecht. Neben Anforderungen an die Darstellung und Datengüte etabliert die MaRisk turnusmäßige Berichtszyklen, um die Geschäftsleitung über die aktuelle Risikosituation zu informieren (BaFin, 2017, pt. BT 3.1).

Die aufsichtsrechtlichen Offenlegungspflichten im Sinne der Marktdisziplin nach Basel Säule 3 ergeben sich aus Teil 8 der Verordnung (EU) Nr. 575/2013 vom 26.6.2013 (Capital Requirements Regulation, kurz: CRR). Unter Anwendung des Art. 435 CRR sind Kreditinstitute zur externen Offenlegung der Risikomanagementziele und der Risikopolitik aller wesentlichen Risikoarten verpflichtet. Eine Konkretisierung der quantitativen und qualitativen

Offenlegungsanforderungen erfolgt hierbei in BCBS 455 „Pillar 3 disclosure requirements – updated framework“ des Baseler Ausschusses und den EBA (2017) „Leitlinien zu den Offenlegungspflichten gemäß Teil 8 der Verordnung (EU) Nr. 575/2013“. Zu den wesentlichen Risikoarten einer Bank gehören das Kreditrisiko (Art. 442 ff. CRR), Gegenparteausfallrisiko (Art. 439 f. CRR), Marktpreisrisiko (Art. 445 ff. CRR) und das Liquiditätsrisiko (Art. 435 CRR). Auf eine explizite Berücksichtigung von Nachhaltigkeitsrisiken verzichtet das Aufsichtsrecht. Auch der vom IASB (2017) novellierte IFRS 7 beschränkt sich auf die Offenlegung der Art und Umfangs der aus Finanzinstrumenten resultierenden Risiken, bestehend aus Kreditrisiko, Marktrisiko und Liquiditätsrisiko (IFRS 7.31-7.42). Auch die im DRS 20.A1.3-A.1.21 dargestellten Anforderungen an die externe Risikoberichterstattung von Banken verzichten auf eine explizite Thematisierung von klimabezogenen Risiken (DRSC, 2017).

3.3 Empirische Analyse der nichtfinanziellen Risikoberichterstattung europäischer Banken

3.3.1 Literaturüberblick und Hypothesenbildung

Empirische Studien zur CSR-Berichterstattung besitzen mehr denn je eine hohe Relevanz in der Management- und Accounting-Literatur (z. B. Bhimani et al., 2016; Huang & Watson, 2015). Während bisherige Studien den Einfluss der CSR-Berichterstattung auf die Finanzperformance (z. B. Friede et al., 2015), die Kapitalkosten (z. B. Dhaliwal et al., 2011; El Ghouli et al., 2011) oder Unternehmensmerkmale (z. B. Dienes et al., 2016) adressieren, besteht in der Wechselwirkung zwischen Corporate Social Responsibility und dem Unternehmensrisiko bisweilen noch Forschungsbedarf (Sassen et al., 2016). Empirische Studien zur Nachhaltigkeitsberichterstattung von Banken sind weiterhin im Vergleich zum Unternehmenssektor unterrepräsentiert (Sethi et al., 2015). Im Folgenden soll zunächst ein Überblick über ausgewählte empirische Studien zum Risikomanagement und zur Risikoberichterstattung von Nachhaltigkeitsrisiken gegeben und Hypothesen für die weitere Untersuchung gebildet werden.

3.3.1.1 State of the Art der empirischen Forschung

Dobler et al. (2014) untersuchen auf Basis einer Content-Analyse von rohstoff- und energieintensiven Industrieunternehmen den Einfluss von Umweltrisiken und Risikomanagementaktivitäten auf die Umweltperformance. Sie konstatieren eine hohe Heterogenität zwischen Umweltrisiko und Risikomanagementaktivität je nach Unternehmen und Branche und weisen einen negativen Zusammenhang zwischen Umweltperformance und Umweltrisiko nach. In einer weiteren Studie erkennen Dobler et al. (2015) eine positive Korrelation zwischen der

Offenlegungsqualität der Umweltberichterstattung und dem zugrundeliegenden Umweltrisiko eines Unternehmens. Truant et al. (2017) analysieren unter Verwendung einer Strukturgleichungsmodellierung (PLS-SEM) Einflussfaktoren auf die Offenlegung von Risiken in GRI-Nachhaltigkeitsberichten börsennotierter italienischer Unternehmen. Sie finden heraus, dass insbesondere die Internationalisierung der Geschäftstätigkeit und die Erfahrung mit Nachhaltigkeitsthemen³⁴ einen signifikanten Einfluss auf die Offenlegung von Nachhaltigkeitsrisiken besitzen.

Sakhel (2017) untersucht mittels einer Content-Analyse in der CDP-Datenbank die Risikobewertung und Mitigation von Klimarisiken 126 europäischer Unternehmen über den Zeitraum von 2011–2013. Mittels einer ANOVA Analyse stellt sie fest, dass regulatorische Klimarisiken von den Unternehmen eine höhere Aufmerksamkeit erfahren als physische und marktpreisbezogene Klimarisiken.

Auf Grundlage eines Samples kapitalmarktorientierter australischer Unternehmen erforschen Dumay und Hossain (2018) den Umfang der Offenlegung von ESG-Risiken im Fiskaljahr 2014/2015. Sie stellen fest, dass der Finanzsektor hierbei die meisten Informationen offenlegt, sowohl bei der Anzahl der Wörter als auch im Umfang der qualitativen Offenlegung. Weiterhin konstatieren sie, dass die Unternehmensgröße positiv mit der Offenlegung von Nachhaltigkeitsrisiken korreliert ist, wobei größere Unternehmen mehr Informationen über Nachhaltigkeitsrisiken offenlegen als kleinere Unternehmen.

3.3.1.2 Bankspezifische Faktoren

Eine von der Stichprobengröße umfangreiche Studie zur CSR-Tätigkeit von Kreditinstituten führen Wu und Shen (2013) mit einem Sample von 162 Banken aus 32 Nationen über den Zeitraum von 2003–2009 durch. Neben einem positiven Wirkungszusammenhang zwischen dem Umfang der CSR-Tätigkeit³⁵ und der Finanzperformance³⁶ von Banken, konstatieren sie eine negative signifikante Beziehung zwischen CSR-Tätigkeit und notleidender Kredite (sog. Non-Performing Loans) in der Bankbilanz. Angaben zu notleidenden Krediten und die Bildung der Risikovorsorge stellen für den Bilanzadressaten einen wesentlichen Indikator über das Risikoverhalten des Finanzinstituts dar (Bushman & Williams, 2012). Die bilanzielle Abbildung von Kreditrisiken bei Banken ist Gegenstand einer breiten Diskussion (Beatty & Liao, 2014)

³⁴ Als Proxy für die Erfahrung mit Nachhaltigkeitsthemen nutzen Truant, Corazza und Scagnelli (2017) den Zeitraum der Nachhaltigkeitsberichterstattung, gemessen in Jahren, und die Anzahl der Seiten im Nachhaltigkeitsbericht.

³⁵ Die CSR-Tätigkeit wurde gemessen auf Basis einer 5-Punkte Skala.

³⁶ Als Proxy für die Finanzperformance nutzen Wu & Shen (2013) die Variablen Return on Assets, Return on Equity, Net-Interest Income und Non-Interest Income.

und Forschungsgegenstand wissenschaftlicher Beiträge zur Risikoberichterstattung von Kreditinstituten (z. B. Ahmed et al., 2004; Fiechter & Zhou, 2016; Nier & Baumann, 2006). Dem bisherigen Incurred-Loss-Modell zur Bildung von Loan-Loss-Provisions wurde in der Finanzkrise 2008 eine krisenverstärkende Wirkung beigemessen (Barth & Landsman, 2010), was zu einer Novellierung des bisherigen Impairment-Modells des IAS 39 durch den IFRS 9, der das Expected Credit Loss-Modell aufgreift, führte (IASB, 2014).

Neben der Überarbeitung der Rechnungslegungsstandards wurde insbesondere durch Basel III die Eigenkapitalausstattung der Banken durch schärfere Anforderungen gestärkt, um eine höhere Verlustabsorptionsfähigkeit in Krisensituationen zu gewährleisten (Deutsche Bundesbank, 2011). Die Umsetzung in multinationales europäisches Recht erfolgte zum Geschäftsjahr 2014 durch das CRD-IV-Paket, besteht aus der Capital Requirements Directive (CRD IV)³⁷ und der Capital Requirements Regulation (CRR).³⁸ In der Kapitalausstattung sieht die CRR eine schrittweise Erhöhung der Eigenkapitalunterlegung der Risikogewichteten Aktiva (RWA) in Form des Harten Kernkapitals und des Ergänzungskapitals über den Zeitraum 2016–2019 vor (Deutsche Bundesbank, 2011). Die Regulierungsbestrebungen gehen hierbei einher mit empirischen Studien zur Kapitalmarktforschung. Berger und Bouwman (2013) konstatieren, dass kleine Banken mit einer hohen Kapitalausstattung in Krisensituationen eine höhere Überlebenswahrscheinlichkeit besitzen. Zusätzlich wirkt sich eine hohe Kapitalausstattung positiv auf die Profitabilität der Banken in Krisensituationen aus. Blum (1999) stellt fest, dass eine verbesserte Kapitaladäquanz mit einem Anstieg der Risikobereitschaft einhergeht, um steigende Eigenkapitalkosten zu kompensieren. Dies führt zur Bildung der ersten beiden Hypothesen:

H1a: Kreditinstitute mit einem hohen Anteil an Non-Performing Loans besitzen eine höhere Qualität der Environmental Risk Disclosure (Climate Risk Disclosure).

H1b: Kreditinstitute mit einem hohen Anteil an Loan-Loss-Provisions besitzen eine höhere Qualität der Environmental Risk Disclosure (Climate Risk Disclosure).

H2: Die Kapitaladäquanz eines Kreditinstituts besitzt einen signifikanten Einfluss auf die Qualität der Environmental Risk Disclosure (Climate Risk Disclosure).

3.3.1.3 Konstitutive Faktoren

Die Integration von Umweltrisiken in den Kreditmanagementprozess europäischer Banken betrachten auch Weber, Fenchel und Scholz (2008). Eine Berücksichtigung von Umweltrisiken

³⁷ Richtlinie 2013/36/EU des Europäischen Parlamentes und des Rates vom 26. Juni 2013.

³⁸ Verordnung (EU) Nr. 575/2013 Europäischen Parlamentes und des Rates vom 26. Juni 2013.

erfolgt überwiegend in der Rating-Phase, eine ganzheitliche Integration in allen Phasen des Kreditmanagementprozesses findet jedoch nicht statt. Unterzeichner der UNEP-Erklärung der Vereinten Nationen weisen hierbei einen höheren Implementierungsstand als Nichtunterzeichner auf (Weber et al., 2008). Den Einfluss der Equator Principles zur Projektfinanzierung auf die Performance von Banken untersuchen Scholtens und Dam (2007) und stellen fest, dass insbesondere die Größe der Bank einen signifikanten Einfluss auf die freiwillige Übernahme der Equator Principles nimmt. Auf Basis einer Event-Studie stellen sie zusätzlich fest, dass die Einführung der Equator Principles keinen negativen Einfluss auf den Marktwert der Bank besitzt. Finger et al. (2018) untersuchen den Einfluss der freiwilligen Übernahme der Equator Principles auf das Finanzierungsverhalten von Banken in entwickelten Ländern und Entwicklungsländer. Sie weisen nach, dass bei Banken in entwickelten Ländern die Einführung der Equator Principles mit einer Zunahme der Finanzierungstätigkeit und des Anteils der Zinserträge verbunden ist. Für Entwicklungsländer gilt dies vice versa. Den Einfluss von Economic-, Environmental- und Social Sustainability-Kriterien auf das traditionelle bankinterne Ratingverfahren bei der Kreditvergabe erforschen Weber et al. (2010) auf Basis einer Befragung von Kreditanalysten in 40 deutschen Sparkassen. Sie stellen fest, dass eine positive Korrelation zwischen den betrachteten Sustainability-Kriterien und der finanziellen Performance des Kreditnehmers vorliegt. Unter Anwendung einer Diskriminanzanalyse zeigen sie weiterhin, dass die Integration von Sustainability-Kriterien die korrekte Risikoklassifikation der Kredite von 78,9% auf 86,6% verbessert. Sie validieren somit bereits vorherige Studien, die einer genaueren Vorhersage zukünftiger Kreditausfallereignisse durch die kombinierte Nutzung von finanziellen- und nichtfinanziellen Faktoren nachweisen (Grunert et al., 2005). Dies führt zur Bildung der folgenden Hypothese:

H3: Die Unterzeichnung eines freiwilligen Frameworks wie z. B. die Equator Principles besitzt einen signifikanten Einfluss auf die Qualität der Environmental Risk Disclosure (Climate Risk Disclosure).

In einer weiteren Studie untersucht Scholtens (2009) auf Grundlage eines selbst erstellten Frameworks die CSR-Berichterstattung von 32 internationalen Banken zwischen 2000 und 2005. Neben einem konstanten Anstieg der Berichtsqualität im Zeitablauf, konstatiert er eine hohe Heterogenität in der Berichterstattung und Unterschiede je nach Sitzstaat und Region. Zu ähnlichen Ergebnissen kommen auch Sethi et al. (2015). Auf Basis einer Analyse der CSR-Berichtsqualität von 104 internationalen Banken aus dem Jahr 2012 zeigen sie, dass rechtliche

Faktoren und das CSR-Umfeld im Sitzstaat eine wichtige Rolle für die CSR-Berichtsqualität darstellen. Banken mit Sitz im Rechtskreis des Common Laws weisen eine systematisch höhere CSR-Berichtsqualität auf als Kreditinstitute mit Sitz in Ländern, wo das Code Law vorherrscht. Zusätzlich weisen sie nach, dass Unternehmen in Ländern mit höheren CSR-Standards deutlich höherwertige CSR-Berichte erstellen (Sethi et al., 2015). Beide Studien stehen somit in Einklang mit den Arbeiten von La Porta et al. (1997, 1998). Diese validieren den positiven Einfluss von Rechtsnormen und der Rechtsdurchsetzung auf die Entwicklung von nationalen Kapitalmärkten (La Porta et al., 1997). Länder mit dem Rechtskreis des Common Laws weisen zusätzlich höhere Schutzvorschriften für Aktionäre auf als Länder mit vorherrschendem Zivilrecht (La Porta et al., 1998). Dies führt zur Bildung der folgenden Hypothese:

H4: Die rechtlichen Faktoren der Landesgesetzgebung des Sitzstaates der Bank besitzen einen signifikanten Einfluss auf die Qualität der Environmental Risk Disclosure (Climate Risk Disclosure).

3.3.1.4 Environmental-, Social- und Assurance-Faktoren

Basierend auf einer Metaanalyse konstatieren Orlitzky und Benjamin (2001), dass die Corporate Social Performance eines Unternehmens einen negativen Einfluss auf das finanzielle Risiko besitzt. Mishra und Modi (2013) validieren dieses Ergebnis und zeigen einen signifikanten Einfluss der Corporate Social Responsibility auf das idiosynkratische Risiko. Aufbauend auf diesen beiden Studien untersuchen Sassen et al. (2016) mit Hilfe eines europäischen Panel-Datensatzes den Einfluss von ESG-Faktoren auf verschiedene Risikovariablen und stellen fest, dass die Social Performance eines Unternehmens einen signifikant negativen Einfluss auf das Unternehmensrisiko besitzt. Sie zeigen zusätzlich einen negativen Einfluss der Umweltperformance auf das idiosynkratische Risiko, die Corporate Governance Performance besitzt jedoch keinen signifikanten Einfluss auf die Risikodeterminanten.³⁹ Dies führt zur Bildung der folgenden Hypothesen:

H5a: Die Umweltperformance (Corporate Environmental Performance) besitzt einen signifikanten Einfluss auf die Qualität der Environmental Risk Disclosure (Climate Risk Disclosure).

³⁹ Als Risikodeterminanten nutzen Sassen et al. (2016) für das Gesamtrisiko, die auf 12-Monate durchschnittliche Aktienkursvolatilität, das Unternehmensbeta als systematisches Risiko und das idiosynkratische Risiko auf Basis eines Vierfaktorenmodells.

H5b: Die Sozialperformance (Corporate Social Performance) besitzt einen signifikanten Einfluss auf die Qualität der Environmental Risk Disclosure (Climate Risk Disclosure).

Den Zusammenhang zwischen nachhaltigen Unternehmenswerten und Sustainability Risk Management untersuchen auch Wijethilake und Lama (2018) auf Basis einer Befragung von 175 Führungskräften. Sie zeigen einen hohen Einfluss der Unternehmenswerte und des Engagements der Unternehmensleitung auf die Implementierung eines nachhaltigen Risikomanagementsystems. Im Sinne der Legitimitätstheorie besitzen Unternehmen und Banken die Motivation über ihr Risikomanagement (Linsley & Kajuter, 2008; Oliveira et al., 2011) oder ihre CSR-Tätigkeit im Rahmen der Offenlegung zu berichten (Hahn & Kühnen, 2013). Die Nachhaltigkeitsberichterstattung ist jedoch geprägt durch eine hohe Heterogenität in der Offenlegungsqualität (Holder-Webb et al., 2009), mit der Folge, dass insbesondere die externe Prüfung durch eine Assurance-Leistung eine stärkere Relevanz erfährt (Cohen & Simnett, 2015; Velte & Stawinoga, 2017b). Zusammenfassend führt dies zur Bildung der folgenden Hypothese:

H6: Die freiwillige Prüfung der CSR-Berichterstattung (CSR-Assurance) besitzt einen signifikanten Einfluss auf die Qualität der Environmental Risk Disclosure (Climate Risk Disclosure).

3.3.2 Datensatz

Zur Erstellung unserer Stichprobe folgen wir dem Ansatz von Trapp und Weiß (2016) und selektieren zunächst alle europäischen kapitalmarktorientierten Banken, die in der Datenbank Thomson Reuters Datastream als „Banking Services“ gelistet sind und eine Datenbasis in der ASSET 4-Datenbank besitzen. Im nächsten Schritt exkludieren wir alle Institute, die im August 2018 nicht unter der Beaufsichtigung der Europäischen Zentralbank standen oder von der European Banking Authority als Global Systemically Important Institution (G-SII) eingruppiert wurden. Die betrachteten Banken unterliegen somit einer einheitlichen Bankenaufsicht (Single Supervisory Mechanism) wodurch regionale Unterschiede im Aufsichtsregime der einzelnen Mitgliedstaaten reduziert werden sollen. Als Ergänzung zum SSM sollen weiterhin europäische Institute mit einem Leverage Ratio Exposure von 200 Mrd. Euro – sogenannte Global Systemically Important Institutions (G-SIIs) – Berücksichtigung finden. Hierdurch soll sichergestellt werden, dass systemrelevante Banken, die nicht zu den teilnehmenden Ländern im SSM gehören, inkludiert werden. Systemrelevante Banken unterliegen als Ausprägung des

Proportionalitätsprinzips gesonderten makroprudenziellen Anforderungen durch die Aufsicht.⁴⁰ Neben einer höheren Eigenkapitalausstattung verlangt die Aufsicht weiterhin stärkere Anforderungen an das Risikomanagement, die Risk Governance und das Interne Kontrollsystem der systemrelevanten Institute (FSB, 2018).

Die Zusammensetzung der Stichprobe ist in Table 3.1 dargestellt.

Table 3.1: Zusammensetzung der Stichprobe

Stichprobe	Anzahl
Thomson Reuters „BANKS EU“	119
abzüglich: Fehlende Datenverfügbarkeit in Thomson Reuters ASSET 4	-38
▪ Hiervon: bedeutend beaufsichtigte Unternehmen der Europäischen Zentralbank (EZB)	39
▪ Hiervon: Global Systemically Important Institutions (G-SIIs) der European Banking Authority	25
abzüglich: mangelnde Systemrelevanz	-34
Systemrelevante Banken (EZB und G-GII)	47
abzüglich: Fehlende Datenverfügbarkeit bei den Kontrollvariablen	-8
abzüglich: M&A-Aktivitäten im Betrachtungszeitraum	-1
Total Sample	38
Firm-Year Observations	152

Basierend auf diesen Kriterien können insgesamt 47 systemrelevante europäische Banken identifiziert werden. Sieben Banken werden aufgrund von fehlender Datenverfügbarkeit bei den Kontrollvariablen und eine Bank, die im Zeitraum durch eine Fusion entstanden ist, exkludiert. Die finale Stichprobe beinhaltet somit 38 systemrelevante Banken aus Belgien, Dänemark, Deutschland, Frankreich, Griechenland, Irland, Italien, Niederlande, Österreich, Portugal, Schweden, Spanien und dem Vereinigten Königreich. Die notwendigen Fundamentaldaten für die ökonometrische Analyse werden der Thomson Reuters Worldscope Datenbank entnommen. Zur Operationalisierung der Environmental und Social-Performance wird in Anlehnung an andere empirische Studien zur CSR-Forschung (Eccles et al., 2014; Sassen et al., 2016) auf die Thomson Reuters ASSET4-Datenbank zurückgegriffen.

3.3.3 Forschungsdesign, Variablendefinition und Methodik

Die Analyse der Determinanten auf die Qualität der nichtfinanziellen Risikoberichterstattung soll auf Basis eines Random Effects-Panelmodells (GLS) der Berichtsjahre 2014–2017 durchgeführt werden. Im Unterschied zu einer gepoolten Querschnittsanalyse, die vereinfacht

⁴⁰ Für einen Überblick über den makroprudenziellen Ansatz der Bankenaufsicht und eine Einordnung in den SSM, siehe Deutsche Bundesbank (2013).

eine summierte Querschnittsanalyse über mehrere Perioden darstellt, ordnet ein Panel-Datensatz jeder Variable eine zugehörige Bank und eine Zeiteinheit zu (Wooldridge, 2013). Dies besitzt den Vorteil, dass Unterschiede in den Managementtechniken einzelner Banken über den Zeitablauf abgebildet werden (Greene, 2012). Die Entscheidung zur Wahl des GLS-Modells erfolgte auf Basis des Hausmann-Tests (Wooldridge, 2010) und des Breusch-Pagan LM-Tests (Greene, 2012). Die gewonnenen Testergebnisse bestätigen, dass zufällige Effekte vorliegen und ein Random-Effects Modell einer OLS-Regression vorzuziehen ist.⁴¹ Zusammenfassend führt dies zur nachfolgenden Modellbildung:

$$ERD_{it} = \alpha + \beta_1 NPL_{it} + \beta_2 LLP_{it} + \beta_3 CET1_{it} + \beta_4 CET2 + \beta_5 EQP_{it} + \beta_6 Law_{it} + \beta_7 ENVSCORE_{it} + \beta_8 SOCScore_{it} + \beta_9 CSRA_{it} + \beta_{10-22} Controls_{it} + \varepsilon_{i,t} \quad (1)$$

$$CRD_{it} = \alpha + \beta_1 NPL_{it} + \beta_2 LLP_{it} + \beta_3 CET1_{it} + \beta_4 CET2 + \beta_5 EQP_{it} + \beta_6 Law_{it} + \beta_7 ENVSCORE_{it} + \beta_8 SOCScore_{it} + \beta_9 CSRA_{it} + \beta_{10-22} Controls_{it} + \varepsilon_{i,t} \quad (2)$$

Das Subskript $i = 1, \dots, N$ bezeichnet die betrachteten Banken über die Zeitperioden $t = 1, \dots, T$. Die Variablen $ERD_{i,t}$ und $CRD_{i,t}$ beschreiben als abhängige Variable die Qualität der Environmental Risk Disclosure und Climate Risk Disclosure. Die Erhebung der Environmental Risk Disclosure-Qualität erfolgt auf Basis einer manuellen Content-Analyse. Die Content-Analyse ermöglicht nach Krippendorff (2018) „replizierbare und gültige Schlussfolgerungen aus Texten in ihren Anwendungskontext zu ziehen“ (Krippendorff, 2018, p. 24). In Anlehnung an die Abgrenzung von Beattie, McInnes und Fearnley (2004) wird zur Objektivierung auf einen selbsterstellten Offenlegungsindex zurückgegriffen. Im Unterschied zu anderen Verfahren der Textanalyse⁴² erfolgt die Kodierung auf Grundlage eines vorab definierten Rahmenwerkes (Beattie et al., 2004). Die jeweiligen Jahresabschlüsse und CSR-Berichte werden hierzu manuell von den jeweiligen Websites der Banken heruntergeladen und auf Basis des in Anhang 4 dargestellten Indizes in MAXQDA 2018 kodiert. Die Grundstruktur des Environmental Risk Disclosure-Index folgt in Anlehnung an den „Operational Risk Disclosure Quality Index“ von Barakat und Hussainey (2013).⁴³ Im Aufbau orientiert sich der ERD an den Empfehlungen des novellierten COSO-ERM Frameworks für ESG-Risiken (COSO & WBCSD, 2018) und den

⁴¹ Siehe für eine Darstellung der Testergebnisse Appendix 3.2 und Appendix 3.3.

⁴² Für eine Übersicht an Verfahren zur Textanalyse, siehe insbesondere den Überblicksartikel von Lourghran und McDonald (2016).

⁴³ Barakat und Hussainey (2013) bewerten ebenfalls die quantitative, qualitative und visuelle Offenlegung (Tabelle und Grafiken) von Risikoinformationen.

TCFD Recommendations (TCFD, 2017). Neben der Abbildung des allgemeinen ESG-Risikomanagementsystems, soll insbesondere die Offenlegung von Transition-Klimarisiken und Physischen-Klimarisiken bewertet werden. In Anlehnung an vorangegangene Studien zur Risiko-berichterstattung (Al-Hadi et al., 2016; Barakat & Hussainey, 2013; Pérignon & Smith, 2010) und zur Verringerung der Subjektivität im Kontext des Scorings erfolgt die Bewertung auf Basis einer Binär-Codierung (Beattie et al., 2004). Bei Offenlegung eines Items oder Sub-Items erfolgt die Bewertung mit 1. Wird auf eine Offenlegung verzichtet, so erfolgt eine Bewertung mit 0. Dies führt zur Bildung des folgenden Environmental Risk Disclosure Quality Index:

$$ERD = \frac{1}{27} \sum_{i=1}^{27} \text{Index}_i$$

Neben der Environmental Risk Disclosure soll zusätzlich die Messung der Climate Risk Disclosure-Qualität untersucht werden. Hierzu wird auf eine abgewandelte Version des Index zurückgegriffen:

$$CRD = \frac{1}{21} \sum_{i=7}^{27} \text{Index}_i$$

Bei Offenlegung eines Items oder Sub-Items erfolgt die Bewertung mit 1. Wird auf eine Offenlegung verzichtet, so erfolgt eine Bemessung mit 0.

Zur Sicherstellung einer zuverlässigen Bewertung wurden die Geschäftsberichte von den Autoren unabhängig voneinander codiert und auf Intercoderreliabilität überprüft (Krippendorff, 2018). Die Überprüfung erfolgt auf Basis der STATA Routine kappaetc von Klein (2018). Die prozentuale Übereinstimmung der kodierten Elemente beträgt 97,51 %. Sowohl Cohens Kappa ($k_k = 0.8995$) Scott/Fleiss' Pi ($k_\pi = 0.8994$) 0.8994 und Krippendorffs' Alpha ($k_\alpha = 0.8994$) können auf Basis der Skalierung von Landis und Koch (1977, p. 165) als „Almost Perfect“ klassifiziert werden.

Als unabhängige Variablen verwendet die Regression zur Messung der Asset Qualität die Non-Performing-Loans (NPL) und die Loan-Loss-Provisions (LLP). Zur Untersuchung des Einflusses der Kapitaladäquanz wird die Common Equity Tier 1-Ratio (CET1) als Harte Kernkapitalquote nach Art. 26-50 CRR und die Common Equity Tier 2-Ratio (CET2) als Ergänzungskapital nach Art. 62-71 CRR verwendet. Die Verwendung der Equator Principles (EQP) erfolgt auf Basis einer Binärcodierung (Finger et al., 2018). Als Proxy für die Bewertung der Legislative der Sitzstaaten wird in Anlehnung an La Porta (1997, 1998) auf das Rules of Law-Rating (LAW) der Weltbank zurückgegriffen (z. B. auch Barakat & Hussainey, 2013). Zur Messung der Umweltperformance und Sozialperformance der Banken wird in Anlehnung an Sassen et al. (2016) und Eccles et al. (2014) auf das Scoring der Thomson Reuters Asset 4 Datenbank

zurückgegriffen. Die unabhängige Variable ENVSCORE beschreibt den Einfluss der Bank auf die Ökologie und bewertet die ganzheitliche Unternehmensführung zur Vermeidung des Ressourcenverbrauchs, der Reduzierung von Emissionen und die Entwicklung von Innovationen. Der SOCScore bewertet den Einfluss der Unternehmensführung Vertrauen und Loyalität bei den wesentlichen Stakeholdern in den Bereichen Mitarbeiter, Menschenrechte, Gesellschaft und Produktverantwortung zu erzeugen (Thomson Reuters, 2019). Die Prüfung der Nachhaltigkeitsberichterstattung mittels einer Assurance Leistung erfolgt auf Basis der Binärvariablen CSRA (Kolk & Perego, 2010; Liao et al., 2016; Moroney et al., 2012).

Als Kontrollvariablen folgt das empirische Modell der Determinanten und Unternehmenscharakteristik Forschung zur Risikoberichterstattung (z. B. Khlif & Hussainey, 2016). Hierzu soll als Proxy für die Profitabilität auf die Market-to-Book-Ratio gemessen als TOBINSQ zurückgegriffen werden (Dhaliwal et al., 2011; Lioui & Sharma, 2012; Nahar et al., 2016). Zur Messung der Finanzperformance der Bank werden weiterhin der Return on Assets (ROA), der Return on Equity (ROE) und das Non-Interest Income (NonII) verwendet (Wu & Shen, 2013). Zur Darstellung der Charakteristik der Unternehmensgröße (Linsley & Shrivs, 2006), soll auf die logarithmierten Total Assets (LNTA) zurückgegriffen werden (Finger et al., 2018; Sethi et al., 2015). Zur Abbildung der Überwachungsfunktion der Corporate Governance wird die Größe (BoardSize) und Unabhängigkeit (BoardIn) des Boards (Elshandidy & Neri, 2015), sowie der Anteil an weiblichen Board Mitgliedern (BoardDiv) verwendet (Dienes & Velte, 2016). Zusätzlich soll die volkswirtschaftliche Entwicklung des Sitzstaates der Bank, dargestellt durch das jährliche Wachstum des GDPs (GDP) und die Höhe der Inflation (Inflation), berücksichtigt werden (Barakat & Hussainey, 2013). Als weitere Kontrollvariablen werden Dummy-Variablen für die Jahre 2014–2017 hinzugefügt. Zur Vermeidung von Messfehlern durch Heteroskedastizität, verwendet das ökonometrische Modell robuste und nach Banken geclusterte Huber-White Standardfehler (Petersen, 2009; Wooldridge, 2010, 2013). Einen Überblick über die Modellvariablen, einschließlich Definition und Datenquelle, ist in Table 3.2 dargestellt.

Table 3.2: Variablenübersicht und Definition

Variablen	Definition	Datenquelle
<i>Abhängige Variablen</i>		
ERD	Selbsterstellter Environmental Risk Disclosure Index (siehe hierzu Anhang A)	Geschäftsbericht, CSR-Bericht
CRD	Selbsterstellter Climate Risk Disclosure Index (siehe hierzu Anhang A)	Geschäftsbericht, CSR-Bericht
<i>Unabhängige Variablen</i>		
NPL	Notleidende Kredite (Non-Performing Loans Ratio), Non-Performing Loan / Total Loans	WorldScope
LLP	Kreditrisikovorsorge (Loan-Loss Provisions Ratio), LLP / Total Loans	WorldScope
CET1	Harte Kernkapital Quote (Common Equity Tier 1 Capital Ratio), Common Equity Tier 1 Capital / Risk Weighted Assets	WorldScope
CET2	Ergänzungskapital Quote (Common Equity Tier 2 Capital Ratio), Common Equity Tier 2 Capital / Risk Weighted Assets	WorldScope
EQP	Unterzeichner und Anwender der Equator Principles, Dummy (1/0)	Equator Principles Association
LAW	Rule of Law Index der Weltbank	World Bank
ENVSCORE	Environmental Performance Score	Asset 4
SOCSCORE	Social Performance Score	Asset 4
CSRA	Prüfung der CSR-Berichterstattung auf Basis einer Limited oder Reasonable Assurance, Dummy (1/0)	
<i>Kontrollvariablen</i>		
TobinsQ	TobinsQ, (Equity market value + liabilities market value) / (equity book value + liabilities book value)	WorldScope
ROE	Return on Equity, Net Income / Total Equity	WorldScope
ROA	Return on Assets, Net Income / Total Assets	WorldScope
NonII	Non-Interest-Income	
LNTA	Logarithmierte Total Assets	WorldScope
BoardSize	Board Size (Anzahl der Mitglieder des Boards)	Asset 4
BoardDiv	Board Diversity (Prozentualer Anteil an weiblichen Mitgliedern des Boards)	Asset 4
BoardIn	Board Independence (Prozentualer Anteil an unabhängigen Mitgliedern des Boards)	Asset 4
GDP	GDP-Wachstumsrate zum Vorjahr	Eurostat
Inflation	Durchschnittliche jährliche Inflationsrate	Eurostat
YEAR	Year-Dummies für die Jahre 2014-2017	Manuell

3.4 Ergebnisse der empirischen Analyse

3.4.1 Deskriptive Statistik

Table 3.3 liefert eine deskriptive Darstellung über den in der Untersuchung verwendeten Datensatz. Die durchschnittliche Environmental Risk Disclosure-Qualität der betrachteten Banken beträgt 15.98 bei einer Standardabweichung von 12.1 und einer leptokurtischen Kurtosis von 3.561. Die Bewertung der Offenlegungsqualität liegt zwischen 0 bis maximal 62.96. Die durchschnittliche Offenlegungsqualität der Climate Risk Disclosure beträgt 5.42 bei einer

Standardabweichung von 8.804 und einer Kurtosis von 8.869, wobei hier der maximale Wert 52.38 beträgt.

Betrachtet man die Entwicklung der Climate Risk Disclosure- und Environmental Risk Disclosure-Qualität im Zeitablauf, so lässt sich feststellen, dass im Gesamtsample eine konstante Verbesserung der Offenlegungsqualität vorliegt (Appendix 3.5). So stieg die durchschnittliche Qualität der ERD von 12.48 im Jahr 2014 auf 22.81 im Jahr 2017, was einem prozentualen Anstieg von 82.77 Prozent darstellt. Auffällig ist auch der Anstieg der Climate Risk Disclosure: Betrug die durchschnittliche Qualität im Jahr 2014 nur 2.51 Punkte, so stieg sie um das rund vierfache auf 12.28 im Jahr 2017 an. Insbesondere im Jahr 2017 kann – mit Ausnahme von Irland – ein signifikanter Anstieg der Höhe der Offenlegung festgestellt werden. Betrachtet man die Qualität der Environmental Risk Disclosure im Ländervergleich, so fällt auf, dass Banken in Deutschland, Frankreich, Großbritannien und den Niederlanden eine hohe Offenlegungsgüte besitzen. Im Gegensatz dazu legen Kreditinstitute aus Irland, Portugal und Italien im Verhältnis weniger Informationen offen. Ein ähnliches Bild liefert auch die Qualität der Offenlegung der Climate Risk Disclosure. Hier dominieren Institute aus Deutschland, Frankreich und Großbritannien. Alleine Institute aus Dänemark und Irland legen keine Informationen zu Climate Risk offen.

Table 3.3 Deskriptive Statistik

Variablen	N	Mean	Sd.	Min	Max	Skewness	Kurtosis
<i>Abhängige Variablen</i>							
ERD	152	15.98	12.10	0	62.96	0.628	3.561
CRD	152	5.420	8.804	0	52.38	2.219	8.869
<i>Unabhängige Variablen</i>							
NPL	152	12.14	14.73	0.220	63.13	1.999	6.442
LLP	152	0.661	0.952	-0.280	4.653	2.487	9.378
CET1	152	14.19	3.058	8.170	27.90	1.407	6.173
CET2	152	2.638	1.428	0	6.609	0.174	2.849
EQP	152	0.500	0.502	0	1	0	1
Law	152	1.182	0.653	0.0840	2.096	-0.308	1.566
ENVSCO	152	85.88	16.29	17.32	95.46	-2.693	9.803
SOCSCO	152	85.10	16.00	25.79	96.33	-2.006	5.942
CSRA	152	0.862	0.346	0	1	-2.097	5.398
<i>Kontrollvariablen</i>							
TobinsQ	152	0.984	0.0301	0.867	1.042	-0.867	5.179
RoE	152	1.404	12.72	-88.27	15.63	-3.429	20.12
ROA	152	0.0626	0.816	-4.159	1.076	-2.531	10.23
lnTA	152	19.61	1.403	16.93	21.99	-0.104	1.789
NonII	152	46.70	15.30	12.15	87.64	0.0947	2.904
BoardSize	152	15.14	4.279	6	30	0.381	3.660
BoardDiv	152	26.87	11.55	0	53.85	-0.00528	2.852
BoardIn	152	49.32	25.80	1.140	92.02	-0.288	1.803
GDP	152	2.265	3.019	-0.400	25.10	5.900	44.09
Inflation	152	0.546	0.882	-1.400	2.700	0.462	2.920
YEAR	152	2,016	1.122	2,014	2,017	0	1.640

Table 3.4: Korrelationstabelle

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
(1) ERD	1.000																					
(2) CRD	0.796	1.000																				

(3) NPL	-0.222	-0.081	1.000																			

(4) LLP	-0.004	-0.058	-0.120	1.000																		
(5) CET1	0.072	0.065	-0.093	-0.037	1.000																	
(6) CET2	0.274	0.127	-0.517	-0.004	0.036	1.000																
	***		***																			
(7) EQP	0.408	0.111	-0.480	0.044	0.166	0.278	1.000															
	***		***		**	***																
(8) Law	0.164	0.008	-0.687	0.084	0.397	0.490	0.318	1.000														
	**		***		***	***	***															
(9) ENVSCO	0.429	0.244	-0.192	0.129	0.206	0.201	0.363	0.264	1.000													
	***	***	**		**	**	***	***														
(10) SOCSO	0.373	0.240	-0.101	0.188	0.141	0.016	0.325	0.062	0.796	1.000												
	***	***	**	**	*		***	***	***													
(11) CSRA	0.408	0.216	-0.280	0.196	0.286	0.178	0.400	0.406	0.773	0.566	1.000											
	***	***	***	**	***	**	***	***	**	***												
(12) TobinsQ	-0.025	-0.094	-0.706	0.004	0.260	0.226	0.411	0.571	0.170	0.076	0.248	1.000										
			***		***	***	***	***	**	**	***											
(13) RoE	0.105	0.004	-0.524	-0.034	0.275	0.181	0.305	0.344	0.149	-0.002	0.328	0.425	1.000									
	***		***	**	***	**	***	***	*	***	***	***										
(14) ROA	0.120	0.032	-0.624	-0.027	0.149	0.326	0.320	0.351	0.137	0.000	0.262	0.463	0.902	1.000								
	***		***	*	*	***	***	***	*	***	***	***	***									
(15) lnTA	0.537	0.262	-0.596	0.181	0.375	0.385	0.622	0.587	0.536	0.472	0.524	0.482	0.306	0.303	1.000							
	***	***	***	**	***	***	***	***	***	***	***	***	***	***								
(16) NonII	0.204	0.128	-0.423	0.111	-0.120	0.216	0.296	0.202	0.221	0.227	0.089	0.324	0.197	0.214	0.437	1.000						
	**		***		***	***	***	**	***	***	***	***	**	***	***							
(17) BoardSize	0.103	0.067	0.064	0.105	-0.395	0.049	-0.105	-0.306	0.081	0.190	0.036	-0.235	-0.089	-0.063	-0.011	0.228	1.000					
					***		***	***	**	**	**	***	***	***	***	***						
(18) BoardDiv	0.320	0.230	-0.376	-0.129	0.186	0.301	0.345	0.299	0.215	0.164	0.035	0.288	0.164	0.124	0.513	0.447	-0.064	1.000				
	***	***	***	**	***	***	***	***	**	**	**	***	**	***	***	***	***	***				
(19) BoardIn	0.124	0.072	-0.207	0.055	-0.017	0.034	0.175	0.151*	0.101	0.159*	0.101	0.111	0.093	0.106	0.210	0.062	-0.121	0.064	1.000			
			**		**		**	*		*		***	**	***	***	***	***	***	***			
(20) GDP	-0.180	-0.101	-0.131	0.032	0.126	-0.033	-0.058	0.297	-0.162	-0.233	-0.045	0.224	0.100	0.092	-0.087	-0.121	-0.302	-0.044	0.144	1.000		
	**							***	**	***		***					**		*			
(21) Inflation	0.326	0.369	-0.360	-0.082	0.250	0.365	0.205	0.340	0.150	0.087	0.110	0.169	0.231	0.274	0.232	0.208	-0.076	0.240	0.116	-0.006	1.000	
	***	***	***	**	***	***	**	***	*	***	**	**	***	***	***	***	***	***	***	***	***	
(22) YEAR	0.298	0.391	-0.030	-0.140	0.303	0.013	0.047	-0.066	0.187	0.146	0.060	-0.145	0.154	0.116	-0.012	0.024	-0.152	0.244	0.007	0.035	0.536	1.000
	***	***		*	***			***	**	*		*	*				*	***			***	

Table 3.4 beschreibt die Korrelationsmatrix mit paarweisen Pearson Korrelationskoeffizienten. Mit Environmental Risk Disclosure (ERD); Climate Risk Disclosure (CRD); Non-Performing-Loans (NPL); Loan-Loss-Provisions (LLP); Common Equity Tier 1-Ratio (CET1); Common Equity Tier 2-Ratio (CET2); Anwender der Equator Principles (EQP); Rules of Law (Law); Environmental Performance Score (ENVSCO); Social Performance Score (SOCSO); CSR Assurance (CSRA); Tobins' Q (TobinsQ); Return on Equity (ROE); Return on Assets (ROA); Non-Net-Interest-Income (NonII); die logarithmierten Total Assets (LnTA); Größe des Boards (BoardSize); Board Diversity (BoardDiv); Board Independence (BoardIn); Wachstum des GDPs (GDP); Höhe der Inflation (Inflation); Year-Dummies für die Jahre 2014-2017 (YEAR). *** p<0.01, signifikant auf dem 0.01 Level, ** p<0.05, signifikant auf dem 0.05 Level, * p<0.1, signifikant auf dem 0.1 Level.

3.4.2 Univariate Analyse

In Table 3.4 ist die Korrelationsmatrix dargestellt. Die unabhängigen Variablen CET2, EQP, ENVSCO, SOCSCO und CSRA besitzen eine höchst signifikante und Law eine sehr signifikante positive Korrelation mit der abhängigen Variablen ERD. Entgegen der Annahme zeigt die Variable NPL eine höchst signifikant negative Korrelation. Die CET1 besitzt hingegen keine Signifikanz.

Auf die abhängige Variable CRD besitzen allein ENVSCO, SOCSCO und CSRA eine höchst signifikante Korrelation. Die anderen unabhängigen Variablen sind nicht signifikant.

Von den gewählten Kontrollvariablen besitzen die lnTA, BoardDiv, Inflation und YEAR eine höchst signifikante positive Korrelation.

3.4.3 Multivariate Analyse

In Table 3.5 werden die Ergebnisse der Modelle der Random-Effects-Regression zur Erklärung der beiden abhängigen Variablen ERD und CRD dargestellt. Eine Überprüfung der Anpassungsgüte der Regressionsmodelle wurde mit dem Wald-Chi²-Test durchgeführt, der eine Güte der gewählten Schätzgleichungen bestätigt. Das R² beträgt bei Modell 1 52.9 % und bei Modell 2 38.6 %.

Bei der Erklärung der Offenlegungsqualität durch die bilanziell gebildete Kreditrisikovorsorge fällt auf, dass die Loan-Loss-Provisions einen stark signifikant negativen Koeffizienten auf die ERD ($\beta = -1.639$ mit $p < 0.05$) und einen höchst signifikant negativen Effekt auf die CRD ($\beta = -1.137$, mit $p < 0.01$) besitzen. Banken mit hohen Loan-Loss-Provisions legen somit weniger Informationen zu möglichen Umweltrisiken offen, als in der Eingangshypothese angenommen. Die Non-Performing-Loans besitzen stattdessen keine statistische Signifikanz. Dies führt zur Falsifizierung von H1a und einer Bestätigung von Hypothese H1b.

Hypothese H2 betrachtet den Einfluss der Kapitaladäquanz auf die abhängigen Variablen. Es zeigt sich, dass allein die CET2-Ratio ein spürbar stark signifikanter Einflussstreiber auf die ERD ($\beta = 1.164$, mit $p < 0.05$) darstellt. Auf die Höhe der Offenlegungsqualität von Klimarisiken kann keine statistische Signifikanz nachgewiesen werden. Somit lässt sich die aufgestellte Hypothese nur mit Einschränkungen bestätigen.

Die freiwillige Unterzeichnung des freiwilligen Frameworks der Equator Principles als auch die Landesgesetzgebung der betrachteten Sitzstaaten besitzt keine statistische Relevanz auf die Qualität der Environmental und Climate Risk Disclosure. Dies führt zu einer Falsifizierung der Hypothese H3 und H4.

Table 3.5: Ergebnisse der Random-Effects Generalized Least Squares Regression

Variablen	(1) ERD	(2) CRD
NPL	0.152 (0.132)	0.0528 (0.0953)
LLP	-1.639** (0.803)	-1.137*** (0.433)
CET1	-0.470 (0.428)	-0.317 (0.344)
CET2	1.164** (0.543)	0.913 (0.694)
EQP	-0.385 (4.152)	-3.597 (2.760)
Law	-2.257 (3.270)	-3.380 (2.103)
ENVSCO	-0.135** (0.0687)	-0.131 (0.0803)
SOCSCO	0.0586 (0.0623)	0.0216 (0.0614)
CSRA	5.440* (3.171)	7.588** (3.247)
TobinsQ	-30.51 (35.54)	-3.570 (37.20)
RoE	-0.121 (0.0912)	-0.166** (0.0768)
RoA	2.053 (1.375)	1.776 (1.256)
lnTA	6.929*** (1.813)	3.500*** (1.330)
NonII	-0.0156 (0.0742)	0.0145 (0.0599)
BoardSize	0.0130 (0.265)	-0.0419 (0.239)
BoardDiv	0.0284 (0.0887)	0.0314 (0.0799)
BoardIn	0.00907 (0.0450)	0.00187 (0.0361)
GDP	0.0548 (0.155)	0.0645 (0.150)
Inflation	-0.461 (1.992)	0.341 (1.736)
Constant	-87.03 (53.40)	-53.60 (41.94)
Observations	152	152
Number of Banks	38	38
Year Dummies	Yes	Yes
FIRM RE	Yes	Yes
Wald-Chi ²	174.57***	85.42***
R ²	0.529	0.386

Table 3.5 beschreibt die Ergebnisse der Random-Effects GLS Regression über den Zeitraum 2014-2017 mit Environmental Risk Disclosure (ERD) und Climate Risk Disclosure (CRD) als abhängige Variablen. Als unabhängige Variablen verwendet die Regression die folgenden Variablen: Non-Performing-Loans (NPL); Loan-Loss-Provisions (LLP); Common Equity Tier 1-Ratio (CET1); Common Equity Tier 2-Ratio (CET2); Anwender der Equator Principles (EQP); Rules of Law (Law); Environmental Performance Score (ENVSCO); Social Performance Score (SOCSCO); CSR Assurance (CSRA). Als Kontrollvariablen werden folgende Variablen verwendet: Tobins'Q (TOBINSQ); Return on Equity (ROE); Return on Assets (ROA); Non-Net-Interest-Income (NonII); die logarithmierten Total Assets (LNTA); Größe des Boards (BoardSize); Board Diversity (BoardDiv) und die Board Independence (BoardIn); Wachstum des GDPs (GDP); Höhe der Inflation (Inflation), YEAR2014-YEAR2017 beschreiben die Year-Dummies für die Jahre 2014-2017. Robuste und nach Banken geclusterte Huber-White Standard Fehler in den Klammern. *** p<0.01, signifikant auf dem 0.01 Level, ** p<0.05, signifikant auf dem 0.05 Level, * p<0.1, signifikant auf dem 0.1 Level.

Hypothese H5a und H5b untersuchen den Einfluss der Umwelt- und Sozialperformance auf die abhängigen Variablen. Auf die Höhe der Environmental Risk Disclosure Qualität besitzt alleine die Umweltperformance (ENVSCO) einen stark signifikant negativen Effekt ($\beta = -0.135$, mit $p < 0,05$), im Gegensatz zu der Sozialperformance (SOCSCO). Auf die Qualität der Climate Risk Disclosure besitzen beide Variablen keine statistische Signifikanz. Dies führt zur teilweisen Bestätigung der Hypothesen H5a und zu einer Falsifizierung von Hypothese H5b.

Hypothese 6 untersucht die freiwillige Prüfung der CSR-Berichterstattung auf die abhängigen Variablen. Die als Binärvariable codierte CSRA besitzt eine positiv signifikante Wirkung auf die Environmental Risk Disclosure ($\beta = 5.440$, mit $p < 0,1$) und einen sehr signifikanten positiven Einfluss auf die Climate Risk Disclosure ($\beta = 7.588$, mit $p < 0,01$). Dies führt zur Validierung von Hypothese 6.

Bei den verwendeten Kontrollvariablen aus den Unternehmensmerkmalen sticht insbesondere der höchst signifikante Einfluss der Größe der Bank (lnTA) auf die Qualität beider Disclosure Indexe ($\beta = 6.929$ und $\beta = 3.500$, mit $p < 0.01$ für ERD und CRD) ins Auge. Die von Linsley und Shrives (2006, p. 387) gewonnenen Erkenntnisse aus der traditionellen Risikoberichterstattung lassen sich somit auch für die nichtfinanzielle Risikoberichterstattung bestätigen.

3.5 Diskussion und Zusammenfassung

Das Forschungsziel der empirischen Analyse bestand darin, die freiwillige Berichterstattung von Nachhaltigkeitsrisiken europäischer Banken im Zeitablauf zu untersuchen und Einflussfaktoren auf die Offenlegungsqualität zu identifizieren. Auf Basis der Zeitreihenbetrachtung zeigt sich, dass die Offenlegungsqualität von klimabezogenen Risiken konstant angestiegen ist, die durchschnittliche Qualität der ERD mit 15.98 jedoch vergleichbar gering ausfällt. Selbst das Institut mit der höchsten Environmental Risk Disclosure erreicht mit 62.96 im Jahr 2017 nur einen leicht überdurchschnittlichen Wert. Insbesondere im Geschäftsjahr 2017 kann einhergehend mit der verpflichtenden Anwendung der europäischen CSR-Richtlinie ein länderübergreifender Anstieg im Umfang der Offenlegung festgestellt werden. Positiv fällt auf, dass nahezu alle Banken – mit Ausnahme der Institute in Irland und Portugal⁴⁴ – im Berichtszeitraum freiwillige Angaben zum nichtfinanziellen Risikomanagement offengelegt haben. Als möglicher Erklärungsansatz kann die fiskalische Gesamtsituation der beiden Volkswirtschaften herangezogen werden. Sowohl das Bankensystem in Irland als auch in Portugal wurde von der Finanzkrise 2008 und der Euroschuldenkrise 2011 erheblich in Mitleidenschaft gezogen

⁴⁴ Erst im Berichtsjahr 2017 werden Informationen zu klimabezogenen Risiken offengelegt.

(Donnery et al., 2018; EY, 2019). Als Folge dessen besitzen Banken in beiden Staaten überdurchschnittlich hohe Non-Performing Loans in ihrer Bankbilanz.

Die Darstellung der offengelegten Informationen, insbesondere zu den klimabezogenen Risiken, erfolgt jedoch überwiegend rudimentär und beschränkt sich auf einzelne qualitative Angaben. In der Gesamtbetrachtung erfolgt die Risikoberichterstattung zu nicht-finanziellen Risiken der betrachteten Banken äußerst heterogen – vergleichbar mit empirischen Ergebnissen zur CSR-Berichterstattung (Holder-Webb et al., 2009).

Zahlreiche Banken berücksichtigen zwar bereits heute Elemente der TCFD Recommendations (2017), eine vollständige Übernahme der Empfehlungen leistet in der Stichprobe jedoch noch keine Bank. Mit einem Mittelwert von 5.42 im Sample erscheint der Umfang der Offenlegung von Klimarisiken in der heutigen Berichterstattung noch stark unterrepräsentiert. In der Längsschnittuntersuchung zeigt sich jedoch ein positiver Trend, dargestellt am Anstieg des Mittelwertes von 2.51 im Jahr 2014 auf 12.28 im Jahr 2017. Das Ergebnis ist gerade vor dem Hintergrund, dass es sich hierbei – insbesondere für Banken – um noch eine recht junge Risikoart handelt nicht weiter überraschend. Wesentliche Treiber für die Risikoberichterstattung von Banken stellen insbesondere Regulierungsbestrebungen der Bankenaufsicht (Basel Säule III) und Rechnungslegungsstandards dar (z. B. Weber, 2010; Weber & Menk, 2014). Auch zum heutigen Zeitpunkt feste Größen der Risikoberichterstattung unterlagen um die Jahrtausendwende einer ähnlichen Entwicklung. So kann im Zeitablauf sowohl eine Verbesserung des Umfangs der Offenlegung von Marktpreisrisiken (Woods et al., 2008) oder operativen Risiken (Helbok & Wagner, 2006) festgestellt werden. Da zum heutigen Zeitpunkt eine Regulierung der Bankenaufsicht zu klimabezogenen Risiken noch aussteht, bleibt eine ähnliche Entwicklung abzuwarten.

Auf Basis der Untersuchung der Determinanten lässt sich feststellen, dass die Bildung der bilanziellen Kreditrisikovorsorge einen negativen Einfluss auf den Umfang der Environmental- und Climate Risk Disclosure Qualität besitzt. Gerade Kreditinstitute mit einer hohen LLP-Ratio scheinen weniger Informationen zu klimabezogenen Risikomanagementaktivitäten offenzulegen als Banken mit geringerer Kreditrisikovorsorge. Aus verhaltensorientierter Sichtweise stellt sich somit die Frage, ob die relevanten Kreditinstitute auf die Offenlegung aufgrund fehlender regulatorischer Notwendigkeit oder bewusst zur Abmilderung möglicher negativer Folgen des Risikoausweises verzichtet haben (für einen Überblick z. B. Acharya & Ryan, 2016). Vor dem Hintergrund der überwiegenden fehlenden Materialität von klimabezogenen Risiken im

ökonomischen Kapitalkonzept⁴⁵ scheint jedoch die fehlende Offenlegungsverpflichtung zu obliegen. Einen positiven Effekt auf die Environmental Risk Disclosure besitzt das Ergänzungskapital aus den regulatorischen Eigenmitteln der Banken. Das Ergänzungskapital (Common Equity Tier 2) beinhaltet neben nachrangigen Kapitalinstrumenten bei Erfüllung von Art. 63 CRR auch regulatorische Bail-In Instrumente wie z. B. CoCo-Bonds (Hinze et al., 2017). Emittenten von nachrangigen Kapitalinstrumenten scheinen somit das Interesse an einer breiteren Transparenz zu besitzen. Die Umweltperformance besitzt einen leichten negativen Effekt auf die Environmental Risk Disclosure. Kreditinstitute mit einem hohen Nachhaltigkeitsranking scheinen überwiegend die von Thomson Reuters notwendigen Kriterien (z. B. GRI) zu erfüllen und messen dem Umweltrisikomanagement eine geringere Bedeutung zu. Empirisch valide kann die positive Wirkung einer CSR Assurance auf die Offenlegungsqualität beider Modelle festgestellt werden. Banken, die ihre Nachhaltigkeitsberichterstattung im Rahmen einer Limited oder Reasonable Assurance Bescheinigung zertifizieren lassen, besitzen per se eine höhere Offenlegungsqualität.

Zusammenfassend lässt sich auf Basis der Untersuchung konstatieren, dass nichtfinanzielle Risiken in der Offenlegung der Kreditinstitute eine stärkere Relevanz erfahren. Der Umfang der Offenlegung beschränkt sich jedoch überwiegend auf rudimentäre Angaben und erfolgt institutsspezifisch sehr heterogen. Vor dem Hintergrund, dass klimabezogene Risiken insbesondere von Seiten der Regulatoren eine stärkere Aufmerksamkeit erfahren, bleibt es spannend, inwieweit Banken zukünftig die gestiegenen Anforderungen im Rahmen ihres Risikomanagements adaptieren und offenlegen. Insbesondere in der IFRS 7 und CRR-Risikoberichterstattung ist der Standardsetter gefragt, klimabezogene Risiken stärker zu gewichten.

Im Rahmen dieses Beitrages wurde die Stichprobenauswahl auf kapitalmarktorientierte systemrelevante Banken gelegt. Die Studie fügt sich somit ein in bisherige Kapitalmarkt Untersuchungen zur CSR-Berichterstattung (z. B. Dhaliwal et al., 2011; El Ghouli et al., 2011). Durch die Stichprobenauswahl unterliegt die Untersuchung diversen Limitationen. Die Stichprobe beschränkt sich auf IFRS-Anwender im Sinne der IAS-Verordnung (EU-Verordnung Nr. 1606/2002). Nationale Besonderheiten in der Rechnungslegung und Offenlegung der einzelnen Mitgliedstaaten finden keine Berücksichtigung. Kreditinstitute ohne Kapitalmarktorientierung, wie beispielsweise in Deutschland große Landesbanken oder Genossenschaftsbanken, finden keinen Einbezug in diese Studie. Weiterhin werden nur systemrelevante Kreditinstitute in Europa berücksichtigt. Kleine Institute wie Sparkassen oder Privatbanken, ohne Einfluss auf die

⁴⁵ Siehe hierzu insbesondere die Ausführungen der EBA (2014) zur Materialität.

Finanzmarktstabilität, werden nicht betrachtet. Demzufolge sehen die Autoren weiteren Forschungsbedarf in der Analyse der Risikoberichterstattung von nicht-kapitalmarktorientierten Banken, wie Sparkassen und Volksbanken oder Kapitalanlagegesellschaften. Ergänzend zum europäischen Setting besteht zudem weiterer Forschungsbedarf in der Ausweitung auf eine globale Stichprobe.

Anhang

Appendix 3.1: Überblick Frameworks

Herausgeber, Framework	Angaben und Leitlinien zur Risikoberichterstattung	Beschreibung von Umwelt- und Klimarisiken	Berichtsteil und Anwendungsbereich
Committee of Sponsoring Organizations of the Treadway Commission (COSO) / World Business Council for Sustainable Development (WBCSD): Enterprise Risk Management – Applying enterprise risk management to environmental, social and governance-related risks (2018)	<ul style="list-style-type: none"> ▪ COSO-Komponente “Information, Communication & Reporting” beinhaltet die Prinzipien “Leverages information technology“, „Communicates risk information“ und „Reports on risk, culture and performance“ (COSO & WBCSD, 2018, p. 85). ▪ Identifikation und Aufbereitung von relevanten und somit entscheidungsnützlichen Informationen für interne und externe Stakeholder (COSO & WBCSD, 2018). 	<ul style="list-style-type: none"> ▪ In Anlehnung an die MSCI-Definition "Klimawandel, natürliche Ressourcen, Umweltverschmutzung und Abfall sowie Umweltmöglichkeiten" (COSO & WBCSD, 2018, p. 1). ▪ Verweis auf andere Frameworks wie z.B. TCFD Recommendations 	Interner Risikobericht, Corporates und Financial Service Firms, Non-Profit
Global Reporting Initiative (GRI): GRI G4 (2013) GRI-Standards (2016)	<p>GRI G4:</p> <ul style="list-style-type: none"> ▪ Identifikation und Management von Umwelttrisiken, ▪ Berichterstattung über die Wirksamkeit des RM-Systems (GRI, 2013), G4.45-47) ▪ G4.14 EN27 <p>GRI-Standards:</p> <ul style="list-style-type: none"> ▪ Angaben zu Auswirkungen von Nachhaltigkeitsrisiken auf die finanzielle Performance, ▪ Priorisierung und Beschreibung der wichtigsten Risiken, <p>Beschreibung der speziell für das Management von Nachhaltigkeitsrisiken und Chancen bestehenden Governance-Mechanismen und die Identifizierung anderer damit verbundener Risiken und Chancen (GRI, 2016, 102.15).</p>	<ul style="list-style-type: none"> ▪ fehlende Konkretisierung und Spezifikation von klimabezogenen Risikoarten, jedoch deduktiv ableitbar über den Anwendungsbereich des GRI G4: <ul style="list-style-type: none"> ○ Materialien, ○ Energie, ○ Wasser, ○ Biodiversität, ○ Emissionen, ○ Abwasser und Abfall, ○ Produkte und Dienstleistungen, ○ Compliance, ○ Transport, ○ Lieferantenumweltbewertung, ▪ Umweltverträglichkeits-mechanismen (GRI, 2013, S. 9). 	Sustainability Bericht oder Geschäftsbericht, Corporates und Financial Service Firms, Non-Profit

Herausgeber, Framework	Angaben und Leitlinien zur Risikoberichterstattung	Beschreibung von Umwelt- und Klimarisiken	Berichtsteil und Anwendungskreis
International Integrated Reporting Council (IIRC): International Integrated Reporting Framework (2013)	<ul style="list-style-type: none"> ▪ Allgemeine Angaben <i>"Welche spezifischen Risiken und Chancen beeinflussen die Fähigkeit des Unternehmens, kurz-, mittel- und langfristig Wert zu schaffen, und wie geht das Unternehmen damit um?"</i> (IIRC, 2013, IR.4.23) 	<ul style="list-style-type: none"> ▪ Fehlende Konkretisierung und Spezifikation von klimabezogenen Risikoarten 	Integrated Report, kapitalmarktorientierte Corporates und Financial Service Firms
Sustainability Accounting Standards Board (SASB): Sustainability Accounting Standards, Exposure Draft (2018)	<ul style="list-style-type: none"> ▪ Integration von Environmental, Social und Governance-Faktoren in die Kreditrisiko Analyse (SASB (2018), FN-CB-410a.2) 	<ul style="list-style-type: none"> ▪ Fehlende Konkretisierung und Spezifikation von klimabezogenen Risikoarten. ▪ Verweis auf die ESG-Abgrenzung des PRI Reporting Frameworks (PRI Association, 2017, p. 8) 	Corporates und Financial Service Firms, Abbildung von Sektor spezifischen Besonderheiten: z. B. im Financial Sektor: Commercial Banks, Investment Banking & Brokerage, Asset Management & Custody Activities, Consumer Finance, Mortgage Finance, Security & Commodity Exchanges, Insurance Geschäftsbericht, Corporates und Financial Service Firms
Task Force on Climate-related Financial Disclosures (TCFD): Recommendations of the Task Force on Climate-related Financial Disclosures (2017)	<ul style="list-style-type: none"> ▪ Beschreibung des Risikomanagementprozesses zur Identifikation, Bewertung und Management. Angaben zur Terminologie und Einordnung von klimabezogenen Risiken in das ERM, Angaben zur Risikosteuerung (Mitigation, etc.) 	<ul style="list-style-type: none"> ▪ Transition Risks: <ul style="list-style-type: none"> ○ Policy and Legal Risks, ○ Technology Risk, ○ Market Risk ○ Reputation Risk ▪ Physical Risk: <ul style="list-style-type: none"> ○ Acute Risk ○ Chronic Risk 	Geschäftsbericht, Corporates und Financial Service Firms

Herausgeber, Framework	Angaben und Leitlinien zur Risikoberichterstattung	Beschreibung von Umwelt- und Klimarisiken	Berichtsteil und Anwen- derkreis
The Equator Principles Association: Equator Principles (2013)	<ul style="list-style-type: none"> ▪ Bewertung und Management von Umwelt- und Sozialrisiken im Rahmen von Projektfinanzierungen. ▪ Teilnehmende Kreditinstitute verpflichten sich zur Einhaltung von Mindeststandards im Rahmen der Due Diligence und des Kredit-Monitorings, um eine nachhaltige Risikoentscheidung zu treffen 	<ul style="list-style-type: none"> ▪ Fehlende Konkretisierung und Spezifikation von klimabezogenen Risikoarten 	gesonderte Erklärung, Financial Service Firms
United Nations (UN): UNEP Statement of Commitment by Financial Institutions (FI) on Sustainable Development (2011)	<ul style="list-style-type: none"> ▪ Keine konkreten Angaben zur Risikoberichterstattung. 	<ul style="list-style-type: none"> ▪ Fehlende Konkretisierung und Spezifikation von klimabezogenen Risikoarten 	Sustainability Bericht oder Geschäftsbericht, Corporates und Financial Service Firms, Non-Profit

Appendix 3.2: Ergebnisse des Hausmann-Tests zur Prüfung auf Fixed Effects und Random Effects Panel Data Regression

	ERD	CRD
$\chi^2 = (b-B)'[(V_b-V_B)^{-1}](b-B)$	24.14	18.01
Prob > χ^2	0.34	0.6481

Appendix 3.3: Ergebnisse des Breusch-Pagan Lagrangian Multiplier Tests für Random Effects

Variable	Var	Sd = Sqrt (Var)
ERD	146.3351	12.0969
e	29.25041	5.408365
u	58.68254	7.660453
Test: Var(u) = 0		chibar ² (01) = 44.81 Prob > chibar ² = 0.0000
CRD	77.50277	8.803566
e	36.25613	6.021306
u	22.44375	4.737484
Test: Var(u) = 0		chibar ² (01) = 12.57 Prob > chibar ² = 0.0002

Appendix 3.4: Environmental Risk Disclosure Index

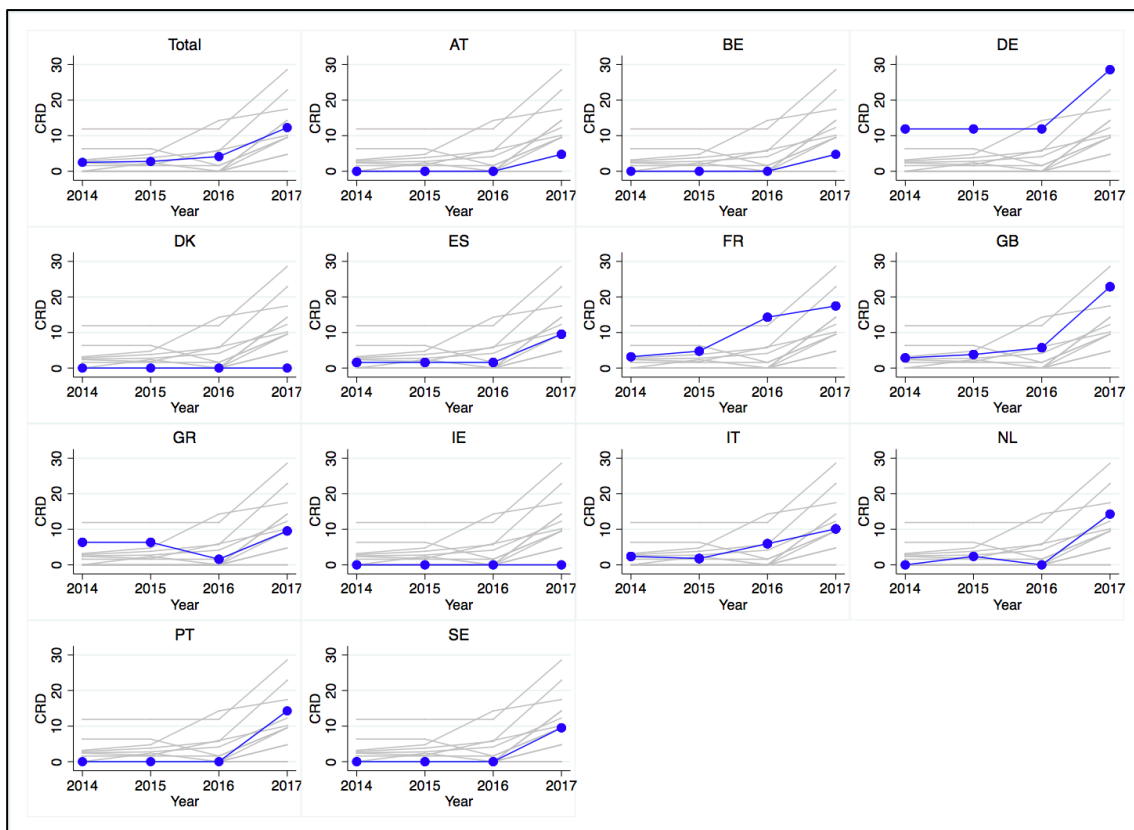
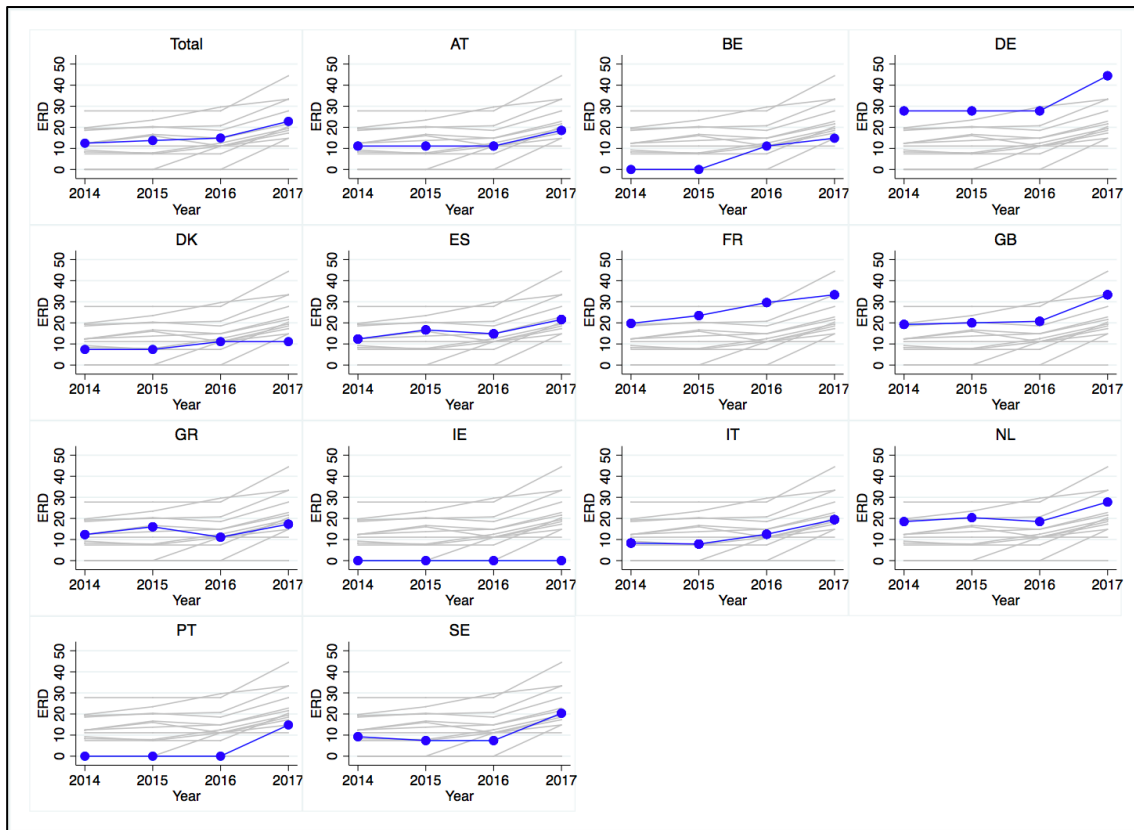
Diese Tabelle beschreibt die Zusammensetzung des Environmental Risk Disclosure Index.

1. Governance & Culture for ESG-related risks (1/0)
2. Strategy and Objective-Setting for ESG-related risks (1/0)
3. Policies for ESG-related risks (1/0)
4. Identifies Risk, Assesses and Prioritizes Risk for ESG-related risks (1/0)
5. Implements Risk Responses (1/0)
6. Communication and Reporting for ESG-related risks (1/0)
7. Climate-Related Risk Management (1/0)
8. Transition Risks (1/0)
9. Policy and Legal Risks Qualitativ (1/0)
10. Policy and Legal Risks Quantitativ (1/0)
11. Graphische oder tabellarische Darstellung (1/0)
12. Technology Risks Qualitativ (1/0)
13. Technology Risks Quantitativ (1/0)
14. Graphische oder tabellarische Darstellung (1/0)
15. Market Risk Qualitativ (1/0)
16. Market Risk Quantitativ (1/0)
17. Graphische oder tabellarische Darstellung (1/0)
18. Reputation Risk Qualitativ (1/0)
19. Reputation Risk Quantitativ (1/0)
20. Graphische oder tabellarische Darstellung (1/0)
21. Physical Risks (1/0)

22. Acute Risk Qualitativ (1/0)
23. Acute Risk Quantitativ (1/0)
24. Graphische oder tabellarische Darstellung (1/0)
25. Chronic Risk Qualitativ (1/0)
26. Chronic Risk Quantitativ (1/0)
27. Graphische oder tabellarische Darstellung (1/0)

Maximal-Score: 27

Appendix 3.5: Entwicklung der Environmental und Climate Risk Disclosure im Zeitablauf 2014-2017



Dargestellt ist die Environmental und Climate Risk Disclosure im Zeitablauf 2014-2017 für systemrelevante Kreditinstitute aus den Ländern Österreich (AT), Belgien (BE), Deutschland (DE), Dänemark (DK), Spanien (ES), Frankreich (FR), Großbritannien (GB), Griechenland (GR), Irland (IE), Italien (IT), Niederlande (NL), Portugal (PT) und Schweden (SE).

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Chapter 4: Bank Opacity, Systemic Risk, and Financial Stability

Bank Opacity, Systemic Risk, and Financial Stability

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Abstract:

This paper examines the impact of bank opacity on European financial stability. Based on a panel dataset of listed European banks covering the period 2002–2018, it can be shown that bank opacity has a significant influence on the institution-specific contribution to the Δ Conditional Value at Risk and Marginal Expected Shortfall. The enforcement mechanism and the policies introduced by accounting standard setters and regulators for the risk disclosure of banks have a positive impact on the mitigation of bank opacity and the reduction of systemic risk. Both the risk reporting in accordance with IFRS 7 and the measures introduced by the Basel Committee in the form of the Basel Pillar 3 regulation led to an increase in transparency (reduction of bank opacity) and thus an improvement in financial market stability. As an independent enforcement mechanism, the country-specific strength of the external auditing profession plays a significant role in mitigating opacity and fostering stability. The results are robust, by using both alternative opacity measures and dynamic panel data models (GMM) to control for potential endogeneity.

Keywords: Systemic Risk, Bank Opacity, Banking Regulation, IFRS 7, Basel Pillar 3

JEL-Classification: G21, G28, G32, M41, M42

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4.1 Introduction

Due to their business model of being financial intermediaries, banks are generally seen as opaque, causing negative consequences for overall financial market stability (Morgan, 2002). This is mainly because assessing risk behavior is difficult for capital market participants (Jungherr, 2018), especially in times of crisis (Flannery et al., 2013). Market discipline – as a regulatory disclosure paradigm – seeks to generate greater transparency about the risk management activities of credit institutions, in particular through the extended disclosure requirements codified by the Basel Committee in Basel Pillar 3 (Basel Committee on Banking Supervision [BCBS], 2015, 2009a, 2009b, 2004). It follows the idea that market participants monitor and discipline the risk-taking activities of banks (Bliss & Flannery, 2002; Stephanou, 2010).

In this context, high-quality financial reporting is a key success factor for effective market discipline and regulation (Acharya & Ryan, 2016). In addition to Pillar 3, International Financial Reporting Standard 7: Financial Instruments Disclosure (IFRS 7) of the International Accounting Standards Board (IASB), which became applicable for the first time for fiscal year 2007, represents a crucial standard for risk reporting for capital market-oriented banks under securities law (Bischof, 2009). The external risk reporting of banks is therefore subject to the dualistic disclosure regime of two regulatory bodies with two reporting elements: (I.) the banking supervision with the Basel Pillar 3 regulation and (II.) the accounting standard setters with the annual risk report. The paradigm of two risk disclosure frameworks with overlapping requirements (Bischof et al., 2022; Giner et al., 2020) and its inherent dysfunctions⁴⁶ have received a considerable amount of attention primarily from practitioners (PwC, 2018, 2008; Wilms, 2014), whereas in academia they often occupy a shadowy existence (Bischof et al., 2022). Due to the direct influence of disclosure on the capital market (Verrecchia, 2001; Leuz & Wysocki, 2016), discretionary disclosure of material information also plays an important role from a management perspective (Jorgensen & Kirschenheiter, 2003; Verrecchia, 2001, 1990). In addition to the multiple beneficial effects, such as on the cost of capital (Heinle & Smith, 2017), market liquidity (Leuz & Verrecchia, 2000; Smith, 2019) or risk-taking behavior (Jungherr, 2018), more transparency can also have some negative side effects, also known in the literature as Hirshleifer effect (Jungherr, 2018; Ball, 2013). These include a potential loss of confidence by market participants in bank solvency, which increases the risk of bank runs (Goldstein & Sapra, 2014; Homölle, 2009) or asset price collapses (Goldstein & Yang, 2019), with negative consequences for financial stability.

⁴⁶ An example of this is the different treatment of PDs in regulatory and IFRS 9 credit risk measurement. While the CRR primarily requires a through-the-cycle measurement, IFRS 9 and, downstream, the disclosures in IFRS 7 rely on a point-in-time estimate (Novotny-Farkas, 2016).

In the context of this paper, the line of research on systemic risk is followed to measure financial stability. Systemic risk can be defined in many different ways, resulting in a high degree of heterogeneity in the understanding of the terminology. In spite of the large number of empirical contributions, a uniform terminology has not yet been established (for an overview, see Benoit et al., 2017; Silva et al., 2017, Ellis et al., 2022). For simplicity, the following article uses the European Union definition. According to Regulation (EU) No. 1093/2010 of the European Parliament and the Council (2010, pt. 15), “systemic risk should be defined as a risk of disruption in the financial system with the potential to have serious negative consequences for the internal market and the real economy.”⁴⁷

While empirical studies in recent literature have focused primarily on the evidence for bank opacity or its determinants, the direct effect on the systemic risk of the financial system and the interaction with banking regulation and enforcement mechanism remain almost under-researched. Individual studies have already shown a causal relationship between financial stability in the form of idiosyncratic risks or insolvency risks (e.g., Fosu et al., 2017; Cao & Juelsrud, 2022) or the influence of regulatory intervention on opacity (Gallemore, 2022). However, a holistic view of opacity, systemic risk, and disclosure regulation is not yet discussed in the literature. In addition, with few exceptions (e.g., Iannotta, 2006; Cao & Juelsrud, 2022), the majority of studies concentrate on the United States. This paper attempts to fill this gap with a focus on the European capital market which has had a uniform regulatory and supervisory framework since 2014 due to the Capital Requirements Regulation (EU) No 575/2013 (CRR),⁴⁸ Capital Requirements Directive 2013/36/EU (CRD)⁴⁹ and the Single Supervisory Mechanism (SSM).⁵⁰

The purpose of this paper is to examine the impact of bank opacity on European financial stability and the possible influence of accounting and banking regulation on disclosure. To measure disclosure quality, a market-based approach is followed, assuming that the capital market anticipates regulatory measures (Leuz & Wysocki, 2016). Based on a panel dataset of listed European banks covering the period 2002–2018, it can be shown that bank opacity has a significant influence on the institution-specific contribution to the Δ Conditional Value at Risk (Δ CoVaR) and Marginal

⁴⁷ Regulation (EU) No 1093/2010 of the European Parliament and of the Council of November 24, 2010, establishing a European Supervisory Authority (European Banking Authority), amending Decision No. 716/2009/EC and repealing Commission Decision 2009/78/EC.

⁴⁸ Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012 Text with EEA relevance.

⁴⁹ Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC Text with EEA relevance.

⁵⁰ Council Regulation (EU) No 1024/2013 of 15 October 2013 conferring specific tasks on the European Central Bank concerning policies relating to the prudential supervision of credit institutions.

Expected Shortfall (MES). The policies introduced by accounting standard setters and regulators for the risk disclosure of banks have a positive impact on the mitigation of bank opacity and the reduction of systemic risk. Both the risk reporting in accordance with IFRS 7 and the regulatory measures introduced by the Basel Committee in the form of the Basel Pillar 3 regulation led to an increase in transparency (reduction of bank opacity) and thus an improvement in financial market stability. As a relevant enforcement factor, the strength of national external auditors also plays an important role in reducing bank opacity. The results are robust, by using both alternative opacity measures and dynamic panel data models (GMM) to control for endogeneity.

This paper belongs to a growing literature that examines how bank opacity affects bank soundness (Cao & Juelsrud, 2022; Dewally & Shao, 2013; Fosu et al., 2017; Tran et al., 2022). Within this context, I make four contributions to the literature: First, I extend the literature by examining the impact of bank opacity on systemic risk capital measures. Market-oriented methods are used as proxies to measure banks' opacity. In contrast to accounting-based methods (as in Cao & Juelsrud, 2022; Flannery et al., 2013), market-based methods have the advantage that market participants anticipate expected regulatory effects *ex ante* in the valuation (Leuz & Wysocki, 2016). To measure the risk-induced contribution of financial institutions, this paper follows the literature on systemic risk (Ellis et al., 2022; Kleinow et al., 2017; Silva et al., 2017) and uses the two capital measures for systemic risk ΔCoVaR and MES. Systemic risk capital measures are suitable for both regulators and market participants to determine the individual contribution of an institution to the systemic risk of the financial market and thus the resilience capacity in case of a financial market crisis (Ellis et al., 2022). In contrast to individual risk measures in the research field (see e.g. contributions by Cao & Juelsrud, 2022; Dewally & Shao, 2013; Fosu et al., 2017; Vallascas & Keasey, 2013), the two measures ΔCoVaR and MES have the advantage that, in addition to the individual equity tail risks of a bank, they also take into account contagion effects between financial institutions in particular. This provides a more holistic view of a bank's individual system-wide risk, especially from a macroprudential perspective. Second, the paper contributes to research on the impact of regulatory policies on bank systemic risk measures, in particular by examining the moderating effect of disclosure regulation and accounting enforcement. The paper attempts to address the research question raised by Ellis et al. (2022) on the impact of accounting standards on capital-based measures of systemic risk by focusing on the impact of the IASB's IFRS 7 accounting standard. In addition to the plain application of accounting standards, the influence of regulatory market discipline, as codified in the individual Basel Pillar 3 framework, is also addressed. Third, the paper assesses the moderating effect of accounting enforcement measures on bank transparency. Following the framework of Barth et al. (2006), I specifically consider the interplay between national banking supervision, external auditors and national transparency

regulations. Fourth, from a theoretical market discipline perspective, the chosen methodology has the further advantage of addressing two key actors: Financial analysts and the macroprudential banking supervision (Stephanou, 2010). The role of financial analysts is to evaluate disclosed information and provide information to the capital markets to support investment decisions. From a supervisory perspective, systemic risk measures are appropriate for the identification and monitoring of systemically important institutions and their regulation with macroprudential instruments (e.g., additional capital buffers, bank resolution) in accordance with the principle of proportionality (ESRB, 2016).

The remainder of this paper is structured as follows: In chapter 4.2, an overview of the current state of the literature is presented, and hypotheses are derived. Chapter 4.3 provides an overview of the dataset and the empirical research methodology. Chapter 4.4 outlines the empirical results of multivariate regressions and robustness checks. Chapter 4.5 contains a discussion of the results and concludes with a summary and limitations.

4.2 Literature Review and Hypotheses

Bank Opacity and Financial Stability

A large number of studies investigated the research question of whether the financial sector is less transparent than the non-financial sector, partly producing heterogeneous results. For example, Morgan (2002) examined the rating behavior of bond issuers by the rating agencies Moody's and Standard & Poor's in the period 1983–1993 and found that banks and insurance companies in particular exhibit rating deviations more frequently than non-banks. Morgan interprets this so-called split rating as bank opacity.⁵¹ Iannotta (2006) came to a similar conclusion based on a study of 2,473 bonds issued by European companies in the period 1993–2003.

Based on a microstructural market survey of US banks in the period 1990–1997, Flannery et al. (2004) reached different results; they did not find evidence to confirm that bank assets are less transparent than non-bank assets. In a follow-up study covering the period 1990–2009, Flannery et al. (2013) confirmed their previous results; banks are not less transparent than non-banks in normal scenarios. However, especially in crisis situations (long-term capital management [LTCM] crisis of 1998 and financial crisis 2007–2009), smaller credit institutions exhibit significant spread and price volatility in both crisis scenarios. For larger credit institutions, this effect can be observed in the financial crisis 2007–2009 (Flannery et al., 2013). According to Jones et al. (2012), bank opacity further favors the appearance of speculative bubbles with contagious effects, which

⁵¹ This was caused mainly by agency problems due to non-transparent bank assets. In his empirical study, Morgan (2002) particularly notes split ratings for loans and leases, cash and deposits, and trading assets.

increases the probability of a financial crisis. In an additional study, Jones et al. (2013) examined the impact of opacity on the profitability and valuation of banks during the period 2000–2007, noting that investing in opaque assets leads to higher required returns and consequently higher valuation discounts compared with transparent assets. They also observed an increase in systematic risks amongst banks, accompanied by a decrease of investments in transparent assets. This leads to systemic risks, especially in crisis situations, with negative consequences for the real economy (Jones et al., 2013).

In addition to the general risk of opaque assets and the economic consequences, a small body of literature addresses the direct impact of opacity on banks' risk-taking behavior. Fosu et al. (2017) analyzed the impact of opacity on financial stability in the form of the risk behavior of US banks over the period 1995–2013 and found that opacity increases the risk of bankruptcy of credit institutions. Dewally and Shao (2013) examined the use of derivative financial instruments as a proxy for opacity and concluded that the use of interest rate and foreign exchange derivatives reduces the transparency of bank balance sheets and that an increase in opacity leads to a significant increase in future stock price crash risk. There is also empirical evidence that more opaque banks tend to have higher stock co-movements (Hagendorff, 2013). Based on the Norwegian capital market, Cao and Juelsrud (2022) found similar results. They also argued, that better capitalized banks and greater market discipline tend to mitigate this effect. Tran et al. (2022) argued that increased opacity reduces bank profitability and leads to higher volatility of bank returns. In addition, it worsens bank's asset quality, leads to greater price synchrony, and thus to a growth in systematic risk.

Table Appendix 4.1 provides an overview of the opacity and risk proxies used in these studies. To summarize, from a methodology perspective, the majority of studies are based on idiosyncratic default risk measures like Z-Score (Cao & Juelsrud, 2022; Fosu et al., 2017; Tran et al., 2022) and Distance-to-Default (Vallascas & Keasey, 2013) or stock price risk (Dewally & Shao, 2013; Hagendorff, 2013). There is still a lack of research on the direct influence of opacity on systemic risk measures. Only Hagendorff (2013) attempts to address the direct impact of opacity on systemic risk. However, in the context of his study, he does not use systemic risk measures in the narrower sense (Silva et al., 2017, Ellis et al., 2022), instead he uses stock co-movements. This led to the following hypothesis:

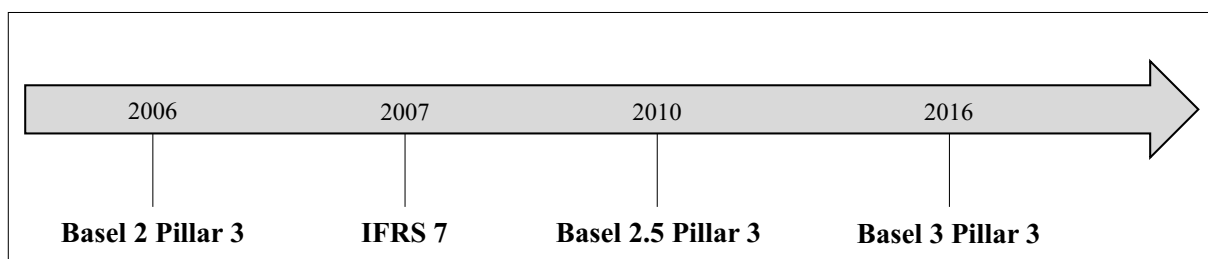
***H1:** Bank opacity has a significant impact on the systemic risk of banks and thus on financial stability.*

Bank Opacity, Banking and Accounting Regulation

Accounting regulation has played an essential role in addressing past financial crises. Along with more stringent financial accounting requirements (IASB, 2017, 2014; Novotny-Farkas, 2016), particularly addressing critics on fair value accounting (Landsman, 2006; Laux & Leuz, 2010; Xie, 2016) and loan loss provisioning under former accounting standards (Barth & Landsman, 2010; Bushman & Williams, 2012; Huizinga & Laeven, 2019; Laeven & Majnoni, 2003), risk disclosure has also received considerable attention from both scholars (Acharya & Ryan, 2016; Elshandidy et al., 2018; Ibrahim et al., 2022; Ryan, 2012) and regulators (EDTF, 2012; G 20, 2009). Theory and empirical contributions show that risk disclosure has numerous positive effects, such as a positive impact on the cost of capital (Fiechter & Zhou, 2016; Heinle & Smith, 2017; Poshakwale & Courtis, 2005), market liquidity (Bischof & Daske, 2013; Smith, 2019) and bank valuation (Elbannan & Elbannan, 2015; Giner et al., 2020). While numerous papers have discussed the impact of risk disclosure practices on banks' risk-taking behavior (Nier & Baumann, 2006; Wang et al., 2020), there is still a lack of research on the impact of accounting, especially disclosure standards, on the measurement of systemic risk measures (Ellis et al., 2022).

As described in the introduction, banks, face numerous supranational risk disclosure regulations. Figure 4.1 shows the main requirements in the form of a timeline. Capital market-oriented banks in Europe are required to prepare their consolidated financial statements in line with the International Accounting Standards (IFRS) beginning fiscal year 2005.⁵²

Figure 4.1: The Development of Risk Disclosure Requirements over the Period 2006–2018



In particular, the IFRS 7 of the IASB, applied for the first time in fiscal year 2007, represents a key standard for risk reporting by banks. Based on a European sample, Bischof (2009) identified an increase in the quality of risk reporting after the first-time adoption of IFRS 7. In addition to the risk report in the annual report, banks are also required to publish a regulatory risk report, the so-called Basel Pillar 3 report. Market discipline – as a regulatory disclosure paradigm – seeks to generate greater transparency about the risk management activities of credit institutions, in

⁵² See also: Regulation (EC) No 1606/2002 of the European Parliament and of the Council of July 19, 2002, on the application of international accounting standards.

particular through the extended disclosure requirements codified by the Basel Committee in Basel Pillar 3 (BCBS, 2015, 2009a, 2009b, 2004). It follows the idea that market participants monitor and discipline the risk activities of banks (Bliss & Flannery, 2002; Stephanou, 2010).⁵³ This led to the following hypotheses:

***H2a:** Accounting regulation (IFRS 7) has a mitigating effect on bank opacity and reduces the systemic risk of banks.*

***H2b:** Market discipline (Basel Pillar 3 regulation) has a mitigating effect on bank opacity and reduces the systemic risk of banks.*

In addition to the material application of the accounting standards, public enforcement is a key factor in the effectiveness of financial reporting (Bischof et al., 2022; Christensen et al., 2016; Holthausen, 2009). In addition to the banking supervisory authorities, the main enforcement bodies include the external auditors (Barth et al., 2013, 2006, 2004; Brown et al., 2014). In their analysis of the influence of accounting and enforcement measures on the stock price crash risk by global banks⁵⁴, Abedifar et al. (2019) found that accounting regulation was more efficient in countries with higher enforcement standards. Regulatory measures are most effective when they strengthen disclosure quality, direct banking supervision, and oversight by external auditors. The results were congruent with the findings of Barth et al. (2006) and Tadesse (2006). Barth et al. (2006) identified accurate information disclosure and internal and external control mechanisms as the most appropriate instruments to strengthen financial stability. According to Tadesse (2006), bank systems are also more resilient in countries with higher disclosure and transparency regulation. Duru et al. (2020) stated that the decision usefulness of financial statements is higher in countries with stronger accounting regulations and more rigorous enforcement. This led to the formulation of the following hypothesis:

***H3:** The quality of the external enforcement mechanism (e.g., external audit or banking supervision) has a mitigating effect on bank opacity and reduces the systemic risk of banks.*

⁵³ The theory distinguishes two forms of market discipline: *Direct market discipline* describes the opportunity for shareholders and stakeholders as market participants to influence the behavior of credit institutions (Stephanou, 2010). This includes shareholders, creditors, and depositors of sight deposits and lenders (European Central Bank, 2005). *Indirect market discipline* refers to the influence of a bank's risk activity on the market prices of the debt securities issued on the primary and secondary markets (Kwan, 2002). According to the ECB, supervisors, rating agencies, and central banks can thus be enabled to derive implications for the financial situation of the institution and to take corrective action (European Central Bank, 2005).

⁵⁴ Abedifar et al. (2019) used the negative skewness as a proxy and the volatility as a measure of equity price risk.

Finally, as a subsumption of the previous empirical and theoretical findings, the integrated influence of disclosure regulation and enforcement mechanisms should be considered. Following Fosu et al. (2017), this leads to the formation of the following natural hypothesis:

H4: Disclosure regulation and external enforcement mechanism have a mitigating effect on bank opacity and reduce the systemic risk of banks.

4.3 Research Design, Methodology, and Data

4.3.1 Sample and Data

Within the framework of this empirical study, listed European banks over the period 2002–2018 were selected. For the analysis, fundamental data from the Refinitiv Eikon database and analyst forecasts from the Institutional Brokers' Estimate System (I/B/E/S) were taken. Initially, all banks listed in the “Euro Stoxx Total Banks” index were used as the basis population. On this basis, 99 banks were identified. In the second step, eight subsidiaries were excluded. Further, one bank was excluded due to lack of market data. The final sample included a total of 90 banks from Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, and United Kingdom.

Table 4.1: The Composition of the Sample

Sample	(Share) Total Assets in Mio. EUR	No. of Banks
EURO STOXX Total Banks	25,791,789.00	99
excluding subsidiaries of a global bank holding company		8
excluding Banks with missing data in Thomson Reuters Eikon		1
Total Sample	99.1%, 25,570,839	90

Table 4.1 describes the composition of the sample.

4.3.2 Empirical Model and Dependent Variable

The analysis of the impact of bank opacity on European financial stability was carried out based on several univariate and multivariate linear fixed effects panel data models covering the reporting years 2002–2018. The decision to choose the fixed effects model was taken based on the Hausmann test (Wooldridge, 2010). Hence, this led to the following baseline model:

$$\text{Systemic Risk}_{it} = \alpha + \beta_1 \text{Opacity}_{it} + \beta_{2-8} \text{Bank Controls}_{it} + \beta_{9-11} \text{Macro Controls}_{it} + \varepsilon_{i,t} \quad (1)$$

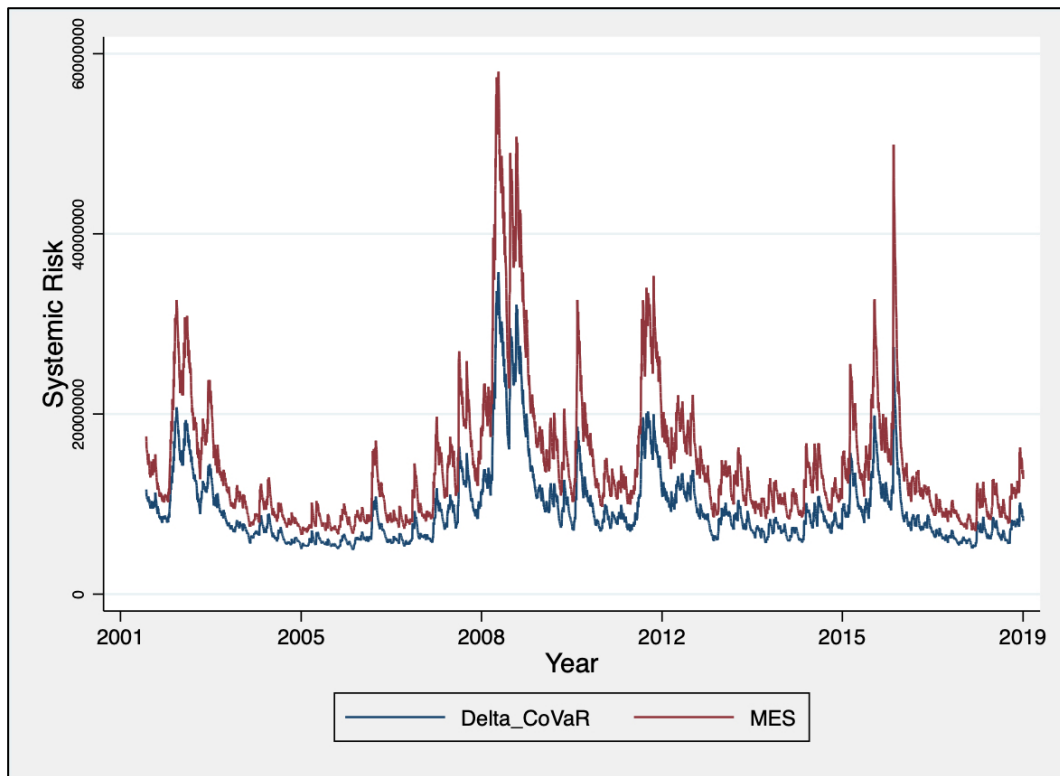
The subscript $i = 1, \dots, N$ describes the banks considered over the time periods $t = 1, \dots, T$. The variable Systemic Risk $_{it}$, measured as ΔCoVaR_{it} and MES_{it} describes as a dependent variable the marginal institutional contribution to systemic risk. According to Adrian and Brunnermeier (2016), ΔCoVaR_{it} describes the difference in the Conditional Value at Risk under the assumption that a bank is in financial distress compared to its median state:

$$\Delta\text{CoVaR}_{\alpha}^{ji} = \text{CoVaR}_{\alpha}^{j|X^i=\text{VaR}_{\alpha}^i} - \text{CoVaR}_{\alpha}^{j|X^i=\text{Median}^i} \quad (2)$$

The Marginal Expected Shortfall (MES) according to Acharya et al. (2017) is defined as the Marginal Expected Shortfall of an institution compared to the overall risk exposure of the financial system.

$$\text{MES}_{\alpha}^i \equiv \frac{\partial \text{ES}_{\alpha}}{\partial y_i} = -E(r_i | R \leq -\text{VaR}_{\alpha}) \quad (3)$$

Figure 4.2: The Development of Systemic Risk in the European Financial Sector over the Period 12/2001–12/2018



ΔCoVaR_{it} and MES_{it} were determined based on a daily time series from 2002 to 2018 with a confidence level α of 95% and a holding period of 252 days. In accordance with Brownlees and Engle (2017), I estimated the volatility of stock price returns using a generalized autoregressive conditional heteroscedastic (GARCH) model and the correlations using a dynamic conditional

correlation (DCC) model. The computations were carried out following the MATLAB routine of Belluzzo (2020). To study the impact of disclosure regulation at the annual level, the daily systemic risk measures were transformed on an annual basis. Figure 4.2 provides an overview of the development of the systemic risk measures of the sample over time. The excesses during the global financial crisis in 2007–2008 and the euro debt crisis in 2016 were remarkable.

4.3.3 Measuring Bank Opacity and the Moderating Role of Risk Disclosure Regulation & Enforcement

For the measurement of bank opacity, this paper followed the approach by Fosu et al. (2017) and Flannery et al. (2004) and used as a proxy the analysts' forecast errors and analysts' forecast dispersions. The use of analysts' forecasts as a market-related measure for determining disclosure quality has a long history in empirical accounting and finance research (e.g., Anolli et al., 2014; Barron et al., 2009, 1998; Hope, 2003; Lang & Lundholm, 1996; for an overview, see also Leuz & Wysocki, 2016) and is suitable for measuring bank opacity. Following Lang and Lundholm (1996), opacity is here defined as follows:

$$\text{Forecast Error}_{it} = \left| \frac{\text{FEPS}_{it} - \text{AEPS}_{it}}{\text{Price}_{it}} \right| \quad (4)$$

FEPS denotes the 12-month analysts' forecast errors. *EPS* were the actual earning per shares. *Price* is the share price at year-end closing.

The analysts' forecast dispersions are in accordance with Lang and Lundholm (1996), defined as the standard deviation of the 12-month forecast of earnings per shares of bank *i* for year *t*:

$$\text{Forecast Dispersion}_{it} = \sigma \text{FEPS}_{it} \quad (5)$$

The second part of the econometric analysis focuses on the moderating role of risk disclosure regulation and country-specific enforcement mechanisms. This leads to an extension of the baseline model (1) by the interaction term *Opacity_{it} * Regulatory and Enforcement_{it}*, resulting in the following model:

$$\text{Systemic Risk}_{it} = \alpha + \beta_1 \text{Opacity}_{it} + \beta_2 \text{Opacity}_{it} * \text{Regulatory and Enforcement}_{it} + \beta_3 \text{Regulatory and Enforcement}_{it} + \beta_{10-22} \text{Bank Controls}_{it} + \beta_{10-22} \text{Macro Controls}_{it} + \varepsilon_{i,t} \quad (6)$$

The subscript $i = 1, \dots, N$ describes the banks considered over the time periods $t = 1, \dots, T$. The variable Regulatory and Enforcement $_{it}$, will be measured on several ways: Risk Disclosure and Enforcement Quality Index (RD&E $_{it}$), Accounting Risk Disclosure Regulation (IFRS7), Regulatory Risk Disclosure Regulation (Basel Pillar3), the strength of local banking supervision (Supervisory Power $_{it}$), and the strength of external audit (ExternalAudit $_{it}$).

Following previous studies on the influence of regulatory and enforcement measures on bank disclosure (Abedifar et al., 2019; Ayadi et al., 2016; Duru et al., 2020; Tadesse, 2006), data from the World Bank Regulation and Supervisory Survey were used (Anginer et al., 2019; Barth et al., 2008, 2006, 2001; Čihák et al., 2012). To measure the overall country-specific disclosure regulation and enforcement quality, the index variable risk disclosure & enforcement (RD&E $_{it}$) was created. In addition to local and supranational requirements for the preparation of risk reports (esp. IFRS 7 and Basel Pillar 3), the index contains proxies for measuring country-specific enforcement bodies.

$$RD\&E_{it} = \sum(\text{SupervisoryPower}_{it} + \text{External Audit}_{it} + \text{FinStatementTransparency}_{it} + \text{IFRS7}_{it} + \text{Basel Pillar 3 Regulation}_{it}) \quad (7)$$

Similar to Abedifar et al. (2019) and Duru et al. (2020), the index follows the variable definitions of Barth et al. (2006) and uses data from the World Bank Supervisory Survey 2001, 2006, 2008, 2012, and 2019 to determine the strength of local banking supervision (SupervisoryPower $_{it}$), the strength of external audit (ExternalAudit $_{it}$), and local transparency requirements for the preparation of the financial statement (FinStatementTrans $_{it}$). As additional disclosure requirements, the index further includes the binary variables IFRS 7 and Basel Pillar 3 regulation (BCBS, 2015, 2009a, 2009b, 2004) to cover the European Union supplemental requirements for capital market-oriented banks. The dummy variable IFRS 7 is assigned a value of 1 for reporting years starting in 2007, the effective date of the new accounting standard IFRS 7, zero otherwise. As a proxy for market discipline, we use the binary variable Basel Pillar 3, which is assigned a value of 1 if the Basel Pillar 3 regulation is applicable.

A detailed overview of the variables used in this index, including their definition and data source, is presented in Table 4.2.

4.3.4 Bank and Macroeconomic Controls

The econometric models use bank-specific and macroeconomic control variables. On the bank specific level, I follow Dong and Oberson (2022) and control for significant banks that are directly supervised by the European Central Bank (ECB Supervision_{it}) to address the impact of supranational banking supervision under the SSM (Lannoo, 2014).⁵⁵ Following former studies in the research field (Hagendorff, 2013; Vallascas & Keasey, 2013), I use the bank size, measured by the logarithm of total assets (logAssets_{it}) as control variable. According to Hagendorff (2013), large banks in particular are more vulnerable to systematic and systemic shocks as smaller banks through a higher exposure of risk. Big Banks are also subject to more rigorous macroprudential instruments in line with the principle of proportionality. (e.g., Chiti et al., 2020; ECB, 2019; World Bank & BCBS, 2021). As suggested by literature (e.g., Demirgüç-Kunt & Huizinga, 2010; Dong & Oberson, 2022) we control for additional proxies for the business model, such as the deposits ratio scaled by total assets (DepRatio_{it}), and for measuring bank's asset structure the loans ratio scaled by total assets (LoanRatio_{it}). Return on equity (ROE_{it}) serves as a proxy for profitability and non-performing loans scaled by total loans (NPL_{it}) as an indicator for the risk profile resulting on credit risk. As additional measures of banks' asset quality, I use the equity ratio (EQRatio_{it}) as a proxy for bank capitalization, and for bank's capital structure the leverage ratio (LevRatio_{it}).

On the macroeconomic level, I followed Demirgüç-Kunt and Huizinga (2010) and Neitzert and Petras (2022) to control for the annual growth rate of gross domestic product (GDP Growth_{it}), change in gross domestic product divided by midyear population (Δ GDP per Capita_{it}), and the inflation (Inflation_{it}). As further control variables, dummy variables for the years 2002–2018 were added. To address possible endogeneity and reduce simultaneously, and reverse causality bias, all independent and control variables in Model 6 were lagged by one year (e.g., Neitzert & Petras, 2022; Steinberg & Malhotra, 2014; Buch et al., 2013). To avoid measurement errors, the econometric models used robust Huber–White standard errors clustered by banks (Petersen, 2009; Wooldridge, 2013, 2010). An overview of the model variables, including definition and data source, is presented in Table 4.2. Table 4.3 and Table 4.4 also provides an overview of the descriptive statistics and a pairwise correlations matrix of the sample.

⁵⁵ Council Regulation (EU) No 1024/2013 of 15 October 2013 conferring specific tasks on the European Central Bank concerning policies relating to the prudential supervision of credit institutions.

Table 4.2: Description of Variables

Variables	Description	Datasource
Dependent Variables		
ΔCoVaR	Delta Conditional Value at Risk according to Adrian & Own Computation Brunnermeier (2008)	
MES	Marginal Expected Shortfall according to Acharya et al. Own Computation (2010)	
Independent Variables		
Opacity _{FE}	Bank Opacity measures in 12-Month Analysts' Forecast Error, $\text{abs}((12\text{-Month-Forecast EPS} - \text{Actual EPS}) / \text{Price})$	Refinitiv EIKON
Opacity _{Dis}	Forecast Dispersion (σ 12-Month-Forecast EPS)	Refinitiv EIKON
High Forecast Errors ($\in \{0; 1\}$)	Dummy that equals 1 if Opacity _{FE} is above the Median; and 0 otherwise	Refinitiv EIKON
High Forecast Dispersion ($\in \{0; 1\}$)	Dummy that equals 1 if Opacity _{Dis} is above the Median; and 0 otherwise	Refinitiv EIKON
RD&E	Proxy for Risk Disclosure and Enforcement Quality Index, Own Computation Supervisory Power + ExternalAuditStrength + FinStatementTrans + Basel Pillar 3 + IFRS 7	
SupervisoryPower	“Whether the supervisory authorities have the authority to take specific actions to prevent and correct problems; Sum of WBG 5.5 + 5.6 + 5.7 + 6.1 + 10.4 + 11.2 + 11.3.1 + 11.3.2 + 11.3.3 + 11.6 + 11.7 + 11.9.1 + 11.9.2 + 11.9.3 Does the supervisory agency have the right to meet with external auditors to discuss their report without the approval of the bank? (5.5); Are auditors required by law to communicate directly to the supervisory agency any presumed involvement of bank directors or senior managers in illicit activities, fraud, or insider abuse? (5.6); Are external auditors legally required to report to the supervisory agency any other information discovered in an audit that could jeopardize the health of a bank? (5.6.1); Can supervisors take legal action against external auditors for negligence? (5.7); Can the supervisory authority force a bank to change its internal organizational structure? (6.1); Are off-balance sheet items disclosed to supervisors? (10.4); Can the supervisory agency order the bank's directors or management to constitute provisions to cover actual or potential losses? (11.2); Can the supervisory agency suspend the directors' decision to distribute: (11.3); Dividends? (11.3.1); Bonuses? (11.3.2); Management Fees? (11.3.3); Who can legally declare---such that this declaration supersedes some of the rights of shareholders that a bank is insolvent: (Check all that apply) (11.6); Bank Supervisor (11.6.1); Court (11.6.2); Deposit insurance agency (11.6.3); Bank restructuring or Asset Management Agency (11.6.4); Other (please specify) (11.6.5); According to the Banking Law, who has authority to intervene that is, suspend some or all ownership rights a problem bank? (Check all that apply) (11.7); Bank Supervisor (11.7.1); Court (11.7.2); Deposit insurance agency (11.7.3); Bank restructuring or Asset Management Agency (11.7.4); Other (please specify) (11.7.5); Regarding bank restructuring and reorganization, can the supervisory agency or any other government agency do the following: (11.9); Supersede shareholder rights? (11.9.1); Bank Supervisor (11.9.1.1); Court (11.9.1.2); Deposit insurance agency (11.9.1.3) Bank restructuring or Asset Management Agency (11.9.1.5); Other (please specify) (11.9.1.5); Remove and replace management? (11.9.2); Bank Supervisor (11.9.2.1); Court (11.9.2.2); Deposit insurance agency (11.9.2.3); Bank	Barth et al. (2006), p. 339.

Variables	Description	Datasource
ExternalAudit	restructuring or Asset Management Agency (11.9.2.5); Other (please specify) (11.9.2.5) Remove and replace directors? (11.9.3); Bank Supervisor (11.9.3.1); Court (11.9.3.2); Deposit insurance agency (11.9.3.3); Bank restructuring or Asset Management Agency (11.9.3.5); Other (please specify) (11.9.3.5)” “The Effectiveness of external audit of Banks; Sum of WBG 5.1+5.2+5.3+5.4+5.5+5.6+5.7 Is an external audit a compulsory obligation for banks? (5.1); Are specific requirements for the extent or nature of the audit spelled out? (5.2); Are auditors licensed or certified? (5.3); Do supervisors get a copy of the auditor's report? (5.4); Are auditors required by law to communicate directly to the supervisory agency any presumed involvement of bank directors or senior managers in illicit activities, fraud, or insider abuse? (5.6); Can supervisors take legal action against external auditors for negligence? (5.7)”	Barth et al. (2006), p. 354.
FinStatementTrans	“The transparency of bank financial statements practices; Sum of WBG 10.1 + 10.3 + 10.4.1 + 10.5 + 10.6 + (10.1.1-1) *(-1) Does accrued, though unpaid, interest/principal enter the income statement while the loan is still performing? (10.1); Does accrued, though unpaid, interest/principal enter the income statement while the loan is still non-performing? (10.1.1); Are financial institutions required to produce consolidated accounts covering all bank and any non-bank financial subsidiaries (including affiliates of common holding companies)? (10.3); Are off-balance sheet items disclosed to the public? (10.4.1); Must banks disclose their risk management procedures to the public? (10.5); Are bank directors legally liable if information disclosed is erroneous or misleading? (10.6)”	Barth et al. (2006), p. 355.
Basel Pillar 3 (€ {0; 1})	Proxy for Regulatory Risk Disclosure Regulation, Dummy Own Computation, BCBS that equals 1 if Basel Pillar 3 Regulation is applicable, Basel 2 + Basel 2.5 + Basel 3	(2004, 2009a, 2009b, 2015)
IFRS 7 (€ {0; 1})	Proxy for Accounting Risk Disclosure Regulation, Dummy Own Computation, IASB that equals 1 if IFRS 7 is applicable, 1 if Year ≥ 2007 and 0 (2005) otherwise	
Basel 2 (€ {0; 1})	Dummy that equals 1 if Basel 2 Pillar 3 is applicable, 1 if BCBS (2004) Year ≥ 2006 and 0 otherwise	
Basel 2.5 (€ {0; 1})	Dummy that equals 1 if Basel 2.5 Pillar 3 is applicable, 1 if BCBS (2009a, 2009b) Year ≥ 2010 and 0 otherwise	
Basel 3 (€ {0; 1})	Dummy that equals 1 if Basel 3 Pillar 3 is applicable, 1 if BCBS (2015) Year ≥ 2016 and 0 otherwise	
Bank Controls		
ECB Supervision (€ {0; 1})	Significant supervised entity, which is supervised by the European Central Bank European Central Bank, Dummy that equals 1 if a bank is supervised by ECB and 0 otherwise	
logAssets	Logarithm of Total Assets	Refinitiv EIKON
DepRatio (%)	Deposits Ratio, (Total Deposits / Total Assets)	Refinitiv EIKON
LoanRatio (%)	Loans Ratio, (Total Loans/ Total Assets)*100	Refinitiv EIKON
ROE (%)	Return on Equity, Net Income / Total Equity	Refinitiv EIKON
NPL (%)	Non-Performing Loans-Ratio, NPL / Total Loans	Refinitiv EIKON
EQRatio (%)	Equity Ratio, Total Equity / Total Assets	Refinitiv EIKON
LevRatio (%)	Leverage Ratio, Total Liabilities / Total Equity	Refinitiv EIKON
Macro Controls		
GDP Growth (%)	Annual growth rate of Gross domestic product	World Bank

Variables	Description	Datasource
ΔGDP per Capita	Change in Gross domestic product divided by midyear population	World Bank
Inflation	Inflation	World Bank

Table 4.2 describes the definition and data sources of the used variables. Dependent Variables comprises the used Systemic Risk Measures, Independent Variables comprises proxies for Opacity and Risk Disclosure and Enforcement Regulation. In addition, Bank Level and Macroeconomic Controls are used.

Table 4.3: Descriptive Statistics

Panel A:

Country	No. of Banks	No. of Obs.	ΔCoVaR	No. of Obs.	MES	No. of Obs.	Opacity _{FE}	No. of Obs.	Opacity _{Dis}	No. of Obs.	RD&E
Austria	4	50	.0115148	50	.0211666	31	4.274231	31	2.094693	68	21.2
Belgium	2	17	.0159883	17	.0334384	17	4.399121	17	2.46067	32	21.875
Cyprus	1	2	.0026514	2	.0068464	2	17.1	2	3.700741	17	18.8
Denmark	5	85	.0118385	85	.0151697	82	2.694681	79	1.254253	85	18.6
Finland	2	17	.0188348	17	.02601	25	1.326891	23	.711878	34	20.5
France	4	68	.0188513	68	.0350416	68	3.847772	68	1.73597	68	20.8
Germany	3	38	.0188828	38	.0356265	36	5.471052	37	3.273431	51	20.2
Ireland	2	34	.0093544	34	.0300663	33	23.4	32	17.6	34	18.5
Italy	12	174	.0153605	174	.0283399	153	4.279174	142	2.083401	204	21.8
Netherlands	2	21	.0182572	21	.0355724	20	4.153875	20	1.849895	34	20.2
Norway	13	152	.009392	152	.0125027	144	12.7	122	1.284994	221	18.9
Poland	5	46	.0095581	46	.0156754	41	5.80676	34	2.196702	85	19.6
Portugal	1	17	.0117653	17	.0251795	17	6.512566	17	3.514235	17	21.5
Spain	8	96	.0169847	96	.0267601	92	2.297324	92	1.574181	136	21.8
Sweden	4	71	.0173923	71	.0248666	60	2.391884	55	.9565368	70	21.4
Switzerland	12	186	.007737	186	.0108838	154	1.93288	135	1.022199	204	24.5
UK	10	118	.015937	118	.0276265	112	3.474991	114	1.654128	170	19.8

Panel B:

VARIABLES	(1) N	(2) Mean	(3) σ	(4) Min	(5) Max	(6) Skewness	(7) Kurtosis	(8) p1	(9) p25	(10) p50	(11) p75	(12) p90	(13) p99
<i>Panel A: Dependent Variables</i>													
ΔCoVaR	1,192	0.0133	0.00797	-0.00217	0.0460	0.833	4.200	-0.00121	0.00761	0.0124	0.0173	0.0236	0.0367
MES	1,192	0.0222	0.0155	-0.00439	0.101	1.170	5.114	-0.000863	0.0112	0.0199	0.0294	0.0424	0.0727
<i>Panel B: Independent Variables</i>													
Opacity _{FE}	1,334	4.890	13.54	0	278.2	10.59	161.6	0.0191	0.729	1.736	4.828	10.11	63.94
Opacity _{Dis}	1255	1.464	11.308	0	272.715	17.008	353.032	0.0100	0.047	0.103	0.303	0.860	36.78
RD&E	1,621	20.74	3.234	14	26	-0.0216	1.868	15	18	21	23	25	26
FinStatementTrans	1,621	4.702	0.585	3	5	-1.822	5.161	3	5	5	5	5	5
ExternalAudit	1,621	5.162	0.829	2	6	-0.726	3.297	3	5	5	6	6	6
SupervisoryPower	1,621	9.496	2.289	4	13	-0.231	2.067	4	8	10	12	12	13
IFRS7	2,002	0.545	0.498	0	1	-0.183	1.033	0	0	1	1	1	1
Basel Pillar 3	2,002	0.591	0.492	0	1	-0.370	1.137	0	0	1	1	1	1

VARIABLES	(1) N	(2) Mean	(3) σ	(4) Min	(5) Max	(6) Skewness	(7) Kurtosis	(8) p1	(9) p25	(10) p50	(11) p75	(12) p90	(13) p99
Basel 2	2,002	0.182	0.386	0	1	1.650	3.722	0	0	0	0	1	1
Basel 2.5	2,002	0.273	0.445	0	1	1.021	2.042	0	0	0	1	1	1
Basel 3	2,002	0.136	0.343	0	1	2.119	5.491	0	0	0	0	1	1
<i>Panel C: Bank Controls</i>													
ECB Supervision	2,002	0.0704	0.256	0	1	3.358	12.27	0	0	0	0	0	1
logAssets	1,648	17.81	2.037	9.508	21.84	-0.142	2.338	13.27	16.24	17.79	19.47	20.54	21.42
DepRatio (%)	1,625	48.43	17.38	0.0669	93.92	-0.108	2.822	4.648	36.51	48.66	60.37	71.64	85.52
LoanRatio (%)	1,594	66.37	18.61	1.453	99.50	-0.982	3.722	12.10	57.77	69.92	78.87	87.98	93.41
ROE (%)	1,647	7.677	26.79	-856.5	317.2	-20.77	680.0	-40.99	5.064	8.965	13.68	18.14	29.85
NPL (%)	1,322	3.641	5.308	0	62.96	3.757	24.96	0.0250	0.729	1.801	4.046	8.937	26.78
EQRatio (%)	1,648	6.885	4.625	-2.198	98.74	7.014	110.8	1.988	4.479	6.029	7.686	11.61	20.82
LevRatio (%)	1,648	1,738	930.2	-4,651	11,876	1.880	15.83	368.6	1,198	1,557	2,121	2,882	4,837
<i>Panel D: Macroeconomic Controls</i>													
GDP Growth (%)	2,002	1.965	2.220	-8	25	0.549	16.26	-5	1	2	3	4	7
Δ GDP per Capita	1,911	4,514	11,189	-43,841	51,961	1.654	10.19	-11,768	589	975	2,991	15,213	47,700
Inflation	2,002	1.970	2.398	-5	15	1.941	11.01	-3	1	2	3	4	11

Table 4.3 describes the descriptive statistics of the sample in the period from 2002-2018. For the definition and data sources of the used variables see Table 4.2.

Table 4.4: Correlation Table

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) ΔCoVar	1										
(2) MES	0.893***	1									
(3) $\text{Opacity}_{\text{FE}}$	0.072**	0.169***	1								
(4) $\text{Opacity}_{\text{Dis}}$	0.173***	0.334***	0.657***	1							
(5) RD&E	0.054*	0.082***	-0.077***	-0.044	1						
(6) finstatetrans	0.137***	0.171***	-0.043	0.031	0.319***	1					
(7) IFRS 7	0.197***	0.250***	0.083***	0.111***	0.531***	0.206***	1				
(8) Basel Pillar3	0.155***	0.208***	0.077***	0.096***	0.497***	0.212***	0.911***	1			
(9) External Audit Strength	-0.011	-0.050*	0.009	-0.016	0.493***	-0.206***	-0.101***	-0.100***	1		
(10) Supervisory Power	-0.016	0.008	-0.120***	-0.095***	0.946***	0.185***	0.356***	0.306***	0.428***	1	
(11) ECB Supervision	0.039	0.091***	-0.022	-0.016	0.143***	0.142***	0.251***	0.229***	-0.092***	0.116***	1
(12) $\log\text{Assets}$	0.600***	0.606***	-0.102***	0.050*	0.095***	0.194***	0.116***	0.125***	-0.022	0.065**	0.215***
(13) DepRatio	-0.458***	-0.396***	0.006	-0.028	0.086***	-0.117***	0.121***	0.099***	-0.016	0.112***	0.058**
(14) LoanRatio	-0.412***	-0.384***	0.106***	0.019	-0.064**	-0.066**	-0.103***	-0.107***	0.053*	-0.063**	-0.091***
(15) ROE	-0.155***	-0.215***	-0.251***	-0.300***	-0.012	-0.017	-0.134***	-0.112***	0.082***	-0.008	-0.033
(16) NPL	0.109***	0.247***	0.044	0.155***	0.149***	-0.057*	0.268***	0.238***	-0.021	0.149***	0.273***
(17) EQRatio	-0.237***	-0.276***	-0.012	-0.04	0.025	-0.022	0.129***	0.123***	-0.100***	0.038	-0.02
(18) LevRatio	0.316***	0.338***	-0.003	0.038	-0.093***	0.004	-0.200***	-0.191***	0.079***	-0.092***	-0.041*
(19) GDP Growth	-0.353***	-0.344***	-0.158***	-0.220***	-0.170***	-0.131***	-0.334***	-0.281***	-0.134***	-0.092***	0.059***
(20) $\Delta\text{GDP per Capita}$	-0.166***	-0.227***	0.108***	-0.098***	-0.195***	0.008	-0.078***	-0.034	-0.093***	-0.227***	-0.086***
(21) Inflation	-0.022	-0.080***	0.048*	-0.166***	-0.293***	0.001	-0.235***	-0.188***	-0.123***	-0.286***	-0.095***

(Continued on next page)

Table 4.4: Correlation Table (continued)

VARIABLES	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(12) logAssets	1									
(13) DepRatio	-0.437***	1								
(14) LoanRatio	-0.513***	0.415***	1							
(15) ROE	0.001	-0.051**	-0.017	1						
(16) NPL	0.096***	0.179***	0.033	-0.282***	1					
(17) EQRatio	-0.499***	0.232***	0.104***	-0.01	0.106***	1				
(18) LevRatio	0.493***	-0.360***	-0.266***	-0.289***	-0.147***	-0.624***	1			
(19) GDP Growth	-0.094***	0.142***	0.045*	0.138***	-0.078***	0.061**	-0.044*	1		
(20) ΔGDP per Capita	-0.237***	0	0.204***	0.044*	-0.143***	0.027	-0.082***	0.188***	1	
(21) Inflation	-0.140***	-0.027	0.123***	0.046*	-0.136***	0.009	-0.032	0.219***	0.746***	1

Table 4.4 describes the pairwise Correlation Matrix. *** p<0.01, ** p<0.05, * p<0.1

4.4 Results

4.4.1 Univariate and Multivariate Analysis

Table 4.5 summarizes the results of fixed effects regression measuring the impact of bank opacity on systemic risk over the period 2002–2018. In this context, Model (1–3) describes the results for ΔCoVaR and Model (4–6) for the Marginal Expected Shortfall (MES) as a systemic risk metric. Bank opacity has a significant positive effect on the measured systemic risk of a bank. The results of both the univariate regression (Models 1 and 4) and the multivariate regressions are significant at the 1% level (Models 2 and 5) and 5% level (Models 3 and 6) with variations in the control variables. The results are robust using bank controls and macroeconomic control variables, with both analysts forecast errors and forecast dispersions as proxies for opacity. It is noticeable that the control variable ECB supervision in particular has a significant negative effect on ΔCoVaR at the 5% level and a highly significant negative effect on the MES at the 1% level. Supervision by the European Central Bank thus reduces the systemic risk of individual banks and hence strengthens financial market stability. The first hypothesis H1 can be confirmed. Bank Opacity has a significant effect on the increase of systemic risk. The results are in line with the initial empirical findings of previous studies (Cao & Juelsrud, 2022; Fosu et al., 2017; Hagendorff, 2013).

Table 4.5: Bank Opacity and Systemic Risk – Fixed Effects Estimation

Panel A: Forecast Errors

VARIABLES	(1) ΔCoVaR	(2) ΔCoVaR	(3) ΔCoVaR	(4) MES	(5) MES	(6) MES
Opacity _{FE}	5.08e-05*** (1.50e-05)	3.75e-05*** (1.31e-05)	3.54e-05** (1.48e-05)	0.000169*** (5.70e-05)	0.000138*** (4.99e-05)	0.000123** (4.74e-05)
ECB Supervision ($\in \{0; 1\}$)		-0.00158** (0.000624)	-0.00154** (0.000647)		-0.00447*** (0.00135)	-0.00385*** (0.00137)
logAssets		0.00177* (0.00105)	0.00171 (0.00107)		0.00679*** (0.00214)	0.00598*** (0.00207)
DepRatio (%)		-2.22e-05 (3.01e-05)	-2.08e-05 (3.10e-05)		-5.72e-05 (6.27e-05)	-5.62e-05 (6.24e-05)
LoanRatio (%)		2.64e-05 (2.71e-05)	2.60e-05 (2.69e-05)		5.83e-05 (5.08e-05)	4.79e-05 (4.95e-05)
ROE (%)		-2.99e-05 (2.10e-05)	-2.92e-05 (2.07e-05)		-8.66e-05** (3.57e-05)	-8.27e-05** (3.60e-05)
NPL (%)		0.000265*** (7.36e-05)	0.000262*** (7.41e-05)		0.000460*** (0.000170)	0.000447** (0.000172)
EQRatio (%)		0.000111 (0.000195)	0.000131 (0.000192)		0.000106 (0.000358)	0.000132 (0.000335)
LevRatio (%)		2.13e-07 (4.98e-07)	2.68e-07 (4.94e-07)		-4.00e-07 (1.17e-06)	-2.17e-07 (1.15e-06)
GDP Growth (%)			-0.000108 (8.88e-05)			-0.000460*** (0.000118)
ΔGDP per Capita			1.39e-08 (3.27e-08)			1.05e-07 (6.93e-08)
Inflation			6.86e-05 (0.000148)			-0.000405 (0.000349)
Constant	0.0155*** (0.000643)	-0.0179 (0.0189)	-0.0172 (0.0196)	0.0241*** (0.00117)	-0.0975** (0.0374)	-0.0817** (0.0363)
Observations	1,067	970	970	1,067	970	970

Number of Banks	85	77	77	85	77	77
Year FE	✓	✓	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓	✓	✓
R ²	0.279	0.558	0.562	0.289	0.631	0.646

Panel B: Forecast Dispersions

VARIABLES	(1) ΔCoVaR	(2) ΔCoVaR	(3) ΔCoVaR	(4) MES	(5) MES	(6) MES
Opacity _{Dis}	0.000138*** (4.57e-05)	0.000101** (3.86e-05)	0.000109*** (3.82e-05)	0.000446*** (5.86e-05)	0.000358*** (5.44e-05)	0.000344*** (6.53e-05)
ECB Supervision (∈ {0; 1})		-0.00136** (0.000617)	-0.00144** (0.000642)		-0.00382*** (0.00127)	-0.00360*** (0.00130)
logAssets		0.00161 (0.00109)	0.00177 (0.00111)		0.00595*** (0.00212)	0.00576*** (0.00209)
DepRatio (%)		-1.24e-05 (3.09e-05)	-7.47e-06 (3.20e-05)		-2.58e-05 (6.12e-05)	-1.90e-05 (6.15e-05)
LoanRatio (%)		2.04e-05 (2.68e-05)	2.31e-05 (2.68e-05)		4.19e-05 (4.74e-05)	4.00e-05 (4.64e-05)
ROE (%)		-2.31e-05 (1.83e-05)	-2.23e-05 (1.78e-05)		-6.45e-05** (2.98e-05)	-6.28e-05** (2.97e-05)
NPL (%)		0.000250*** (7.38e-05)	0.000250*** (7.41e-05)		0.000419** (0.000165)	0.000416** (0.000165)
EQRatio (%)		0.000111 (0.000185)	0.000139 (0.000180)		8.51e-05 (0.000357)	0.000139 (0.000340)
LevRatio (%)		3.22e-07 (4.76e-07)	3.73e-07 (4.70e-07)		-3.51e-08 (1.09e-06)	1.02e-07 (1.08e-06)
GDP Growth (%)			-8.00e-05 (8.33e-05)			-0.000399*** (0.000131)
ΔGDP per Capita			-1.46e-08 (3.07e-08)			2.81e-08 (6.35e-08)
Inflation			0.000255* (0.000133)			0.000129 (0.000309)
Constant	0.0164*** (0.000638)	-0.0148 (0.0199)	-0.0187 (0.0203)	0.0257*** (0.00115)	-0.0828** (0.0371)	-0.0800** (0.0367)
Observations	1,007	918	918	1,007	918	918
Number of Banks	82	76	76	82	76	76
Year FE	✓	✓	✓	✓	✓	✓
FIRM FE	✓	✓	✓	✓	✓	✓
R ²	0.327	0.555	0.567	0.370	0.653	0.662

Table 4.5 describes the impact of Bank Opacity on Systemic Risk in the period from 2002–2018. The dependent variable describes the Systemic Risk measures Delta Conditional Value-at-Risk (ΔCoVaR) according to Adrian & Brunnermeier (2008) and Marginal Expected Shortfall (MES) according to Acharya et al. (2010). Opacity is derived from 12-month Analysts' Forecast Errors of Earnings Per Shares scaled by share price (Opacity_{FE}) and the Standard Deviation of 12-month Forecast earnings per shares (Opacity_{Dis}). Bank Controls: ECB significant supervised entity (ECB Supervision), Logarithm of Total Assets ($\log\text{Assets}$), Deposits Ratio (DepRatio), Loans Ratio (LoanRatio), Return on Equity (ROE), Non-Performing Loans-Ratio (NPL), Equity Ratio (EQRatio), Leverage Ratio (LevRatio), Annual growth rate of Gross domestic product (GDP Growth), Change in Gross domestic product divided by population ($\Delta\text{GDP per Capita}$), Inflation (Inflation). Robust and bank clustered Huber-White Standard errors in brackets. Detailed variable Definitions are given in Table 4.2. *** $p < 0.01$, significant on the 0.01 Level, ** $p < 0.05$, significant on the 0.05 Level, * $p < 0.1$, significant on the 0.1 Level.

To verify Hypothesis H2-H4, the interaction effect of risk disclosure regulation and enforcement mechanism on bank opacity and its impact on the institution's contribution to systemic risk will be analyzed. The analysis is carried out in a two-step approach. First, the moderating effect of the individual components is examined according to the research hypotheses H2a, H2b, and H3 formulated in Chapter 4.3. This is followed by an integrated analysis based on the index variable RD&E. Table 4.6 summarizes the results of fixed effects regression measuring the moderating impact of the regulatory sub-components on bank opacity and systemic risk over the period 2002–

2018. Model (1–5) describes the results for ΔCoVaR and Model (6-10) for the Marginal Expected Shortfall (MES) as a systemic risk metric.

The interaction effect is consistent for both risk disclosure frameworks: Both IFRS 7 and Basel Pillar 3 lead to a significant reduction in opacity and systematic risk metrics ΔCoVaR and MES at the 1% level. Also, the $\text{FinStatementTrans}_{it}$ as proxy for the country specific transparency requirements for the preparation of the financial statement has a reducing effect on ΔCoVaR and MES at the 1% level. The results are consistent with Blau et al. (2020) and Jungherr (2018). The quality of the country-specific regulation of the external auditor also has a significant mitigating effect on the interaction term at the 1% level for ΔCoVaR (Model 4) and MES (Model 9). Furthermore, the country-specific power of banking supervision has a reducing effect on systemic risk, although only $\text{Opacity}_{FE} * \text{Supervisory Power}_{it}$ has a strong significant reducing effect on MES (Model 10). Basically, the results are consistent even using forecast dispersions as an alternative proxy for bank opacity.

In an additional analysis, the effect of the different amendments of the Basel Pillar 3 Framework is tested and summarized in Table 4.7. The interaction term $\text{Opacity} * \text{Basel 2 Pillar 3}$ has a highly significant negative effect on the reduction of ΔCoVaR at the 1% level (Models 1 and 3) and the MES (Model 2 at the 1% level and Model 4 at the 10% level). The Pillar 3 Framework Basel 2.5, amended in 2009, also has a significant negative effect on systemic risk: The interaction term $\text{Opacity} * \text{Basel 2.5 Pillar 3}$ has a significant negative effect on the reduction of systemic risk at the 5% level in the Forecast Error Model (Models 1 and 2) and at the 1% level in the Forecast Dispersion Model (Models 3 and 4). In contrast to Basel 2 and Basel 2.5 Framework, Basel 3 Pillar 3 only has a highly significant negative interaction effect on the MES in Model 4. The revised Basel Pillar 3 is characterized, in particular, by the fact that the European Union has codified the Basel 3 requirements of the Basel Committee into European law as a supranational regulatory framework – the CRD-IV package – that is mandatory for all EU member states. The regulatory disclosure requirements are thus substantial component syndicates in Part 8 of the Capital Requirements Regulation (CRR). In summary, the CRR remains very generic in the design of the disclosure requirements and, in Article 434a, mandates the European Banking Authority (EBA) to develop technical disclosure standards with a higher level of details. In summary, the initial hypotheses H2a, H2b and H3 can be confirmed.

Table 4.6: Interaction Sub-Components – Risk Disclosure Regulation on Bank Opacity and Systemic Risk – Fixed Effects Estimation with 1-year Lag

Panel A: Analyst Forecast Errors

VARIABLES	(1) ΔCoVaR	(2) ΔCoVaR	(3) ΔCoVaR	(4) ΔCoVaR	(5) ΔCoVaR	(6) MES	(7) MES	(8) MES	(9) MES	(10) MES
L.Opacity	-0.000171** (6.48e-05)	4.71e-05*** (1.66e-05)	4.61e-05*** (1.46e-05)	0.000147*** (4.08e-05)	6.56e-05* (3.65e-05)	-0.000361*** (0.000134)	0.000131*** (4.24e-05)	0.000123*** (3.69e-05)	0.000475*** (0.000129)	0.000236*** (8.78e-05)
L.FinStatementTrans	-9.37e-06 (0.000336)					-0.000445 (0.000876)				
L.Opacity * L.FinStatementTrans	3.63e-05*** (1.32e-05)					7.81e-05*** (2.82e-05)				
L.Basel Pillar 3		-0.00781*** (0.00157)					-0.0166*** (0.00327)			
L.Opacity * L.Basel Pillar 3		-4.73e-05*** (1.55e-05)					-0.000122*** (3.79e-05)			
L.IFRS 7			-0.00781*** (0.00157)					-0.0166*** (0.00328)		
L.Opacity * L.IFRS 7			-4.76e-05*** (1.32e-05)					-0.000117*** (3.21e-05)		
L.ExternalAudit				0.000291 (0.000305)					0.00169** (0.000748)	
L.Opacity * L.ExternalAudit				-2.81e-05*** (7.73e-06)					-9.00e-05*** (2.26e-05)	
L.SupervisoryPower					-0.000150 (0.000109)					-0.000109 (0.000251)
L.Opacity * L.SupervisoryPower					-9.27e-06 (5.80e-06)					-3.21e-05** (1.34e-05)
L.ECB Supervision(∈ {0; 1})	-0.000939 (0.000666)	-0.000909 (0.000649)	-0.000907 (0.000649)	-0.000872 (0.000642)	-0.00104 (0.000644)	-0.00230 (0.00144)	-0.00235 (0.00143)	-0.00235 (0.00143)	-0.00204 (0.00133)	-0.00257* (0.00143)
L.logAssets	0.00375*** (0.00104)	0.00400*** (0.00103)	0.00400*** (0.00103)	0.00378*** (0.00105)	0.00390*** (0.00103)	0.0103*** (0.00258)	0.0108*** (0.00259)	0.0108*** (0.00258)	0.0101*** (0.00255)	0.0104*** (0.00255)
L.DepRatio (%)	4.90e-05 (3.07e-05)	4.78e-05 (3.08e-05)	4.66e-05 (3.09e-05)	4.50e-05 (3.06e-05)	4.16e-05 (3.11e-05)	8.95e-05 (6.64e-05)	8.30e-05 (6.72e-05)	8.04e-05 (6.76e-05)	7.64e-05 (6.57e-05)	8.10e-05 (6.61e-05)
L.LoanRatio (%)	1.55e-05 (2.79e-05)	1.92e-05 (2.74e-05)	1.89e-05 (2.74e-05)	1.50e-05 (2.58e-05)	2.88e-05 (2.80e-05)	4.17e-05 (6.00e-05)	4.42e-05 (5.89e-05)	4.34e-05 (5.89e-05)	2.18e-05 (5.70e-05)	5.84e-05 (6.00e-05)
L.ROE (%)	1.13e-05	9.92e-06	9.90e-06	1.05e-05	1.05e-05	3.51e-05	3.26e-05	3.26e-05	3.45e-05	3.60e-05

L.NPL (%)	(1.96e-05) 0.000357***	(1.99e-05) 0.000355***	(2.00e-05) 0.000354***	(2.00e-05) 0.000350***	(1.92e-05) 0.000372***	(3.68e-05) 0.000567**	(3.77e-05) 0.000563**	(3.78e-05) 0.000562**	(3.77e-05) 0.000527***	(3.61e-05) 0.000615***
L.EQRatio (%)	(7.19e-05) 0.000148	(7.19e-05) 0.000175	(7.19e-05) 0.000173	(6.53e-05) 0.000183	(7.19e-05) 0.000141	(0.000219) 0.000364	(0.000216) 0.000420	(0.000216) 0.000411	(0.000197) 0.000563	(0.000216) 0.000380
L.LevRatio (%)	(0.000252) 1.60e-06**	(0.000251) 1.58e-06**	(0.000251) 1.58e-06**	(0.000259) 1.59e-06**	(0.000256) 1.55e-06**	(0.000517) 2.08e-06	(0.000522) 2.06e-06	(0.000523) 2.06e-06	(0.000477) 2.07e-06	(0.000531) 2.09e-06
L.GDP Growth (%)	(7.46e-07) -0.000115	(7.46e-07) -0.000133*	(7.48e-07) -0.000127*	(7.57e-07) -0.000102	(7.26e-07) -0.000113	(1.66e-06) -0.000478	(1.65e-06) -0.000496**	(1.66e-06) -0.000482**	(1.67e-06) -0.000379*	(1.62e-06) -0.000470*
L.ΔGDP per Capita	(7.43e-05) 1.83e-08	(7.24e-05) 1.86e-08	(7.23e-05) 1.81e-08	(7.39e-05) 2.70e-08	(7.11e-05) 1.09e-08	(0.000240) 8.30e-08*	(0.000226) 8.79e-08*	(0.000227) 8.70e-08*	(0.000204) 1.11e-07**	(0.000240) 6.17e-08
L.Inflation	(2.07e-08) -0.000164	(1.92e-08) -0.000166	(1.93e-08) -0.000178*	(2.11e-08) -0.000204*	(2.10e-08) -9.64e-05	(4.79e-08) -0.000657	(4.61e-08) -0.000688**	(4.64e-08) -0.000716**	(4.97e-08) -0.000805**	(5.11e-08) -0.000496
Constant	(0.000103) -0.0581***	(0.000103) -0.0633***	(0.000105) -0.0632***	(0.000108) -0.0601***	(0.000108) -0.0601***	(0.000282) -0.168***	(0.000295) -0.180***	(0.000301) -0.179***	(0.000306) -0.175***	(0.000321) -0.172***
	(0.0182)	(0.0179)	(0.0179)	(0.0179)	(0.0176)	(0.0446)	(0.0445)	(0.0442)	(0.0433)	(0.0434)
Observations	928	937	937	928	928	928	937	937	928	928
R-squared	0.623	0.627	0.627	0.622	0.624	0.589	0.594	0.594	0.594	0.591
Number of id	74	74	74	74	74	74	74	74	74	74
Year Dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FIRM FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
R ²	0.539	0.540	0.540	0.541	0.538	0.552	0.547	0.547	0.553	0.553

(Continued on next page)

Table 4.6: Interaction – Risk Disclosure Regulation on Bank Opacity and Systemic Risk – Fixed Effects Estimation with 1-year Lag (continued)

Panel B: Analyst Forecast Dispersion

VARIABLES	(1) ΔCoVaR	(2) ΔCoVaR	(3) ΔCoVaR	(4) ΔCoVaR	(5) ΔCoVaR	(6) MES	(7) MES	(8) MES	(9) MES	(10) MES
L.Opacity	0.000156 (0.000445)	0.000159*** (3.05e-05)	0.000176*** (3.07e-05)	0.000302*** (4.80e-05)	7.39e-05** (3.20e-05)	0.00330*** (0.00107)	0.000275*** (9.16e-05)	0.000327*** (9.12e-05)	0.000501*** (0.000119)	0.000105 (7.93e-05)
L.FinStatementTrans	0.000103 (0.000345)					0.000162 (0.000854)				
L.Opacity * L.FinStatementTrans	-2.88e-05 (8.85e-05)					-0.000640 *** (0.000211)				
L.Basel Pillar 3		-0.00808*** (0.00156)					-0.0172*** (0.00325)			
L.Opacity * L.Basel Pillar 3		-0.000148 *** (2.44e-05)					-0.000190 ** (7.54e-05)			
L.IFRS7			-0.00805*** (0.00155)					-0.0171*** (0.00324)		
L.Opacity * L.IFRS 7			-0.000165 *** (2.54e-05)					-0.000242 *** (7.67e-05)		
L.ExternalAudit				0.000159 (0.000242)					0.00102* (0.000613)	
L.Opacity * L.ExternalAudit				-5.73e-05 *** (8.11e-06)					-8.23e-05 *** (1.91e-05)	
L.SupervisoryPower					-0.000183* (0.000105)					-0.000296 (0.000249)
L.Opacity * L.SupervisoryPower					-9.43e-06 *** (2.85e-06)					-3.25e-06 (7.41e-06)
L.ECB Supervision(∈ {0; 1})	-0.000727 (0.000635)	-0.000677 (0.000609)	-0.000666 (0.000609)	-0.000764 (0.000614)	-0.000822 (0.000601)	-0.00162 (0.00127)	-0.00166 (0.00124)	-0.00164 (0.00123)	-0.00168 (0.00123)	-0.00181 (0.00125)
L.logAssets	0.00384*** (0.00107)	0.00376*** (0.00104)	0.00373*** (0.00105)	0.00391*** (0.00107)	0.00408*** (0.00106)	0.0102*** (0.00261)	0.0103*** (0.00259)	0.0102*** (0.00259)	0.0104*** (0.00262)	0.0106*** (0.00260)
L.DepRatio (%)	4.97e-05 (3.13e-05)	4.85e-05 (3.03e-05)	4.84e-05 (3.01e-05)	4.51e-05 (3.12e-05)	4.33e-05 (3.23e-05)	0.000105 (6.90e-05)	9.34e-05 (6.70e-05)	9.24e-05 (6.65e-05)	8.33e-05 (6.80e-05)	8.56e-05 (6.98e-05)
L.LoanRatio (%)	1.11e-05 (2.75e-05)	2.74e-05 (2.49e-05)	3.01e-05 (2.45e-05)	1.98e-05 (2.42e-05)	2.53e-05 (2.65e-05)	2.88e-05 (5.48e-05)	5.07e-05 (5.34e-05)	5.70e-05 (5.28e-05)	3.12e-05 (5.28e-05)	4.66e-05 (5.68e-05)
L.ROE (%)	1.35e-05	1.17e-05	1.13e-05	1.42e-05	1.57e-05	6.53e-05	5.92e-05	5.82e-05	6.28e-05	6.20e-05

	(2.47e-05)	(2.54e-05)	(2.58e-05)	(2.46e-05)	(2.38e-05)	(4.09e-05)	(4.08e-05)	(4.11e-05)	(4.16e-05)	(4.04e-05)
L.NPL (%)	0.000344***	0.000385***	0.000394***	0.000352***	0.000348***	0.000588***	0.000624***	0.000644***	0.000552***	0.000576***
	(6.98e-05)	(5.93e-05)	(5.70e-05)	(5.99e-05)	(6.45e-05)	(0.000170)	(0.000169)	(0.000163)	(0.000166)	(0.000173)
L.EQRatio (%)	0.000147	0.000160	0.000161	0.000183	0.000149	0.000553	0.000497	0.000500	0.000640	0.000450
	(0.000255)	(0.000247)	(0.000246)	(0.000250)	(0.000255)	(0.000431)	(0.000455)	(0.000449)	(0.000440)	(0.000495)
L.LevRatio (%)	1.66e-06**	1.64e-06**	1.65e-06**	1.64e-06**	1.59e-06**	2.71e-06	2.53e-06	2.55e-06	2.51e-06	2.45e-06
	(7.43e-07)	(7.32e-07)	(7.35e-07)	(7.39e-07)	(7.15e-07)	(1.64e-06)	(1.63e-06)	(1.63e-06)	(1.67e-06)	(1.62e-06)
L.GDP Growth (%)	-0.000138*	-0.000152**	-0.000151**	-0.000126*	-0.000132*	-0.000528**	-0.000540**	-0.000538**	-0.000447**	-0.000518**
	(7.58e-05)	(7.26e-05)	(7.28e-05)	(7.19e-05)	(7.27e-05)	(0.000240)	(0.000225)	(0.000224)	(0.000213)	(0.000236)
L.ΔGDP per Capita	2.47e-08	1.61e-08	1.65e-08	2.50e-08	1.21e-08	7.20e-08	6.50e-08	6.60e-08	9.31e-08*	6.06e-08
	(2.13e-08)	(1.93e-08)	(1.93e-08)	(2.17e-08)	(2.18e-08)	(4.81e-08)	(4.59e-08)	(4.60e-08)	(4.90e-08)	(4.84e-08)
L.Inflation	-0.000180	-0.000158	-0.000156	-0.000173	-0.000100	-0.000537*	-0.000549*	-0.000551*	-0.000643**	-0.000483
	(0.000117)	(0.000106)	(0.000106)	(0.000118)	(0.000123)	(0.000293)	(0.000290)	(0.000291)	(0.000307)	(0.000305)
Constant	-0.0598***	-0.0593***	-0.0591***	-0.0622***	-0.0628***	-0.172***	-0.172***	-0.172***	-0.179***	-0.175***
	(0.0185)	(0.0181)	(0.0181)	(0.0183)	(0.0184)	(0.0451)	(0.0445)	(0.0445)	(0.0446)	(0.0449)
Observations	877	886	886	877	877	877	886	886	877	877
R-squared	0.640	0.652	0.654	0.73	0.645	0.617	0.622	0.624	0.618	0.616
Number of id	73	73	73	0.645	73	73	73	73	73	73
Year Dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FIRM FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
R ²	0.536	0.529	0.525	0.540	0.539	0.545	0.549	0.552	0.543	0.541

Table 4.6 describes the Interaction Effect of Risk Disclosure Regulation and Enforcement on Bank Opacity and Systemic Risk in the period from 2002-2018. The dependent variable describes the Systemic Risk measures Delta Conditional Value-at-Risk (ΔCoVar) according to Adrian & Brunnermeier (2008) and Marginal Expected Shortfall (MES) according to Acharya et al. (2010). Bank Opacity is derived from 12-month Analysts' Forecast Errors of Earnings Per Shares (Forecast Errors) and Analyst Forecast Dispersions (Forecast Dispersions). Banks Financial Statement Transparency according to Barth et al. (2006) (FinStatementTrans), Basel Pillar 3, Proxy for Accounting Risk Disclosure Regulation, (IFRS 7), the Effectiveness of external audit of banks according to Barth et al. (2006) (ExternalAudit) and the strength of the Supervisory Power according to Barth et al. (2006) (SupervisoryPower). Bank Controls: ECB significant supervised entity (ECB Supervision), Logarithm of Total Assets (logAssets), Deposits Ratio (DepRatio), Loans Ratio (LoanRatio), Return on Equity (ROE), Non-Performing Loans-Ratio (NPL), Equity Ratio (EQRatio), Leverage Ratio (LevRatio), Annual growth rate of Gross domestic product (GDP Growth), Change in Gross domestic product divided by population ($\Delta\text{GDP per CU}$), Inflation (Inflation). Robust and bank clustered Huber-White Standard errors in brackets. Detailed variable Definitions are given in Table 4.2. *** p<0.01, significant on the 0.01 Level, ** p<0.05, significant on the 0.05 Level, * p<0.1, significant on the 0.1 Level.

Table 4.7: Interaction – Basel Pillar 3 Regulation on Bank Opacity and Systemic Risk – Fixed Effects Estimation with 1-year Lag

Opacity Proxies:	Forecast Errors		Forecast Dispersion	
	(1)	(2)	(3)	(4)
VARIABLES	ΔCoVaR	MES	ΔCoVaR	MES
L.Opacity	4.76e-05*** (1.70e-05)	0.000128*** (4.09e-05)	0.000156*** (3.04e-05)	0.000243*** (7.72e-05)
L.Opacity * L.Basel 2 Pillar 3	-4.81e-05*** (1.46e-05)	-0.000116*** (3.52e-05)	-0.000145*** (2.07e-05)	-0.000133* (7.08e-05)
L.Opacity * L.Basel 2.5 Pillar 3	-4.92e-05** (2.03e-05)	-0.000115** (4.56e-05)	-0.000147*** (3.87e-05)	-0.000233*** (7.50e-05)
L.Opacity * L.Basel 3 Pillar 3	5.95e-06 (7.75e-05)	-0.000399 (0.000342)	-0.000549 (0.000514)	-0.00597*** (0.00157)
L.Basel 2 Pillar 3 ($\in \{0; 1\}$)	-0.00396*** (0.00119)	-0.00793*** (0.00271)	-0.00436*** (0.00118)	-0.00945*** (0.00286)
L.Basel 2.5 Pillar 3 ($\in \{0; 1\}$)	-0.00262* (0.00152)	-0.00341 (0.00335)	-0.00289* (0.00147)	-0.00429 (0.00328)
L.Basel 3 Pillar 3 ($\in \{0; 1\}$)	-0.00803*** (0.00165)	-0.0155*** (0.00345)	-0.00801*** (0.00157)	-0.0162*** (0.00325)
Constant	-0.0644*** (0.0182)	-0.174*** (0.0445)	-0.0589*** (0.0181)	-0.163*** (0.0444)
Bank Controls	✓	✓	✓	✓
Macro Controls	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓
N	937	937	886	886
Number of Banks	74	74	73	73
R ²	0.539	0.553	0.530	0.559

Table 4.7 describes the Interaction Effect of Basel Pillar 3 Regulation on Bank Opacity and Systemic Risk in the period from 2002-2018. The dependent variable describes the Systemic Risk measures Delta Conditional Value-at-Risk (ΔCoVaR) according to Adrian & Brunnermeier (2008) and Marginal Expected Shortfall (MES) according to Acharya et al. (2010). Bank Opacity is derived from 12-month Analysts' Forecast Errors of Earnings Per Shares (Forecast Errors) and Analyst Forecast Dispersions (Forecast Dispersions). Bank Controls: ECB significant supervised entity (ECB Supervision), Logarithm of Total Assets (logAssets), Deposits Ratio (DepRatio), Loans Ratio (LoanRatio), Return on Equity (ROE), Non-Performing Loans-Ratio (NPL), Equity Ratio (EQRatio), Leverage Ratio (LevRatio), Annual growth rate of Gross domestic product (GDP Growth), Change in Gross domestic product divided by population ($\Delta\text{GDP per CU}$), Inflation (Inflation). Robust and bank clustered Huber-White Standard errors in brackets. Detailed variable Definitions are given in Table 4.2. *** $p < 0.01$, significant on the 0.01 Level, ** $p < 0.05$, significant on the 0.05 Level, * $p < 0.1$, significant on the 0.1 Level.

Table 4.8 summarizes the results of fixed effects regressions measuring the moderating effect of the aggregate index variable Risk Disclosure Regulation & Enforcement on bank opacity and systemic risk over the period 2002-2018. Model (1-2) describes the results for forecast errors and model (3-4) for forecast dispersion as a proxy for opacity.

The interaction term $\text{Opacity}_{it} * \text{RD\&E}_{it}$ has a significant negative effect on ΔCoVaR and MES, which implies that banking regulation and enforcement mechanisms have a moderating role on systemic risk. The results are consistent for both forecast errors and forecast dispersion. In summary, this leads to a confirmation of Hypothesis 4. In summary, the results are consistent with the findings of the literature (Tadesse, 2006; Duru et al., 2020) and this confirms Tadesse's (2006) finding that banking resilience is higher in countries where disclosure and transparency requirements have been strengthened.

Table 4.8: Interaction– Risk Disclosure Regulation & Enforcement on Bank Opacity and Systemic Risk – Fixed Effects Estimation with 1-year Lag

Opacity Proxies	Forecast Errors		Forecast Dispersion	
	(1)	(2)	(3)	(4)
VARIABLES	ΔCoVaR	MES	ΔCoVaR	MES
L.Opacity	0.000202** (9.57e-05)	0.000685*** (0.000209)	0.000192*** (3.86e-05)	0.000246** (0.000113)
L.Opacity * L.RD&E	-1.07e-05** (5.31e-06)	-3.56e-05*** (1.14e-05)	-9.63e-06*** (1.44e-06)	-8.60e-06* (4.32e-06)
L.RDE	-5.75e-05 (8.93e-05)	8.52e-05 (0.000210)	-9.72e-05 (8.31e-05)	-0.000105 (0.000200)
L.ECB Supervision($\in \{0; 1\}$)	-0.000996 (0.000649)	-0.00247* (0.00142)	-0.000799 (0.000605)	-0.00179 (0.00126)
L.logAssets	0.00392*** (0.00103)	0.0105*** (0.00255)	0.00403*** (0.00107)	0.0105*** (0.00262)
L.DepRatio (%)	4.32e-05 (3.08e-05)	8.13e-05 (6.58e-05)	4.53e-05 (3.17e-05)	9.02e-05 (6.89e-05)
L.LoanRatio (%)	2.64e-05 (2.71e-05)	4.97e-05 (5.78e-05)	2.68e-05 (2.56e-05)	4.53e-05 (5.51e-05)
L.ROE (%)	1.08e-05 (1.95e-05)	3.70e-05 (3.67e-05)	1.59e-05 (2.39e-05)	6.42e-05 (4.07e-05)
L.NPL (%)	0.000372*** (7.03e-05)	0.000613*** (0.000209)	0.000356*** (6.17e-05)	0.000581*** (0.000170)
L.EQRatio (%)	0.000149 (0.000258)	0.000426 (0.000527)	0.000153 (0.000252)	0.000481 (0.000486)
L.LevRatio (%)	1.58e-06** (7.41e-07)	2.18e-06 (1.65e-06)	1.63e-06** (7.27e-07)	2.53e-06 (1.65e-06)
L.GDP Growth (%)	-0.000120* (7.15e-05)	-0.000468* (0.000235)	-0.000141* (7.28e-05)	-0.000527** (0.000235)
L. Δ GDP per Capita	1.26e-08 (2.16e-08)	6.65e-08 (5.11e-08)	1.48e-08 (2.18e-08)	6.76e-08 (4.86e-08)
L.Inflation	-0.000113 -0.000996	-0.000546* (0.000317)	-0.000116 (0.000123)	-0.000520* (0.000306)
Constant	-0.0609*** (0.0177)	-0.176*** (0.0436)	-0.0620*** (0.0184)	-0.175*** (0.0453)
Observations	928	928	877	877
Number of Banks	74	74	73	0.616
Year FE	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓
R ²	0.536	0.550	0.536	0.541

Table 4.8 describes the Interaction Effect of Risk Disclosure Regulation and Enforcement on Bank Opacity and Systemic Risk in the period from 2002-2018. The dependent variable describes the Systemic Risk measures Delta Conditional Value-at-Risk (ΔCoVaR) according to Adrian & Brunnermeier (2008) and Marginal Expected Shortfall (MES) according to Acharya et al. (2010). Bank Opacity is derived from 12-month Analysts' Forecast Errors of Earnings Per Shares (Forecast Errors) and Analyst Forecast Dispersions (Forecast Dispersions). Bank Controls: ECB significant

supervised entity (ECB Supervision), Logarithm of Total Assets (logAssets), Deposits Ratio (DepRatio), Loans Ratio (LoanRatio), Return on Equity (ROE), Non-Performing Loans-Ratio (NPL), Equity Ratio (EQRatio), Leverage Ratio (LevRatio), Annual growth rate of Gross domestic product (GDP Growth), Change in Gross domestic product divided by population (Δ GDP per CU), Inflation (Inflation). Robust and bank clustered Huber-White Standard errors in brackets. Detailed variable Definitions are given in Table 4.2. *** $p < 0.01$, significant on the 0.01 Level, ** $p < 0.05$, significant on the 0.05 Level, * $p < 0.1$, significant on the 0.1 Level.

4.4.2 Further Robustness Checks

Alternative Measures for Opacity: Discretionary Loan Loss Provisions

As an alternative to the previously used market-based opacity measures, the robustness of the model will be tested below using accounting-based measures following Jiang et al. (2016), Tran et al. (2022) and Gallemore (2022). To test the robustness of the model, I follow the approach by Gallemore (2022) using the discretionary loan loss provision model of Bushmann and Williams (2012) and Beatty and Liao (2011) as an alternative proxy for bank opacity. The delayed loan loss recognition (DELR) can be determined using the following equations:

$$LLP_{it} = \alpha + \beta_1 Ebllp_{it} + \beta_4 \Delta NPL_{it-1} + \beta_5 \Delta NPL_{it-2} + \beta_6 EQRatio_{it-1} + \beta_7 \log Assets_{it-1} + \varepsilon_{i,t} \quad (8)$$

$$LLP_{it} = \alpha + \beta_1 Ebllp_{it} + \beta_2 \Delta NPL_{it+1} + \beta_3 \Delta NPL_{it} + \beta_4 \Delta NPL_{it-1} + \beta_5 \Delta NPL_{it-2} + \beta_6 EQRatio_{it-1} + \beta_7 \log Assets_{it-1} + \varepsilon_{i,t} \quad (9)$$

The subscript $i = 1, \dots, N$ describes the banks considered over the time periods $t = 1, \dots, T$. LLP_{it} describes the loan loss provision scaled by lagged total loans. $Ebllp_{it}$ measures the earnings before loan loss provisions, defined as earnings before taxes plus loan loss provisions, scaled by lagged total loans. The variable ΔNPL_{it} describes the change in non-performing loans scaled by lagged total loans. $EQRatio_{it}$ is defined as the total equity scaled by total assets, and $\log Assets_{it-1}$ is defined as the lagged logarithm of total assets.

Following Beatty and Liao (2011), a regression was performed for each observation in the time series over a rolling window of three years. According to Gallemore (2022), the $DELR_{it}$ is the result of subtracting the adjusted R-squared from Equation (9) minus the adjusted R-squared from Equation (8) multiplied by minus one.

Liquidity and High Analyst Forecast Errors and Dispersions

As an additional measure of opacity, liquidity measures were also used (e.g., Flannery et al., 2004). For this task, I used the modified Roll implicit spread according to Hasbrouck (2009).⁵⁶ This extends the Methods of Moments model of Roll (1984) for measuring implicit bid-ask spreads

⁵⁶ The computations to calculate RIS were also carried out following the MATLAB routine of Belluzzo (2020).

(Equation 10) by a market factor model based on the Bayesian–Gibbs estimation method (Equation 11). According to Hasbrouck (2009), the Rolling Implicit Spread (RIS) is defined as follows:

$$\text{RIS} = c_{it}^{\text{Gibbs}} = \sqrt{-\text{Cov}(\Delta p_t, \Delta p_{t-1})} \quad (10)$$

$$\text{Where } \Delta p_t = c\Delta q_t + \beta_m r_{mt} + u_t \quad (11)$$

$\sqrt{-\text{Cov}(\Delta p_t, \Delta p_{t-1})}$ describes the first order autocovariance of price changes of the share price. p_t describes the logarithmic trade price. q_t describes the indicator for a buy or a sell order. r_{mt} describes the market return at time t . The disturbing term u_t reflects the market information known to the public.

As additional alternative measures for the robustness check, the variables High Forecast Error and High Forecast Dispersion were generated. High Forecast Error ($\in \{0; 1\}$) is defined as a binary variable that equals 1 if $\text{Opacity}_{\text{FE}}$ is above the median and 0 otherwise. High Forecast Dispersion ($\in \{0; 1\}$) is defined as a binary variable that equals 1 if $\text{Opacity}_{\text{DIS}}$ is above the median and 0 otherwise.

Table 4.9 summarizes the results of the first robustness check measuring the impact of opacity on systemic risk. In this context, Models 1, 3, 5 and 7 describe the results for ΔCoVaR and Model 2, 4, 6 and 8 for the Marginal Expected Shortfall (MES) as a systemic risk metric.

DELR and RIS have a highly significant positive effect at the 1% level for ΔCoVaR and a highly significant positive effect at the 1% level for MES in Model 2. High forecast error also has a highly significant positive effect at the 1% level for ΔCoVaR and MES (Model 5–6), and high forecast dispersion has a strong significant effect at the 5% level for ΔCoVaR (Model 7). It can be shown that the results are consistent with the main results of the baseline regression. In summary, even when different measures of opacity are used, there is a causality between bank opacity and systemic risk.

Table 4.9: Bank Opacity and Systemic Risk – Alternative Measures

Opacity Proxies: VARIABLES	Delayed Loan Loss Recognition (DELR)		Rolling Implicit Spread (RIS)		High Forecast Errors ($\in \{0; 1\}$)		High Forecast Dispersion ($\in \{0; 1\}$)	
	(1) ΔCoVaR	(2) MES	(3) ΔCoVaR	(4) MES	(5) ΔCoVaR	(6) MES	(7) ΔCoVaR	(8) MES
Opacity	0.00146*** (0.000409)	0.00295*** (0.000752)	0.360*** (0.0870)	0.367 (0.278)	0.00143*** (0.000236)	0.00244*** (0.000509)	0.00129** (0.000575)	0.00137 (0.00117)
ECB Supervision ($\in \{0; 1\}$)	-0.00118 (0.000718)	-0.00295** (0.00142)	-0.00160** (0.000684)	-0.00355** (0.00151)	-0.00126* (0.000643)	-0.00316** (0.00134)	-0.00125* (0.000661)	-0.00316** (0.00135)
logAssets	0.00115 (0.00123)	0.00635*** (0.00239)	0.00286** (0.00110)	0.00775*** (0.00236)	0.00219** (0.000977)	0.00659*** (0.00205)	0.00138 (0.000907)	0.00537*** (0.00192)
DepRatio (%)	4.38e-06 (3.36e-05)	-3.63e-05 (7.22e-05)	-2.45e-06 (3.09e-05)	-2.91e-05 (6.72e-05)	-1.32e-05 (2.72e-05)	-3.92e-05 (5.75e-05)	-2.13e-05 (2.97e-05)	-5.34e-05 (6.02e-05)
LoanRatio (%)	9.17e-06 (2.43e-05)	1.09e-05 (4.46e-05)	2.44e-05 (2.22e-05)	4.99e-05 (4.53e-05)	1.62e-05 (2.12e-05)	3.08e-05 (4.17e-05)	1.83e-05 (2.33e-05)	3.39e-05 (4.45e-05)
ROE (%)	-3.43e-05 (2.40e-05)	-0.000109 (4.39e-05)	-5.51e-05 (3.14e-05)	-0.000142 (5.04e-05)	-3.19e-05 (2.01e-05)	-9.88e-05 (3.46e-05)	-3.52e-05 (2.03e-05)	-0.000106 (3.43e-05)
NPL (%)	0.000263*** (7.40e-05)	0.000448*** (0.000169)	0.000197*** (5.59e-05)	0.000390*** (0.000141)	0.000265*** (6.90e-05)	0.000468*** (0.000174)	0.000278*** (7.44e-05)	0.000488*** (0.000180)
EQRatio (%)	-4.37e-05 (0.000202)	-0.000409 (0.000567)	0.000209 (0.000172)	0.000210 (0.000478)	7.63e-05 (0.000186)	-8.80e-05 (0.000381)	8.02e-05 (0.000193)	-0.000110 (0.000380)
LevRatio (%)	9.48e-07 (6.11e-07)	3.67e-07 (1.50e-06)	5.56e-07 (4.34e-07)	1.44e-07 (1.28e-06)	1.67e-07 (5.21e-07)	-5.87e-07 (1.25e-06)	2.20e-07 (4.97e-07)	-5.74e-07 (1.17e-06)
GDP Growth (%)	-4.88e-05 (8.29e-05)	-0.000405*** (0.000146)	-0.000144 (9.19e-05)	-0.000636*** (0.000112)	-0.000137 (0.000103)	-0.000557*** (0.000133)	-0.000161* (9.56e-05)	-0.000596*** (0.000129)
ΔGDP per Capita	1.15e-08 (3.52e-08)	1.30e-07 (1.04e-07)	9.33e-09 (3.77e-08)	1.16e-07 (9.86e-08)	2.55e-08 (3.31e-08)	1.47e-07 (8.94e-08)	2.59e-08 (3.37e-08)	1.44e-07 (9.19e-08)
Inflation	0.000188 (0.000149)	-0.000277 (0.000570)	4.99e-05 (0.000166)	-0.000554 (0.000523)	-4.07e-05 (0.000157)	-0.000697 (0.000478)	-2.55e-05 (0.000161)	-0.000658 (0.000492)
Constant	-0.00745 (0.0229)	-0.0830* (0.0433)	-0.0426** (0.0202)	-0.120*** (0.0416)	-0.0258 (0.0178)	-0.0913** (0.0364)	-0.0117 (0.0167)	-0.0690** (0.0342)
Observations	718	718	860	860	1,072	1,072	1,072	1,072
Number of id	71	71	55	55	81	81	81	81
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓	✓	✓	✓	✓
R ²	0.521	0.636	0.604	0.643	0.583	0.624	0.501	0.625

Table 4.9 describes the effect of opacity on systemic Risk with alternative opacity measures in the period from 2002-2018. The dependent variable describes the Systemic Risk measures Delta Conditional Value-at-Risk (ΔCoVaR) according to Adrian & Brunnermeier (2008) and Marginal Expected Shortfall (MES) according to Acharya et al. (2010). Bank Controls:

ECB significant supervised entity (ECB Supervision), Logarithm of Total Assets (logAssets), Deposits Ratio (DepRatio), Loans Ratio (LoanRatio), Return on Equity (ROE), Non-Performing Loans-Ratio (NPL), Equity Ratio (EQRatio), Leverage Ratio (LevRatio), Annual growth rate of Gross domestic product (GDP Growth), Change in Gross domestic product divided by population (Δ GDP per CU), Inflation (Inflation). Robust and bank clustered Huber-White Standard errors in brackets. Detailed variable Definitions are given in Table 4.2.
*** $p < 0.01$, significant on the 0.01 Level, ** $p < 0.05$, significant on the 0.05 Level, * $p < 0.1$, significant on the 0.1 Level.

Sub-sampling and Weighted Least Squares Regression

Furthermore, we follow the literature (e.g., Schulte & Winkler, 2019) and perform a sub-sampling of Equation (1) to exclude possible bias in the composition of the sample. For this purpose, we firstly exclude the Switzerland and Cyprus as the smallest groups in the sample. As a further robustness check, we perform a Weighted Least Squares (WLS) regression to remove possible bias in the sample composition.

Table 4.10: Panel A and B summarizes the results of the sub-sampling to validate the impact of opacity on systemic risk. In this context, Models 1 and 2 describe the results for Forecast Errors as Proxy and Model 3 and 4 the Forecast Dispersions as opacity proxies.

Excluding Switzerland (Panel A) and Cyprus (Panel B), the results are consistent with the baseline regression. For the sample without Switzerland (Panel A), the results are significant at the 10% level (Models 1), the 5% level (Model 2), and the 1% level (Models 3 and 4). In the subsample without Cyprus, the results are significant at the 5% level (Models 1 and 2) and at the 1% level (Models 3 and 4).

Table 4.10: Panel C summarizes the results of the WLS regression. The results are significant at the 5% level (Models 1 and 3) and at the 1% level (Models 2 and 4). To summarize, the results are not affected by an imbalance in country representation.

Table 4.10: Sub-sampling and WLS-Regression

Panel A: Switzerland excluded

Opacity Proxies	Forecast Errors		Forecast Dispersion	
	(1)	(2)	(3)	(4)
VARIABLES	ΔCoVaR	MES	ΔCoVaR	MES
Opacity	2.71e-05*	0.000107**	0.000101***	0.000330***
ECB Supervision ($\in \{0; 1\}$)	(1.52e-05)	(4.78e-05)	(3.63e-05)	(6.49e-05)
	-0.00138**	-0.00369**	-0.00132*	-0.00354**
	(0.000665)	(0.00141)	(0.000661)	(0.00134)
logAssets	0.00143	0.00558**	0.00171	0.00572**
	(0.00113)	(0.00217)	(0.00115)	(0.00219)
DepRatio (%)	7.84e-06	1.05e-05	2.62e-05	5.78e-05
	(3.13e-05)	(6.08e-05)	(3.19e-05)	(5.78e-05)
LoanRatio (%)	3.49e-06	1.41e-05	-7.35e-07	3.14e-06
	(2.86e-05)	(5.39e-05)	(2.78e-05)	(4.87e-05)
ROE (%)	-1.95e-05	-6.81e-05**	-1.31e-05	-4.96e-05*
	(1.62e-05)	(3.15e-05)	(1.36e-05)	(2.60e-05)
NPL (%)	0.000247***	0.000411**	0.000231***	0.000373**
	(7.84e-05)	(0.000179)	(7.66e-05)	(0.000170)
EQRatio (%)	-9.00e-05	-0.000340	-9.56e-05	-0.000356
	(0.000195)	(0.000373)	(0.000169)	(0.000352)
LevRatio (%)	3.13e-07	-1.24e-07	4.07e-07	1.67e-07
	(4.78e-07)	(1.21e-06)	(4.62e-07)	(1.13e-06)
GDP Growth (%)	-5.47e-05	-0.000378***	-1.88e-05	-0.000299**
	(8.32e-05)	(0.000124)	(7.92e-05)	(0.000137)
$\Delta\text{GDP per Capita}$	3.52e-08	1.47e-07*	3.98e-10	5.53e-08
	(3.51e-08)	(7.70e-08)	(3.28e-08)	(7.01e-08)

Inflation	-1.12e-05 (0.000156)	-0.000562 (0.000381)	0.000204 (0.000142)	4.43e-05 (0.000344)
Constant	-0.0107 (0.0206)	-0.0726* (0.0386)	-0.0164 (0.0212)	-0.0776* (0.0390)
Observations	847	847	808	808
Number of id	66	66	66	66
Year Dummies	✓	✓	✓	✓
FIRM FE	✓	✓	✓	✓
R ²	0.654	0.655	0.674	0.687

Panel B: Cyprus excluded

VARIABLES	Forecast Errors		Forecast Dispersion	
	(1) ΔCoVaR	(2) MES	(3) ΔCoVaR	(4) MES
Opacity	3.54e-05** (1.48e-05)	0.000123** (4.74e-05)	0.000109*** (3.82e-05)	0.000344*** (6.53e-05)
ECB Supervision (∈ {0; 1})	-0.00154** (0.000647)	-0.00385*** (0.00137)	-0.00144** (0.000642)	-0.00360*** (0.00130)
logAssets	0.00171 (0.00107)	0.00598*** (0.00207)	0.00177 (0.00111)	0.00576*** (0.00209)
DepRatio (%)	-2.08e-05 (3.10e-05)	-5.62e-05 (6.24e-05)	-7.47e-06 (3.20e-05)	-1.90e-05 (6.15e-05)
LoanRatio (%)	2.60e-05 (2.69e-05)	4.79e-05 (4.95e-05)	2.31e-05 (2.68e-05)	4.00e-05 (4.64e-05)
ROE (%)	-2.92e-05 (2.07e-05)	-8.27e-05** (3.60e-05)	-2.23e-05 (1.78e-05)	-6.28e-05** (2.97e-05)
NPL (%)	0.000262*** (7.41e-05)	0.000447** (0.000172)	0.000250*** (7.41e-05)	0.000416** (0.000165)
EQRatio (%)	0.000131 (0.000192)	0.000132 (0.000335)	0.000139 (0.000180)	0.000139 (0.000340)
LevRatio (%)	2.68e-07 (4.94e-07)	-2.17e-07 (1.15e-06)	3.73e-07 (4.70e-07)	1.02e-07 (1.08e-06)
GDP Growth (%)	-0.000108 (8.88e-05)	-0.000460*** (0.000118)	-8.00e-05 (8.33e-05)	-0.000399*** (0.000131)
ΔGDP per Capita	1.39e-08 (3.27e-08)	1.05e-07 (6.93e-08)	-1.46e-08 (3.07e-08)	2.81e-08 (6.35e-08)
Inflation	6.86e-05 (0.000148)	-0.000405 (0.000349)	0.000255* (0.000133)	0.000129 (0.000309)
Constant	-0.0172 (0.0196)	-0.0817** (0.0363)	-0.0187 (0.0203)	-0.0800** (0.0367)
Observations	970	970	918	918
Number of id	77	77	76	76
Year Dummies	✓	✓	✓	✓
FIRM FE	✓	✓	✓	✓
R ²	0.616	0.619	0.637	0.652

Panel C: WLS

VARIABLES	Forecast Errors		Forecast Dispersion	
	(1) ΔCoVaR	(2) MES	(3) ΔCoVaR	(4) MES
Opacity	2.68e-05** (1.17e-05)	0.000180*** (4.28e-05)	5.32e-05** (2.14e-05)	0.000414*** (4.84e-05)
ECB Supervision (∈ {0; 1})	-0.00148** (0.000585)	-0.00199* (0.00110)	-0.00157*** (0.000599)	-0.00187* (0.00113)
logAssets	0.00233*** (0.000154)	0.00384*** (0.000291)	0.00222*** (0.000166)	0.00361*** (0.000313)
DepRatio (%)	-3.86e-05*** (1.44e-05)	-9.00e-05*** (2.71e-05)	-3.22e-05** (1.48e-05)	-7.65e-05*** (2.78e-05)
LoanRatio (%)	-3.67e-05*** (1.31e-05)	-5.26e-05** (2.45e-05)	-3.04e-05** (1.34e-05)	-3.97e-05 (2.52e-05)
ROE (%)	-3.22e-05*** (1.23e-05)	-8.04e-05*** (2.65e-05)	-2.84e-05** (1.22e-05)	-5.67e-05** (2.39e-05)
NPL (%)	8.09e-05** (3.45e-05)	0.000469*** (6.64e-05)	7.15e-05** (3.56e-05)	0.000429*** (6.72e-05)
EQRatio (%)	0.000526***	0.000466**	0.000484***	0.000414*

	(0.000113)	(0.000216)	(0.000117)	(0.000221)
LevRatio (%)	5.94e-07	7.60e-07	7.26e-07*	1.20e-06
	(3.94e-07)	(7.52e-07)	(4.00e-07)	(7.55e-07)
GDP Growth (%)	-0.00112***	-0.00185***	-0.00114***	-0.00188***
	(8.18e-05)	(0.000157)	(8.35e-05)	(0.000158)
ΔGDP per Capita	1.59e-09	-5.98e-09***	1.18e-09	-6.46e-09***
	(1.13e-09)	(2.12e-09)	(1.18e-09)	(2.21e-09)
Inflation	0.000253***	0.000414**	0.000253***	0.000497***
	(8.97e-05)	(0.000181)	(9.77e-05)	(0.000186)
Constant	-0.0278***	-0.0423***	-0.0263***	-0.0398***
	(0.00415)	(0.00790)	(0.00440)	(0.00830)
Observations	970	970	912	912
R ²	0.505	0.522	0.480	0.536

Table 4.10 describes the impact of Bank Opacity on Systemic Risk in the period from 2002-2018 based on a Weighted Least Squares Regression. The dependent variable describes the Systemic Risk measures Delta Conditional Value-at-Risk (ΔCoVar) according to Adrian & Brunnermeier (2008) and Marginal Expected Shortfall (MES) according to Acharya et al. (2010). Opacity is derived from 12-month Analysts' Forecast Errors of Earnings Per Shares scaled by share price (Opacity_{FE}) and the Standard Deviation of 12-month Forecast earnings per shares (Opacity_{Dis}). Bank Controls: ECB significant supervised entity (ECB Supervision), Logarithm of Total Assets ($\log\text{Assets}$), Deposits Ratio (DepRatio), Loans Ratio (LoanRatio), Return on Equity (ROE), Non-Performing Loans-Ratio (NPL), Equity Ratio (EQRatio), Leverage Ratio (LevRatio), Annual growth rate of Gross domestic product (GDP Growth), Change in Gross domestic product divided by population ($\Delta\text{GDP per Capita}$), Inflation (Inflation). Robust and bank clustered Huber-White Standard errors in brackets. Detailed variable Definitions are given in Table 4.2. *** $p < 0.01$, significant on the 0.01 Level, ** $p < 0.05$, significant on the 0.05 Level, * $p < 0.1$, significant on the 0.1 Level.

Additional Endogeneity Tests

Theoretically, there are several sources of a potential endogeneity problem in the chosen research design. From an economic perspective through macroprudential regulation and model assumptions of selected dependent and independent variables. To strengthen the overall resilience of the financial system, banks are further subject to the regulation of macroprudential instruments in accordance with the proportionality principle, depending on their exposure to risk (e.g., Chiti et al., 2020; ECB, 2019; World Bank & BCBS, 2021). As a result, banks with a higher systemic risk are subject to stricter supervision by regulators. The size of a bank ("too big to fail") and its interconnectedness with other credit institutions serves as key indicators for the classification of systemically important institutions (EBA, 2020a). In addition to additional capital buffers, inclusion in the group of G-SIIs will also result in enhanced reporting requirements, such as participating in the European Banking Authority (EBA) stress test (BCBS, 2013; EBA, 2020b). The EBA performs stress tests on a regular basis in two-year intervals for G-SIIs (EBA, 2020b). In accordance with the literature, this leads to an increase in public awareness of the stress test participants in the capital market (Goldstein & Sapra, 2014; Bischof & Daske, 2013). The stress test participants anticipate this by increasing the disclosure of the respective risk types under review (Bischof & Daske, 2013). To summarize, it can be said that the systemic risk of an institution affects its disclosure behavior⁵⁷. As shown above, the size of a bank serves as a possible indicator of systemic risk. In line with the literature, this is approximated in the econometric model by the logarithm of total assets. To

⁵⁷ See also Barakat and Hussainey (2013) for comparable results based on operational risk disclosures.

determine ΔCoVaR and MES, the two accounting variables book value of assets and book value of equity are required in addition to the stock price. Thus, total assets are part of the systemic risk and the control variable. To determine bank opacity, we follow Fosu et al. (2017) and calculate analysts' forecast errors following Lang and Lundholm (1996). Again, the stock price is included in the systemic risk measure as well as in the numerator and denominator of the earnings per share forecast error.

As an alternative to address this potential endogeneity problem, I follow the contributions in the research field (e.g., Vallascas & Keasey, 2014) by using a dynamic system GMM approach following Roodman (2009).⁵⁸ Roodman's Stata Routine (2009) uses the Arellano–Bover/Blundell–Bond estimator (Arellano & Bover, 1995; Blundell & Bond, 1998) as an extension to the Arellano–Bond estimator (Arellano & Bond, 1991).

Table 4.11 describes the results of the dynamic system GMM estimation to analyze the impact of risk disclosure and enforcement mechanism. Table 4.11: Panel A analyzes the interaction effect of $L.Opacity_{it} * L.RD\&E_{it}$ to address the integrated Risk Disclosure & Enforcement Regulation on ΔCoVaR and MES. The results are consistent with the previous findings from the baseline regressions and robustness checks: $L.Opacity_{it} * L.RD\&E_{it}$ has a highly significant negative effect at the 1% level for ΔCoVaR and a highly significant negative effect at the 1% level for MES, with exceptions of Model 8.

Table 4.11: Panel B examines the impact of each risk disclosure regulation measure using analyst forecast errors as a proxy for bank opacity. $L.Opacity_{it} * L.FinStatementTrans_{it}$, $L.Opacity_{it} * L.IFRS7_{it}$ and $L.Opacity_{it} * L.ExternalAudit_{it}$ has a highly significant negative effect at the 1% level for ΔCoVaR and a highly significant negative effect at the 1% level for MES.

Table 4.11: Panel C considers the Analyst Forecast Dispersions as a proxy for bank opacity. $L.Opacity_{it} * L.BaselPillar3_{it}$, $L.Opacity_{it} * L.IFRS7_{it}$ and $L.Opacity_{it} * L.ExternalAudit_{it}$ and $L.Opacity_{it} * L.SupervisoryPower_{it}$ has a highly significant negative effect at the 1% level for ΔCoVaR and MES.

⁵⁸ Instead of a dynamic system GMM approach, the use of a two-stage least squares (2SLS) model to address endogeneity in the panel data set would also have been appropriate (Semykina & Wooldridge, 2010).

Table 4.11: Interaction – Risk Disclosure Regulation & Enforcement on Bank Opacity and Systemic Risk – System-GMM

Panel A: RD&E

VARIABLES	Forecast Errors		Forecast Dispersion		Rolling Implicit Spread (RIS)		High Forecast Dispersion ($\in \{0; 1\}$)		High Forecast Errors ($\in \{0; 1\}$)	
	(1) ΔCoVaR	(2) MES	(3) ΔCoVaR	(4) MES	(5) ΔCoVaR	(6) MES	(7) ΔCoVaR	(8) MES	(9) ΔCoVaR	(10) MES
L.Systemic Risk	0.375*** (0.00991)	0.368*** (0.00591)	0.438*** (0.00935)	0.409*** (0.00451)	0.326*** (0.00923)	0.319*** (0.00892)	0.352*** (0.00666)	0.315*** (0.00597)	0.383*** (0.00553)	0.343*** (0.00492)
L.RD&E	0.00113*** (9.87e-05)	0.00169*** (0.000126)	0.00106*** (7.64e-05)	0.00147*** (9.82e-05)	0.00118*** (0.000133)	0.00191*** (0.000312)	0.00109*** (7.16e-05)	0.00156*** (0.000149)	2.24e-05 (8.57e-05)	-0.000145 (0.000100)
L.Opacity	0.000647*** (0.000137)	0.00104*** (0.000181)	0.00274*** (0.000321)	0.00297*** (0.000225)	1.354*** (0.403)	1.426*** (0.458)	0.00867*** (0.00229)	0.00255 (0.00357)	-0.0297*** (0.00123)	-0.0659*** (0.00248)
L.Opacity*L.RD&E	-3.78e-05*** (7.50e-06)	-6.28e-05*** (9.44e-06)	-0.000161*** (1.63e-05)	-0.000181*** (1.22e-05)	-0.0816*** (0.0188)	-0.0867*** (0.0248)	-0.000415*** (9.34e-05)	5.37e-05 (0.000159)	0.00135*** (5.09e-05)	0.00309*** (0.000115)
L.ECB Supervision ($\in \{0; 1\}$)	0.00122*** (0.000131)	0.00281*** (0.000197)	0.000949*** (6.50e-05)	0.00272*** (0.000200)	0.000399* (0.000208)	0.000857*** (0.000282)	0.000839*** (0.000110)	0.00216*** (0.000178)	0.00125*** (0.000139)	0.00305*** (0.000176)
L.logAssets	0.00302*** (0.000400)	0.00881*** (0.000741)	0.00364*** (0.000358)	0.00869*** (0.000610)	0.00366*** (0.000363)	0.00849*** (0.000941)	0.00348*** (0.000269)	0.00802*** (0.000584)	0.00266*** (0.000215)	0.00684*** (0.000690)
L.DepRatio (%)	-0.000164*** (1.06e-05)	-0.000361*** (2.42e-05)	-0.000149*** (1.08e-05)	-0.000313*** (1.66e-05)	-0.000125*** (2.05e-05)	-0.000270*** (3.03e-05)	-0.000147*** (7.59e-06)	-0.000316*** (1.15e-05)	-0.000139*** (8.91e-06)	-0.000323*** (2.43e-05)
L.LoanRatio (%)	2.14e-05** (9.69e-06)	0.000107*** (2.76e-05)	1.15e-05 (7.93e-06)	5.61e-05* (3.09e-05)	-7.43e-07 (1.19e-05)	5.29e-05 (3.45e-05)	1.67e-05** (6.72e-06)	6.57e-05*** (1.93e-05)	1.66e-05* (8.54e-06)	3.84e-05** (1.95e-05)
L.ROE (%)	9.62e-05*** (8.46e-06)	0.000199*** (9.23e-06)	8.39e-05*** (8.69e-06)	0.000221*** (1.04e-05)	4.13e-05*** (6.36e-06)	0.000148*** (8.53e-06)	8.80e-05*** (5.33e-06)	0.000206*** (7.90e-06)	7.54e-05*** (3.52e-06)	0.000178*** (5.02e-06)
L.NPL (%)	-0.000140*** (2.76e-05)	-0.000278*** (3.08e-05)	-0.000151*** (2.61e-05)	-0.000227*** (3.22e-05)	-1.45e-05 (3.06e-05)	-0.000149*** (4.10e-05)	-0.000148*** (1.19e-05)	-0.000310*** (2.26e-05)	-0.000142*** (1.25e-05)	-0.000360*** (3.43e-05)
L.EQRatio (%)	-3.98e-05 (0.000114)	0.000288** (0.000146)	0.000249* (0.000143)	0.000582*** (0.000157)	0.000811*** (0.000126)	0.000812*** (0.000220)	0.000131 (0.000115)	0.000348** (0.000171)	-5.52e-05 (0.000184)	0.000132 (0.000115)
L.LevRatio (%)	5.20e-06*** (2.91e-07)	9.67e-06*** (5.03e-07)	5.31e-06*** (3.47e-07)	9.92e-06*** (4.39e-07)	5.99e-06*** (3.71e-07)	9.84e-06*** (4.89e-07)	5.16e-06*** (3.42e-07)	9.62e-06*** (4.10e-07)	4.28e-06*** (4.54e-07)	8.41e-06*** (2.93e-07)
L.GDP Growth (%)	0.000359*** (2.47e-05)	0.000549*** (3.86e-05)	0.000270*** (2.40e-05)	0.000550*** (2.24e-05)	0.000265*** (2.83e-05)	0.000440*** (5.18e-05)	0.000375*** (1.77e-05)	0.000687*** (2.23e-05)	0.000401*** (1.31e-05)	0.000632*** (2.54e-05)
L. Δ GDP per Capita	4.71e-09 (1.72e-08)	-2.51e-08 (2.54e-08)	1.85e-08 (1.65e-08)	1.32e-08 (2.00e-08)	4.97e-09 (1.57e-08)	5.49e-09 (4.08e-08)	8.48e-10 (7.68e-09)	-4.02e-08* (2.34e-08)	-3.94e-09 (6.18e-09)	-5.58e-08*** (1.84e-08)
L.Inflation	-3.43e-06 (6.46e-05)	0.000167 (0.000111)	-0.000153** (7.57e-05)	-0.000176** (8.86e-05)	6.77e-05 (6.37e-05)	6.12e-05 (0.000218)	2.52e-05 (2.35e-05)	0.000218*** (8.15e-05)	6.17e-05** (3.01e-05)	0.000350*** (8.35e-05)
Constant	-0.0725*** (0.00617)	-0.190*** (0.0129)	-0.0852*** (0.00622)	-0.186*** (0.0113)	-0.0912*** (0.00773)	-0.193*** (0.0161)	-0.0818*** (0.00564)	-0.173*** (0.00963)	-0.0419*** (0.00388)	-0.109*** (0.0141)
Observations	888	888	838	838	797	797	983	983	983	983

Number of id	74	74	73	73	55	55	79	79	79	79
AR(1)	5.01e-08	9.71e-08	5.01e-07	3.17e-07	2.66e-07	1.66e-06	1.86e-08	6.32e-08	3.49e-08	9.94e-08
AR(2)	0.858	0.999	0.239	0.191	0.185	0.264	0.260	0.207	0.257	0.142
Hansen	1	1	1	1	1	1	1	1	1	1
Sargan	0	0	0	0	0	0	0	0	0	0
Number of Instruments	132	132	132	132	132	132	132	132	132	132

(continued on next page)

Table 4.11: Interaction – Risk Disclosure Regulation on Bank Opacity and Systemic Risk – System-GMM (continued)

Panel B: Forecast Error

VARIABLES	(1) ΔCoVaR	(2) ΔCoVaR	(3) ΔCoVaR	(4) ΔCoVaR	(5) ΔCoVaR	(6) MES	(7) MES	(8) MES	(9) MES	(10) MES
L.Systemic Risk	0.400*** (0.00693)	0.395*** (0.00718)	0.267*** (0.00856)	0.414*** (0.00932)	0.412*** (0.00950)	0.407*** (0.00566)	0.376*** (0.00508)	0.237*** (0.00651)	0.391*** (0.00467)	0.417*** (0.00749)
L.Opacity _{FE}	0.000575*** (0.000174)	-0.000338*** (7.68e-05)	5.59e-05 (4.46e-05)	0.000614*** (0.000153)	-0.000175*** (6.12e-05)	- (0.000267)	-0.000843*** (8.49e-05)	0.000262*** (7.76e-05)	0.00144*** (0.000233)	-9.59e-05 (8.09e-05)
L.FinStatementTrans	0.00195*** (0.000234)					0.000407 (0.000691)				
L.Opacity _{FE} * L.FinStatementTrans	-0.000136*** (3.65e-05)					0.000157*** (5.39e-05)				
L.Basel Pillar 3		0.00550*** (0.000228)					0.0107*** (0.000462)			
L.Opacity _{FE} * L.Basel Pillar 3		0.000227*** (8.08e-05)					0.000658*** (8.97e-05)			
L.IFRS 7			0.0119*** (0.000209)					0.0229*** (0.000284)		
L.Opacity _{FE} * L.IFRS 7			-0.000157*** (4.84e-05)					-0.000411*** (7.03e-05)		
L.External Audit Strength				0.00485*** (0.000301)					0.00859*** (0.000964)	
L.Opacity _{FE} * L.External Audit Strength				-0.000148*** (3.20e-05)					-0.000329*** (4.62e-05)	
L.Supervisory Power					- (6.71e-05)					-0.00155*** (0.000134)
L.Opacity _{FE} * L.Supervisory Power					0.000764*** (6.71e-05)					-1.51e-05 (1.19e-05)
L.ECB Supervision (∈ {0; 1})	0.00110*** (0.000111)	0.00140*** (0.000109)	0.000751*** (0.000101)	0.00156*** (9.92e-05)	0.00121*** (0.000120)	0.00313*** (0.000251)	0.00329*** (0.000206)	0.00216*** (0.000203)	0.00284*** (0.000241)	0.00245*** (0.000192)
L.logAssets	0.00632*** (0.000387)	0.000718** (0.000285)	-0.00431*** (0.000395)	0.00646*** (0.000269)	0.00780*** (0.000449)	0.0141*** (0.000676)	0.00249*** (0.000499)	-0.00560*** (0.000907)	0.0143*** (0.000466)	0.0174*** (0.000399)
L.DepRatio (%)	- (9.91e-06)	- (7.14e-06)	- (1.08e-05)	- (1.42e-05)	- (1.09e-05)	- (1.27e-05)	- (1.73e-05)	- (1.76e-05)	- (2.59e-05)	- (2.00e-05)

L.LoanRatio (%)	7.44e-05*** (9.77e-06)	6.41e-05*** (1.22e-05)	1.33e-05 (1.18e-05)	3.42e-05*** (1.24e-05)	7.21e-05*** (1.03e-05)	0.000199*** (3.77e-05)	0.000195*** (4.41e-05)	0.000129*** (3.90e-05)	8.32e-05** (3.40e-05)	0.000245*** (3.28e-05)
L.ROE (%)	6.74e-05*** (8.96e-06)	7.25e-05*** (7.95e-06)	9.85e-05*** (8.59e-06)	5.42e-05*** (6.80e-06)	4.77e-05*** (9.63e-06)	0.000172*** (7.75e-06)	0.000186*** (7.39e-06)	0.000247*** (7.71e-06)	0.000143*** (7.37e-06)	0.000136*** (8.91e-06)
L.NPL (%)	0.000174*** (3.69e-05)	0.000137*** (2.89e-05)	0.000157*** (2.47e-05)	0.000185*** (3.79e-05)	0.000159*** (3.71e-05)	0.000245*** (2.73e-05)	0.000248*** (2.95e-05)	0.000311*** (5.00e-05)	0.000396*** (3.39e-05)	0.000197*** (2.60e-05)
L.EQRatio (%)	-2.11e-05 (0.000134)	-0.000164 (0.000165)	-0.000369 (0.000119)	0.000165 (0.000191)	-1.53e-05 (0.000141)	0.000113 (0.000167)	-0.000169 (0.000158)	-0.000503 (0.000147)	3.51e-05 (0.000174)	0.000118 (0.000129)
L.LevRatio (%)	4.56e-06*** (3.74e-07)	5.40e-06*** (4.00e-07)	6.03e-06*** (2.37e-07)	4.06e-06*** (3.91e-07)	3.88e-06*** (3.91e-07)	8.31e-06*** (4.85e-07)	9.64e-06*** (3.46e-07)	1.16e-05*** (3.30e-07)	6.99e-06*** (5.03e-07)	6.89e-06*** (4.19e-07)
L.GDP Growth (%)	0.000376*** (2.23e-05)	0.000337*** (2.17e-05)	0.000485*** (2.72e-05)	0.000343*** (2.08e-05)	0.000338*** (3.18e-05)	0.000601*** (3.84e-05)	0.000559*** (4.11e-05)	0.000826*** (3.81e-05)	0.000647*** (4.09e-05)	0.000545*** (4.04e-05)
L.ΔGDP per Capita	3.18e-08** (1.49e-08)	4.95e-08*** (1.14e-08)	3.18e-08** (1.31e-08)	5.52e-08*** (1.31e-08)	7.60e-09 (1.52e-08)	-4.67e-08* (2.43e-08)	5.09e-08* (2.89e-08)	8.79e-09 (2.66e-08)	1.27e-08 (2.76e-08)	-3.98e-08 (3.27e-08)
L.Inflation	0.000223*** (6.58e-05)	0.000248*** (4.93e-05)	-9.10e-05* (5.00e-05)	-	-9.44e-05 (5.08e-05)	0.000175*** (6.56e-05)	-0.000235** (0.000106)	1.79e-06 (8.68e-05)	-0.000200** (7.87e-05)	0.000170 (0.000140)
Constant	-0.122*** (0.00609)	-0.0155*** (0.00570)	0.0778*** (0.00723)	-0.137*** (0.00465)	-0.131*** (0.00740)	-0.257*** (0.0108)	-0.0530*** (0.0103)	0.0952*** (0.0179)	-0.293*** (0.00965)	-0.302*** (0.00665)
Observations	888	897	897	888	888	888	897	897	888	888
Number of id	74	74	74	74	74	74	74	74	74	74
AR(1)	4.20e-08	6.75e-09	8.54e-07	5.64e-08	1.01e-07	9.83e-08	5.31e-09	1.53e-06	1.28e-07	9.35e-08
AR(2)	0.105	0.207	0.144	0.283	0.0310	0.439	0.764	0.240	0.915	0.350
Hansen	1	1	1	1	1	1	1	1	1	1
Sargan	0	0	0	0	0	0	0	0	0	0
Number of Instruments	132	132	132	132	132	132	132	132	132	132

(continued on next page)

Table 11: Interaction – Risk Disclosure Regulation on Bank Opacity and Systemic Risk – System-GMM (continued)

Panel C: Forecast Dispersion

VARIABLES	(1) ΔCoVaR	(2) ΔCoVaR	(3) ΔCoVaR	(4) ΔCoVaR	(5) ΔCoVaR	(6) MES	(7) MES	(8) MES	(9) MES	(10) MES
L.Systemic Risk	0.483*** (0.00733)	0.457*** (0.00533)	0.309*** (0.00568)	0.474*** (0.00789)	0.498*** (0.00725)	0.443*** (0.00618)	0.415*** (0.00448)	0.273*** (0.00471)	0.425*** (0.00512)	0.455*** (0.0104)
L.Opacity _{Dis}	-0.00271*** (0.000809)	6.47e-05 (6.51e-05)	0.000104 (7.20e-05)	0.00114*** (0.000212)	0.000260*** (9.47e-05)	-0.00576*** (0.000798)	-6.45e-05 (0.000122)	-8.47e-05 (0.000118)	0.000291 (0.000259)	0.000256** (0.000109)
L.FinStatementTrans	0.000746** (0.000301)					0.000756 (0.000512)				
L.Opacity _{Dis} * L.FinStatementTrans	0.000472*** (0.000165)					0.00107*** (0.000162)				
L.Basel Pillar 3		0.00621*** (0.000208)					0.0128*** (0.000454)			
L.Opacity _{Dis} * L.Basel Pillar 3		-0.000395 *** (5.98e-05)					-0.000360 *** (0.000120)			
L.IFRS 7			0.0117*** (0.000146)					0.0227*** (0.000275)		
L.Opacity _{Dis} * L.IFRS7			-0.000336 *** (7.31e-05)					-0.000256** (0.000112)		
L.External Audit				0.00333*** (0.000204)					0.00516*** (0.000279)	
L.Opacity _{Dis} * L.External Audit				- 0.000296*** (4.33e-05)					-0.000143 *** (5.12e-05)	
L.Supervisory Power					-0.000807 *** (7.49e-05)					-0.00166*** (0.000116)
L.Opacity _{Dis} * L.Supervisory Power					-0.000103 *** (1.21e-05)					-0.000118 *** (1.61e-05)
L.ECB Supervision (∈ {0; 1})	0.00127*** (9.57e-05)	0.00137*** (7.48e-05)	0.000866*** (0.000107)	0.00145*** (0.000113)	0.000996*** (0.000210)	0.00301*** (0.000148)	0.00346*** (0.000171)	0.00268*** (0.000165)	0.00256*** (0.000181)	0.00239*** (0.000234)
L.logAssets	0.00600*** (0.000265)	0.000958*** (0.000200)	-0.00463*** (0.000306)	0.00639*** (0.000341)	0.00831*** (0.000332)	0.0133*** (0.000477)	0.00240*** (0.000481)	-0.00703*** (0.000847)	0.0141*** (0.000340)	0.0173*** (0.000370)
L.DepRatio (%)	- 0.000163*** (1.65e-05)	- 0.000134*** (1.96e-05)	- 0.000173*** (1.21e-05)	- 0.000136*** (1.20e-05)	- 0.000138*** (1.47e-05)	- 0.000328*** (1.80e-05)	- 0.000348*** (2.15e-05)	- 0.000450*** (1.79e-05)	- 0.000263*** (2.19e-05)	- 0.000287*** (1.25e-05)

L.LoanRatio (%)	4.55e-05*** (1.08e-05)	3.63e-05** (1.79e-05)	6.73e-06 (1.50e-05)	2.27e-05* (1.17e-05)	6.93e-05*** (1.81e-05)	0.000125*** (3.35e-05)	0.000168*** (2.70e-05)	0.000121*** (3.73e-05)	9.08e-05*** (2.74e-05)	0.000197*** (3.35e-05)
L.ROE (%)	8.30e-05*** (5.02e-06)	0.000101*** (5.85e-06)	0.000122*** (5.78e-06)	7.77e-05*** (6.43e-06)	5.77e-05*** (5.70e-06)	0.000191*** (3.51e-06)	0.000230*** (5.60e-06)	0.000279*** (5.81e-06)	0.000172*** (8.71e-06)	0.000158*** (7.10e-06)
L.NPL (%)	0.000194*** (2.41e-05)	0.000146*** (2.62e-05)	0.000174*** (1.87e-05)	0.000213*** (2.13e-05)	0.000154*** (3.09e-05)	0.000266*** (3.88e-05)	0.000207*** (3.19e-05)	0.000315*** (2.37e-05)	0.000396*** (4.14e-05)	0.000197*** (3.82e-05)
L.EQRatio (%)	5.22e-05 (0.000192)	0.000142 (0.000108)	-0.000133 (0.000125)	0.000318*** (0.000120)	0.000288*** (8.54e-05)	0.000348*** (0.000111)	0.000221 (0.000171)	-0.000103 (0.000158)	0.000448*** (0.000126)	0.000485*** (0.000138)
L.LevRatio (%)	4.31e-06*** (4.00e-07)	5.65e-06*** (2.65e-07)	6.15e-06*** (2.29e-07)	4.34e-06*** (2.97e-07)	3.72e-06*** (2.71e-07)	8.28e-06*** (2.19e-07)	1.01e-05*** (2.57e-07)	1.20e-05*** (2.63e-07)	7.04e-06*** (4.33e-07)	6.97e-06*** (3.30e-07)
L.GDP Growth (%)	0.000295*** (1.63e-05)	0.000354*** (2.44e-05)	0.000539*** (3.09e-05)	0.000339*** (2.11e-05)	0.000186*** (1.63e-05)	0.000593*** (1.88e-05)	0.000649*** (2.86e-05)	0.000903*** (3.11e-05)	0.000667*** (2.99e-05)	0.000463*** (3.42e-05)
L. Δ GDP per Capita	5.70e-08*** (1.72e-08)	8.06e-08*** (1.61e-08)	5.06e-08*** (1.39e-08)	9.48e-08*** (1.49e-08)	4.89e-08** (1.90e-08)	2.24e-09 (2.90e-08)	9.46e-08*** (2.19e-08)	6.55e-08*** (2.51e-08)	7.55e-08** (3.24e-08)	2.17e-08 (1.97e-08)
L.Inflation	0.000429*** (6.75e-05)	0.000484*** (7.12e-05)	0.000211*** (5.10e-05)	0.000601*** (6.96e-05)	0.000358*** (8.85e-05)	0.000307*** (0.000115)	0.000606*** (7.82e-05)	0.000241*** (8.69e-05)	0.000504*** (0.000121)	0.000306*** (8.99e-05)
Constant	-0.109*** (0.00495)	-0.0216*** (0.00364)	0.0833*** (0.00556)	-0.131*** (0.00652)	-0.143*** (0.00728)	-0.244*** (0.0101)	-0.0551*** (0.00977)	0.121*** (0.0170)	-0.280*** (0.00689)	-0.301*** (0.00853)
Observations	838	847	847	838	838	838	847	847	838	838
Number of id	73	73	73	73	73	73	73	73	73	73
AR(1)	1.50e-07	4.45e-08	3.17e-06	3.94e-07	4.98e-08	1.18e-07	1.30e-08	3.38e-06	3.26e-07	9.48e-08
AR(2)	0.121	0.482	0.299	0.205	0.257	0.709	0.318	0.579	0.778	0.971
Hansen	1	1	1	1	1	1	1	1	1	1
Sargan	0	0	0	0	0	0	0	0	0	0
Number of Instruments	132	132	132	132	132	132	132	132	132	132

Table 4.11 describes the results for dynamic system GMM regression of testing the Interaction Effect of Risk Disclosure Regulation and Enforcement on Bank Opacity and Systemic Risk in the period from 2002-2018. The dependent variable describes the Systemic Risk measures Delta Conditional Value-at-Risk (Δ CoVar) according to Adrian & Brunnermeier (2008) and Marginal Expected Shortfall (MES) according to Acharya et al. (2010). Bank Opacity is derived from 12-month Analysts' Forecast Errors of Earnings Per Shares (Forecast Errors) and Analyst Forecast Dispersions (Forecast Dispersions). Banks Financial Statement Transparency according to Barth et al. (2006) (FinStatementTrans), Basel Pillar 3, Proxy for Accounting Risk Disclosure Regulation, (IFRS 7), the Effectiveness of external audit of banks according to Barth et al. (2006) (External Audit Strength) and the strength of the Supervisory Power according to Barth et al. (2006) (Supervisory Power). Bank Controls: ECB significant supervised entity (ECB Supervision), Logarithm of Total Assets (logAssets), Deposits Ratio (DepRatio), Loans Ratio (LoanRatio), Return on Equity (ROE), Non-Performing Loans-Ratio (NPL), Equity Ratio (EQRatio), Leverage Ratio (LevRatio), Annual growth rate of Gross domestic product (GDP Growth), Change in Gross domestic product divided by population (Δ GDP per CU), Inflation (Inflation). Robust and bank clustered Huber-White Standard errors in brackets. Detailed variable Definitions are given in Table 4.2. *** p<0.01, significant on the .01 Level, ** p<0.05, significant on the 0.05 Level, * p<0.1, significant on the 0.1 Level.

4.5 Conclusion

In the context of this paper, I investigated the impact of bank opacity on the financial stability of European credit institutions. In contrast to previous studies (Flannery et al., 2013; Fosu et al., 2017), this paper did not use idiosyncratic risk measures to assess the risk behavior of banks. Instead, the systemic risk measures ΔCoVaR and MES were used. This allowed a granular analysis of the banks' contribution to systemic risk and thus to European financial stability. By using market-based measures to assess disclosure quality, a significant relationship between transparency and financial stability was identified.

Based on a panel dataset of listed European banks covering the period 2002–2018, it was shown that bank opacity has a significant influence on the institution-specific contribution to the $\Delta\text{Conditional Value at Risk}$ and $\text{Marginal Expected Shortfall}$.

In the second step, the regulatory measures introduced by the banking supervisory authorities and accounting standard setters and their interaction with the market-based disclosure were examined. The policies introduced by accounting standard setters and regulators for the risk disclosure of banks have a positive impact on the mitigation of bank opacity and the reduction of systemic risk. Both the risk reporting in accordance with IFRS 7 and the measures introduced by the Basel Committee in the form of the Basel Pillar 3 regulation led to an increase in transparency and a reduction of bank opacity and thus an improvement in financial market stability. The research also shows that the external auditor serves a special role in ensuring transparency requirements. Depending on the chosen research design, the strength of national banking supervision or monitoring by the ECB in the form of the single supervisory mechanism also plays a role of greater or lesser importance in mitigating systematic risks.

The results are thus in line with previous studies on regulation and enforcement (Abedifar et al., 2019; Duru et al., 2020; Tadesse, 2006) and are as follows: domestic regulation and enforcement policies are of central relevance for strengthening financial stability and increasing the quality of disclosure. The results are robust, by using both alternative opacity measures and dynamic panel data models (GMM) to control for endogeneity.

This study has several limitations. IFRS 7 and Pillar 3 regulation were primarily represented based on a simple binary proxy. The scope of analysis of the banks considered is still limited to listed European banks. EBA stress test participants not listed on the capital market, such as Landesbank Baden-Württemberg (LBBW) or DZ Bank in Germany, are not included in this study. It would be advisable to extend the research design to a broader regional area or to include non-listed banks such as savings banks and cooperatives.

Further research is needed in the granular analysis of accounting and Basel Pillar 3 regulation through more precise analysis methods such as using disclosure indices or textual analysis. In addition, the influence of the certified public accountants on the financial market stability of global banks should be examined in more detail. Besides the size of the auditor (Big 4 vs. Next Ten), for example, the choice of relevant key audit matters on audit quality and the interaction with bank opacity can be assessed.

Appendix 4.1: Review of the literature on bank opacity and risk-taking

Author(s), Year	Proxy for Opacity	Proxy for Risk Taking	Country, Sample
Dewally and Shao, 2013	HI	Crash, NCSKEW, DUVOL	USA, 1995-2010
Hagendorff, 2013	PRIV_INF	Stock Co-Movement, TCRASHES, CCRASHES, UCRASHES	Europe, 1991-2006
Vallascas and Keasey, 2014	IN_ASYMMETRY	DTD	Europe, 1993-2011
Fosu et al., 2017	AFE, AFD	Z-Score, Z-Score (CAR), Z-Score (ROA), SYSR, IDIOR, TR	USA, 1995-2013
Cao and Juelsrud, 2022	Ratio of available-for-sales securities; ratio of off-balance sheet items	Z-Score, σ ROA	Norway, 1993q1-2015q4
Tran et al., 2022	DLLP	Z-Score	USA, 2001-2021

This table provides an overview of contributions on bank opacity and risk taking in chronological order. Variable definitions:⁵⁹

AFD	Analysts Forecast Dispersion
AFE	Analyst Forecast Errors
AFS	Ratio of available-for-sales securities
CRASH	Dummy that equals 1 if a bank experiences one crash during the year and 0 otherwise
DLLP	Discretionary Loan Loss Provisions
DTD	Distance to Default
DUVOL	Natural logarithm of the ratio of the standard deviation on the down weeks to the standard deviation on the up weeks
HI	Interest rate derivatives reported to total assets
IDIOR	Idiosyncratic Risk according to the market model
IN_ASYMMETRY	Asymmetric Information Index according to Bharath et al. (2009)
NCSKEW	Negative conditional return skewness of weekly bank-specific return
OBSI	Ratio of off-balance sheet items
PRIV_INF	Absolute Value of Residual of the earnings prediction model according to Park (1999) & Crouzille et al. (2004)
Stock Co-Movement	Logistic Transformation of the R^2 of the fitted stock co-movement model
SYSR	Systematic Risk according to the market model
TR	Annual standard deviation of daily stock returns
Z-Score	Z-Score
Z-Score (CAR)	Z-Score (CAR)

⁵⁹ For the sake of simplicity, the detailed derivation of the variables will be not presented here. Please refer to the explanations in the respective articles (Cao & Juelsrud, 2022; Dewally & Shao, 2013; Fosu et al., 2017; Vallascas & Keasey, 2013).

Z-Score (ROA)	Z-Score (ROA)
σ ROA	Standard deviation of Return on Assets

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**Chapter 5: Can Bank Accounting Regulation
Strengthen Resilience? The Impact of IFRS 9
Adoption on Loan Loss Provisioning and
Bank Behavior**

Can Accounting Regulation Strengthen Resilience? The Impact of IFRS 9 Adoption on Loan Loss Provisioning and Bank Behavior

Michael Mies, Michael Torben Menk

Abstract:

Academic research on loan loss provisioning and the earlier incurred credit losses (ICL) model has a long tradition in the literature. Academic criticism of the ICL was taken up by the Financial Stability Board (FSB) after the financial crisis of 2008, leading to a fundamental revision of accounting methodology by standard setters. The objective of this paper is to extend the research field with an empirical contribution to the recognition of Loan Loss Provisions (LLPs) based on the expected credit loss model (ECL). By using a Difference-in-Differences research design, this paper aims to investigate the impact of accounting standard changes on bank behavior and, consequently, on the resilience of corporate and investment banks. Thus, this paper provides early empirical evidence of the IFRS 9 transition for bank supervisors, governments, and financial analysts.

Keywords: IFRS9, Asset Quality, Risk Taking, Loan Loss Provisioning

JEL-Classification: G21, G28, G32, G38, G41, M41, M48

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5.1 Introduction

During the replacement of the International Accounting Standard 39 Financial Instruments: Recognition and Measurement (IAS 39) by the International Financial Reporting Standard 9 Financial Instruments (IFRS 9), risk reporting under commercial law is also undergoing a fundamental revision. The transition from the backward-looking incurred credit loss (ICL) model to the forward-looking expected credit loss (ECL) model of IFRS 9 has intensified the spotlight on the disclosure of credit risk. With the revised impairment model, the International Accounting Standards Board (IASB) has responded to ongoing criticism of the existing impairment model (Barth & Landsman, 2010) and replaced it with a three-stage ECL model for loan loss provisioning as of the financial year 2018 (IASB, 2014a).⁶⁰ The previous accounting approach for loan loss provisioning under IAS 39 was too slow in recognizing changes in credit risk, and it did not take effect until the loss event was incurred (“too little, too late”), which had a procyclical effect, especially in times of crisis (BCBS, 2021b, 2015a; Laeven & Majnoni, 2003).

Early normative analyses of the IFRS 9 ECL model indicate an earlier recognition and higher loan loss provisions (LLPs) to be expected overall (Novotny-Farkas, 2016). Preliminary surveys by the European Banking Authority (EBA) in 2016 have also verified this, stating that income volatility will also be higher (EBA, 2016a). Due to the amendment of the International Financial Reporting Standard 7 Financial Instruments Disclosure (IFRS 7) and extended regulatory disclosure requirements of the supervisory authority, there is still an enhanced opportunity for market discipline and, thus, improved financial market stability despite the IFRS 9-related options of the ECL model (Novotny-Farkas, 2016). Indeed, the Basel Committee on Banking Supervision (BCBS, 2018, 2016a, 2016b) and the EBA (2018a, 2016b) have provided guidance for model-specific risk disclosure and the design of the accounting-related control system.⁶¹ Further extensive guidance on the initial disclosure of the ECL model and the associated adjustment of risk governance processes has been published by the Enhanced Disclosure Task Force of the Financial Stability Board (FSB) of the Group of Twenty (EDTF, 2015).

Traditionally, academic research on LLPs and, thus, on the ICL model has a long history; it has been the subject of a large number of empirical studies (see for an overview of the literature, Beatty & Liao, 2014; Ozili & Outa, 2017). The objective of this paper is to extend the field of research with an empirical contribution to loan loss provisioning based on the ECL Model. Employing a

⁶⁰ In the European Union, in particular, the first-time application of IFRS 9 was accompanied by an endorsement procedure by the European Parliament lasting several years. For a comprehensive overview of the endorsement process for IFRS 9, see the remarks by Bischof and Daske (2016).

⁶¹ These include, among others, transition matrices and options for the amortization of the first-time adoption effect.

Difference-in-Differences (DiD) approach over the period 2016-2019, this paper aims to investigate the impact of accounting standard changes on bank behavior and bank resilience.

In the first part of this paper, the impact of adopting IFRS 9 on earnings management and the forward-looking characteristics of LLPs due to timely recognition will be considered. In particular, the effects of income smoothing, and discretionary LLPs discussed in the ICL literature will be addressed. As a subsequent research question, the effect of the IFRS 9 transition on the resilience of financial institutions will be investigated. As key determinants of a resilient financial system, we follow the regulatory debate (e.g., BCBS, 2017, 2015a) and use the risk-taking behavior and determinants to measure asset quality as a proxy to illustrate resilience. LLPs represent an essential information source, especially for the addressee, to assess the credit risk of a bank. In particular, a resilient financial market system requires transparency about banks' asset quality to assess risks in terms of regulatory market discipline (Acharya & Ryan, 2016). In the context of our third research question, we will investigate the capital market reaction to the IFRS 9 transition on the basis of a market-based valuation model. Based on our results, we observed that the introduction of IFRS 9 has led to an improvement in the timely recognition of LLPs. We also found that the new accounting standard incentivizes less income smoothing than the ICL approach. We further evaluated the market reaction of the discretionary and non-discretionary components of LLPs in our market-based valuation model following Beaver and Engel (1996). We show that the capital market reacts positively to the increased transparency of non-discretionary LLPs. On the other hand, discretionary LLPs (DLLPs) have a negative impact on market valuation. Lastly, our empirical results indicate that the adoption of the revised accounting standard has a positive effect on the resilience of the banks in the sample and, thus, has a positive impact on financial stability. The adoption of IFRS 9 will lead to a reduction in banks' asset and insolvency risk, resulting in more financial stability.

This paper adds to a growing body of literature that examines the change in accounting for LLPs resulting from the implementation of IFRS 9 (e.g., López-Espinosa et al., 2021; Oberson, 2021; Orthaus & Rugilo, 2022). In this context, it makes four contributions to the literature: First, by using a common empirical LLP model (see for an overview, e.g., Beatty & Liao, 2014), we analyze whether the intent of the accounting standard setters and policy makers (FSB, 2009; IASB, 2014a) to improve the credit loss model by moving to the ECL model has been achieved. Second, following the discussion initiated by the BCBS to investigate the interplay between accounting and regulation on bank behavior (BCBS, 2017, 2015a), we analyze the risk-taking behavior of global banks. Unlike previous studies (Dong & Oberson, 2022; Kund & Rugilo, 2021), we emphasize idiosyncratic solvency metrics and determinants to measure asset quality to determine the

resilience of ECL adopters. Third, we use a market-based valuation model to analyze the capital markets' acceptance of the revised accounting standard. By distinguishing between a discretionary and a non-discretionary component of LLP, this article extends the ongoing discussion of discretionary LLPs as an instrument of market discipline to mitigate bank opacity (Gallemore, 2022; Jiang et al., 2016; Tran et al., 2022). Finally, this paper provides early empirical evidence of the IFRS 9 transition for bank supervisors, governments, and financial analysts. In addition, it also provides comparative insights into the impact of ECL provisioning, particularly in light of the upcoming adoption of the Current Expected Credit Losses methodology (CECL) in the United States.

The remainder of this paper is structured as follows: Chapter 5.2 will first provide a brief overview of the technical characteristics of the IFRS 9 impairment model. In addition, a brief literature review of the current state of IFRS 9 research will be given along with the establishment of initial hypotheses. Chapter 5.3 will cover the empirical research design and the data set used. Chapter 5.4 will present the empirical results. The paper concludes with a discussion and a conclusion.

5.2 IFRS 9 Impairment Model, Literature Review, and Hypotheses Development

5.2.1 Background: Technical ECL Accounting and Disclosure Policy according to IFRS 9 and IFRS 7

As a direct consequence of the criticism of the previous accounting standard IAS 39 (FSB, 2009), the IASB published the revised accounting standard IFRS 9 in July 2014 (IASB, 2014b). The standard is divided into three parts *Classification and measurement*, *Impairment*, and *Hedge accounting*. In the following chapter, the new ECL model will be briefly explained, and the disclosure requirements under IFRS 7 will be presented.⁶²

IFRS 9.5.5.1 requires the classification of financial assets, lease assets, contract assets, and financial guarantees in Stage 1 of a three-stage impairment model upon initial recognition. For this purpose, an initial allowance is recognized on the basis of a default event that occurs within the next 12 months (12-m ECL). IFRS 9 does not explicitly specify how credit risk models are to be defined, which leaves the practitioner some leeway in terms of design. The measurement of ECLs at reporting date t can be calculated by multiplying the exposure at default (EAD) with the loss given default (LGD) and the probability of default (PD) discounted with the effective interest rate to capture the time value of money (EY, 2018; KPMG, 2018, 2017; Scharpe et al., 2017):

⁶² This subsection is a revised summary of our paper Scharpe et al. (2017): Effects of IFRS 9 on risk reporting in banks with a capital market focus published in FIRM Yearbook 2017.

$$\text{Stage 1: } LLP_t = \frac{PD_t^{12m} \times LGD_t \times EAD_t}{i_{\text{gross carrying amount}}^{\text{effective}}} \quad (1)$$

At each reporting date, a risk assessment must be performed to determine whether there has been a significant increase in credit risk since the loan was granted (IFRS 9.5.5.9), which would trigger a transfer to Stage 2 and an estimation of the loan losses with the lifetime ECL (LTEL) (IFRS 9.B5.5.43; Scharpe et al., 2017).

$$\text{Stage 2: } LLP_t = \frac{\sum_{k=t}^T PD_k^{\text{Remaining LT}} \times LGD_t \times EAD_t}{i_{\text{gross carrying amount}}^{\text{effective}}} \quad (2)$$

For the transition from Stage 1 to Stage 2, the significant increase in credit risk is determined based on the change in the cumulative probability of default over the remaining lifetime, whereby a threshold is to be determined that can be derived from historical internal credit risk management data (Scharpe et al., 2017; KPMG, 2017). Through the use of ECL-based models, the new IFRS 9 is more closely aligned with bank risk management practices. However, it is not possible to use the regulatory migration matrices for PD in their entirety. Instead, the regulatory through-the-cycle estimates must be adjusted accordingly, as IFRS 9 explicitly relies on a point-in-time estimate of PD (KPMG, 2014; Novotny-Farkas, 2016). If objective indications and indications of a need for impairment, such as insolvency or payment default of 90 days or more, are observed, the transfer to Stage 3 takes place (IFRS 9.B5.5.37). This results in the following equation for determining Stage 3 (Scharpe et al., 2017):

$$\text{Stage 3: } LLP_t = \frac{\sum_{k=t}^T PD_k^{\text{Remaining LT}} \times LGD_t \times EAD_t}{i_{\text{net carrying amount}}^{\text{effective}}} \quad (3)$$

The requirements for external disclosure of the impairment model to determine the credit risk are set out in IFRS 7.35F-N. The impairment model must be disclosed in the notes to the consolidated financial statements. Banks must provide information on their credit risk management practices. In particular, this includes measures to identify the significant increase in credit risk and the used default definition (IFRS 7.35F).

Furthermore, banks are required to disclose the input factors, assumptions, and estimation methods used to calculate the 12-month ECL and lifetime ECL. In particular, the addressees should be made aware of whether the default risk has increased significantly or whether the asset is credit impaired. Moreover, the extent to which forward-looking information and macroeconomic factors have been considered in determining the ECL should be described (IFRS 7.35G). Additionally, quantitative

and qualitative information on the amount of ECL must be disclosed by the preparer of the financial statements (IFRS 7.35H-L), in addition to the default risk (IFRS 7.35M-N).

Figure 5.1: IFRS 9 Impairment Model, illustration in accordance with Scharpe et al. (2017) and IASB (2014b)

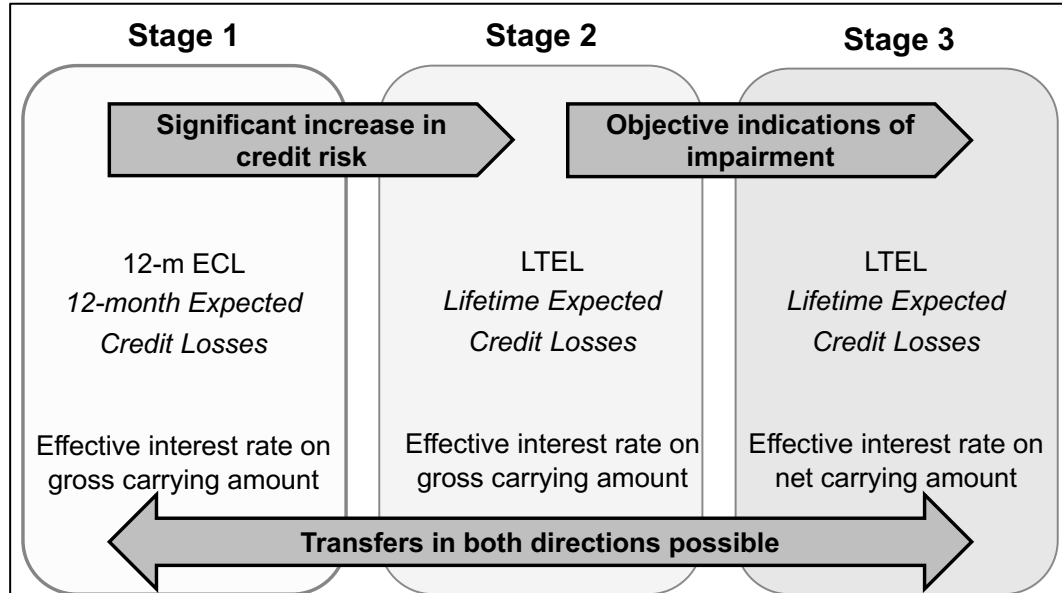


Figure 5.1 describes the three stages of the revised IFRS 9 impairment model.

5.2.2 Literature Review and Hypotheses Development

State of the Art of Empirical IFRS 9 Research

Before we begin to develop our hypotheses, we would like to briefly review some of the recent research related to the IFRS 9 ECL Model. Albrahimi (2020) analyzed the adoption of the IFRS 9 ECL model and found evidence of reduced market discipline, especially in income-smoothing countries. Kim et al. (2021) showcased that the shift to the ECL model significantly improved the timeliness of loan loss provisioning and that the adoption of IFRS 9 mitigates the procyclicality of bank lending and risk-taking behavior. Kund and Rugilo (2021) draw similar findings based on the European stress test dataset. In the short term, the introduction of IFRS 9 will lead to an increase in impairments due to the so-called “front-loading effect.” However, “financial stability benefits from the reduced ‘cliff-effect’ in the long run” (Kund & Rugilo, 2021, p. 3). In a further study based on the EBA stress test dataset, Kund und Neitzert (2020) found evidence of regulatory earnings and capital management and an increase in impairments of stress test participants.

Based on a sample of systemically important banks (SIBs), López-Espinosa et al. (2021) showed “that ECL provisions are more predictive of future bank risk than ICL provisions” (López-Espinosa et al., 2021, p. 757). Additionally, they found that the effect of first-time adoption leads to lower stock returns and higher variations in Credit Default Swaps (CDS) spreads. Oberson (2021) also found evidence of enhanced timeliness in loan loss recognition under IFRS 9 and increased

incentives for income smoothing. Based on CDS spreads, Oberson (2021) showcased that the decision usefulness of the disclosed information was increased by future ECLs, but earnings smoothing reduced this effect. In addition, he found evidence that a strong corporate governance has an impact on LLPs and market valuation. Dong and Oberson (2022) used a European sample over 2016–2019 to investigate the use of capital transition arrangements (CTA) and found that CTA users reduced their systematic risk during the transition period. However, statistical significance is only present in countries with strong banking supervision; furthermore, they found evidence that users in weaker supervisory regimes “tend to exercise more aggressively their accounting discretion” (Dong & Oberson, 2022, p. 641). Using an experimental research design, Du et al. (2022) surveyed 72 bank managers and found evidence of unconditional conservatism in the new ECL model. Those surveyed were reluctant to include positive news in the model when historical information indicated a high risk of default.

Forward-Looking Loan Loss Provisioning, Income Smoothing, and Capital Management

Earnings management⁶³ emerges through the intentional use of accounting discretion with the aim of misleading the addressee “about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers” (Healy & Wahlen, 1999, p. 368). In the banking literature, the discretionary use of LLPs is alleged to favor earnings management, in particular by income smoothing (Kanagaretnam et al., 2003) and capital management (Ahmed et al., 1999; Collins et al., 1995).

There is empirical evidence that the accruals of LLPs are comparatively higher in economic downturns and lower in economic upturns – the so-called booms (Bikker & Metzmakers, 2005; Laeven & Majnoni, 2003). To mitigate this effect, banks smooth earnings by accruing income in prosperous periods and using it to smooth earnings in less prosperous times (Bikker & Metzmakers, 2005; Kanagaretnam et al., 2003). In addition to mere accounting cosmetics, there is a wide consensus that especially in the context of the financial crisis of 2007–2009, the recognition of loan losses was reported too slowly, with negative consequences for overall financial market stability (Bischof et al., 2021). Furthermore, the low amount of accounting write-downs in the disclosed bank balance sheets of corporate and investment banks reflected a discrepancy with the risk exposures presented in credit indices, resulting in misleading market participants (Vyas, 2011).

The impact of loan loss provisioning on capital management has been the subject of academic debate in various jurisdictions (e.g., Ahmed et al., 1999; Collins et al., 1995). Ahmed et al. (1999) showed based on a U.S. sample that banks use LLPs to engage in active capital management. The

⁶³ Earnings management is also known as “big bath accounting” (Kirschenheiter & Melumad, 2002) or “cookie jar reserves” (Beck & Narayanamoorthy, 2012, p. 42) in the literature.

authors argued that “the relation between loan loss provisions and capital is more negative for banks with above average loan growth” (Ahmed et al., 1999, p. 3). The timely recognition of LLPs also has a significant impact on capital management. Beatty and Liao (2011) showed that banks with a lower delay in loan loss recognition were also less likely to curtail lending during recessions, thus limiting a recession-induced capital shortage for the financial system.

In response to the observed weaknesses of the accounting standards in the delayed recognition of credit losses, the FSB decided in 2009, on behalf of the G20 (2009), to instruct the accounting standard setter to fundamentally revise the ICL model (FSB, 2009). The IASB responded with the publication of the new accounting standard IFRS 9 (IASB, 2014a, 2014b). In addition to improving the usefulness of the model for decision-making, one of the main objectives of the revision of the accounting standard was to provide users of financial statements with an improved presentation of forward-looking loan loss provisioning (IASB, 2014a, 2014b). This leads to the following hypotheses:

H1: The adoption of IFRS 9 has a significant impact on the timeliness of LLPs.

H2: The adoption of IFRS 9 has a significant effect on banks' capital management.

In addition to management discretion (Kirschenheiter & Melumad, 2002; Lobo et al., 2001) and macroeconomic factors (Bikker & Metzmakers, 2005), country-specific regulatory conditions influence earnings management (Leuz et al., 2003) and risk-taking behavior and market discipline of banks (Bushman & Williams, 2012). For instance, Leventis et al. (2011) found evidence for a significant decrease in earnings management and an improvement in earnings quality due to the introduction of IFRS accounting standards in the European Union. In addition, they showed that riskier banks engage in more earnings management than less risky ones. Shen and Chih (2005) and Fonseca and González (2008) came to similar conclusions based on global studies of earnings management and the investigation of determinants influencing income smoothing. Both studies showed that, in addition to prudential regulation and supervision (Fonseca & González, 2008), accounting-related disclosures lowered earnings management (Shen & Chih, 2005) or income smoothing (Fonseca & González, 2008). Based on a sample of 231 European banks, Peterson and Anrun (2018) obtained slightly different results. They argued that stronger capital regulation generates incentives for income smoothing, especially for global SIBs (G-SIBs). This leads to the following hypothesis:

H3: The adoption of IFRS 9 has a significant impact on the decrease in earnings management, especially income smoothing.

Impact of IFRS 9 on Asset Quality and Bank Resilience

The financial resilience of credit institutions has increased because of numerous macroprudential regulatory measures since the last global financial crisis in 2008 (BCBS, 2021a). In addition to strengthening the capital base under capital adequacy, measures to enhance bank resilience also include bolstering the leverage ratio (LR) and the liquidity coverage ratio (LCR), as well as introducing supranational recovery and resolution mechanisms (KPMG, 2020).

Based on a global sample from 27 jurisdictions, Bushman and Williams (2012) showcased that discretionary use of LLPs in the form of income smoothing has a negative impact on disciplining banks' risk-taking behavior. The authors argued that the reduced transparency resulting from earnings management reduces regulatory market discipline and makes it more difficult for market participants to assess banks' risk exposure (Bushman & Williams, 2012). Moreover, there is still a consensus in the academic literature that accounting enforcement has a significant negative effect on banks' risk-taking behavior (Dal Maso et al., 2020). This leads to the following hypotheses:

H4: The adoption of IFRS 9 has a positive effect on asset quality and, thus, on bank resilience.

IFRS 9 and Value Relevance

One of the main objectives of IFRS is to provide users of financial statements with a true and fair view of the financial position, results of operations, and cash flows (IASB, IAS 1.15). In line with the regulatory paradigm of market discipline (e.g., Bliss & Flannery, 2002; Flannery, 1998; Stephanou, 2010), the disclosure of credit risk information on LLPs also has a significant influence on the external market valuation of banks (Ahmed et al., 1999; Beaver & Engel, 1996; Wahlen, 1994). Studies on the "signaling effect" of LLPs (Ahmed et al., 1999, p. 1) date back to the late 1980s/early 1990s.⁶⁴ By assumption, the market anticipates provisioning as disclosure of managers' private information about the bank's expected future earnings; market participants use this disclosed information (so-called non-discretionary information) to estimate the discretionary components in unexpected loan loss provisioning (Wahlen, 1994).

Based on a sample of 86 banks over the period 1984 Q4 to 1989 Q3, Wahlen (1994) found evidence that banks raise the discretionary components of disclosed LLPs when the outlook for future cash flows is positive. Beaver and Engel (1996) analyzed the capital market valuation of LLPs and

⁶⁴ For example, in an early study, Beaver et al. (1989) analyzed the explanatory power of LLA and NPL based on 149 banks over the period 1979–1983.

showed that the non-discretionary component is valued negatively, and the discretionary component is priced positively by the market.

A diverging conclusion is stated by Ahmed et al. (1999) based on a sample of 113 Bank Holding Companies (BHCs) over the period 1986–1995. In principle, they could verify the positive market valuation of DLLPs by replicating the research design of Beaver and Engel (1996). Nevertheless, using a return-based approach, they stated a significant negative association between DLLPs, and the stock returns considered (Ahmed et al., 1999). Additionally, early empirical evidence suggests that first-time adoption of IFRS 9 will lead to improved decision usefulness (Oberson, 2021) but will also induce higher variations in CDS spreads (López-Espinosa et al., 2021). This leads to the following hypothesis:

H5: The adoption of IFRS 9 has a positive impact on the valuation of LLPs on the capital market.

5.3 Empirical Research Design and Methodology

5.3.1 Sample and Data

A sample of global listed banks was selected to study the economic impact of IFRS 9 on banks over the period 2016–2019. Initially, to define the population of the sample, all banks listed in the Refinitiv EIKON “Banks Total World” index were used. On this basis, 531 banks were identified. In the second step, 53 subsidiaries of BHCs were excluded. The final sample included a total of 478 banks from 64 countries. For the empirical analysis, fundamental data from the Refinitiv EIKON Worldscope database and macroeconomic control variables from the World Bank and the OECD were taken. In addition, the Worldwide Governance Indicators (WGI) were used to control for country-specific governance and regulation (Kaufmann et al., 2010).

Table 5.1: The composition of the sample

Sample	No. of Banks	IFRS Adop- ters	Control Group
Refinitiv „Banks Total World“	531		
excluding subsidiaries of a global bank holding company	53		
Total Sample	478		
Panel A: Baseline Regression			
Less missing Accounting Data	227		
Less missing Macro Controls	82		
Total Sample	169	93	76
Panel B: Asset Quality and Risk-Taking Behavior			
Less missing Accounting Data	244		
Less missing Regulatory Data	29		

Sample	No. of Banks	IFRS Adopters	Control Group
Less missing Macro Controls	68		
Total Sample	137	85	52
Panel C: Market Valuation Model (Beaver et al., 1996)			
Less missing Market Data	78		
Less missing Accounting Data	52		
Total Sample	348	209	139
Panel D: Market Valuation Model (Collins et al., 1995)			
Less missing Market Data	78		
Less missing Accounting Data	32		
Total Sample	368	225	143

Table 5.1 describes the composition of the global sample.

5.3.2 Methodology

5.3.2.1 Income Smoothing, Forward-Looking Loan Loss Provisioning, and Capital Management

The empirical analysis of the IFRS 9 implementation effect was carried out on several multivariate regressions covering the reporting years 2016–2019.⁶⁵ We applied a DiD approach as a “quasi-experimental research design” (Wing et al., 2018, p. 454) to study the IFRS 9 adoption effect. DiD models are particularly suitable for the analysis of regulatory policies (e.g., Angrist & Krueger, 1999) or even the introduction of accounting standards (e.g., Bischof et al., 2022; Poshakwale et al., 2020).

We defined the treatment group as all banks that prepare their annual report according to the IFRS. As the control group, we selected all banks that prepare their financial statements according to U.S. GAAP⁶⁶ or local GAAP in the period under consideration.⁶⁷ The effective date of IFRS 9, January 1, 2018 was used as the event date.⁶⁸ Following Bushman and Williams (2012), we used the following baseline model:

$$LLP_{it} = \alpha + \beta_1 \Delta NPL_{it+1} \times IFRS \times IFRS9 + \beta_2 Eblp_{it} \times IFRS \times IFRS9 + \beta_3 Capital_{it} \times IFRS \times IFRS9 + \beta_4 IFRS \times IFRS9 + \beta_5 Eblp_{it} + \beta_6 \Delta NPL_{it+1} + \beta_7 Capital_{it} + \beta_8 \Delta NPL_{it} + \beta_9 \Delta NPL_{it-1} + \beta_{10} \Delta NPL_{it-2} + \beta_{11} \log Assets_{it-1} + \beta_{12-21} Macro\ Controls_{it} + \mu_t + \varepsilon_{i,t} \quad (1)$$

⁶⁵ The sample was not expanded to include the 2020 and 2021 reporting years due to potential bias in the accounting data because of the ongoing COVID-19 pandemic.

⁶⁶ Despite the planned change from ICL to CECL, U.S. GAAP is still suitable as a control group in this period, as the mandatory effective date of CECL for SEC filers are for fiscal years beginning after December 15, 2019 (FASB, 2016). Furthermore, in the wake of the COVID-19 pandemic, the application of the CECL methodology can be deferred by banks until January 1, 2022 (Federal Reserve Bank of St. Louis, 2022).

⁶⁷ For this purpose, we follow the classification of the prevailing accounting system in Refinitiv EIKON (WC07536).

⁶⁸ In order to verify whether individual countries have deviated from the mandatory adoption date of January 1, 2018 or whether individual banks have decided to adopt IFRS 9 prior to this date, all included banks were initially validated based on the annual reports.

The subscript $i = 1, \dots, N$ describes the analyzed banks over the periods $t = 1, \dots, N$. Equation (1) regresses LLP_{it} which describes the LLPs scaled by lagged total loans on the following independent variables. As a proxy for income smoothing, we follow previous studies (Bouvatier et al., 2014; Bushman & Williams, 2012; Gallemore, 2022) and use the variable $Ebllp_{it}$ that measures the earnings before LLPs, defined as earnings before taxes plus LLPs, scaled by lagged total loans. The variable ΔNPL_{it} describes the change in non-performing loans (NPLs) scaled by lagged total loans. Following Bushman and Williams (2012), the ratio ΔNPL_{it+1} is suitable for measuring the ability of actual provisions to anticipate future impairments in banks' credit portfolios. $Capital_{it}$ describes the Common Tier 1 Capital, scaled by risk-weighted assets. Following prior studies, we use the Capital Ratio as a proxy for capital management (Ahmed et al., 1999; Collins et al., 1995). As further bank characteristics, the lagged logarithmized total assets ($\log Assets_{it-1}$) is included as a proxy for bank size. As macroeconomic control variables, we use the annual GDP growth, unemployment rate, house price index, and inflation rate. To control for country-specific features on regulation, we also use the WGI governance variables like political stability, government effectiveness, regulatory quality, and rule of law (Kaufmann et al., 2010). To measure the influence of the adoption of the revised accounting standards, we use the binary variables $IFRS \times IFRS9$. The binary variable $IFRS$ is assigned a value of 1 if the bank belongs to the IFRS treatment group and 0 otherwise.⁶⁹ The dummy variable $IFRS 9$ is assigned a value of 1 for reporting years starting in 2018, the effective date of the new accounting standard IFRS 9, and 0 otherwise. As further control variables, dummy variables for the years 2016–2019 are added. To avoid measurement errors, the econometric model uses robust Huber–White standard errors clustered by banks (Petersen, 2009; Wooldridge, 2013, 2010).

5.3.2.2 ECL Model and Bank Resilience

To test the explanatory quality of provisioning in the wake of IFRS 9 adoption, we followed the reverse approach of Bhat et al. (2019) in Equation (2) and regressed $Bank\ Resilience_{it}$ on LLPs:

$$\begin{aligned} Bank\ Resilience_{it} = & \alpha + \beta_1 LLP_{it} \times IFRS \times IFRS9 + \beta_2 IFRS \times IFRS9 + \beta_3 LLP_{it} + \beta_4 \Delta NPL_{it-2} + \\ & \beta_5 \Delta NPL_{it+1} + \beta_6 \log TotalAssets_{it-1} + \beta_7 Capital_{it-1} + \beta_8 Ebllp_{it} + \beta_9 NCO_{it} + \beta_{10} LLR_{it} + \\ & \beta_{11} LOANS_{it-1} + \beta_{12-19} Macro\ Controls_{it} + \mu_t + \varepsilon_{i,t} \end{aligned} \quad (2)$$

⁶⁹ To improve the interpretability of the results, especially by avoiding triple interactions, we used the product $IFRS \times IFRS9$ as the treatment variable in the DiD model. In addition, an omitted variable bias in the FE model could be reduced.

The subscript $i = 1, \dots, N$ describes the analyzed banks over the periods $t = 1, \dots, N$. To measure the impact of the revised ECL model on bank resilience, we followed the macroprudential regulatory mechanism of the BCBS (2021a). We used the asset quality of a bank and the effect on financial stability as proxies to measure bank resilience. In this paper, we followed Imbierowicz et al. (2018) to measure banks' asset quality and used the dependent variables $\Delta\text{Capital Ratio}_{it}$, $\text{Capital growth}_{it}$, $\text{Tier 1 Capital growth}_{it}$, $\text{Capital Buffer}_{it}$, and $\Delta\text{Asset Risk}_{it}$ as proxies.

$\Delta\text{Capital Ratio}_{it}$ describes the change in Total Tier Capital scaled by risk-weighted assets. $\text{Capital growth}_{it}$ depicts the Logarithmic Equity Capital Growth. $\text{Tier 1 Capital growth}_{it}$ describes the Logarithmic T1 Capital Growth. $\text{Capital Buffer}_{it}$ is defined as the difference between the Total Regulatory Capital Ratio and the Basel Minimum Capital Requirements. $\Delta\text{Asset Risk}_{it}$ describes $\Delta\text{Risk-Weighted Assets}$ scaled by Total Assets.

As an additional measure for banks' soundness and risk-taking behavior – and their contribution to financial stability – we followed prior studies and used the z_score_{it} (Berger et al., 2009; Fosu et al., 2017; Laeven & Levine, 2009). A higher z_score_{it} implies a lower probability of bank failure (Demirgüç-Kunt & Huizinga, 2010) and, thus, higher bank stability (Berger et al., 2009).

$$z_score_{it} = \frac{ROA_{it} + CAR_{it}}{\sigma(ROA_{it})} \quad (3)$$

ROA_{it} describes the Return on Assets. CAR_{it} is defined as the Ratio of banks' total equity to total assets. $\sigma(ROA_{it})$ measures the standard deviation of the return on assets. Following prior studies, we used a rolling window of three years to measure $\sigma(ROA_{it})$ (Berger et al., 2017, 2009; Demirgüç-Kunt & Huizinga, 2010).

The model further uses the following control variables: The Net Charge offs (NCO_{it}) are scaled by lagged loans. Loan Loss Reserves (LLR_{it}) are defined as reserves for loan losses scaled by lagged total loans. $LOANS_{it-1}$ measures the lagged loans. The additional independent and control variables are defined in equation (1) and in a higher level of detail with data origin in Appendix 5.1.

5.3.2.3 Discretionary LLP and Bank Valuation

In our analysis of the value relevance of IFRS 9, we followed the approach of Beaver and Engel (1996) and used the “Ohlson model” (Feltham & Ohlson, 1995; Ohlson, 1995) as a market-based valuation model. Following previous studies (Beaver & Engel, 1996), we differentiated the LLPs into a discretionary and a non-discretionary component. Discretionary Loan Loss Provisions (DLLPs) are suitable as evidence of potential income smoothing because “DLLP represents the

portion of the accrual that is under management control” (Kanagaretnam et al., 2003, p. 65). Based on Beaver and Engel (1996), this leads to the formation of the following econometric model:

$$MVS_{it} = \alpha + \beta_1 BVS_{it} + \beta_2 EPS_{it} + \beta_3 GBV_{it} + \beta_4 LLP_{it} \times IFRS \times IFRS9 + \beta_5 DLLP_{it} \times IFRS \times IFRS9 + \beta_6 IFRS \times IFRS9 + \beta_7 \Delta NPL_{it} + \beta_8 NPL_{it} + \mu_t + \varepsilon_{i,t} \quad (4)$$

The subscript $i = 1, \dots, N$ describes the analyzed banks over the periods $t = 1, \dots, N$. Equation (4) regresses the Market Value per Share (MVS_{it}) on the following independent variables: BVS_{it} describes the Book Value Per Share; EPS_{it} measures the Earnings per Share, and GBV_{it} describes the Gross Book Value of common equity.

To determine discretionary LLPs ($DLLP_{it}$), we followed previous studies and adopted the residuals approach (Beaver & Engel, 1996; Jutasompakorn et al., 2021; Kanagaretnam et al., 2003). The $DLLP_{it}$ are obtained as the residuals $\varepsilon_{i,t}$ of the following OLS regressions:

Beaver & Engel (1996) Model:

$$LLP_{it} = \alpha + \beta_1 GBV_{it} + \beta_2 NCO_{it} + \beta_3 \Delta Loans_{it} + \beta_4 \Delta NPL_{it+1} + \beta_5 \Delta NPL_{it} + \varepsilon_{i,t} \quad (5)$$

Collins et al. (1995) Model:

$$LLP_{it} = \alpha + \beta_1 LLR_{it-1} + \beta_2 NPL_{it-1} + \beta_3 \Delta NPL_{it} + \varepsilon_{i,t} \quad (6)$$

An overview of all model variables, including definition and data source, is presented in Appendix 5.1. Table 5.2 and Table 5.3 also provide an overview of the descriptive statistics and a pairwise correlations matrix of the sample.

Table 5.2: Descriptive Statistics

Panel A: Baseline Regression

Variables	Obs.	Mean	Std.Dev.	Min	Max	p1	p99	Skew.	Kurt.
LLP	1746	.998	4.679	-116.015	118.877	-.243	9.271	1.91	470.376
Eblp	1444	6.654	88.174	-688.689	2302.841	.034	26.593	24.172	640.615
ΔNPL_{t+1}	1166	-.138	6.359	-154.51	69.648	-12.688	10.865	-10.471	321.64
CapitalR1	1422	14.581	7.704	-158.6	55.049	7.878	32.941	-13.482	304.663
ΔNPL_t	1542	-.085	5.606	-154.51	69.648	-11.228	10.196	-11.556	403.105
$\Delta NPL_{t-1}(\%)$	1508	.032	5.255	-154.51	69.648	-9.955	8.979	-15.581	521.27
$\Delta NPL_{t-2}(\%)$	1474	.312	2.691	-33.008	43.09	-6.356	8.598	1.28	73.765
$\log Assets_{t-1}$	1841	17.265	1.881	10.478	22.001	12.496	21.59	.036	3.316
GDP Growth (%)	1798	2.768	2.189	-4.712	8.256	-2.565	8.17	.334	3.43
Unemployment	1822	5.711	4.503	.11	28.47	.14	26.54	2.201	9.169
HPI (%)	1123	3.799	3.319	-6.4	17	-5.3	11.2	-.234	3.865
Inflation	1798	2.908	5.144	-8.977	50.623	-6.838	22.933	4.157	32.238
Political Stability	1862	.094	.862	-2.483	1.615	-2.258	1.34	-.796	3.187
GovernmentEffectiveness	1862	.75	.841	-1.658	2.231	-1.286	2.056	-.31	2.273
Regulatory Quality	1862	.674	.871	-2.364	2.227	-1.959	2.047	-.464	2.824
Rule of Law	1862	.632	.911	-2.322	2.045	-2.241	1.948	-.357	2.627
IFRSXIFRS9	1882	.287	.452	0	1	0	1	.942	1.888

Panel B: Asset Quality and Risk-Taking Behavior

Variables	Obs	Mean	Std.Dev.	Min	Max	p1	p99	Skew.	Kurt.
$\Delta CapitalRatio$	1286	.005	.078	-2.6	.192	-.085	.092	-28.741	956.013
Capital Growth	1291	4.702	26.078	-688.526	251.367	-38.92	56.672	-13.917	395.168
T1 Capital	1374	6.491	17.454	-139.515	239.412	-34.999	61.722	1.635	32
Capital Buffer	1454	8.765	7.838	-166.573	47.444	1.54	27.697	-12.942	293.078
$\Delta Asset Risk$	1497	.02	.147	-4.173	.738	-.268	.316	-15.814	448.876
Z-Score	1837	172.136	319.851	-2.746	4459.284	2.794	1372.99	7.101	73.98
LLP	1746	.998	4.679	-116.015	118.877	-.243	9.271	1.91	470.376
ΔNPL_{t-2}	1474	.327	2.014	-6.876	9.939	-6.356	8.598	1.265	10.236
ΔNPL_{t+1}	1166	-.138	6.359	-154.51	69.648	-12.688	10.865	-10.471	321.64
$\log Assets$	1849	17.297	1.906	1.946	22.107	12.619	21.625	-.259	5.453
Capital R1	1422	14.581	7.704	-158.6	55.049	7.878	32.941	-13.482	304.663
EBP	1444	6.654	88.174	-688.689	2302.841	.034	26.593	24.172	640.615
NCO	1578	.615	6.728	-193.734	84.045	-2.279	8.527	-20.699	604.505
LLR	1608	3.478	12.008	-334.309	226.355	.078	22.441	-8.024	480.602

Variables	Obs	Mean	Std.Dev.	Min	Max	p1	p99	Skew.	Kurt.
Loans	1778	116.322	170.359	-35.247	3995.929	47.907	222.926	19.12	397.565
GDP Growth	1798	2.768	2.189	-4.712	8.256	-2.565	8.17	.334	3.43
Unemployment	1822	5.711	4.503	.11	28.47	.14	26.54	2.201	9.169
HPI	1123	3.799	3.319	-6.4	17	-5.3	11.2	-.234	3.865
Inflation	1798	2.908	5.144	-8.977	50.623	-6.838	22.933	4.157	32.238
Political Stability	1862	.094	.862	-2.483	1.615	-2.258	1.34	-.796	3.187
GovernmentEffectiveness	1862	.75	.841	-1.658	2.231	-1.286	2.056	-.31	2.273
Regulatory Quality	1862	.674	.871	-2.364	2.227	-1.959	2.047	-.464	2.824
Rule of Law	1862	.632	.911	-2.322	2.045	-2.241	1.948	-.357	2.627
IFRSXIFRS9	1882	.287	.452	0	1	0	1	.942	1.888

Table 5.2 describes the descriptive statistics of the sample in the period from 2016–2019 for Equation 1 and Equation 2. For the definition and data sources of the used variables, see Appendix 5.1.

Table 5.3: Correlation Matrix

Panel A: Panel A: Baseline Regression

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) LLP	1.00																
(2) EblIp	0.34 ***	1.00															
(3) Δ NPL _{t+1}	0.18 ***	0.02	1.00														
(4) Capital R1	-0.31 ***	0.02	0.03	1.00													
(5) Δ NPL	-0.35 ***	-0.06 **	-0.25 ***	0.02	1.00												
(6) Δ NPL _{t-1}	0.62 ***	0.17 ***	0.02	-0.00	-0.23 ***	1.00											
(7) Δ NPL _{t-2}	0.00	-0.02	-0.18 ***	0.01	0.02	0.06 **	1.00										
(8) logAssets _{t-1}	-0.11 ***	-0.03	-0.03	-0.05 *	-0.04	-0.05 *	-0.10 ***	1.00									
(9) GDP Growth	-0.00	-0.01	0.04	-0.06 **	0.01	0.04	0.03	-0.07 ***	1.00								
(10) Unemployment	0.05 **	0.02	-0.06 *	0.03	-0.05 **	-0.04	-0.02	0.03	-0.19 ***	1.00							
(11) HPI	0.01	-0.01	0.03	-0.18 ***	0.02	0.00	-0.14 ***	0.01	0.48 ***	-0.09 ***	1.00						
(12) Inflation	0.08 ***	0.04	-0.01	-0.00	-0.01	0.06 **	0.08 ***	-0.14 ***	-0.15 ***	0.13 ***	0.23 ***	1.00					
(13) Political Stability	-0.12 ***	-0.07 ***	-0.01	0.06 **	-0.03	-0.06 **	-0.10 ***	0.23 ***	-0.25 ***	-0.18 ***	-0.17 ***	-0.35 ***	1.00				
(14) Government	-0.17 ***	-0.12 ***	-0.01	0.00	-0.02	-0.05 *	-0.10 ***	0.38 ***	-0.23 ***	-0.20 ***	-0.03	-0.38 ***	0.82 ***	1.00			
(15) Regulatory Quality	-0.17 ***	-0.15 ***	-0.02	-0.00	-0.03	-0.07 ***	-0.12 ***	0.32 ***	-0.30 ***	-0.15 ***	0.01	-0.39 ***	0.78 ***	0.95 ***	1.00		
(16) Rule of Law	-0.18 ***	-0.14 ***	-0.01	0.00	-0.02	-0.05 **	-0.11 ***	0.32 ***	-0.28 ***	-0.19 ***	-0.03	-0.38 ***	0.80 ***	0.96 ***	0.95 ***	1.00	
(17) IFRSXIFRS9	0.01	-0.03	0.01	-0.00	-0.05 *	-0.06 **	-0.05 **	0.04 *	-0.16 ***	0.13 ***	-0.10 ***	0.09 ***	0.07 ***	0.01	0.05 **	0.02	1.00

(To be continued on next page)

Panel B: Asset Quality and Risk-Taking Behavior

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
(1) Δ CapitalRatio	1.00																								
(2) Capital Growth	0.70 ***	1.00																							
(3) T1Capital Growth	0.85 ***	0.63 ***	1.00																						
(4) Capital Buffer	0.58 ***	0.08 ***	0.04	1.00																					
(5) Δ Asset Risk	0.87 ***	0.52 ***	0.71 ***	0.39 ***	1.00																				
(6) Z-Score	0.02	-0.00	0.03	0.05 **	0.04	1.00																			
(7) LLP	-0.62 ***	-0.02	0.01	-0.33 ***	-0.48 ***	-0.04 *	1.00																		
(8) Δ NPL _{t-2}	0.02	0.03	0.02	0.02	0.04 *	-0.04 *	0.00	1.00																	
(9) Δ NPL _{t+1}	-0.03	-0.04	-0.01	0.00	-0.02	0.01	0.18 ***	-0.18 ***	1.00																
(10) log Assets	0.08 ***	-0.04	-0.07 ***	0.00	0.04	0.08 ***	-0.10 ***	-0.10 ***	-0.04	1.00															
(11) Capital R1	0.59 ***	0.02	0.06 **	0.98 ***	0.41 ***	0.02	-0.31 ***	0.01	0.03	-0.03	1.00														
(12) Eblp	-0.01	-0.00	0.00	0.08 ***	0.01	-0.01	0.34 ***	-0.02	0.02	0.04*	0.02	1.00													
(13) NCO	-0.04	-0.04	-0.04	0.04	-0.05 *	-0.01	0.37 ***	-0.04	0.20 ***	-0.03	0.05 *	0.08 ***	1.00												
(14) LLRt-1	-0.29 ***	-0.02	-0.01	-0.30 ***	-0.23 ***	-0.04 *	0.79 ***	0.01	0.09 ***	-0.11 ***	-0.29 ***	0.28 ***	0.15 ***	1.00											
(15) Loans	0.11 ***	0.23 ***	0.30 ***	-0.03	0.25 ***	-0.03	0.23 ***	-0.00	0.00	0.02	-0.02	0.87 ***	-0.28 ***	0.25 ***	1.00										
(16) GDPGrowth	0.04	0.07 **	0.07 **	-0.00	0.03	-0.07 ***	-0.00	0.03	0.04	-0.06 ***	-0.06 **	-0.01	0.01	0.01	0.08 ***	1.00									
(17) Unemployment	-0.00	-0.11 ***	-0.11 ***	0.02	-0.05 **	-0.09 ***	0.05 **	-0.02	-0.06 *	0.02	0.03	0.02	0.06 **	0.10 ***	-0.00	-0.19 ***	1.00								
(18)HPI	0.04	0.02	0.04	-0.12 ***	0.07 **	-0.09 ***	0.01	-0.14 ***	0.03	0.01	-0.18 ***	-0.01	0.01	-0.00	0.04	0.48 ***	-0.09 ***	1.00							
(19) Inflation	-0.06 **	-0.07 **	-0.15 ***	0.02	-0.13 ***	-0.05 **	0.08 ***	0.08 ***	-0.01	-0.16 ***	-0.00	0.04 *	0.05 *	0.02	-0.03	-0.15 ***	0.13 ***	0.23 ***	1.00						
(20) Politic Stability	0.05 *	0.01	0.04 *	0.01	0.06 **	0.13 ***	-0.12 ***	-0.10 ***	-0.01	0.24 ***	0.06 **	-0.07 ***	-0.00	-0.10 ***	-0.08 ***	-0.25 ***	-0.18 ***	-0.17 ***	-	0.35* **	1.00				
(21) Government Effectiveness	0.03	0.00	0.02	-0.02	0.06 **	0.14 ***	-0.17 ***	-0.10 ***	-0.01	0.39 ***	0.00	-0.12 ***	-0.01	-0.16 ***	-0.13 ***	-0.23 ***	-0.20 ***	-0.03	-0.38 ***	0.82 ***	1.00				
(22) Regulatory Quality	0.01	-0.01	-0.01	-0.02	0.03	0.11* **	-0.17 ***	-0.12 ***	-0.02	0.33 ***	-0.00	-0.15 ***	0.02	-0.15 ***	-0.17 ***	-0.30 ***	-0.15 ***	0.01	-0.39 ***	0.78 ***	0.95 ***	1.00			
(23) Rule of Law	0.01	-0.01	-0.00	-0.02	0.04	0.13 ***	-0.18 ***	-0.11 ***	-0.01	0.33 ***	0.00	-0.14 ***	-0.00	-0.16 ***	-0.15 ***	-0.28 ***	-0.19 ***	-0.03	-	0.38* **	0.80* **	0.96 ***	0.95 ***	1.00	
(24)IFRSXIFRS9	-0.04 *	-0.02	-0.07 ***	-0.00	-0.06 **	-0.01	0.01	-0.05 **	0.01	0.04 *	-0.00	-0.03	0.01	0.05 **	-0.02	-0.16 ***	0.13 ***	-0.10 ***	0.09* **	0.07* **	0.01	0.05 **	0.02 **	1.00	

Table 5.3 describes the correlation matrix of the relevant variables used in the Baseline Regression (Panel A) and Asset Quality and Risk-Taking Behavior (Panel B). *** p<0.01, significant on the .01 Level, ** p<0.05, significant on the 0.05 Level, * p<0.1, significant on the 0.1 Level

5.4 Results

5.4.1 Income Smoothing, Forward-Looking Loan Loss Provisioning, and Capital Management

Table 5.4 summarizes the results of the baseline regression to measure the impact of IFRS 9 on loan loss timeliness, income smoothing, and capital management. In this context, Model (1) describes the results for the DiD-regression over the period 2016–2019 and Model (2) over the period 2017–2018. All continuous variables are winsorized on the 1% and 99% levels. The coefficient β_1 of the interaction term $\Delta NPL_{it+1} \times IFRS \times IFRS9$ has a strong significant positive effect on the LLPs at the 5% level (Model 1) and a highly significant positive effect at the 1% level (Model 2), suggesting an improvement in LLP timeliness due to the implementation of IFRS 9. The results support the initial empirical findings of previous studies (Kim et al., 2021; Oberson, 2021).

However, unlike Oberson (2021), our study implies a reduction in income smoothing due to the introduction of IFRS 9. The coefficient β_2 of the interaction term $Ebllp_{it} \times IFRS \times IFRS9$ has a highly significant negative effect at the 1% level (Model 1-2). A positive coefficient β_2 suggests that banks are practicing earnings management (e.g., Bushman & Williams, 2012). There is evidence that the introduction of IFRS 9 has made banks more sensitive to this practice.

Moreover, we found no empirical evidence for increased use of active capital management in the wake of IFRS 9 adoption. Thus, our results also differ from that of Kund and Neitzert (2020). Based on the EBA stress test data set, they showed evidence for regulatory capital management in the wake of the IFRS 9 adoption (Kund & Neitzert, 2020).⁷⁰ However, our findings are in line with Collins et al. (1995). The impact of capital management on loan loss provisioning has been the subject of controversial debates in the academic literature to date (Ahmed et al., 1999; Curcio & Hasan, 2015; Kim & Kross, 1998; Lobo et al., 2001; Pérez et al., 2008). The introduction of IFRS 9 also appears to be further contributing to this ongoing discussion.

⁷⁰ In contrast to the EBA stress test dataset in the study of Kund and Neitzert (2020), we used real accounting data in this paper. The EBA dataset uses the fiscal year 2017 as the cutoff date and requires participating banks to approximate the reporting years 2018 and 2019.

Entropy Balancing

Following previous studies (Haislip et al., 2017; Hasan & Jiang, 2023; McMullin & Schonberger, 2020), we applied the entropy balancing method as a first robustness check. Entropy balancing performs a covariate reweighting of the control group in the sample. This is done by adjusting the mean values of the treatment and control group, without excluding data points (Hainmueller, 2012; Hainmueller & Xu, 2013). The results of entropy balancing are robust. Both ΔNPL_{t+1} ($\beta_1 = 0.117$; $p < 1\%$) and $Ebllp$ ($\beta_2 = -0.112$; $p < 1\%$) have a highly significant influence on the dependent variable in Model (3).

Table 5.4: Baseline Regression: Earnings Management, Loan Loss Timeliness, and Capital Management

VARIABLES	2016-2019	2017-2018	Entropy Bal- anced
	(1) LLP _{it} (%)	(2) LLP _{it} (%)	(3) LLP _{it} (%)
$\Delta NPL_{t+1} (\%) \times IFRS \times IFRS9 (\in \{0; 1\})$	0.111** (0.0501)	0.129*** (0.0440)	0.117*** (0.0358)
$Ebllp (\%) \times IFRS \times IFRS9 (\in \{0; 1\})$	-0.103*** (0.0341)	-0.123*** (0.0355)	-0.112*** (0.0384)
Capital R1 (%) $\times IFRS \times IFRS9 (\in \{0; 1\})$	-0.0147 (0.0109)	-0.0190 (0.0144)	-0.0149 (0.0116)
$IFRS \times IFRS9 (\in \{0; 1\})$	0.476** (0.225)	0.785*** (0.295)	0.587** (0.237)
$Ebllp (\%)$	0.385*** (0.0358)	0.418*** (0.0276)	0.380*** (0.0397)
$\Delta NPL_{t+1} (\%)$	-0.0126 (0.0231)	-0.0421 (0.0439)	-0.0346 (0.0245)
Capital R1 _t (%)	-0.00720 (0.0163)	0.0215 (0.0178)	-0.00382 (0.0148)
$\Delta NPL_t (\%)$	0.0279 (0.0187)	0.0149 (0.0598)	0.0356 (0.0220)
$\Delta NPL_{t-1} (\%)$	0.0590*** (0.0153)	0.0741 (0.0454)	0.0351 (0.0221)
$\Delta NPL_{t-2} (\%)$	0.0619** (0.0249)	0.0784* (0.0397)	0.0500* (0.0270)
logAssets	0.540*** (0.169)	0.926*** (0.284)	0.866*** (0.269)
GDP Growth (%)	-0.0377 (0.0287)	-0.0360 (0.0319)	-0.0253 (0.0225)
Unemployment (%)	0.0671 (0.0510)	0.191* (0.108)	0.0918** (0.0455)
HPI (%)	0.00236 (0.0107)	-0.0189 (0.0152)	-0.0111 (0.0132)
Inflation (%)	-0.00137 (0.0131)	0.0504* (0.0295)	0.0272* (0.0147)
Political Stability	0.396** (0.180)	0.334 (0.310)	0.662*** (0.243)
Government Effectiveness	0.564* (0.291)	1.390*** (0.475)	0.437 (0.271)
Regulatory Quality	-0.0935 (0.348)	-0.186 (0.707)	-0.206 (0.281)
Rule of Law	0.0583	-1.158	-0.0273

Constant	(0.388) -11.26*** (3.202)	(0.965) -19.32*** (5.296)	(0.394) -17.64*** (5.149)
Observations	493	326	493
Year FE	✓	✓	✓
Bank FE	✓	✓	✓
R ²	0.930	0.970	0.959

Table 5.4 describes the impact of IFRS 9 adoption on earnings management, loan loss timeliness, and capital management in the period 2016–2019 (Model 1), 2017–2018 (Model 2), and Entropy Balanced Sample (Model 3). The dependent variable LLP_{it} describes the LLPs scaled by lagged total loans. Independent variables: $Ebllp_{it}$ describes the earnings before LLPs scaled by lagged total loans. ΔNPL_{it} describes the change in non-performing loans scaled by lagged total loans. $Capital R1_{it}$ describes the Common Tier 1 Capital scaled by risk-weighted assets; $\log Assets_{it}$ describes the logarithmized total assets. Macroeconomic and country governance controls: $GDP Growth_{it}$ describes the annual growth rate of gross domestic product. Unemployment describes unemployment rate by the World Bank. HPI describes the House Price Index by OECD. Inflation describes the inflation deflated by the annual GDP by the World Bank. Political stability describes the Political stability estimate by WGI. Government describes the government effectiveness estimate by WGI. Regulatory describes the regulatory quality estimate by WGI. Rule of Law describes the rule of law estimate by WGI. Robust and bank-clustered Huber–White standard errors are given in brackets. Detailed variable definitions are given in Appendix 5.1. Accounting Data is winsorized at the 1st and 99th percentiles. *** $p < 0.01$, significant on the 0.01 level, ** $p < 0.05$, significant on the 0.05 level, * $p < 0.1$, significant on the 0.1 level.

5.4.2 Asset Quality and Risk-Taking Behavior

Table 5.5 represents the results of testing the explanatory quality of provisioning in the wake of IFRS 9 adoption on bank resilience. Following Imbierowicz et al. (2018), we used proxies to determine banks' asset quality (Model 1–5) and the Z-score to measure banks' risk-taking behavior. All variables are winsorized at the 1% and 99% levels, except the binary variable and the macroeconomic and governance control variables.

The interaction term $LLP_{it} \times IFRS \times IFRS9$ has a strong significant negative effect on $\Delta Capital Ratio_{it}$ and $Capital growth_{it}$ at the 5% level and a significant negative effect on $T1 Capital growth_{it}$ at the 10% level. The results confirm the initial empirical findings of the regulators that the amended accounting standard leads to a reduction in CET 1 regulatory capital due to an increase in impairments (Deutsche Bundesbank, 2019; EBA, 2016a). To mitigate this so-called “Day 1 effect,” adopters in the European Union had the option of making transitional arrangements, which allowed them to amortize the effect over a five-year period (EBA, 2018).

Furthermore, the coefficient of the interaction term also has a significant negative effect on $\Delta Asset Risk_{it}$ ($\beta_1 = -0.034$; $p < 5\%$). The results suggest that banks are granting fewer loans to debtors with poor credit ratings after the introduction of IFRS 9, with the result that they must hold less regulatory capital as a risk buffer. The lower credit risks have a reducing effect on the risk-weighted assets in the bank balance sheet, resulting in improved capital

adequacy. This is accompanied by a significant positive effect on the capital buffer at the 10% level.

The impact on the Z-score ($\beta_1 = 91.51$; $p < 5\%$) also suggests a positive influence of the revised accounting standard on the financial stability of the bank. It can therefore be stated that despite the negative impact of the “Day 1 effect” on Tier 1 capital, the introduction of IFRS 9 has a positive impact on banks’ overall asset quality and, thus, on financial market stability.

5.4.3 Discretionary and Non-Discretionary LLP and Bank Valuation

In this subsection, we display the results of the market-based valuation model of non-discretionary and discretionary LLPs in the context of IFRS 9 adoption. Table 6 describes the descriptive statistics of the variables used. We determined the DLLP based on the residuals of LLP models (Beaver & Engel, 1996; Jutasompakorn et al., 2021; Kanagaretnam et al., 2003). Table 6, Panel A describes the regressions of the Beaver and Engel (1996) and Collins et al. (1995) LLP model to derive the discretionary LLPs. Panel B summarizes the results of the valuation model to measure the impact of LLPs and DLLPs at IFRS 9 adoption on the market value of shares. The interaction term $LLP_{it} \times IFRS \times IFRS9$ has a highly significant positive effect on MVS at the 1% level (Model 1 and 2). In contrast, the discretionary LLPs have a significant negative effect at the 10% level (Model 1) and a highly significant negative effect at the 1 % Level on MVS. The disclosed information on LLPs thus is a value-enhancing factor for the capital market, but the discretionary component is evaluated adversely. More specifically, the discretion to use a wide range of technical methodologies in the calculation of the ECL represents uncertainty for the addressee. Although the supervisory authorities – in particular the EBA (2018) – are trying to mitigate the impact by imposing stricter disclosure requirements, the capital market still prices in the uncertainty.

Table 5.5: Asset Quality and Risk-Taking Behavior

VARIABLES	(1) ΔCapital Ratio (%)	(2) Capital Growth (%)	(3) T1 Capital Growth (%)	(4) Capital Buffer (%)	(5) ΔAssetRisk (%)	(6) z_score _{it}
LLP (%)× IFRS ×IFRS9 (∈ {0; 1})	-0.00816** (0.00387)	-6.133** (2.488)	-5.154* (2.659)	0.265* (0.147)	-0.0340** (0.0139)	91.51** (43.10)
IFRS ×IFRS9 (∈ {0; 1})	0.0124** (0.00495)	7.218** (3.160)	8.168*** (2.889)	0.000593 (0.194)	0.0506*** (0.0146)	2.506 (40.45)
LLP (%)	0.00670 (0.00525)	2.483 (3.573)	2.834 (3.632)	0.0756 (0.111)	0.00739 (0.0107)	26.53 (22.08)
ΔNPL _{t-2} (%)	-0.00211** (0.000890)	-1.209** (0.555)	-0.616 (0.512)	-0.0161 (0.0217)	-0.000538 (0.00212)	-5.027 (4.014)
ΔNPL _{t+1} (%)	-0.000695 (0.000685)	-0.412 (0.453)	-0.530 (0.557)	-0.0147 (0.0201)	-0.00187 (0.00141)	1.311 (2.480)
logAssets _{t-1}	-0.0413*** (0.0128)	-39.38*** (10.48)	-38.45*** (10.63)	0.219 (0.368)	-0.300*** (0.0612)	-162.8** (72.18)
Capital R1(%)	0.00327*** (0.00112)	1.885** (0.741)	3.162*** (0.740)	0.967*** (0.0345)	-0.00945*** (0.00247)	1.632 (6.101)
Ebl1p (%)	0.00401* (0.00227)	2.597* (1.499)	2.134 (1.466)	-0.170*** (0.0615)	0.0133 (0.00803)	-27.64** (11.57)
NCO (%)	-0.00795** (0.00311)	-4.331** (2.075)	-3.414 (2.333)	0.00532 (0.0678)	-0.0252*** (0.00934)	10.87 (9.432)
LLR (%)	-0.00438* (0.00247)	-2.063 (1.668)	-1.589 (1.743)	0.0993 (0.0614)	-0.00469 (0.00723)	8.128 (8.253)
Loans _{t-1} (%)	-0.000174** (8.50e-05)	-0.111** (0.0544)	-0.0670 (0.0569)	-0.00870** (0.00354)	-0.000524** (0.000255)	-0.551 (0.547)
GDP Growth (%)	-0.00105 (0.00155)	-0.856 (0.882)	0.327 (0.861)	-0.0366 (0.0448)	-0.00921** (0.00431)	0.779 (7.703)
Unemployment (%)	-0.000676 (0.00356)	-0.177 (2.058)	0.686 (1.397)	-0.0764 (0.0848)	0.00925 (0.00740)	16.28 (12.67)
HPI (%)	-0.00107 (0.000874)	-0.614 (0.564)	-0.495 (0.482)	-0.0273 (0.0257)	0.00154 (0.00232)	-8.782 (6.645)
Inflation (%)	-0.000732 (0.00121)	-0.334 (0.720)	-0.775 (0.480)	0.0127 (0.0281)	-0.00761*** (0.00279)	-5.103 (5.726)
Political Stability (%)	0.00984 (0.0107)	6.294 (7.156)	6.351 (6.022)	0.738* (0.385)	0.0350 (0.0318)	86.55 (90.28)
Government (%)	0.0107	11.57	2.211	-0.0675	0.0310	163.2

	(0.0202)	(11.38)	(11.46)	(0.697)	(0.0670)	(146.7)
Regulatory Quality (%)	0.0271	4.062	21.24*	0.147	-0.0490	-213.5*
	(0.0235)	(13.91)	(11.81)	(0.723)	(0.0645)	(125.5)
Rule of Law (%)	0.0268	26.51	-5.760	-0.154	0.00425	295.4*
	(0.0280)	(17.00)	(13.22)	(0.847)	(0.0695)	(163.1)
Constant	0.693***	685.7***	655.0***	-7.818	5.712***	2,862**
	(0.231)	(190.7)	(190.1)	(5.963)	(1.117)	(1,298)
Observations	357	357	440	432	448	449
Year FE	✓	✓	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓	✓	✓
R ²	0.670	0.700	0.661	0.988	0.736	0.603

Table 5.5 describes the impact of IFRS 9 adoption on banks' asset quality and risk-taking behavior in the period 2016–2019. The dependent variables Δ Capital Ratio_{it} describes Δ Total Tier Capital scaled by risk-weighted assets; Capital growth_{it} describes the Logarithmic Equity Capital Growth; Tier 1 Capital growth_{it} describes the Logarithmic Tier 1 Capital Growth; Capital Buffer_{it} describes the difference between the Total Regulatory Capital Ratio and the Basel Minimum Capital Requirements; Δ Asset Risk_{it} describes Δ Risk-Weighted Assets scaled by Total Assets; z_score_{it} describes the Z-Score. Independent Variables: LLP_{it} describes the LLPs scaled by lagged total loans. Eblp_{it} describes the earnings before LLPs scaled by lagged total loans. Δ NPL_{it} describes the change in non-performing loans scaled by lagged total loans. Capital R1_{it} describes the Common Tier 1 Capital scaled by risk-weighted assets. logAssets_{it} describes the logarithmized total assets. Net Charge offs (NCO_{it}) are scaled by lagged loans. Loan Loss Reserves (LLR_{it}) are defined as reserves for loan losses scaled by lagged total Loans. LOANS_{it-1} measures the lagged loans. GDP Growth_{it} describes the annual growth rate of gross domestic product. Unemployment describes unemployment rate by the World Bank. HPI describes the House Price Index by OECD. Inflation describes the inflation deflated by the annual GDP by the World Bank. Political stability describes the political stability estimate by WGI. Government describes the government effectiveness estimate by WGI. Regulatory describes the regulatory quality estimate by WGI. Rule of Law describes the rule of law estimate by WGI. Robust and bank-clustered Huber–White standard errors are given in brackets. Detailed variable definitions are given in Appendix A1. Continuous variables are winsorized at the 1st and 99th percentiles. *** p < 0.01, significant on the 0.01 level, ** p < 0.05, significant on the 0.05 level, * p < 0.1, significant on the 0.1 level.

Table 5.6: Descriptive Statistics

Panel A:

Variables	Obs	Mean	Std.Dev.	Min	Max	p1	p99	Skew.	Kurt.
LLP	2582	1.041	4.178	-116.015	118.877	-.223	8.989	3.278	519.369
DLLP _{Beaver and Engel}	1682	0	.879	-5.844	10.92	-2.211	3.111	2.688	32.876
DLLP _{Collins et al.}	2048	0	1.982	-12.055	38.459	-2.776	7.762	6.985	102.914
GBV	2429	0	0	0	0	0	0	19.533	429.519
NCO	2336	.64	5.633	-193.734	84.045	-1.958	7.862	-23.709	831.927
Δ Loans	2623	16.598	143.036	-135.247	3895.929	-48.286	126.443	22.05	542.924
Δ NPL _t	2258	.09	4.935	-154.51	69.648	-10.799	9.963	-11.412	462.872
Δ NPL _{t+1}	1905	.075	5.139	-154.51	69.648	-10.799	10.149	-12.206	463.283
LLR	2381	3.635	11.405	-334.309	226.355	.094	21.159	-2.765	457.845
NPL _t	2308	4.593	26.825	-1155.034	427.844	.094	38.693	-33.201	1541.693
MVS	2583	.536	7.357	0	173.174	0	6.717	19.338	392.81
BVS	2752	2225.7	47583.58	-7.424	1459724	.004	1827.342	24.391	635.053
EPS	2573	23.617	618.94	0	30673.49	0	106.91	47.38	2339.539

Panel B:

Country	LLP			DLLP _{Beaver & Engel (1996)}			DLLP _{Collins et al. (1995)}					
	N	Mean	Min	Max	N	Mean	Min	Max	N	Mean	Min	Max
Argentina	24	2.662	0.978	4.719	12	0.089	-0.980	0.994	15	1.319	-0.657	3.958
Australia	36	0.151	0.075	0.322	30	-0.230	-0.780	0.013	36	-0.310	-1.350	0.232
Austria	35	0.214	-3.616	1.670	17	-0.450	-2.115	0.715	20	-0.880	-5.214	0.336
Bahrain	62	2.827	-0.188	118.877	31	0.007	-2.380	3.611	41	0.360	-2.393	8.736
Belgium	7	0.083	-0.143	0.449	0	.	.	.	0	.	.	.
Brazil	26	5.110	1.372	45.721	20	0.413	-2.572	2.986	25	3.332	-2.184	38.459
Bulgaria	11	2.060	0.247	5.196	1	1.552	1.552	1.552	2	3.395	2.055	4.736
Canada	48	0.271	0.104	0.518	40	-0.236	-0.930	0.132	48	-0.187	-0.837	0.363
Chile	6	1.066	0.783	1.317	0	.	.	.	0	.	.	.
China	72	1.165	0.397	2.835	60	0.216	-0.349	1.094	70	0.053	-1.637	2.700
Colombia	42	2.046	-1.805	3.944	0	.	.	.	5	1.669	1.037	2.631

Country	LLP			DLLP _{Beaver & Engel (1996)}			DLLP _{Collins et al. (1995)}					
	N	Mean	Min	Max	N	Mean	Min	Max	N	Mean	Min	Max
Croatia	16	1.499	0.323	6.890	10	0.180	-1.248	0.863	13	-0.608	-2.460	1.746
Cyprus	12	10.324	0.304	61.841	5	1.768	1.038	2.671	6	-0.309	-3.797	6.167
Denmark	30	0.435	-0.142	4.150	25	0.069	-0.695	2.259	30	0.600	-1.356	18.977
Egypt	12	1.737	0.603	3.367	10	0.757	-1.420	2.522	12	0.712	-1.141	7.950
Estonia	7	0.538	0.346	0.798	0	.	.	.	0	.	.	.
Finland	12	0.076	-0.003	0.167	5	-0.167	-0.274	-0.045	8	-0.437	-1.159	-0.127
France	48	0.205	-0.019	0.775	35	-0.189	-0.541	0.303	42	-0.517	-1.507	-0.124
Germany	32	0.251	-0.095	0.852	12	-0.053	-0.414	0.405	15	-0.152	-0.588	0.694
Greece	36	2.382	-3.013	16.629	25	1.292	-4.185	10.920	30	1.631	-3.122	9.900
Hong Kong	12	0.330	0.059	1.409	10	-0.250	-0.644	0.306	12	-0.228	-1.147	0.204
Hungary	6	2.200	0.482	5.658	5	-1.203	-2.422	0.176	6	-0.442	-2.839	2.343
India	82	1.691	0.000	5.082	0	.	.	.	1	0.140	0.140	0.140
Indonesia	53	1.857	0.006	6.747	40	0.229	-0.918	1.320	48	0.607	-1.187	3.035
Ireland	18	-0.050	-1.192	0.556	15	-1.044	-2.655	0.305	17	-1.081	-4.111	1.541
Israel	36	0.218	-0.046	0.751	25	-0.070	-0.625	0.918	30	-0.385	-1.301	0.564
Italy	71	0.986	-0.099	5.204	42	0.224	-5.844	4.078	50	-0.257	-2.811	2.493
Japan	214	0.068	-0.501	4.479	166	-0.249	-1.437	0.719	200	-0.477	-1.798	1.867
Jordan	60	0.696	-0.163	3.280	47	-0.064	-2.211	1.433	57	-0.307	-3.969	4.116
Kuwait	54	1.295	0.177	3.484	41	0.035	-2.232	1.807	50	0.365	-1.662	4.113
Lithuania	6	1.528	-0.223	4.538	5	-0.021	-0.993	1.158	6	0.999	-1.209	5.067
Malaysia	66	0.283	-0.324	2.113	52	-0.051	-0.655	1.555	63	-0.461	-1.705	0.554
Malta	17	0.818	-0.241	6.791	5	-0.153	-0.886	1.041	5	-0.710	-0.961	-0.488
Mexico	27	3.234	0.542	10.576	21	0.497	-4.103	3.564	25	1.272	-6.666	9.149
Morocco	18	0.765	-0.151	1.583	10	0.426	0.083	0.954	12	-0.470	-2.040	0.304
Netherlands	18	0.149	-0.136	0.575	15	-0.078	-0.345	0.452	18	-0.222	-0.766	0.424
Nigeria	60	1.691	-0.599	9.271	38	0.364	-2.993	5.385	48	0.610	-1.911	7.576

Country	LLP			DLLP _{Beaver & Engel (1996)}			DLLP _{Collins et al. (1995)}					
	N	Mean	Min	Max	N	Mean	Min	Max	N	Mean	Min	Max
Oman	30	0.635	0.079	4.551	25	-0.090	-0.933	0.802	29	-0.498	-1.278	1.502
Pakistan	48	0.270	-0.851	1.865	38	-0.039	-1.753	3.111	46	-1.535	-5.103	-0.040
Peru	23	2.557	1.381	4.030	15	0.493	-1.055	1.531	18	1.257	-1.360	3.148
Philippines	42	0.473	0.025	2.063	35	-0.182	-1.283	1.192	42	-0.429	-2.464	3.424
Poland	18	1.184	0.347	2.884	10	0.066	-0.327	0.409	13	-0.211	-0.893	2.474
Portugal	6	1.343	0.793	1.975	5	0.639	-0.151	2.671	6	0.742	-0.047	1.968
Qatar	51	0.714	-0.098	10.650	40	-0.139	-3.803	2.400	48	-0.387	-2.139	1.023
Romania	7	3.638	0.442	14.166	4	-0.604	-2.432	1.350	5	-0.308	-1.015	1.006
Russia	18	1.923	0.422	5.819	10	0.262	-1.073	1.783	13	0.159	-2.227	2.644
Saudi Arabia	53	0.615	-0.076	2.312	44	-0.185	-2.997	1.602	52	-0.239	-1.321	1.936
Singapore	18	0.253	0.094	0.563	15	-0.227	-0.423	0.029	18	-0.420	-0.972	-0.074
Slovakia	12	0.476	0.015	1.056	10	-0.050	-0.753	0.896	12	-0.473	-1.003	0.352
Slovenia	6	0.350	-0.498	1.004	0	.	.	.	1	0.218	0.218	0.218
South Africa	30	2.962	0.568	14.413	25	0.701	-0.226	6.100	30	1.642	-0.330	11.754
South Korea	27	0.441	0.000	1.720	13	-0.204	-0.709	0.025	17	-0.237	-1.055	0.492
Spain	40	0.823	0.000	4.993	25	-0.163	-0.980	0.527	32	-0.255	-5.757	0.680
Sri Lanka	30	0.752	0.086	1.640	0	.	.	.	0	.	.	.
Sweden	20	0.066	0.000	0.143	15	-0.217	-0.539	-0.027	18	-0.402	-1.086	-0.056
Switzerland	90	0.194	-0.115	3.090	18	-0.130	-0.479	0.200	25	-0.537	-1.454	-0.024
Taiwan	60	0.990	-0.182	11.851	50	0.063	-0.321	3.243	60	0.243	-1.573	11.222
Thailand	36	1.157	0.337	2.238	30	0.234	-0.858	1.031	36	-0.172	-2.214	1.496
Turkey	33	1.306	0.259	2.737	24	0.286	-0.737	2.454	30	0.781	-0.626	5.949
United Arab Emir	83	1.684	0.120	10.494	61	0.270	-2.093	9.846	76	0.354	-3.313	12.317
United Kingdom	60	0.670	-0.315	3.344	38	-0.204	-1.237	1.559	48	0.007	-1.503	2.481
United States	234	0.154	-116.016	51.589	195	-0.190	-3.267	1.770	234	-0.272	-10.009	14.273
Venezuela	32	5.786	0.002	30.783	14	0.544	-1.002	2.716	18	3.318	-12.055	23.041

Country	LLP				DLLP _{Beaver & Engel (1996)}				DLLP _{Collins et al. (1995)}			
	N	Mean	Min	Max	N	Mean	Min	Max	N	Mean	Min	Max
Vietnam	83	1.144	0.117	6.138	48	-0.066	-2.192	1.383	55	0.037	-1.221	1.855
Total	2582	1.041	-116.016	118.877	1682	.3.40e-10	-5.844	10.920	2048	-1.29e-10	-12.055	38.459

This table describes the descriptive statistics of the variables used in the market valuation model. Panel B describes the non-discretionary and discretionary components of LLPs at the country level.

Table 5.7: Market-Based Valuation Model

Panel A: Baseline Regression to determine DLLP

VARIABLES	DLLP _{Beaver & Engel (1996)}	DLLP _{Collins et al. (1995)}
	(1) LLP (%)	(2) LLP (%)
GBV	6,841 (29,271)	
NCO (%)	0.763*** (0.0133)	
Δ Loans (%)	0.00730*** (0.000178)	
Δ NPL _t (%)	0.115*** (0.00658)	-0.187*** (0.0114)
Δ NPL _{t+1} (%)	0.0264*** (0.00462)	
LLR _{t-1} (%)		0.308*** (0.0239)
NPL _{t-1} (%)		-0.242*** (0.00915)
Constant	0.252*** (0.0307)	1.085*** (0.0746)
Observations	1,682	2,048
Year FE	✓	✓
Bank FE	✓	✓
R ²	0.773	0.398

Panel A describes the baseline regression to determine the DLLPs based on the LLP Model of Beaver & Engel (1996) and Collins et al. (1995) from Equations 5 and 6. LLP_{it} describes the LLPs scaled by lagged total loans. GBV describes the Gross Book Value of common equity; NCO describes the Net Charge Off measured as loans-charge off scaled by lagged total loans. Loan Loss Reserves (LLR_{it}) are defined as reserves for loan losses scaled by lagged total loans. Δ NPL_{it} describes the change in non-performing loans scaled by lagged total loans. Detailed variable definitions are given in Appendix 5.1. Continuous variables are winsorized at the 1st and 99th percentiles. *** p < 0.01, significant on the 0.01 level, ** p < 0.05, significant on the 0.05 level, * p < 0.1, significant on the 0.1 level.

Panel B: Ohlson Model according to Beaver & Engel (1996)

VARIABLES	DLLP _{Beaver & Engel (1996)}	DLLP _{Collins et al. (1995)}
	(1) MVS	(2) MVS
LLP (%) × IFRS × IFRS9 (∈ {0; 1})	0.197*** (0.0478)	0.125*** (0.0400)
DLLP × IFRS × IFRS9 (∈ {0; 1})	-8,399* (4,900)	-3,556*** (1,309)
IFRS × IFRS9 (∈ {0; 1})	-0.0873*** (0.0313)	-0.0557* (0.0293)
BVS	0.00321*** (0.000705)	0.00196*** (0.000390)
EPS	-0.00599*** (0.00224)	-0.000236 (0.00169)
GBV	-47,279 (62,073)	72,902* (43,230)
LLP (%)	-0.130*** (0.0341)	-0.0419* (0.0252)
IFRS	-0.128* (0.0689)	-0.0372 (0.0330)
LLP (%) × IFRS (∈ {0; 1})	0.125***	0.0116

	(0.0350)	(0.0305)
IFRS9 ($\in \{0; 1\}$)	0.107***	0.0856***
	(0.0289)	(0.0205)
LLP (%) \times IFRS9 ($\in \{0; 1\}$)	-0.189***	-0.118***
	(0.0468)	(0.0369)
DLLP	-269.2	-2,009***
	(636.7)	(743.1)
DLLP \times IFRS($\in \{0; 1\}$)	128.7	2,949***
	(745.2)	(1,081)
DLLP \times IFRS9($\in \{0; 1\}$)	7,032	1,821**
	(4,773)	(793.3)
Δ NPL _t (%)	-0.0260***	-0.00951***
	(0.00678)	(0.00289)
NPL _t (%)	0.0289***	0.0155***
	(0.00641)	(0.00376)
Constant	0.271***	0.241***
	(0.0581)	(0.0470)
Observations	991	1,346
Number of ids	348	368
Year FE	✓	✓
Bank FE	✓	✓
R ²	0.499	0.480

Panel B describes the impact of IFRS 9 adoption on LLP and DLLP in the market-based valuation model for the period 2016–2019. The dependent variable describes the Market Value per Share (MVS). Independent Variables: LLP_{it} describes the LLPs scaled by lagged total loans. DLLP describes the discretionary LLPs measured as the residuals of the LLP Model according to Beaver & Engel (1996) and Collins et al. (1995) scaled by lagged total assets. BVS_{it} describes the Book Value Per Share; EPS_{it} measures the Earnings per Share, and GBV_{it} describes the Gross Book Value of common equity. ΔNPL_{it} describes the change in non-performing loans scaled by lagged total loans. NPL_{it} describes the non-performing loans scaled by lagged total loans. Robust and bank-clustered Huber–White standard errors are given in brackets. Detailed variable definitions are given in Appendix 5.1. Continuous variables are winsorized at the 1st and 99th percentiles. *** $p < 0.01$, significant on the 0.01 level, ** $p < 0.05$, significant on the 0.05 level, * $p < 0.1$, significant on the 0.1 level.

5.4.4 Robustness Checks and Additional Analysis

I. Alternative Measures for Bank Risk-Taking

To conduct further robustness checks, we followed Köhler (2015) and used the following variations of the z_score_{it} as risk variables by splitting the numerator of the Z-Score into its components Return on Assets (ROA) and Capital Ratio (CAR):

$$z_score(ROA)_{it} = \frac{ROA_{it}}{\sigma(ROA_{it})} \quad (7)$$

$$z_score(CAR)_{it} = \frac{CAR_{it}}{\sigma(ROA_{it})} \quad (8)$$

As an additional alternative measure, the Regulatory Z-Score ($Reg_z_score_{it}$) was used to address potential “regulatory capital constraints faced by banks” (Bouvatier et al., 2018, p. 2). We calculated the $reg_z_score_{it}$, similar to Esho et al. (2005), as the difference between the regulatory capital and the Basel Committee’s minimum capital requirements divided by $\sigma(ROA_{it})$.

$$\text{reg_z_score}_{it} = \frac{\frac{\text{Total Tier Capital}_{it} - 0.08}{\text{RWA}_{it}}}{\sigma(\text{ROA}_{it})} \quad (9)$$

Total Tier Capital_{it} describes the total common equity capital of a bank. RWA_{it} measures the risk-weighted assets. As further variants, the minimum capital requirements for CET 1 and CET 2 capital were considered (Esho et al., 2005):

$$\text{reg_z_score}(\text{CET 1})_{it} = \frac{\frac{\text{Tier 1 Capital}_{it} - 0.06}{\text{RWA}_{it}}}{\sigma(\text{ROA}_{it})} \quad (10)$$

$$\text{reg_z_score}(\text{CET 2})_{it} = \frac{\frac{\text{Tier 2 Capital}_{it} - 0.02}{\text{RWA}_{it}}}{\sigma(\text{ROA}_{it})} \quad (11)$$

Table 5.8 describes the results of testing alternative Z-Score variations. The empirical results confirm the findings from the baseline regression (Equation 2). The interaction term LLP×IFRS×IFRS9 has a significant positive effect on z_score(ROA)_{it} (β₁ = 8.816; p < 0.05) and z_score(CAR)_{it} (β₁ = 82.84; p < 0.05). However, only a moderate positive significance can be observed on the Regulatory Z-score Reg_z_score_{it} and its substrate Reg_z_score(CET 2)_{it}.

II. Entropy Balancing and Subsampling

In addition to the alternative risk measures, we also used entropy balancing as a robustness check (Table 5.9, Panel A, Model 1–3). The results of the interaction term LLP×IFRS×IFRS9 are robust, both for the z_score_{it} (β₁ = 139.5; p < 5%), and the variants z_score(ROA)_{it} (β₁ = 11.66; p < 5%) and z_score(CAR)_{it} (β₁ = 127.4; p < 5%). Furthermore, we followed the literature (e.g., Schulte & Winkler, 2019) and performed various sub-samplings of Equation 2. For this purpose, we first excluded the USA as the largest control group and the EU as the largest treatment group in the sample. Furthermore, we excluded the so-called PIIGS⁷¹ countries in the European Monetary Union. These countries have become the focus of speculators, especially in the context of the euro debt crisis, and are characterized by high government debt ratios (e.g., Brazys & Hardiman, 2015). These results were also robust (Table 5.9, Panel B, Model 1-9).

⁷¹ In our robustness check, we also differentiate between PIGS (Portugal, Italy, Greece, Spain), PIIGS (Portugal, Italy, Ireland, Greece, Spain) and PIIGGS (Portugal, Italy, Ireland, Greece, UK, Spain).

In addition, highly profitable banks (Table 5.9, Panel C, Model 1-3), in terms of ROE, and the influence of corporate governance and ESG performance are considered as subsamples. The quality of corporate governance has a significant influence on the risk behavior of banks and is therefore highly relevant for banking regulation (BCBS, 2015b; Laeven & Levine, 2009). In our sub-sampling, banks with low corporate governance quality were considered (Table 5.9, Panel C, Model 4–6). Recent studies show a positive relationship between ESG performance and idiosyncratic (di Tommaso & Thornton, 2020; Neitzert & Petras, 2022) and systemic bank risk (Aevoae et al., 2023). Moreover, ESG is increasingly becoming a major regulatory theme in the banking industry (Bank of England, 2019, 2018; BCBS, 2020; European Bank for Reconstruction and Development [EBRD], 2019). In the context of our sub-sampling, banks with a low ESG performance were considered (Table 5.9, Panel C, Model 7–9).

In summary, it can be stated that even when considering the variations in the definitions of the Z-score or implementing subsampling, the positive effect of IFRS 9 on the reduction of insolvency risk and, thus, improvement in financial market stability can be consistently demonstrated.

Table 5.8: Robustness Check: Asset Quality and Risk-Taking Behavior — Variations of Z-Score

VARIABLES	(1) z score (ROA)	(2) z score (CAR)	(3) reg z Score	(4) reg z score (T1)	(5) reg z score (T2)
LLP × IFRS × IFRS9 (∈ {0; 1})	8.816** (3.785)	82.84** (39.87)	0.588* (0.342)	0.435 (0.282)	0.115* (0.0651)
IFRS × IFRS9 (∈ {0; 1})	0.349 (3.070)	2.248 (37.62)	-0.122 (0.411)	0.00489 (0.376)	0.0784 (0.0789)
LLP	1.958 (1.889)	24.63 (20.50)	0.299 (0.205)	0.229 (0.175)	0.0252 (0.0349)
ΔNPL _{t-2} (%)	-0.458 (0.309)	-4.582 (3.725)	-0.0529 (0.0456)	-0.0430 (0.0389)	0.00235 (0.00709)
ΔNPL _{t+1} (%)	0.214 (0.247)	1.093 (2.254)	0.000190 (0.0237)	0.00454 (0.0196)	0.00384 (0.00292)
logAssets _{t-1}	-13.21** (6.176)	-148.8** (66.09)	-1.718** (0.689)	-1.276** (0.554)	-0.0586 (0.120)
Capital R1 (%)	-0.0540 (0.555)	1.691 (5.577)	0.129 (0.0848)	0.0724 (0.0680)	-0.000123 (0.0101)
EBP (%)	-2.015* (1.079)	-25.64** (10.54)	-0.304*** (0.0975)	-0.202** (0.0838)	-0.0262 (0.0188)
NCO (%)	0.608 (0.916)	10.24 (8.603)	0.0928 (0.0951)	0.0642 (0.0711)	0.00264 (0.0133)
LLR _{t-1} (%)	0.296 (0.817)	7.818 (7.492)	0.133 (0.0842)	0.0669 (0.0673)	0.00699 (0.0136)
Loans _{t-1} (%)	-0.0607 (0.0501)	-0.496 (0.502)	-0.00238 (0.00529)	-0.00340 (0.00417)	-0.000590 (0.000759)
GDP Growth (%)	-0.106 (0.685)	1.022 (7.107)	-0.00111 (0.0902)	-0.0272 (0.0729)	0.00108 (0.0109)
Unemployment (%)	1.892 (1.180)	14.23 (11.61)	0.111 (0.138)	0.140 (0.109)	0.0367* (0.0209)
HPI (%)	-0.708 (0.567)	-8.217 (6.200)	-0.104 (0.0905)	-0.0500 (0.0601)	0.00289 (0.0125)
Inflation (%)	-0.536 (0.498)	-4.580 (5.263)	-0.0782 (0.0600)	-0.0687 (0.0485)	-0.00179 (0.00802)
Political Stability	6.705 (6.767)	79.79 (83.80)	1.221 (1.079)	0.733 (0.706)	0.220* (0.125)
Government Effectiveness	14.15 (11.56)	150.4 (135.9)	1.835 (1.823)	1.915 (1.312)	0.152 (0.191)

Regulatory Quality	-24.20** (10.76)	-190.3 (115.6)	-2.293 (1.564)	-2.388** (1.191)	0.195 (0.169)
Rule of Law	19.61 (12.57)	276.2* (151.0)	2.811 (1.770)	2.120 (1.702)	-0.000938 (0.234)
Constant	246.4** (110.6)	2,602** (1,191)	28.81** (12.60)	21.87** (10.00)	0.522 (2.173)
Observations	449	449	432	449	430
Year FE	✓	✓	✓	✓	✓
FIRM FE	✓	✓	✓	✓	✓
R ²	0.669	0.602	0.634	0.675	0.747

Table 5.8 presents variations of the Z-Score (z_score_{it}) to analyze the IFRS 9 adoption robustness in the period 2016–2019. The dependent variable describes the Z-Score split into Return on Assets or Z-Score (ROA), Capital Ratio or Z-Score (CAR), the Regulatory Z-Score (Reg_Z-Score), and its variations in Core 1 Capital - Reg_Z-Score (T1) and Core 2 Capital - Reg_Z-Score (T2). Independent Variables: LLP_{it} describes the LLPs scaled by lagged total loans. $Ebllp_{it}$ describes the earnings before LLPs scaled by lagged total loans. ΔNPL_{it} describes the change in non-performing loans scaled by lagged total loans. $Capital\ R1_{it}$ describes the Common Tier 1 Capital scaled by risk-weighted assets; $\log Assets_{it}$ describes the logarithmized total assets. Net Charge offs (NCO_{it}) are scaled by lagged loans. Loan Loss Reserves (LLR_{it}) are defined as reserves for loan losses scaled by lagged total Loans. $LOANS_{it-1}$ measures the lagged loans. GDP Growth_{it} describes the annual growth rate of gross domestic product. Unemployment describes unemployment rate by the World Bank. HPI describes the House Price Index by OECD. Inflation describes the inflation deflated by the annual GDP by the World Bank. Political stability describes the political stability estimate by WGI. Government describes the government effectiveness estimate by WGI. Regulatory describes the regulatory quality estimate by WGI. Rule of Law describes the rule of law estimate by WGI. Robust and bank-clustered Huber–White standard errors are given in brackets. Detailed variable definitions are given in Appendix 5.1. Continuous variables are winsorized at the 1st and 99th percentiles. *** $p < 0.01$, significant on the 0.01 level, ** $p < 0.05$, significant on the 0.05 level, * $p < 0.1$, significant on the 0.1 level.

Table 5.9: Robustness Check: Asset Quality and Risk-Taking Behavior - Z-Score Sample Changes

Panel A: Entropy Matching and Country Changes (Sub-sampling)

VARIABLES	Entropy Balancing				USA excluded		EU excluded		
	(1) z_score	(2) z_score (ROA)	(3) z_score (CAR)	(4) z_score	(5) z_score (ROA)	(6) z_score (CAR)	(7) z_score	(8) z_score (ROA)	(9) z_score (CAR)
LLP (%)× IFRS ×IFRS9 (∈ {0; 1})	139.5** (60.30)	11.66** (5.249)	127.4** (55.57)	114.1** (52.75)	11.57** (4.533)	102.7** (48.89)	121.8* (68.27)	12.36** (6.004)	109.8* (63.38)
IFRS ×IFRS9 (∈ {0; 1})	-119.8** (52.81)	-10.29** (4.456)	-108.6** (48.78)	-29.15 (54.04)	-2.981 (4.240)	-26.16 (50.13)	-30.61 (48.83)	-4.987 (4.328)	-25.59 (45.32)
LLP (%)	18.28 (40.79)	2.268 (3.542)	16.74 (37.79)	29.32 (23.80)	2.955 (2.045)	26.45 (22.11)	35.80 (23.58)	2.430 (2.047)	33.43 (21.84)
ΔNPL _{t-2} (%)	-14.00 (8.849)	-0.934 (0.666)	-12.94 (8.181)	-2.802 (4.711)	-0.284 (0.350)	-2.535 (4.379)	-8.907 (4.083) **	-0.633** (0.306)	-8.304** (3.807)
ΔNPL _{t+1} (%)	4.341 (5.068)	0.326 (0.414)	4.009 (4.659)	0.946 (2.764)	0.144 (0.281)	0.801 (2.504)	-2.887 (3.989)	-0.161 (0.377)	-2.725 (3.631)
logAssets _{t-1}	-490.6*** (159.0)	-47.39*** (14.37)	-442.1*** (144.0)	-258.0** (119.4)	-24.07** (10.57)	-232.4** (108.4)	-147.7 (89.56)	-13.91* (7.914)	-132.8 (81.82)
Capital R1 (%)	13.09 (9.933)	0.885 (0.793)	11.95 (9.120)	3.998 (6.752)	0.0436 (0.616)	3.956 (6.172)	-5.381 (8.273)	-0.520 (0.789)	-4.973 (7.524)
Eblp (%)	-53.30*** (19.11)	-4.225** (1.634)	-48.80*** (17.40)	-35.07** (13.90)	-3.045** (1.234)	-32.05** (12.71)	-21.01* (12.11)	-1.169 (1.151)	-19.77* (10.97)
NCO (%)	35.34* (20.90)	2.561 (2.007)	32.37* (19.06)	2.820 (12.45)	-0.568 (1.117)	3.340 (11.51)	1.061 (12.27)	-0.358 (1.086)	1.344 (11.36)
LLR _{t-1} (%)	29.30* (17.18)	1.913 (1.486)	26.93* (15.66)	2.593 (10.67)	-0.431 (1.015)	2.984 (9.760)	4.288 (10.02)	0.172 (0.944)	4.017 (9.171)
Loans _{t-1} (%)	-1.140 (0.903)	-0.0905 (0.0809)	-1.054 (0.834)	-1.352* (0.732)	-0.122* (0.0631)	-1.238* (0.681)	-0.881 (0.752)	-0.0662 (0.0708)	-0.819 (0.689)
GDP Growth (%)	15.93 (16.91)	0.763 (1.316)	15.06 (15.56)	3.319 (9.152)	0.0909 (0.763)	3.389 (8.459)	4.395 (11.25)	0.239 (0.959)	4.324 (10.43)
Unemployment (%)	5.363 (17.31)	1.212 (1.510)	4.241 (15.90)	14.91 (14.86)	1.838 (1.350)	12.90 (13.62)	8.069 (16.23)	1.110 (1.540)	6.712 (14.84)
HPI (%)	-23.17*** (8.836)	-2.062** (0.889)	-21.09** (8.130)	-9.803 (6.987)	-0.806 (0.586)	-9.138 (6.521)	-9.284 (7.194)	-0.765 (0.683)	-8.746 (6.713)

Inflation (%)	-5.667 (8.004)	-0.174 (0.810)	-5.480 (7.267)	-6.475 (6.083)	-0.631 (0.529)	-5.867 (5.598)	-10.51 (8.021)	-0.760 (0.710)	-9.844 (7.417)
Political Stability	252.4 (234.8)	18.33 (15.79)	232.5 (216.8)	65.56 (95.76)	3.888 (7.302)	61.77 (88.94)	12.28 (75.02)	0.433 (7.585)	12.29 (68.62)
Government Effectiveness	41.77 (370.1)	4.213 (25.01)	39.01 (340.8)	194.7 (148.0)	16.49 (11.66)	179.5 (137.1)	271.1 (203.5)	8.206 (19.21)	263.8 (187.3)
Regulatory Quality	-369.6** (154.0)	-35.54** (13.96)	-333.4** (140.3)	-137.0 (158.0)	-18.37 (12.27)	-119.2 (146.2)	-368.6* (211.2)	-30.09 (19.10)	-339.0* (193.9)
Rule of Law	556.0** (221.6)	46.86*** (17.50)	508.1** (204.0)	267.6 (190.9)	18.13 (14.95)	248.9 (176.2)	498.1 (305.0)	48.80* (26.57)	449.4 (279.5)
Constant	9,138*** (2,964)	890.7*** (268.1)	8,231*** (2,689)	4,721** (2,208)	456.8** (195.8)	4,238** (2,008)	2,678* (1,562)	259.0* (137.1)	2,404* (1,431)
Observations	449	449	449	335	335	335	304	304	304
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
FIRM FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
R ²	0.782	0.825	0.782	0.607	0.694	0.604	0.656	0.706	0.655

Panel B: Entropy Matching and Country Changes (Sub-sampling)

VARIABLES	PIGS excluded			PIIGS excluded			PIIGGS excluded		
	(1) z_score	(2) z_score (ROA)	(3) z_score (CAR)	(4) z_score	(5) z_score (ROA)	(6) z_score (CAR)	(7) z_score	(8) z_score (ROA)	(9) z_score (CAR)
LLP (%)× IFRS ×IFRS9 (∈ {0; 1})	113.9** (50.31)	10.79** (4.386)	103.3** (46.54)	114.3** (51.31)	10.79** (4.472)	103.6** (47.48)	114.0** (53.95)	10.72** (4.687)	103.4** (49.95)
IFRS ×IFRS9 (∈ {0; 1})	0.165 (45.66)	0.505 (3.480)	-0.236 (42.46)	0.0774 (46.86)	0.525 (3.587)	-0.331 (43.57)	-0.763 (48.46)	0.544 (3.699)	-1.183 (45.07)
LLP (%)	26.70 (33.03)	1.168 (2.793)	25.66 (30.64)	25.08 (33.46)	1.075 (2.821)	24.16 (31.04)	24.36 (34.91)	0.976 (2.948)	23.54 (32.38)
ΔNPL _{t-2} (%)	-6.592 (4.999)	-0.750* (0.417)	-5.857 (4.606)	-6.730 (5.050)	-0.759* (0.421)	-5.985 (4.653)	-6.693 (5.335)	-0.787* (0.448)	-5.924 (4.916)
ΔNPL _{t+1} (%)	0.310 (3.736)	0.116 (0.357)	0.189 (3.405)	0.486 (3.866)	0.135 (0.369)	0.345 (3.525)	0.102 (4.593)	0.0957 (0.437)	0.000773 (4.192)
logAssets _{t-1} (%)	-200.3** (82.14)	-17.26** (6.916)	-182.2** (75.27)	-196.2** (83.00)	-16.99** (6.967)	-178.4** (76.09)	-198.8** (91.43)	-16.75** (7.657)	-181.1** (83.86)
Capital R1 (%)	1.861 (7.153)	-0.0409 (0.651)	1.908 (6.536)	1.623 (7.190)	-0.0577 (0.655)	1.689 (6.573)	1.839 (7.542)	-0.0432 (0.687)	1.893 (6.897)

Ebl1p (%)	-24.61 (14.93)	-1.382 (1.367)	-23.26* (13.63)	-25.03 (15.32)	-1.398 (1.398)	-23.66* (13.99)	-24.89 (16.16)	-1.360 (1.484)	-23.53 (14.76)
NCO (%)	23.27* (13.26)	2.017 (1.240)	21.22* (12.11)	23.11* (13.56)	1.981 (1.265)	21.08* (12.37)	24.38* (14.50)	2.049 (1.361)	22.28* (13.24)
LLR _{t-1} (%)	-1.530 (10.88)	-0.860 (1.071)	-0.704 (9.906)	-0.358 (11.23)	-0.797 (1.103)	0.391 (10.21)	-0.540 (11.94)	-0.846 (1.175)	0.237 (10.85)
Loans _{t-1} (%)	-0.562 (0.611)	-0.0705 (0.0562)	-0.497 (0.561)	-0.567 (0.611)	-0.0709 (0.0563)	-0.501 (0.561)	-0.616 (0.733)	-0.0804 (0.0667)	-0.542 (0.674)
GDP Growth (%)	0.891 (8.138)	-0.0502 (0.705)	1.079 (7.524)	0.257 (8.467)	-0.0897 (0.743)	0.490 (7.819)	0.151 (8.400)	-0.0970 (0.742)	0.390 (7.757)
Unemployment (%)	14.15 (16.25)	2.639* (1.573)	11.40 (14.83)	16.43 (17.76)	2.765 (1.712)	13.52 (16.21)	15.08 (17.83)	2.697 (1.749)	12.25 (16.24)
HPI (%)	-8.747 (6.889)	-0.688 (0.589)	-8.200 (6.424)	-8.774 (6.899)	-0.689 (0.589)	-8.226 (6.433)	-8.845 (7.208)	-0.689 (0.605)	-8.296 (6.721)
Inflation (%)	-6.198 (6.032)	-0.670 (0.525)	-5.544 (5.547)	-6.097 (6.064)	-0.666 (0.527)	-5.450 (5.577)	-6.551 (6.822)	-0.719 (0.579)	-5.855 (6.284)
Political Stability	100.9 (103.6)	9.502 (7.906)	91.26 (96.04)	98.45 (104.2)	9.379 (7.981)	88.99 (96.68)	105.9 (118.0)	10.15 (8.915)	95.73 (109.5)
Government Effectiveness	140.2 (147.8)	10.81 (11.61)	130.8 (137.0)	132.8 (151.3)	10.50 (11.88)	123.8 (140.3)	135.9 (173.7)	10.85 (13.60)	126.7 (161.3)
Regulatory Quality	-161.0 (140.0)	-15.62 (11.56)	-146.4 (129.2)	-147.4 (147.8)	-14.89 (12.25)	-133.8 (136.3)	-168.8 (171.4)	-16.97 (14.48)	-153.3 (158.0)
Rule of Law	254.3 (172.0)	14.46 (13.02)	240.1 (159.6)	253.8 (171.9)	14.46 (13.00)	239.7 (159.5)	252.1 (173.6)	14.15 (13.14)	238.2 (161.0)
Constant	3,599** (1,497)	320.1** (125.6)	3,263** (1,374)	3,514** (1,528)	314.5** (127.8)	3,184** (1,404)	3,590** (1,648)	313.0** (137.3)	3,260** (1,514)
Observations	408	408	408	402	402	402	382	382	382
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
FIRM FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
R ²	0.603	0.669	0.602	0.602	0.668	0.602	0.595	0.659	0.595

Panel C: Profitability and Sustainability

VARIABLES	High ROE			Low Corporate Governance			Low ESG		
	(1) z_score	(2) z_score (ROA)	(3) z_score (CAR)	(4) z_score	(5) z_score (ROA)	(6) z_score (CAR)	(7) z_score	(8) z_score (ROA)	(9) z_score (CAR)
LLP (%)× IFRS ×IFRS9 (∈ {0; 1})	182.4** (69.12)	17.52*** (6.082)	165.8** (64.16)	257.8** (126.5)	23.79** (9.819)	236.3* (119.0)	411.2** (154.5)	38.42*** (12.07)	377.5** (145.7)
IFRS ×IFRS9 (∈ {0; 1})	-70.53 (61.02)	-7.784 (6.110)	-63.32 (55.82)	-52.44 (86.94)	-3.886 (6.156)	-48.90 (81.64)	-114.3 (69.99)	-10.08* (5.543)	-106.0 (65.39)
LLP (%)	64.02 (53.04)	5.282 (4.903)	59.57 (49.26)	-1.105 (47.39)	-0.990 (3.588)	0.616 (44.56)	90.22 (110.5)	3.083 (7.982)	89.78 (104.7)
ΔNPL _{t-2} (%)	-8.361 (6.303)	-0.994 (0.646)	-7.414 (5.729)	0.450 (9.388)	0.00988 (0.792)	0.327 (8.712)	-27.01* (15.19)	-2.273* (1.261)	-24.79* (14.04)
ΔNPL _{t+1} (%)	-3.897 (4.893)	-0.490 (0.464)	-3.383 (4.461)	-7.934* (4.430)	-0.855** (0.374)	-7.111* (4.093)	-24.25* (13.95)	-2.401* (1.280)	-21.78* (12.76)
logAssets _{t-1}	-513.4** (196.9)	-56.21*** (18.09)	-452.0** (176.3)	-146.6 (137.7)	-9.645 (11.04)	-136.5 (127.6)	-90.11 (153.7)	-2.464 (13.49)	-87.52 (140.8)
Capital R1 (%)	-8.859 (7.185)	-1.302* (0.751)	-7.745 (6.459)	-14.56 (18.64)	-0.831 (1.338)	-13.34 (17.49)	-38.93 (29.15)	-2.044 (2.057)	-36.89 (27.19)
Ebllp (%)	-57.22** (24.77)	-4.911** (2.300)	-52.37** (22.63)	-25.84 (26.00)	-2.232 (2.225)	-23.79 (24.02)	-16.86 (34.88)	-0.522 (3.246)	-16.96 (32.03)
NCO (%)	-2.849 (21.32)	-0.204 (1.971)	-3.026 (19.64)	29.70 (31.61)	2.749 (2.391)	26.49 (29.60)	-36.64 (73.39)	-0.471 (5.579)	-37.83 (69.30)
LLR _{t-1} (%)	-3.217 (17.15)	-1.057 (1.688)	-2.535 (15.50)	18.86 (22.84)	1.985 (1.803)	16.85 (21.27)	3.492 (37.09)	0.184 (3.354)	3.556 (34.12)
Loans _{t-1} (%)	-2.096 (1.325)	-0.198 (0.127)	-1.921 (1.217)	-1.731 (1.317)	-0.184 (0.117)	-1.569 (1.216)	-0.717 (1.100)	-0.102 (0.110)	-0.623 (0.996)
GDP Growth (%)	-6.838 (9.077)	-0.789 (0.961)	-5.918 (8.195)	29.00* (17.09)	2.021 (1.480)	27.58* (15.89)	-18.84 (17.96)	-1.700 (1.612)	-17.00 (16.52)
Unemployment (%)	-14.06 (28.39)	-0.402 (3.052)	-13.62 (25.46)	-46.16 (49.07)	-2.238 (3.916)	-43.61 (45.76)	-46.80 (175.6)	1.189 (14.54)	-47.41 (161.6)
HPI (%)	-6.284 (4.497)	-0.371 (0.459)	-5.904 (4.095)	-21.39 (13.92)	-1.541 (1.190)	-20.34 (13.01)	-5.000 (23.12)	-0.299 (1.912)	-5.211 (21.55)
Inflation (%)	-8.216 (7.843)	-0.873 (0.800)	-7.359 (7.085)	-18.37 (12.98)	-2.057** (1.001)	-16.58 (12.18)	-9.542 (18.92)	-1.623 (1.511)	-8.091 (17.51)
Political Stability	-94.73	-7.061	-88.45	273.5	23.78	249.2	150.8	12.14	136.7

	(100.5)	(10.35)	(91.42)	(282.4)	(18.76)	(264.3)	(188.5)	(16.22)	(173.4)
Government Effectiveness	152.9	0.895	150.6	-27.28	-0.717	-15.75	801.2*	56.69*	749.0*
	(152.9)	(16.09)	(138.0)	(428.9)	(30.58)	(401.4)	(422.8)	(31.54)	(394.6)
Regulatory Quality	-488.7**	-46.74*	-444.5**	159.2	2.776	153.3	-937.1*	-72.92	-868.1*
	(234.7)	(23.94)	(213.8)	(357.4)	(25.62)	(333.2)	(526.4)	(44.29)	(485.0)
Rule of Law	651.8**	59.67**	591.5**	415.3	35.53	393.5	98.17	1.743	96.73
	(254.2)	(23.46)	(231.8)	(469.8)	(35.62)	(440.6)	(425.5)	(31.50)	(397.9)
Constant	10,163***	1,123***	8,952***	2,780	184.2	2,559	2,598	106.0	2,491
	(3,679)	(341.0)	(3,295)	(2,652)	(205.1)	(2,467)	(2,890)	(240.1)	(2,662)
Observations	187	187	187	158	158	158	128	128	128
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
FIRM FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
R ²	0.670	0.733	0.664	0.661	0.688	0.662	0.752	0.766	0.753

Table 5.9 presents variations of the Z-Score (z_score_{it}) to analyze the IFRS 9 adoption robustness in the period 2016–2019. The dependent variable describes the Z-Score split into Return on Assets or Z-Score (ROA), Capital Ratio or Z-Score (CAR), the Regulatory Z-Score (Reg_Z-Score), and its variations in Core 1 Capital - Reg_Z-Score (T1) and Core 2 Capital - Reg_Z-Score (T2). Independent Variables: LLP_{it} describes the LLPs scaled by lagged total loans. $Ebllp_{it}$ describes the earnings before LLPs scaled by lagged total loans. ΔNPL_{it} describes the change in non-performing loans scaled by lagged total loans. $Capital R1_{it}$ describes the Common Tier 1 Capital scaled by risk-weighted assets; $\log Assets_{it}$ describes the logarithmized total assets. Net Charge offs (NCO_{it}) are scaled by lagged loans. Loan Loss Reserves (LLR_{it}) are defined as Reserves for loan losses scaled by lagged total Loans. $LOANS_{it-1}$ measures the lagged loans. $GDP Growth_{it}$ describes the Annual growth rate of Gross domestic product. Unemployment describes unemployment rate by the World Bank. HPI describes the House Price Index by OECD. Inflation describes the Inflation deflated by the annual GDP by the World Bank. Political Stability describes the Political Stability Estimate by WGI. Government describes the Government Effectiveness Estimate by WGI. Regulatory describes the Regulatory Quality Estimate by WGI. Rule of Law describes the Rule of Law Estimate by WGI. Robust and bank clustered Huber-White Standard errors in brackets. Detailed variable Definitions are given in Appendix 5.1. Continuous variables are winsorized at the 1st and 99th percentiles. *** $p < 0.01$, significant on the 0.01 Level, ** $p < 0.05$, significant on the 0.05 Level, * $p < 0.1$, significant on the 0.1 Level.

5.5 Discussion and Conclusion

The introduction of IFRS 9 and the shift from the ICL model under IAS 39 to the ECL model represents a groundbreaking change in the accounting and disclosure of credit risks in the annual financial statements of banks. With the new amendments, the accounting standard setters have responded to ongoing criticism of the existing accounting model for the provisioning of loan losses. This paper was intended to examine the transition from IAS 39 to IFRS 9 based on a sample of global banks. On the basis of our empirical findings, it can be stated that the introduction of IFRS 9 has led to an improvement in the timely recognition of LLPs. In particular, the change from the ICL to the ECL model provides an enhancement in the presentation of forward-looking NPLs. The results follow the tenor of IFRS 7.35G, which requests a more detailed disclosure of “forward-looking information” for the calculation of the credit loss model. Thus, our empirical results confirm the effectiveness of the standard-setting and supervisory measures to achieve a timely recognition of credit risk in the annual reports. In contrast to previous IFRS 9 studies (Kund & Neitzert, 2020), we did not find a clear statistical relevance for the active practice of capital management in our baseline model.⁷² This can be explained by the use of supervisory discretion in the preparation of the implementation of IFRS 9. During the transition, banks had the opportunity to make use of transitional arrangements to mitigate the first-time effect (see e.g., Dong & Oberson, 2022; Orthaus & Rugilo, 2022). This may have resulted in a reduced incentive to engage in active capital management. Irrespective of the initial implementation of the new accounting standard, it remains interesting to see whether new incentives for capital management will emerge in the medium term. Furthermore, based on our DiD regression, we found that the new accounting standard provides incentives for the reduction of income smoothing compared to the ICL approach. However, since IFRS 9 provides a large number of discretionary factors for the design of the credit loss model, these findings must be viewed in a differentiated manner. As shown in our results in Equation 4, the capital market already anticipates the uncertainty caused by discretionary loan loss provisioning in the market price for shares. In our market-based valuation model, we further investigated the market reaction of the discretionary and non-discretionary components of LLPs. We found that the capital market has a positive connotation of increased transparency in the accounting data of non-discretionary LLPs. In contrast, DLLPs negatively affected market valuation. It can be concluded that the capital market already anticipates that banks will make greater or lesser use of IFRS 9 discretionary options in the calculation of the ECL model. The resulting opacity of DLLPs leads to a reduced capital market valuation.

⁷² No statistical significance can be found in both 2016–2018, 2017–2018 and based on the entropy balanced sample.

Moreover, we investigated the impact of the ECL model on asset quality and bank resilience. Our results are in line with early empirical findings of regulators that IFRS 9 leads to a reduction in CET 1 regulatory capital due to an increase in impairments (Deutsche Bundesbank, 2019; EBA, 2016a). Finally, based on our empirical analyses, we showed that the introduction of the amended accounting standard has a positive effect on improving the resilience of the banks under scrutiny and, thus, has a positive impact on financial market stability. Apart from the negative impact on Tier 1 capital, the introduction of IFRS 9 can lead to a reduction in asset risk and insolvency risk for banks. The results are robust, considering both country changes and entropy balancing.

In summary, it can be said that the measures introduced by the IASB to revise the impairment model, at least in the short term, had a positive impact on the behavioral management of bank managers. The revised methodology, which in particular requires early anticipation of future information, leads to a reduction in the probability of insolvency and, thus, results in strengthening financial market stability.

Our analysis is also subject to various limitations. Due to the primary focus on the implementation effect of IFRS 9, only a short period was considered. In particular, market disruptions and interventions by regulators, including moratoria and government guarantees in the wake of the COVID-19 pandemic (EBA, 2020),⁷³ were not considered. We see a further need for research in the investigation of the resilience capability of IFRS 9 in the wake of stress scenarios, such as the COVID-19 pandemic situation and the increase in geopolitical risks with possible contagion effects for credit institutions. Finally, we used idiosyncratic proxies to measure bank soundness. It is recommended to use additional systemic risk measures in a follow-up study.

⁷³ Regulation (EU) 2020/873 of the European Parliament and of the Council of 24 June, 2020 amending Regulations (EU) No 575/2013 and (EU) 2019/876 as regards certain adjustments in response to the COVID-19 pandemic.

Appendix 5.1: Description of Variables

Variables	Description	Datasource
Dependent Variables		
LLP (%)	Loan Loss Provisions, LLP / lagged Total Loans	Refinitiv EIKON
Δ CapitalRatio (%)	Change in Capital Ratio, (Δ Total Tier Capital / Risk Weighted Assets)* 100	Refinitiv EIKON
Capital Growth (%)	Logarithmic Equity Capital Growth, $\log(\text{Total Tier Capital} / \text{lagged Total Tier Capital}) * 100$	Refinitiv EIKON
Capital Buffer (%)	Difference between Total Regulatory Capital Ratio (CET 1 Ratio and CET 2 Ratio) and Basel Minimum Capital Requirements (8%), $((\text{Total Tier Capital} / \text{Risk Weighted Assets}) - 0.08) * 100$	Refinitiv EIKON
Δ Asset Risk (%)	Change in Asset Risk, (Δ Risk Weighted Assets / Total Assets) * 100	Refinitiv EIKON
z_score	Z-Score, $(\text{Return on Assets} + \text{Capital Ratio}) / \sigma(\text{ROA})$	Own Computations
z_score (ROA)	Z-Score ROA, $(\text{Return on Assets}) / \sigma(\text{ROA})$	Own Computations
z_score (CAR)	Z-Score CAR, $(\text{Equity Ratio}) / \sigma(\text{ROA})$	Own Computations
Reg_Z-Score	Regulatory Z-Score, $((\text{Total Tier Capital} / \text{Risk Weighted Assets}) - 0.08) / \sigma(\text{ROA})$	Own Computations
Reg_Z-Score (CET 1)	Regulatory Z-Score, $((\text{Tier 1 Capital} / \text{Risk Weighted Assets}) - 0.06) / \sigma(\text{ROA})$	Own Computations
Reg_Z-Score (CET 2)	Regulatory Z-Score, $(\text{Tier 2 Capital} / \text{Risk Weighted Assets}) - 0.02) / \sigma(\text{ROA})$	Own Computations
MVS	Market Value per Share, Market Value / Free Float Outstanding	Refinitiv EIKON
Independent Variables		
Eblp (%)	Earnings before Loan Loss Provisions, $((\text{EBIT} - \text{Interest Expense on Debt} + \text{Loan Loss Provisions}) / \text{lagged Loans Total}) * 100$	Refinitiv EIKON
NPL (%)	Non-Performing Loans-Ratio, NPL / lagged Total Loans	Refinitiv EIKON
Δ NPL (%)	Change in Non-Performing Loans-Ratio, Δ NPL / lagged Total Loans	Refinitiv EIKON
Δ NPL _{t+1} (%)	Forward Looking Non-Performing Loans	Refinitiv EIKON
Capital R1 (%)	Common Tier 1 Capital, $(\text{Tier 1 Capital} / \text{Risk Weighted Assets}) * 100$	Refinitiv EIKON
logAssets	Logarithm of Total Assets	Refinitiv EIKON
NCO (%)	Net Charge Off, $\text{Loans-Charge Off} / \text{lagged Total Loans}$	Refinitiv EIKON
LLR (%)	Loan Loss Reserves, $\text{Reserves for Loan Losses} / \text{lagged Total Loans}$	Refinitiv EIKON
Loans (%)	Loans, $(\text{Loans Total} / \text{lagged Loans Total}) * 100$	Refinitiv EIKON
perloangrowth (%)	Percentage Loan Growth	Refinitiv EIKON
BVS	Book Value per Share	Refinitiv EIKON
EPS	Earnings per Share	Refinitiv EIKON
GBV	Gross Book Value of Common Equity, $1 / (\text{Total Equity} + \text{Reserve for Loan Losses})$	Refinitiv EIKON
IFRS ($\in \{0; 1\}$)	Dummy that equals 1 if IFRS is applicable, based on Worldscope Classification (WC07536).	Own Computations
IFRS 9($\in \{0; 1\}$)	Dummy that equals 1 if IFRS 9 is applicable, 1 if Year ≥ 2018 and 0 otherwise	Own Computations
DLLP _{Beaver & Engel (1996)}	Discretionary Loan Loss Provisions, Residuals of the LLP Model according to Beaver & Engel (1996) / lagged Total Assets	Own Computations
DLLP _{Collins et al. (1995)}	Discretionary Loan Loss Provisions, Residuals of the LLP Model according to Collins et al. (1995) / lagged Total Assets	Own Computations

Variables	Description	Datasource
Macro Controls		
GDP Growth (%)	Annual growth rate of Gross domestic product	World Bank
Inflation (%)	Inflation; (Inflation GDP deflator annual)	World Bank
Unemployment (%)	Unemployment Rate	World Bank
HPI (%)	House Price Index	OECD
Political Stability	Political Stability Estimate	Worldwide Governance Indicators (WGI)
Government Effectiveness	Government Effectiveness Estimate	Worldwide Governance Indicators (WGI)
Regulatory Quality	Regulatory Quality Estimate	Worldwide Governance Indicators (WGI)
Rule of Law	Rule of Law Estimate	Worldwide Governance Indicators (WGI)

Appendix 5.1 describes the definition and data sources of the used variables. Dependent Variables comprises the used LLP, Asset Quality and Risk Measures, Independent Variables comprises proxies for LLP and Bank Valuation. In addition, Bank Level and Macroeconomic Controls are defined.

Appendix 5.2: Summary Statistic for Entropy Balancing of the Baseline Model

Panel A: Before

	Treat			Control		
	Mean	variance	Skewness	Mean	variance	Skewness
LLP _{it} (%)	0.5403	0.4296	2.295	0.6839	0.9949	2.973
Eblp (%)	2.329	5.218	5.378	2.698	4.102	2.88
Δ NPL _{t+1} (%)	-0.295	4.421	0.2324	-0.07859	4.735	0.8702
CapitalR1 (%)	14.56	10.78	0.5007	13.74	12.05	1.447
Δ NPL _t (%)	-0.8942	8.492	0.2801	-0.04639	2.384	1.441
Δ NPL _{t-1} (%)	-0.1796	2.128	-1.53	0.1137	2.111	0.2874
Δ NPL _{t-2} (%)	-0.3527	2.553	-0.6314	0.1889	3.057	0.6844
logAssets _{t-1}	18.81	2.691	-0.1433	18.35	2.776	0.1485
GDP Growth (%)	3.002	3.603	1.306	2.846	4.115	0.8502
Unemployment (%)	6.609	12.44	1.843	6.029	12.27	2.402
HPI (%)	3.337	12.71	0.2712	4.352	10.98	-0.7575
Inflation (%)	2.97	12.02	2.442	1.99	5.802	2.54
Political Stability	0.31	0.4037	-0.4546	0.2592	0.5131	-0.7998
Government Effectiveness	1.087	0.3948	-0.2796	1.141	0.4507	-0.6988
Regulatory Quality	1.021	0.6277	-0.5204	1.062	0.5824	-0.7627
Rule of Law	0.9796	0.71	-0.4168	1.049	0.6736	-0.7263

Panel B: After

	Treat			Control		
	Mean	Variance	Skewness	Mean	Variance	Skewness
LLP _{it} (%)	0.5403	0.4296	2.295	0.5404	0.6418	3.553
Ebllp (%)	2.329	5.218	5.378	2.329	2.944	3.536
Δ NPL _{t+1} (%)	-0.295	4.421	0.2324	-0.295	5.872	1.571
CapitalR1 (%)	14.56	10.78	0.5007	14.56	10.36	0.8355
Δ NPL _t (%)	-0.8942	8.492	0.2801	-0.8942	3.291	-1.207
Δ NPL _{t-1} (%)	-0.1796	2.128	-1.53	-0.1796	5.207	0.03176
Δ NPL _{t-2} (%)	-0.3527	2.553	-0.6314	-0.3526	3.943	-1.754
logAssets _{t-1}	18.81	2.691	-0.1433	18.81	2.513	-0.1583
GDP Growth (%)	3.002	3.603	1.306	3.002	6.394	0.5273
Unemployment (%)	6.609	12.44	1.843	6.609	10.18	1.851
HPI (%)	3.337	12.71	0.2712	3.337	21.1	-0.6005
Inflation (%)	2.97	12.02	2.442	2.97	14.32	1.979
Political Stability	0.31	0.4037	-0.4546	0.31	0.6734	-0.7721
Government Effectiveness	1.087	0.3948	-0.2796	1.087	0.5064	-0.3365
Regulatory Quality	1.021	0.6277	-0.5204	1.02	0.6549	-0.4747
Rule of Law	0.9796	0.71	-0.4168	0.9796	0.7537	-0.4259

Appendix 5.2 describes the summary statistics of the Entropy Balanced Sample (Model 3). LLP_{it} describes the LLPs scaled by lagged total loans. Independent variables: Ebllp_{it} describes the earnings before LLPs scaled by lagged total loans. Δ NPL_{it} describes the change in non-performing loans scaled by lagged total loans. Capital R1_{it} describes the Common Tier 1 Capital scaled by risk-weighted assets; logAssets_{it} describes the logarithmized total assets. Macroeconomic and country governance controls: GDP Growth_{it} describes the annual growth rate of gross domestic product. Unemployment describes unemployment rate by the World Bank. HPI describes the House Price Index by OECD. Inflation describes the inflation deflated by the annual GDP by the World Bank. Political stability describes the political stability estimate by WGI. Government describes the government effectiveness estimate by WGI. Regulatory describes the regulatory quality estimate by WGI. Rule of Law describes the rule of law estimate by WGI. Detailed variable Definitions are given in Appendix 5.1.

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Chapter 6: Results, Discussion, and Conclusion

“Iucundi acti labores”

Marcus Tullius Cicero, de finibus bonorum et malorum 2,1203

6.1 Summary of Findings and Discussion

The overall objective of this dissertation was to provide a better understanding of selected issues regarding risk disclosure and banking regulation. Based on a Systemic Literature Review (SLR) and three empirical studies on climate risk, bank opacity, and bank accounting, three main research questions were addressed. The following chapter presents and discusses the main findings of the overall research questions (ORQs) on a consolidated basis.

Ad ORQ 1: What are the current developments and drivers in risk reporting by banks?

Table 6.1 summarizes the key results of studies that address ORQ 1. These studies also include several additional research questions and hypothesis tests.

Table 6.1: Summary of Findings ORQ 1

ORQ 1	Chapter	Research Questions and Hypotheses	Key Results
ORQ 1: <i>What are the current developments and drivers in risk reporting by banks?</i>	Chapter 2	RQ 1: <i>How has the empirical literature evolved over time in terms of both its content and methodology?</i>	During 2002–2022, 69 contributions were identified; see Table 2.4 for an overview of the methodology used and Figure 2.6 and Appendix 2.3–2.8 for the risk types used in the research area.
		RQ 2: <i>What are the regulatory and influencing factors affecting banks' risk-reporting research?</i>	Accounting Approach (IFRS 7, ASB), Regulatory Approach (Stress test, Basel Pillar 3), Management Approach (Corporate Governance, Sharia Governance).
		RQ 3: <i>Where is the need for further research in the coverage of this research field?</i>	See Table 2.12.
	Chapter 3	Descriptive Results:	The disclosure of environmental and climate-related risks is increasing but remains low, across the sample.
		H1a: <i>Banks with a high proportion of non-performing loans have a higher quality of environmental risk disclosure (climate risk disclosure).</i>	Rejection of H1a.
		H1b: <i>Banks with a high proportion of loan loss provisions have a higher quality of Environmental Risk Disclosure (Climate Risk Disclosure).</i>	Banks with high loan loss provisions seem to disclose less information about climate-related risk management activities.
		H2: <i>The capital adequacy of a credit institution has a significant influence on the quality of the environmental risk disclosure (climate risk disclosure).</i>	Banks with good Common Equity Tier (CET) 2 capitalization have comparatively higher environmental risk disclosure (ERD); no empirical evidence for climate risk disclosure (CRD).
		H3: <i>The signing of a voluntary framework such as the Equator Principles has a significant impact on the quality of the environmental risk disclosure (climate risk disclosure).</i>	Rejection of H3.
		H4: <i>The legal factors of the country legislation of the bank's country of residence have a significant influence on the quality of the environmental risk disclosure (climate risk disclosure).</i>	Rejection of H4.
		H5a: <i>Corporate environmental performance has a significant influence on the quality of environmental risk disclosure (climate risk disclosure).</i>	Environmental performance shows a strongly significant negative effect on the quality of environmental risk disclosure.
		H5b: <i>Corporate social performance has a significant influence on the quality of environmental risk disclosure (climate risk disclosure).</i>	Rejection of H5b.
H6: <i>The voluntary audit of CSR reporting (CSR assurance) has a significant impact on the quality of environmental risk disclosure (climate risk disclosure).</i>	CSR assurance (CSRA) has a positively significant effect on environmental risk disclosure and a highly significant positive effect on climate risk disclosure.		

Note. ORQ: Overall Research Question; RQ: Research Question; H: Hypothesis

The implementation of enhanced transparency requirements for risk reporting in the banking sector has been the subject of several regulatory initiatives. Besides the disclosure requirements of accounting standard setters (IASB, 2017), banking supervision defines, in particular, essential requirements for disclosure behavior through the implementation of regulatory market discipline (BCBS, 2021b). Based on the SLR conducted in **Chapter 2**, it may be concluded that academic studies on risk disclosure enjoy continued relevance through a variety of publications. However, a look at the underlying database of the empirical contributions in the SLR reveals that 47 contributions examined the annual report and only five contributions used the Basel Pillar 3 report for deeper analysis. Ten papers were equally devoted to both disclosure formats. The low number of contributions to Basel Pillar 3 is surprising at first glance. Practitioners often criticize that although both reporting formats should be based on the same basic facts, they are often unrelated and hardly comparable (Weber, 2010a). According to Weber (2010b), the high level of detail and complexity resulting from oversizing the disclosure requirements for the risk management framework leads to limited decision usefulness on the capital market and substantial compliance costs for banks. Polizzi and Scannella (2020) found similar results in an Italian dataset. They observed a high degree of redundancy between the management commentary in the annual report and Basel Pillar 3, which deteriorates “the overall comprehensibility and relevance of bank risk reporting” (Polizzi & Scannella, 2020, p. 465).

Nevertheless, based on the SLR, it can be stated that *traditional* or more *classic* financial risk types such as market price and credit risks continue to predominate in the academic literature. Non-financial risks, such as operational risks, have been growing in importance, but they accounted for only 18.97% of the literature at the beginning of 2022. Further in-depth studies on reputational risk were not found in the sample and remain largely neglected, except for one by Heidinger and Gatzert (2018). Also, climate-related risks – which are currently being discussed by banking regulators (BaFin, 2022; Bank of England, 2018, 2019; European Banking Authority, 2022a, 2022b) and accounting standard-setting bodies (International Sustainability Standards Board [ISSB], 2023a, 2023b) – are not part of the sample and remain largely under-researched. **Chapter 3** aims to fill this research gap by using a self-constructed risk disclosure index and examines the climate-related risk disclosure of systemically important banks in Europe. It may be stated that, within the timeframe of this study (2014–2017), voluntary disclosure of environmental and climate-related risks was relatively low, compared to the proposed self-constructed benchmark index.⁷⁴ Climate

⁷⁴ As a framework for compiling the index, this paper used the Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD, 2017).

risks are likely to become more significant in the future, especially in light of the forthcoming mandatory disclosures. The mandatory sustainability disclosure requirements also have implications for banks, not only at the level of financial reporting but also in the context of Basel Pillar 3 reporting (BCBS, 2022a; European Banking Authority, 2022a). European banks, in particular, are subject to the Corporate Sustainability Reporting Directive (CSRD)⁷⁵ and the European Sustainability Reporting Standards (EFRAG, 2022a, 2022b) from the beginning of the fiscal year 2024. Moreover, the ISSB is also developing a novel standard for sustainability reporting: the IFRS S1 “General Requirements for Disclosure of Sustainability-related Financial Information” (ISSB, 2023a) and IFRS S2 “Climate-related Disclosures” (ISSB, 2023b). The Basel Pillar 3 Implementing Technical Standards (ITS) on prudential disclosures on ESG risks, in accordance with Article 449a CRR of the EBA, impose additional disclosure requirements for the financial service sector (European Banking Authority, 2022a). From an academic perspective, the extent to which the additional requirements will influence climate risk disclosure practices remains a challenging research question. As accounting standard setters (ISSB, 2023a, 2023b; SEC, 2022), banking supervisors (BaFin, 2022; European Banking Authority, 2022a), and the EFRAG (2022c) have codified some divergent requirements for the banking practice, the implementation of the sustainability requirements will not be trivial.⁷⁶ Standard setters need to be encouraged to harmonize the set of requirements, to reduce the recurring divergence of varied transparency requirements.

Ad ORQ 2: What is the influence of risk reporting on the financial stability of banks?

The second ORQ examines the impact of risk-related disclosure requirements on banks’ financial stability. This paper-based dissertation addresses two directions for measuring financial stability: systemic risk measures (Acharya et al., 2017; Ellis et al., 2022; Silva et al., 2017) and idiosyncratic risk measures (Berger et al., 2009; Fosu et al., 2017; Laeven & Levine, 2009). Table 6.2 summarizes the main findings under test and the underlying research questions.

⁷⁵ Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC, and Directive 2013/34/EU, as regards corporate sustainability reporting (Text with EEA relevance).

⁷⁶ The ESRS includes a total of two cross-cutting standards (ESRS 1: General principles; ESRS 2: General, strategy, governance, and materiality assessment disclosure requirements); five standards on environment (ESRS E1 Climate change; ESRS E2 Pollution; ESRS E3 Water and marine resources; ESRS E4 Biodiversity and ecosystems; ESRS E5 Resource use and circular economy); four standards on social issues (ESRS S1 Own workforce; ESRS S2 Workers in the value chain; ESRS S3 Affected communities; ESRS S4 Consumers and end-users); and two standards on governance issues (ESRS G1 Governance, risk management and internal control; ESRS G2 Business conduct). See EFRAG (EFRAG, 2022c) for a detailed outline of the ESRS standards.

Table 6.2: Summary of Findings ORQ 2

ORQ	Chapter	Research Questions and Hypotheses	Key Results
RQ 2: <i>What is the influence of risk reporting on the financial stability of banks?</i>	Chapter 4	H1: <i>Bank opacity has a significant impact on the systemic risk of banks and thus on financial stability?</i>	Bank opacity has a significant impact on the institution-specific contribution to capital-based systemic risk measures.
		H2a: <i>Disclosure regulation and external enforcement mechanism have a mitigating effect on bank opacity and reduce the systemic risk of banks.</i>	Enforcement mechanisms and measures introduced by accounting and regulatory bodies for banks' risk disclosures show a positive impact on reducing banks' opacity and reducing systemic risk.
		H2b: <i>The quality of the external enforcement mechanism (e.g., external audit or banking supervision) has a mitigating effect on bank opacity and reduces the systemic risk of banks.</i>	The quality of country-specific external audit regulation has a significant moderating effect on the interaction term at the 1% level for ΔCoVaR and MES.
		H2c: <i>Accounting regulation (IFRS 7) has a mitigating effect on bank opacity and reduces the systemic risk of banks.</i>	IFRS 7 leads to a significant reduction in bank opacity and systematic risk metrics.
	H2d: <i>Market discipline (Basel Pillar 3 regulation) has a mitigating effect on bank opacity and reduces the systemic risk of banks.</i>	Basel Pillar 3 measures lead to a significant reduction in opacity and systematic risk metrics.	
Chapter 5	H4: <i>The adoption of IFRS 9 has a positive effect on asset quality and thus on bank resilience.</i>	Accounting regulation (especially IFRS 9) has a positive impact on the behavioral management of bank managers. IFRS 9 sensitizes banks to reduce their risk-taking behavior, resulting in a reduction in the risk of insolvency and an increase in the resilience of the financial system.	

Note. ORQ: Overall Research Question; RQ: Research Question; H: Hypothesis

The ongoing assessment of a bank's current risk situation by market participants is accorded a high priority in the regulatory nomenclature, especially due to market discipline (European Central Bank, 2005; Kwan, 2002). Any potential impairment of the function of disclosure would undermine this principle, resulting in negative market reactions (e.g., Homölle, 2009; Jungherr, 2018). **Chapter 4** examines the impact of bank opacity on the systemic risk of the financial system. The influence of bank opacity on systemic risk measures has been analyzed in this study, through a European dataset of systemically important banks. In a second step, this paper addresses the mitigating effects of risk disclosure and enforcement measures on bank opacity and the financial stability of European financial markets. Bank opacity is observed to significantly influence the institution-specific contribution to capital-based systemic risk measures. As part of a further analysis, it may be stated that bank opacity is positively affected by the enforcement mechanism and the risk disclosure policies introduced by accounting standard setters and regulators. Both IFRS 7 risk reporting and the measures introduced by the Basel Committee through the Basel Pillar 3 framework have a reducing effect on bank opacity. The strength of the external audit profession in each country, as an independent enforcement mechanism, also plays an important role in the reduction of opacity and the promotion of stability.

Chapter 5 examines the impact of the transition to IFRS 9 on the resilience of financial institutions. Following the regulatory debate, risk-taking behavior and its determinants have been used as a proxy to measure asset quality as a key determinant of a resilient financial system. Loan loss

provisions serve as an important source of information to assess a bank's credit risk, especially for the recipient (BCBS, 2015a). In particular, a resilient financial market system requires transparency regarding banks' asset quality to assess potential risks in terms of regulatory market discipline (Beltrame et al., 2018; Flannery, 2001; Gropp et al., 2004). Finally, the empirical results indicate that the adoption of the revised accounting standard positively affects the resilience capacity and thereby the financial stability of banks. The adoption of IFRS 9 leads to a reduction in banks' asset and insolvency risks.

Ad ORQ 3: What influence does the interplay of accounting and regulation have on the behavioral management of banks?

The third ORQ examined how bank accounting and regulation interact to influence bank behavior. In line with the discussion initiated by the Basel Committee on Banking Supervision on the interplay between accounting and regulation on bank behavior (BCBS, 2015b, 2017), **Chapter 5** analyzes the impact of IFRS 9 implementation on loan loss provisioning and bank soundness. Consistent with previous studies on the incurred loss model (Ahmed et al., 1999; Bikker & Metzmakers, 2005; Collins et al., 1995; Kanagaretnam et al., 2003; Laeven & Majnoni, 2003), this study examines the timeliness of loan loss provisioning, earnings management, and capital management. Table 6.3 provides an overview of the main results.

Table 6.3: Summary of Findings ORQ 3

ORQ	Chapter	Research Questions and Hypotheses	Key Results
ORQ 3: <i>What influence does the interplay of accounting and regulation have on the behavioral management of banks?</i>	Chapter 5	H1: <i>The adoption of IFRS 9 has a significant impact on the timeliness of loan loss provisions.</i>	The timeliness of loan loss provisions has improved due to the implementation of IFRS 9.
		H2: <i>The adoption of IFRS 9 has a significant effect on banks' capital management.</i>	Rejection of H2.
		H3: <i>The adoption of IFRS 9 has a significant impact on the decrease in earnings management esp. income smoothing.</i>	Income smoothing has been reduced due to the implementation of IFRS 9.
		H4: <i>The adoption of IFRS 9 has a positive effect on asset quality and thus on bank resilience.</i>	The implementation of IFRS 9 has a reducing effect on asset risk and the risk-taking behavior of global banks.

Note. ORQ: Overall Research Question; RQ: Research Question; H: Hypothesis

Based on the empirical findings, it may be concluded that the introduction of IFRS 9 has improved the timely recognition of loan loss provisions. Specifically, the transition from the ICL model to the ECL model improves the presentation of forward-looking non-performing loans in the annual report. We also found evidence for reduced income smoothing due to the implementation of the new accounting standard. In line with ORQ 2, the implementation of IFRS 9 also positively affects bank-wide asset quality and contributes to a higher sensitivity in risk-taking behavior. The

disclosure requirements under IFRS 7 also play an important role in the development of risk disclosure practice. The specific IFRS 7 requirements to disclose key model parameters of the ECL model and, in particular, the underlying model assumptions, such as macroeconomic factors, is intended to make the management logic of provisioning more transparent. In terms of content, the IASB follows the idea of the management approach (Weber, 2012b, 2012a). The disclosed credit risk parameters intend to make the risk management process more transparent to the addressee. In particular, the notes should explain how the key input parameters of the ECL model are defined. Besides relevant credit risk management parameters, such as LGD, EAD, and PD,⁷⁷ the external annual report should explain how the criteria for reclassification of loans under the three-stage approach are determined (IFRS 7.35F). Of particular importance is the institution-specific definition of “significant increase in credit risk” which defines the transition from a 12-month ECL to a LECL (e.g., Scharpe et al., 2017).

Besides defining the technical parameters of the credit risk model, the supplementary guidelines of the Enhanced Disclosure Task Force (EDTF) recommend disclosing the IFRS 9-specific risk governance processes (EDTF, 2015). Moreover, the presentation of the credit-risk-specific risk governance framework, including the organizational structure and process organization, and the presentation of the bank-specific risk-disclosure governance framework in the annual report is also recommended (Weber & Menk, 2014). According to Weber and Menk (2014), risk disclosure governance is defined as an internal regulatory framework for external risk reporting, which is internally operationalized in the form of a disclosure policy. In addition to outlining the disclosure process in the form of guidance, process-immanent controls must be established to ensure process and data quality and provide useful decision-making information to the external addressee and the capital market (BCBS, 2015a).

6.2 Theoretical and Practical Contributions

Based on the previous studies, the following overarching implications for theory and practice may be derived:

1. A stronger alignment between the annual risk report and the Basel Pillar 3 report is necessary. On the one hand, there exists a high degree of redundancy of information between the two reporting regimes, which inevitably leads to a high degree of information overload. The Basel Pillar 3 report is essentially based on the principle of regulatory market discipline. According to it, market participants allocate their capital to banks excelling in risk management (Kwan,

⁷⁷ In principle, IFRS 9 provides a leeway for the use of the accounting-based credit risk model, which theoretically allows a large number of variants (EY, 2018).

2002; Stephanou, 2010). This assumption may be justified from a theoretical point of view, but the annual report and daily capital market data also provides reliable information about the solvency quality of a bank (e.g., Chiu et al., 2018; Claußen et al., 2015; Oberson, 2021). It remains a mystery to the users of the capital markets why comparable risks are valued differently under IFRS and under supervisory law. This is particularly noticeable in the case of credit risks. While the regulatory Basel Pillar 3 report is primarily based on a through-the-cycle estimate, the ECL model of IFRS 9 follows a point-in-time estimate. These disclosure dysfunctions (Weber, 2010a, 2010b) should be jointly addressed by supervisors and standard setters. Further, it should be critically reviewed by the banking supervisory authorities, who should be the addressees of the Pillar 3 report. In principle, the supervisory authority has sufficient information about the supervised banks through the FINREP regulatory reporting system (see for an overview of the requirements, for example, EBA, 2019)⁷⁸. For the capital market addressee, the Basel Pillar 3 report, in parallel with the risk reporting within the annual report, appears partly redundant, except for regulatory and accounting differences. From a practical point of view, reducing the number of regulatory filters by aligning discretionary reporting is recommended. Besides a reduction in complexity, greater decision-making usefulness can be achieved through closer integration of the reports. Since both IFRS 7 and the Basel Pillar 3 Report lead to a reduction of bank opacity (Mies, 2022), enhancing the homogenization of both disclosure regimes should positively influence transparency and strengthens the financial market's resilience..

2. Reduction in bank opacity leads to greater financial market stability. Besides the disclosure framework, the efficiency of the enforcement system also has a significant impact on bank opacity. Based on the empirical findings in **Chapter 4**, it can be stated that an external auditor plays a special role in the mitigation of bank opacity. From a theoretical point of view, it is advisable to further investigate the interaction between the external audit, the characteristics of the auditor, and the moderating effect on bank opacity and financial market stability. Since the profession of an external auditor is also subject to stricter enforcement as a result of various corporate scandals (see for an overview, for example, Böcking, 2003; Gros & Dutzi, 2021), it seems reasonable to consider the enforcement quality in a multinational setting.
3. The increasing complexity of the various disclosure regimes, combined with increasing regulatory requirements for data quality, such as BCBS 239 (BCBS, 2013, 2020), necessarily requires the establishment of appropriate governance processes for risk-related disclosure. Apart from establishing a framework for risk reporting, the audit process requires the establishment

⁷⁸ Regulation (EU) 2015/534 of the European Central Bank of 17 March 2015 on reporting of supervisory financial information (ECB/2015/13).

of an accounting-related internal control system to ensure the quality of the data material. According to the holistic, comprehensive banking approach (Hinze et al., 2017), the integration of the regulatory, accounting, and the management approaches is inevitable. The integration of risk reporting into a practiced risk governance framework (Stein & Wiedemann, 2016) seems to be necessary from the perspective of not only the regulators (EDTF, 2015) but also other stakeholders. Further empirical research is needed on the role of risk disclosure governance in banks' risk reporting practices. Based on these findings, practical implications may be drawn regarding tightening the requirements for establishing an internal control system for risk-related disclosure.

In terms of the banking triad (Hinze et al., 2017; Menk & Warkentin, 2014; Wiedemann et al., 2021), this dissertation primarily considers the influence of the accounting and regulatory components. Although **Chapter 5** examines the behavioral management of IFRS 9 regarding risk-taking behavior, it refrains from a purely institutional consideration of the management component. Based on the SLR in **Chapter 2**, it may be concluded that the characteristics of the corporate governance structure, in particular, influence risk reporting. However, the research practice primarily focuses on the determinants of board characteristics and board independence based on archival data. However, the SLR sample shows that no systemic analysis has been conducted concerning contingency theory approaches (see for an overview, for example Dutzi, 2005).

4. The empirical studies show the positive impact of accounting regulation on financial market stability. In particular, the amended IFRS 9 has had a positive impact on financial stability during the period under study (Mies & Menk, 2023). Considering the recent COVID-19 pandemic and current geopolitical challenges, it is recommended that further studies be conducted and that IFRS 9 be validated in a stress scenario.

6.3 Limitations and Outlook

In the context of this thesis, selected issues related to risk disclosure and banking regulation have been addressed. The choice of empirical research designs per se implies making assumptions; this inevitably leads to limitations. The following section presents the major limitations of each study in terms of data selection and research design, followed by a general outlook on the need for further research.

Chapter 2: Empirical Research on Banks' Risk Disclosure: Systematic Literature Review, Bibliometric Analysis and Future Research Agenda:

- *Data Selection:* The selected databases could have biased the results, besides the keywords chosen as part of the search strategy. Although the most common business databases and a snowball search were employed in the study, even that does not guarantee complete coverage of the literature. Only journals with at least a C in the VHB ranking and ABDC or a 2 in the ABS ranking were included. Further, “grey literature” was not included in the literature review. The sample size can be increased by choosing alternative rankings or by not using the quality threshold.
- *Research Design:* The bibliometric analysis was performed using the R application Bibliometrix based on the Clarivate Web of Science database. This research design is subject to certain limitations as well. It is recommended that the Elsevier Scopus database be used in a follow-up study.

Chapter 3: Environmental and Climate Risk Disclosure von Kreditinstituten: Empirische Evidenz der nichtfinanziellen Risikoberichterstattung europäischer Banken:

- *Data Selection:* In the context of this thesis, the sample selection was based on listed, systemically important banks. National accounting and disclosure characteristics of individual member states were not considered. Moreover, only systemically important credit institutions in Europe were considered. Smaller institutions such as savings banks or private banks, which do not have an impact on financial stability, were not included. Also, banks without a capital market orientation, such as the large *Landesbanken* or cooperative banks in Germany, were not included in this study. Therefore, the authors see the need for further research regarding the analysis of risk reporting by non-capital-market-oriented banks, such as savings and cooperative banks or investment companies. Further research is also needed on the extension to a global sample, besides the European setting.
- *Research Design:* A small sample size over the 2014–2018 timeframe was considered. It is recommended that the study period be extended and current developments such as the CSRD be considered.

Chapter 4: Bank Opacity, Systemic Risk, and Financial Stability

- *Data Selection:* The scope of the analysis is still limited to publicly traded European banks. Non-listed EBA stress-test participants were not included in this study. It is recommended that the sample be extended to other regions or unlisted banks such as savings banks and cooperative banks.
- *Research Design:* A binary variable was used as a proxy for IFRS 7 and Pillar 3 regulation. There is a need for further research on the granular analysis of the accounting and the Basel

Pillar 3 regulation, through more precise methods of analysis, such as the use of disclosure indices or textual analysis.

Chapter 5: Can Bank Accounting Regulation Strengthen Resilience? The Impact of IFRS 9 Adoption on Loan Loss Provisioning and Bank Behavior

- *Data Selection:* Data selection was limited to publicly traded global banks, non-listed IFRS 9 adopters were not included in this study.
- *Research Design:* Due to the primary focus on the implementation effect of IFRS 9, only a short time period was considered. In particular, market disruptions and interventions by regulators, including moratoria and government guarantees in the wake of the COVID-19 pandemic (EBA, 2020),⁷⁹ were not considered. The authors see a further need for research on the resilience of IFRS 9, in the wake of stress scenarios such as the ongoing pandemic situation and the increase in geopolitical risks with possible contagion effects for credit institutions. The authors also used idiosyncratic proxies to measure bank soundness. It is recommended that additional systemic risk measures be used in a follow-up study.

Risk disclosure has become an increasingly important research topic over the past 20 years. Financial services and banking industries are unique in that they are subject to a variety of disclosure requirements at the national and supranational levels. In this context, (risk) disclosure often provides a picture of current banking practices. Considering disclosure practices over this broad period, the analyzed studies in the SLR reflect both boom phases of financial engineering, in the form of increasing relevance of market price risks (e.g., Al-Hadi et al., 2017; Jorion, 2002; Pérignon & Smith, 2010; Woods et al., 2008) as well as phases of recession and financial crises, including the increasing relevance of stress tests (e.g., Bischof & Daske, 2013; Corona et al., 2019; Lazzari et al., 2017; Petrella & Resti, 2013). Financial crises, in particular, often serve as a catalyst for more stringent regulation, as evidenced by the large number of diverse measures employed during the 2008 financial crisis (Cubillas et al., 2012; Laeven, 2011).

The upcoming global sustainability efforts may be seen as part of the next major wave of regulation, with an impact on the business model of banks and thereby also on risk reporting. As financial institutions, banks play an essential role in the transformation of the economy. Due to these sustainability efforts, addressing climate-related risks will become a regulatory imperative for banks and will shape risk reporting. With several standard setters and banking regulators currently issuing various guidelines on how to deal with climate risks, the market situation remains dynamic (BaFin, 2022; Bank of England, 2018; European Banking Authority, 2022b, 2022a). The future

⁷⁹ Regulation (EU) 2020/873 of the European Parliament and of the Council of 24 June 2020, amending Regulations (EU) No 575/2013 and (EU) 2019/876, as regards certain adjustments in response to the COVID-19 pandemic.

integration of climate risk into the IFRS 9 impairment model⁸⁰ or the Basel Pillar 3 framework (European Banking Authority, 2022a) remains an exciting area for practitioners and empirical research. Besides sustainability efforts, alternative assets such as crypto assets are gaining more attention from financial institutions and regulators (BCBS, 2022; BIS, 2018; FSB, 2018; Ocampo et al., 2023). As **Chapter 4** show, regulatory measures that enhance accounting and transparency have a positive impact on financial stability. The responses of standard setters and regulators to new crises and financial innovations for ensuring a resilient financial system will therefore remain an interesting and challenging area of study. Bank accounting regulation is a powerful tool in this endeavor.

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⁸⁰ The IASB's ongoing discussion in ED 2023/2 initially concentrates on the recognition and measurement of financial instruments and does not yet address the impairment process (IASB, 2023).

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