Regulatory Risk Disclosure in the Banking Industry: A Scoring Model Approach

Johannes Hofinger

A thesis submitted in partial fulfilment of the requirements of
Sheffield Hallam University
for the degree of Doctor of Business Administration

March 2021

Candidate Declaration

I hereby declare that:

1. I have not been enrolled for another award of the University, or other academic or professional organisation, whilst undertaking my research degree.

2. None of the material contained in the thesis has been used in any other submission for an academic award.

3. I am aware of and understand the University's policy on plagiarism and certify that this thesis is my own work. The use of all published or other sources of material consulted have been properly and fully acknowledged.

4. The work undertaken towards the thesis has been conducted in accordance with the SHU Principles of Integrity in Research and the SHU Research Ethics Policy.

5. The word count of the thesis is 70,000 (excluding appendix and bibliography).

Name	Johannes Hofinger
Date	March 2021
Award	Doctor of Business Administration (DBA)
Faculty	Sheffield Hallam University - Sheffield Business School
Director(s) of Studies	Nigel Garrow (Director of Studies) Samah Issa (Second Supervisor 1) Eva Stumpfegger (Second Supervisor 2)

Abstract

Banks communicate their regulatory risk exposures through disclosure reports to market participants. These reports are based on the Basel III Pillar 3 guidelines, implemented in the European Union in form of the Capital Requirements Directive and Regulation (CRD IV/CRR).

Agency theory views such disclosures as one viable option to reduce the information asymmetry between the banks' managers and investors. Also, high-quality risk disclosures can strengthen the competitive position of banks through lower cost of capital and higher stock liquidity. It is therefore in the interest of banks to prepare high-quality disclosures and evaluate current disclosure practices.

This thesis proposes a scoring model that measures the quality of bank regulatory risk disclosures and thereby supports banks and their stakeholders in their decision-making process on risk communication. The model builds on a two-dimensional framework including 1) a risk dimension comprising credit risk, market risk, operational risk, other risks including liquidity risk, and risk management in general; and 2) a quality dimension covering the criteria readability, comprehensiveness, meaningfulness, time comparability, and sector comparability. The quality criteria are operationalised and applied to the risk categories to facilitate the calculation of composite disclosure scores for regulatory risk disclosure reports of a sample of thirty large European-headquartered banks for the period 2016 to 2018.

Prior research shows that disclosure quality depends on both qualitative and quantitative elements. Therefore, a multi-methods approach is applied in this thesis to build the scoring model based on a pragmatic research philosophy. In the research design, qualitative elements are captured with semantic content analysis, while quantitative elements are explored using factor analysis.

The calculation of composite disclosure scores results in an average composite disclosure score of 3.86 (out of a maximum of 5) with a spread of about 20% to both sides. The analysis finds that reading difficulty across individual disclosure reports is generally very high, disclosure quantity varies substantially, banks are reluctant to provide forward-looking information, and only few information on time and sector comparability is included. This, therefore, makes it difficult for different stakeholders to benefit from bank disclosure reports and leaves ample space for banks to improve on their risk communication.

The main academic contribution of this thesis is the development of a scoring model that captures the quality of regulatory risk disclosures in the EU banking industry. Such a practice-based model does not yet exist and has long been called for in prior literature. This research also introduces a comprehensive word-based approach that is an adequate proxy for measuring disclosure quality. Finally, the thesis adds to the understanding of how the term "information content" is interpreted differently across EU banks in the context of agency theory.

For the professional contribution, the proposed scoring model enables banks to analyse their current disclosure practices and points them to areas for improvements. Supervisory authorities and analyst houses also benefit from the scoring model through a more efficient and effective analysis of disclosure reports. Finally, consultancies and software firms can benefit from such a model to expand their offerings on business intelligence.

JEL classification: M48 (Government Policy and Regulation)
Keywords: Banking risk reporting; Regulation; Disclosure; Basel III Pillar 3; CRD IV/CRR; Quality scoring model.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

ABS	Asset backed securities
AIMR	Association for Investment Management and Research
AT	Agency Theory
BCBS	Basel Committee on Banking Supervision
CEBS	Committee of European Banking Supervisors
CoC	Cost of Capital
COREP	Common solvency ratio reporting
CRD	Capital Requirements Directive
CRR	Capital Requirements Regulation
CSR	Corporate Social Responsibility
EBA	European Banking Authority
ECB	European Central Bank
EDTF	Enhanced Disclosure Task Force
EMH	Efficient Market Hypothesis
EOY	End of Year
ESG	Environmental, Social and Governance
EU	European Union
FINREP	Financial Reporting
FSB	Financial Stability Board
G-SII	Global Systemically Important Institutions
HHI	Herfindahl-Hirschman Index
IASB	International Accounting Standards Board
ICAAP	Internal Capital Adequacy Assessment Process
IDE	Integrated Development Environment
IFRS	International Financial Reporting Standards
LEI	Legal Entity Identifier
MD&A	Management's Discussion and Analysis
O-SII	Other Systemically Important Institutions
RWA	Risk Weighted Asset
SOX	Sarbanes-Oxley Act of 2002
SQL	Structured Query Language

1 Chapter One: Thesis Background, Research Question and Objectives

1.1 Introduction and Significance

A good quality of risk disclosure offers benefits to banks, their stakeholders and the wider economies, while poor quality is costly to all (Enhanced Disclosure Task Force, 2012). Previous research identifies potential benefits as lower cost of capital (Cheynel, 2013; Verrecchia & Clinch, 2015) or higher stock price liquidity (Ajina et al., 2015; Schoenfeld, 2017). Active communication also supports banks in managing their relationships with stakeholders and contributes to sustainable economic performance and resilience in the financial sector (Basel Committee on Banking Supervision, 2015). Therefore, banks have a vital and significant interest in disclosing appropriate information to their stakeholders. Managing disclosure levels effectively, however, requires methods that support the evaluation of disclosure quality (Berger, 2011; Beyer et al., 2010). This thesis addresses the measurement of the quality of regulatory risk disclosure in the banking industry with the development of a disclosure scoring model, and thereby supports banks and their stakeholders in improving their overall performance.

Regulatory risk disclosure gained importance during the financial crisis of 2008 and the years thereafter when high quality risk information was not available in a timely manner. Trust among market participants fell to low levels, resulting in a liquidity crisis on a global basis (Draghi, 2011). Over the last decade, several regulatory initiatives such as the introduction of the Basel III guidelines have been taken to improve the risk communication of banks (Basel Committee on Banking Supervision, 2017b). Still, the banking industry is vulnerable to adverse shocks in the external environment as for instance the increase in non-performing loans during the recent COVID-19 pandemic shows (Ari et al., 2020).

Firms regularly communicate their risk profile and assessment through the risk section in their annual reports. However, due to their specific risk-taking nature, banks are required by law to disclose additional risk information through regulatory risk disclosure reports (European Parliament, 2013b). The Basel Committee on Banking Supervision (BCBS), the leading policymaker for banking regulation, states the purpose of regulatory risk disclosure as aiming

"…to promote market discipline by providing meaningful regulatory information to investors and other interested parties on a consistent and comparable basis". (Basel Committee on Banking Supervision, 2015, p. 3)

While resilient financial markets are the overall goal of the BCBS, the immediate addressees of disclosure are the external stakeholders of banks with a focus on investors. The tools to achieve this goal are the disclosure reports whose quantitative and qualitative regulatory content must be meaningful to stakeholders. This is the case if reports include sufficient and consistent information on a bank's risk profile such as risk policies, risk measurement and exposures, and the management of credit, market, and operational risks.

Banks comply with these disclosure requirements in many different ways. Some banks restrict their disclosures to providing a minimum level of information, while others prepare disclosure reports that comprehensively discuss their risk profiles and outlook. Overall, banks must decide on the quantity and content of their disclosures, and investors must determine what quantity and content to expect from banks' disclosures. These decision-making processes require empirical evidence as a basis for making meaningful disclosures. The quote "if you cannot measure it, you cannot manage it", attributed to management consultant Peter Drucker, summarises the significance of the thesis well. The main aim of this research is to develop a scoring model with which the quality of risk disclosures can reliably be assessed in order to support banks and investors in preparing and analysing high-quality disclosure reports to the benefit of their investment decisions and for the overall good of society.

1.2 Thesis Background

Stakeholders such as investors, creditors and governments have a variety of sources available to obtain financial and risk information on a firm. They range from financial statements to analysts' reports and corporate filings. Traditionally, annual reports have been important sources on firms' financial position, performance, and risk. IFRS (International Financial Reporting Standards) Practice Statement 1 provides a content outline for the management discussion

and analysis (MD&A) section of an annual report. It includes suggestions for disclosure on risk exposures and management:

> *"Management should disclose an entity's principal risk exposures and changes in those risks, together with its plans and strategies for bearing or mitigating those risks, as well as disclosure of the effectiveness of its risk management strategies."* (International Accounting Standards Board, 2010, p. B836)

More recently, IFRS 7 on Financial Instruments explicitly requires firms to disclose the nature and extent of risks arising from their use of financial instruments:

> *"An entity shall disclose information that enables users of its financial statements to evaluate the nature and extent of risks arising from financial instruments to which the entity is exposed at the end of the reporting period."* (International Accounting Standards Board, 2016, p. A242)

IFRS rules are applicable to all publicly traded firms in the European Union including banks when preparing their consolidated financial statements (European Commission, 2002). In addition, further regulatory disclosure requirements apply to banks due to their specific nature as risk-taking enterprises (Linsley & Shrives, 2005b) including:

(1) the non-binding Basel III guidelines on prudential requirements for credit institutions (Basel Committee on Banking Supervision, 2011) and

(2) the binding Capital Requirements Directive (CRD) IV (European Parliament CRD, 2013) and Capital Requirements Regulation (CRR) (European Parliament CRR, 2013) which both came into force in the European Union in 2014. In legal terms, the so-called CRD IV/CRR framework is directly applicable to all financial institutions headquartered in the EU without further national implementation, and therefore replaces former national banking regulations.

The leading policymaker in banking regulation and initiator of the Basel III guidelines, the Basel Committee on Banking Supervision (BCBS), highlights the importance of regulatory risk disclosure and active market communication with the following quote:

> *"Market discipline has long been recognized as a key objective of the BCBS. (…) The provision of meaningful information about common key risk metrics to market participants is a fundamental tenet of a sound banking system. It reduces information asymmetry and helps promote the comparability of banks' risk profiles within and across jurisdictions*." (BCBS, 2015, p. 1)

The general purpose of disclosure in this respect is to increase transparency in firms' operations, risks, and financial position and performance (BCBS, 2015). Furthermore, with mounting pressure from society, firms have to accept their corporate social responsibility (CSR) and provide transparency in environmental, social and governance (ESG) matters. A good performance on these subjects can positively impact social reputation and result in the benefits of improved credit ratings (UNIDO, 2019).

The Basel III guidelines consist of three pillars: *pillar one* covers rules on capital requirements for risk exposures while *pillar two* includes rules on supervisory processes. Regulatory risk disclosure which constitutes the basis for this thesis, comprises the *third pillar*. This pillar defines a risk reporting framework that builds on the regulatory requirements of pillar 1 and 2 and that consists of quantitative and qualitative disclosure recommendations on banking risks such as credit, market, and operational risks.

With the transfer of the non-binding Basel III guidelines into EU law, some Basel III recommendations on disclosure became mandatory, thereby setting a minimum threshold for disclosure. However, Art. 431 (3) CRR on General Principles of Disclosure (European Parliament, 2013b, p. 254) says that

> *"…institutions shall (…) have policies for assessing the appropriateness of their disclosures (…). Institutions shall also have policies for assessing whether their disclosures convey their risk profile comprehensively to market participants.*

Where those disclosures do not convey the risk profile comprehensively to market participants, institutions shall publicly disclose the information necessary (…)".

This legal text stipulates that disclosures must fully reflect the risk profiles of banks in a true and fair way. The responsibility is shifted to banks to decide on the quantity and quality of any supplementary and additional information they deem necessary to voluntarily communicate their risk profiles to external stakeholders (EBA, 2020)[1]. This responsibility is interpreted differently by each bank and leads to very different levels of disclosure quality per bank. The decision of what to disclose should be driven by a comprehensive view of the banks' risk profiles, but also by factors such as impact on cost of capital, share price liquidity, and credit rating (Beyer et al., 2010). As far as the quantity of information disclosed is concerned, academic research from as early as the 1990's suggests that firms will voluntarily disclose risk information as long as they benefit from it, taking the associated proprietary costs into account (Beretta & Bozzolan, 2004; Cheynel, 2013; Elshandidy et al., 2013, 2018; Verrecchia, 1990). Furthermore, Awolowo, Garrow, & Somerset (2019) address the importance of the factor 'trust' in the firms' reporting with respect to misleading or even fraudulent information. They view good corporate governance (of which comprehensive risk disclosure is one crucial element) as a key in the quest to maintain trust and protect stakeholders. Forensic accounting tools are suggested to enhance trust in disclosure.

The need for transparency in a firm's communication is also a key theme in agency theory (Jensen & Meckling, 1976) which studies the relationship between a firm's owners and the firm's managers (e.g., Donnellan, 2016; Wiseman et al., 2012). An inherent conflict of interest exists between owners (often also referred to as investors or principals) and managers who are employed as agents to run the firm. Usually, managers have better access to internal information than external owners and, therefore, can use this information asymmetry to take actions to their own advantage and at the expense of the owners. Jensen and Meckling (1976) suggest that one way to reduce this conflict of interest is to increase transparency by monitoring the behaviour of managers

[1] An example of a pillar 3 regulatory risk disclosure report can be found on the website of one of the leading UK banks HSBC (2018).

through regular (e.g., disclosure) reports on the firm's financial position and risk (Dobler, 2008; European Banking Authority, 2017; Pepper & Gore, 2015). The benefits from transparency come, however, at a cost which can be of pecuniary or non-pecuniary nature.

Agency theory introduces pecuniary agency costs in the form of bonding and monitoring costs that both ultimately reduce the wealth of owners (Jensen & Meckling, 1976). Bonding costs are costs incurred by firms for preparing and publishing reports, but also cover all expenses on the relationship management with stakeholders. Monitoring costs are incurred on the stakeholders' side whenever, for example, reports must be analysed or the performance of firms is evaluated in general (Palia & Porter, 2007). On the non-pecuniary cost side, too much transparency can also weaken the competitive position of firms, as some proprietary and confidential information might be disclosed that is of material value to competitors. The disclosure of legally problematic information can even lead to increased litigation that can potentially damage the reputation and destroy firm value (Verrecchia, 1990).

From the perspective of the users of disclosure reports, it is important to note that risk information is not interpreted in the same way by every stakeholder. Even if some theories, such as the dominant Efficient Market Hypothesis (EMH) developed by Fama (1970), assume that investors act rationally, other theories stemming from behavioural finance studies suggest that human psychology influences investment decisions, therefore adding an individual perspective to investors' behaviour and the interpretation of risk disclosure reports (Shiller, 2003; Thaler, 2005). Consequently, the perceived quality of disclosure does not only depend on the preparers of the reports, but also on the users and their information assessment.

Banks regularly face a trade-off between providing adequate risk disclosure to cater for the information needs of their stakeholders, and limiting their risk disclosure to avoid adverse effects of too much openness (Cheynel, 2013; Jia et al., 2016). They must balance the pecuniary and non-pecuniary costs of disclosure with the benefits received, which is a difficult optimisation task (Jensen & Meckling, 1976). While budgeting and controlling the actual production and publishing costs of disclosure reports is rather straightforward, quantifying the non-pecuniary costs, such as loss in competition, is less precise. The same

applies to measuring the benefits of disclosure such as lower cost of capital (Beyer et al., 2010). Benefits directly attributable to risk disclosure are difficult to measure empirically considering that, besides disclosure, a variety of other factors such as financial performance and overall economic activity impact on the monetary value of benefits.

A prerequisite for optimising the relationship between costs and benefits is the ability to measure the quality of disclosure. Models are required that evaluate the quality of disclosure reports before further empirical analysis on costs incurred and benefits received can be performed. Beyer et al. (2010) state that, so far, most theoretical models on disclosure are “abstract representations” of the complex corporate information environment. They do not address the concrete challenges and requirements experienced in practice of communicating risk through disclosure. So, the task is to develop new models that produce “insights into practice” and that inform empirical studies as to whether the proxies selected for quality measurement reflect the key challenges faced by managers.

The research in this thesis, therefore, proposes a scoring model for regulatory risk disclosure that measures disclosure quality and provides support for banks’ internal decision-making and understanding of what determines the quality of their regulatory risk disclosures and how it can be efficiently and effectively managed.

1.3 Personal Motivation

Between 2005 and 2012, I had the chance to contribute to the definition of the requirements of regulatory risk disclosure in the European banking industry. Later, I was involved in the implementation of several regulatory risk disclosure reports in Germany and Austria. Collecting appropriate information and writing these reports (about 100 – 200 pages each including quantitative and qualitative content) was time-consuming and cost-intensive, and banks started questioning the overall purpose and usefulness of these reports. Considering the substantial investments, it quickly became clear that banks developed a vital interest in benefiting from them economically or at least from a reputational view.

Despite several efforts to explain potential benefits, the discussions remained rather vague and were lacking empirical arguments. A structured

scoring model such as developed in this thesis would have helped to convince banks on the importance of regulatory risk disclosure as well as make suggestions on how to improve it.

The future will show whether it is possible to establish generally accepted quality criteria that measure disclosure quality. This thesis is one initiative to promote the progress in disclosure research. Academically, I am interested in how a disclosure scoring model for regulatory risk in the banking industry can be defined and developed. Professionally, I would like to use the scoring model results in the daily consulting work where disclosure reports are prepared, analysed, and eventually improved.

1.4 Research Aim, Question and Objectives

In this section, the research aim, the research question, and the four research objectives are defined and explained. Figure 1 provides an overview of the research approach and shows that the objectives follow an “analyse – develop – apply – evaluate” process.

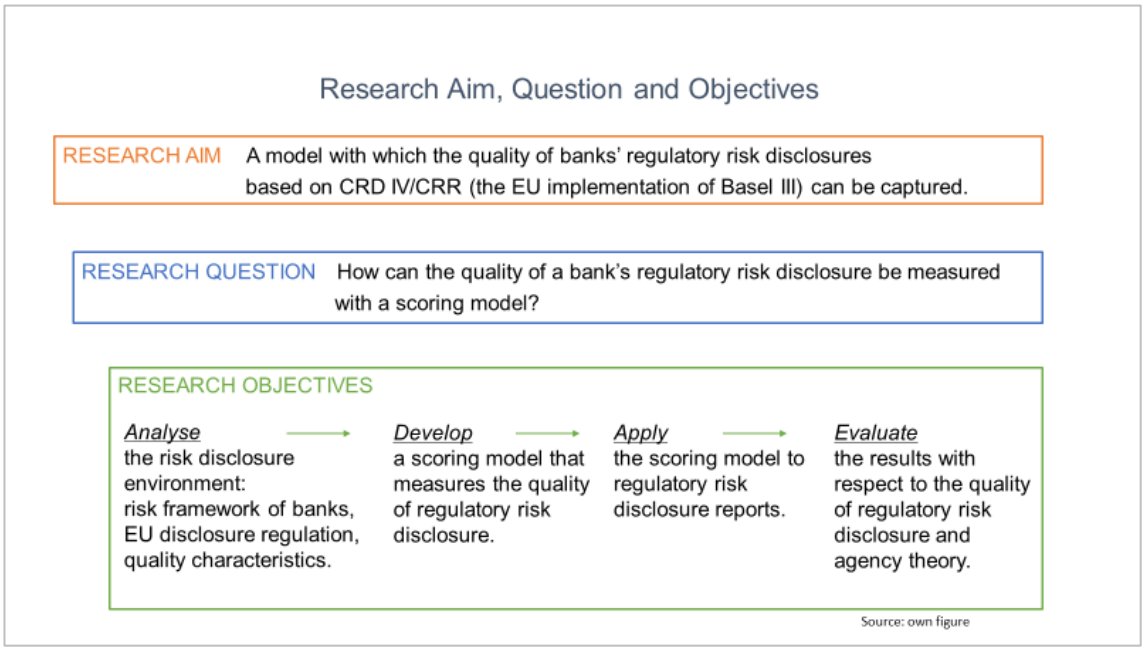

Figure 1: Research aim, question, and objectives

The main aim of this thesis is the development of a model that captures the quality of banks’ regulatory risk disclosures based on the CRD IV/CRR legal framework (the EU implementation of Basel III). Risk disclosure is a key element of banks’ overall communication strategy with external stakeholders, and forms an essential part of banking regulation, good corporate governance, and agency theory. Substantial amounts of financial resources are invested in the production and publication of risk disclosure reports. Therefore, banks and their stakeholders have a vital interest in gaining appropriate benefits from their monetary investments into the quality of reports. The ability to measure the quality of disclosure is, therefore, the missing link between analysing the relationship between costs incurred for achieving a certain level of disclosure quality, and the benefits received from higher quality disclosure reports.

The research aim of a regulatory risk disclosure scoring model development leads to the following research question and four research objectives:

Research Question: How can the quality of regulatory risk disclosure of banks in the EU be measured with a scoring model?

The research question is embedded in three strands of academic research on disclosure. Disclosure research in general studies the impact of disclosure on management behaviour, and how a desirable behaviour can be reinforced (Elshandidy et al., 2015; Linsley & Shrives, 2005a; Verrecchia & Clinch, 2015). The underlying theory to this thesis is agency theory where disclosure is seen as one way to reduce the conflict of interest between managers and investors (Jensen & Meckling, 1976). A second strand relates disclosure to the impact it potentially has on performance indicators such as cost of capital or share price liquidity (Cheynel, 2013; Core et al., 2015; Dobler, 2008). Theories in this context claim that higher-quality disclosure leads to lower cost of capital and smaller bid/ask spreads due to higher share price liquidity. Finally, research on supervisory banking regulation analyses the effects of mandatory and voluntary disclosures on the resilience of banks and financial markets (Beyer et al., 2010; Estrella Arturo, 2004; European Banking Authority, 2017). In this thesis, it is argued that all three strands of research require models that measure disclosure quantity and quality empirically and that provide evidence-based input for further research (Berger, 2011; Beyer et al., 2010).

The research question, therefore, comprises (1) the development of a scoring model that measures the quality and quantity of regulatory risk disclosure in the EU banking industry, and (2) the application of the model to a sample of risk disclosure reports in order to gain insights into current disclosure practices with respect to disclosure quality and quantity, and agency theory.

The research question is answered by achieving the following four research objectives. The research objectives are pursued in a sequential way as they are building on each other.

Research Objective 1)	Analyse the risk disclosure environment including the risk frameworks of banks, the disclosure regulation on risk in the European Union, and the characteristics of high-quality disclosure.
Research Objective 2)	Develop a scoring model that measures the quality of regulatory risk disclosure based on the findings of research objective 1. The model shall result in a composite disclosure score that represents the overall quality and quantity of a bank's disclosure report.
Research Objective 3)	Implement the scoring model developed in research objective 2 and apply it to a sample of regulatory risk disclosure reports of banks in the EU for a three-year period.
Research Objective 4)	Evaluate the scoring results with respect to the quality of regulatory disclosure and their impact on agency theory.

1.4.1 Research Objective 1 "Analyse the Risk Disclosure Environment"

Disclosure reports and their quality measurement are embedded in the risk disclosure environment of banks. Banks are risk-taking enterprises as opposed to other manufacturing and service companies in an economy (Deloitte, 2015). Due to this special nature of banks and their important role for the overall economic stability (European Central Bank, 2018; Jorion, 2007), risk disclosure is seen as an important way to inform investors about the risk profile of a bank, and to supervise banks with a risk-based approach (Basel Committee on Banking Supervision, 2015). Therefore, the analysis of how banks operate within their risk disclosure environment and what characterises their risk framework, is a prerequisite for measuring the quality of risk disclosure.

One important aim of banking regulation is to regulate the risk exposures of banks with a risk framework in a prudent way. Many large banks are perceived as systemically important for the stability of economies (Financial Stability Board, 2017), so their failure can put major economic sectors at risk. The financial crisis

of 2008 led supervisory authorities to strengthen banking regulation in order to prevent future crises. European integration and the establishment of a single market further advanced the regulatory environment in the EU with the aim of providing a single rulebook for the banking industry (European Parliament, 2013b). Common regulatory rules and regulations such as the Basel III guidelines were developed that define the risk framework, the risk categories and risk measurement approaches. Based on this set of rules and regulations, regulatory risk disclosure reports are prepared and published by banks. The scoring model builds on this underlying legal framework on risk disclosure in the EU and an analysis is essential to the model development.

Before regulatory risk disclosure reports can be evaluated with a scoring model, the criteria for measurement must be defined. The criteria can be of quantitative (e.g., amount of information disclosed) or qualitative (e.g., meaningfulness of the content disclosed) nature. Several leading organisations such as the International Accounting Standards Board (IASB), the Financial Stability Board (FSB), and the Basel Committee on Banking Supervision (BCBS) suggest a range of potential criteria that aim to capture the characteristics of disclosure reports (Basel Committee on Banking Supervision, 2015; Enhanced Disclosure Task Force, 2012; International Accounting Standards Board, 2017). In this thesis, their proposals are critically evaluated and in a further step consolidated into a common set of criteria, before they become part of the scoring model framework.

1.4.2 Research Objective 2 “Develop a Scoring Model”

The development of the regulatory risk disclosure scoring model is at the core of this research objective. It builds on the analysis of the disclosure environment in research objective one (risk frameworks for banks, risk disclosure regulation, and characteristics of high-quality disclosure). The proposed model takes the risk categories from the risk framework for banks based on the risk disclosure regulations in the European Union (CRD IV/CRR). It then applies the quality criteria selected from the analysis of the high-quality disclosure principles of leading policymakers and standard setters to the risk categories and calculates composite disclosure scores that represent the overall quality of the disclosures.

Measuring the quality of content-based risk disclosures has been a challenge for a long time (Beretta & Bozzolan, 2008; Elshandidy et al., 2018; Miihkinen, 2011). Several methods exist that range from assigning subjective ratings, quantitative indexing, textual and linguistic analysis, and content analysis (see section 2.4). All methods come with advantages and disadvantages regarding coding workload, ease of processing of large sample sizes, and explanatory power (Hassan & Marston, 2010; Ibrahim & Hussainey, 2019). For the development of the scoring model, measurement methods are suggested that capture the content quality and quantity of disclosure well, but also support a reduction in the coding workload through potential (semi-)automatisation in the future.

Other tasks performed in this research objective include the definition of the model framework, the identification of the data requirements, the operationalisation of the quality criteria, the definition of the processing logic, and the development of the algorithms for calculating the composite disclosure scores.

1.4.3 Research Objective 3 “Implement and Apply the Scoring Model”

The theoretical scoring model framework developed in research objective two is technically implemented in the form of a prototype before it is applied to regulatory risk disclosure reports of a sample of thirty large EU banks. This requires the development of the technical architecture of the model and the selection of software for coding, data storage, processing, statistical analysis, and consolidation. Then, the prototype of the scoring model is programmed and installed. In parallel, a sample of regulatory risk disclosure reports from thirty large banks, mainly headquartered in the European Union, for the period 2016 to 2018 is collected from banks’ websites. Finally, all reports are processed with the prototype software and composite disclosure scores are calculated for each disclosure report (90 disclosure reports in total).

1.4.4 Research Objective 4 “Evaluate the Disclosure Scores”

In this objective, the composite disclosure scores are evaluated with respect to disclosure quality and the impact on agency theory. First, the risk disclosures in the banks’ reports are analysed for each pair of risk category and quality criterion. Individual disclosure scores are calculated and evaluated separately for each bank report. Then, the individual scores are consolidated and evaluated with respect to the overall quality criteria defined. This approach supports the identification of common disclosure practices within and across banks and highlights differences and commonalities within the sample. The analysis and evaluation of the scores explain and inform banks in which disclosure areas they are already performing well and in which areas they need to improve compared to their competitors for achieving an overall higher disclosure quality.

Second, the composite disclosure scores are evaluated with respect to agency theory. The analysis focuses on the identification of different kinds of disclosure qualities when studying the effects of information asymmetry. The analysis of disclosure scores will show whether the disclosure practices on regulatory risk in the EU banking industry are homogeneous or heterogeneous, and what that means for the definition of “information” in the context of agency theory.

1.5 Research Scope

The research scope presented in Figure 2 defines the focus of this research (shaded boxes) and the boundaries that are not part of it.

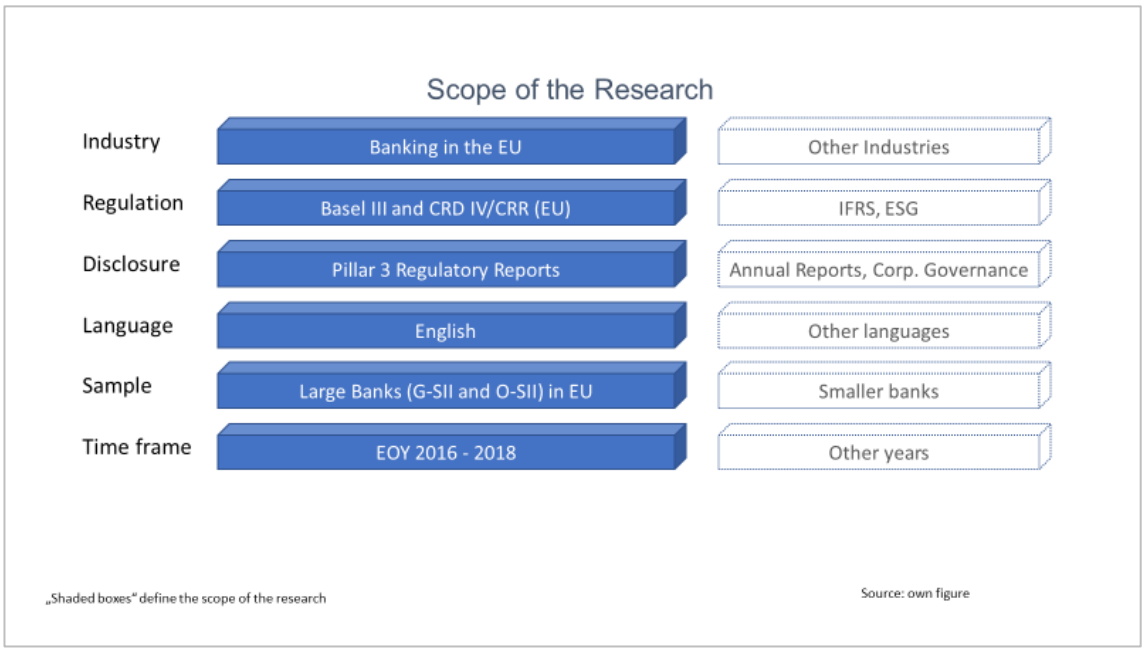

Figure 2: Scope of the research

The research focus is on regulatory risk disclosure in the banking industry. This industry is special with regards to the risk-taking nature of banks, their risk profiles and risk management as compared to the manufacturing or service sector (Linsley & Shrives, 2005b) and, therefore, justifies a separate analysis of its disclosure policies.

Furthermore, the banking industry in the European Union is regulated by a homogenous set of regulatory reporting rules defined by the Basel III guidelines and legally implemented in the EU CRD IV/CRR framework. The common reporting environment makes risk disclosures easily comparable within the industry. Other legal reporting requirements such as the International Financial Reporting Standards (IFRS) or the Environmental, Social and Governance regulations (ESG) coexist besides the banking regulation, but serve different purposes and are, therefore, not in the focus of this research.

The proposed scoring model evaluates the quality of the so-called Pillar 3 Regulatory Risk Disclosure Reports. These reports include information on

regulatory risk that is specific to banks, which cannot be found in the risk sections of annual reports or corporate governance reports (International Accounting Standards Board, 2010).

As far as the reporting language is concerned, the scoring model is applied to the English language version of risk disclosure reports only. This is an issue for banks from non-English speaking countries. Such banks regularly prepare their disclosure reports in the local language before they get translated into English. It must be noted that other languages have different language properties and would require the adjustment of parameters of the scoring model at the expense of comparability. As this research focuses on the largest European banks, the sample is selected in a way that all disclosure reports are available in the English language.

The sample of disclosure reports for the purpose of model testing and results evaluation is taken from the G-SII (global systemically important institutions) and O-SII (other systemically important institutions) lists annually published by the Financial Stability Board (FSB) and the European Banking Authority (EBA). The largest banks headquartered in the EU are selected (with one exception of Switzerland which is sharing similar banking regulations to that of the EU). Large banks are regularly the industry leaders with the most comprehensive risk profiles and, therefore, represent the industry and the disclosure benchmarks well (EBA, 2020). The sample comprises thirty banks, with the largest proportion of banks originating from the biggest EU countries UK[2], Germany, France, Spain, and Italy.

The time frame considered for analysis is the period 2016 to 2018 during which the regulatory environment for disclosure was effectively stable. In this period, no material changes were made to the CRD IV/CRR framework issued in 2013 (European Banking Authority, 2018). In total, the sample covers ninety bank years, with thirty banks and annual disclosure reports for three years each.

[2] For the research period 2016 to 2018, the UK was still a member of the EU.

1.6 Gaps and Contribution to Knowledge and Practice

Disclosure research originates from the analysis of the information content provided in financial statements in general without considering the particular requirements of the banking industry. Researchers have examined how the quality of the content of annual reports can be evaluated from the perspective of stakeholders as these reports are viewed as an important tool for reducing information asymmetry between firms and their stakeholders (e.g., Beretta & Bozzolan, 2008; Core, 2001; Core et al., 2015; Elshandidy et al., 2013; Healy & Palepu, 2001; Miihkinen, 2011). Others have focused on the perspective of a firm having to decide which kind and quantity of information to disclose in financial statements, by also considering the costs incurred (Guay et al., 2016; Hope et al., 2016; International Accounting Standards Board, 2018; Li, 2010). Recent research focuses on the information content of ad hoc statements and analysts' reports and their impact on performance ratios such as cost of capital or return on equity (Cheynel, 2013; Francis et al., 2008; Lambert et al., 2006; Verrecchia & Clinch, 2015). With the rise in importance of corporate governance, several studies examine the impact of corporate governance mechanisms on firm performance (Kodwani et al., 2020; Ntim et al., 2013).

The information provided in financial statements regularly focuses on the financial position and performance of firms. General disclosure on risk as part of annual reports emerged only in the last two decades (Basel Committee on Banking Supervision, 2006c; Mendoza, 2015). Disclosure on environmental, social and governance issues (Refinitiv, 2019) is still developing, considering for instance the discussion on the European Green Deal (European Commission, 2019).

Regulatory risk disclosure is a special case of disclosure and only applies to the banking industry. Although research and model development was performed on general risk disclosure (see section 2.2.7), there does not yet exist a model that addresses the evaluation of the quality of regulatory risk disclosure of banks. The proposed scoring model closes this research gap.

A recurring suggestion for further disclosure research is the unresolved issue of quantifying disclosure quality (Beyer et al., 2010). Several approaches are suggested ranging from self-constructed indices (Beretta & Bozzolan, 2004; Francis et al., 2008) to using the external disclosure ratings (e.g. Brown &

Hillegeist, 2007; Refinitiv, 2019). Li (2010) adds a new perspective by using natural language processing techniques. However, no approach has become a general standard for measuring disclosure quality so far due to several reasons such as little practicality or too much specialisation (Berger, 2011; Beyer et al., 2010). This thesis closes a gap in the applicability of disclosure measurement models by suggesting a framework for quantifying regulatory risk disclosure quality based on widely accepted measurement criteria in the banking industry (Basel Committee on Banking Supervision, 2018).

Previous studies often focus on the risk reporting of non-financial firms. Financial firms are purposely excluded from the research due to their specific risk nature as risk-taking enterprises (Beretta & Bozzolan, 2004; Elshandidy et al., 2015; Elzahar & Hussainey, 2012; Miihkinen, 2011). By addressing the specific regulatory risk disclosure requirements of banks, this thesis closes the research gap with respect to disclosure in the banking industry.

Banking risk regulation gained prominence over the last decade and now stands side by side with financial reporting in the banking industry (European Parliament, 2013b). There is a research gap in linking banking regulation based on the Basel III guidelines to measuring the quality of reporting on regulatory risk. It is not clearly understood whether more and better disclosure leads to more resilient market behaviour by reducing the information asymmetry between firms and stakeholders (Beyer et al., 2010). A precondition for such an analysis is the ability to measure disclosure quality reliably. The model developed in this thesis offers such an opportunity.

There is a genuine and significant interest in evaluating the impact of disclosure on the resilience of economies and on society as a whole. Often, increasing the level of disclosure is suggested as one way for improving economic stability (Basel Committee on Banking Supervision, 2018; IFRS, 2019; UNCTAD, 2017). Firms, including banks, are expected to conduct their business transparently and act responsibly by society (European Parliament, 2014). Current political initiatives such as the European Green Deal follow suit (European Commission, 2019). It is expected that the discussion on disclosure will further gain momentum in the future. However, without models and tools that “measure” the quality of disclosures, the discussions remain on a rather theoretical level. The research in this thesis takes the discussion on improving

the stability of financial markets one step forward by developing a tool that can quantifying disclosure quality.

1.7 Ethical Considerations

The Declaration of Helsinki (World Medical Association, 2013) sets standards of good practice in research ethics. Although the declaration originates from medical research, it is widely accepted in other research settings such as social sciences and business administration. The principles of the declaration also provide guidance for this research.

The declaration categorises the ethical principles of research in beneficence, non-malfeasance, informed consent and confidentiality, and anonymity. Research should strive to do something positive (beneficence) and not harm anyone or anything (malfeasance). In case human subjects are involved, they shall be informed about the research underway and asked for permission (informed consent). Their data shall be treated confidentially. In published research work, individual data shall be anonymised if not agreed otherwise (World Medical Association, 2013).

The principles of the declaration apply to this thesis in the following way. In this research, the objects of interest are regulatory risk disclosure reports published periodically by banks. Although these reports are prepared by employees of banks, there is no direct interaction taken with these individuals. The research focuses on analysing and evaluating the document-based disclosure reports with a scoring model, and no personal or proprietary information is used or inquired during and after the research process.

The research contributes positively to knowledge in the field of disclosure, and it is not expected to harm the interests of individual participants or organisations (banks).

All disclosure reports are available on the banks' websites in the public domain and can be freely accessed by every interested party. The download, usage and analysis of the reports conform to the legislation on data protection.

During the research process, the names of the banks in the sample and other characteristics such as asset size, risk weighted assets, country of headquarter, and risk assessment are known to the researcher. However, in the

evaluation phase, the results on disclosure scores are anonymised and consolidated. Upon publication of evaluation results, it is not possible to identify an individual bank anymore. Individual information on banks is kept confidential in a secure online workspace and access granted only to university supervisors or other interested academic researchers.

The author of this thesis has worked for a number of banks included in the research sample on a consulting basis in the past, but has not been affiliated with any of them over the last three years.

1.8 Structure of the Thesis

The thesis is structured into seven chapters. Figure 3 provides an overview of the chapter contents.

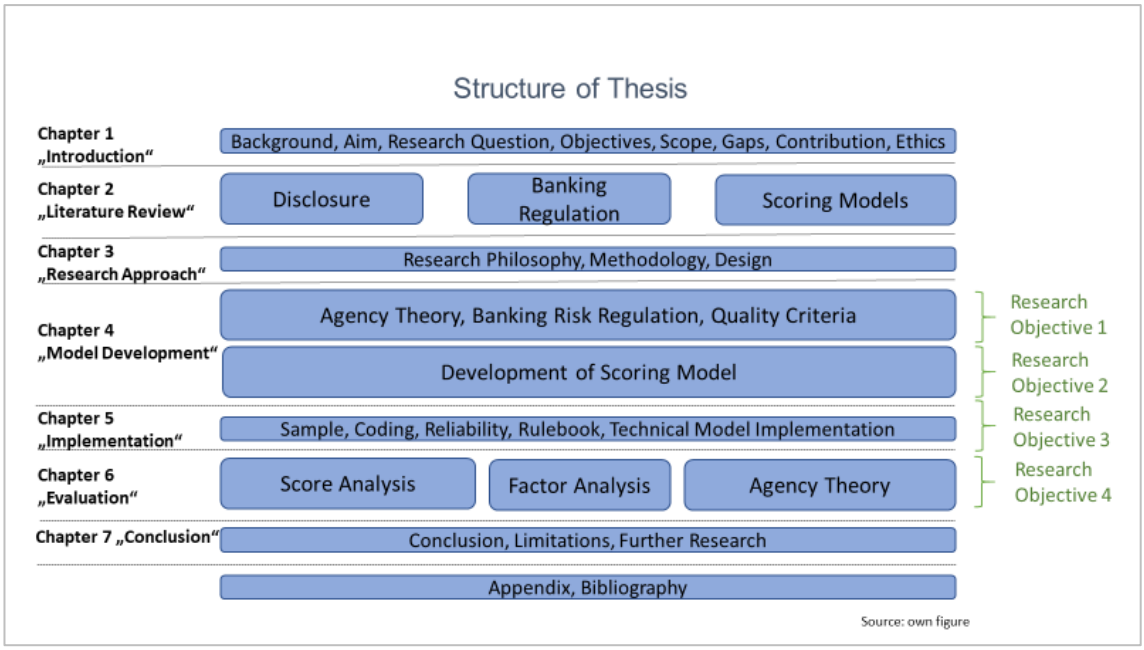

Figure 3: Structure of the thesis

Chapter *one* introduces the research subject of the thesis. It creates awareness for the trade-off faced by banks to disclose as much information to stakeholders and the public as possible, but also not to threaten their competitive and legal position. The research problem of measuring the quality of regulatory risk disclosure is explained in the general background section. It is followed by a section where the research aim, the research question and the four research

objectives are precisely defined. The section on the research scope adds to the definition by setting out the focus of this research. The next section outlines the existing research gaps and explains the contributions of this research to academic and professional progress. In a final section, potential ethical issues arising in this research are discussed and explained how potential dilemmas are solved.

In chapter *two* the existing literature on bank disclosure is reviewed. This review is divided into three sections. First, the theoretical framework of disclosure in general is discussed. The chapter then narrows down the focus to the reporting regime in the European Union and the disclosure regulations for banks operating in this environment. The third section extends the literature review to quantitative and qualitative measurement approaches of disclosure.

Chapter *three* introduces the philosophical stance of this thesis and it justifies the choice of pragmatism as the main paradigm adopted for this research. Continuing with the methodological approach, the next section explains why the use of multiple methods best help to answer the research question. The chapter concludes with the description of the research design and the consecutive steps taken as required in multi-methods research.

The regulatory risk disclosure scoring model is developed in chapter *four*. The basis is set with a closer look at agency theory focusing on benefits of information sharing and incurred agency costs. As this thesis is about regulatory risk disclosure in the banking industry, the next section outlines the risks particularly relevant to this industry. The chapter continues with the selection of the criteria used to measure disclosure quality in the proposed scoring model. The final section of this chapter develops the scoring model with the integration of the risk and quality dimensions in one model.

Chapter *five* includes the implementation and testing of the scoring model. First, the selection criteria for the test sample of thirty large European banks over 2016 - 2018 are summarised. In semantic content analysis it is important to follow a strict process and organisation to minimise inherent subjectivity. These procedures are set out in section two. The results of the statistical tests for reliability and validity undertaken can be found in section three. Section four includes the coding rulebook that coders had to follow rigorously. The last section

explains the technical implementation of the model in Nvivo, SPSS, Python and Excel.

The results of the scoring model testing are evaluated in chapter *six*. In section one, each quality criterion is analysed individually before the composite disclosure scores are finally evaluated. Section two continues with the statistical factor analysis on the model results. First, the correlation matrix between all quality criteria is analysed and interpreted. The second part includes the principal component analysis that results in the identification of the underlying thematic structure of the model. In the final section of this chapter, the impact of the model results on agency theory is discussed and analysed.

Chapter *seven* concludes this thesis. It summarises the empirical results of the risk disclosure scoring model and the activities undertaken in this research, but also critically discusses experiences made during the model development and evaluation phase. In the two remaining sections, limitations of the research are listed and suggestions for further research are made.

1.9 Chapter Summary

The chapter introduced the thesis. It provided the academic and professional background of regulatory risk disclosure which is the main theme of this thesis. It explained the significance of the subject by highlighting that banks only can manage their disclosure when they can measure it. The research question “How can the quality of regulatory risk disclosure of banks in the EU be measured with a scoring model?” was explained and split into four major research objectives that follow the analyse-develop-implement-evaluate process. The definition of the scope of the research set the main constituents of the model but also separated the model from related research questions. Several research gaps were discussed of which the most important one was that there simply does not yet exist a comparable regulatory risk disclosure scoring model for the banking industry. The gaps lead to an extensive overview of potential academic and professional contributions of this thesis. Finally, ethical considerations were made that are relevant for this academic research.

2 Chapter Two: Literature Review

2.1 Overview

Research in the disclosure field asks three fundamental questions (Beyer et al., 2010). *Why* do firms disclose, *what* do they disclose and *how* do they disclose information? The answers to these questions all make a strong impact on the development of the regulatory risk disclosure scoring model in this thesis (Figure 4). They give the reasons for disclosing regulatory risk information to the public, they define the content of regulatory risk disclosure reports, and they provide criteria for measuring the quality of the disclosure.

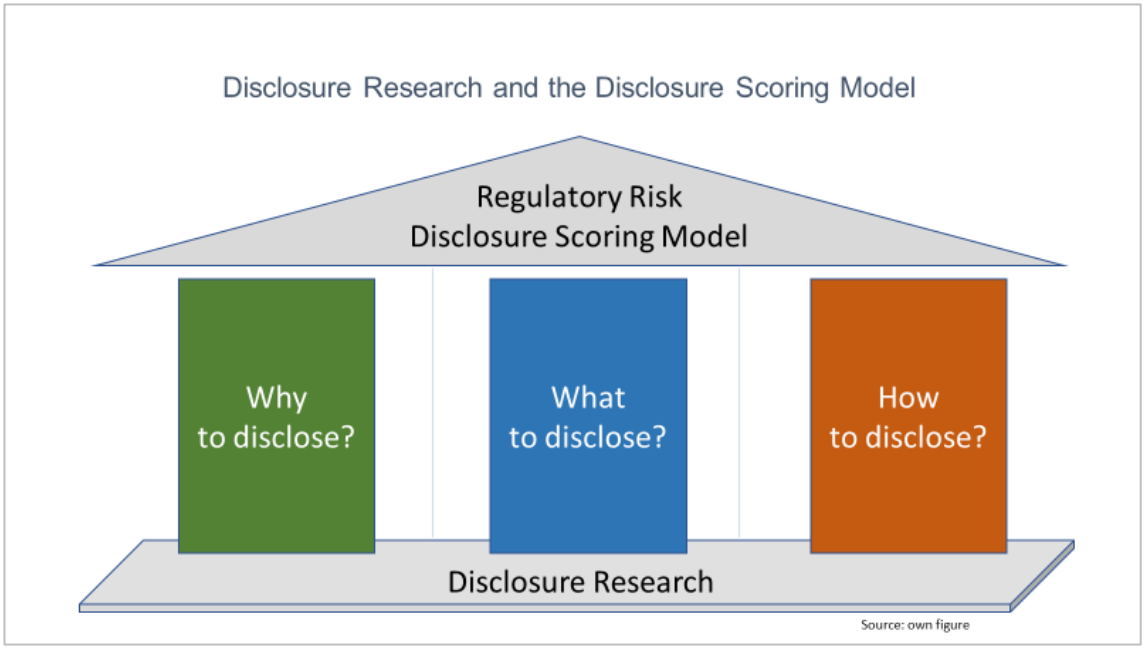

Figure 4: Disclosure research and the scoring model

First, the question is "*why do firms disclose internal information at all?"* that makes it necessary to develop a disclosure scoring model. Internal information is proprietary to a firm and it needs good reasons for communicating this information externally (Elshandidy et al., 2018). The first section of the literature review critically summarises the state of disclosure research including definitions for "disclosure", "risk", and "regulatory reporting", determinants of disclosure and vehicles of disclosure. These factors build the foundation for the disclosure scoring model. It further gives an overview of the theories that aim to explain the disclosure policies of firms. Agency theory (Jensen & Meckling, 1976) is a

prominent theory in this field, but there are also other theories that explain the disclosure policies from different perspectives. The first section concludes with a critical discussion of agency theory in the banking environment and highlights the research gap the scoring model closes in this respect.

The second question is "*what do firms disclose*?" Besides the information needs of investors there is also a public interest in a basic flow of information (EBA, 2020). This public interest is reflected in mandatory and voluntary disclosures that can be found in laws, regulations and guidelines (European Parliament, 2013b). The literature review in the second section examines the disclosure requirements found in banking regulatory reporting (Basel III, implemented in the EU through the Capital Requirements Directive CRD IV and Regulation CRR), in financial accounting (IFRS), in stock exchange listing requirements, and in environmental, social and governance (ESG) reporting. The main emphasis in this section is on banking regulatory reporting, as this is the focus of the disclosure scoring model.

The third and last question is "*how do firms disclose?"* The answer defines the measurement of disclosure quantity and quality in the disclosure scoring model. In the literature many research papers suggest different answers to this question. However, so far no measurement approach is generally accepted (Berger, 2011). This third section of the literature review first gives an overview of the measurement methods, ranging from direct to indirect approaches as well as from quantitative to qualitative approaches (scores and indices, semantic content analysis, computational linguistics, surveys, interviews). Then the methods are critically evaluated as each one has its benefits (time, cost, and sample size) and drawbacks (subjectivity and validity). In the end, the section prepares the basis for the selection of the measurement approach suggested in this research for the scoring model.

2.2 Theoretical Framework of Disclosure

The objective of this thesis is to develop a "regulatory risk disclosure scoring model". In order to define the constituents of the model, this section first reviews the literature on the terms "disclosure", "risk" and "regulatory reporting", highlights the disputes in the research, and then applies the definitions to the scoring model.

2.2.1 Definition of Disclosure

The term "disclosure" can be defined in a broader and narrower sense. The definition which is used depends on the purpose of disclosure. Figure 5 provides an overview of relevant aspects for the definition of the term "disclosure" found in various sources.

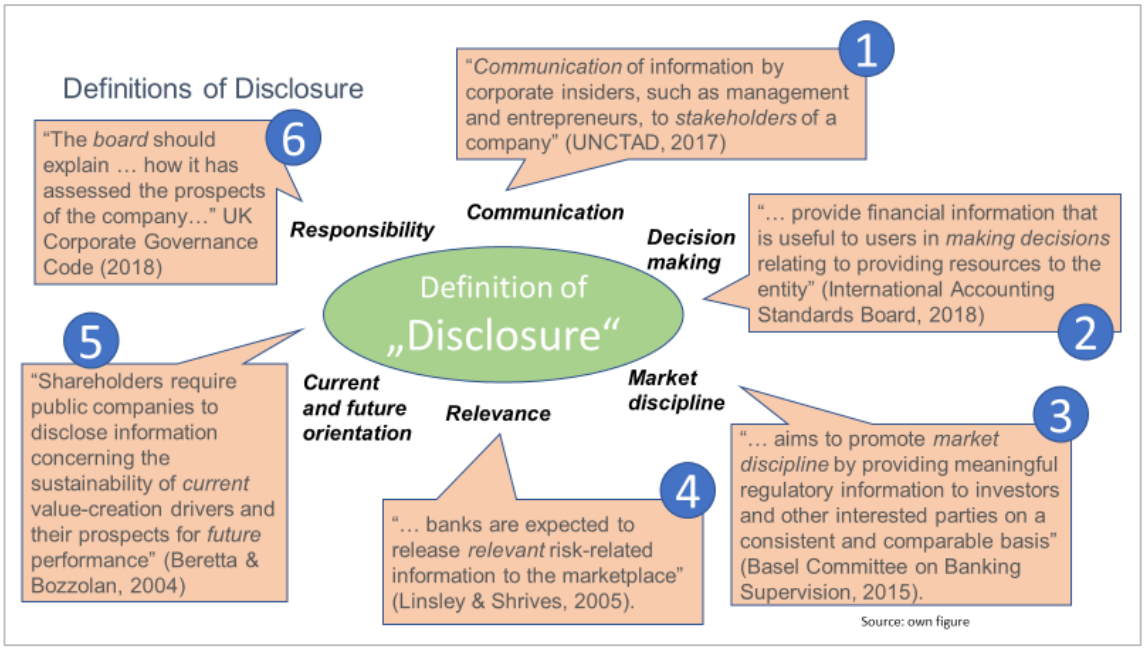

Figure 5: Definitions of disclosure

At a 2017 conference on the future development of corporate disclosure, the United Nations Commission for Trade and Development (UNCTAD) suggested a rather general definition of disclosure (Figure 5 [1]) that leaves room for subsuming many different aspects of disclosure. It states that "corporate disclosure comprises the communication of information by corporate insiders, such as management and entrepreneurs, to stakeholders of a company"

(UNCTAD, 2017). It leaves open which kind of information is meant, understanding that even a commercial on TV represents a form of communication in addition to the more traditional forms of annual reports and regulatory filings. The explanation following the definition lists the main external audiences of disclosure. These are primarily the stakeholders that provide equity and debt capital to a firm. However, other stakeholder groups such as regulatory bodies, tax authorities, policymakers, employees, and society are interested in disclosure as well and must be included in the audience. Lastly, the definition recognises that good corporate governance heavily depends on information, thereby highlighting the importance of disclosure (UNCTAD, 2017).

The accounting profession is a major driver in the development of financial reporting and disclosure. One of the leading policymakers in this area, the International Accounting Standards Board (IASB) sets out the objective of financial reporting as to "… provide financial information that is useful to users in making decisions relating to providing resources to the entity" (International Accounting Standards Board, 2018). In this definition (Figure 5 [2]), disclosure must support users such as current and potential investors in decision-making. For this purpose, they need information on an entity's economic resources, claims against the entity and changes in those resources and claims, as well as information on how efficiently and effectively management has discharged its responsibilities to use the entity's economic resources (International Accounting Standards Board, 2018). Information is presumed to be useful only if it is material ("materiality concept"). Information is material if omitting it or misstating it could influence investors' decisions.

Supervisory authorities such as regulatory bodies in the banking industry often share interests with financial accounting policymakers but add their specific goals to the definition of disclosure. In the case of the banking industry, the Basel Committee on Banking Supervision (BCBS) sets the (non-binding) standards for prudent banking regulation and disclosure. It is a forum for regular cooperation on the supervision of the international banking system and is made up of national banks and supervisory authorities from 28 leading countries worldwide. The BCBS adds to its definition of disclosure (Figure 5 [3]) the overall goal of resilient financial markets through market discipline (Basel Committee on Banking Supervision, 2015). It states that regulatory risk disclosure (pillar 3 of the Basel

III framework) “complements the minimum risk-based capital requirements and other quantitative requirements (pillar 1) and the supervisory process (pillar 2)” and it “aims to promote market discipline by providing meaningful regulatory information to investors and other interested parties on a consistent and comparable basis” (Basel Committee on Banking Supervision, 2015). The basis of regulatory risk disclosure is information from financial accounting (the so-called Financial Reporting FINREP) that is further processed through extensive risk-related rules set forth in pillar 1 and 2 of the Basel III framework (European Parliament, 2013b). The BCBS regards a disclosure report as being of high-quality if it “enables users to better understand and compare a bank’s business and its risks”, an observation that already establishes criteria for the scoring model (Basel Committee on Banking Supervision, 2015).

Linsley & Shrives (2005b) add to the risk perspective that “… the essence of any bank is that it is a risk-taking enterprise…” and therefore, as part of good corporate governance, “… it is expected that relevant risk-related information will be released to the marketplace”. So, in addition, they define the responsibility of the provider of information. Disclosure must include relevant risk-related information on credit, market, and operational risks as well as the approach of how these risks are assessed and managed.

Beretta & Bozzolan (2004) add a current and future time orientation to the definition of disclosure (Figure 5 [5]). They state that the definition of disclosure must include two important aspects. One aspect is that disclosure must inform on the “sustainability of current value-creation drivers”. The second aspect is of equal importance: “… shareholders require public companies to disclose information concerning their prospects for future performance” (Beretta & Bozzolan, 2004). They go on to mention that the narrative components of risk communication must offer useful insights into value-generation drivers besides clarifying and validating quantitative measures. They highlight the importance of qualitative descriptive disclosure besides an exclusive normative and figures-based disclosure. In developing their risk communication model in their study on Italian firms, they define risk disclosure as “the communication of information concerning firms’ strategies, characteristics, operations, and other external factors that have the potential to affect expected results” (Beretta & Bozzolan, 2008).

Finally, provision 31 of the UK Corporate Governance Code 2018 (Financial Reporting Council, 2018) shifts the focus of the disclosure definition to the board of directors (Figure 5 [6]). The Code defines the responsibilities of the board by saying that by "…taking account of the company's current position and principal risks, the board should explain … how it has assessed the prospects of the company, over what period it has done so and why it considers that period to be appropriate" (Financial Reporting Council, 2018). The board shall include in its governance reports both, compliance with the Code but also, equally important, explanations for non-compliance (Kodwani et al., 2020). Consequently, good disclosure must consider content but also the role and intention of the authors of the disclosure reports.

In summary, the literature review on the definition of disclosure shows that the definition is often driven by the purpose of disclosure. The organisations and researchers pursue different goals in their work, therefore leading to rather heterogeneous disclosure definitions. They highlight in their definitions various aspects as summarised in Figure 5. Disclosure can be a tool for communication, decision making, market discipline, or assigning responsibility. Disclosure must also be relevant and oriented to the current and future performance of a firm. While all aspects are important for the definition used in the development of the scoring model, the basic definition applied here is the one from the BCBS (Figure 5 [3]). The reason is that the disclosure scoring model is based on regulatory risk reporting, and banks must follow this regulation (European Parliament, 2013b) when preparing their disclosure reports (European Banking Authority, 2018).

2.2.2 Definition of Risk

The main focus of the disclosure scoring model is on regulatory risk. There is a long-standing debate in the financial literature whether the term "risk" refers only to negative outcomes of an event or whether the positive outcomes (the chances) of the same event should be included in the definition of risk as well (Brealey et al., 2014; Ibrahim & Hussainey, 2019; Jorion, 2007). The question of the scope of risk is of high importance for the scoring model development. For instance, in semantic content analysis it makes a difference if only negative risk

words (e.g., uncertainty, danger) are counted or also positive words (e.g., success, opportunity) (Li, 2010), thereby materially impacting scoring results.

In their analysis of the definition of risk Ibrahim & Hussainey (2019) differentiate between a pre-modern and a modernist view. They argue that the pre-modern view recognises risk as something bad, therefore covering only a single side of risk (the negative one). The modernist view recognises risk as both the negative and the positive side of an uncertain event, therefore covering both sides of potential outcomes.

Arguments supporting either view can be found in the literature. It often depends on the purpose of the research which definition is recommended. In their study of risk disclosures in the annual reports of UK companies, Linsley & Shrives (2006) decide to apply the broad, modernist definition of risk. For the purpose of their study they mark a sentence in an annual report as risk-relevant "…if the reader is informed of any opportunity or prospect (edited: the positive side), or of any hazard, danger, harm, threat or exposure (edited: the negative side), that has already impacted upon the company or may impact upon the company in the future or of the management of any such opportunity, prospect, hazard, harm, threat or exposure" (Linsley & Shrives, 2006).

Brealey et al. (2014) use a technical definition of risk. By statistical means they analyse the variability of expected stock price returns. They define risk in terms of price variability. The higher the variability of a stock, the higher the risk is (in the case of normally distributed returns). Hence, variability is not differentiated in positive and negative outcomes. This technical definition of risk follows the modernist definition of risk.

The pre-modern standpoint is taken by bank supervisory authorities (Kinglsey et al., 1998). The Basel III framework regulates the own capital (equity) required to support the risks taken by banks. The definition of risk is essential to correctly measure the risks incurred. In a paper of the Basel Committee on Banking Supervision (2017) amendments are suggested for finalizing the post-financial crisis reforms of banking regulation. In the context of operational risks, the committee defines risk as "the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events" (Basel Committee on Banking Supervision, 2017). This single-sided perspective on risk ("failure") is followed up in the EU implementation of the Basel III framework, the

CRD IV/CRR package. A definition of risk is mentioned in point (10) of article 3(1) of the directive 2013/36/EU (European Parliament, 2013a). There, the definition of systemic risk includes the “risk of disruption in the financial system with the potential to have serious negative consequences for the financial system and the real economy”. Point (11) of Article 3(1) of the same directive defines model risk as the “potential loss an institution may incur, as a consequence of decisions that could be principally based on the output of internal models, due to errors in the development, implementation or use of such models ” (European Parliament, 2013a).

The Basel III and the EU CRD IV/CRR definitions of risk clearly show that for banking regulatory purposes the pre-modern, single-sided view of risk is applied as key phrases “risk of loss”, “negative consequences” and “potential losses” in the risk definition suggest. Consequently, the regulatory risk disclosure scoring model follows this risk definition focusing on the negative outcomes of risk only.

2.2.3 Definition of Regulatory Reporting and Disclosure

The European Central Bank (ECB) defines “regulatory reporting” from the perspective of a banking supervisor: “The aim [edited: of regulatory reporting] is to provide supervisors with all relevant information on the financial institutions’ risk exposures, as well as their capital and liquidity positions” (Nouy, 2014). Nouy, then the chairperson of the ECB’s supervisory board, suggests a broad scope for defining regulatory reporting. In the definition, regulatory reporting includes all information that supervisors need to evaluate the financial soundness of a bank. This comprises information on risk exposures, capital, and liquidity. On a side note, he also acknowledges that the public interest in regulatory reporting is growing (Nouy, 2014). Risk information that used to be reported only to banking supervisory authorities is on the verge of becoming a major concern for external stakeholders as well. Therefore, risk information must continuously be made accessible to the public. Technically, the public provision of information on regulatory risk is summarized as “regulatory disclosure” and thereby extends the original term “regulatory reporting” that used to focus only on requirements of regulatory supervision (European Parliament, 2013a).

The EU CRD IV/CRR framework goes into more detail in the definition of regulatory disclosure. The purpose of regulation is to “establish uniform and directly applicable prudential requirements for credit institutions and investment firms, since such requirements are closely related to the functioning of financial markets in respect of a number of assets held by credit institutions and investment firms” (European Parliament, 2013a). In the public interest, supervisors must establish common banking rules for ensuring stable and resilient financial markets, and the supervised banks must disclose all regulatory information that is needed to achieve this goal.

The leading banking policymaker in the EU, the European Banking Authority (EBA) summarises the need for regulation and regulatory disclosure in its “single rulebook” approach (European Banking Authority, 2018). The Single Rulebook “aims to provide a single set of harmonised prudential rules”. The goal of this unified regulatory framework for the EU financial sector is to complete the single market in financial services. A precondition for the functioning of a single market is that rules and regulations such as Basel III are uniformly applied in all member states, and banks have to adhere to comparable reporting standards. It is essential that similar standards for regulatory disclosure, and the same methodologies for the calculation of key requirements, such as capital and liquidity ratios are used by all market participants. This way, regulatory disclosure will contribute to a more effective functioning of the single market (Morrison & White, 2009).

In summary, it can be observed that the definition of regulatory reporting has changed over the years. Originally, the main purpose of regulatory reporting was banking supervision where banks had to submit risk-relevant data to supervisory authorities only. With the introduction of the Basel III framework, the group of potentially interested stakeholders in regulatory reporting and potential receivers of information was widened to include all market participants. The information provided through regulatory reporting must now guarantee both, the resilience of the individual bank but also the functioning of financial markets. This change in purpose has strong implications on the development of the scoring model. The model must consider the needs of a wide audience. It must cover all relevant risk-related information as well as measure the quality of disclosure for a diverse group of stakeholders.

2.2.4 Dimensions of Disclosure

The nature of disclosure is best described using a multi-dimensional approach (Elshandidy et al., 2018). Disclosure can take on many different forms. Figure 6 summarises the main dimensions ranging from mandatory/voluntary disclosure to benefits of disclosure. In this section, the literature on these dimensions is evaluated and the impact on the development of the disclosure scoring model explained.

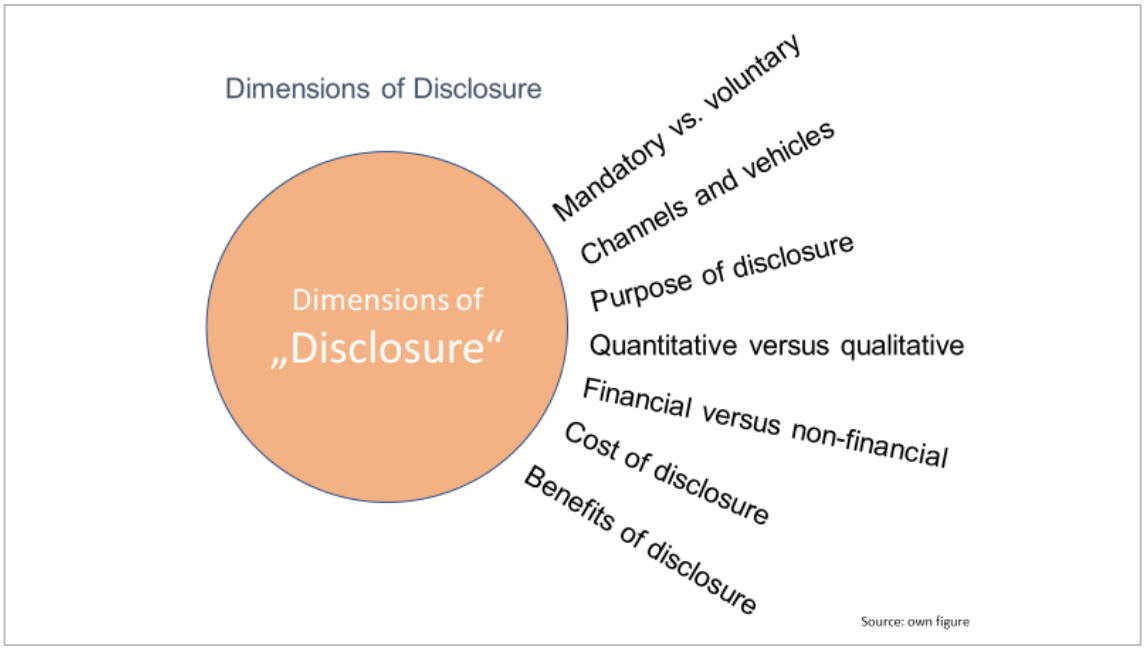

Figure 6: Dimensions of disclosure

2.2.4.1 Mandatory versus Voluntary Disclosure

Linsley & Shrives (2000) examine the merits and demerits of disclosing risk information in annual reports from both the firms' and investors' points of view. They observe that "…although businesses have had the opportunity to disclose risk information voluntarily few have done so, and if it is considered that such disclosure is desirable then there is a strong argument for regulation" (Linsley & Shrives, 2000). Linsley and Shrives find that firms tend to be reluctant to disclose internal risk information voluntarily. In order to ensure a minimum level of disclosure, supervisory authorities must issue mandatory rules and regulations. Institutions such as the Basel Committee of Banking Supervision

(BCBS) define their role in the same sense although their guidelines are non-binding (Basel Committee on Banking Supervision, 2006c).

Disclosure of information can be mandated/regulated by supervisory authorities or be voluntary at the choice of the firm. Often a minimum level of disclosure is mandated and everything above is considered voluntary communication (UNCTAD, 2017). The most common sources of mandated disclosure are accounting standards, e.g., IFRS 7 Financial Instruments Disclosure, legal regulations such as the EU Capital Requirements Directive CRD IV together with the Capital Requirements Regulation CRR package for the banking industry in the European Union, corporate governance codes with their comply or explain obligation, non-financial disclosures such as ESG reporting, and listing rules of stock exchanges (Beyer et al., 2010).

The originators of voluntary disclosure are the firms themselves whenever they decide to voluntarily communicate information (Verrecchia, 1990). While voluntary disclosure can take on many forms, the academic literature focuses on disclosures on risk and financial products, such as value-at-risk, new ventures, and exposures to interest rates (Jorgensen & Kirschenheiter, 2003). Cheynel (2013) expands the range of voluntary disclosure to expected or projected cash flows, such as asset values, earnings forecasts, sales projections, expense reductions or asset acquisitions.

The distinction in either mandatory or voluntary disclosure is not always clear-cut. Several informal industry norms (e.g., the Operating and Financial Review in the UK, recommendations for good disclosure practice by the Deutsche Bundesbank) and societal norms such as corporate governance codes or ESG standards exist, that often put pressure on firms to disclose information even if they are not obliged to do so. A well-known approach is the “comply or explain” method that can be found in corporate governance codes (see for instance: Financial Reporting Council, 2018).

2.2.4.2 Disclosure Channels and Vehicles

A variety of channels and vehicles are available for firms through which they can disperse information. Beyer et al. (2010) suggest a broad range of means of disclosure. They view every communication of a firm with the outside world even in the form of an email or a TV commercial as a form of disclosure.

However, traditional disclosure vehicles include disclosure reports for regulatory purposes (e.g., Basel III, CRD IV/CRR framework), financial statements (annual reports, interim reports) for financial accounting purposes (e.g., IFRS, GAAP), and publication requirements such as prospectuses for stock exchange listing purposes (see section 2.3.2 Risk Disclosure Regulation in the European Union). Voluntary disclosures consist of investor and analyst presentations, management forecasts, conference calls and press releases, online publications such as websites, newsletters, and ad hoc reporting in case of events with an impact on the economic situation of a firm (Beyer et al., 2010).

2.2.4.3 Purpose of Disclosure

Healy & Palepu (2001) analyse why firms do disclose information at all. They find that not every firm is necessarily interested in disclosure and the transparency it brings with it. Often, small or medium-sized firms are wholly owned and managed by the owner. Such firms do not see a benefit in publishing internal information, in particular when considering competitive issues and the costs incurred. Healy and Palepu note that the disclosure policies have changed historically. Disclosure gained a new purpose starting in the late 19th century when the era of industrialisation began. Firms grew larger and became more capital intensive (Healy & Palepu, 2001). This development paved the way from sole proprietorships to joint stock companies when the role of owners was often reduced to capital providers. The firms were run by managers that were externally hired. An information asymmetry arose between owners and managers where the latter regularly have easier and better access to information. This fact created the demand for increased disclosure (Jensen & Meckling, 1976).

The literature identifies two purposes of disclosure as a consequence of the separation of investors' and managers' roles (Beyer et al., 2010). One purpose is solving the valuation problem. Before an investment in a firm is made potential investors need to value various investment alternatives. Investors can do so only if they have access to internal information of the target firms (due diligence agreements are a special case of disclosure). A firm therefore might disclose information in order to attract investors.

Once the investment is made, a stewardship problem occurs. Due to the separation of ownership and control, there is an information gap between the

investor and the management (Jensen & Meckling, 1976). Disclosure is one method that serves the purpose of reducing this gap by providing sufficient information to investors for the ongoing assessment of the performance of their investment.

2.2.4.4 Quantitative versus Qualitative Disclosure

Disclosures must be useful to a diverse group of users posing a particular challenge for the definition of quality criteria for the disclosure scoring model (Enhanced Disclosure Task Force, 2012; International Accounting Standards Board, 2017). Some users expect mainly data-driven disclosures, some look for narratives that explain the financial position and the performance of the firm (EBA, 2020). Firms and standard setters face the challenge of how best to provide the optimal balance between quantitative information and accompanying qualitative information (Miihkinen, 2011). The provision of quantitative information offers the advantage for standard setters that the content and the level of detail can be specified, and for firms that they can follow rules and fill in templates for their disclosures. Users benefit from receiving structured information on the firm which can be conveniently evaluated and compared to other firms' data. However, the standardisation of quantitative disclosure comes with the disadvantage that the provision of the templates quickly becomes a technical task without much managerial judgement added, thereby reducing the information value of disclosure (International Accounting Standards Board, 2017).

Besides the provision of quantitative data, there is an information need for descriptive and explanatory disclosure. Users regularly require two kinds of additional narrative information (Miihkinen, 2011). First, they expect an evaluation of the firm's current performance and risk enriched with managers' comments. And second, users are interested in forward-looking information that helps them understanding the future prospects of the firm. Such information on opportunities and risks in the future are difficult to communicate in the form of standardised quantitative templates but can better be conveyed in textual, narrative form (Abraham & Cox, 2007; Elshandidy & Neri, 2015; Elzahar & Hussainey, 2012).

For the development of the disclosure scoring model, it is argued that both, current and forward-looking disclosures are important for measuring the quality. In the context of regulatory reporting, the BCBS aims to improve the comparability

and consistency of disclosures, but also wants to leave banks enough room for discretionary reporting (Basel Committee on Banking Supervision, 2015). To this end, the standard setter introduces harmonised templates for quantitative disclosures that all banks are recommended to disclose. However, the BCBS also recognises the need to allow management flexibility to provide qualitative commentary on a bank's specific risk profile. Management therefore shall enrich quantitative information with comments and explanations in order to provide a comprehensive risk assessment of the bank (European Banking Authority, 2017). The disclosure scoring model takes up this point and evaluates how comprehensively a bank communicates its risk profile through quantitative and qualitative information.

2.2.4.5 Financial versus Non-financial Disclosure

The content of disclosure can be of financial or non-financial nature. Firms regularly publish *financial* information in the form of annual/interim reports, regulatory risk reports, corporate governance reports, ad hoc news and similar reports. Beyer et al. (2010) divide financial disclosure into reports with an ex-ante and an ex-post perspective. Disclosure allows investors to evaluate the potential return of investment opportunities in a firm (the ex-ante perspective). Once investors have committed financial resources to a firm, financial disclosure allows them to monitor the use of their capital (the ex-post perspective).

The discussion on corporate social responsibility (CSR) reporting has brought forward the need for further, *non-financial* disclosures (European Parliament, 2014). Firms are expected to be good and responsible corporate citizens (Dhaliwal et al., 2011). They must contribute to a sustainable development in terms of environmental, social and governance issues (Ali et al., 2017). The need for transparency is one of the core principles of CSR reporting. The principle requires firms to be "…open about decisions and activities that affect society, the economy and the environment and willing to communicate these in a clear, accurate, timely, honest and complete manner" (International Organization for Standardization, 2010). CSR reporting is implemented in the EU through the directive 2014/95/EU Disclosure of non-financial and diversity information (European Parliament, 2014). Companies are obliged to publish non-financial statements from 2018 onwards.

2.2.4.6 Cost of Disclosure

Disclosing information comes at a cost (Berger, 2011). The cost can be divided into two categories. The first category is the operational cost of preparation, production and dissemination of disclosure information and reports (EBA, 2020). The costs can be material as in the case of regulatory and accounting reports, separate departments are responsible for the reporting process, and auditing is required to ensure correctness and completeness of the reports (International Federation of Accountants, 2018).

The second category of costs are proprietary costs (Dhaliwal et al., 2011). The published information may be used by competitors and other parties in a way which is disadvantageous to the reporting firm (Verrecchia, 1983). Disadvantages can be copying of products by competitors, but also negative consequences such as litigation if disclosed information turns out to be misleading or false in hindsight. Verrecchia (1990) argues in the proprietary cost theory that a firm will only disclose information if the benefit received exceeds the production and proprietary costs. In consequence this means that not all relevant information is disclosed, particularly if a negative reaction from investors is foreseeable. However, Verrecchia notes that investors will react less negatively to this disclosure dilemma if they are aware of the consequences of disclosure. Regulatory authorities are also aware of potentially negative consequences of disclosure. For instance, in the CRR (European Parliament, 2013b) Art. 431a allows firms to abstain from disclosing if confidentiality agreements prevent this.

The consequences for the scoring model development are manifold. Information which is not disclosed cannot be evaluated by the model due to obvious reasons. Furthermore, despite extensive internal and external auditing, there remains a certain degree of uncertainty on the correctness and robustness of the information disclosed including the quality and objectivity of audit reporting (e.g., Awolowo et al. (2019); Garrow et al. (2019)).

2.2.4.7 Benefits of Disclosure

The literature suggests two benefits that can be partly attributed to the effects of disclosure: a reduction in the cost of capital (resulting in higher valuations) and an increase in stock price liquidity.

Disclosure can have a positive impact on the cost of capital (CoC). Investors use this rate for valuing their investments by discounting the operating cash flows (Brealey et al., 2014). According to the Capital Asset Pricing Model (Sharpe, 1964) the cost of (equity) capital depends on the risk premium investors charge on top of the risk-free market interest rate. This risk premium is derived from an evaluation of the specific risk of a firm (Markowitz, 1952) and is closely related to the rating of the firm. The relationship between the rating and the cost of capital is inverse. The better the rating of a firm, the lower the risk premium investors demand from the firm. One important factor that impacts the rating is the quantity and quality of information disclosed (Servigny, 2004).

Cheynel (2013) develops a theory on the relationship between disclosure and cost of capital where she explores the links on two levels. On a microeconomic level, she empirically confirms the inverse relationship between more disclosures and lower cost of capital. However, she also acknowledges the difficulties in isolating the disclosure effect on the cost of capital from other economy-wide, exogenous factors. Furthermore, on a macroeconomic level, she performs the analysis of the effects of disclosure on the aggregate cost of capital within an economy with respect to overall economic efficiency. She identifies a "disclosure friction", meaning that investors are unable to fully distinguish between firms that choose not to disclose and firms that cannot disclose. As a consequence, the risk-sharing efficiency in an economy is reduced.

Clinch & Verrecchia (2015) challenge the dominant discourse of the inverse relationship between disclosure and cost of capital. They critically discuss the problem that disclosure is just one of many endogenous factors that may have an impact on the risk premium. Other factors should not be omitted from the analyses. Clinch and Verrecchia find that it is not obvious to clearly discern the effect of disclosure from other factors. In some circumstances, the relationship between disclosure and the cost of capital can be positively correlated. For instance, an increase in disclosure levels could be interpreted by the market participants as a worrying sign of corporate troubles (Verrecchia & Clinch, 2015).

Another potential benefit of disclosure comes from higher liquidity in a firm's shares trading. Liquidity is defined as the possibility to buy and sell shares anytime at fair market prices (Jorion, 2007). A restricted information policy may increase bid/ask spreads and therefore hinder these efficient trading activities.

Leuz & Verrecchia (2000) study the disclosure environment in Germany for 102 firms listed in the DAX index for the year 1998. It was a year when several DAX firms switched to the IAS reporting regime that requires more disclosure than local GAAP rules. Leuz and Verrecchia find that after the introduction of higher disclosure standards, the share prices of the firms experienced a lower bid-ask spread and the trading volume increased compared to firms remaining with German local GAAP.

2.2.4.8 Summary on Dimensions of Disclosure

The literature review in this section shows how manifold the dimensions of disclosure are and in which environment the regulatory risk disclosure scoring model is embedded. The detailed review is the prerequisite for the definition of the scope of the model in chapter 4 where the theoretical basis for the model is developed.

Regulatory risk disclosure is part of the overall financial reporting of a bank. It consists of mandatory elements, but banks are also free to disclose any additional information voluntarily. It is argued that the scoring model must consider both sides. The content of disclosure is a mix of quantitative risk figures and qualitative comments on risk exposures, and serves the purpose of informing market participants in every phase of their investment. The question of benefits of disclosure is again addressed in the recommendation for further research, as the model can provide empirical input for the analysis of relationships such as disclosure and cost of capital or liquidity.

2.2.5 Theories on Disclosure

This section of the literature review summarises the theories that help to explain the reasons for disclosure in general and for risk disclosure in particular. Literature on agency theory (Jensen & Meckling, 1976) and how it is impacted by disclosure is reviewed in a separate section (2.2.6) due to its importance as the underlying theory of this research.

Khlif & Hussainey (2016) identify two schools of thought when analysing the reasons for disclosure. One strand is best described by the social/political

theory approach, and the other one by the economic theory approach. Figure 7 contrasts these two schools of thought and categorises the individual theories.

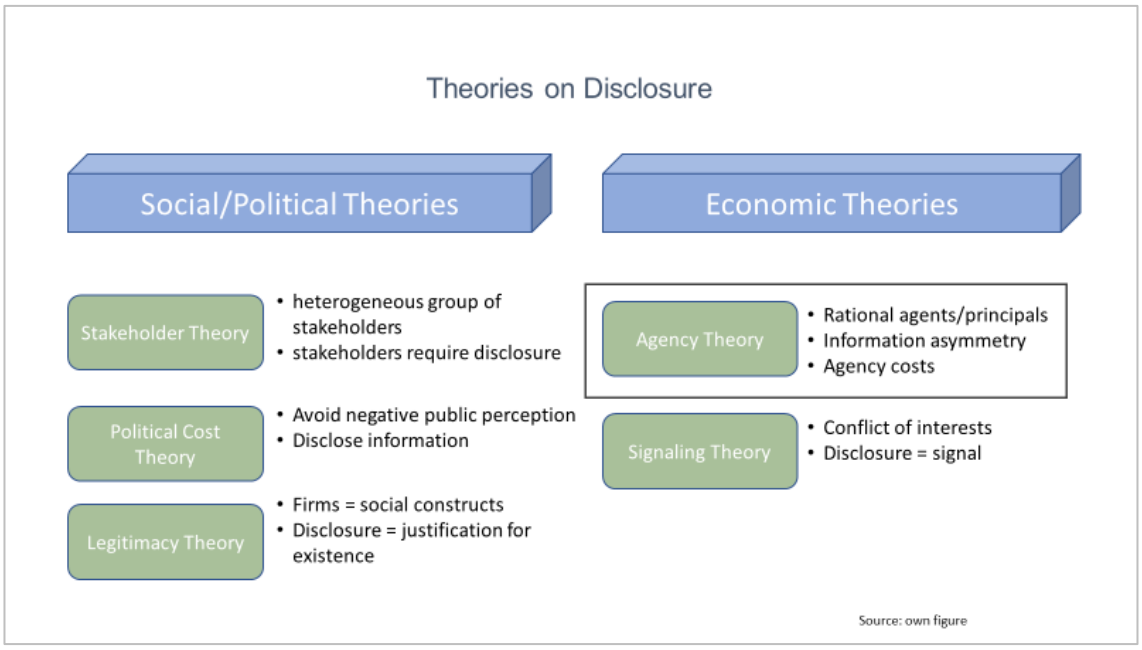

Figure 7: Theories on disclosure

Social/political theories on disclosure focus on the social and political relationships between a firm and its stakeholders in the society to understand the motivations of risk disclosure and the communication methods used.

Economic theories on disclosure rely on self-interest and profit maximization of economic agents. These theories study the individual behaviour of firms and their nature. They assume that risk information is disclosed only if individual economic benefits can be achieved (Khlif & Hussainey, 2016).

Stakeholder theory is social/political theory explains the dynamic and complex relationships between an organisation and its environment (Gray, 2014). Firms are assumed to be aware of the many different interests of their heterogeneous groups of stakeholders and their information needs. Stakeholders will request as much information as possible which they need for their own decision-making. It is the challenge of firms to balance their disclosure in a way that is to the benefit of the firm, but also to its various groups of stakeholders.

Political cost theory (Watts & Zimmerman, 1990) takes a strategic perspective on disclosure. A firm's capitalistic endeavour to maximise profits might attract unwanted attention and criticism from public institutions such as

media, politicians, or NGO's. In order to avoid negative headlines, firms might proactively communicate certain kinds of information that will put them in a brighter light and avoid political costs in the form of negative press or public sentiment.

Legitimacy theory (Tapan, 2019) views firms in a permanent struggle to justify their societal existence. The legitimacy of firms' existence is derived from a social contract with society that requires them to act in accordance with certain accepted social norms. If firms violate this social contract through their misbehaviour, they need to redeem themselves by disclosing additional information to make up for the loss in societal trust.

In the context of social/political theories, external factors such as the governance, the legal system and regulation, uncertainty avoidance, and industry are analysed for their impact on disclosure (see sections 2.2.7.5 to 2.2.7.8).

Signalling theory and agency theory fall both into the category of economic theories. Typical determinants of this stream of theories are the analysis of the impact of firm-specific (internal) factors such as corporate size, leverage, profitability and risk factors on disclosure (see sections 2.2.7.1 to 2.2.7.4), factors that are of high relevance for the development of the scoring model as well.

Signalling theory, originally developed in evolutionary biology, examines the communication between individuals with conflicting interests, a situation which is familiar to the relationship between a firm and market participants. Spence (1973) transfers signalling theory into the economic context. The theory draws on the positive/negative and honest/dishonest "signals" a firm's managers send to the investors with the information communicated. The theory assumes that managers have a certain purpose in mind when they are disclosing information. In good times they wish to demonstrate their success, in bad times their ability to handle the crisis. However, the signals do not necessarily have to be true and must therefore be taken with care.

The second economic theory is agency theory. Agency theory is the foundation of the regulatory risk disclosure scoring model. Therefore, the next section reviews literature on this theory with a special focus on its specific relevance for disclosure and the banking industry.

2.2.6 Disclosure and Agency Theory

2.2.6.1 Overview

Agency theory draws on different aspects of property rights, agency costs and the construct of a firm itself. It recognises that a firm is simply a legal fiction that serves as a nexus for contracts between various stakeholders such as owners, managers, employees but also customers, suppliers and governments (Jensen & Meckling, 1976). Regularly, the interests of each group are brought into equilibrium by normative actions such as bilateral contracts. Various forms of contracts are entered into to formally define the work requirements and compensations (Jensen, 1998). Above the normative aspects there also exist informal agreements and disagreements of how collaboration should be organised. Agency Theory focuses on these informal relationships and the consequences of sub-optimal performance (Fama, 1980).

The split in owner and manager roles is at the core of agency relationships. An agency relationship is defined as:

"a contact under which one or more persons (the principal(s)[3]) engage another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent." (Jensen & Meckling, 1976)

Agency theory assumes that both the principal and the agent act rationally as postulated in the Efficient Markets Hypothesis (Fama, 1970). This means that in their relationship they both try to maximise their utility. It becomes apparent that the agent therefore will not necessarily always act in the interest of the principal and vice versa (Figure 8).

An agent who maximises his own wealth does so at the expense of the principal's wealth. In order to reduce this conflict of interest, the principal as well as the agent can take costly actions to help to align the interests of both (Cuevas-

[3] „Principal" refers in the context of Agency Theory to the legal owner of a firm who is entitled to receive proceeds such as dividend payments but also bears the risk of the firm's failure.
„Agent" refers to the manager hired to manage the firm on behalf of the principals (Jensen & Meckling, 1976).

Rodríguez et al., 2012). Such actions can result in pecuniary costs such as bonus payments or share options. They can also be non-pecuniary costs such as a fancy office, friendship, or discipline. Principals are willing to accept these costs as long as the benefits in wealth creation exceed the costs.

The alignment attempts can be categorised into actions that are initiated by the principals and those initiated by the agents of a firm.

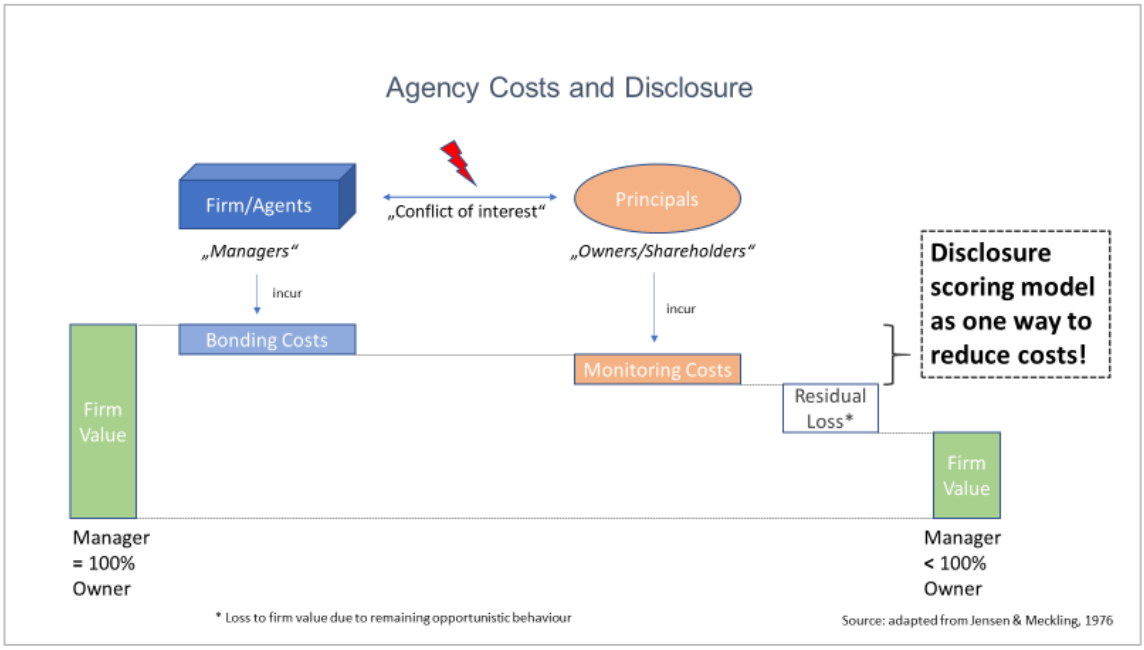

Figure 8: Agency costs and firm value

Figure 8 depicts the conflict of interest between the firm's agents and the principals, shows how the different forms of agency costs reduce firm value, and locates the disclosure scoring model in the conceptual framework of agency theory.

Monitoring costs are incurred whenever principals demand a scheme that observes and measures the performance of agents with the goal of making them act in the interest of the principals. Monitoring schemes appear in many different forms such as regular risk and profitability reports, budget restrictions or certain operating rules (Chakravarty & Grewal, 2016). A good example for monitoring are the banks' regulatory risk disclosure reports that constitute the basis for the disclosure scoring model developed in this thesis.

Monitoring activities are not restricted to principals. With increasing public interest in corporate well-behaviour, the influence of other external stakeholders

rises. Organisations such as standard setters (BCBS), banking regulators (e.g., ECB, Bank of England[4]) and accounting boards (IASB) suggest guidelines and introduce regulations that monitor the economic behaviour of firms in the public interest and therefore align the interests of different stakeholder groups not limited to principals (EBA, 2020). Firms are required to follow financial accounting rules (IFRS, local GAAP), are recommended to implement good corporate governance, and prepare non-financial reports (see section 2.3). In the case of banks, they must also adhere to the requirements of regulatory risk reporting (CRD IV/CRR) that defines the legal framework for the scoring model development (European Parliament, 2013b).

Agents can have an interest themselves in demonstrating that they are acting in the best interests of principals. So-called *bonding* activities are promises and guarantees to the principals for a certain behaviour, informal meetings for lunch or additional presentations of financial and non-financial information (Chakravarty & Grewal, 2016). Often, such bonding activities are of voluntary nature. But again, all bonding costs incurred use financial resources of the firm that reduce the total value of the firm as long as there is no positive offsetting wealth effect from conflict alignment.

Besides monitoring and bonding expenditures, Jensen and Meckling (1976) find a third category of potential value reduction of a firm as a result of the separation of principal and agent roles. Even if monitoring and bonding expenditures are at their optimal level one cannot be sure that there is no divergence between an agent's and a principal's decision for maximizing firm value. Jensen and Meckling call this divergence cost the *residual loss* that remains, despite attempts to align conflicting interests with other means.

In summary, monitoring in the form of public regulation and bonding in the form of voluntary disclosure comes at a cost to the principals of a firm. Ultimately, any costly action taken by principals or agents destroys firm value and the cost must ultimately be borne by the principals. Therefore, principals have a vital interest in keeping the agency costs low as long as the wealth creation through a reduced conflict of interest exceeds the costs (Chakravarty & Grewal, 2016). Enhanced disclosure on risk is generally seen as one suitable way of solving the

[4] Together with the Prudential Regulation Authority (PRA) and the Financial Conduct Authority (FCA)

conflict of interest (Basel Committee on Banking Supervision, 2015). In this thesis it is argued that the provision of higher quality risk disclosure has a positive effect on the agency relationship. Therefore, various stakeholder groups including principals have an interest in achieving a high quality in risk disclosures that lead to further wealth creation. For their decision making, stakeholders need a tool such as the disclosure scoring model developed in this thesis that empirically measures disclosure quality.

2.2.6.2 Criticism on Disclosure and Agency Theory

Agency theory is often seen as being too positivistic in its assumptions. The theory assumes that agents and principals act rationally on information (Fama, 1970) and in a bureaucratic way (e.g., regulatory risk disclosure reports "describe" the corporate reality) (McAuley, 2014) where "form fits function" (Donaldson, 1996). This positivistic view raises criticism which is of high relevance for the development of the disclosure scoring model. The criticism revolves around the question whether it is fair to assume a (fully) rational behaviour of firms' managers and investors in risk disclosure.

Sanders & Carpenter (2003) and Pepper & Gore (2015) challenge agency theory by developing a "behavioural agency theory" where non-rational, subjective behavioural components such as the agents' motivation, risk averseness and time preference are viewed as equally important to solving the agent-principal conflict as aligning the interests through technical monitoring and compensation schemes. The agents' motivation to disclose information or even not to disclose information has an impact on the content of disclosure and must be taken into account when analysing and evaluating disclosure reports through a scoring model.

Other academics challenge agency theory by pointing out that the theory is limited to a rather reductionist agent (manager) – principal (owner) relationship and it produces an "under socialised" view of agents and principals (Lubatkin, 2007). Agency theory is said to neglect other stakeholders that make up the world of corporate governance such as taxpayers, employees and society as a whole. Wiseman, Cuevas-Rodríguez & Gomez-Mejia (2012) suggest a compromise in defence of agency theory by arguing that "agency theory's flexibility allows for its application to a variety of non-traditional settings". They suggest extending

agency theory to diverse settings using a deductive approach. This can be accomplished by formally recognizing and incorporating the institutional context surrounding agent-principal relationships into agency-based models that include other stakeholders as well (Pepper & Gore, 2015).

A practical application for this “institutional context” are the BCBS guidelines on risk disclosure that form the basis for the disclosure scoring model (Basel Committee on Banking Supervision, 2015). The BCBS explicitly states that the addressees of the Basel III pillar 3 disclosure reports are the “market participants” e.g., the investors, but also supervisory authorities, rating agencies and other interested parties.

In summary, the overview of theories in the previous two sections (2.2.5 and 2.2.6) shows that there are several theories that attempt to explain the disclosure policy of a firm from different perspectives. The theories share the finding that disclosure is an important tool to enhance the relationship between firms and stakeholders and reduce potential conflicts of interest through better information-sharing. For the development of the scoring model, it is important to understand that disclosure reports are not only a factual tool to communicate risk exposures but serve many different purposes driven by the interests of diverse groups of stakeholders. The quality of disclosure reports and how it is perceived therefore often depends on how well the reports address the subjective needs of an individual or a societal group. In consequence that means that a scoring model on disclosure must incorporate objective quantitative but also subjective qualitative elements when measuring disclosure quality.

2.2.7 Determinants for Disclosure Level and Quality

A large number of studies can be found in the literature on the determinants of risk disclosure. The findings are discussed in this section as they have an immediate impact on the development of the disclosure scoring model and the control variables used in the model. In the context of this thesis, “risk disclosure determinants” are factors that influence the disclosure policy of a bank and as a consequence also the content of disclosure reports. For instance, the factor “industry” might have an impact on the level of disclosure. Banks are eventually more likely to disclose information on risk than manufacturing firms because banks operate in the financial industry. The literature review first critically analyses the research on internal disclosure determinants (see section 2.2.7.1 to 2.2.7.4) before it moves on to external disclosure determinants (see sections 2.2.7.5 to 2.2.7.8), and finally consolidates the impact of the determinants on the disclosure scoring model.

Figure 9 summarises the determinants identified in the literature and maps them to the internal and external categories.

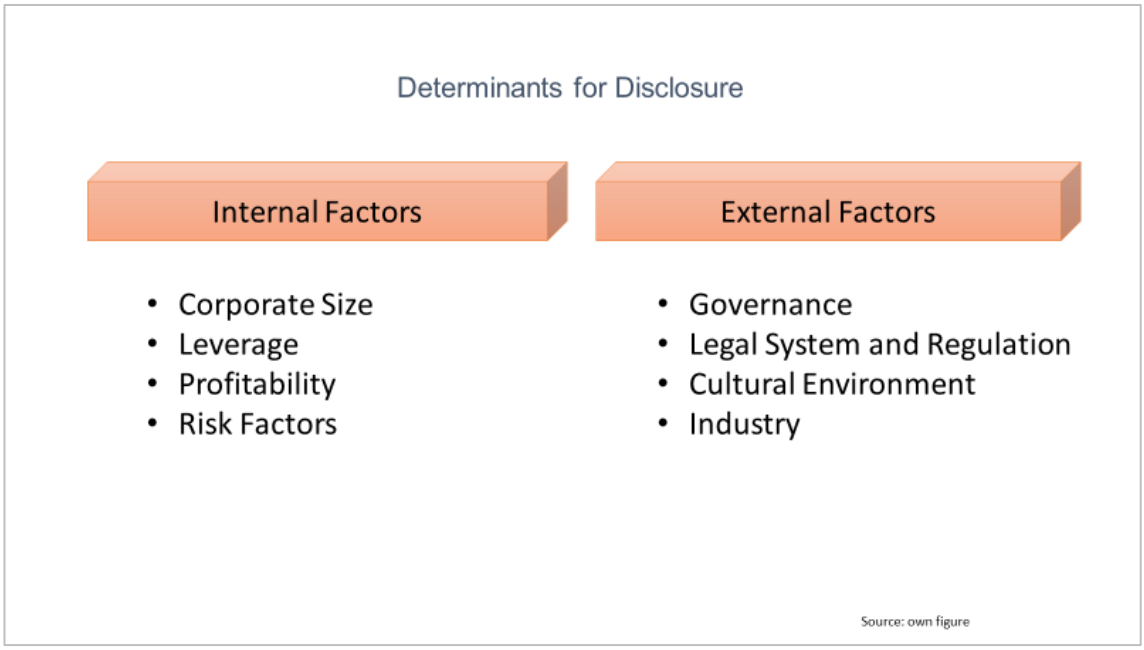

Figure 9: Determinants for disclosure

Internal factors have their roots within the firms whereas external factors are found in the external environment of a firm.

2.2.7.1 Corporate Size

Several studies on the determinants of disclosure identify corporate size as a driving force behind the amount of disclosure. Deumes & Knechel (2008) and Elzahar & Hussainey (2012) find that large firms run more complex and sophisticated operations that often result in higher risk levels. This in turn leads to a higher information asymmetry as explained by agency theory (Jensen & Meckling, 1976). Consequently, the information needs of investors rise and firms must spend more on disclosure. Deumes and Knechel also identify other reasons for the impact of firm size on disclosure. The higher visibility of large firms in the economy results in increased public interest. Furthermore, due to corporate size, more resources are available to prepare disclosure reports compared to smaller firms. Elzahar and Hussainey suggest that "…regulators may wish to allow firms some flexibility in their internal control reporting choice, as firms take a broad approach to internal control that goes beyond Sarbanes-Oxley act-based regulations, and tailor their internal control reports to suit their specific environments" (Elzahar & Hussainey, 2012).

Corporate size is also an important issue in regulatory risk disclosure. Often, disclosure rules are eased for smaller banks and subsidiaries. For instance, Art. 13 CRR says that only EU parent institutions must comply with the disclosure regulations on a consolidated basis (European Parliament, 2013b). Significant subsidiaries of EU parent institutions and those subsidiaries which are of material significance for their local market must disclose only a reduced amount of information.

Contrary to the findings on the impact of corporate size above, Handley-Schachler (2009) does not find a significant relationship between firm size and the amount of disclosure. He explores the disclosure practice of 52 UK listed companies in three different years around the millennium. He finds that only UK/US dual listings and involvements in heavy industry are positively correlated with the amount of disclosure, but not firm size in general.

2.2.7.2 Leverage

Elzahar & Hussainey (2012) examine the determinants of narrative risk information in interim reports of 72 UK companies. Besides corporate size, they

also analyse the impact of leverage on the level of disclosure. The leverage ratio measures the proportion of debt and equity in a firm's balance sheet (Saunders, 2017). Firms with higher leverage ratios tend to be riskier due to the higher perceived default risk on debt. Consequently, investors require more disclosure from higher-leveraged firms for evaluating their investment risk.

The study of Dobler, Lajili, & Ze (2011) observes that risk disclosure quantity is positively correlated with firms' leverage ratios, although this observation is true for the US only. They do not find such a positive relationship in Germany where the amount of disclosure is negatively associated with the leverage ratio.

Elzahar & Hussainey (2012) show contradicting results. Although they find that investors' monitoring costs rise with higher leverage ratios, they do not find a significant relationship between leverage and disclosure level. A similar observation of non-significance is made in the studies of Handley-Schachler (2009) and Abraham & Cox (2007).

2.2.7.3 Profitability

Some research papers see profitability as a determinant for risk disclosure, although findings are again mixed. Researchers find good arguments for more disclosure in cases of high, but also of low profitability levels. Elshandidy, Fraser, & Hussainey (2013) argue that managers prefer more disclosure in periods of higher profits as they are happy to signal to the market their successful management skills. Managers also want to assure investors that they can sustain high profitability levels in the future. Firms characterised by higher risk-adjusted returns and lower levels of stock return variability are likely to exhibit significantly higher levels of aggregated and voluntary risk disclosures. Furthermore, firms with greater compliance with mandatory regulations have a greater probability to make additional voluntary risk disclosures (Elshandidy et al., 2013).

In cases of low profitability or even loss-making times, the interest in more risk disclosure shifts from managers to investors. Douglas (1994) finds that bad performance forces managers to increase the amount of disclosure as investors are worried about their investments and the future of the firm. Douglas observes large stock price declines on days with negative earnings announcements and notes that shareholders are more likely to enter legal action if adverse information is not disclosed promptly and explained in detail. He also observes reputational

damage to managers once professional money managers or security analysts get the impression that managers appear to delay disclosure of bad news.

2.2.7.4 Risk Factors

Risk means uncertainty to the investors (Jorion, 2007). According to the Capital Asset Pricing Model (CAPM) rational investors attempt to limit uncertainty to their predefined risk appetite (Sharpe, 1964). In the banking industry frameworks such as the Basel III guidelines (Basel Committee on Banking Supervision, 2006b) and legal regulations such as the EU CRD IV/CRR (European Parliament, 2013b) limit the risks banks may take on their balance sheets. The banking guidelines and regulations identify a number of risk factors such as credit and market risks, but also operational and liquidity risks. The complete list of risk factors relevant for the regulatory risk disclosure model is analysed in section 4.3.4 Content Overview on Risk Disclosure in the CRR.

Miihkinen (2011) finds a positive relationship between risk factors and risk disclosure. He finds that information asymmetry increases with higher risk exposures in several risk factors, and the need for more risk disclosure coincides with a reduction of the information gap. He analyses the impact of the introduction of a new and detailed Finnish risk disclosure accounting standard on the disclosure policies of listed Finnish firms. Miihkinen notes that national regulatory bodies were able to raise the quality of risk disclosure on several risk factors. Furthermore, the amount of risk disclosures increases when more comprehensive disclosure on risk factors is required in a risk disclosure accounting standard. However, he does not find a corresponding increase in quantitative disclosure on risk factors such as Value-at-Risk (VaR) as their disclosure is not required in the accounting standard.

2.2.7.5 Governance

Turning to literature on external determinants of disclosure, corporate governance is “the system by which companies are directed and controlled. Boards of directors are responsible for the governance of their companies….” (Financial Reporting Council, 2018). The UK Corporate Governance Code of 2018 recommends in Principle N that the “the board should present a fair,

balanced and understandable assessment of the company's position and prospects" and in Principle O that the board should "… establish procedures to manage risk" (Financial Reporting Council, 2018). Several studies analyse whether a tighter governance regime leads to more disclosure.

Abraham & Cox (2007) analyse the significance of governance functions such as number of executive directors, dependent non-executive directors, and independent directors, for the level of risk disclosure. They assume that board separation into various roles can reduce agency problems and therefore lower the agency costs of a firm for meeting disclosure requirements. Abraham and Cox find that both the number of executive and the number of independent directors is positively correlated with the amount of corporate risk disclosure. However, they do not find the same positive relationship for dependent non-executive directors. Abraham and Cox conclude that independent and/or executive directors are beneficial for more disclosure as recommended in the Principle N of the UK Corporate Governance Code (Financial Reporting Council, 2018).

The study of Bhasin, Makarov & Orazalin (2012) confirms the findings of Abraham & Cox (2007). Bhasin et al. examine the impact of voluntary disclosure in the banking sector with respect to corporate governance issues. They include governance factors such as board size, board composition as well as bank size and bank maturity in their analysis. They find that the number of outside (independent) directors and bank size have the most significantly positive impact on the amount of disclosure.

2.2.7.6 Legal and Regulatory Environment

The legal and regulatory environment for financial reporting depends on the rules and regulations developed by national and supranational lawmakers and standard setters (Rutterford, 2006). Although the environment differs from country to country (or supranational bodies), two general financial reporting models can be distinguished.

The Anglo-American model is shared by countries where common law is prevalent (Rutterford, 2006). This model seeks to present a "true and fair" view of the company's assets and liabilities. It measures the financial performance

from the point of interest of the shareholders. Financial positions are frequently revalued to their fair value and fluctuate with market developments.

The Franco-German model is guided by a more conservative reporting approach where primarily the interests of creditors are protected. This model is widely applied in countries where the legal system is based on Roman civil law (Rutterford, 2006). In the financial statements, assets and liabilities are carried at historical cost, and the financial performance is based on the realisation principle.

The financial reporting regime has an impact on disclosure and the disclosure scoring model. The need for regular disclosure is seen as more important in environments where earnings are more volatile. This is the case in the Anglo-American model due to frequent mark-to-market revaluations of the financial position and performance. In the Franco-German environment where the financial position and performance of firms changes less frequently as a result of the historic cost approach, regular disclosures are of lesser importance (Rutterford, 2006).

The impact of the legal system on disclosure policies is examined in a cross-country study prepared by Dobler, Lajili & Ze (2011). By analysing annual reports from 160 manufacturing firms across the US, Canada, UK, and Germany the study finds that in terms of quantity of risk disclosure, US firms generally dominate with the highest amount of disclosure. Despite Germany being a civil law country, it takes second place in the quantity of disclosed information. In the special case of environmental risks, UK firms disclose the highest amount of information. However, Dobler et al. can only partly link the cross-country variation in risk disclosure quantity to domestic legal systems. They note that besides the legal and reporting environment, local incentives for risk disclosure also play an important role.

Elshandidy, Fraser & Hussainey (2015) examine the drivers of mandatory and voluntary risk reporting across Germany, the UK, and the US. They find that the proportion of mandatory versus voluntary disclosure quantity differs significantly across these three countries. German firms operating in a traditionally civil law environment tend to disclose more information mandatorily and less voluntarily. In the UK, a traditionally common law country, firms disclose more information voluntarily than mandatorily. Furthermore, Elshandidy et al. note that the findings in their study are not fully consistent with theory. By

comparing US firms with German firms, the latter tend to disclose more information voluntarily despite residing in a civil law country. They conclude that the distinction in mandatory and voluntary disclosure does not only depend on the legal and regulatory reporting environment, but must also be seen from the systemic risk and cultural values environment of a country (Elshandidy et al., 2015).

2.2.7.7 Cultural Environment

Disclosure decisions are usually embedded in a specific cultural environment. In his pioneering research, Hofstede (1980) collects structural elements that together describe the culture of a nation. He focuses on elements that strongly affect the behaviour of organisations and institutions in a country and differentiates it from others. Originally, Hofstede identifies individualism/ collectivism, masculinity/femininity, power distance and uncertainty avoidance as significant cultural elements. Hofstede later added long-term orientation and indulgence/self-restraint to the list.

The decision to disclose a certain content is influenced by all elements, although uncertainty avoidance is seen as the dimension with the highest material impact (Wong, 2012). Uncertainty avoidance is defined as a society's tolerance for uncertainty and ambiguity (Hofstede, 1980). Wong's research shows that European cultures score high on avoiding uncertainty whereas the US is on the other end of the scale with a high tolerance level on uncertainty. Wong finds that firms operating in cultures with high uncertainty avoidance (e.g., Europe) disclose less risk information as they try to avoid possible conflicts, restrict uncertainties of competition, and preserve security. Interestingly, countries with high uncertainty tolerance (e.g., the US) are open to more risk disclosure as transparency is seen as a tool to reduce potential uncertainty.

A detailed analysis[5] of uncertainty avoidance reveals that there are also substantial differences among European countries. Figure 10 summarises the uncertainty avoidance scores for France, Germany, and the United Kingdom, and adds the US for comparison reasons.

[5] Source: https://www.hofstede-insights.com/country-comparison/germany,france,the-uk,the-usa/, accessed May 2020

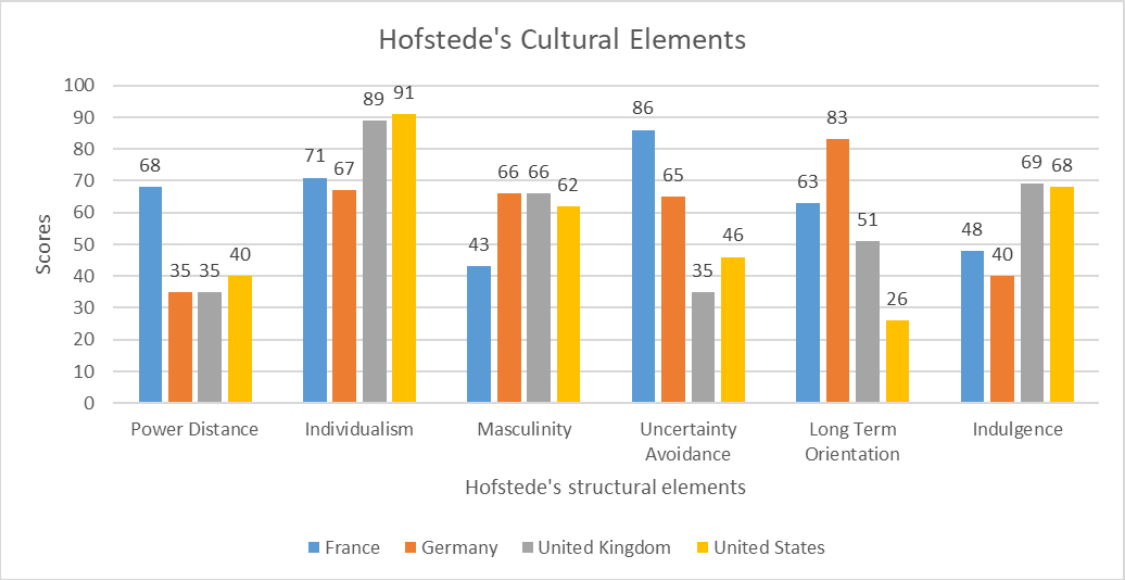

Figure 10: Hofstede: uncertainty avoidance in Europe

Following the research findings of Wong (2012) firms from France with a high score of 86 on uncertainty avoidance (fourth block from the left) are expected to disclose more information than their peers from Germany (score 65) and the UK (a low score of 35). The results of the disclosure scoring model on disclosure quantity will show whether Wong's (2012) observation holds in the context of regulatory risk reporting.

2.2.7.8 Industry

Beretta and Bozzolan (2004) suggest “industry” as a key external factor that influences the amount of disclosure of a firm. In their study they find that the amount and content of disclosure tend to become similar within an industry. The dominant firms set the disclosure standards, and other firms follow suit in a way they call the “bandwagon effect”. Beretta and Bozzolan argue that stakeholders are primarily interested in the relative ranking of a firm within an industry and less in its absolute position. Furthermore, investors use disclosure reports as a tool that supports them in comparing the performance and the risk across firms in an industry. The comparability analysis is facilitated by similarly structured disclosure reports. Firms are aware of this fact and prepare their disclosure reports accordingly (Beretta & Bozzolan, 2004). Besides the industry factor, Beretta and Bozzolan also note that shared business models and risk exposures lead to similar report structures.

Khlif & Hussainey (2016) support the observation from Beretta and Bozzolan (2004) of the bandwagon effect in an industry. With respect to the banking industry, they note that this industry is a highly regulated one compared to other industries. The shared regulatory environment implies that disclosure reports of banks tend to become similar. From the perspective of the factor “banking industry” the variation of disclosure levels among banks is expected to be rather low.

2.2.7.9 Summary

The literature review in this section reveals that a large number of determinants of disclosure are analysed in several studies that potentially have an impact on the amount and content of disclosure. The determinants of disclosure can be divided into internal and external factors. Internal factors are related to firm-specific properties and are therefore likely to influence disclosure directly, whereas external factors are more of general nature and impact disclosure levels only indirectly.

Research results on internal factors are mixed and arguments can be found for and against potential impacts on disclosures. No general consensus on a final set of factors has yet been found. Still, “company size” was identified in the studies as a rather strong factor. Results on “leverage” are contradicting, and the findings on “profitability” support both sides of the disclosure argument. There is evidence that the number of “risk factors” makes a positive impact on disclosure levels. Therefore, company size and number of risk factors are taken into closer consideration in the further development of the disclosure scoring model.

External factors relate to macroeconomic issues and are indirectly taken into account in the scoring model development. Research on “governance” shows that this factor makes a general impact on disclosure, depending how strictly governance codes are applied. The factor “legal system and regulation” also makes a difference depending on where the firms are headquartered. The “cultural environment” shows strong variation in uncertainty avoidance across European countries, an observation which is possibly reflected in scoring model results. “Industry” was found as a decisive factor between different parts of the economy. The scoring model takes these macroeconomic factors into account by focusing on a homogeneous basis for model testing and sample selection. The

relevant “industry” for the model is the banking industry only. The legal and regulatory environment is the EU CRD IV/CRR framework which is applicable to all banks in the sample. Should the scoring model be applied to a wider sample of firms, then more macroeconomic factors should be integrated in the scoring model.

2.3 Risk Disclosure and the EU Regulatory Environment

2.3.1 Status of Risk Disclosure Research

Beyer et al. (2010) present a cross-sectoral review of the corporate information environment. The study summarises the state of the mandatory and voluntary reporting environment and raises many open questions in disclosure research of which developing scoring models for measuring disclosure quality is one of them. They see the main benefit of disclosure in supporting (1) disclosures mandated by regulators, (2) managers' voluntary disclosure decisions, and (3) reporting decisions by analysts.

On the *mandatory* disclosure side including regulations and frameworks such as Basel III, IFRS or US-SOX, Beyer et al. (2010) note that so far there is no clear empirical evidence on the (positive) effects of regulation. It is still unclear what the triggers for changes in the regulatory regime are, whether regulation addresses the observed failures in financial markets, what the regulators' objectives and incentives are, and what the overall costs of regulation to the economies are.

On *voluntary* disclosure decisions, Beyer et al. (2010) emphasise three aspects that need further research: how voluntary disclosure is perceived depends on how investors interpret the disclosure made; management and not the "firm" makes the disclosure decisions therefore the management's utility curve must be considered; and incentive systems derived from agency theory are not only relevant for managers' compensation but also for other decision-making processes such as investment allocation, capital structure and competitive behaviour.

On disclosures made by *analysts*, Beyer et al. (2010) acknowledge the importance of the analysts' roles as mediators between firms and investors and as market participants who use and provide information at the same time. For a firm making a disclosure decision, it is crucial to research which content analysts look for in disclosure reports for writing their forecasts, how they decide to cover a firm and how the financial markets react to their output.

Beyer et al. (2010) clearly identify a research gap in the context of agency theory. They argue that theoretical models based on agency theory are "abstract representations" of a complex corporate information environment and the

challenge is to develop new models (such as the regulatory risk disclosure scoring model in this thesis) that produce “insights into practice” and that inform empirical studies if the proxies selected for quality measurement reflect the key challenges faced by managers.

2.3.2 Risk Disclosure Regulation in the European Union

Rules and regulations for risk disclosure in the banking industry can be found in several guidelines and legal documents. It depends on the purpose of the rules and regulations which kind of disclosure is recommended or required (Becker et al., 2012). Traditional sources of disclosure in the banking industry originate from banking regulation (CRD IV/CRR in the EU), International Financial Reporting Standards (IFRS), corporate governance, non-financial (ESG) reporting, and listing requirements of stock exchanges (for a summary of financial and risk disclosures see Table 1). Disclosures are made through regulatory reports, annual reports, governance and ESG reports, and securities prospectuses (Beyer et al., 2010). In recent years, non-financial disclosures covering environmental, social and governance issues gained importance in addition to financial disclosures (Refinitiv, 2019). Firms are increasingly viewed as “corporate citizens”. To become a good corporate citizen, it takes not only financial success and tax payments, but also social and environmental awareness as well as a good corporate governance (Ali et al., 2017).

Table 1 summarises the disclosure regime in the EU. It includes the four binding EU directives that are most relevant for disclosure in general (regulatory reporting, financial reporting, reporting on securities trading, reporting on corporate social responsibility). Corporate Governance Codes (CGC) of the UK and Germany are added to the table due to their importance for disclosure. CGC are not legally binding (“comply or explain approach”) and are still a national issue in the EU. The table reflects the applicable laws as of June 2020. The row “Regulatory Reporting (Banking)” is highlighted as it represents the basis for the regulatory risk disclosure scoring model developed in this thesis.

Subject	Name of EU Directive/Regulation	EU Directive/ Regulation
Regulatory Reporting[6] (Banking)	Access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms (CRD IV). Prudential requirements for credit institutions and investment firms (CRR)	Directive 2013/36 Regulation (EU) No 575/2013
Financial Reporting (IFRS)	Annual and consolidated accounts of certain types of companies, banks and other financial institutions and insurance undertakings. Annual financial statements, consolidated financial statements and related reports of certain types of undertakings.	Directive 2003/51 Directive 2013/34
Corporate Governance Codes	UK, latest version July 2018 Germany, latest version February 2017	www.frc.org.uk www.dcgk.de
Securities Trading	Harmonisation of transparency requirements in relation to information about issuers whose securities are admitted to trading on a regulated market	Directive 2004/109/EC
Corporate Social Responsibility (CSR)	Disclosure of non-financial and diversity information by certain large undertakings and groups	Directive 2014/95/EU

Table 1: Disclosure regime in the EU

[6] Basis for the development of the regulatory risk disclosure model in this thesis.

2.3.3 Transparency in Regulatory Reporting

The regulatory risk disclosure scoring model builds on the regulations on regulatory risk reporting. Therefore, the largest part of this section is dedicated to this subject. Many of the banking regulations are first developed by the BCBS on a supranational level and are non-binding for banks ("recommendations/ guidelines"). In the case of Basel III, the guidelines are legally implemented in the EU in the form of the CRV IV/CRR legal package.

2.3.3.1 The Basel III Regulatory Reporting Framework

The Basel III regulatory reporting framework comprises three pillars that together form the requirements for prudent banking regulation (Becker et al., 2012). The Three-Pillar approach has long been discussed in a quest to define a good methodology for banking supervision, before in 2006 an agreement was reached that resulted in 25 Basel core principles for an effective banking supervisory system (Basel Committee on Banking Supervision, 2006a).

For the purpose of regulatory risk disclosure, principle 22 (accounting and disclosure) states that "supervisors must be satisfied that each bank … publishes, on a regular basis, information that fairly reflects its financial condition and profitability" (Basel Committee on Banking Supervision, 2006a).

Figure 11 shows the three pillars of Basel III. They include the "minimum capital requirements" (pillar 1), the "supervisory review process" (pillar 2) and "market discipline" (pillar 3). The three pillars are all interrelated (Becker et al., 2012). For the development of the disclosure scoring model, pillar 3 is of highest relevance as it consists of the guidelines on regulatory risk disclosure.

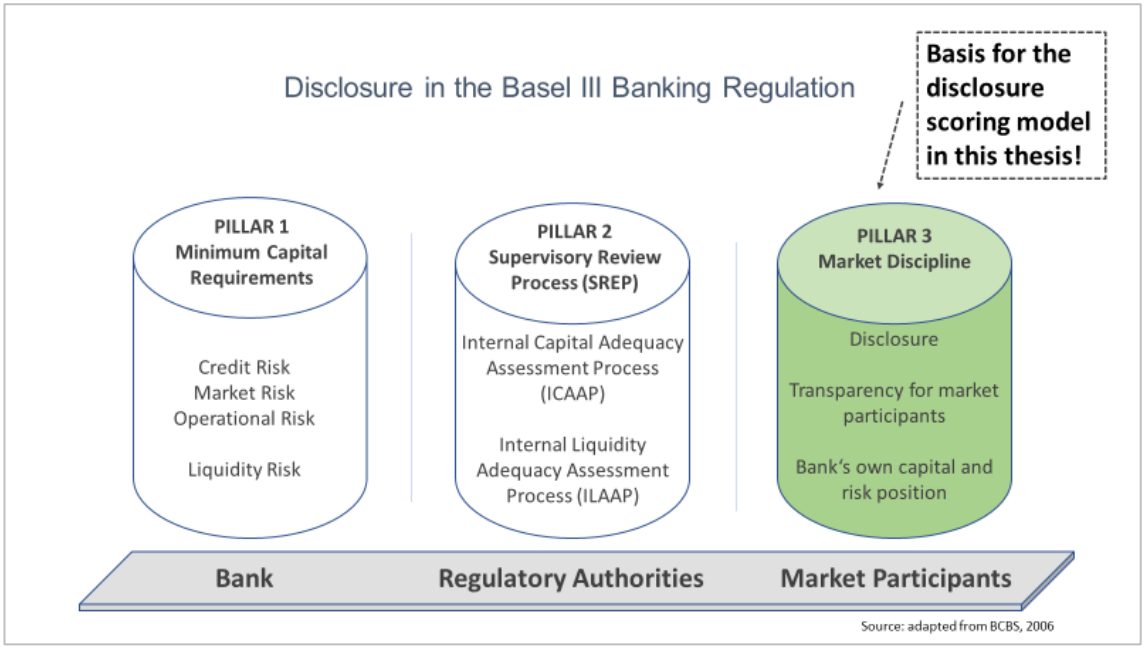

Figure 11: The pillars of Basel III banking regulation

Pillar 1 "minimum capital requirements" includes the rules for calculation of the minimum capital requirements which banks must hold to support their credit, market, and operational risks (Basel Committee on Banking Supervision, 2006a). For each position in an asset class, the risk-weighted asset (RWA) value is calculated by taking into account the exposure at default (EAD), loss given default (LGS) and the probability of default (PD). In a separate calculation, the eligible own funds' components (tier 1, tier 2) are added to result in the total available regulatory capital. Finally, the solvency ratio is calculated by dividing the regulatory capital by the sum of all risk-weighted assets (RWA). The ratio must not fall below a minimum level (Becker et al., 2012).

Pillar 2 "supervisory review process" outlines the supervisory review process SREP (Buchmüller, 2019). It recommends banks to develop and use better risk management techniques in monitoring and managing their risks (Cannata & Quagliariello, 2011). It also instructs bank supervisors how to perform a prudent supervision of banks. Supervisory authorities such as the European Central Bank (ECB), the Bank of England[7] or Germany's Deutsche Bundesbank are expected to evaluate how well banks are assessing their capital requirements relative to their risks, and to intervene when and where appropriate. Major

[7] Through the Prudential Regulation Authority (PRA) and the Financial Conduct Authority (FCA).

advances in pillar 2 were achieved in 2018 with the introduction of the Internal Capital Adequacy Assessment Process (ICAAP) and the Internal Liquidity Adequacy Assessment Process (ILAAP) (Buchmüller, 2019).

Pillar 3 “market discipline” includes the regulatory risk disclosure framework on which the scoring model developed in this thesis is built. This pillar includes recommendations for quantitative and qualitative disclosures (Andrae et al., 2018). Banks may follow these recommendations, but are essentially free to decide which and how much quantitative and qualitative information to disclose (Basel Committee on Banking Supervision, 2016). Banks must have a formal disclosure policy approved by the board of directors that addresses the bank’s approach for determining the disclosure content and the internal controls over the disclosure process. In addition, banks must implement a process for assessing the appropriateness of their disclosures, including validation of disclosed items and frequency of disclosures (Becker et al., 2012). For “assessing the appropriateness of their disclosures” banks need a model that supports them in their work. Beyer et al. (2010) raise the point that there does not yet exist a model that measures the quality of disclosures based on Pillar 3 and no further literature is yet available on this specific subject. Filling this research gap is one of the main aims of this thesis.

2.3.3.2 The Current Legal Status of Regulatory Reporting in the EU[8]

Building on the Basel III regulatory reporting framework published as a revised version in June 2011, the European Union introduced in 2013 the CRD IV/CRR legal package in order to complete the single market for financial services (European Banking Authority, 2018).

It comprises

- the CRD IV[9] (Capital Requirements Directive) 2013/36 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms (European Parliament, 2013a)

and

[8] As of June 2020

[9] EU directives do not unfold immediate binding effects on member states but need to be implemented in national laws by member states first.

- the CRR[10] (Capital Requirements Regulation) 575/2013 Prudential requirements for credit institutions and investment firms (European Parliament, 2013b).

The CRD IV/CRR legal package is the fourth set of amendments (Draghi, 2011) to the original banking directive (CRD) of 2006. It follows two earlier sets of revisions adopted by the Commission in 2009 (CRD II) and 2010 (CRD III) as a consequence of the financial crisis of 2008.

The overarching goal of the CRD IV/CRR package is to prevent financial capital and liquidity crises in the future by defining stricter prudential risk requirements for banks (Cannata & Quagliariello, 2011). The package requires banks to keep certain minimum capital reserves (measured by the solvency ratio) and sufficient liquidity (measured by the liquidity coverage ratio).

The *directive* CRD IV governs the access to deposit-taking activities in the EU (European Parliament, 2013a). It establishes rules on the corporate governance of banks, powers and responsibilities of national authorities (e.g., supervision, authorisation, capital buffers and sanctions) and requirements on internal risk management that are linked to national company laws (Becker et al., 2012).

The *regulation* CRR establishes the technical prudential requirements that financial institutions must follow (European Parliament, 2013b). It sets out the manifold rules for calculating capital requirements and reporting for credit, market, and operational risks, and for measuring liquidity requirements and reporting on them.

2.3.3.3 The Nature of Disclosure in the CRR

The CRR follows a mixed mandatory and voluntary disclosure approach (Andrae et al., 2018). Banks must disclose basic information on the composition of regulatory capital, risk management structure and processes, the risk exposures for credit, market and operational risks, and the capital adequacy. The disclosures on capital and risks are data-driven, but qualitative commentaries

[10] EU regulations are self-executing and do not require any implementing measures in member states. They are immediately legally binding and there is no room for national adaptations.

shall be added voluntarily where necessary for easier comprehension or whenever the bank sees a need to communicate its risk profile comprehensively (Enhanced Disclosure Task Force, 2012). In general, the CRR defines the structure of the disclosure reports and the key content. Banks are then flexible to choose how best to implement the requirements. In this thesis, it is argued that the disclosure scoring model will measure the quality of such implementations and highlight areas for improvements as supervisory authorities expect the banking industry to develop a “best practice” approach (Basel Committee on Banking Supervision, 2018). A recent market survey of the EBA (2020) concludes that still a wide quality range of disclosure reports exists and no standard has been reached so far.

2.3.4 Transparency in other Reporting Areas

Regulatory risk disclosure must be seen in the wider context of financial and non-financial disclosure (Berger, 2011). This section of the literature review summarises disclosure requirements from other sources such as financial accounting, and corporate governance reporting, and concludes that (1) regulatory risk reporting is embedded in a comprehensive disclosure policy of a bank and (2) there does not yet exist an overarching model for measuring the quality of the entire communication of a firm.

2.3.4.1 Transparency in Financial Accounting

For a long time, financial accounting has been the driver of corporate disclosure (Abraham & Cox, 2007). Several IFRS standards include the requirement or recommendation to disclose information to external stakeholders.

The non-binding IFRS Practice Statement 1 expects preparers of financial reports according to IAS 1 (financial statements) to add a management commentary that helps users “… evaluate an entity’s prospects and its general risks, as well as the success of management’s strategies for achieving its stated objectives” (International Accounting Standards Board, 2010).

The binding IFRS 7 (financial instruments) requires “disclosure of information about the significance of financial instruments to an entity, and the

nature and extent of risks arising from those financial instruments, both in qualitative and quantitative terms" (International Accounting Standards Board, 2016).

In 2015 the International Accounting Standards Board (IASB) decided that better communication in financial reporting is a central theme of the Board's work for the period 2017-2021 (International Accounting Standards Board, 2017). The IASB established the so-called Disclosure Initiative. This Initiative is a broad-based research project exploring how to make disclosures in financial statements more effective. The main objective of this project is to identify disclosure issues and develop new, or clarify existing, disclosure principles in IFRS Standards to "… address those issues and to:

- help entities to apply better judgement and communicate information more effectively,
- improve the effectiveness of disclosures for the primary users of financial statements and
- assist the IASB to improve disclosure requirements in Standards".

(International Accounting Standards Board, 2017).

In a first step the "disclosure problem" was identified. The three main concerns about information disclosed in general purpose financial statements are that

- there is not enough relevant information disclosed
- irrelevant information is included and
- information is communicated ineffectively.

The reason for these weaknesses is identified as a judgement problem. Comparable to regulatory reporting (Basel Committee on Banking Supervision, 2015), firms, auditors and regulators view the preparation of reports primarily as a compliance matter that can be met with technical tools. However, the IASB expects the preparers of disclosure reports to use judgement when evaluating the financial situation (International Accounting Standards Board, 2017). By 2019, the IASB had developed disclosure principles that form an important input for the development of quality criteria used in the disclosure scoring model (see section 4.4.2).

2.3.4.2 Transparency in Corporate Governance

A corporate governance code (CGC) is a “set of principles that emphasise the value of good corporate governance to long-term sustainable success” (Financial Reporting Council, 2018). Many countries have issued their own corporate governance code, so for instance the UK (Financial Reporting Council, 2018) or Germany (Deutsche Regierungskommission, 2017). There is no EU-wide directive in place that governs CSR.

CGC reports must be meaningful. This requires the discussion of how the principles are applied. A simple boilerplate reporting must be avoided. Furthermore, firms must explain which measures were taken to comply with the principles and what outcomes were achieved. High-quality reporting must include signposting and cross-referencing to those parts of the annual report that describe how the principles were applied (Financial Reporting Council, 2018).

With respect to disclosure the section “audit, risk and internal control” of the UK CGC is of high relevance to this thesis (Financial Reporting Council, 2018). Principles N states that “a fair, balanced and understandable assessment of the company’s position and prospects” should be presented. Principle O says that “the board should establish procedures to manage risk, oversee the internal control framework, and determine the nature and extent of the principal risks the company is willing to take in order to achieve its long-term strategic objectives” (Financial Reporting Council, 2018). Firms must disclose the role and responsibilities of the audit committee, the roles and responsibilities of its directors and state whether the directors consider that “…the annual report and accounts, taken as a whole, are fair, balanced and understandable, and provide the information necessary for shareholders to assess the company’s position, performance, business model and strategy.” (Financial Reporting Council, 2018)

The German CGC (Deutsche Regierungskommission, 2017) is quite different to the UK’s CGC as German corporate law requires firms to operate on a two-tier system made up of a management entity (“Vorstand”) and a separate supervisory entity (“Aufsichtsrat”). A full section of the German CGC relates to disclosure. Section 6 is dedicated to transparency and requires firms to treat all shareholders equally with respect to information. Firms shall “disclose to all shareholders, without undue delay, all material new facts that used to be made

available only to financial analysts and similar addressees” (Deutsche Regierungskommission, 2017).

2.3.4.3 Summary

The detailed discussion of regulatory risk disclosure in the EU and the overview of disclosure requirements found in other sources demonstrates that achieving transparency through disclosure is an important objective in many reporting fields. Research is quite advanced in defining the constituents of good disclosure, but as the literature review shows not much progress has been made on quality and impact measurement of disclosure.

For the development of the regulatory risk disclosure model, the basis is the CRD IV/CRR legal package focusing on banking regulation. However, it must be acknowledged that regulatory risk disclosure is an important, but only one part of the entire reporting agenda of a bank. This is a good reason why the recommendations for further research include one suggestion to develop an overarching disclosure scoring model where this scoring model can add much value (see section 7.4). Furthermore, it is important to compare the disclosure requirements from different sources. They share many conceptual similarities in particular when the question is raised about what quality criteria should be selected and applied to disclosure reports in the scoring model. The findings of this section of the literature review form an integral part of the development of the quality dimension of the scoring model (see section 4.4.3).

2.4 Measuring Disclosure Quantity and Quality

In this part of the literature review methods and techniques are analysed that are applied in similar studies to measure the quantity and quality of disclosure in various contexts. This literature review prepares the basis for selecting the measurement method and technique used in the regulatory risk disclosure scoring model.

2.4.1 Overview on Disclosure Measurement

A prerequisite for analysing the effectiveness of disclosure is the ability to measure disclosure quantity and quality (Beretta & Bozzolan, 2008). Several measurement approaches were suggested so far in the literature but none has become an industry benchmark (Hassan & Marston, 2010). The reason lies mainly in the fact that many of the approaches are single goal oriented, meaning that they serve one purpose well but cannot be easily generalised.

Hassan & Marston (2010) and Ibrahim & Hussainey (2019) categorise the different measurement approaches found in the literature. They differentiate between the *methods* of how the research object is treated and into the *techniques* applied to the research object (Figure 12). Before they come to a conclusion, they acknowledge that disclosure cannot be exactly measured as there is always some subjectivity involved. Still, although not perfect they note that proxies can be found that closely represent disclosure quantity and quality. Figure 12 summarises the methods and techniques where the methods are assigned to the direct or indirect group, the techniques to the content or linguistic based group.

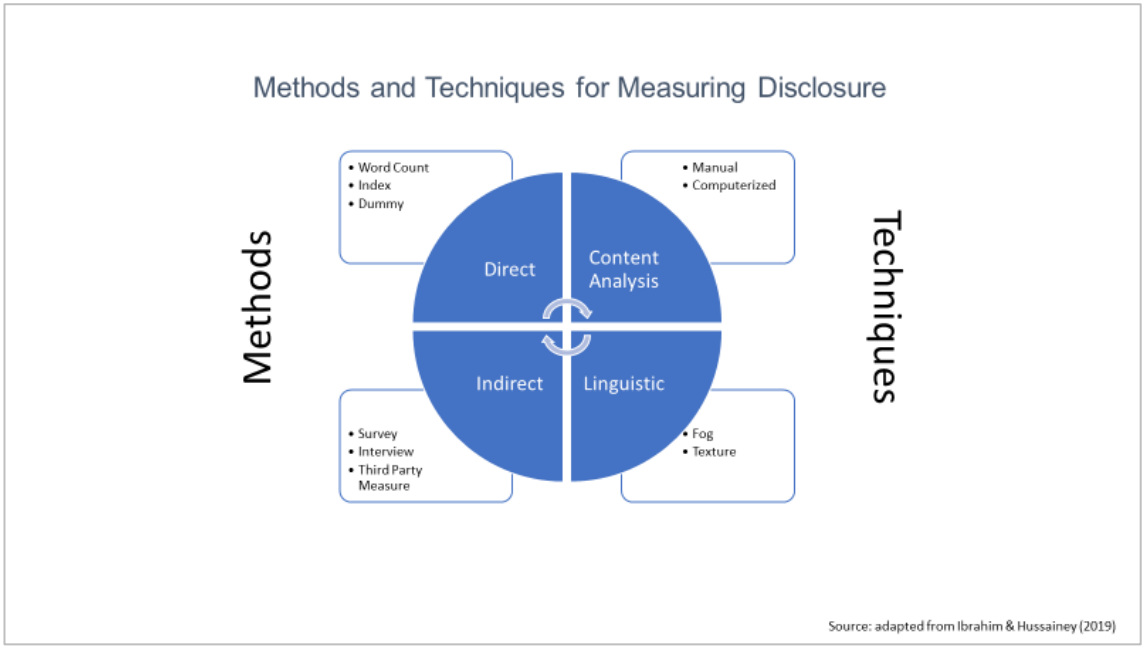

Figure 12: Methods and techniques for measuring disclosure

In disclosure research, the research object is the means by which disclosure is made (Hassan & Marston, 2010). The most common means are financial and non-financial reports such as regulatory risk reports (as it is the case in this thesis), annual reports or corporate governance/ESG reports (see in more detail sections 2.2.4.2 and 2.3.2).

Methodologically, the research object can be treated in two ways (left side in Figure 12). It can be examined *directly* by analysing the actual disclosure report. It can also be examined *indirectly* by surveying preparers and recipients of the reports on how they rate the report and how they perceive the content (Hassan & Marston, 2010).

The *direct* research method includes counting and evaluating disclosure relevant facts (words, sentences, paragraphs) in a report or calculating an index from a predefined framework that is applied to a report (Miihkinen, 2011). Also, less-complex methods can be found in the literature such as the use of dummy variables. A dummy variable is constructed in the form of whether for example some piece of information is disclosed or not.

The *indirect* research method makes use of recipients' perceptions and third-party information (deVaus, 2011). Reports are not analysed per se but peoples' perception of the reports is of interest in the research. Personal interviews are held with preparers and users, asking questions such as how the

quality of a report is rated. Also, surveys are conducted with a larger number of market participants asking standardised questions. Personal interviews and surveys have in common that the researchers are responsible themselves to collect the research data. In the financial industry there are also other data sources available for collecting data on disclosure. Several external information providers offer generic disclosure data and pre-calculated ratings that can be used by researchers in their work (Refinitiv, 2019).

The choice of the research *technique* (right side of the figure) is between analysing the *content* itself, or analysing the *linguistic* features of a text (Ibrahim & Hussainey, 2019). The decision on the form of *content analysis* is driven by questions of labour intensity, sample size, and precision (Krippendorff, 2004). Content analysis performed manually may lead to better and more precise results but is very labour intensive, and usually can be done once and only for small-sized samples (Elshandidy et al., 2018). Analysing content in a computerised way solves the problem of too small sample sizes as a large number of reports can be processed in a short time (Hall, 2013). The automated analysis also reduces the intermediate workload on the researcher as long as enough computational power is available. However, the programming process and the clear definition of disclosure coding rules upfront is a prerequisite and again labour and cost intensive.

Computational *linguistics* techniques are applied for measuring the properties of text (Li, 2008). For example, the well-known Gunning-Fog index (Gunning, 1952) with which readability can be measured has been applied in several disclosure studies (Ajina et al., 2016). Often, general linguistic techniques are adjusted for specific purposes. So in the case of analysing financial texts, the linguistic properties of the financial language are added (Li, 2008).

2.4.2 Direct Measurement Methods

2.4.2.1 Index Construction Method

The index construction method is a multi-step approach (Hassan & Marston, 2010). Before the quality index of a disclosure report can be constructed, the approach first requires the definition of a standard of expected risk disclosure outcomes. In a second step the content of actual disclosure

reports is benchmarked against this standard. The index then measures the extent of conformity of the disclosure report with the predefined standard (Hassan & Marston, 2010).

In a similar way, Ibrahim & Hussainey (2019) recommend the following three steps in the process of constructing the index. First a “checklist” of disclosure items must be compiled. This checklist requires careful consideration as it will strongly influence the validity of the resulting index values. In a second step, the actual reports are examined whether the items from the checklist are covered or not (binary approach) or to what extent they are covered following a defined coding scheme (ordinal approach). For each report, a checklist is completed, the matched items are evaluated, and a score is assigned to each of them.

The total index score can be calculated with two basic methods (Hassan & Marston, 2010). One method means adding up all item values and dividing them by the number of items (averaging method). The other method first requires the assignment of weights to each item (weighting method). Weights can be derived from expert estimations for example or from choosing a suitable quantitative base such as balance sheet values or risk-weighted assets (RWA) showing the relative importance of disclosed items. Then, the item values are multiplied by the respective weights and summed up for the total index.

Several studies use the index construction method. Beretta and Bozzolan (2004) propose a framework for the qualitative analysis of risk communication and an index for measuring the quality of risk disclosure. The four dimensions of their index checklist are content of information disclosed, economic sign, type of measures and the outlook orientation. For content evaluation they apply a manual content analysis technique. The results are indices for the four dimensions and a composite average index which can be used to rank firms according to their disclosure quality. Beretta & Bozzolan (2004) conclude that still more research needs to be done on the identification of the determinants of the disclosure index.

Lipunga (2014) chooses the structure and the requirements of the Basel II risk framework as the index checklist which he applies to annual reports on a rather small sample of seven commercial banks. The goal is to measure both the risk disclosure levels and the influence of disclosure on profitability. The checklist consists of six high level categories (risk management structure, market risk,

credit risk, liquidity risk, capital management, and operational and other risks) and a total of 34 individual disclosure items (compare to the risk dimension of the regulatory risk disclosure scoring model in section 4.5.1). By applying the average method to the calculation of the composite index, the study finds that the disclosures sections in annual reports match closely the Basel II structure and requirements. Summarizing, Lipunga (2014) sees limitations of his study as far as the sample selection, the sample size and the short time horizon are concerned, but sees added value on the methodological side.

Finally, the determinants of voluntary disclosure in the banking sector are empirically studied by Bhasin (2012) with respect to corporate governance issues. He links governance factors (independent variables) which he derives from annual reports to a voluntary disclosure index (dependent variable). The sample consists of twenty-three banks for which the annual reports for the year 2010 are collected. The index checklist includes nine categories with 65 items. A dummy variable of 1 is awarded if the item is found in the annual report and 0 if not. No weighting is used for computing the total disclosure index. Bhasin (2012) finds that the number of outside directors and the banks' sizes have the most significantly positive impact on disclosure.

In summary, Ibrahim & Hussainey (2019) view the construction of an index for measuring disclosure as a very effective method. Particularly, it is important that the checklist contains all disclosure items as imposed by the disclosure regulation. A remaining challenge is measuring not only the existence, but also the quality of the items disclosed. Berger (2011) sees a potential limitation in self-constructed indices that they are very labour-intensive to calculate, potentially subjective, expensive, and feasible only for rather small samples.

2.4.2.2 Semantic Content Analysis

Semantic content analysis is the most immediate method of all methods available for measuring disclosure quality and quantity (Saunders, 2013). It refers to the semantic analysis of content of both written and non-written documents where the content is categorised objectively in a systematic and replicable manner. This approach allows text analysis with quantitative tools. The main purpose is to embed the content of a document in its context (Saunders, 2013).

The method requires the counting of data items such as risk-related words in a text. An item can be a single word, a sentence, a paragraph, and other text elements. The literature therefore distinguishes into conceptual content analysis (existence and frequency of keywords) and relational content analysis (taking also relationships among words into account) (Hassan & Marston, 2010).

The implementation of semantic content analysis requires a considerable amount of preparatory work. The selection of the "right" keywords (Li, 2008) and understanding the appropriate comprehension level of the users ("the readability") is crucial (Ajina et al., 2016). For example, specialised financial texts such as regulatory risk disclosure reports (that are of interest in this thesis) use a different financial language than the (general) markets section in a daily newspaper. Also, investors or analysts who are used to reading financial texts have a different comprehension capability of financial texts than the average reader of a newspaper.

In a study, Henry (2008) creates the first word list targeting financial texts specifically, although she includes only 85 negative words. In the years thereafter, the number of keywords grew. The widely used Harvard GI words list[11] (although not specifically derived from financial texts) includes more than 4,000 negative words excluding inflections. The Diction word list[12] is another collection of words that focuses on optimistic and pessimistic meanings of words therefore measuring the sentiment in a text. Loughran & Mcdonald (2016) advance the word lists by criticising the Harvard GI and Diction word lists for not originating from the financial and accounting area. They then create their own word list with a focus on financial market communication. The freely available[13] Loughran & Mcdonald word list comprises six sub-categories (negative, positive, uncertainty, litigious, strong modal, weak modal) and covers about 350 positive and 2,300 negative words.

Semantic content analysis can be conducted manually or automatically (Hassan & Marston, 2010). Manual content analysis is labour-intensive and requires expert coders and therefore limits the sample sizes and iterations. Automated content analysis has gained importance with the rise in computing

[11] http://www.wjh.harvard.edu/~inquirer/homecat.htm

[12] https://www.dictionsoftware.com/diction-overview/

[13] https://sraf.nd.edu/

power (Saunders, 2013). Several supporting software tools have been developed (e.g., Nvivo, ATLAS.ti, Diction). Automated contents analysis is easy to (re-)use and economically feasible in terms of time, effort, money, and replicability. The main criticism is that software solutions have difficulties capturing the meaning of text and not only counting items (Hassan & Marston, 2010).

2.4.2.2.1 Manual Semantic Content Analysis

Linsley & Shrives (2005) are conducting a manual content analysis on a sentence basis. They examine the risk disclosures within annual reports for 79 large UK non-financial companies, selected from the FTSE 100 list for the year 2001. Methodologically, the authors first read each annual report personally. They mark all sentences with risk and management meaning. While coding, Linsley and Shrives categorise each sentence based on the potential current or future impact on risk and management policy. In further steps they assign each marked sentence to six predefined risk categories (financial risk, operations risk, empowerment risk, information processing and technology risk, integrity risk, and strategic risk) and also map each marked sentence according to its monetary/non-monetary content, good/neutral/bad news and past/current/future orientation.

Linsley & Shrives's (2005) study reveals that in most cases strategic risks are disclosed in annual reports, followed by integrity risks and financial risks. The authors also find that firms are more willing to disclose external than internal risks. They further find that firms provide a statistically significant higher proportion of future information than historic information. And finally, the study reveals that most of the risk information disclosed is neutral, not as one might expect of positive nature. The authors are critically aware of problems of subjectivity in their work. In order to reduce the bias in coding, Linsley and Shrives first code a limited set of reports individually before they compare their results and agree on common coding rules. The remaining reports are coded by single coders who must follow the rules in the coding rule book strictly.

2.4.2.2.2 Automated Semantic Content Analysis

Elshandidy & Neri (2015) use automated content analysis when they study the influence of corporate governance on mandatory and voluntary risk disclosure practices in the UK and Italy. They review annual reports of 290 British and 88 Italian listed firms (excluding financial firms due to their special risk profile) for the period 2005 (the year of IFRS introduction) to 2010. With the software package QSR Version 6, they calculate risk disclosure scores for each annual report[14].

During the software parameterisation process, Elshandidy and Neri individually read and code thirty randomly selected annual reports. From the coding results they generate a proprietary risk word list originally in the English language which they later translate into Italian. They then pass on the risk word list to the software where it is automatically processed on the annual reports. In order to check for validity and reliability of the automatically calculated results, the authors compare the manually and automatically generated scores by using Cronbach's alpha analysis. The study finds that governance factors influence the decisions of UK and Italian firms to disclose risk information either voluntarily or mandatorily in their annual report narratives. More strongly governed firms tend to provide more meaningful risk information to their investors than firms governed more weakly (Elshandidy & Neri, 2015).

Henry (2008) prepares a study where she aims to gain an understanding of the firm-investor communication process by analysing press releases on earnings. She finds that the communication process involves quantitative and qualitative elements which makes her choose a mixed-methods research approach. In the qualitative part she explores the properties of earnings press releases with automated content analysis software, using a word list (see section 2.4.3.1). In the subsequent quantitative part, she assesses the impact of the press releases on investors by analysing the stock market reaction following release dates with respect to the tone and other stylistic attributes. The measures of tone and style are created by another computer-based content analysis software, Diction 5.0[15].

[14] QSR is the producer of the Nvivo Software. As of 2020 the software is available in version 12.

[15] Diction software allows for user-defined word lists for frequency counts (known as dictionaries). The software has also a built-in tool for measuring verbal complexity (e.g., the average number of characters per word).

In summary, Henry finds in the qualitative analysis that earnings press releases exhibit a potential duality of purpose: information and promotion. The quantitative analysis suggests that the tone of earnings press releases, even when controlling for financial performance, influences investors, as indicated by market reaction.

2.4.3 Indirect Measurement Methods

Surveys, interviews and third party measurements are indirect methods for measuring disclosure quality (Hassan & Marston, 2010). All methods focus on the users of disclosure reports and their perceptions, and not directly on the disclosure reports.

Surveys are a quantitative method for collecting data regarding the characteristics of cases relevant for the analysis and evaluating the data with statistical variance analysis (deVaus, 2011).

Interviews are a qualitative method that can be seen as a conversation with a purpose, where the interviewer's aim is to obtain knowledge about the interviewee's world (Alvesson & Svensson, 2013).

Third party measurements is a collective term for using information such as disclosure scores and indices usually provided by external content providers (Refinitiv, 2019).

2.4.3.1 Surveys

Surveys are taken when the interest lies in collecting data from a large focus group with the aim of gaining insights into the behaviour of this group (deVaus, 2011). The literature review shows that this method has not yet been applied in the academic context of disclosure research. However, in practice, this method was applied by the European Banking Authority (2013) for comparing banks' risk disclosure approaches. In a survey which the EBA called the "EU-wide transparency exercise" 64 European banks from 21 countries of the European Economic Area (EEA) were surveyed. A questionnaire was sent out consisting of questions on disclosure of capital, risk weighted assets (RWAs) and

sovereign exposures. The survey data returned covered 730,000 data points and were processed and evaluated automatically. Enria (European Banking Authority, 2013), then the chairperson of the EBA, claims that the survey results help to continue the efforts to enhance transparency through disclosure in the EEA banking industry. He continues that "…reliable and comparable information on EU banks fosters the trust of investors, as well as the proper functioning of the market. It puts all market participants in a better position to understand the situation of EU banks" (European Banking Authority, 2013). Since 2013 this survey on disclosure is conducted every second year.

2.4.3.2 Interviews

No study on risk disclosure has yet been conducted that uses interviews exclusively as a research method. However, a study by Tauringana & Chithambo (2016) uses the interview technique as part of a mixed methods approach for measuring risk disclosure. In their study, they investigate the extent and the determinants of risk disclosure compliance with the requirements of IFRS 7 (Financial Instruments: Disclosures, see section 2.3.4). The authors criticise previous studies by being too single sided on either the quantitative or qualitative side. Tauringana and Chithambo observe that only a combination of both sides can fully explain the quality of risk disclosure. Their study comprises a quantitative panel data regression analysis, and qualitative interviews. They identify four company variables (number of non-executive directors, company size, gearing, and profitability) which they assume to explain IFRS 7 risk disclosure compliance.

2.4.3.3 Third Party Measures

Researchers do not necessarily have to participate in the data collection process for risk disclosure analysis, but can rely on disclosure ratings from intermediates such as Refinitiv (2019) or the Association for Investment Management and Research (Healy & Palepu, 2001).

Refinitiv publishes disclosure scores on environmental, social and governance (ESG) measures based on reported data in the public domain across three pillars and ten different ESG topics (Refinitiv, 2019).

AIMR disclosure ratings were available in the US during the 1980s and 1990s (Healy & Palepu, 2001). These ratings were calculated by the Association for Investment Management and Research (AIMR), which nowadays is known as the Chartered Financial Analyst (CFA) Institute. Leading analysts for each industry were surveyed annually on their perception of disclosure quality in annual reports and 10-K's (a standardised and structured format of an annual report in the US). The analysts were supposed to be experts in their fields and particularly well-suited to give a qualified opinion on the disclosure quality of the firms they cover.

2.4.3.3.1 Computational Linguistics

Computational linguistics is a developing research method that examines how computers might be used to process and interpret human language and texts automatically (Li, 2008). The mathematical and logical characteristics of natural text and language is analysed first. Then computer software is developed that builds on algorithms and statistical processes for automatic language processing.

Li (2008) is the first to analyse the characteristics of a large sample of Management Discussion and Analysis (MD&A) sections of annual reports of US firms with the help of computational linguistic techniques. The sample consists of about 55,000 firm years for the period 1993 – 2003. Li measures the readability with the linguistic Gunning-Fog index (Gunning, 1952) and with the length of the MD&A document. He relates readability to earnings persistence (= future stability of earnings). Through regression analysis he finds that [1] poorer performing companies are more likely to hide bad information through complex and harder to read annual reports and [2] that firms with positive persistent earnings are easier to read (Li, 2008).

Li (2010) introduces another computational linguistics method of analysing the content of corporate filings. He applies a naïve Bayesian Machine Learning Technique instead of a dictionary-based approach as in a previous study (Li, 2008). He first categorises 30,000 test sentences manually along the dimensions tone and content and uses the results to statistically infer the tone and content from another 1,400,000 sentences. The Bayesian algorithm calculates the statistical correlation between the frequency of some key words and the document type. Li finds that the tone of a forward-looking statement in an annual

report is a function of current performance, accruals, firm size, return volatility, the Gunning-Fog index and firm age (Li, 2010).

2.4.4 Summary on Methods and Techniques

The literature review on disclosure measurement methods and techniques shows that a variety of approaches are used to capture disclosure quality. Direct methods that evaluate disclosure reports immediately are found to be used more frequently than indirect methods. Still, it is interesting to observe that even direct method studies suggest further research to apply indirect methods as well by adding the users' perception of reports to the overall quality evaluation.

Another striking observation from the literature review in this section is that many authors suggest mixed method approaches. They acknowledge that the quality of disclosure reports depends on quantitative and qualitative elements and focusing only on one side neglects the impact of the other on report quality.

Within the discussion on direct methods, semantic content analysis is widely used in many studies where the coding results are then further processed for index calculation. Index construction on the basis of standardised (benchmark) templates is less frequently applied as this method potentially limits capturing the richness of a disclosure report.

Interesting trends on the development of a disclosure scoring model can be found in the literature review for automation and third-party initiatives. Measuring disclosure quality manually is time-consuming therefore many studies suggest moving to automatization for the recurring parts of coding. Also, a market is developing for centrally calculating and providing third-party disclosure scores, comparable to ratings from large rating agencies such as Standard & Poor's and Moody's. The regulatory risk disclosure scoring model developed in this research aims to add value in both cases by defining (semi-) automated processes and to be open for implementation in various bank internal and external environments.

2.5 Chapter Summary

The literature review in this chapter was split into three parts. The first part focused on disclosure literature in general and explained its impact on the research question of this thesis. For that purpose, definitions of "disclosure",

“risk”, and “regulatory reporting” were collected, compared and the appropriate definitions for this thesis selected. The review of the dimensions of disclosure showed how rich the disclosure subject is and how important it is do precisely define the scope of this research. The dimensions of disclosure covered issues such as mandatory versus voluntary disclosure, quantitative versus qualitative disclosures and, besides others, costs and benefits of disclosure. Several theories attempt to explain why firms are actually disclosing information. This chapter reviewed these theories and put a focus on agency theory which is the chosen underlying theory of this thesis. The literature review on the determinants of disclosure provided important input for the scoring model development. Determinates such as “industry”, “size”, and “risk” became control variables in the scoring model.

The second part of the literature review shifted the focus to the banking industry and its risk disclosure. Literature on the risk reporting environment of banks was analysed before the review moved to the legal and regulatory requirements. The Basel III guidelines were evaluated with respect to disclosure (pillar 3). Then, the implementation of the guidelines in the European Union in form of the CRD IV/CRR legal package was explained as it builds the legal basis for the regulatory risk disclosure model.

The third part of the literature review covered the review of methods and models on how to measure the quality of disclosures. Direct methods such as index construction and semantic content analysis were considered, as well as indirect methods such as surveys and interviews. The literature review in this part prepared the basis for the decision on which method(s) to apply in the scoring model.

3 Chapter Three: Research Philosophy, Methodology and Design

In this chapter, the research philosophy of this thesis is set forth, the methodology explained, and the design described. In the first section, the historical struggle for finding the best-fitted approach for risk disclosure measurement is outlined. In the second section, the philosophical stance of this thesis is set, with pragmatism as the chosen philosophical position. The third section moves on to explain the multi-methods approach, which combines qualitative semantic content analysis with Computer-Aided Qualitative Data Analysis (CAQDAS) and quantitative factor analysis with descriptive statistics on empirical indicators. Finally, the last section on research design describes in detail the four stages of this research including requirements analysis, model development, model operationalisation, and test and results evaluation.

3.1 Historical Challenges in Risk Disclosure Research

Risk disclosure research has undergone several methodological changes over the last decades. Initially, mostly quantitative analysis was performed before qualitative methods took over and finally an integrated view was suggested (Beyer et al., 2010).

Regulatory risk disclosure comprises quantitative and qualitative information. A good disclosure measurement model must integrate both. The underlying EU regulation of this thesis, the Capital Requirements Regulation CRR (European Parliament, 2013b) makes a clear distinction between quantitative disclosures that are based on financial figures, and qualitative disclosures that explain the financial figures and comment on the risk exposures of a bank. Both parts are complementary. The quantitative parts are significantly standardised by the regulatory authorities, so offering few possibilities for banks to differentiate themselves from other banks with respect to presentation. The qualitative parts, however, provide many more opportunities for banks to customise their risk reporting to their specific risk profile (Jia et al., 2016). This is the area where banks can make a difference to competitors and benefit from higher quality disclosures. Therefore, a comprehensive disclosure of risk must combine elements of both quantitative figures and qualitative explanations/comments. However, this raises the question of how both aspects can be captured best in a common measure.

Prior research on disclosure is undecided on this question, although over time a development is discernible. Early research in the 1980s and 1990s applied a positivistic approach where disclosure is measured in binary terms. That means a simple distinction is made between whether a firm discloses a certain risk item (value = 1) or not (value = 0) (Botosan, 1997; Guthrie et al., 2004; Verrecchia, 1990; Zarzeski, 1996). Often, signalling theory (see section 2.2.5) is adopted to explain the disclosure strategy of firms. The idea is that a firm either wants to signal something to the market or not. For achieving this purpose, a quantitative research method is sufficient (Dobler, 2008).

Once disclosure research gained momentum around the millennium, positivistic quantitative measures were still widespread for measuring the quality of disclosure. However, the tools became more refined by transitioning from binary measures to ordered numerical measures such as counting the number of words or sentences on disclosed risks. The justification for this approach is the assumption that more quantitative disclosure is a proxy for higher quality disclosure (Hassan & Marston, 2010). Another more recent example of a quantitative method to measure quality can be found in the work of Loughran & Mcdonald (2014) on measuring the readability of disclosure reports. The authors suggest measuring the file size of disclosure reports in bytes to derive a proxy for disclosure quality. In their study, they identify a significant but surprising correlation between file size and readability.

Beretta & Bozzolan (2008) critically challenge in their widely-quoted study the assumptions found in previous disclosure research that the quantity of information disclosed has an implication in determining the quality of disclosure. And Healy & Palepu (2001) note that measuring the quality of disclosed information with quantitative research methods is problematic, and remains one of the questions that must be answered in a satisfactory way. Consequently, many researchers were dissatisfied with applying only quantitative methods to disclosure measurement and thereby neglecting the qualitative elements of the disclosure narrative. They turned to suggesting a mixture of quantitative and qualitative measures. Ground-breaking work was done by Beretta & Bozzolan (2004) with their initial development of a partly qualitative and partly quantitative disclosure framework. Besides quantitative measures, they suggest several qualitative measures for semantic content analysis of disclosure texts. Semantic

context analysis is a classical qualitative research method (Saunders, 2013). Other researchers who also adopted qualitative methods include Abraham & Cox, 2007; Elshandidy et al., 2018; Ibrahim & Hussainey, 2019; and Jia et al., 2016. Most of these studies are focused on the financial disclosure of non-financial firms and not - as in this thesis - regulatory risk disclosure of financial firms (banks).

In conclusion, researchers appreciate the advancements in qualitative research methods in the disclosure field, but also note that quantitative analysis remains of similar importance and must be addressed equally (Beretta & Bozzolan, 2008; Miihkinen, 2011). By understanding that neither a straight quantitative nor a straight qualitative research methodology captures disclosure quality in its entirety, this research suggests a multi-methods approach, comprising quantitative and qualitative elements.

3.2 Philosophical Position

The underlying philosophical position of this research is pragmatism. *"In pragmatism there are no 'a priori' propositions or categories and no universal cognitive structures or mental models that shape knowledge. Meaning is derived from lived experience in which humans are at work with their environments on a continuous basis"* (Dewey, 1924 in Boydston, 1985).

Applied to the context of this research, this quote is interpreted in the following way: regulatory risk disclosure reports are prepared by humans who interact with their environment. Employees of financial institutions write regulatory risk disclosure reports for a wider audience including market participants such as investors and other external stakeholders. Reports are prepared on a regular basis (minimum annually) and are continuously revised through lived experience.

There is no a priori or normative definition of what represents a "good" risk disclosure report. Knowledge on disclosure quality develops over time through experience and interaction with stakeholders in the wider sense of agency theory. Regular interaction also takes place between practitioners and academics in advancing knowledge of disclosure quality (Johnson & Duberley, 2000). This cooperation is complementary and necessary in constructing theories and models on "disclosure quality". Johnson and Duberley (2000) note that "practice"

in general is often viewed by pragmatists as a source of inspiration. The neo-modernist concept of the learning organisation as a means of developing corporate and personal capabilities points in the same direction (McAuley, 2014). In the case of risk disclosure, the focus of this thesis, organisations are evolving through constant learning on how to prepare better quality disclosure reports to reduce the information gap between agents and principals as suggested in agency theory (Jensen & Meckling, 1976). As long as it “works” to improve the quality through constant learning, the pragmatic approach is justified.

Pragmatism (Sayer, 1992) emphasises a fallibilistic epistemology in which experience develops through action and critical thinking in the process of inquiry and reflection. A typical example for this fallibilistic epistemology can be found in this thesis. There is no absolute “truth” about the quality of risk disclosure. There is not one “correct” or “right” risk disclosure report. However, through the cooperative effort of preparers, users, regulatory authorities, and standard setters (see section 4.4.2), a common understanding of what constitutes quality disclosure can be developed. Such understanding can be achieved through repetitive inquiry and reflection.

In pragmatism, the ontological position is often a realistic one (Arbib & Hesse, 1986). A realistic ontology emphasises the transactional relationship between the research object (here: the “risk disclosure reports”) and the world (here: the preparers and the users of the reports, and regulatory authorities and standard setters). It is no question that the risk disclosure reports exist in reality and represent the risk profile of an individually existing legal entity (the “bank”). However, whether they do this in an objective way is something that can be and must be debated. Kołakowski (1969) states that “while reality does exist, we can never ultimately know it because of our lack of a theory-neutral observational language”. Even at this point it must be noted that a certain degree of subjectivity remains in the interpretation of the reports (compare to the discussion on “subjectivity in risk disclosure” in section 4.5.4).

3.3 Research Methodology

Regulatory risk disclosure consists of information that can be of quantitative or qualitative nature (Basel Committee on Banking Supervision,

2015). The quantitative amount of relevant risk information disclosed plays an important role in evaluating the risk profile of a bank. However, also the qualitative comments on the risk exposures and risk management add value to the comprehensive understanding of the banks' risk profiles. Both kinds of information are essential to gain a comprehensive view of the overall quality of risk disclosure (compare to the historical development of disclosure research discussed in section 3.1). Therefore, neither a quantitative research method alone, nor a qualitative method alone may lead to a complete assessment of the risk profile. In order to capture both aspects of risk disclosure, this research adopts a mixed methods approach.

The mixed-methods methodology developed as an umbrella term is appealing to research situations where more than one methodological approach is used in combination with another (Bazeley, 2013). Often elements are drawn from both quantitative and qualitative approaches to research. A comparative analysis of studies in the management research journals Administrative Science Quarterly (ASQ) and Academy of Management Journal (AMJ) by Bazeley (2013) shows that eight out of 35 studies use mixed methods, where the most common approach is the quantification of qualitative data for statistical analysis according to an 'a priori' coding scheme.

A multiple methodology approach works well for two kinds of research settings (Bazeley, 2013). The first setting is one where *complementary data* is sought to enhance overall or general understanding of research questions. However, this setting is of lesser importance to this thesis as the primary data sources (the risk disclosure reports) are uniform and not complementary.

The second research setting covers cases where different methods are appropriate for various elements of one *common data source*, and where each element contributes to the overall picture. Smith (1975) explains that such "methodological triangulation" overcomes the inherent bias of any single-method approach. He advocates that different methodological strengths are enhanced, and inherent weaknesses are cancelling out, thereby producing more convincing research results.

For this thesis, this second research setting is of high relevance. The research question asks how to measure the quality of a bank's regulatory risk disclosure with a scoring model (see section 1.4). Answering this question

requires different forms of approaches to a shared dataset of regulatory risk disclosure reports. Therefore, the theoretical framework of the scoring model suggests different quality criteria (see section 4.4.3) that are either of quantitative (e.g., quantity of disclosed information) or of qualitative (e.g., readability, richness, and depth) nature, and therefore require different research methods to capture their quantities and meanings. Only combined they provide a comprehensive picture of the disclosure quality level that is represented by the composite disclosure score.

A challenge in applying a the multi-method approach is the staging and sequencing of the research methods applied (the so-called “components”) and the identification of the relative dominance of one method over the other (Bazeley, 2013). Also, the results of the various research methods must be integrated at a certain point during the research process. Typically, the integration occurs at the end of the process where results are interpreted and discussed (Bazeley, 2013). This thesis approaches the integration by following a sequential procedure. First, qualitative semantic content analysis with Computer-Aided Qualitative Data Analysis (CAQDAS) is carried out on the regulatory risk disclosure reports. Then, the results are processed with quantitative descriptive statistics techniques. Finally, the results are integrated and the composite disclosure score for each disclosure report is calculated and analysed with a quantitative factor analysis.

3.3.1 Semantic Content Analysis (qualitative)

Saunders (2013) defines semantic content analysis as an “analysis of the content of both written and non-written documents where each document is quantified objectively in a systematic and replicable manner using predetermined categories, thereby allowing the data to be analysed quantitatively”. Saunders mentions company reports, annual reports and mission statements as examples of the main sources of semantic content analysis within business and management research. It can be used as the sole or main technique as well as a secondary or supplementary technique in a multi-methods study (see section 2.4.2.2).

Krippendorff (2004) sets the content of a document in relation to its context. The context may include the purpose of the document (here “regulatory risk disclosure”), but also organisational and cultural aspects (here “banking

industry sector”). Document analysis can be performed manually (see section 2.4.2.2.1) or with computer support (see section 2.4.2.2.2). Computer-Aided Qualitative Data Analysis (CAQDAS) can assist in the management of rich, complex but often non-standardised unstructured data. Data can comprise text, audio, and video files. Computer systems may facilitate the analysis of data, but it remains for the researcher to analyse the data and draw the right conclusions (Hall, 2013). In this research, functionalities of Nvivo, one of the leading CAQDAS systems, are used for qualitative semantic content analysis of risk disclosure reports. All disclosure reports are coded in Nvivo following the rules predefined in a coding rulebook. In parallel, word lists are developed that capture the text properties for the relevant quality criteria. Once the reports are coded, several word frequency queries of Nvivo are run on the raw data for capturing individual results on the quality criteria. Finally, methodological quality and consistency checks are performed using built-in statistical methods for the Kappa coefficient test and the percentage agreement test for analysing coding reliability and validity.

3.3.2 Numerical Descriptive Statistics (quantitative)

Descriptive statistics are a way of summarizing the properties of large sets of quantitative (numerical) information (Sincich, 1995). Univariate analysis is performed on the dataset for each quality criterion that is identified as quantitative in the scoring model framework. Univariate analysis describes the behaviour of a single variable. This involves the occurrences and the distribution of the variable, its central tendency (measured with its mean and mode) and its dispersion (including range and quartiles as well as measures of the spread such as the variance and standard deviation). Of particular importance for the scoring model is the shape of the distribution and the analysis of potential outliers as these effects point to deviations from the norm. For each variable, the skewness (the measure of the lack of symmetry) and the kurtosis (the measure that compares the fit of the actual distribution to the normal distribution) are calculated and analysed (Sincich, 1995).

In summary, for each variable the following statistical values are calculated and analysed:

- Mean and mode values
- Standard error
- Variance and standard deviation
- Skewness and kurtosis
- Minimum and maximum values
- Count of occurrences

Finally, where applicable, ordinary and cumulative relative frequency distributions (histograms) are used to describe and analyse the results for the quality criteria.

3.3.3 Factor analysis (quantitative)

Factor analysis is a quantitative statistical technique that is commonly applied in management research (Hutcheson & Sofroniou, 2011). It is used extensively in textual data analysis (Miihkinen, 2011) where underlying data structures must be analysed, patterns identified, and theoretical insights to the research question be provided. Factor analysis uses statistical tools to extract underlying factors from a dataset that capture the variation in the collected data.

In social and management research, multiple factors often have an impact on one particular variable, and their relative impact is difficult to discern. From this fact, two consequences should be considered. First, factors are usually not fully independent of each other, meaning in statistical terms that they are correlated. In consequence, they have a similar impact on the variable especially if highly correlated. It would therefore be redundant to consider highly correlated factors simultaneously, and such factors should be consolidated. The second consequence relates to finding the relative importance of each factor as not every factor is of the same importance to the value of the variable. By employing factor analysis, it becomes transparent which factor has the higher relative impact on the variable than the others. Knowing the importance of each factor is crucial as factors with a higher impact also have a better statistical explanatory power on the variable values/results (Hutcheson & Sofroniou, 2011; Sincich, 1995).

For the evaluation of scoring model results in this thesis, addressing both consequences is of high relevance. Several quality criteria (see section 4.4.3) are determined in the disclosure scoring model that proxy the quality of the risk categories identified. The explanatory power of the composite disclosure scores

calculated in the proposed scoring model improves with a deliberate selection of quality criteria. If empirical indicators (“factors”) are chosen with low correlations, then the scoring model covers a wider range of quality properties of the risk disclosure reports, and predictions are not redundant.

Finally, the composite disclosure score is made up of several empirical indicators for disclosure quality. Only with factor analysis the relative importance of each factor for the model as a whole becomes transparent.

3.4 Research Design

The research design comprises a sequence of four stages (Figure 13):

- First, the requirements of the regulatory risk disclosure model are defined (stage 1)
- Second, the model framework is developed (stage 2)
- Third, the model is implemented (stage 3)
- Finally, the model is tested and the results are evaluated (stage 4).

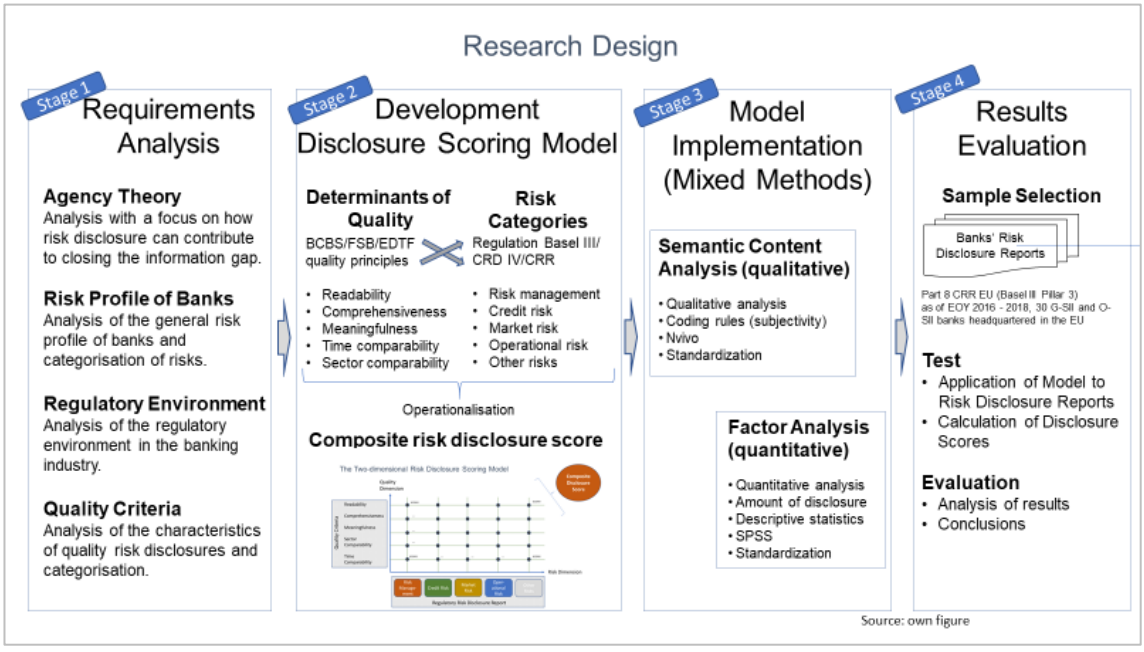

Figure 13: Research design

3.4.1 Stage 1 Requirements Analysis

In stage one the requirements for the regulatory risk disclosure scoring model are analysed. Requirements can be found in the context of agency theory (disclosure as a tool to reduce the information asymmetry), the general risk profile of banks (risk categories), the regulatory environment of the banking sector (risk measurement and reporting), and in prior studies of the leading standard setters and policy makers IASB, FSB and BCBS (criteria for quality disclosure).

The conceptual framework of the scoring model is agency theory (Jensen & Meckling, 1976). The requirement analysis highlights how agency theory defines the conflicts of interest, how disclosure is embedded in the theory and how the agency cost/benefit trade-off can be improved through higher-quality disclosure. The basis for the analysis is the seminal paper by Jensen and Meckling (1976). Additional research papers are included to capture the critical discussion of the theory with respect to disclosure after its initial publication (Pepper & Gore, 2015; Sanders & Carpenter, 2003; Wiseman et al., 2012).

The risk profile of banks is different to that of non-financial firms (Beretta & Bozzolan, 2008; Miihkinen, 2011). Many prior studies exclude banks from their analysis due to their risk-taking nature. For banks, managing financial risks is the core business, whereas non-financial firms attempt to minimise their exposure to financial risks. The requirements analysis discusses in detail the financial risks that constitute a bank's risk profile. Disclosures on these financial risks build the primary input for the disclosure scoring model and the calculation of composite disclosure scores and is, therefore, of high relevance to the model development.

Regulatory disclosure happens within the regulatory environment for banks. Banks are heavily supervised by regulatory authorities that set mandatory rules and regulations which banks must adhere to. Authorities also issue voluntary guidelines which banks are recommended but not obliged to follow. The primary EU regulation for this thesis is the Capital Requirements Regulation CRR (European Parliament, 2013b) which is legally applicable to all banks operating in the European Union. The requirements analysis focuses on part 8 of this regulation where the structure and main contents of risk disclosure are defined (Art. 435 - 453 CRR). A second source for the requirements analysis is the consultative paper on Basel III Pillar 3 (Basel Committee on Banking Supervision, 2015) published by the BCBS. This paper is the non-binding guidance for

disclosing risk in the banking industry, prepared by the leading banking standard setter BCBS worldwide.

Finally, the fourth part of the requirements analysis covers the quality criteria. Measuring the quality of risk disclosure reports means that the determinants of quality must be identified. The analysis makes use of three sources of documents, all published by the leading policymakers in the financial accounting, finance, and banking regulation field. Disclosure quality principles are suggested by the International Accounting Standards Board IASB (2017), the Enhanced Disclosure Task Force EDTF as a working group of the Financial Stability Board FSB (Banziger et al., 2012), and the Basel Committee on Banking Supervision BCBS (2015). In the requirements analysis, the various disclosure quality principles are analysed, compared, and consolidated into a common set of quality principles that are applied in the scoring model.

3.4.2 Stage 2 Development of the Disclosure Scoring Model

In stage two, the framework of the regulatory risk disclosure scoring model is developed. The findings on the regulatory risk profiles and quality principles identified in stage one are taken and integrated into a two-dimensional model. The procedure results in splitting the risk profiles in relevant risk categories (the first dimension “risk categories”), and in mapping the quality criteria to the second dimension (the “quality criteria”) of the scoring model (see section 4.5).

In a next step, the model parameters are operationalised. For each criterion on the quality dimension, an empirical indicator is suggested. The indicators are proxies that represent and capture the content and purpose of each quality criterion. Following the multi-methods approach, the selected empirical indicators are partly of qualitative and partly of quantitative nature. The assignment depends on the properties of the quality principles to be measured.

For model development, the general risk frameworks of Beretta & Bozzolan (2004), Beretta & Bozzolan (2008), and Miihkinen (2011) are adapted to the financial industry and expanded with the regulatory risk perspective. These risk frameworks suggest various indicators that measure the quality of risk communication in the Management Discussion and Analysis (MD&A) section of annual reports of non-financial firms, and in IFRS risk reporting. There does not yet exist a framework that specifically addresses the requirements of the financial

sector. Therefore, it is necessary to adapt existing indicators to the regulatory environment of banks, but also develop new indicators for disclosure areas not covered in the frameworks.

A second input for the development of the scoring model are the studies of Gunning (1952) and Loughran & Mcdonald (2016). Both studies include research in the area of text readability. Gunning developed the Gunning-Fog index for readability. Loughran and Mcdonald suggest financial word lists that complement standard readability methods to the financial sector. The proposed word lists are used as a basis for the development of the Gunning-Fog readability index for risk disclosure in banks.

Once the risk and quality dimensions are established and criteria operationalised, the internal processing logic and the algorithms of the model are defined. Algorithms and functions are developed that apply the quality criteria to the risk categories (see section 4.5.1) and calculate disclosure scores for each pair of risk category and quality criterion. Then, the scores are standardised in order to make them comparable to each other. Control variables such as risk factors, firm size and industry are used to take scale effects into account. Risk categories are weighted with their respective proportion of total risk weighted assets (RWA) to account for their relative importance in a bank's risk profile. Finally, the process for calculation of the composite risk disclosure scores is defined.

3.4.3 Stage 3 Model Implementation and Test

After the development of the model framework in stage two, the model is technically implemented in stage three. The structuring and coding of the risk disclosure reports is facilitated by the computer-aided textual analysis software Nvivo. A coding rulebook is developed where coding rules and coding categories are defined, along with instructions of how they shall be interpreted by the coders.

The technical implementation of the prototype of the scoring model builds on the database of Nvivo, and where possible on existing query functionalities of Nvivo. Additional functionalities required by the scoring model are implemented in the statistics software package SPSS, and in the programming language Python running in the integrated development environment of PyCharm. The final

consolidation and calculation of the composite disclosure scores is performed in Microsoft Excel.

Objectivity is an issue in semantic content analysis. There is always the possibility that the person performing the coding is biased, so results cannot be easily replicated. Saunders (2013) suggests that transparency of procedures and processes in the selection of the sample and in coding the text sources helps to mitigate the inherent subjectivity. In addition, a clear set of rules can make the coding easier to replicate. In order to prevent subjectivity, this thesis follows a two-step approach. Before the actual coding of all disclosure reports is performed, a subset of reports is coded by independent coders to ensure validity and reliability. The coding results are compared, and open or unclear issues are discussed, clarified, and documented in the coding rulebook. The final coding is done by using the text analysis functionalities of Nvivo on the basis of the coding rulebook. Then, a sample of the automated coding is manually double-checked by the coders. Also, statistical tests are performed to check again for reliability and validity of the coding. These tests include the analysis of the Kappa coefficient (Cohen, 1960) and the percentage agreement factor (see section 5.4).

3.4.4 Stage 4 Sample Selection and Evaluation of Results

In stage four, the model is first applied to a sample of risk disclosure reports, before the disclosure scores are interpreted and evaluated. The sample is selected following a clear rationale in terms of the type of disclosure report and publication date. The type of document is given by the definition of regulatory risk disclosure in the Basel III Pillar 3 framework and implemented in the EU by the CRD IV/CRR legal package (European Parliament, 2013b). The sample consists of all EU headquartered banks that are classified as global systemically important institutions (G-SII) by the Financial Stability Board (FSB). The sample is supplemented with other systemically important institutions (O-SII) as defined by the European Banking Authority (EBA). Both lists were established after the financial crisis in 2008 and are updated annually. All major EU banks are included that are deemed as posing a potential threat to the stability of the financial system by regulators. The sample size is thirty banks that mainly originate from the six

largest financial markets in the EU (UK[16], France, Germany, Italy, Spain, The Netherlands). A detailed discussion of the sample compilation and the selection criteria can be found in section 0.

Once all disclosure reports are processed with the scoring model software implemented in stage 3, the composite disclosure scores and scores per risk categories and quality criteria are evaluated in two directions. The longitudinal direction includes the comparison of individual banks' composite disclosure scores over time. The cross-sectional direction evaluates scores among different banks and countries of origin. (see sections 6.2 and 6.3). The overall goal of the result evaluation in this stage is to learn about the disclosure quality of individual banks, but also to spot trends in disclosure practices in the EU banking industry.

Composite disclosure scores are also evaluated with respect to a potential reduction of information asymmetry as highlighted in agency theory. Disclosure is seen as an important constituent of the information environment of a bank. Different levels of disclosure quality represented by the composite disclosure scores will show how differently the term "information" is interpreted by EU banks.

3.5 Chapter Summary

This chapter discussed the philosophical and methodological stance of the thesis. The main challenge was to choose research methods that capture the quantitative and qualitative elements of regulatory risk disclosure reports. For this, a multi-methods approach is suggested that includes both, quantitative statistical methods (descriptive statistics and factor analysis) as well as qualitative methods (semantic content analysis).

Furthermore, the research design was described and explained. The research follows a four steps approach where first the business requirements are analysed (agency theory, general risk profile of banks, regulatory and disclosure environment of the banking sector in the EU). In step two, the scoring model is conceptionally developed and technically implemented. Step three includes the testing of the model and applying it to a sample of disclosure reports. Finally, in step four the composite scores are evaluated in the context of disclosure quality and agency theory.

[16] During the research period 2016 – 2018 the UK was a member of the European Union.

4 Chapter Four: The Regulatory Risk Disclosure Scoring Model

4.1 Overview

In this chapter the theoretical foundations of measuring the quality of regulatory risk disclosures with a scoring model are developed.

The entry point in section 4.2 is agency theory (Jensen & Meckling, 1976) and how it impacts disclosure. Agency theory is a powerful and far-reaching theory that covers many aspects of interactions between a firm's managers and its investors. Given that there exists an information gap between them and that agency costs must be incurred to reduce the gap, it is in the interest of investors to get the best return for their money by receiving high-quality risk disclosures. Section 4.2 analyses the parts of agency theory that are of high relevance to disclosure. It also discusses where and how a disclosure scoring model can help to improve managers' behaviour to increase firm value with high-quality risk disclosure, while still considering the costs incurred.

The proposed scoring model is a two-dimensional model. One dimension covers the various categories of financial risks that are evaluated with the model. The other dimension consists of quality criteria that are applied to each risk category. Section 4.3 on risk categories (risk dimension of the scoring model) describes the risks incurred by banks and how their business model is different from firms in non-financial sectors. The rest of the section then moves on to banking regulation and reviews in detail the parts of the Basel III guidelines and the EU Capital Requirements Regulation CRR that are relevant for disclosure. The risk categories for the model are subsequently defined and the expected contents on risk described. In total there are five risk categories which present the major input into the scoring model.

Section 4.4 develops the quality criteria dimension of the risk disclosure scoring model. Prior research on disclosure from the leading standard setters and policymakers in the regulatory, finance, and accounting area (BCBS, FSB and IASB) is analysed for this purpose. Their research findings are then consolidated into five quality criteria. These are criteria that are generally agreed by market participants to be indicators of high-quality disclosures.

Section 4.5 introduces the framework for the regulatory risk disclosure scoring model. It uses the research findings from sections 4.3 and 4.4 as model

input. The generic measurement approach and the structure of the model are outlined in this section. The risk dimension is split into five categories (risk management, credit risk, market risk, operational risk, and other risks). The five quality criteria (readability, comprehensiveness, meaningfulness, time comparability, sector comparability) are operationalised. An empirical indicator that proxies each quality criterion is suggested. Next, the application method of the quality criteria on the risk categories is defined, and the calculation rules and algorithms are developed. Finally, the procedure of calculating the composite disclosure score is described. The section concludes with a word of caution on model measurement errors and model-inherent subjectivity.

4.2 Risk Disclosure in Agency Theory

4.2.1 Optimisation Strategies for the Agency Cost/Benefit Relationship

Agency theory lays out the fundamental properties of agency costs but leaves it to professional bodies to develop concepts for the measurement and prudent management of these costs (Pepper & Gore, 2015). Few firms are in a position to actively understand what total amount of agency costs they incur and what the associated benefits are (Westermann, 2018). Firms therefore need a system that compiles agency costs and benefits of all activities undertaken in this respect. The development of the proposed disclosure scoring model is one step in this direction.

It is in the interest of firms to optimise their agency costs and benefits relationship. In the case of external communication, for a given level of cost incurred they expect to get the highest quality of disclosure possible. The potential optimisation strategy firms may follow can be analysed by first taking a closer look at the graph in Figure 14.

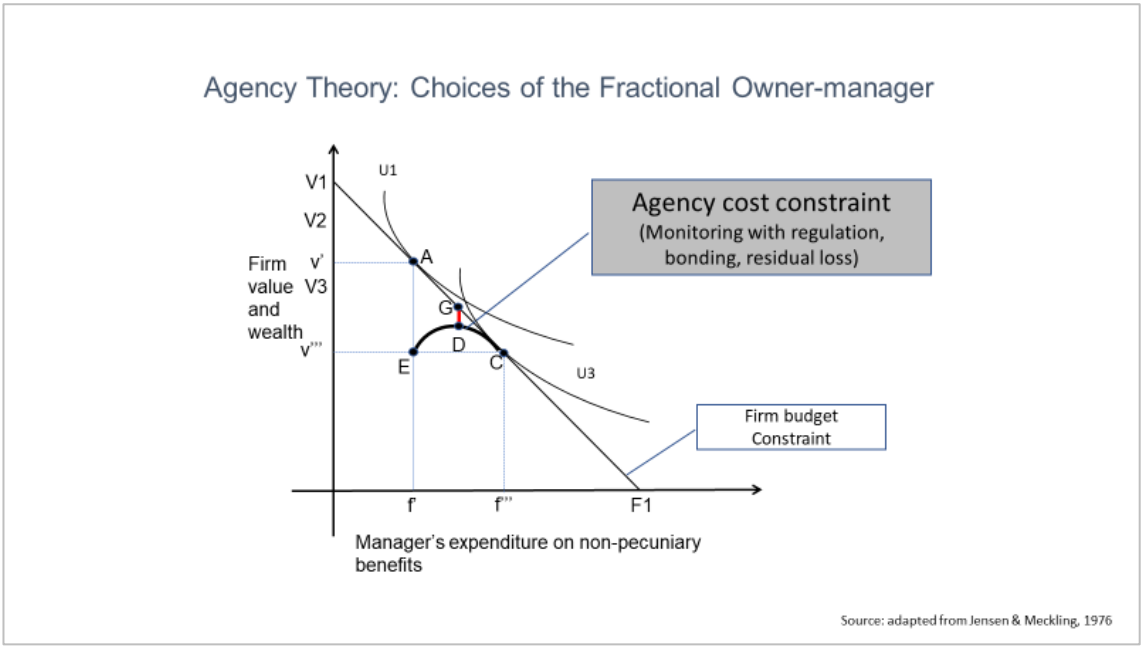

Figure 14: The agency cost constraint

The graph shows on the vertical axis the firm value and wealth, on the horizontal axis expenditures a manager can make on non-pecuniary benefits. Any such expenditure a manager makes reduces firm value. The straight line $\overline{V1F1}$ represents the budget constraint of (fractional) owner-managers of a firm (Jensen & Meckling, 1976). Initially, the firm value is at V1. The more of a firm's resources owner-managers spend for their own good, the more the value of the firm will decline until ultimately point F1 is reached. As owner-managers also have an ownership interest[17] in the firm, the actual value of firm resources spent depends on their marginal utility given by curve U3. In Figure 14 this point is represented by point C.

A firm's value can be increased by implementing a monitoring and reporting system that limits owner-managers' abilities to spend firm's resources for their own good (Jensen & Meckling, 1976). The implementation of such a system is costly, therefore the net gain in firm value will be less than the expected gain. The level of agency costs incurred is the distance between the straight line V1F1 and the curve CDE for different levels of expenditures. The curve CDE represents the agency cost constraint. Ideally, the firm value would increase proportionally to the reduction in owner-managers' spending of a firm's

[17] An ownership interest in this respect means that (fractional) owner-managers have to bear themselves the cost of some of the resources they spend as managers.

resources. However, as agency costs must be incurred to prompt owner-managers to reduce their spending, the resulting new firm value lies on the agency cost constraint curve CDE, while the difference $\overline{GD}$ between the budget constraint and the agency cost constraint represents the agency costs incurred.

For analysing the impact of risk disclosure (Donnellan, 2016; Palia & Porter, 2007), the shape of curve CDE must be analysed in more detail as it reveals important insights for the principals. Starting from point C and moving to the left, an initially rather small investment in a monitoring system such as regulatory risk disclosure reports will lead to a rather large reduction in the spending of firm's resources by the owner-managers, thereby increasing firm value by more than the cost incurred. Subsequently, the incremental benefits decline until additional investments in monitoring systems do not result in any further value appreciation.

From this observation a sub-optimal and an optimal monitoring strategy for principals can be derived. Scenario one in Figure 15 discusses the sub-optimal strategy that results in a ratio where high costs are incurred for receiving low benefits. Scenario two in Figure 16 shows the strategy that optimises the cost/benefit ratio (low costs but high benefits).

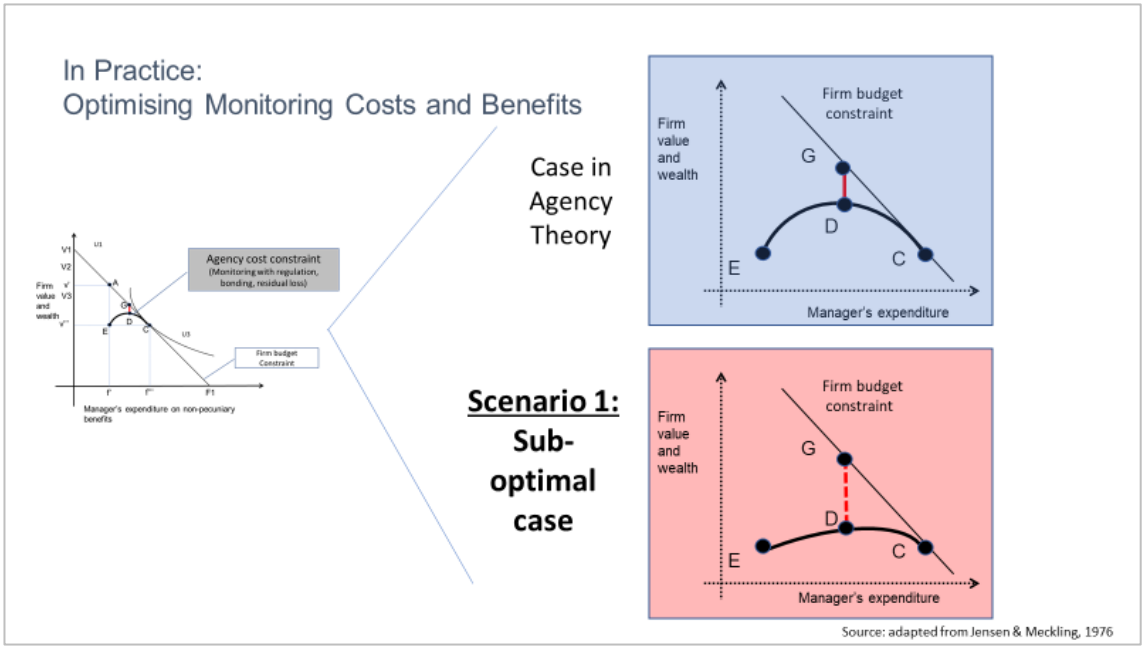

Figure 15: Optimising monitoring costs and benefits, scenario 1[18]

[18] Own figure developed for this research with input from Figure 14

Scenario 1 in Figure 15 depicts the situation which principals should attempt to avoid. Large amounts of firm resources (dotted line) are spent on monitoring and reporting systems. However, the impact on managers' behaviour on spending resources for their own good is low. They keep on expropriating firm resources at a high rate despite the monitoring and reporting systems in place. In this scenario, the quality of the reporting and monitoring system is not effective enough to make an immediate material impact on spending behaviour. Any positive effects on firm value appreciation are quickly offset by large investments in systems. In technical terms, the shape of the curve CDE is rather flat, resulting in a wide distance $\overline{GD}$ between the budget constraint line $\overline{V1F1}$ and the vertical point D on curve CDE.

Scenario 2 in Figure 16 shows the scenario that is more favourable to principals. A rather small investment is made on monitoring and reporting systems. The agents in the role of owner-managers react strongly to the supervision and reduce their expenditures of firm's resources at a higher rate than investments made, resulting in relatively higher firm value appreciations. The monitoring and reporting systems in this scenario are effective in reducing the expropriation of firm resources by the agents.

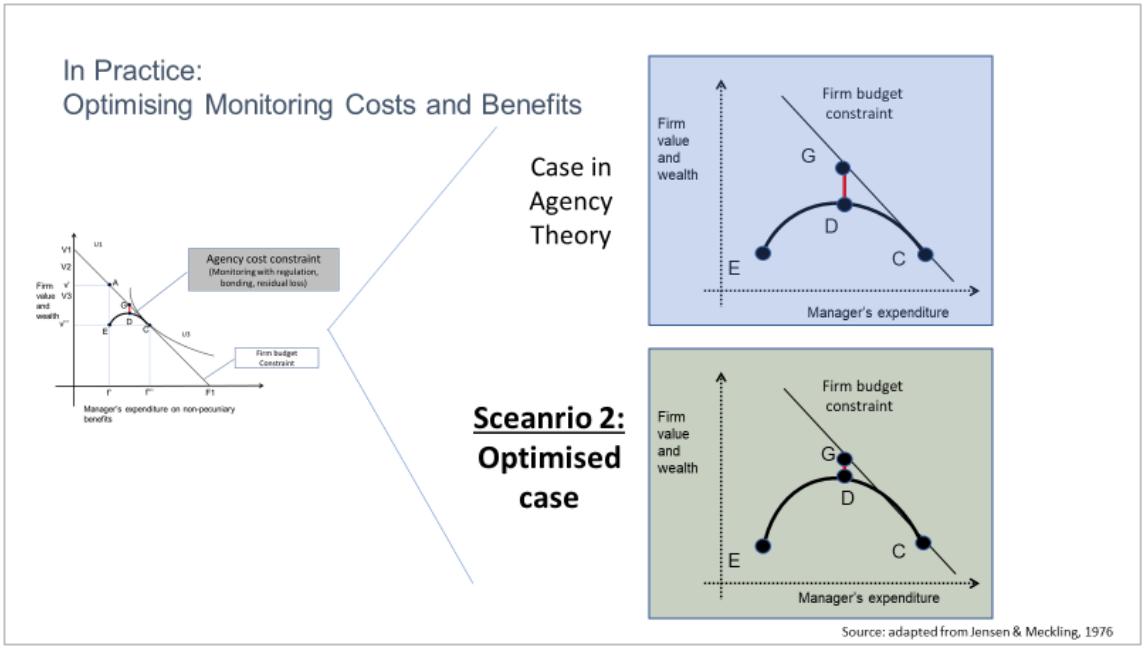

Figure 16: Optimising monitoring costs and benefits, scenario 2[19]

[19] Own figure developed for this research with input from Figure 14

Again, in technical terms, starting at point C on the budget constraint line $\overline{\mathrm{V1F1}}$, the curve CDE initially moves closely along the firm budget constraint line. Even for reaching the climax point D, only a small investment in the monitoring and reporting systems must be made to achieve a high appreciation of firm value.

Finally, it must be noted that the maximal cost/benefit trade-offs would lie on the budget constraint line, meaning that it would be possible to influence the owner-managers' spending behaviour without any monitoring and reporting costs being incurred. This extreme scenario can only be achieved if ownership and management are not separated which Jensen & Meckling, (1976) discuss in their "100% ownership" case. However, as there is no free lunch, at least some investments must be made in monitoring and reporting systems in order to impact the spending behaviour of agents. The best realistic point D for principals is located on curve CDE with a rather small remaining vertical distance $\overline{\mathrm{GD}}$ from the budget constraint line.

In summary, it remains the challenge for principals to set up monitoring and disclosure systems that effectively reduce the expenditures of a firm's resources by the owner-managers, thereby optimising the agency cost/benefit relationship as discussed in Scenario 2. Implementing cost-effective disclosure scoring models that evaluate regulatory risk disclosure quantitatively and qualitatively in a high-quality manner will support this challenge. The implementation of such regulatory risk disclosure systems requires an understanding of what constitutes regulatory risk disclosure. The disclosure requirements are discussed in section 4.3, and the measurement of their quality is explored in section 4.4.

4.3 Theoretical Framework of Financial Risks

Regulatory risk disclosure reports published by banks form the basis for this thesis. A thorough analysis of their content is important to understand how their quality can be measured with a scoring model (see Figure 17). In the first part of this section, an overview of the general risk framework of banks is presented. The second part of the section moves on to a brief overview of the regulatory risk framework and how the general risk framework of banks is reflected in the regulatory environment. The third part discusses the details of regulatory risk disclosure, and the last part of this section maps the regulatory risk disclosure requirements to the risk categories of banks' general risk framework. This mapping will then become the major input for the development of the regulatory risk disclosure model in section 4.5.

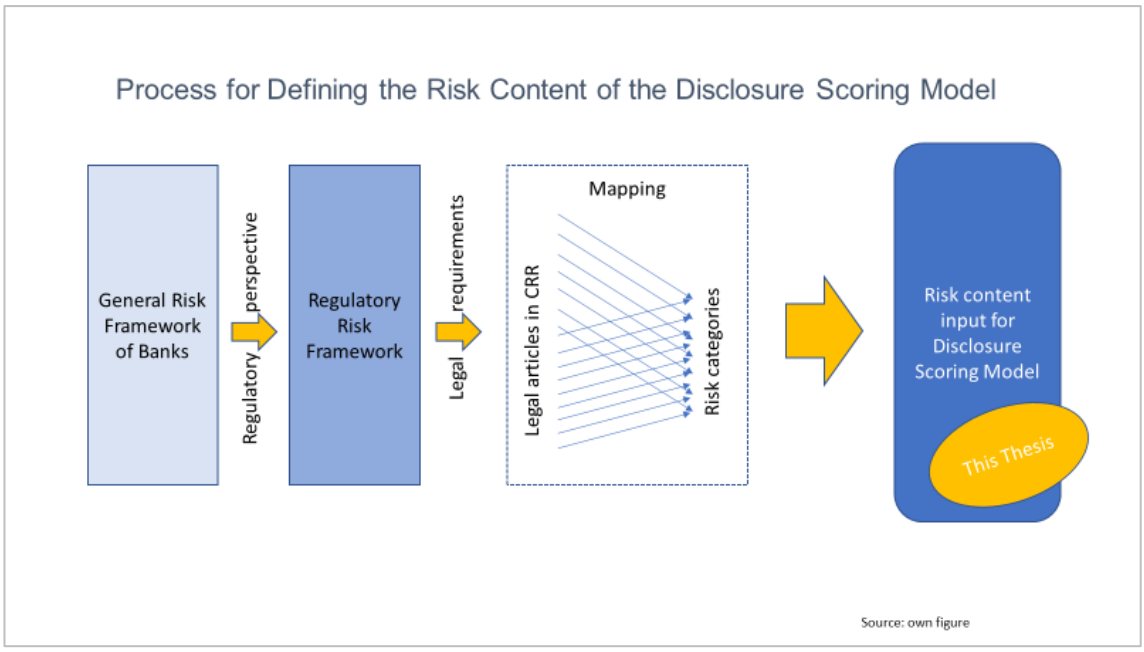

Figure 17: Process for risk content definition

4.3.1 General Risk Framework of Banks

Taking and managing financial risks is a core activity in the banking industry. Banks act as intermediaries between depositors/investors who have a surplus of money, and borrowers who have a deficit of money (Brealey et al., 2014). By taking on the role as intermediary in financial markets, banks enter a variety of risk exposures. In some respect, banks experience similar systemic

and business risks to those found in the so-called “real economy” of the manufacturing and service sector (Renn et al., 2019). After all, banks are equally exposed to general economic and market conditions. However, the special nature of banks’ business models of accepting and transferring risks implies that they are exposed to additional risks that cannot be found to the same extent in other sectors of the economy (Renn et al., 2019).

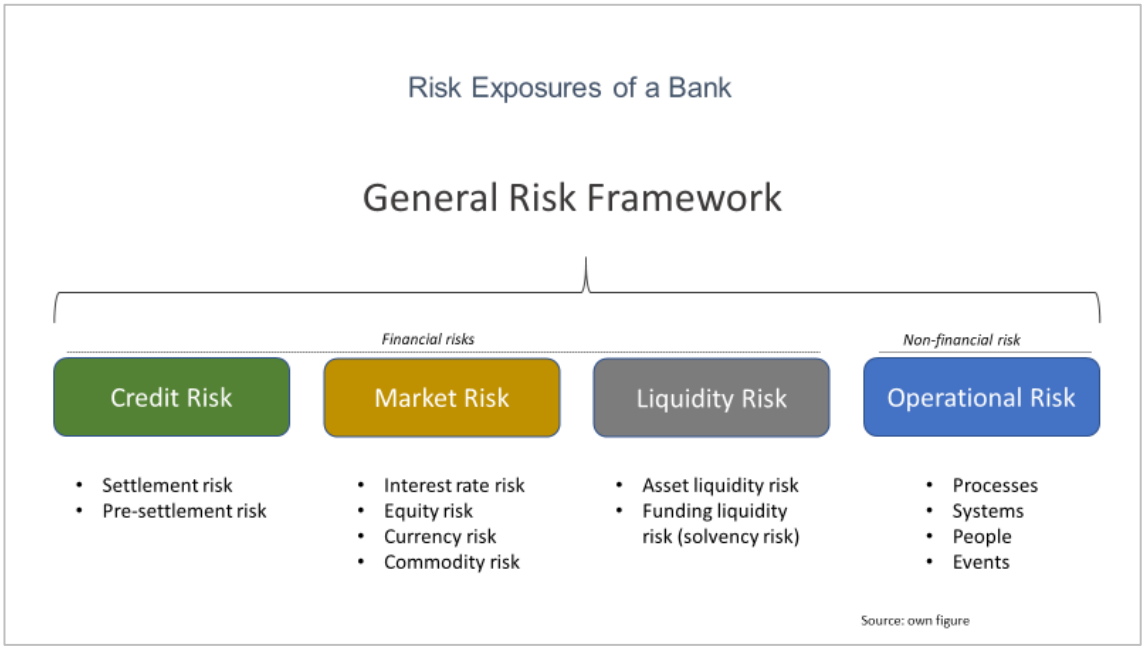

Figure 18: General risk framework of a bank

Figure 18 includes the main risk categories of an integrated risk management system of a bank (Saunders, 2017; Stulz, 2014). Traditionally, risk management activities are mapped under the headings of financial risks such as credit, market, and liquidity risk, as well as non-financial risks such as operational risks. Integrated risk management does not include business risk which is defined as “anything that threatens a company's ability to meet its targets or achieve its financial goals” and which is managed separately (Jorion, 2007).

Traditionally, the most important financial risk for banks is credit risk (EBA, 2017). History shows that most bank failures were due to credit risk becoming imminent. Credit risk is the risk “… of loss due to the fact that counterparties may be unwilling or unable to fulfil their contractual obligations” (Jorion, 2007). Credit risk can be divided into settlement risk (failed exchange of contractual obligations at a specified point in time) and pre-settlement risk (failure of a counterparty to

perform on its obligation such as paying interest during the lifetime of the contract) (Saunders, 2017). Disclosure on credit risk usually covers a major portion of a regulatory disclosure report, and hence is very relevant to measuring the quality of risk disclosure with a scoring model.

Market risk is defined as the "… risk of loss due to movements in the level or volatility of market prices" (Jorion, 2007). It is divided into four sub-categories: interest rate risk, equity price risk, foreign exchange risk and commodity price risk. Market risks are often measured with Value-at-Risk (VaR) models. High-quality risk disclosure will communicate information on all market risk sub-categories and on the methods of how to measure and manage these risks.

The third major financial risk category in banking is liquidity risk. This risk can take on two forms: asset liquidity risk and funding liquidity risk (solvency risk). Asset liquidity risk arises if "… a transaction cannot be conducted at prevailing market prices due to the size of the position relative to normal trading lots" (Jorion, 2007). Jorion (2007) defines funding liquidity risk (solvency risk) as "… the inability to meet payment obligations".

Operational risk can be generally defined as "… the risk of losses caused by failures in operational processes or the systems that support them, including those adversely affecting reputation, legal enforcement of contracts and claims." (Kinglsey et al., 1998). Operational risks may arise from the breakdown of systems, people, and processes within the organisation (Allen, 2004). Several of these items are relevant for the development of the disclosure scoring model and its evaluation of disclosed content. For example, reporting systems can break down or report poor quality data. People employed in a firm can collude or commit fraud when preparing risk disclosure reports. Internal processes can entail potential accounting and regulatory reporting errors or faulty valuations. Operational risks also include external events such as sudden regulatory, legal, political, environmental changes, or physical risks such as natural disasters or data theft.

In the next section, the identified financial and non-financial risks are transferred from the economic perspective to the legal perspective that forms the basis for the proposed regulatory risk disclosure scoring model.

4.3.2 Regulatory Risk Framework of Banks

The general risk framework of banks analysed in the previous section 4.3.1 provides the basis for the regulatory risk framework. The BCBS recommends that the regulatory risk framework for banks shall be driven by the conservative concept of resilience and stability (Basel Committee on Banking Supervision, 2004). The focus of the regulatory risk framework as implemented in the EU (European Parliament, 2013b) is on the methods applied for measuring banking risks with respect to a bank's own regulatory capital (Basel Committee on Banking Supervision, 2011). Figure 19 expands the general risk framework with the perspective of regulation.

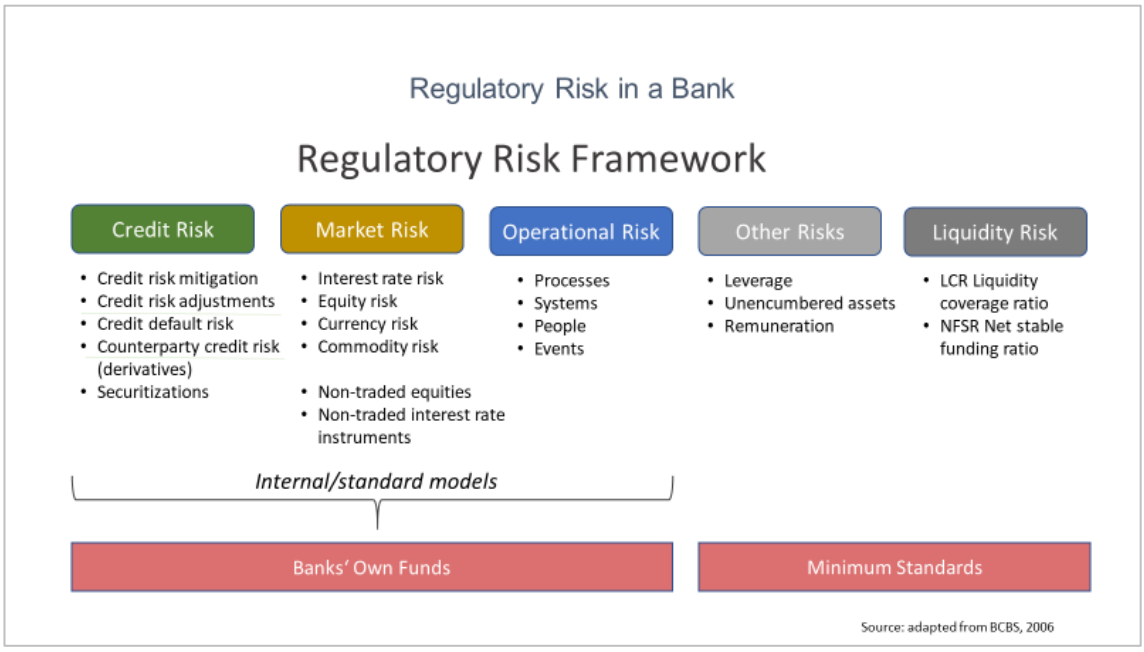

Figure 19: Regulatory risk framework

The regulatory risk framework differentiates between risks for which a bank must hold own funds (equity capital), and risks that are only assessed and a minimum regulatory standard must be met (Mendoza, 2015). Own funds are a scarce resource for banks and therefore expensive as capital providers expect a return depending on the overall perceived risk of their investment.

In the regulatory risk framework, all major financial risks, except liquidity risk and some other minor risks, must be supported with own funds. Regulatory authorities follow a conservative approach when permitting capital instruments eligible for using as own funds of a bank. Only highly rated capital may be chosen.

Therefore, the amount of available own funds for regulation purposes can differ substantially from the actual economic capital available to a bank.

Comparable to the general risk framework, banking regulation also divides the risks into the main categories credit risks, market risks, operational risks, and liquidity risks (Mendoza, 2015). When assessing the own funds requirement of these risks (except liquidity risk), banks have the choice between calculating the capital charge with a standard model or an internal model. The standard models for each risk category are defined in detail by the Capital Requirements Regulation CRR. Banks must map their assets to exposure classes and apply a specific risk weight. These so-called risk weighted assets (RWA) are then weighted with the solvency ratio of a minimum 8 % or above where applicable (European Parliament, 2013b). The result is the capital requirement banks governed by EU law must hold, thereby effectively limiting the overall risk a bank can take on in its books.

Banks with large risk portfolios can opt for internal regulatory risk measurement approaches. With this option, they can quantify their financial risks more precisely compared to the standard models imposed externally by regulators (Allen, 2004). However, a disadvantage of the internal approaches is that many risk parameters must be defined by the banks internally which leaves room for misjudgement or even manipulation. Internal approaches therefore need to be validated by regulatory authorities which is a time-consuming and costly process. For regulatory risk disclosure and the scoring model, internal approaches are an important area for quality evaluation. Investors are aware of the inherent judgement problems and expect detailed comments and explanations on model parameters, main methodologies and results.

The CRR (European Parliament, 2013b) further divides credit risk and market risk portfolios into outright assets such as credit exposures or equities, and derivatives whose value is conditional on that of the underlying assets (Hull, 2018). Although derivatives are notional (not nominal) contracts, their trading volume and risk can substantially surpass that of the underlying assets. This being the case, regulatory authorities as well as investors are especially concerned about these derivative instruments and expect extensive disclosure on them (EBA, 2020) that must again be evaluated extensively in the disclosure scoring model.

The financial crisis of 2008 shifted regulatory attention further to asset-backed securities (ABS), a special class of financial products with market and credit risks based on traditional loan exposures (Basel Committee on Banking Supervision, 2009). ABS can take on various forms and are often subsumed as securitisations. The massive default on ABS instruments was one of the main reasons for the financial crisis in addition to liquidity problems (Enhanced Disclosure Task Force, 2012). For increasing transparency in these exposures, regulators set up a separate disclosure category where investors can find consolidated information.

Liquidity risks and a group of other risks such as unencumbered assets and leverage do not need to be supported by a bank's own funds, but regulatory minimum ratios must be met. The purpose of these minimum ratios is to make banks more resilient towards external shocks in the market. In the case of liquidity, these minimum ratios differentiate between short term (liquidity coverage ratio - LCR) and medium to long-term (net stable funding ratio - NSFR) orientation.

Lastly, a special case is the subject "remuneration" in the regulatory risk framework. During the 2008 financial crisis several banks were heavily criticised for paying high management bonuses despite being close to failure or even being bailed out with taxpayers' money (European Parliament, 2010). There was substantial public interest in cutting off excessive bonus payments that could pose a material risk to the sustainability of a bank. As a result, banks are urged to disclose their remuneration policies in regulatory risk reports.

In summary, the regulatory risk framework imposes a wide range of rules and regulations for disclosure on financial risks that banks must comply with. Banks must disclose their exposures and how they measure and manage them. There are also several options available for non-standardised risk measurement (e.g., internal approaches) where banks can choose which model best fits their risk profile. Whenever this is the case, there is ample room for additional quantitative and qualitative disclosures for explaining methods and procedures applied. Evaluating and assessing the quality of these disclosures is one of the challenges the proposed disclosure scoring model faces.

4.3.3 Content of Regulatory Risk Disclosure in the EU

After the discussion of the general risk framework of banks and the regulatory risk framework in the two preceding sections, this section now explores in detail the content to be disclosed in banks' regulatory risk disclosure reports according to the EU regulations. This section is part of the coding rulebook (see 5.5) as it includes the content that coders can expect in regulatory risk disclosure reports, and that later gets evaluated by the disclosure scoring model.

The international Basel Committee on Banking Supervision (BCBS) published several recommendations (see section 2.3.3.1) on how best to disclose risk information to shareholders and other interested market participants. The original ground-breaking consultative document was issued in June 2006. A revised framework for the "International Convergence of Capital Measurement and Capital Standards" (Basel Committee on Banking Supervision, 2006b) was compiled and put up for discussion and comments. Part four of this document (pages 226 – 242) specifically addresses risk disclosure issues and suggests possible contents and formats. Banks may voluntarily follow these recommendations.

The guidelines of the BCBS have the character of recommendations and are not immediately legally binding. Within the EU, BCBS disclosure recommendations are transferred in EU law in the form of the CRD IV/CRR legal package which came into force on 17 July 2013 ("CRD IV") and 28 June 2013 ("CRR"). By choosing the form of an EU regulation, there is no further adoption into national law of member states required ("single rulebook" of the common European market) (European Banking Authority, 2018). The CRD IV/CRR fully substitutes national banking regulations, thereby providing a level playing field for banking services in the EU (Morrison & White, 2009). The start of the first reporting period of the new legal package was scheduled for 1 January 2014. The first annual disclosure reports covering the year 2014 were therefore dated 31 December 2014.

Regulatory disclosure requires the publication of quantitative (regulatory and financial data) and qualitative (explanations and comments) information on risk management, regulatory capital, and risks (see for example the disclosure report of HSBC Hongkong & Shanghai Banking Corporation (2018)). The reports must be prepared on a consolidated level and with an annual frequency (only a

subset of key figures must be published quarterly if certain thresholds apply). Furthermore, for significant subsidiaries, key capital ratios must be disclosed. Internal auditing on the accuracy of the disclosure content must be performed formally regarding processes and responsibilities, but not materially on regulatory figures (Becker et al., 2012).

Figure 20 summarises the structure of the regulatory risk disclosure requirements of the CRR.

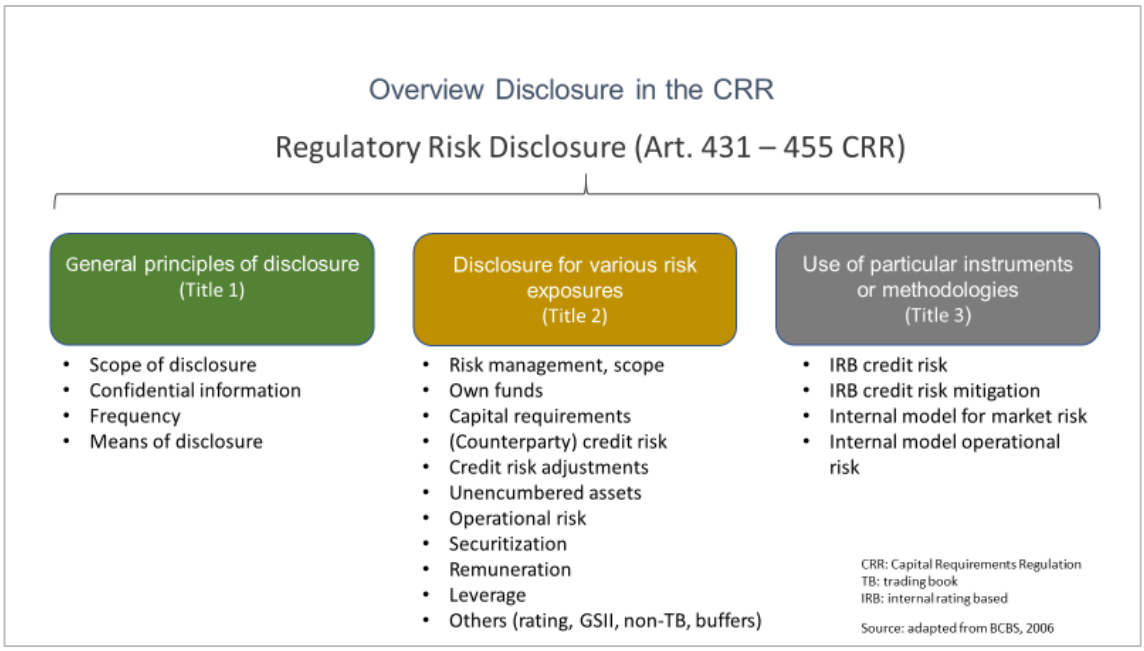

Figure 20: Overview disclosure in the CRR

Disclosure by institutions is regulated in part eight of the CRR (European Parliament, 2013b) in articles 431 to 455 as follows:

- The general principles of risk disclosure are laid out in Title 1. They primarily comprise qualitative issues such as the description of the risk policy and management, and the risk profile of banks.
- The criteria on transparency and disclosure for various risk exposures follow in Title 2. Under this headline, disclosures on *own funds and standard approaches* for risk exposures in the credit, market and operational risk area are compiled.
- Finally, the last part in Title 3 includes the qualifying requirements for the use of particular instruments or methodologies (*internal approaches*). Banks can opt for using internal risk measurement approaches, thereby substituting the

(default) standard risk approaches (European Parliament, 2013b). If a bank chooses to do so, it must disclose an extensive list of additional model parameters and supporting comments and explanations on their measurement approaches.

Table 2 summarises the main contents of risk disclosures in the CRR. Articles not listed in the right column of this table are not relevant for risk disclosure.

Title I General principles	
• Adoption of a formal policy • Assessment of appropriateness of disclosure • Comprehensiveness assessment of risk profile	Art. 431 – 434 CRR
Title II Technical criteria on transparency and disclosure	
General overview of risk management objectives and policies	Art. 435
Disclosure on own funds (capital)	Art. 437
Disclosure on capital requirements	Art. 438
Disclosure on counterparty credit risk	Art. 439
Disclosure on credit risk and adjustments	Art. 442
Disclosure on market risk exposures	Art. 445
Disclosure on operational risks	Art. 446
Disclosure on equity exposures not included in the trading book	Art. 447
Disclosure to interest rate risk not included in the trading book	Art. 448
Disclosure on securitisation exposures	Art. 449
Disclosure on the remuneration policy	Art. 450
Disclosure on leverage	Art. 451
Title III Qualifying requirements for the use of particular instruments or methodologies	
Disclosure on the use of an internal model (IRB) for credit risk	Art. 452
Disclosure on the use of credit risk mitigation techniques	Art. 453
Disclosure on the use of an internal model (AMA) for oper. risk	Art. 454
Disclosure on the use of an internal model for market risk	Art. 455

Table 2: Disclosure categories in the CRR

In the next section the main contents of each CRR article are outlined. They cover all issues that a reader (the “principal”, as defined in agency theory) may expect from a regulatory risk disclosure report. The quality of such a report depends on how well a bank communicates the mandatory and voluntary parts of information. The scoring model developed in this thesis relies on this content when it measures the quality of disclosure reports.

4.3.4 Content Overview on Risk Disclosure in the CRR

The general principles of risk disclosures in Title 1 form a central part of regulatory risk disclosures (Becker et al., 2012). They cover only four CRR articles but define the scope of disclosure reports. The *scope of disclosure* (Art. 431 CRR) comprises all institutions that are subject to the banking regulations of the CRR. The top consolidated legal entity, usually the corporate headquarter or the holding company, is required to publish the regulatory risk disclosure reports on a consolidated basis (Kasprowicz & Klopf, 2016). The proposed scoring model will therefore focus only on this level.

At minimum, banks must publicly disclose all information that is required in the regulation. An exception exists only for non-material, proprietary or confidential information (Art. 432 CRR). Institutions must formally comply with the CRR disclosure framework, therefore forming the mandatory part of risk disclosure (Art. 431(1)).

In addition, banks must adopt a formal policy for assessing the appropriateness of their risk disclosures (Kasprowicz & Klopf, 2016). Art. 431(3) CRR states that they must assess whether their risk disclosures “… convey the risk profile comprehensively to market participants” (European Parliament, 2013b). Whenever this is not the case, “… institutions shall publicly disclose the information necessary in addition to that required in accordance with that regulation” (European Parliament, 2013b). This fall-back rule opens the doors for any voluntary risk disclosure. Institutions are responsible to disclose whatever additional information they deem necessary for communicating their comprehensive risk profile to market participants. The proposed scoring model measures the quality of information provided, regardless of whether banks follow a minimalist or a more open disclosure policy.

The scope of disclosure is limited by three dimensions namely materiality, non-proprietary and non-confidentiality (Art. 432 CRR). Only material information shall be disclosed. Information is regarded as material if the omission of the information would alter the economic decisions of market participants. The interest of the institutions is considered through the non-proprietary requirement. Information is regarded as proprietary if disclosing it would undermine the institution's competitive position in the market. The interest of external stakeholders is taken care of in the confidentiality clause. Information shall not be disclosed if a confidentiality agreement between the institution and a customer exists and disclosure would breach this contract. Still, where appropriate, the institution should aim at disclosing more general information avoiding the identification of individual contracts or relationships (Becker et al., 2012).

The next two CRR articles, 433 and 434, cover the frequency and the means of disclosure. Banks face the trade-off between publishing regulatory risk disclosure reports frequently as financial markets can move quickly, and the associated substantial costs for preparing these reports (Basel Committee on Banking Supervision, 2015). The minimum frequency of regulatory risk disclosure reports is annually in conjunction with the annual reports prepared for financial reporting (Art. 433 CRR). A more frequent disclosure policy shall be taken into consideration in case the characteristics of an institution's business activities justify quicker responses to changes in market conditions. At the current status of development, the proposed disclosure scoring model is based on an annual publication of disclosure reports.

Risk disclosure reports need to be easily accessible to interested parties. The means of disclosure are recommended in Art. 434 CRR. A study conducted by the EBA (2020) has found that market participants prefer to find all relevant disclosure contents in one place, usually in one document published online on an institution's website under the investor relations section. Institutions face the challenge that disclosure does not become too redundant in a sense that disclosure requirements from IFRS reporting, corporate governance reporting, or stock exchange listings tend to be quite similar to regulatory reporting in certain areas (e.g., equity, credit risk adjustments or the risk discussion in the MD&A section of an annual report) (EBA, 2020). However, often the conceptual perspective (profitability and financial position in annual reports versus risk in

regulatory reports) and the data basis differs between these reporting frameworks. Therefore, regulatory risk disclosure reports should be self-contained and published in one place. Only where necessary should references to other sources be made.

The criteria on transparency and disclosure for various risk exposures are discussed in Title 2 of the CRR. The regulation uses the term “technical criteria”. Yet, the term is misleading. In the beginning, this part demands a general overview of risk management objectives and policies that summarise the overall risk profile of an institution. The content of this part is of high importance to the disclosure scoring model as this is the place where a bank explains its risk management approach (Becker et al., 2012). The part further includes all regulatory relevant risk categories ranging from credit risks to leverage risks (see Table 2: Disclosure categories in the CRR). It specifies the subjects market participants can expect in the risk disclosure reports.

Disclosures on risk categories are regularly split into a quantitative tabular presentation of actual risk figures and an accompanying qualitative explanation and discussion of exposures. By and large, the extent of quantitative information is predefined, and banks have little room to adjust the reporting templates (Basel Committee on Banking Supervision, 2015). However, banks enjoy much more freedom on the qualitative side. In their comments, they can decide whether they want to present just basic information on their risk exposures or provide a more detailed analysis.

Art. 435 CRR outlines the main contents of this overview on risk management objectives and policies. The disclosures must primarily include the strategies an institution has defined to manage its risks and all processes that are in place to support the implementation of these strategies (Becker et al., 2012). Furthermore, the bank must explain the organisational structure and the internal organisation of its risk management functions, supported by an organisation chart with information on decision-making power and authority and lines of reporting. Besides strategy, process and people, the institution must give information on the scope and nature of systems used for the calculation and reporting of risk exposures (European Parliament, 2013b). Effective risk management means actively monitoring and limiting risk exposures through hedging with offsetting positions or mitigating through collateral from counterparties. (Jorion, 2007). A

bank must disclose its policies for hedging and mitigating risks (Becker et al., 2012) and the strategies and processes for monitoring the continuing effectiveness of the hedges and collateralised exposures (European Parliament, 2013b). Finally, the responsibilities of management for the risk management function are set forth by two declarations management has to make. The management must assure that the internal risk management systems in place are adequate with regard to the institution's risk profile and strategy. Additionally, a risk statement must be approved by management that describes the overall risk profile and how it interacts with the risk tolerance set by the institution's governing bodies (European Parliament, 2013b). Both declarations are very relevant to the discussion on disclosure in agency theory as they both define the responsibilities of the "agents" for guaranteeing to the "principals" the correctness of the monitoring reports. Ultimately, it is a question of maintaining trust whether stakeholders "believe" the content presented in the reports (compare to a similar discussion on trust in corporate governance practice (Awolowo et al., 2019)).

A bank must have enough own funds (equity capital) available to support its risks (Kuritzkes et al., 2002). This is achieved by first measuring the risk of its assets and then applying a minimum capital requirement. In technical terms, risk weights are applied to the exposures for calculating risk weighted assets (RWA) which are then set in relation to the available own funds. The resulting solvency ratio must be above a certain threshold which is at 8 % plus applicable add-ons (European Parliament, 2013b). An institution that falls below these minimum capital thresholds triggers a process that ultimately leads to the loss of its banking license. The models, rules and methods for calculating the solvency ratio are defined in the Capital Requirements Regulation (CRR) that builds on pillar 1 of the Basel III guidelines (European Parliament, 2013b).

The quality of own funds is crucial for the resilience of a bank (Meneau & Sabatini, 2011). Institutions must disclose quantitative and qualitative information for all key risk and own funds categories investors need in order to understand the calculation of capital requirements. Several regulatory restrictions apply to the calculation of own funds eligible for regulatory purposes (Meneau & Sabatini, 2011). Own funds are segregated into high-quality core capital ("Tier 1") and lower-quality additional capital ("Tier 2"). Banks must disclose their own funds composition and explain any conditions that apply, especially in the case of

innovative, complex or hybrid capital instruments. An institution must also explain its approach to assessing the adequacy of its internal capital to support current and future operations (Internal Capital Adequacy Assessment Process ICAAP) (Buchmüller, 2019). Art. 436 to 438 CRR specify the disclosure requirements for own funds (European Parliament, 2013b). For each risk category, the risk weighted assets (RWA) and the required capital must be disclosed. This disclosure requirement is particularly important for this thesis. The proposed regulatory risk disclosure model requires the weighting of disclosures scores per risk category with their relative proportions of total risk (see section 4.5.3). These proportions are taken from this disclosure requirement.

For many banks, credit risk is the single most important risk category (European Central Bank, 2018). The disclosure on credit risk (Art. 442) must provide external stakeholders with a wide range of information on the total credit exposure which is the outstanding credit balance after any specific and general credit provisions have been made (Jorion, 2007). Banks must disclose information on the specific nature of the exposures (geographic distribution, break down by industry and counterparty type) and the methods applied for capital assessment and evaluation of the reliability of the information disclosed. In addition to an extensive quantitative disclosure, the focus is on the qualitative discussion of current and future credit risks. Furthermore banks must explain how they integrate their current credit risk profile in their overall credit risk management policy (European Parliament, 2013b). The use of an internal credit risk model makes the disclosure requirements much more complex (Servigny, 2004). Banks must explain and review the structure of their internal rating system, the use of other internal parameter estimates, the process for managing and recognising credit risk mitigation, and the control mechanisms for the rating systems with respect to independence, accountability, and the rating system (European Parliament, 2013b).

Counterparty credit risk is a special kind of credit risk where the risk of a derivative instrument depends on the value of an underlying instrument (Cannata & Quagliariello, 2011), whereas traditional credit risk is based on the outstanding nominal balances of loans or similar products (Hull, 2018). Usually, the nominal of the contract is not exchanged but only used as a notional amount for calculating cash flows (Art. 439 CRR). Most derivative instruments such as

futures, options and swaps follow this logic, resulting in notional volumes of derivative positions becoming very high. However, the credit exposure is limited to the actual interest and currency cash flows on the derivative (Hull, 2018). Banks must disclose the methodologies used to assign regulatory and economic capital to counterparty credit exposures together with an explanation of how the credit limitation process is implemented (European Parliament, 2013b).

An encumbered asset is an asset that is pledged to secure, collateralise or credit-enhance any on-balance-sheet or off-balance-sheet transaction from which it cannot be freely withdrawn (European Banking Authority, 2014). Banks must separate their assets into those that are used to support existing funding or collateral requirements with central banks and emergency liquidity assistance provided by central banks, and those that are available for potential funding needs (Art. 443 CRR). Investors prefer unencumbered assets in case of economic and financial crisis as these assets can be freely manipulated by the bank without being constrained by other investors' rights (Banal-Estanol et al., 2017). Institutions must disclose narrative information on the impact of their business model on their level of encumbrance and the importance of encumbrance in their funding model (Art. 443 CRR).

Market risk is the second most important risk category for banks (European Central Bank, 2018). The CRR allows banks to decide whether they prefer to use a standardised approach for measuring their market risks or to use an internal Value-at-Risk approach (Becker et al., 2012). The content of the disclosure on the standardised approach is regulated in Art. 445 CRR. Banks must split their market risk measurement into interest rate risk, equity position risk, foreign exchange risk, and commodity risk, and comment qualitatively on the exposures and trends with a focus on general and specific (issuer) market risks (European Parliament, 2013b). In case a bank has opted for an internal market risk model (Art. 455 CRR), the disclosure covers a wide range of model parameters and model validation rules. For each market risk portfolio banks must explain the characteristics of the model used as well as the methodologies applied, and the risks measured including migration and correlation risks. They must describe the stress testing applied to the portfolios, the approaches used for back-testing and the validation of the accuracy and consistency of the internal models and the modelling process (Becker et al., 2012).

Similar to the CRR regulations on credit and market risks, banks have the option to use a standardised (Art. 446 CRR) or internal (Art. 454 CRR) measurement approach for their operational risks. Banks must disclose the approach for their assessment of operational risk and describe any bank internal methodology they apply, together with a discussion of all relevant internal and external factors and parameters considered. Due to the fact that operational risk can be manifold in nature (see section 4.3.1), they must disclose the scope and coverage of any partial model use. In case of an (internal) advanced measurement approach (AMA), banks must describe any use of insurances or other risk transfer mechanisms for the purpose of mitigating their operational risks (Kinglsey et al., 1998).

A bank can invest in equities with the sole objective to profit from short-term price changes. Such positions need to be assigned to the trading book portfolio and the risk and capital charge is calculated based on Art. 445 CRR (standard approach) and Art. 455 CRR (internal model approach).

Equity and interest rate bearing instruments with which banks pursue mainly strategic and participation objectives as opposed to making capital gains through trading activities are assigned to the banking book (Allen, 2004). Art. 447 and 448 CRR require banks to disclose information on how they differentiate in assigning positions to the trading and banking book (European Parliament, 2013b). Banks must make their investment objectives transparent and discuss the policies for their valuation and accounting, including the underlying valuation assumptions and eventual changes in accounting policies.

Securitisation gained prominence in regulatory reporting over the past decade as it was considered one of the main factors that triggered the financial crisis in 2008 (Enhanced Disclosure Task Force, 2012). The information demanded by external stakeholders is high which is reflected in wide disclosure requirements (Basel Committee on Banking Supervision, 2011). In a securitisation agreement, non-tradable bank assets such as loan portfolios (mortgages, student or car loans) are converted into marketable securities (Culp, 2012). Once securitised into asset-backed securities (ABS) banks can physically or synthetically sell these credit exposures to other investors, thereby reducing their credit and concentration risk. Investors in ABS benefit from risk diversification and higher returns for lower rated tranches but bear the risk of poor

quality and composition of the underlying loan portfolio (Culp, 2012). Art. 442 CRR details which information banks must disclose on their securitisation positions. They must describe their securitisation objectives, the nature of other inherent risks such as liquidity risk, and the type of risks of the underlying assets with respect to seniority and re-securitisation (European Parliament, 2013b). Banks must further disclose their role in the securitisation process such as originator, investor or sponsor as well as the extent to which they are involved in each role. Finally, regulatory authorities expect banks to comment on all significant changes on quantitative disclosures since the last reporting period.

Although not a classical risk category, management remuneration is added by regulatory authorities to the general disclosure requirements (Art. 450 CRR). Regulators are concerned that a remuneration policy not closely linked to risk management might induce managers to accept higher risk exposures by not being made accountable for eventual negative outcomes, which is a classic example for a moral hazard situation (Argimon et al., 2011). Remuneration of managers also plays an important role in agency theory in its attempt to reduce the information gap between agents and investors through aligning their financial interests. Banks must disclose their remuneration decisions and how the general remuneration policy is determined (European Parliament, 2013b).

One of the fundamental constituents of the Basel III framework is the weighting of exposures with risk weights. Experience shows that in times of financial distress the actual losses exceeded by far the losses predicted by the regulatory risk weights (Basel Committee on Banking Supervision, 2013). The build-up of excessive on- and off-balance sheet leverage in the banking system was identified as another cause of the 2008 financial crisis (Adkins, 2011). To cope with this adverse situation, banking authorities introduced a simple, transparent, non-risk-based leverage ratio (European Parliament, 2013b). The ratio is defined as the relationship between the eligible regulatory capital and the unweighted IFRS exposures (Adkins, 2011). The total amount of exposures must not exceed a bank’s capital by a certain percentage (3 % as of 2019). Banks must disclose the processes implemented to manage the risk of excessive leverage (Art. 451 CRR). They also must explain all factors that had an impact on the leverage ratio for the period to which it refers to.

Risk mitigation covers an important part of the risk management process (Art. 453). While taking risks is one of the core businesses of a bank there is also the need to actively manage the risk positions with risk mitigation techniques (Becker et al., 2012). Traditionally the acceptance of collateral and guarantees is the major source of risk mitigation. Banks must disclose in detail these risk mitigation instruments and describe the policies and processes for their on- and off-balance sheets netting agreements. Banks must also summarise the policies for collateral valuation and management as well as the types of collateral they are willing to accept. In case banks make use of credit derivatives or guarantor agreements they must disclose the main types and creditworthiness of the guarantors (European Parliament, 2013b).

In summary, this section discussed the content of regulatory risk disclosures in CRR articles 431 to 455. The proposed regulatory risk disclosure scoring model measures the quality of these disclosures. As the discussion above shows, banks must describe their risk exposures, but also must explain and comment extensively on the current and future impact of the risks, their management, and the strategies they pursue with them. Banks have discretion on how to disclose the required risk information, and the quality of their disclosures will depend on how good they perform on this task.

4.3.5 Mapping of Risk Exposures to Risk Categories

In the first step of developing the scoring model, the content of the disclosure requirements in CRR articles 431 to 455 is consolidated to the risk categories reviewed in section 4.3.4 (see Table 3). The risk categories are the main input on the risk dimension for the scoring model developed in section 4.5. The mapping rules are as follows:

- CRR articles with credit risk content are mapped to the risk category “credit risk”
- CRR articles with market risk content are mapped to the risk category “market risk”
- CRR articles with operational risk content are mapped to the risk category “operational risk”

- CRR articles with capital and risk management content are mapped to the category “risk management”, and
- CRR articles with content that does not fall into any of the aforementioned categories are mapped to the risk category “other risks”.

CRR disclosure requirements	CRR articles	Mapping to scoring model risk categories
Title I General principles		
Formal policy, appropriateness, comprehensiveness of risk profile	Art. 431 - 434	Risk management
Title II Technical criteria on transparency and disclosure		
Risk management objectives and policies	Art. 435	Risk management
Own funds (capital)	Art. 437	Risk management
Capital requirements	Art. 438	Risk management
Counterparty credit risk	Art. 439	Credit risk
Credit risk and adjustments	Art. 442	Credit risk
Market risk exposures	Art. 445	Market risk
Operational risks	Art. 446	Operational risk
Equity exposures not incl. in the trading book	Art. 447	Credit risk
Interest rate risk not incl. in the trading book	Art. 448	Credit risk
Securitisation exposures	Art. 449	Market risks
Remuneration policy	Art. 450	Other risks
Leverage	Art. 451	Other risks
Title III Qualifying requirements for the use of particular instruments or methodologies		
Internal model (IRB) for credit risk	Art. 452	Credit risk
Credit risk mitigation techniques	Art. 453	Credit risk
Internal model (AMA) for operational risk	Art. 454	Operational risk
Internal model for market risk	Art. 455	Market risk

Table 3: Mapping CCR disclosure regulation to risk categories

4.4 Principles of High-Quality Disclosure

The focus of this section is on how to analyse the quality of risk disclosure. The first part of this section summarises criticism of the current practices of disclosure and identifies areas for improvement. The second part reviews three initiatives for improvements. These initiatives have in common that they all aim to improve financial communication to stakeholders. They, therefore, contribute to the discussion of reducing the information gap as discussed in agency theory. However, the initiatives come from different areas, one from banking regulation (BCBS), one from financial accounting (IASB), and one from the finance (political) side (FSB). All these three organisations suggest several principles for better disclosure. In the third part of this section, the principles are contrasted, integrated, and consolidated into five quality criteria. Finally, the five quality criteria are analysed and explained in detail for their use in the development of the regulatory risk disclosure scoring model in section five.

4.4.1 Challenges for Risk Disclosure

At the 2017 conference on “The role of disclosure in risk assessment and enhancing the usefulness of corporate reporting in decision-making” organised by the United Nations Commission Trade and Development Board the following main concerns of users of risk disclosure reports were expressed. The concerns are relevant for all types of firms and not necessarily limited to financial institutions (UNCTAD, 2017).

- Disclosures are dispersed within and across several disclosure reports of the firm. The reports also vary in quality and quantity and are also often leading to ambiguous situations where the discussions and explanations for similar cases are not reconciled across reports.
- Disclosure reports of comparable firms are of different quantity and quality. Stakeholders are expected to benefit from being able to compare risk disclosure reports from their focus group. Therefore, homogeneous reports facilitate their tasks, while heterogeneous reports aggravate them. However, even similar firms within the same industry do not share identical business models, therefore requiring flexibility in their risk reporting and undermining comparability in good faith.

- Often generic and industry-specific language is used which is difficult to comprehend for outsiders.
- Disclosure reports cover a long list of many potential risks but lack focus on materiality. To be on the safe side, firms tend to use boilerplate disclosures that cover all potential adverse scenarios but obfuscate the concrete material risks. Stakeholders, therefore, find it difficult to spot the risks that are more likely to materialise than others.
- Disclosures are only descriptive without links to potential economic impacts. The evaluation of risks also carries some inherent subjectivity of the preparers. Moreover, evaluating the potential future economic impacts of the risks makes the risk reports even more subjective. Therefore, firms tend to refrain from subjective evaluations while understanding that evaluations would add value to the reader's comprehension of the firm's risk profile.
- Users face the trade-off between the public wish for transparency and a justified interest of the firm for confidentiality.

The concerns mentioned above are not solely those of the users of risk reports. Also, the preparers of reports often must make subjective decisions on how to disclose their risks. By the very nature of risks, they tend to be difficult to assess quantitatively and qualitatively. Consequently, firms favour comprehensive, but generic disclosures over concise future-oriented reports in order to avoid misinterpretations and criticism for omissions or even litigation (UNCTAD, 2017).

4.4.2 Initiatives for Improvements of Risk Disclosure Reports

In recent years, three major initiatives were taken to address the concerns about disclosure and suggest improvements for risk disclosure reports. The initiatives cover different areas of risk reporting. The *International Accounting Standards Board (IASB)* promotes improvements for all firms that must follow IFRS accounting rules. The *Financial Stability Board's (FSB)* role is to promote banks' transparency in the wake of the 2008 financial crisis. Lastly, the *Basel Committee on Banking Supervision (BCBS)* suggests improvements from the

banking regulation's perspective. Figure 21 summarises these initiatives and their focus.

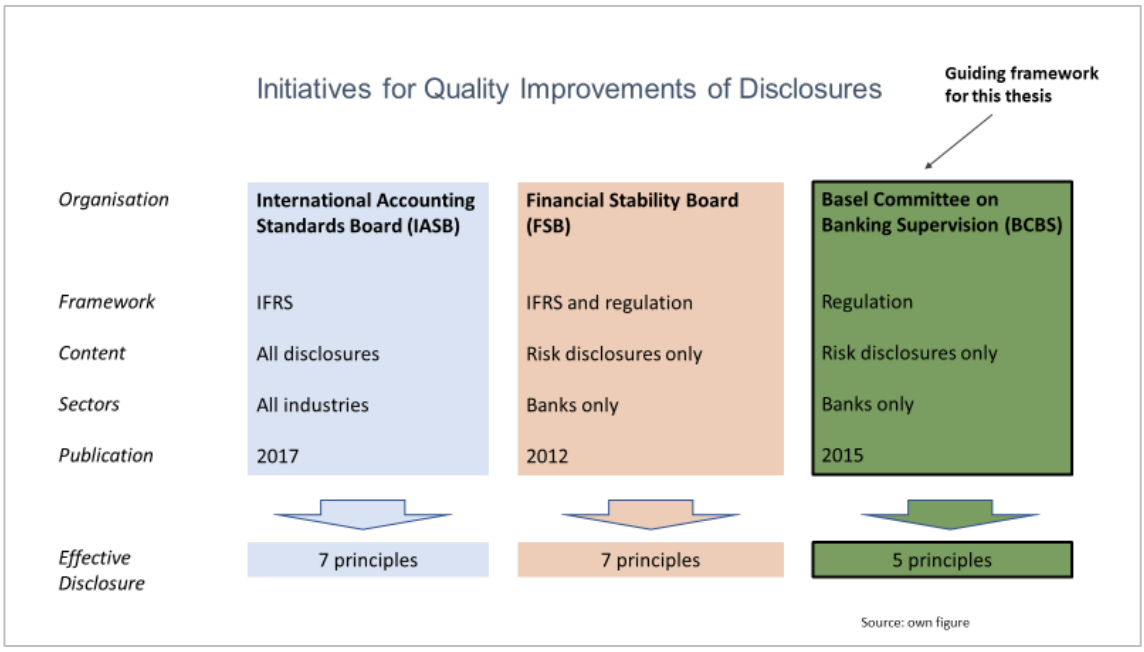

Figure 21: Initiatives for quality improvements of disclosure

Each organisation has published a list of several principles that are summarised in tables Table 4 to Table 8 below. The principles are partly overlapping and can be consolidated into five quality criteria.

A broad-based initiative is undertaken by the International Accounting Standards Board (IASB) for the improvement of disclosures in financial reports (IFRS). The project called "Disclosure Initiative" was started after a public discussion forum on Financial Reporting Disclosure in 2013. Feedback received from participants identified a need for substantial improvements in risk and general disclosures. In particular, disclosures were viewed as being little effective in communicating risk exposures to stakeholders. The project pursues two goals. First, firms should be supported by applying better judgement to their reporting, and second, the effectiveness of disclosures to stakeholders such as investors, lenders and other creditors should be improved. By March 2017, the project reached a milestone by publishing its discussion paper "Principles of Disclosure" (International Accounting Standards Board, 2017). This paper establishes seven principles for high-quality disclosure that provide firms with guidance on

improving the effectiveness of their disclosures. The Disclosure Initiative project is still ongoing and will run until 2021.

While the IASB Disclosure Initiative is of a general nature focusing on all kinds of IFRS disclosures for various industry sectors, the second initiative is targeting risk disclosures of banks specifically. The Enhanced Disclosure Task Force (EDTF) was established by the Financial Stability Board (FSB) in 2012 after the turmoil of the 2008 financial crisis. Investors' trust and confidence in banks was deemed low and better risk disclosures were an important step towards rebuilding resilient relationships. The goal of the task force was to provide firms with a "foundation for developing high-quality, transparent disclosures that clearly communicate banks' business models and the risks that arise from them" (Enhanced Disclosure Task Force, 2012). The task force claims that the composition of its member groups from users (investors, analysts, rating agencies), supervisors (international regulators, standard setters, auditors) and preparers (banks) leads to an integrated perspective on improvements of risk disclosures in the banking sector. In 2012, the task force published its final report "Enhancing the Risk Disclosures of Banks" with several recommendations (Enhanced Disclosure Task Force, 2012). The recommendations were published in seven fundamental principles. They address the main disclosure concerns of users in the area of understanding banks' business models, the key risks and their measurement, the banks' liquidity positions, the calculations of banks' risk-weighted assets (RWA) and the changes in both RWA's and regulatory capital. Further concerns were the relationship between market risk and balance sheet measures, and loan forbearances with respect to impaired and non-performing loans.

The practical recommendations of the EDTF were taken into consideration and followed-up by the leading international standard setter for the banking sector when work was started to improve Basel III pillar 3 disclosure requirements by the Basel Committee on Banking Supervision (BCBS). In January 2015 the BCBS published its final version on "Revised Pillar 3 disclosure requirements" (Basel Committee on Banking Supervision, 2015). The paper includes five guiding principles that aim to make regulatory risk disclosures more effective. The overarching goal of the five principles is to "provide meaningful regulatory information to investors and other interested parties" (Basel Committee on

Banking Supervision, 2015) on a basis that is internally and externally consistent and comparable among banks. Investors and other market participants should be put in a position to better understand a bank's business model and its inherent risks, and benefit from comparative studies in the banking sector.

Tables Table 4 to Table 8 summarise the disclosure principles suggested by each of the three organisations (IASB, FSB and BCBS). Due to the importance of the regulatory standard setter BCBS for this thesis, the seven principles of the IASB and the FSB are then mapped to the five principles of the BCBS, before they are consolidated into five major themes (the "quality criteria").

Table 4 compares principles from the IASB, the FSB and BCBS that can be consolidated into a quality criterion “readability”.

Principles for **“readability”**		
IASB	FSB	BCBS
IASB Principle 2) Information should described as simply and directly as possible • no loss of material information • no unnecessary increase in length IASB Principle 5) No unnecessary duplication of information, material information only IASB Principle 7) Appropriate format of information, narrative text vs. tables for data-intensive information	FSB Principle 1) Disclosures should be clear, balanced and understandable • Communication suitable to a range of users from sophisticated to less specialised • Appropriate balance between qualitative and quantitative disclosures • Explanations for more complex issues	BCBS Principle 1) Disclosures should be clear • presented in an understandable form to key stakeholders • communicated through an accessible medium • highlighting important messages • explaining complex issues in simple language and definition of important terms • presenting related risk information in one place

Table 4: Principles related to “readability”

Table 5 compares principles from the IASB, the FSB and BCBS that can be consolidated into a quality criterion “comprehensiveness”.

Principles for **“comprehensiveness”**		
IASB	FSB	BCBS
IASB Principle 1) Disclosure shall be entity-specific • no "boilerplate" language IASB Principle 7) Appropriate format of information narrative text vs. tables for data-intensive information	FSB Principle 2) Disclosures should be comprehensive and include all of the bank's key activities and risks. • Overview of the bank's activities and key risks • Informative explanations of important processes and procedures for a bank's business and risk management • Information about key underlying assumptions and sensitivity/scenario analysis	BCBS Principle 2) Disclosures should be comprehensive • describe bank's main activities and risks • include sufficient information in both qualitative and quantitative terms on processes and procedures for identifying, measuring and managing risks • reflect on how senior management and the board of directors internally assess and manage risk and strategy (risk tolerance/appetite)

Table 5: Principles related to “comprehensiveness”

Table 6 compares principles from the IASB, the FSB and BCBS that can be consolidated into a quality criterion “meaningfulness”.

Principles for **“meaningfulness”**		
IASB	FSB	BCBS
IASB Principle 3) Highlight and emphasise important matters • Based on disclosures that are used for internal decision-making and risk management • Explanation of the risk and rewards profile of a bank's activities • Balance of confidentiality and materiality IASB Principle 4) Links where and when relevant to other information and highlighting relationships	FSB Principle 3) Disclosures should present relevant information • Only material information that reflects a bank's activities and risks and that can be prepared without unreasonable cost • Avoid generic or boilerplate disclosures • Information should be provided in the sufficient detail to enable users to understand the nature and extent of a bank's risks. • Explanation of the business model to provide the context for the business and risk disclosures. • FSB Principle 4) Disclosures should reflect how the bank manages its risks	BCBS Principle 3) Disclosures should be meaningful • Highlight the most significant current and emerging risks • Include information that is likely to receive market attention • make references to financial statements where necessary • avoid information that does not add value • remove information that is no longer meaningful or relevant

Table 6: Principles related to “meaningfulness”

Table 7 compares principles from the IASB, the FSB and BCBS that can be consolidated into a quality criterion “time comparison”.

Principles for **“time comparison”**		
IASB	FSB	BCBS
IASB Principle 6b) Optimised comparability across reporting periods without compromising usefulness	FSB Principle 5) Disclosures should be consistent over time • Core disclosures should not change dramatically but should evolve over time • Changes should be clearly highlighted and explained.	BCBS Principle 5) Disclosures should be comparable over time • identify trends in risk profiles • explain additions, deletions and changes from previous reports • highlight and explain changes from bank's specific, regulatory or market developments

Table 7: Principles related to “time comparison”

Table 8 compares principles from the IASB, the FSB and BCBS that can be consolidated into a quality criterion “sector comparison”.

Principles for **“sector comparison”**		
IASB	FSB	BCBS
IASB Principle 6a) Optimised comparability among entities without compromising usefulness	• FSB Principle 6) Disclosures should be comparable among banks	BCBS Principle 4) Disclosures should be consistent across sector Comparisons across banks and jurisdictions for business activities, prudential metrics, risks and risk management

Table 8: Principles related to “sector comparison”

For the sake of completeness, FSB Principle 7 “Disclosures should be provided on a timely and frequent basis in appropriate media” was not mapped in tables Table 4 to Table 8 as it is a technical principle that is implicitly taken into account in disclosure reporting through the implementation of Art. 433 CRR.

The tabular comparisons of the principles of the three leading standard setters and policymakers in tables Table 4 to Table 8 show that the principles are of quite similar nature and can be consolidated into five overarching themes. Even though each organisation pursues different goals and addresses different stakeholder groups with their disclosure principles, they share a common understanding of the constituents of high-quality disclosures.

Figure 22: Five criteria for high-quality disclosure

The five criteria readability, comprehensiveness, meaningfulness, time comparability and sector comparability as summarised in Figure 22 are the result of the consolidation of principles, and build the basis for the evaluation of the quality of the regulatory risk disclosure reports in the proposed scoring model. It is argued that a bank that scores high in each of these five criteria is assumed to release high-quality disclosures to its stakeholders and benefit from lower agency costs (see section 4.2.1).

4.4.3 Analysis of the Criteria for High-Quality Disclosure

In this section, the five quality criteria identified in Figure 22 and the key findings from the comparison and integration from tables Table 4 to Table 8 are summarised. The focus is on the disclosure guidelines of the BCBS as this thesis is about regulatory risk disclosure (Basel Committee on Banking Supervision, 2015). The BCBS guidelines are enriched with findings from the IASB and FSB where appropriate.

4.4.3.1 Quality Criterion 1: Readability - Disclosures Should be clear

The quality criterion readability can be viewed from two perspectives. One perspective covers the reading skills of the users of a text. Regulatory risk disclosure reports are usually read by a rather small group of stakeholders who are familiar with the peculiarities of the financial and banking language. However, regulators are worried about an extensive use of “technical” financial language in the reports (Basel Committee on Banking Supervision, 2015). The use of such language can easily blur the important messages in the report. Regulators require preparers of reports to use “clear” language. The term “clarity” in this context refers to the form of the disclosure. Disclosure should be understandable to the key stakeholders such as investors, analysts, and banking customers. Banking-specific language should be avoided when explaining complex issues. In case technical language is required, then important terms should be clearly defined and explained.

The other perspective is the presentation of the content itself. The disclosure report should be easily accessible through a bank’s website (EBA, 2020). It should usually be located under the headings “investor relations” and/or “financial and regulatory reporting”[20] (or similar). In the disclosure report, crucial information should be highlighted and not hidden throughout an exhaustive report (often, reports are about 100 to 200 pages). Disclosures should be compact and not unnecessarily long. A good balance between quantitative figures and qualitative explanations and comments should be aimed for, and related information should be presented together in one place (EBA, 2020).

[20] See for instance the link to the disclosure report of HSBC https://www.hsbc.com/investors/results-and-announcements/annual-report

4.4.3.2 Quality Criterion 2: Comprehensiveness – Disclosures Should be Complete

The criterion comprehensiveness covers the quantity of disclosed information. Regulators aim to ascertain that a bank provides a complete and comprehensive view of their risk profile. Disclosure should include all business areas and attached significant risks, and not omit any important information. Managerial judgement should be used for decision-making on the disclosure content. Risks should be supported by relevant data and management comments. Changes in activities and risk exposures over time should be made transparent and explained if of material nature (see also quality criterion 4). Disclosures should offer a sufficient level of quantitative and qualitative details that are linked to the complexity of a bank's operations. Furthermore, users should be able to easily understand how risks are identified, measured and managed (Basel Committee on Banking Supervision, 2015).

In regulatory reporting and disclosure, the methods for risk assessment are prescribed externally by regulatory authorities. However, banks also have their internal risk management policies and regulations. A discussion on internal and external risk management approaches should therefore be included. It should also reflect the risk tolerance and appetite of the senior management as well as the internal strategies of how the bank plans to manage the risks.

4.4.3.3 Quality Criterion 3: Meaningfulness - Disclosures Should be Useful to Users

Meaningfulness refers to the content of the disclosure itself. Information is meaningful if it receives considerate market attention (Basel Committee on Banking Supervision, 2015). Only information that is relevant and material for the decision-making of external users should be included. Information that is not deemed relevant or no longer relevant should be left out.

Disclosure reports tend to become exhaustive. Therefore, users should be supported in their evaluation process by highlighting the most important current and future risks, and how they are managed by the bank. Information should not

be hidden throughout the report making it impossible for the user to gain a full understanding of the overall risk exposure.

Regulatory risk disclosure is an important information source, but only one of several sources that convey risk information to stakeholders (see section 2.3.4). Users would benefit from an integrated view so, where possible, regulatory information should be linked to information in other reports such as financial and non-financial statements.

4.4.3.4 Quality Criterion 4: Time Comparability - Disclosures Should be Consistent

Business areas and risks change over time. Therefore, disclosure reports should reflect these changes and be regularly adjusted for content and structure. Users should be able to trace the ongoing changes. Still, continuous structural changes in a disclosure report pose a problem to the users. It makes it nearly impossible for them to spot trends in banks' risk profiles and risk appetite by continuously having to adjust to new formats of presentation.

Banks should prepare disclosure reports that are consistent over time. Structural changes, and even more important changes in risk exposures, should be explained with quantitative period-by-period comparisons and qualitative comments. These comments should not only address the current situation but also the changes from the previous periods. Any further additions and deletions from one report to the next should be highlighted and explained.

4.4.3.5 Quality Criterion 5: Sector Comparability - Disclosures Should be Comparable across Banks

For a user it is important to understand the risk exposure of a certain bank. However, it is also useful to be able to evaluate a bank's risk exposures with respect to that of other competing banks in the market. Business intelligence about a bank can be gained from individual reports but also from comparisons with other banks' disclosure reports. Due to the fact that, so far, only recommendations were given on report structures and detail levels, disclosure reports tend to be formally very different[21]. A shared structure and the detail level

[21] As it is for instance the case in Germany with the Deutsche Bundesbank "Anwendungs-beispiele" (best practice examples).

enable external users to compare and rank banks and ultimately help them in investment decision-making. A minimum of standardisation of reporting formats and contents would benefit the preparers as well as the users of the disclosure reports.

4.5 Development of the Disclosure Scoring Model

In this section, the regulatory risk disclosure scoring model is developed. The section draws on the results from the previous sections. In particular, it takes the findings from section 4.3 on regulatory risk categories and combines it with the findings from section 4.4 on quality criteria.

In the first part of this section, the structure and the processing workflow of the model is explained. The second part operationalises the quality criteria. For each quality criterion, one or more empirical indicators are suggested. Then, mathematical algorithms are developed that calculate a disclosure score for each criterion. In the final part, the calculation of the composite disclosure score representing the combined score on all quality criteria for a disclosure report is described.

4.5.1 The Scoring Model Structure and Processing Workflow

The risk disclosure scoring model is a two-dimensional model that measures the quality of banks' regulatory risk disclosure reports (Figure 23).

One dimension of the model is the risk dimension. This dimension comprises the financial and non-financial risks that are regularly communicated in the disclosure reports. The other dimension is the quality dimension. Quality makes a risk disclosure report effective in achieving its information purpose.

The risk dimension (see section 4.3.3) is divided into five categories, namely risk management, credit risk, market risk, operational risk, and other risks (including leverage, liquidity, and non-financial risks). These categories follow the regulatory structure that can be found in the Basel III guidelines where calculation rules and methods are defined for each of the risks and reported separately (European Parliament, 2013b).

The quality dimension (see section 4.4.3) is also split up into five categories, namely readability, comprehensiveness, meaningfulness, time comparability, and sector comparability. The quality categories are the result of the consolidation of recommendations and guidelines of the leading standard setters and policymakers (IASB, EDTF of the FSB, BCBS) in the finance and banking industry (see 4.4.3).

Regulatory risk disclosure reports consist of quantitative and qualitative parts. In the quantitative part, regulatory figures are published in a standardised

format of tables and templates. There is little difference in their presentation from one bank to another, and banks find it difficult to distinguish them from each other. The qualitative part, on the other hand, makes the difference when evaluating the quality of a disclosure report. Within broad limits (see section 4.3.3), banks are free to choose the reporting quality level they deem appropriate for their risk profile. Some banks are reluctant, while others are more willing to disclose information. In current disclosure reports, the qualitative parts cover about two thirds of disclosures and differ substantially from bank to bank (EBA, 2020). The proposed scoring model, therefore, focuses on the evaluation of these qualitative parts.

Figure 23 introduces the framework of the risk disclosure scoring model.

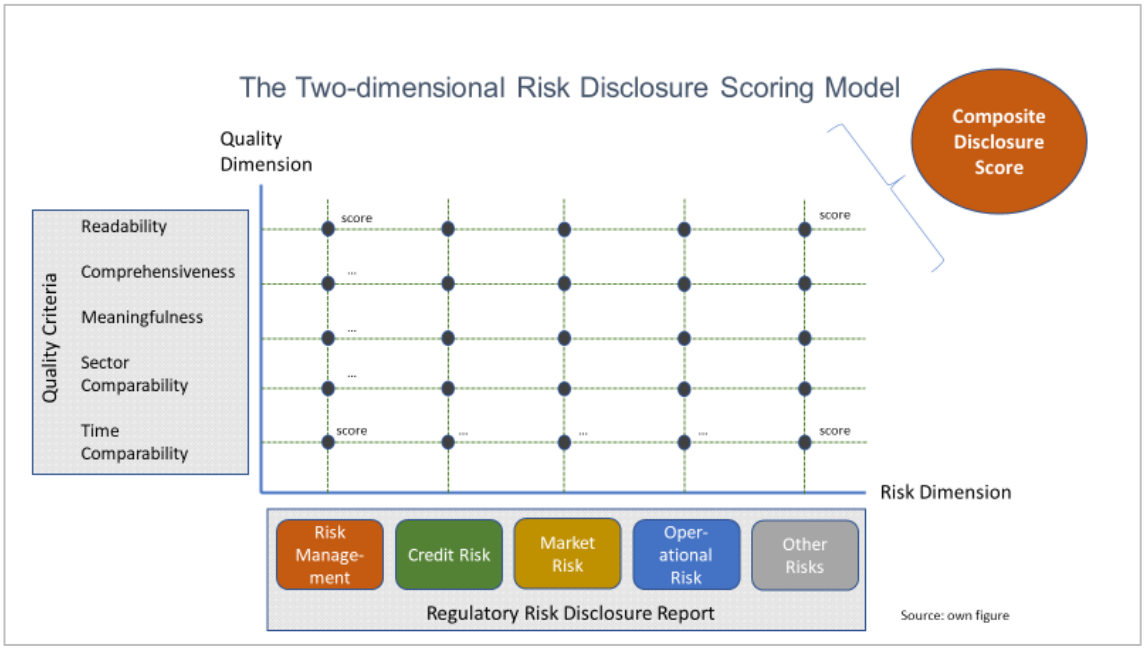

Figure 23: The two-dimensional risk disclosure scoring model

On the horizontal axis the risk dimension is plotted. The vertical axis shows the quality dimension. Each dimension consists of five categories.

The basis of the model are banks' regulatory risk disclosure reports. The model requires structured input from these reports. A report normally consists of all five risk categories as plotted on the horizontal axis, but not necessarily in an orderly manner. Therefore, the relevant qualitative text passages must be extracted from the reports and assigned to each risk category (see section 4.3.5).

The model then applies the five quality criteria on the vertical axis to the content of the risk categories on the horizontal axis. This is done by first operationalising each quality criterion. Empirical indicators are identified for this purpose which proxy each quality criterion well. The definition of these empirical indicators is an important task to ensure the validity and reliability of the model (see 4.5.2).

In the existing literature (see section 2.4) it is discussed how to measure disclosure quality in a complete, valid, and reliable way (Miihkinen, 2011). Beretta & Bozzolan (2004) initiated a stream of academic research to develop empirical indicators that provide useful approximations of important quality aspects of risk disclosure. The proposed risk disclosure scoring model makes use of some of these indicators, develops some further, and suggests new indicators where important quality aspects are not covered by existing indicators. Table 9 summarises the quality criteria, the assigned empirical indicators and provides additional information on the qualitative or quantitative research method applied. Each empirical indicator is then explained and justified in detail in section 4.5.2.

Quality criteria	Operationalisation through empirical indicator (proxy)	Sources	Method
Readability	Gunning-Fog Index	Gunning (1952), Li (2008), Loughran & McDonald (2016)	qualitative
Comprehen-siveness • Quantity	Number of risk disclosure words in disclosure report	Beretta & Bozzolan (2004) *with adjustments*	quantitative
• Coverage	Percentage distribution of risk disclosure words per risk category	Beretta & Bozzolan (2004) *with adjustments*	quantitative
Meaning-fulness	Percentage of quantitative and qualitative risk words indicating future orientation	Jia, Munro, & Buckby (2016) Dobler (2008) Linsley & Shrives (2005)	quantitative and qualitative
Time comparability	Percentage of quantitative and qualitative risk words indicating period comparisons	new	quantitative and qualitative
Sector comparability	Percentage of matches between disclosure report structure and benchmark structure	new	quantitative

Table 9: Mapping of quality criteria to empirical indicators

The processing logic of the scoring model in Figure 23 calculates for each knot on the grid an individual score where a knot represents a “risk-quality” pair of a risk category and a quality criterion. For example, the second left point with the coordinates (2|5) measures the readability (quality criterion) for the disclosure on credit risk (risk category) with the Gunning-Fog index (empirical indicator).

Once all individual scores for the risk-quality pairs are processed, they are condensed into scores for each risk category. Figure 24 explains this process. For each risk category (column “risk dimension”) five individual quality scores (column “quality dimension”) are calculated. The five quality scores per risk category are then weighted arithmetically to result in one quality score per risk category. An arithmetical weighting of the quality criteria is applied so that all quality criteria are treated equally (“quality criteria weighting”), and no quality criterion is superior to the others (Basel Committee on Banking Supervision, 2015).

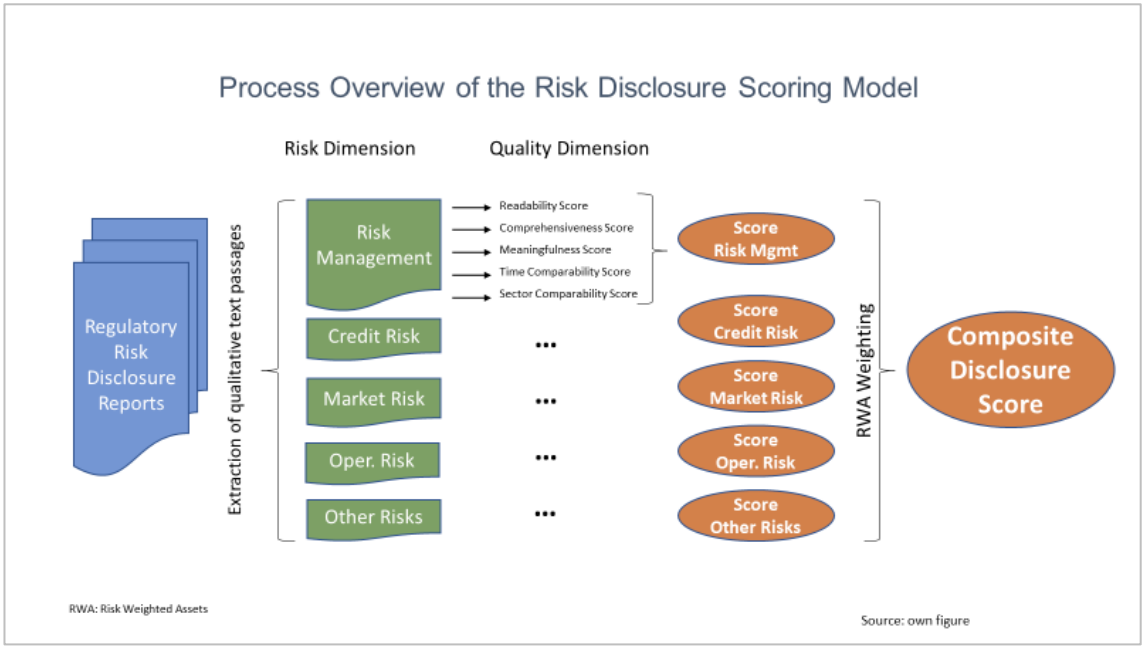

Figure 24: Process of composite score calculation

The final composite disclosure score to the right in Figure 24 is calculated by taking each score per risk category and weighting it with the risk’s relative proportion to the total risk of the bank (“risk category weighting”). This is necessary as not every risk category is of the same importance to each bank. Traditional banks, for instance, tend to be credit risk oriented, while investment banks experience higher levels of market risks (see section 4.3.1). This weighting

procedure expands the weighting process of other scoring models (e.g., Beretta & Bozzolan, 2004). Such models often settle on taking simple arithmetic means for weighting risk categories. In this model, each score per risk category is weighted with its proportion relative to the total RWA (risk weighted assets) of the bank (see section 2.4.2.1), therefore taking into account the risk factors as a control variable. The result of the model is the composite disclosure score that represents the quality of a specific bank regulatory risk disclosure report.

4.5.2 Operationalisation of the Quality Criteria

All five quality criteria (see section 4.4.3) must first be operationalised before they can be applied to the risk categories. In this section, at least one empirical indicator is suggested for each quality criterion. The equations for calculating indicator values are defined in a way that a higher value means higher quality (see below). All indicator results are scaled to a range between 0 and 1 so that they become comparable to each other (Beretta & Bozzolan, 2008).

4.5.2.1 Operationalisation of Readability

Loughran & McDonald (2016) define readability as a special aspect of textual analysis (see section 2.4.2.2) where “the ability of the reader to decipher the intended message” is measured. In the financial and accounting area, textual analysis is an emerging theme, especially with the rise in computer power, faster access to financial information, and an overall increase in financial communication. Still, Loughran and McDonald (2016) concede that more research is needed to overcome challenges of precision. They note that the traditional hallmarks of readability such as polysyllabic words and long sentences need to be complemented when financial texts are interpreted.

The dominant method for measuring the readability of financial texts is the construction of the Gunning-Fog index (Gunning, 1952; Li, 2008). The Gunning-Fog index assumes that a text is more difficult to comprehend if the average sentence length (counted in words) is high and if more complex words (counted in syllables) are used. These two variables are subsequently combined and weighted into an index that refers to the number of years of education needed to

understand the text in a first reading. The higher the Gunning-Fog index, the higher the difficulty to read the text is (Ajina et al., 2015, 2016).

For the purpose of this thesis, and as suggested by Loughran & McDonald (2016), the Gunning-Fog index is complemented before the index for each disclosure report is calculated. In this case, a special list of complex financial words is compiled that are still widespread and easily understood in the financial community ("removal list"). Such words are excluded from the complex word calculation in the Gunning-Fog index. For example, there are several words such as "financial" that are complex (three syllables), but usually familiar to users of disclosure reports. Considering such words would distort the Gunning-Fog index calculation.

For an English text, the Gunning-Fog index is calculated using the following equation (Gunning, 1952):

$$FOG_i = 0.4 \times \left(\frac{\text{number of words}_i}{\text{number of sentences}_i} + \text{percentage of complex words}_i \right) \quad (1)$$

where FOG_i is the Gunning-Fog index for the readability of a report, *number of words*$_i$ is the count of all words in the report of bank i, *number of sentences*$_i$ is the count of all sentences in the report of bank i, and *percentage of complex words*$_i$ is the percentage of words with three or more syllables in the report of bank i excluding words on the exclusion list (see Appendix 8.3).

Mathematically, the Gunning-Fog index can vary between 0 and infinite. The literature does not define an optimal target value for the readability of regulatory risk disclosures. The standard setter BCBS says that the disclosure report should be understandable to key stakeholders (see section 4.4.3.1), but the BCBS does not state which educational level it expects from the readers. In practice, a too high readability difficulty of risk disclosure reports is equally less desirable than a too low readability difficulty. For the sake of the scoring model proposed in this thesis, an average educated person with a basic understanding of financial terminology is chosen as a reference. The standard reading skills of the average educated person reading regulatory risk disclosure reports is proxied by the mean of all Gunning-Fog index values calculated for the reports in the sample. A disclosure report that scores exactly the mean is assumed to match

the comprehension skills of the average reader best[22]. A difference to either side reduces the score. Equation 2 calculates the arithmetic mean of all Gunning-Fog index values in the sample by summing up all FOG_i values and dividing the sum by the sample size. Then, for each report of bank i, the absolute difference (no matter whether positive or negative) from the sample mean is calculated individually.

The following equation is used to calculate the absolute deviation from the mean of all reports:

$$\text{FOG\_DIFF\_ABS}_i = Abs\left(\frac{\sum_i^k FOG_i}{\text{sample\_size}_i^k} - \text{FOG}_i\right) \quad (2)$$

where FOG_i is the Gunning-Fog index for report of bank i (from Equation 1), k is the total number of disclosure reports in the sample, $sample\_size_i^k$ is the number of all banks' disclosure reports in the sample, and $FOG\_DIFF\_ABS_i$ is the absolute difference between the average Gunning-Fog index for the sample and a bank's Gunning-Fog index.

The difference is then normalised to a value between 0 and 1 in order to make the scores for all quality criteria comparable (Beretta & Bozzolan, 2008). A regulatory risk report scores the maximum value on readability of 1 if its Gunning-Fog index matches the mean (i.e., the difference of the sample average Gunning-Fog index and a bank's FOG_i is 0). Any positive or negative deviation reduces the individual report's score.

The normalisation is calculated with this equation:

$$\text{FOG\_SCALED}_i = 1 - \left(\frac{\text{FOG\_DIFF\_ABS}_i}{\text{MEAN\_FOG\_INDEX}}\right) \quad (3)$$

where $FOG\_DIFF\_ABS_i$ is the result from Equation (2) and the *MEAN_FOG_INDEX* is the result of the first term in Equation (2) $\frac{\sum_i^k FOG_i}{\text{sample\_size}_i^k}$, and $\text{FOG\_DIFF\_ABS}_i \leq MEAN\_FOG\_INDEX$.

[22] An adaptation should be made once future research identifies more precisely which reading skills can be expected from the recipients of disclosure reports.

4.5.2.2 Operationalisation of Comprehensiveness

The comparative and integrative analysis in section 4.4.3 reveals that there are two issues to consider on comprehensiveness. For a risk disclosure report to be comprehensive it must cover an appropriate amount of risk related information ("quantity") and it must cover all relevant risk areas of the bank in the appropriate detail ("coverage").

Deumes & Knechel (2008) and Elzahar & Hussainey (2012) find that the quantity of risk disclosure for all firms strongly depends on factors such as industry and size (see section 2.2.7). Certain industries tend to disclose more information than others, and larger firms also tend to disclose more information than smaller ones. In this thesis, the industry focus is only on the banking industry. Therefore, industry will not make a material difference on disclosure quantity, and no control variable for industry must be defined. The control variable size of bank is potentially more relevant. Bank sizes range from small regional banks offering basic banking services to large supranational banks with a full basket of high-level services. The scoring model developed in this thesis focuses on large banks, and the target sample for testing purposes is taken from a list of the largest European banks where the asset size is comparable (see section 5.2.1). Nevertheless, in case that the disclosure scoring model is applied to smaller-sized banks in the future, an adjustment for size should be made.

Beretta & Bozzolan (2004) suggest using the total number of risk disclosure words found in the reports as a proxy for quantity. They assume that a higher occurrence of these risk words means that a firm puts more effort in the overall quality of their risk disclosure. Similar word-based measurement approaches are suggested by Li (2008) and Miihkinen (2011). The quantity of risk disclosure is measured with this formula:

$$\text{QUANTITY}_i = In(\sum_i^n \text{risk\_disclosure\_words}_i) \quad (4)$$

where the sum of *risk_disclosure_words*$_i$ counts the occurrences of words from the pre-defined list of risk disclosure words in a bank's regulatory risk disclosure report (see the word list in the appendix 8.3). The natural logarithm is used to reduce the effect for the right skewness of the distribution for large outliers.

The following equation is used to normalise $QUANTITY_i$ to a value between 0 and 1 in order to make the scores for all quality criteria comparable (Beretta & Bozzolan, 2008):

$$\text{QUANTITY\_SCALED}_i = \frac{\text{QUANTITY}_i}{\ln(QUANTITY_{max})} \quad (5)$$

where $QUANTITY_i$ is the result of Equation 4, and $\ln(QUANTITY_{max})$ is the natural logarithm of the maximum quantity of risk words observed in reports in the sample.

For measuring the coverage of risk disclosure, Miihkinen (2011) suggests the Herfindahl-Hirschman index HHI (Hirschman, 1964) that measures, in its original macroeconomic use, the concentration of firms in relation to their industry (see also Paper & Models, 2018; Turkmen & Yigit, 2012). In the context of the proposed disclosure scoring model, the index measures the concentration/ dilution of risk disclosure words per risk category (comparable to the “firms”) in relation to the risk disclosure report (comparable to the “industry”). Miihkinen (2011) assumes that a balanced description of the major risks increases the quality of risk disclosure.

The Herfindahl-Hirschman index of concentration/dilution is calculated by the following equation (Hirschman, 1964):

$$HHI_i = \sum_{i=1}^{n} p_i^2 \quad (6)$$

where HHI_i is the Herfindahl-Hirschman index for a report of bank i and p_i is the proportion of risk disclosure words on a risk category divided by total count of risk disclosure words in the report.

The Herfindahl-Hirschman index is designed in a way that a high disclosure concentration on one risk category and a neglect of other risk categories leads to a high index value where the maximum possible value is 1 (comparable to a “monopoly”). Hence, a good disclosure balance among the risk categories (comparable to a “competitive market”) would result in a low value of the index. For consistency purposes within the scoring model, the general rule defined in section 4.5.2 requires all components of the composite disclosure score to show higher values for higher quality. In order to bring the resulting HHI

value in line with the general rule, Equation 7 reverses the HHI for calculation of $COVERAGE_i$ by deducting HHI_i from 1 (i.e., a balanced disclosure means higher quality").

$$\text{COVERAGE}_i = 1 - HHI_i \quad (7)$$

where HHI_i is the result of Equation 6 and the deduction of HHI_i from 1 reverts the direction of the Herfindahl-Hirschman index.

Finally, the value for comprehensiveness is calculated by taking the arithmetic mean of "quantity" and "coverage" with the following equation:

$$\text{COMPREHENSIVENESS}_i = \frac{\text{QUANTITY\_SCALED}_i + COVERAGE_i}{2} \quad (8)$$

where $QUANTITY\_SCALED_i$ and $COVERAGE_i$ are the results of Equations 6 and 7 respectively.

4.5.2.3 Operationalisation of Meaningfulness

The purpose of risk disclosure reports is to communicate the regulatory risk profile of a bank to its stakeholders. For readers, the meaningfulness increases if the reports focus on risk and do not include boilerplate comments (Basel Committee on Banking Supervision, 2015). The information provided must be relevant, but also material in nature. Dobler (2008) and Linsley & Shrives (2005) find that risk disclosure reports that include forward-looking information offer a higher level of meaningfulness to users than others. Such reports enable users to better assess the future economic performance and risks of a firm, and potentially improve their investment decisions.

Jia et al. (2016) and Beretta & Bozzolan (2004) suggest an empirical indicator that covers relevance and materiality, but also the element of forward orientation. The so-called depth of a risk disclosure report captures the "content of information disclosed regarding the expected economic impact of identified risks upon future performance" (Beretta & Bozzolan, 2004). Depth is measured by selecting all words that contain a quantitative or qualitative statement on risk and the future impact (forward-looking words). The total number of forward-

looking words is then set in relation to the total number of risk disclosure words in the report. A higher occurrence of forward-looking words suggests a higher meaningfulness of the disclosed information to the readers and results in a higher score on meaningfulness. Beretta & Bozzolan (2004) suggest the “sentence” as the unit of observation. In this thesis, the unit of observation is the “word”, therefore the equation proposed by Beretta & Bozzolan (2004) is adjusted accordingly to measure the meaningfulness of regulatory risk disclosure reports:

$$\text{MEANINGFULNESS}_i = \frac{1}{\sum_i^n \text{risk\_disclosure\_words}_i} * \sum_i^n words\_forward_i \quad (9)$$

where the sum of *words_forward*$_i$ counts the occurrences of words from a pre-defined list of forward looking words in a report of bank i, and the sum of *risk_disclosure_words*$_i$ counts the occurrences of words from a pre-defined list of risk disclosure words in a report of bank i (both word lists are in Appendix 8.3).

4.5.2.4 Operationalisation of Time Comparability

Time comparison is a quality criterion that was not considered in any previous studies so far. This is surprising giving that it is suggested as one of five crucial quality criteria by policymakers such as IASB, EDTF of the FSB and the BCBS (see section 4.4.3).

Time comparison means that the regulatory risk disclosures of a bank are easily comparable from one period to the other. It is beneficial to users who want to trace the developments in a bank over time to get comparative information that facilitates their analysis. Often, information changes over time are, regardless of positive or negative sign, more significant to users than information focusing on the status quo only.

Time comparability is measured with the ratio of words that contain time comparisons quantitatively and qualitatively relative to the total number of risk disclosure words in a report. The formula is similar to the one suggested by Beretta & Bozzolan (2004) for measuring the forward orientation of disclosure. Although time comparability is backwards oriented, from a structural point of view both cases can be similarly measured. The difference lies in the words considered relevant to reflect the time orientation. In the case of time

comparability these are words that are backwards looking and reflecting historic developments.

Equation 9 measures the extent of time comparability in a risk disclosure report:

$$\text{TIME\_COMPARABILITY}_i = \frac{1}{\sum_i^n \text{risk\_disclosure\_words}_i} * \sum_i^n words\_t\_comparison_i \quad (10)$$

where the sum of *words_t_comparison*$_i$ counts the occurrences of words from a pre-defined list of time comparison words in a report of bank i, and the sum of *risk_disclosure_words*$_i$ counts the occurrences of words from a pre-defined list of risk disclosure words in a report of bank i (both word lists can be seen in Appendix 8.3).

4.5.2.5 Operationalisation of Sector Comparability

Similar to the time comparability criterion, sector comparability has not yet been examined in any study as an indicator for disclosure quality despite its importance for users (see section 4.4.3). Sector comparability means that regulatory risk disclosures of the same period can easily be compared from one bank to the other. However, there is an inherent problem in this task. Banks are responsible for the structure and content of their own risk reports. They have no possibility to influence the structure and content of competing banks (apart from some group pressure to report in a similar way as the leading group of banks does – the bandwagon effect (see section 2.2.7.8)).

In regulatory risk disclosure, there is a slow but steady trend to establish a best practice (EBA, 2020; Enhanced Disclosure Task Force, 2012). Still, the banking sector is far away from reaching an industry norm for disclosure. Regulatory authorities (e.g., EBA) are aware of this situation and try to establish a common reporting approach. They introduce templates for a common reporting standard that partly restrict banks' choice on structure and content (Basel Committee on Banking Supervision, 2015).

Still, banks have much freedom to disclose risk information in their preferred way. The risk disclosure reports primarily reflect the risk profile of a

specific bank and do not foster comparability among the peer group. This makes the reports per se individual documents at the cost of comparability.

This thesis suggests a new empirical indicator that measures the structural similarities of the reports. The more similar the structures are, the easier it is for a reader to compare the reports. The proposed indicator builds on the analysis of the bandwagon effect in the financial industry by Khlif & Hussainey (2016). There is a group of top tier banks in the banking industry that take on a leading role in regulatory risk disclosure (EBA, 2020). This group has some formative power to define a best practice in disclosure which other banks may follow.

The empirical indicator for sector comparability first requires analysing the disclosure reports of these leading banks with respect to the risk categories as listed in Table 2 and identifying the structural items of the content disclosed. Then, the risk categories and structural items are consolidated on the basis of maximum commonality among the leading group of banks. The result is an integrated risk disclosure template that can be used as an industry benchmark. All the report structures of the remaining banks are then compared and mapped against this industry benchmark. This procedure is in line with previous research that suggests that most of the smaller market participants "follow the herd" (see section 2.2.7.8).

Disclosure reports score high on the criterion sector comparability if their structures closely match the industry benchmark, thereby making it easier for users to compare them to other reports. They score low if their structures deviate significantly from the industry benchmark.

The sector comparability is measured with this newly developed equation:

$$\text{SECTOR\_COMPARABILITY}_i = \frac{1}{\sum_i^n \text{structure\_benchmark}} * \sum_i^n structural\_items_i \qquad (11)$$

where the sum of *structural_items*$_i$ counts the occurrences of structural items of a disclosure report of bank i that match with the industry benchmark, and the sum of *structure_benchmark* represents the total number of structural items of the industry benchmark derived from the top tier group that can potentially be matched by individual reports.

The equation results in a value of 1 if there is a perfect structural match of a single report's structure with the industry benchmark, suggesting easy

comparability and therefore high quality in this quality criterion. Structural items that do not match reduce the score suggesting that comparison is made more difficult, thereby reducing disclosure quality.

4.5.3 The Composite Disclosure Score

The composite disclosure score is the summary statistic for all quality scores per risk category. It is obtained for each report with the following three-step process. First, for each of the five risk categories of a bank's disclosure report, the individual quality scores (the "risk-quality"-pairs) are weighted equally and an arithmetic average per risk category is calculated (see Figure 24).

The scores for each risk category are calculated with this equation:

$$\begin{aligned}\text{SCORE\_RISK\_CATEGORY}_i = \frac{1}{5} \times [&\text{FOG\_SCALED}_i + \\ &\text{COMPREHENSIVENESS}_i + \text{MEANINGFULNESS}_i + \\ &\text{TIME\_COMPARABILITY}_i + \text{SECTOR\_COMPARABILITY}_i]\end{aligned} \tag{12}$$

where for each risk category *SCORE_RISK_CATEGORY*$_i$ of a report of bank i the scores per quality criterion (results from Equations 3, 8, 9, 10 and 11) are added and arithmetically weighted.

Not every risk category is of the same importance to each bank. For some banks, credit risk is dominant over the other risks. For other banks, the most important risk category could be market risk or one of the other risk categories. Therefore, in step two of the process for calculating the composite disclosure score, the scores per risk categories are weighted according to their importance in the asset portfolio of the bank (except for the risk management category that does not relate to a specific risk category). Each risk category is weighted with its respective proportion of risk weighted assets (RWA) to total RWA to account for the relative importance to the bank.

The RWA weighting is performed in Equation 13 that takes the results from Equation 12 and applies the RWA weights:

$$\text{SCORE\_RISK\_CATEGORY\_WT}_i = \frac{RWA_i}{Total\_RWA_i} \times \text{SCORE\_RISK\_CATEGORY}_i \quad (13)$$

where RWA_i is the risk weighted asset value for each risk category (except risk management), $Total\_RWA_i$ is the total risk weighted asset value for the bank i, and $SCORE\_RISK\_CATEGORY_i$ is the result from Equation 12.

In a third and final step, the composite disclosure score is calculated as the arithmetic mean of the RWA-adjusted scores (see Beretta & Bozzolan, 2004; Miihkinen, 2011). It is suggested that, at this stage of model development, the arithmetic mean is chosen. In future research, it would also be possible to apply weights to the quality criteria (not only to the risk categories as above). However, this would require establishing a relative importance ranking among the quality criteria that heavily depends on the priorities and perceptions of preparers and users of regulatory risk disclosure reports.

The composite disclosure score is calculated as follows:

$$COMP\_DISCLOSURE\_\text{SCORE}_i = \sum_1^n \text{SCORE\_RISK\_CATEGORY\_WT}_i \quad (14)$$

where n is the number or risk categories in a report of bank i and $SCORE\_RISK\_CATEGORY\_WT_i$ is the result from Equation 13.

4.5.4 Subjectivity in Risk Disclosure

Subjectivity is an overarching theme that is addressed in most disclosure studies (see Beretta & Bozzolan, 2008; Miihkinen, 2011). Measuring quality is a complex issue with many dimensions to consider. It lies in the eyes of the users of risk disclosure reports how relevant each dimension is and how its quality is assessed. Beretta & Bozzolan (2008) note in their seminal paper that quality is subjective because “it depends on the perspective through which the disclosure is observed and evaluated.” Users will rarely find a consensus as they all have conflicting interests and values.

Figure 25: Subjectivity in risk disclosure

Subjectivity can have several causes (see Figure 25). First, the risk disclosure reports are prepared by employees of a bank. Despite their effort to present a true and fair view of the risks and despite them following regulatory regulations, it cannot be ruled out that they are not using some form of judgement while preparing the reports. Judgement per se is subjective and has an influence on how risk information is presented in disclosure reports. Verrecchia (1983) notes that firms have various monetary and non-monetary incentives to disclose or not to disclose information (see section 2.2.4.7). Besides regulatory and minimum legal disclosure requirements, it is at the discretion of banks what, how and how much their managers find useful to disclose. This decision is not necessarily a purely objective one.

A second source of subjectivity lies on the users' side. Every user perceives the meaning of a text differently. The comprehension of a text depends on the reading skills, the educational background and the professional experience (Loughran & Mcdonald, 2014). Also, readers might have different emotions while reading a text, as well as other psychological factors might be present that influence their text understanding (Pepper & Gore, 2015). Ultimately, a risk disclosure that is satisfactory for the needs of one reader might be useless for the other. This observation refers to the longstanding dispute between classical finance and behavioural finance theories. In classical finance theories

such as the widespread Efficient Market Hypothesis (EMH) investors are supposed to act rationally (Fama, 1970). Whereas in behavioural finance, investors can also act irrationally, meaning in a subjective manner (Malkiel, 2003). Accordingly, their perceptions of disclosed quality will differ.

Lastly, the researchers themselves bring subjectivity to the analysis. For instance, the decisions taken in section 4.4.3 on which quality criteria to select is ultimately a subjective one. Although it needs to be pointed out that the choice of the indicators is not necessarily an arbitrary one. Beretta & Bozzolan (2008) demand that a "good measure of disclosure quality should reach a sort of "consensus" among different classes of users … and should be validated in terms of reliability[23] and validity[24]". It is an advantage for this thesis that in terms of consensus building it can benefit from broad based studies from leading banking regulators, standard setters, and policymakers. The integration work on disclosure principles in section 4.4.3 reveals that the quality criteria are not congruent, but still overlapping to a large extent. A common and reconciled understanding of quality criteria is a step forward in defining a best practice of measuring risk disclosure quality. For the choice of empirical indicators needed to proxy the quality criteria, the current research status is more ambivalent. As discussed in the literature review (see section 2.4.1), the discussion of indicators that best approximate important aspects of the quality criteria is still ongoing and no broad consensus has been reached so far.

In more technical terms, researchers face subjectivity issues not only in model development but also in applying and testing their models. A distinction can be made in ex ante coding procedures and ex post robustness checks. Semantic text analysis is subjective by its very own nature (Saunders, 2013). Researchers address this bias by either double checking the coding through other independent researchers ("four eyes principle") or by using statistical techniques

[23] Reliability in this context means that the research results (e.g., the disclosure index) can be replicated by other researchers.

[24] Validity in this context means that the research result reflects what the researcher intended to find. In the case of this thesis this means that the disclosure index measures the quality and nothing else.

such as calculating the Kappa coefficient[25] (Cohen, 1960) or Krippendorf's alpha. Once the test results are available, robustness checks help to understand how good the model estimates are. An issue often addressed is endogeneity (Elshandidy et al., 2015). So, for instance, omitted variables can often lead to false attributions of variations in risk factors due to endogenous factors such as firm, industry and country-specific issues (see a list of potential endogenous factors in section 2.2.7).

In summary, subjectivity of preparers, users and researchers is an issue to be critically aware of when evaluating the quality of disclosure reports. Several measures can be taken to reduce the subjectivity problem but some bias in risk judgement will remain.

4.6 Chapter Summary

In this chapter, the business and functional requirements analysis for the scoring model was done (step 1 of the research design) and the model framework developed.

The requirements analysis started with an explanation of how agency theory views the benefits of disclosure (wealth gains through better information sharing between principals and agents), Further requirements were derived from the analysis of the risk profiles of banks and the legal environment of banking regulation in the EU. Key results were the identification of five risk categories (credit risks, market risks, operational risks, other risks, risk management) of the model). The additional analysis of quality principles from the IASB, the EDTF, and the BCBS lead to the definition of five quality criteria readability, comprehensiveness, meaningfulness, time comparability, and sector comparability.

The scoring model was developed within a two-dimensional framework consisting of a risk and a quality dimension. The data requirements, the processing logic, and the algorithms for calculating the composite disclosure scores were defined, and the technical architecture for model implementation in Nvivo, python, SPSS, and MS Excel was developed.

[25] A more detailed explanation of the Kappa coefficient can be found in the model implementation chapter in section 5.4.

5 Chapter Five: Implementation and Test of the Scoring Model

In this chapter, the technical and organisational implementation, and test of the regulatory risk disclosure scoring model is described. A well-designed implementation is crucial to the quality of the model results. So far, designs of similar models on the financial accounting side suffer from one major drawback. The implementation involves substantial human labour efforts for coding and analysis (see section 2.4.2.2.1 Manual Semantic Content Analysis). They are, therefore, time-consuming and costly to implement. This also limits any advanced research activities in the disclosure field, and alternative approaches must be considered. An ideal scoring model implementation is one that can be rerun frequently and automatically, without the need for a high level of human involvement to regularly perform these tasks. The implementation proposed in this chapter promotes an approach that can be semi-automated with computerised support wherever possible.

The first section explains the technical architecture of the model implementation. The model makes use of the software tools Nvivo, SPSS, Excel, and the programming language Python.

The second section of this chapter explains the criteria by which the sample of banks and regulatory risk disclosure reports are selected for testing the scoring model. The goal is to select a sample that represents the EU banking industry well but can also be handled with reasonable time and effort.

The chapter then moves on to discussing how to ensure the quality of the model's input data and coding. As discussed in section 4.5.4 (Subjectivity in Risk Disclosure), semantic content analysis tends to be partly subjective. Therefore, it is important to include safeguards in the implementation to ensure high reliability and validity of the model. The organisational safeguards for the data management and coding activities include the early definition of all procedural coding steps from the preparatory phase to the consolidation phase, and the implementation of a four-eye principle. All these organisational safeguards are explained in section 5.3.

The chapter continues with section 5.4 where the technical safeguards are documented. Several statistical tests such as the Kappa coefficient test and the percentage agreement test are performed to measure and analyse coding reliability and validity.

In addition to the organisational and technical safeguards, the quality of the scoring model results is determined by providing clear instructions for coding the disclosure reports. Section 5.5 describes the coding instructions for both model dimensions (risk and quality) in a coding rulebook. This document can be easily recycled in further research projects or in a software programme for automation purposes.

5.1 Technical Implementation of the Disclosure Scoring Model

The technical implementation of the disclosure scoring model requires the programming of all functionalities as defined in section 4.5.2 on model development. For each of the five empirical indicators on the quality dimension, the predefined equations must be programmed either in Nvivo and SPSS or individually using Python programming language. In addition, the individual scores from each quality criterion must be technically consolidated in a composite disclosure score per bank. The overall objective of the technical implementation is to make use of as many existing functionalities in software systems as possible so that major parts of the processing can be later performed on a semi-automated basis.

In this thesis, Nvivo is the core software system for both coding and model implementation (see Figure 26). The software offers extensive coding functionalities for preparing the input data from the reports to the model specifications (see section 5.5 on the coding rule book). Nvivo also provides several useful functionalities for grouping text snippets to nodes and querying the coded elements for shared textual properties. Whenever possible built-in functions such as word frequencies queries and word count queries across nodes, cases and sources are used. This approach works well for implementing the quality criteria comprehensiveness, meaningfulness, and time comparability.

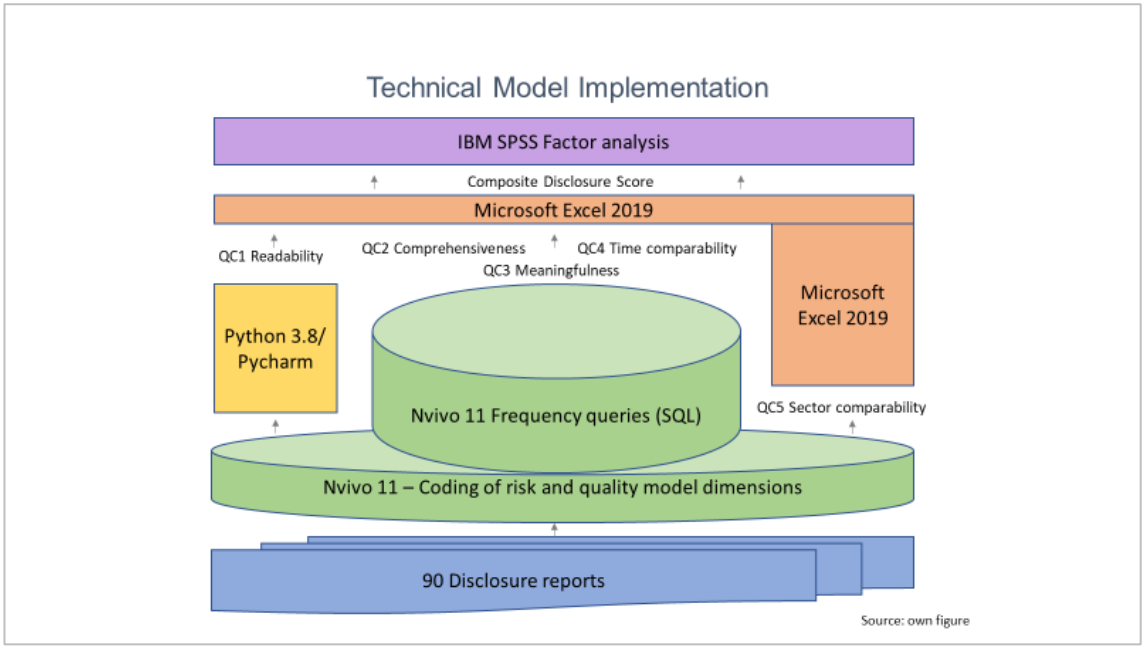

Figure 26: Technical model implementation

A major disadvantage of Nvivo is that the software does not allow direct access to its database via an Application Programming Interface (API). Furthermore, individual SQL querying possibilities are limited[26]. Nvivo functionalities are not sufficient to calculate disclosure scores for quality criterion one (readability) and five (sector comparability). Therefore, raw text extracts are exported from Nvivo to text files (in rtf-format) and further processed in other software systems (IBM SPSS, MS Excel) and software programs written in Python.

The scoring model uses the Nvivo version 11.4.1.1064 (64-bit) for Windows, Pro edition by QSR International. Additional programming is done in Python version 3.8, the IDE (Integrated Development Environment) is the open source software PyCharm by Jetbrains version 2019.3.2, community edition. Additional functionalities from the external Python package Textstat[27] are used to calculate statistics from text files to determine the readability, complexity, and grade level of the text corpus. The software package Textstat is highly rated in the open source software depository GitHub and additional quality checking on results is performed to ensure correctness of results. Further statistical analysis

[26] SQL Structured Query Language. With SQL, database records are queried to the needs of the user.

[27] Textstat 0.6.0, Released: Jan 4, 2020, authors: Shivam Bansal, Chaitanya Aggarwal https://pypi.org/project/textstat/#description;

is done in IBM SPSS Statistics software package version 24.0.0. Finally, consolidation of results, calculation of the composite disclosure score and graphical presentation is performed in Microsoft Excel (Microsoft Office 365).

The overview in Table 10 summarises the technical implementation of each quality criterion of the model and the calculation of the final composite disclosure score.

Quality criteria (QC)/ composite disclosure score	Technical implementation
QC (1) Readability	Export from Nvivo with data export functionality; conversion in .txt format; file import in Python IDE; analysis with Python program using module Textstat and additional programming.
QC (2) Comprehensiveness	Nvivo built-in functionality “word frequency count” ; manual import of “risk word list” in query; export of query results with Nvivo data export functionality; import in Excel for analysis.
QC (3) Meaningfulness	Nvivo built-in functionality “word frequency count” ; manual import of “forward-oriented word list” in query; export of query results with Nvivo data export functionality; import in Excel for analysis.
QC (4) Time comparability	Nvivo built-in functionality “word frequency count” ; manual import of “time comparative word list” in query; export of query results with Nvivo data export functionality; import in Excel for analysis.
QC (5) Sector comparability	Export of node content “table of contents” from Nvivo with data export functionality; import in Excel spreadsheet and manual processing.
Calculation of composite disclosure score	Export of disclosure scores per risk category from Excel to SPSS; analysis of scores with SPSS factor analysis functionality (Analyse – Dimension Reduction – Factor) ; export of SPSS results to Excel for analysis.

Table 10: Technical implementation of the disclosure model

5.2 Sample Selection Criteria

The scoring model is applied to a sample consisting of the thirty largest banks primarily headquartered in the EU. The EU is chosen because the CRD IV/CRR framework is a legal package that is only applicable to EU banks. A small number of adjustments are made in order to get a consistent sample. The selection criteria for the sample and the adjustments made are described below.

5.2.1 Selection of Sample Size and Components

The sample is selected from the annually published Standard & Poor's list of the largest banks in Europe (S&P Global Market Intelligence, 2018). This list ranks the banks according to their total asset value. For the purpose of this thesis, the list as per end of 2017 is chosen as a reference. Two banks from Russia are removed from the list as they are not headquartered in the EU and therefore not part of the EU common market and regulation. A similar elimination rule would have been applied to one Swiss bank on the list. However, an exception is made in this case as the bank is a global systemically important institution (G-SII) with major business operations in the EU. The bank also follows Basel III disclosure guidelines, making its risk disclosure widely comparable with that of its EU banking counterparts. Two further banks, one from the Netherlands and another from Switzerland are excluded from the sample because they do not publish separate regulatory risk disclosure reports. They rather spread their risk information throughout their annual reports and, therefore, are removed from the sample due to impracticability of analysing them. The open places are substituted with the runner-up banks on the S&P list.

A closer look at the asset base of the thirty banks reveals the suitability of this sample choice for representation of the EU banking industry. For validity purposes of the model, it is important that the sample represents the European banking industry well in terms of total assets. The European Central Bank (2018) regularly publishes consolidated data for the EU banking sector (Figure 27).

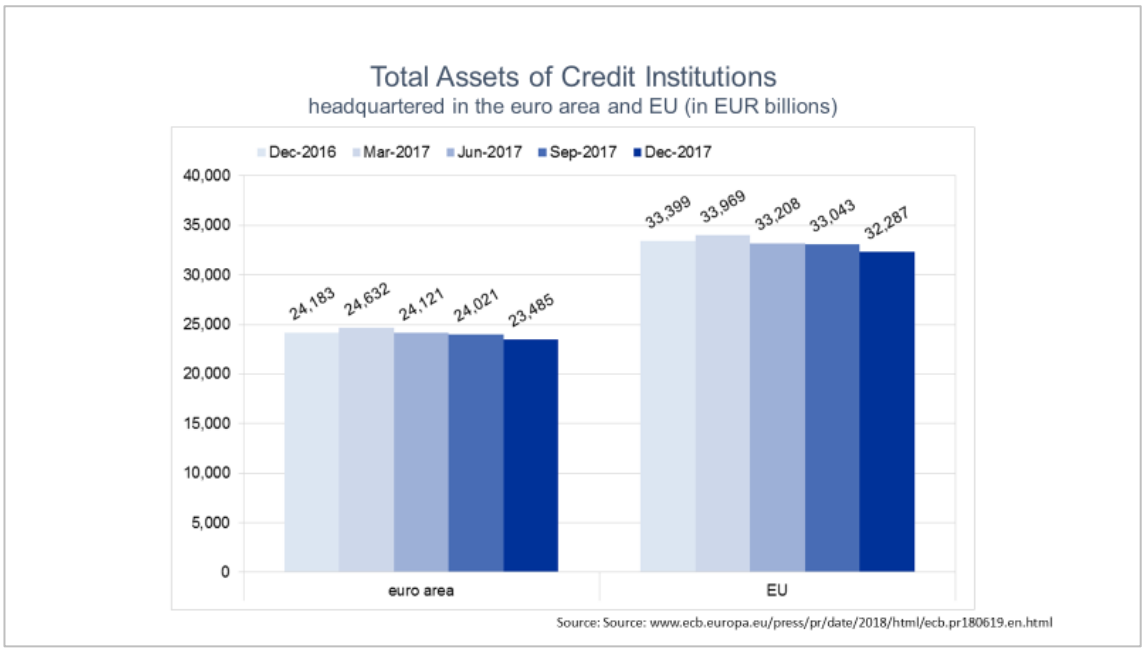

Figure 27: Total assets of EU headquartered banks

By the end of 2017, the total assets of credit institutions headquartered in the EU stood at EUR 32.3 trillion (down by 3.3% from EUR 33.4 trillion in December 2016). The total assets of the chosen sample of thirty EU headquartered banks (including one Swiss bank) is €24,462 trillion. The assets in the sample account for approximately 76% of the total assets of EU banks in 2017 (S&P Global Market Intelligence, 2018). The selected sample, therefore, can be considered representative of the EU banking industry. The remaining fourth quartile of total assets is made up of a large number of relatively small-sized, often local banks.

Table 11 summarizes the final list of banks in the sample. For ease of reference and clarity, the names of the banking groups, their unique legal entity identifier LEI, their FSB/EBA classification, and their total assets as per the end of the year 2017 in billion EUR are listed.

ID	Country	Name of Banking Group	Legal Entity Identifier (LEI)	FSB/EBA Classification	Assets EOY 2017 (€B)
1	GB	HSBC Holdings Plc	MLU0ZO3ML4LN2LL2TL39	G-SII	2.234
2	FR	BNP Paribas	R0MUWSFPU8MPRO8K5P83	G-SII	2.040
3	FR	Crédit Agricole Group	FR969500TJ5KRTCJQWXH	G-SII	1.854
4	ES	Banco Santander, S.A.	5493006QMFDDMYWIAM13	G-SII	1.459
5	DE	Deutsche Bank AG	7LTWFZYICNSX8D621K86	G-SII	1.348
6	FR	Group Société Générale	O2RNE8IBXP4R0TD8PU41	G-SII	1.297
7	FR	BPCE Groupe	FR9695005MSX1OYEMGDF	O-SII	1.277
8	GB	Barclays Plc	G5GSEF7VJP5I7OUK5573	G-SII	1.261
9	GB	Lloyds Banking Group Plc	549300PPXHEU2JF0AM85	O-SII	887
10	NL	ING Bank N.V.	3TK20IVIUJ8J3ZU0QE75	G-SII	887
11	CH	UBS	549300SZJ9VS8SGXAN81	G-SII	837
12	IT	Unicredit Group spa	549300TRUWO2CD2G5692	G-SII	831
13	FR	Credit Mutuel Groupe	9695000CG7B84NLR5984	O-SII	813
14	IT	Intesa Sanpaolo Gruppo	2W8N8UU78PMDQKZENC08	O-SII	787
15	GB	Royal Bank of Scotland Group plc	2138005O9XJIJN4JPN90	G-SII	772
16	ES	Banco Bilbao Vizcaya Argentaria, S.A.	K8MS7FD7N5Z2WQ51AZ71	O-SII	676
17	GB	Standard Chartered Plc	U4LOSYZ7YG4W3S5F2G91	G-SII	601
18	NL	RABO U.A.	DG3RU1DBUFHT4ZF9WN62	O-SII	590
19	FI	Nordea Bank AB	6SCPQ280AIY8EP3XFW53	G-SII	557
20	DE	DZ Bank AG	529900HNOAA1KXQJUQ27	O-SII	518
21	DK	Danske Bank	MAES062Z21O4RZ2U7M96	O-SII	479
22	DE	Commerzbank AG	851WYGNLUQLFZBSYGB56	O-SII	461
23	ES	CaixaBank, S.A.	7CUNS533WID6K7DGFI87	O-SII	386
24	SE	Svenska Handelsbanken	NHBDILHZTYCNBV5UYZ31	O-SII	292
25	BE	KBC Group	6B2PBRV1FCJDMR45RZ53	O-SII	283
26	GB	Nationwide Building Society	549300XFX12G42QIKN82	O-SII	267
27	DE	Landesbank Baden-Württemberg	B81CK4ESI35472RHJ606	O-SII	241
28	AT	Erste Group	PQOH26KWDF7CG10L6792	O-SII	237
29	DE	Bayerische Landesbank	VDYMYTQGZZ6DU0912C88	O-SII	220
30	DE	HSH Nordbank AG	TUKDD90GPC79G1KOE162	O-SII	70

Table 11: The thirty banks in the sample

Geographically, the sample includes banks from eleven EU member countries and Switzerland.[28] The list of countries can be found in Table 12. The three largest economies in the EU (Germany, Great Britain, and France) contribute between five to six banks each. The remaining places in the sample go to nine other countries.

[28] Including Great Britain who left the EU at the end of January 2020.

Country	Country identifier	Number of banks in sample
Great Britain (non-EU per 1/2020)	GB	6
Germany	DE	6
France	FR	5
Spain	ES	3
Italy	IT	2
The Netherlands	NL	2
Switzerland (non-EU)	CH	1
Belgium	BE	1
Denmark	DK	1
Sweden	SE	1
Finland	FI	1
Austria	AT	1
Total		*30*

Table 12: Geographical distribution of banks in the sample

5.2.2 Selection of the Banking Industry

There are several reasons why the banking industry is chosen for this research. First, the CRD IV/CRR framework (see section 2.3.3.1) is a legal regulation package that is targeting the risks in the banking industry only. Regulatory risk disclosure in banking and its partial failure to provide timely information has been a major issue since the global financial crisis in 2008. Therefore, there is a considerable academic and professional interest in analysing and improving this research field (Enhanced Disclosure Task Force, 2012; International Accounting Standards Board, 2017).

Second, in previous research on general risk disclosure (e.g., Abraham & Cox, 2007; Beretta & Bozzolan, 2008; Linsley & Shrives, 2005) banks are regularly eliminated from samples due to their different risk profiles and risk appetite compared to those of firms in the manufacturing and service sectors (see section 4.3.1). This thesis aims to close this gap by addressing the quality of regulatory risk disclosure of banks specifically.

A third reason for selecting the banking industry is the systemic importance of banks to the overall economy. The risk generated by them is perceived as substantial (International Accounting Standards Board, 2017). Therefore, banking regulation is put in place to address the challenges in this sector. Supervisory authorities evaluate banking risks on both global and domestic levels. Both levels are reflected in the chosen sample.

On a global level, the international Financial Stability Board (FSB) compiles annually, in consultation with the Basel Committee on Banking Supervision (BCBS) and national authorities, a list of global systemically important institutions (G-SII's) (Financial Stability Board, 2017). The FSB defines institutions in this category as "financial institutions whose distress or disorderly failure, because of their size, complexity and systemic interconnectedness, would cause significant disruption to the wider financial system and economic activity". G-SII's are expected to

- have a higher Total Loss-Absorbing Capacity (TLAC) alongside the regulatory capital requirements set out in the CRD IV/CRR framework,
- perform group-wide resolution planning regularly, and
- meet higher capital buffers and supervisory expectations for their risk management functions.

As of 2017 the G-SII list consists of thirty banks worldwide of which twelve are headquartered in the EU. Together with one Swiss bank (another G-SII bank), all thirteen G-SII-relevant European banks are included in the sample.

On a domestic level, national supervisory authorities designate additional banks as being of high importance to national economies (Article 131(3) CRD). Such other systemically important institutions (O-SII) are selected by a predefined set of criteria relating to size, complexity, and interconnectedness of the institution with the national financial system. With regard to the chosen sample in this thesis, seventeen O-SII banks (as classified by their national regulators) are included.

5.2.3 Selection of the Reporting Period

For each bank in the sample, three end-of-year regulatory risk disclosure reports are collected, covering the period 2016 to 2018. The period is chosen deliberately. The legal package CRD IV/CRR, including the updated regulatory

risk disclosure regulation, passed the European Parliament in June 2013 and came into force on 1 January 2014. On this date, the first disclosure period 2014 started based on the new legislation. With an annual disclosure reporting frequency, the first disclosure reports had to be prepared by the end of December 2014. The publication of the reports took place in the first half of 2015.

In the following years, the scope of banking regulation remained largely stable. This period of regulatory stability makes risk disclosure reports well comparable over this time frame. From an operational perspective, it takes the banks time to establish disclosure policies and standards for their risk disclosure reporting. In order to avoid problems associated with the introductory phase of the new risk disclosure regulation, the collection of reports for this thesis starts with the reporting period 2016. For each of the thirty banks in the sample, a report per year is gathered for the years 2016, 2017 and 2018. In total, the number of reports in the sample therefore comprises ninety reports (thirty banks and three reports each).

5.3 Organisation of the Coding Process

Coding is the process of assigning text from various sources (here: the regulatory risk disclosure reports) to predefined nodes and cases representing shared properties.[29] The content assigned to nodes and cases can then be evaluated and processed through a model to give results such as the composite disclosure score. The coding process and its organisation is critical to the quality of the model results. It is widely agreed in semantic content analysis that the input data into a model must be of the highest quality possible, otherwise the model output will be questionable, even if the model itself is well designed (Krippendorff, 2004).

This section describes how the coding process is organised to ensure its quality. Human coding is prone to errors like every other task performed by humans. Lessons learnt from the coding work in this thesis shows that experience in regulatory risk reporting as well as in handling the coding tool is required from

[29] In the case of this research, text is the container of information. In general, a container can be any sort of audio, video, or text source. A node is a “collection of references about a specific theme”, a case is a “unit of observation” (Source: Nvivo 11 pro help function).

the coders. Skills in both areas are a prerequisite for a successful model implementation but cannot be easily acquired. Extensive training is necessary to reduce judgmental and handling errors. In addition, manual coding is a time-consuming and burdensome task. The manual coding of one disclosure report takes on average one hour. Therefore, coders need to be well-instructed and supported to take on the coding tasks efficiently and effectively.

There is also considerable subjectivity inherent in coding (see the detailed discussion in section 4.5.4). Several techniques exist to help reduce coders' error rates and subjectivity. The organisational and technical methods applied in this research are (1) definition of a coding rulebook and process and (2) statistical tests for reliability and validity of the coding results.

5.3.1 Coding Project Plan

During the coding work the following steps, as outlined in Figure 28, were taken in order to ensure quality coding results. The project spans over a six-month period from the end of 2019 to the beginning of 2020.

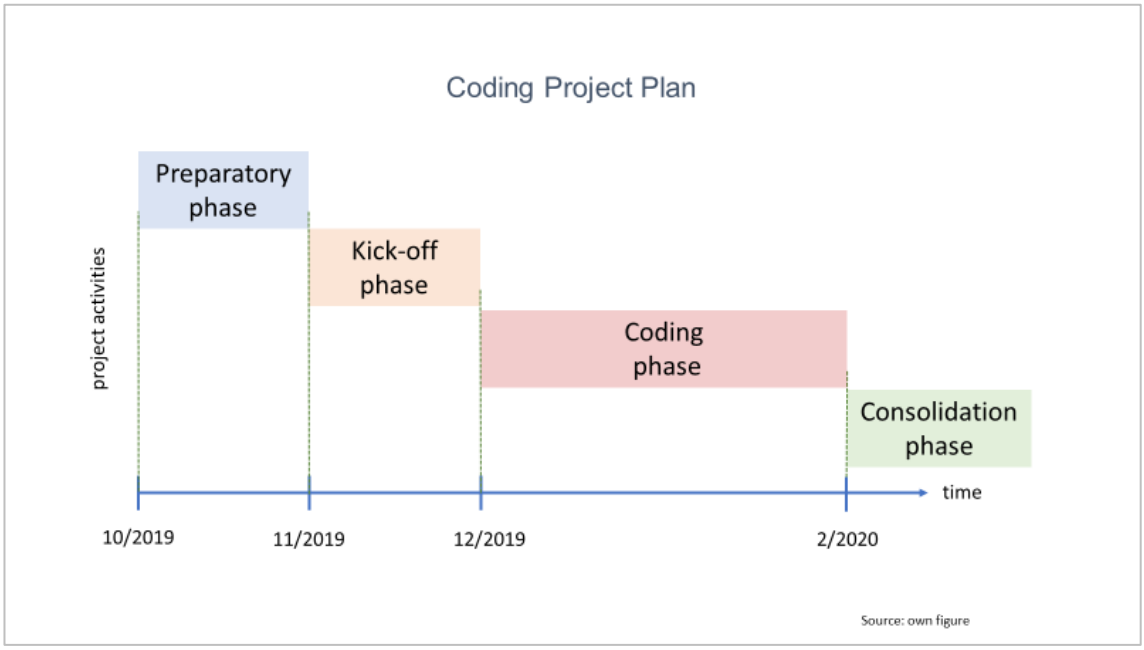

Figure 28: Coding project plan

- In the preparatory phase, the coding goals and processes were defined. The coding requirements of the disclosure scoring model were analysed and translated into the coding tasks (coding rulebook). The risk disclosure

reports were collected from the banks' websites and initially screened for operationality. Finally, several software tools were evaluated for their feasibility to support the coding work.

- In the kick-off phase, the coding team was assembled and instructed, the software tools Nvivo and SPSS were parameterised, and the Integrated Development Environment (IDE) for additional programming in Python was installed.
- In the coding phase, the actual coding of the ninety reports was undertaken and the results were documented.
- In the consolidation phase, individual coding results from coders were checked for quality and consistency, and finally integrated into one project document. The model functionalities were implemented in Nvivo, SPSS, Excel, and Python. Individual and composite disclosure scores were calculated and prepared for the analysis and evaluation stage.

The above four stages are explained in detail below.

5.3.1.1 Preparatory Phase

One prominent technique for coding quality assurance is to explicitly define the coding goals upfront in the preparatory phase and to provide clear instructions, in form of a coding rulebook, on how and what to code (Jia et al., 2016).

The coding work for the scoring model pursues two goals. One goal is to guarantee that the coding captures all the data that is required by the model to calculate the composite disclosure score. The other goal is to develop an implementation architecture that facilitates semi-automated coding in the medium to long term.

For achieving the first goal, the requirements from the theoretical framework of the model are analysed and the coding rules and parameters defined in a coding rulebook. The risk dimension of the model and each of the five quality criteria is broken down into their constituents. The functional coding requirements are documented in the coding rulebook (see section 5.5) and tested for feasibility and completeness. Figure 29 includes an overview of the coding

tasks given to the group of coders who were asked to perform these tasks (written in capital letters in the figure) on each of the ninety risk disclosure reports.

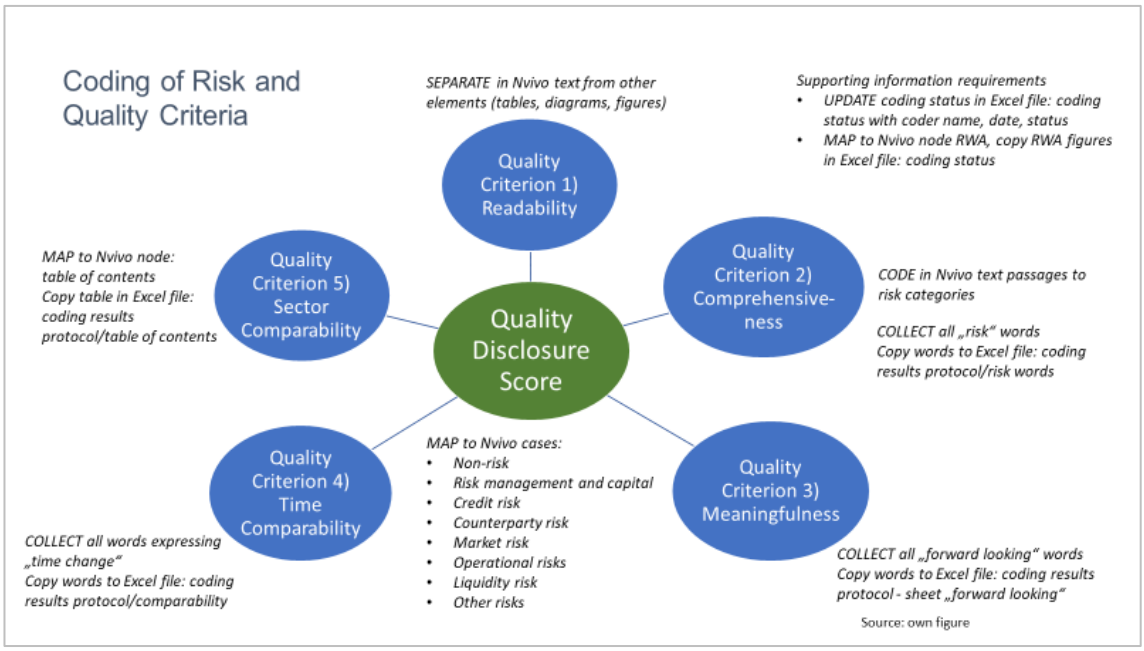

Figure 29: Coding of risk and quality criteria

For the second goal, coding rules are developed in a way that risk disclosure scores can be calculated and replicated regularly with reasonable effort and, where possible, with software support. Manual coding requires many resources and prohibits performing the coding task repetitiously. Many previous studies suffer from this problem (see section 2.4). By learning from past experiences, coding rules in this research are defined in a way that they can be parameterised in existing software tools such as Nvivo and SPSS or can be programmed in proprietary software applications written in the Python programming language. This approach guarantees that in later stages major parts of the manual coding work can be performed on a semi-automated basis.

5.3.1.2 Kick-off Phase

A team approach is necessary for a successful coding work due to the manual workload involved. In the case of this research, more than 13,000 report pages were coded. A coding team of three members was organised. The coding team consisted of the author and two business school students, one on a master's degree and the other one on bachelor's degree level. Students

demonstrated an initial general interest in the subject of risk management in banks. Before the actual coding started, a one-day workshop was held to introduce them to risk management and regulatory risk disclosure in the banking industry. By the end of the day, both were well instructed to code their first reports.

Another good reason for the team approach lies in the coding process itself. In every coding performed by humans, subjectivity is inherent. A checks-and-balances team approach, where one coder randomly evaluates the coding of the other (four-eye principle), can help to reduce a coder's bias (see the discussion on reliability and validity later in section 5.4).

In the project plan, several coding work packages were defined, and responsibilities evenly assigned among the coding team. Initially, a single coder was made responsible for coding the complete set of banks residing in one country. Baskets for UK banks, French banks, and German banks were compiled as these three country groups form the largest groups in the sample. The remaining banks from other countries were coded thereafter and assigned to coders as their time allowed. In the end, the workload ratio for the three coders was quite equally distributed.

5.3.1.3 Implementation Phase

In the implementation phase, the actual coding of the risk disclosure reports was performed in Nvivo. The implementation phase lasted for four weeks. Although this long timeframe was to be expected, it shows again that the coding process needs automatization if used in a professional context in the future. Throughout this phase, regular team meetings were held to ensure consistent coding. Coding results are recorded in a shared environment, accessible to all coders anytime. The protocol of all meetings can be found in Appendix 8.2.

The first team meeting during the implementation phase was a kick-off meeting. The scientific background was again explained to all coders. Another focus was on time and project management, as well as documentation of coding work results. The coders were also familiarised with handling the Nvivo software and introduced to the predefined coding template (including all nodes and cases relevant for coding the model input data). Each coder reserved a workspace in Nvivo and set up the system on their own workstation.

The kick-off meeting was followed by two one-on-one coding meetings where each coder coded their first three reports together with the author (four-eye principle). Coding questions and uncertainties arising from the first practical encounter with the reports were clarified immediately, and a common coding policy was agreed accordingly. Any coding decisions made were recorded in the coding rulebook and protocol.

In the next step, reports were coded individually by the coders. Relevant information on predefined parameters e.g., risk disclosure words, forward-looking words, and comparative words (see section 5.5) were marked as required. A regular status update on the coding work performed was recorded in a separate project management document, keeping all coders well informed about the progress, and ensuring a common coding approach. On a weekly basis, online meetings were held to talk about the coding experience and clarify any open issues.

Once all reports were coded, a final online meeting was held to discuss any remaining open issues and collect experiences from coding that may help to establish procedures for a future semi-automated coding in Nvivo or a similar software tool.

5.3.1.4 Consolidation Phase

In the consolidation phase, three main activities were performed. First, the coding results from all three coders were integrated and consolidated. As each coder was working with a separate Nvivo file, files were finally reconciled in one large project file. Backup copies of all files created during the implementation phase were stored for documentation purposes. Second, a technical analysis of the coding results on reliability and validity was performed. Statistical methods were applied to the coded data (see next section) to check the results for overall consistency. Third, all model functionalities as described in section 4.5.2 were programmed in Nvivo, SPSS, and Python. The technical implementation for each risk and quality criterion can be found in section 5.1. Once all programmes and queries were implemented, they were successfully executed and the output on individual and composite disclosure scores were calculated and stored for the analysis and evaluation stage.

5.4 Statistical Testing of Reliability and Validity

Nvivo offers statistical tools for comparing the coding done by two or more coders. The coding comparison functionality checks to what degree their coding decisions are consistent and stable over time. In this research, the coding reliability and validity are measured through the calculation of the percentage agreement factor and the Kappa coefficient.

A prerequisite to the statistical percentage agreement analysis is to double-code a sub-sample of reports originally coded by another coder. The double-coded reports are then loaded into a separate environment where Nvivo measures the inter-coder reliability with the percentage agreement factor. The percentage is defined as the number of units (in this research the “words”) on which coders agree to assign to the same nodes and cases, divided by the total units of measure (here: total number of words) within the data item (Source: NVivo help).[30] The expectation of a high coding reliability is that the percentage agreement is above 90%

The Kappa coefficient (K) is a statistical value that measures agreement among coders, but also takes into account the amount of agreement that could be expected to occur by chance (Cohen, 1960; NVivo Help). If coders are in complete agreement, then the Kappa coefficient equals 1. If there is no agreement among the coders (other than what would be expected by chance), then the Kappa coefficient is 0 or a little above. Cohen (1960) suggests that values for K should be interpreted within the following ranges (Table 13):

Interpretation of the Kappa Coefficient	
Kappa (K) ranges	Interpretation of agreement
Below 0.40	Poor agreement
0.40 – 0.75	Fair to good agreement
Over 0.75	Excellent agreement

Table 13: Kappa ranges and interpretation

[30] Source: https://help-nv.qsrinternational.com/12/win/v12.1.90-d3ea61/Content/queries/coding-comparison-query.htm?Highlight=comparison#WhyismyKappalow?

The results of the inter-coder reliability and validity tests for the author of this thesis (JH) with the two coders (VT and BT) are shown in the following tables:

Inter-coder reliability and validity test JH - VT		
Nvivo Node	Agreement (%)	Kappa coefficient
1_non risk	96.86	0.9882
2_risk management	98.09	0.9487
3_credit risk	99.66	0.9785
31_securitisation	99.96	0.9940
4_counterparty risk	99.28	0.8654
5_market risk	99.88	0.9846
6_operational risk	99.96	0.9919
7_liquidity risk	99.94	0.9925
8_other risks	99.89	0.9911

Table 14: Coding comparison coder JH - coder VT

Inter-coder reliability and validity test JH - BT		
Nvivo Node	Agreement (%)	Kappa coefficient
1_non risk	97.70	0.8658
2_risk management	97.09	0.8308
3_credit risk	98.85	0.8995
31_securitisation	99.91	0.9816
4_counterparty risk	99.76	0.9397
5_market risk	99.90	0.9907
6_operational risk	99.96	0.9889
7_liquidity risk	98.32	0.9500
8_other risks	98.31	0.7723

Table 15: Coding comparison coder JH - coder BT

In summary, the percentage agreement factor between coder VT and the author JH of this thesis (see Table 14) ranges from 96.86% to 99.96% on a risk category basis, and the Kappa coefficient from 0.87 to 0.99. The results are within acceptable limits. The percentage agreement factor between coder BT and the

author JH of this thesis (see Table 15) ranges from 97.70% to 99.96% on a risk category basis, and the Kappa coefficient from 0.77 to 0.99. The results are also within acceptable levels.

Both statistical tests show that coding results are qualitatively acceptable. Therefore, the coded data can be used as input into the regulatory risk disclosure scoring model.

5.5 The Coding Rulebook

The purpose of a coding rulebook in semantic content analysis is to guarantee quality in coding (Saunders, 2013). Before coding can begin, coders must agree upon a coding scheme which they are required to follow strictly. Written documentation of the coding approach and precise rules to follow is the recommended method for achieving consistency. The coding rulebook consists of rules for coding the risk categories as well as the quality criteria of the scoring model.

5.5.1 Coding Rules for Risk Categories

The risk dimension of the model (see section 4.5.1) requires the identification of risk categories in the risk disclosure reports. The scoring model includes the following categories: risk management, credit risk, market risk, operational risks, and other risks. In the disclosure reports, disclosure on each of these risks can be found either grouped together or spread throughout the document. Experience from coding shows that the standard case is finding multiple occurrences of content for each risk category in different places of the reports. Coders were required to analyse each paragraph and code it to the respective risk category. Only bank-specific risk content is mapped to the risk categories. Text passages that do not address any risk-related content are mapped to the placeholder category “non-risk information”. For instance, a discussion of general economic risks and climate, an overview on the status of Basel III guidelines, or an overview of the business areas of a bank are deemed too broad for inclusion in the mapping to the specific risk categories.

In Nvivo the following cases[31] are parameterised:

- Non-risk information
- Risk management and capital
- Credit risk
- Counterparty risk
- Market risk
- Operational risks
- Liquidity risk
- Other risks

The cases allow the analysis of each risk separately. The querying functionality in Nvivo collects all text passages that are coded to a case. A final consolidation of the cases into the risk categories of the scoring model was done after the coding was finished.

5.5.2 Coding Rules for Quality Criterion 1 - Readability

For measuring readability (see section 4.4.3.1) with the Gunning-Fog index, text must be separated from other elements in a document. The coding rulebook requires coders to read through the entire disclosure report and physically code the text-only content to Nvivo cases. Every word/sentence/paragraph must be assigned to a case. Other elements such as tables, figures, lists, or graphics are disregarded as readability focuses only on text and its ease of reading. The text presentation style adds to the complexity of coding as the reports are often laid out in a two or three column layout. For coding purposes, a single page layout is preferred as only one coding case can occur vertically.

The identification and separation of relevant text from other elements is a challenging task for coders. Regulatory risk disclosure reports vary substantially in size, style, and design. The majority of reports are published in a single document that includes all regulatory risk disclosure information as required in

[31] In Nvivo cases are the 'units of observation' in a research study. They might represent people, places, events, organisations, or other entities that are analysed and compared (Source: Nvivo online help function).

the CRR and any further voluntary information provided by the bank. In general, such reports tend to be easier to read as all information can be found in one place. A number of banks do not publish separate reports but integrate their regulatory risk disclosure into various chapters of their annual report (for instance some of the French banks). The result is that coders must first find the relevant chapters in the annual report. That means that the coders have to work through 500+ pages in total. Some other banks (partly German and Swiss banks) prepare separate disclosure reports but make use of excessive referencing in the disclosure text to other reports in order to avoid redundant information. This approach results in disclosure reports with fewer pages but again leaves it to the coder to collect all required information from a variety of different sources. The ease of readability is reduced due to the large number of references. Lastly, a small number of banks spread their regulatory risk disclosure throughout their annual report with no coherent focus on regulatory risk disclosure. Such reports are impractical to read and code as they are putting the full burden on the coder to search for all relevant risk disclosure content. In the case of this thesis, such reports were removed from the sample (see 5.2.1).

5.5.3 Coding Rules for Quality Criterion 2 - Comprehensiveness

The comprehensiveness of risk disclosure reports is measured with two empirical indicators, one for “quantity” and one for “coverage” (see section 4.4.3.2). The indicator “quantity” measures the overall amount of risk information provided in a disclosure text. The coding goal is to identify all text passages that are related to risk and exclude all passages that discuss general, non-risk relevant issues. The indicator “coverage” measures how balanced the risk information provided is on the various risk categories. Here, the coding goal is to link risk relevant content to risk categories.

In early studies on semantic content analysis (see section 2.4.2.2), a manual sentence-by-sentence analysis is performed. Each sentence is coded to be either risk relevant or not. Despite the coder’s subjectivity this method produces relatively precise results. However, this method comes with a major drawback. It works efficiently only for short text passages. For larger text passages, such as the ninety disclosure reports with about 100 to 200 pages

each (totalling approximately 13,000 pages), this method is impractical to apply. It also prohibits the calculation of disclosure scores on a regular basis due to the recurring high coding effort.

In this coding rulebook, a different approach is followed. A list of relevant risk disclosure words is compiled that capture the content of sentences and paragraphs automatically when processed. Relevant risk disclosure words are defined as words that represent the properties of the empirical indicators used in the risk disclosure model.

In a first step, a subset of reports was screened sentence-by-sentence and all words that represent the nature of the empirical indicators were collected in a list. In a second processing step, the list of relevant words was automatically applied to the remaining documents. Such automated functionality is offered by the coding software Nvivo. In its word frequency count tool, a list of words can be passed on to the software. It then runs a query on the text for counting the number of occurrences of words in the list.

For capturing the quantity of risk information in the coding process, two prerequisites must be in place. First, a list or words that represent “risk disclosure” must be compiled, and second, there needs to be a sufficient large number of risk words in the list. So far, the readily available word lists for risk (see Elshandidy et al., 2015; Li, 2010) are often related to risk reporting in financial accounting only and include a rather limited number of words (approximately ten words only). This research requires the word list to include both, general risk words (e.g., “risk” or “exposure”) and also specifically regulatory risk words (e.g., “RWA” or “asset class”) in order to get a comprehensive result (see the word lists in the Appendix 8.3).

Some research papers (see section 2.4.2.2) suggest performing semantic content analysis on sentences only and not on words and paragraphs. Correctly identifying sentences is problematic if a computer, and not a human performs the task. There is a good reason why even widespread software packages such as Microsoft Word only report words and paragraphs in their statistical analysis, and not sentences. Sentences in the English language are most often separated by periods (besides exclamation and question marks). However, the use of periods is not limited to ending a sentence. Especially in financial texts, periods are widely used as decimal points in numbers or in web addresses. It takes much

programming logic to technically identify the meaning of a period correctly. As Nvivo does not offer such logic either, the coding of risk words in this research relates to the full text and not sub-sets (sentences) of it.

During the coding work, coders were also advised to follow a comprehensive approach in compiling the list of risk disclosure words. The coding goal is to collect as many relevant risk words as possible. The advantage is that even if there are some few cases that might lead to possible misinterpretations of the meaning, in its entirety the automated text interpretation is a good representation of the overall risk content and the time-consuming sentence-by-sentence coding can be avoided.

In practice, the following coding procedures applied for collecting risk words. Each coder analysed the first three disclosure reports (each one from a different bank) in detail and screened them for risk-relevant words. Then, all identified words were collected in a separate spreadsheet. In a parallel work stream, already existing risk word lists of other research papers (Burks et al., 2018; Elshandidy et al., 2015; Li, 2010) were analysed and used in case they add value to the risk content identification. In a subsequent team meeting, the word lists were consolidated into one list. The final version of the regulatory risk disclosure word list (see appendix 8.3, table “regulatory risk disclosure words”) consists of about 150 risk disclosure words that are specifically relevant to regulatory risk reporting. Such a comprehensive list did not exist so far and adds practical value to further endeavours in risk disclosure research.

The second indicator of comprehensiveness is “coverage”. It refers to the relative amount of risk information provided in each risk category. The aim of this indicator is to find out whether the provision of risk information is proportionally distributed among the risk categories or not. Banks are expected to disclose more relevant information on their material risks. Disclosures on less important risks must not dominate the reports although there might be an incentive to do so in case of adverse risk events. For this empirical indicator, there are no additional coding instructions required. The risk categories were coded according to the rules in section 5.5.1, the risk content of each risk category was identified with the risk word list appendix 8.3.

5.5.4 Coding Rules for Quality Criterion 3 - Meaningfulness

The regulatory risk disclosure scoring model measures “meaningfulness” with the extent to which the risk information provided is forward-looking (see section 4.4.3.3). It is assumed that a reader of a risk disclosure report finds information more helpful if future prospects and potential impacts are evaluated, rather than discussing historic events. The empirical indicator for meaningfulness counts how much forward-looking information is provided in the disclosure reports relative to the overall amount of disclosure. More forward-looking information is ranked higher in the disclosure score than less.

Li (2010) provides a general list of words that were found in forward-looking statements such as the MD&A in 10-K and 10-Q filings of US firms. The author suggests using the words “will, should, can, could, may, might, expect, anticipate, believe, plan, hope, intend, seek, project, forecast, objective, and goal”. Words such as “shall” were purposely excluded as they are deemed to indicate boilerplate and legal language. The author further excludes all matches in the word list if the verbs are preceded with “was, were, had, and had been”, as the combination changes forward-looking words into past-oriented words.

The coding in this research makes use of previous research results. It uses Li (2010)’s word list as a basis for expanding it to the specific risk disclosure requirements. Similar to the coding rules in section 5.5.3, the coding rulebook in this section follows a two-step approach. By analysing the first three reports (each from a different bank) in detail, each coder screened the text for words that represent a forward-looking orientation with a particular focus on regulatory risk regulation in the banking industry. All identified words were compiled in a separate spreadsheet. In comparison to Li’s wordlist, the words in this word list include only a few modal words but mainly forward-looking active verbs (e.g., decline, grow) and adjectives (e.g., positive, onward).

In a subsequent coding team meeting, the word list from Li and the newly generated word lists were consolidated into one list. The final list consists of about sixty forward-looking words that are specifically relevant to regulatory risk reporting (see appendix 8.3 table “forward-looking words”). This list of forward-looking words is much more comprehensive than previous lists and a good basis for further research in risk reporting in general.

5.5.5 Coding Rules for Quality Criterion 4 - Time Comparability

The quality criterion “time comparability” measures the comparability of a bank’s risk disclosure from one reporting period to another. Banks in general are not required to provide comparative information. They do so at their own discretion depending on their disclosure strategy. The minimal strategy is that a bank decides to only provide a snapshot of their risk profile at the specific point in time of reporting. This simple and cost-saving strategy is pursued by many banks as the evaluation of model results in the next chapter will show. Banks can also decide to enrich current quantitative (numerical) information with past exposures and value changes. With banks including this comparative information in their disclosure reports, users save time for not having to search for comparative information in two or more reports. A good disclosure strategy from the perspective of the users is if a bank adds qualitative (descriptive and informative) explanations on value changes in their risk exposures. This strategy concurs with the goal of the regulatory risk disclosure model. The model assumes that readers benefit the most if comparative quantitative information is enriched with qualitative comments and explanations.

The coding rulebook defines how information on time comparisons is collected. While coding, reports are screened for words that banks use in their disclosure reports to explain and comment on past changes over time. Words that fall in this category are words such as “change, compare, differ, increase/decrease”. This includes words that highlight a particular change in a risk number from one period to the other. The list of comparative words also includes words that explain changes and developments in underlying risk categories. A list of approximately forty words representing time comparisons was compiled in a spreadsheet by the coders. The complete list of words can be found in the appendix 8.3 table “time comparability words”.

5.5.6 Coding Rules for Quality Criterion 5 - Sector Comparability

The quality criterion “sector comparability” measures how easily readers can access and compare qualitative information on regulatory risk exposures in disclosure reports from different banks. There is no overall reporting standard available that makes reports easily comparable across banks. It is at the

discretion of the banks in which structure they disclose their risk profile and exposures. The structure of reports and the way risk information is presented varies substantially from bank to bank, making it difficult for the users to identify comparable information in different reports. Additionally, banks face the trade-off between customising their reports to their specific risk profile and standardizing them to make them more easily comparable to reports from other banks.

The proposed regulatory risk disclosure model suggests an interbank structural comparison of reports. The model assumes that it benefits the users if the report structures are shared by different banks, and that matching risk information can be found easily in one common place.

The coding rulebook defines how the information on sector comparability is collected from the reports. As all report structures are different, there first must be a standard structure established to which individual report structures can be mapped. This is done by comparing the table of contents from the reports of the top five banks in the sample ranked by asset size. The group of the top five banks consists of one UK, two French, one Spanish and one German bank. These banks are the industry leaders as the reports of this group can act as a benchmark. Other banks are likely to follow this best practice approach. From the report structures of the top five banks, a common template for an “optimal” report structure is consolidated and an “industry benchmark” is set. The final template consists of a list of 25 structural items that readers can expect and easily find in any report. The template with the industry benchmark can be found in appendix 8.4. In a next processing step, the template is applied to the ninety disclosure reports in the sample, and scoring points are awarded for every structural match.

As far as the coding work is concerned, the tables of contents of each report were the starting point for analysing the underlying structure of the reports. Coders were required to code the first three levels of the tables of contents to a predefined node in Nvivo. The tables of contents were then exported to a separate spreadsheet where coders compared each structure with the benchmark template. For each match, a point is awarded; a maximum number of 25 points can be achieved if an individual report is fully comparable to the industry benchmark.

5.5.7 Coding Rules for Supplementary Information

The regulatory risk disclosure model requires the coding of supplementary information that is needed for processing the scoring model and calculating the composite disclosure scores. As the risk profile of every bank is different, not every risk category in the scoring model is of the same importance to each bank. Banks are expected to proportionally disclose more information on risk categories which are of greater importance to their business models than on others. In order to make individual scores on risk categories comparable across banks, they must be weighted with their relative importance in banks' asset portfolios.

In the coding rulebook, coders were required to identify the values for the risk-weighted assets (RWA) per risk category in the reports, and code them to the Nvivo node "RWA". From 2017 onwards, RWA information can be found in a table labelled "EU OV1 (regulatory capital requirements)" in the disclosure reports. Before that date, information on RWA is spread throughout the reports. In a second step, the RWA values per risk category and bank are exported to a separate spreadsheet where they are further processed.

5.6 Chapter Summary

This chapter covered the implementation of the scoring model and its application to a sample of regulatory risk disclosure reports. Following the technical architecture, the model was programmed in Nvivo, python, SPSS, and Excel. Then, for testing purposes, a sample of 90 reports was selected, and the model was applied to them. This task also required the writing of a coding rule book and performing several validity and reliability checks on the coding work.

The overall coding project was time-consuming and lasted for about half a year. More than 10,000 pages were coded. The work consisted of

- a preparatory phase where reports were collected from banks' websites, categorised, and checked for suitability,
- a kick-off phase where coders were instructed on their coding tasks, introduced to the software, and the coding work was structured in work packages,
- a coding phase where the actual coding was done and the model was applied,
- a consolidation phase where quality checks were performed and the individual results were consolidated into composite disclosure scores.

6 Chapter Six: Evaluation of Scoring Model Results

6.1 Overview

In this chapter, the scoring model results are presented and evaluated. This is first done on a single quality criterion basis for readability, comprehensiveness, meaningfulness, time comparability and sector comparability. Then, the composite disclosure scores for all ninety reports in the sample are analysed. Each section presents results followed by an in-depth analysis on selected issues offering insights into various aspects of the quality of regulatory risk disclosure reports.

The basis for the evaluation in this chapter and the steps preceding this analysis are (1) the implementation of the functionalities as laid out in the model development in section 4.5.1, (2) the coding of disclosure reports as described in the coding rule book in section 5.5 and (3) the execution of all programmes on the coded reports as listed in the technical environment plan of section 5.1. The chapter then continues with a quantitative statistical analysis of the model results. Principal components analysis as one method of factor analysis is performed to retrieve underlying patterns in the disclosure reports and to check the statistical significance of the chosen quality criteria. Finally, the scoring model results are discussed in relation to agency theory.

6.2 Evaluation of Quality Criteria Results

6.2.1 Evaluation of Quality Criterion 1 Readability

The Gunning-Fog index measures the reading difficulty of a text. The higher the index, the higher the education level needed to comprehend the text. As a general rule, a text that can be well understood by college students results in Gunning-Fog index values between 13 to 16, university graduates reach levels of above 17 (Gunning, 1952). For example, an index value of 17 means that 17 years of formal education are needed for a good text comprehension (twelve years of primary and high school education, four years of college education and eventually a postgraduate degree).

The difficulty level is expressed by a formula that considers two variables, the average word length of a sentence, and the count of words with three or more

syllables. The index assumes that a text is more difficult to comprehend if the average word count in sentences is higher and if the text includes more complex words. The sum of both variables is then weighted by a factor of 0.4 for the English language.[32]

Gunning-Fog readability indices are calculated for all ninety reports in the sample (see section 4.5.2.1). Table 16 shows the Gunning-Fog index values for the banks in the research sample for each year.

	Gunning-Fog Index Values		
Banks	2016	2017	2018
Bank from AT	18.22	17.67	18.21
Bank from BE	18.46	18.72	18.88
Bank from CH	16.40	17.31	17.99
Bank 1 from DE	17.18	18.77	20.37
Bank 2 from DE	18.63	20.24	18.25
Bank 3 from DE	12.11	11.88	12.15
Bank 4 from DE	16.13	16.12	16.13
Bank 5 from DE	17.38	17.13	17.10
Bank 6 from DE	16.90	16.77	13.11
Bank from DK	15.61	16.77	16.48
Bank 1 from ES	25.02	23.20	23.97
Bank 2 from ES	26.17	26.88	25.26
Bank 3 from ES	18.14	18.07	20.30
Bank from FI	13.91	13.81	13.61
Bank 1 from FR	19.27	19.54	19.75
Bank 2 from FR	19.22	19.40	18.10
Bank 3 from FR	16.30	25.37	24.88
Bank 4 from FR	21.29	20.38	20.97
Bank 5 from FR	15.71	22.17	20.46
Bank 1 from GB	18.79	18.60	18.30
Bank 2 from GB	20.77	20.33	20.43
Bank 3 from GB	20.45	22.11	21.74
Bank 4 from GB	16.30	15.40	15.40

[32] 0.4 is the weight for texts in the English language (which is the case in this thesis). Other languages have different weights (Gunning, 1952).

Bank 5 from GB	21.06	17.61	20.70
Bank 6 from GB	17.99	18.18	18.48
Bank 1 from IT	24.21	24.30	23.50
Bank 2 from IT	21.96	23.14	25.10
Bank 1 from NL	15.85	16.40	16.26
Bank 2 from NL	13.77	13.25	14.99
Bank from SE	12.94	13.04	15.07
Averages	18.20	18.75	18.86

Table 16: Gunning-Fog index values per bank and year

The consolidated results can be seen in Figure 30. The figure shows that the average Gunning-Fog index (the “mean”) for the thirty reports is 18.20 in 2016. This figure increases to 18.75 and 18.86 in 2017 and 2018, respectively. The average index value for the entire three-year period is 18.61.

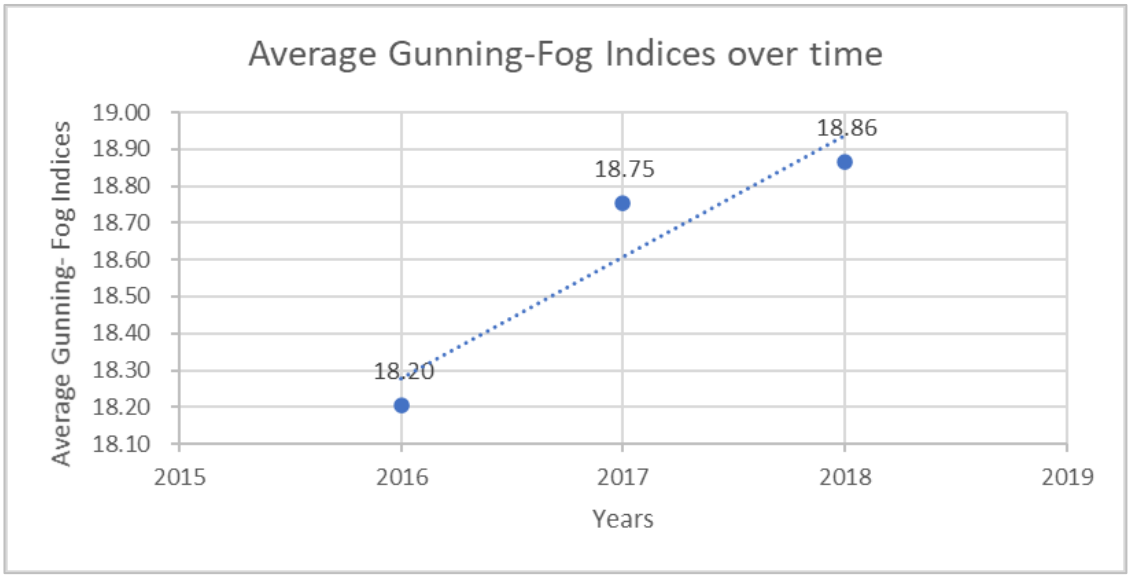

Figure 30: Average Gunning-Fog indices for 2016 - 2018

An average Gunning-Fog index value of about 18 to 19 means that it needs a university graduate degree to understand EU bank risk disclosure reports well. This implies that user groups with lower educational levels practically have less access to information in these reports. Moreover, the increasing index value over time suggests that reading difficulty continues to grow. The results confirm the concerns raised by leading policymakers and standard setters about the

readability of regulatory risk disclosures (see for instance Basel Committee on Banking Supervision (2015); EBA (2020); Enhanced Disclosure Task Force, (2012)). Financial institutions need to think how to make their risk reporting more easily accessible if they want to become attractive to a larger group of stakeholders, and not remain in their insiders' echo chamber.

The readability descriptive statistics for the whole sample are listed in Table 17.

Descriptive Statistics				
	2016	*2017*	*2018*	*Total 2016 - 2018*
Count	30	30	30	90
Mean	18.20	18.75	18.86	18.61
Standard Error	0.62	0.67	0.65	0.37
Median	18.07	18.39	18.39	18.24
Mode	16.30	16.77	16.70	16.30
Standard Deviation	3.38	3.64	3.54	3.49
Sample Variance	11.44	13.28	12.50	12.21
Kurtosis	0.21	-0.13	-0.52	-0.31
Skewness	0.53	0.28	0.13	0.30
Minimum	12.11	11.88	12.15	11.88
Maximum	26.17	26.88	25.26	26.88

Table 17: Descriptive statistics on readability per year and total

Columns two to four show the average statistics of the Gunning-Fog index values for the respective years (thirty reports per year), while column five includes statistics of the total average index value for the three-year period 2016 – 2018.

The observed standard deviations (between 3.38 and 3.64) are about 20 % of the annual means. This percentage indicates that about two-thirds of the disclosure reports fall in a group with Gunning-Fog indices between approximately 16 and 22 (18.61 +/- 20%). This is a relatively wide range and confirms that regulatory risk reports are by far not homogeneous in their writing

style. Also, the way the qualitative information is presented in the disclosure reports differs substantially from one report to another.

Looking at the extreme outliers in the distribution of readability results, there are few reports with Gunning-Fog index values of 12 (see “Minimum” in Table 17). This suggests that such reports are written in a language style that is rather easy to understand. On the other extreme, some reports achieve index values up to 26 (see “Maximum” in Table 17). Such reports would include long and technical sentences, and a high number of complex words, making them extraordinarily difficult to understand.

The distribution of the ninety Gunning-Fog indices is not a perfectly normal distribution. The values for “skewness” in Table 17 are positive for all years indicating negatively skewed results.[33] This happens when a relatively larger number of Gunning-Fog indices is grouped close to the left of the mean but are offset by a smaller number of values far to the right of the mean. The graphical histogram in Figure 31 confirms this observation.

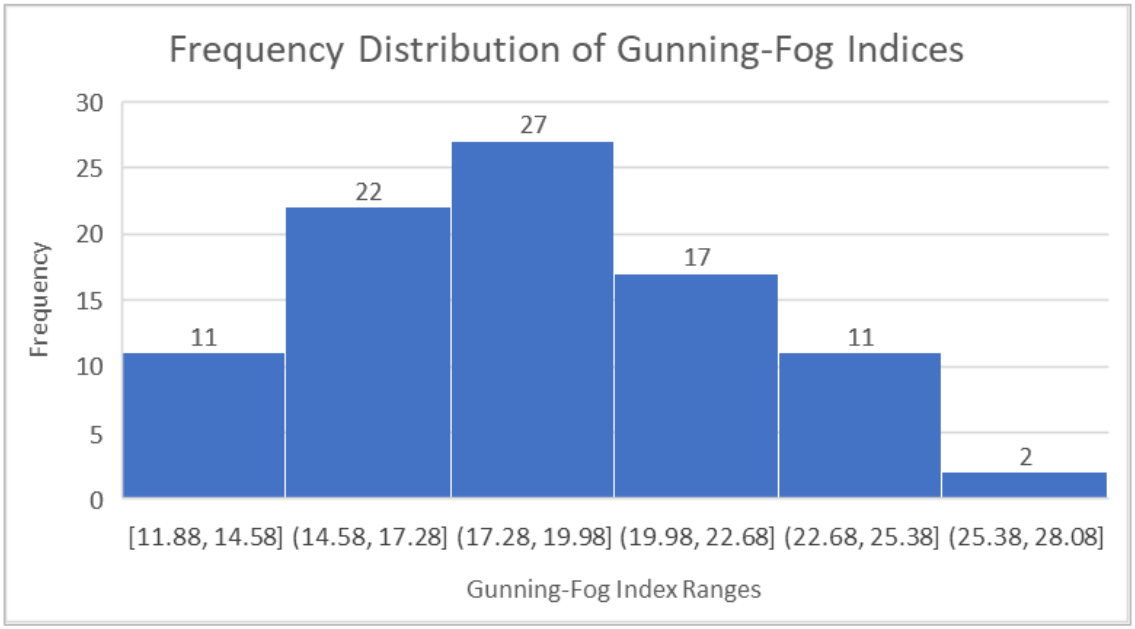

Figure 31: Frequency distribution of Gunning-Fog indices

The histogram also reveals a further practical issue. The numbers on top of the columns represent the total number of reports that fall in the respective Gunning-

[33] A positive skewness means that the distribution is leaning to the left and has the tail to the right side.

Fog index ranges on the x-axis. Although it depends on where readers of reports draw a line of a maximum acceptable index value, it can be seen that exactly sixty reports are below a Gunning-Fog index of 20 (the three columns to the left, values 11, 22, and 27, in total 60). This indicates that about two-third of the sample reports are considered to have an acceptable reading difficulty. The other third of reports needs attention with respect to readability. If these banks want their reports to be comprehended well by average readers, they should attempt to use a much less sophisticated language.

Although the average Gunning-Fog indices across all banks are widely distributed (see the standard deviation about 20 % of the mean), the Gunning-Fog indices per bank over 2016 - 2018 do not change much. Table 18 summarises the period changes per bank.

Gunning-Fog Index Changes per Bank	
% changes for period 2016 to 2018	Number of banks
< 1%	8
1% - 5%	15
> 5%	7

Table 18: Changes of Gunning-Fog index changes per bank

Only seven out of the thirty banks in the sample experience a change of more than 5% in the Gunning-Fog indices over 2016 - 2018. The main reason for such a change can be attributed to major changes in individual banks' disclosure policies and practices. The seven banks stem from several countries and they all restructured their disclosure reports in this period. The reading difficulty of eight reports remains very stable (less than a 1% change for the three-year period). This stability might be explained by a copy-and-paste strategy where standard text modules are recycled in later reports. Fifteen reports changed by a factor between 1% to 5%. Such a change can be expected for reports that are annually adjusted for new events and developments happening within the reporting period.

The average levels of Gunning-Fog indices are also not evenly distributed across EU countries. The columns in Figure 32 show average Gunning-Fog indices of banks per country where they are headquartered.

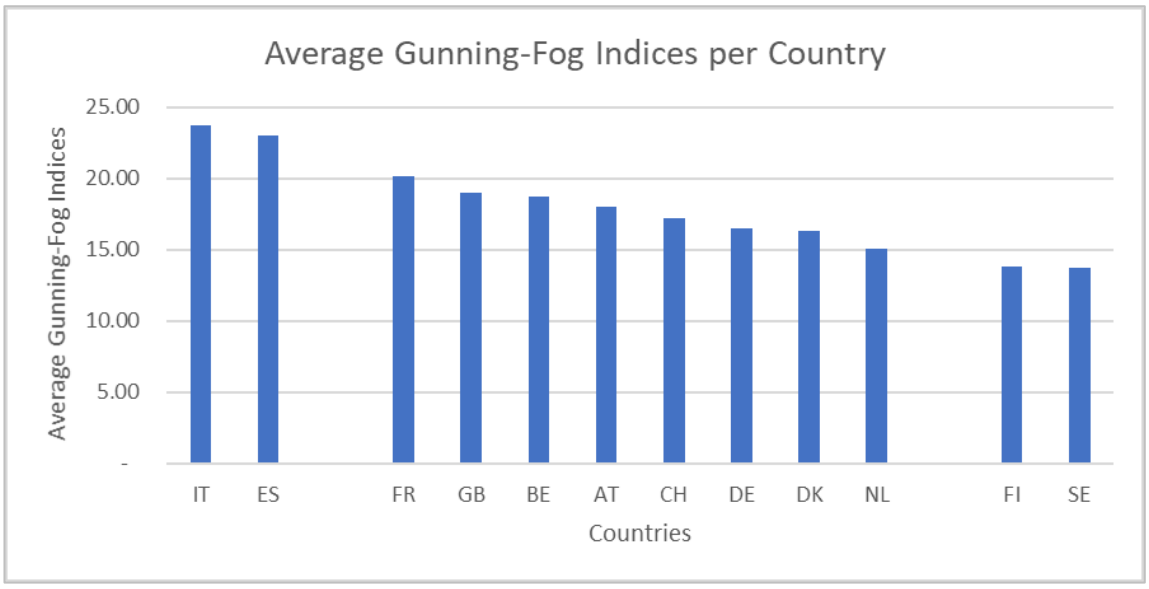

Figure 32: Average Gunning-Fog indices per country

Banks from northern EU countries (Finland, Sweden) tend to prepare disclosure reports that are more easily accessible to their stakeholders (average Gunning-Fog indices below 15). Countries from the southern part of the EU (Italy, Spain) use much more difficult language with index values high above 20. There are several potential explanations for these observations. It can be either a cultural question (Hofstede, 1980), a statistical issue as the number of banks in the sample from the North is relatively smaller than that from the South (see Table 12), or a question of language translation of the reports. It is unknown whether reports are written by native English speakers or were originally written in local languages by experienced bank employees and then translated by people with possibly less experience in translating financial texts.

Firm size is often quoted as a reason for better disclosure quality (Deumes & Knechel, 2008; Elzahar & Hussainey, 2012). Larger firms are viewed to have more financial resources available to spend on a more sophisticated disclosure policy. In this thesis, such an effect cannot be confirmed with respect to the readability of disclosure reports. Figure 33 shows the regression analysis of banks' Gunning-Fog indices relative to their total asset size (represented by the dots in the diagram).

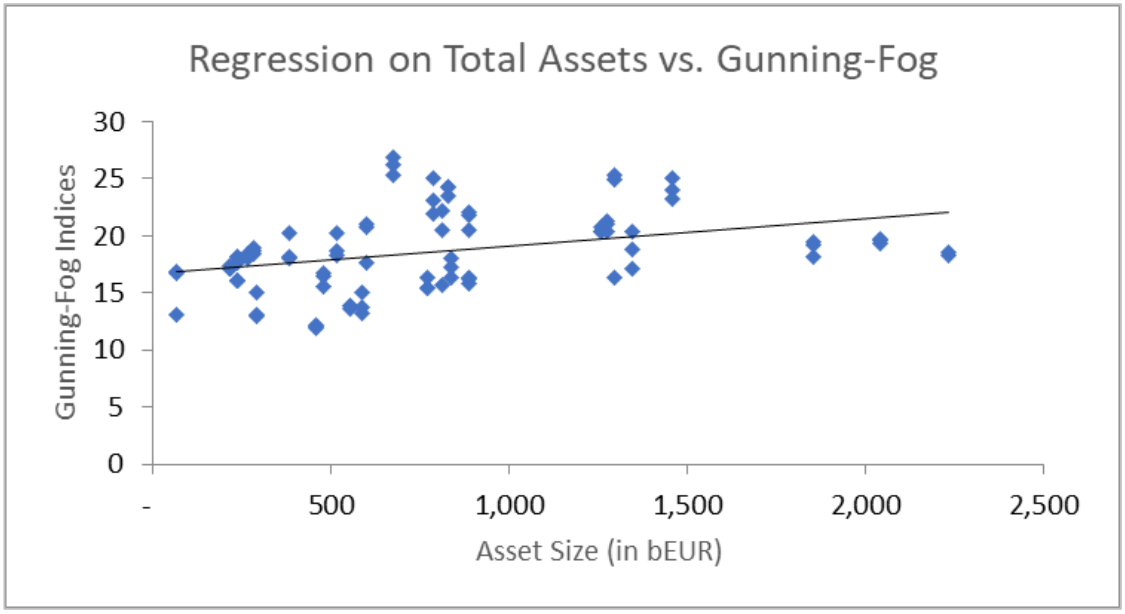

Figure 33: Regression analysis on total assets vs. Gunning-Fog

The regression line with an intercept at 16.69 (y-axis) and a positive but small positive slope of only 0.0024 indicates a slightly upward trend suggesting that larger banks prepare reports that are minimally more difficult to read. Despite this slight increase it is problematic to speak from a significant relationship. The reading difficulty of disclosure reports does not seem to strongly depend on the total asset base of a bank. Insofar, with respect to reading difficulty, the results from the studies of Deumes and Knechel (2008) and Elzahar and Hussainey (2012) cannot be confirmed for risk disclosure reports.

Finally, regulators divide banks into institutions that are systemically important on a global (G-SII), national (O-SII) or only local basis. Regulatory authorities have a particular focus on the first two groups of banks as they could pose a threat to the broader economy and society; especially during economic downturn (Financial Stability Board, 2017). Banks in the global group also must communicate their risk profile in more detail to the public than those of the national group. The local group (usually small banks that are not part of this study) have a reduced disclosure burden.

Figure 34 identifies the difference in reading difficulty of global and national banks.

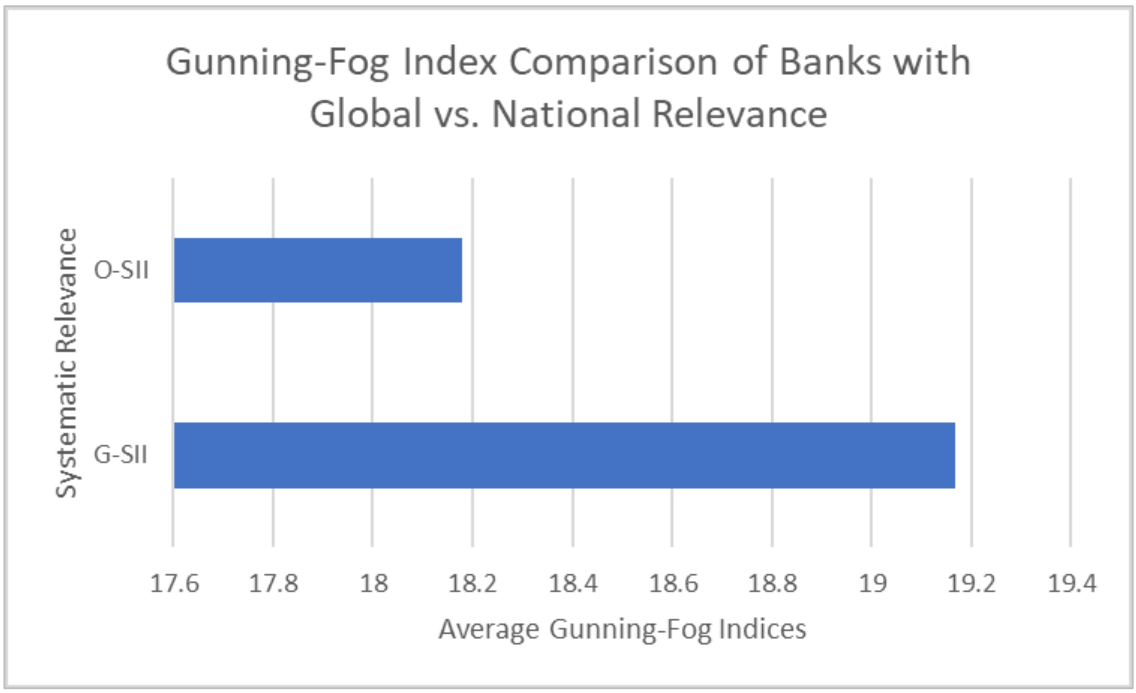

Figure 34: Index comparison banks with global vs. national relevance

The average Gunning-Fog index of banks from the G-SII global systemically important group is about one grade higher than that of the O-SII national systemically important group. This means that G-SII disclosure reports are, on average, more difficult to read than those of the national group. This observation can be attributed to the higher complexity of explaining the risk profile of globally active banks, compared to the lesser active national banks.

6.2.2 Evaluation of Quality Criterion 2 Comprehensiveness

6.2.2.1 Quantity

The effect of the quantity of disclosed information is an area of major interest in disclosure research. A majority of studies find that more disclosure is better than less, and that the amount of disclosure is positively correlated with the size and complexity of a firm's operations (see section 2.2.7). Table 19 shows the total number of risk words published per bank and year in the research sample.

Total number of risk words per bank and year			
Banks	2016	2017	2018
Bank from AT	5,032	5,849	6,321
Bank from BE	4,079	4,264	4,164
Bank from CH	1,982	2,600	2,685
Bank 1 from DE	6,013	7,461	7,450
Bank 2 from DE	3,932	4,928	6,608
Bank 3 from DE	4,181	4,773	5,206
Bank 4 from DE	2,384	4,222	4,261
Bank 5 from DE	4,282	4,354	4,961
Bank 6 from DE	2,819	4,188	3,623
Bank from DK	3,747	4,459	3,815
Bank 1 from ES	3,528	3,968	4,535
Bank 2 from ES	5,206	5,297	5,281
Bank 3 from ES	7,460	8,397	8,995
Bank from FI	4,154	4,014	4,388
Bank 1 from FR	6,501	6,748	7,029
Bank 2 from FR	5,097	5,217	7,453
Bank 3 from FR	6,977	7,570	8,107
Bank 4 from FR	3,992	5,130	6,561
Bank 5 from FR	908	1,818	2,377
Bank 1 from GB	3,316	3,492	3,180
Bank 2 from GB	8,833	8,482	8,291
Bank 3 from GB	4,051	5,850	5,612
Bank 4 from GB	3,494	4,667	4,483
Bank 5 from GB	2,047	2,436	2,449
Bank 6 from GB	2,750	2,826	3,108
Bank 1 from IT	11,451	12,576	11,215
Bank 2 from IT	9,533	9,171	10,072
Bank 1 from NL	2,719	2,124	2,235
Bank 2 from NL	3,913	4,638	4,780
Bank from SE	4,322	4,722	2,977
Averages per year	4,623	5,208	5,407

Table 19: Total number of risk words per bank and year

Table 20 summarises the average quantities of risk information given in regulatory risk disclosure reports on the predefined risk categories for the sample banks. The numbers in the table are the counts of risk-relevant words in the reports (see Appendix 8.3).

Quantities of risk words disclosed						
	Risk management	Credit risk	Market risk	Operational risks	Other risks	TOTAL
Average 2016	1,035	2,082	696	224	586	4,623
Average 2017	1,174	2,281	755	241	756	5,208
Average 2018	1,309	2,337	793	247	721	5,407
Average TOTAL	1,173	2,234	748	237	688	5,080

Table 20: Quantities of risk-relevant information

On average, a risk disclosure report consists of 5,080 risk relevant words for the period 2016 - 2018. A strong upward trend can be spotted from 4,623 words on average in 2016 to 5,407 words in 2018. This is an increase in risk reporting of about 17% over two years. A similar increase can also be observed in the individual risk categories. Without exception, all risk disclosure quantities on risk management, credit risk, market risk, operational risk, and other risks grow over the research period. This upward trend can be explained by banks gaining experience in risk reporting, valuing the opportunities this channel of communication with stakeholders provides, and experiencing growing public pressure to explain their risk profile in more detail.

In section 4.3, it is discussed that credit risk is the most important risk category for European banks. This statement can be confirmed by the results in Table 20 and Figure 35. Over the three-year period of analysis, disclosure on credit risk is by far the subject with the highest risk word count percentage.

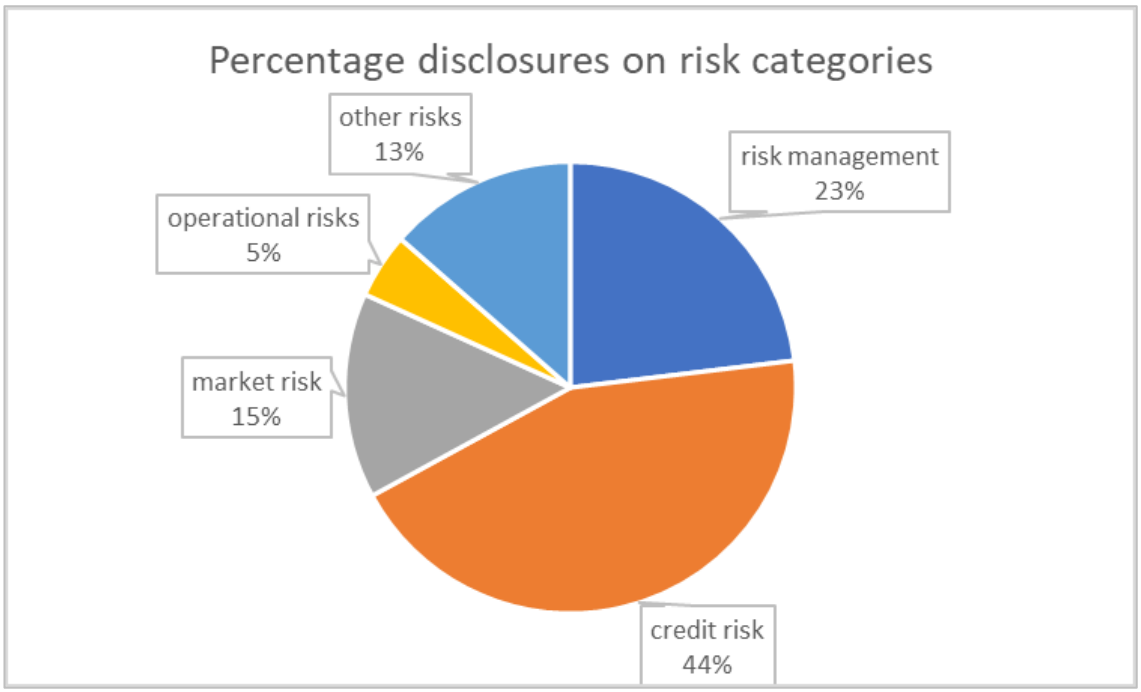

Figure 35: Percentages of disclosures on risk categories

Figure 35 indicates that close to half (44%) of the total risk disclosure is dedicated to credit risk. About another quarter (23%) is on general explanations of risk management strategies, organisation, and processes. Market risk constitutes a rather meagre share of 15%, comparable to the amount of information given on other risks such as liquidity, encumbered assets, and insurance risks ("other risks"). It comes as a surprise that operational risks only cover a proportion of 5%. An explanation for this low share can be that banks focus on their internal operational risks in disclosure reports, while other reporting on environmental, social and governance (ESG) risks are outsourced to the newly introduced reporting standards on non-financial risks.

Further managerial insights can be gained by looking at the results at bank level. The descriptive statistics in Table 21 show that there is not yet a common agreement on the optimal amount of disclosure quantity. There are banks that invest a large effort into very wordy disclosures, while others report close to nothing on specific risk topics.

Descriptive Statistics						
Statistic	Risk management	Credit risk	Market risk	Oper. risk	Other risks	TOTAL
Mean	1,173	2,234	748	237	688	5,080
Standard Error	69.56	113.36	50.51	21.02	50.92	246.77
Mode	1,077	2,118	1,121	n/a	n/a	5,206
Standard Deviation	659.95	1.075.44	479.15	199.39	483.06	2.341.04
Kurtosis	1.04	3.14	1.13	- 0.14	- 0.13	0.83
Skewness	1.04	1.54	1.12	0.83	0.70	1.00
Minimum	197	344	15	0	0	908
Maximum	3,395	6,147	2,158	763	2,124	12,576
Count	90	90	90	90	90	90

Table 21: Descriptive statistics on quantities of risk disclosures

Looking at the row “Minimum” in Table 21, it can be seen that there are banks that disclose very little in general and even nothing on operational and other risks. On the other hand, the row “Maximum” shows that, for instance, on credit risk there are banks that disclose three times more than the average value (6,147 risk words reported compared to the average of 2,234). This results in high standard deviations on all risk categories as can be seen in Table 21.

Furthermore, the data distribution is skewed to the right as the positive skewness factors and Figure 36 show. This is expected as banks are not limited by a maximum amount of information sharing (right side of the distribution) but are limited on the minimum amount (i.e., they cannot choose not to disclose at all).

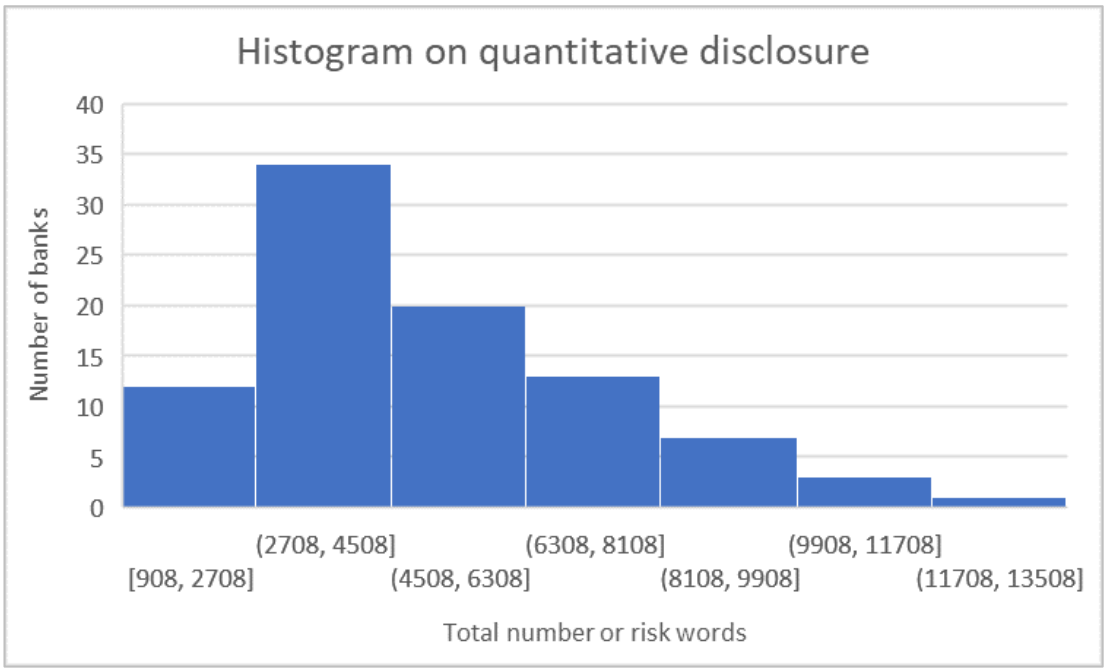

Figure 36: Histogram on quantitative disclosure

Finally, the thirty banks in the sample are headquartered in various EU countries where disclosure strategies may differ despite the so-called level playing field in EU financial services. Often regulatory authorities of one country issue best practice guidelines that are followed by their supervised banks.[34] Table 22 shows average amounts disclosed by banks on a country by country basis; ranked from highest to lowest.

[34] As it is for instance the case in Germany with the Deutsche Bundesbank "Anwendungsbeispiele" (best practice examples).

Disclosure Quantities by Country						
Countries	Risk mgmt.	Credit risk	Market risk	Oper. risks	Other risks	TOTAL
IT	4,491	15,372	5,916	1,369	3,761	30,907
ES	3,601	6,552	3,045	1,094	3,264	17,556
AT	3,283	7,833	2,881	943	2,262	17,202
FR	5,095	5,354	1,829	1,071	2,947	16,297
DE	3,427	6,533	1,965	405	1,945	14,274
GB	2,993	6,780	1,696	490	1,270	13,228
FI	2,103	6,135	2,369	912	1,037	12,556
BE	2,758	5,307	2,406	641	1,395	12,507
DK	3,129	3,495	2,493	864	2,040	12,021
SE	2,888	6,073	763	720	1,577	12,021
NL	2,198	5,549	1,308	248	902	10,205
CH	994	4,041	1,725	56	451	7,267

Table 22: Quantity of disclosed information by country

The data in Table 22 reveal that regarding the quantity of disclosed information, Italy ranks first (30,907 words on average per disclosure report), while Switzerland comes last (7,267 words on average per disclosure report). It is interesting to observe that Italy and also Spain rank high in the reading difficulty of criterion one. A too large number of words appears to also lead to a higher reading difficulty. Banks in the sample from other countries form a relatively homogeneous group where the quantity disclosed ranges between 12,000 to 17,500 words.

6.2.2.2 Coverage

The quantity of disclosed information demonstrates the bank's openness and effort to communicate its risk profile to its stakeholders. However, quantity alone is not sufficient to ensure that a bank covers all relevant risk categories. It is possible that a large number of words is spent on less relevant subjects, thereby distracting the reader from the more important, potentially critical risk areas. Therefore, the proposed scoring model also analyses the balanced

coverage of risk categories in disclosure reports measured by the Herfindahl index (see section 4.5.2.2). The index empirically measures the extent to which various risk categories are covered in a text relative to the total amount of disclosure. If the disclosure on one risk category dominates the other categories, then the index raises a warning signal of an imbalanced disclosure policy.

The potential values for the Herfindahl Index (HHI) are between $1/n \leq HHI \leq 1$ (where n is the sample size). A high value of HHI means that the disclosure is concentrated on one subject, while a value to the lower end means that disclosure is more balanced across the risk categories. Consequently, the expected values for HHI on the disclosure reports would preferably be located in the lower region.

Table 23 shows the descriptive statistics for the coverage criterion measured by the Herfindahl index for the sample of ninety reports with respect to the disclosed number of risk words per risk category (see Appendix 8.3).

Descriptive Statistics	
Mean	0.33
Standard Error	0.01
Median	0.30
Standard Deviation	0.09
Sample Variance	0.01
Kurtosis	5.73
Skewness	2.23
Minimum	0.22
Maximum	0.71
Count	90

Table 23: Descriptive statistics on coverage (Herfindahl index)

The mean of all Herfindahl indices of the ninety disclosure reports is 0.33. Considering the lower border given by $1/n = 1/90 = 0.01$ (periodic) and the upper border of 1, the average index lies within the lower half of the distribution. The value of 0.33 implies that banks on average do not concentrate their risk disclosures on one subject only. On the other hand, disclosures are also not

perfectly balanced as can be seen in Figure 37. This means that not all risk categories are of the same importance to the sample banks. For example, more disclosure is expected on credit risk than on other risks due to its relative importance to banks. In most cases, credit risk is the dominant risk category that requires a higher level of disclosure quantity (see 4.3.1).

Table 23 also shows that the minimum and maximum values of Herfindahl indices range from 0.22 up to 0.71, respectively. The upper values are of concern because this means that risk disclosure is concentrated around one risk category only, potentially neglecting other categories. However, only a few reports need attention as the distribution is strongly skewed (the skewness factor is high at 2.23).

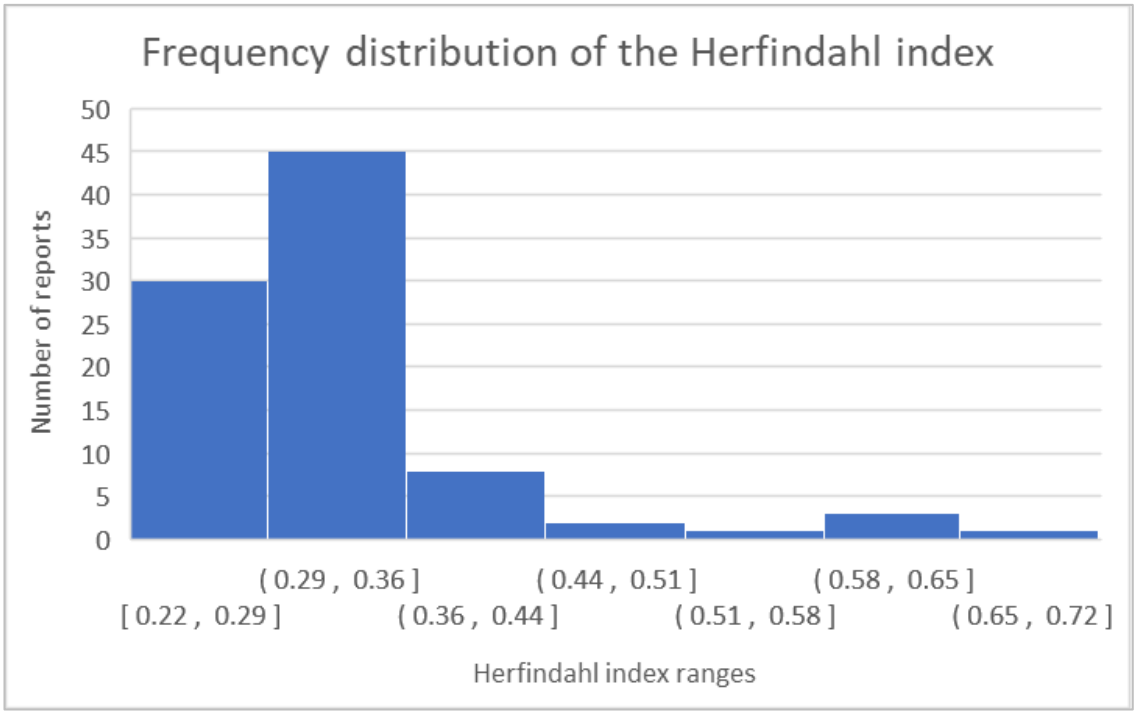

Figure 37: Histogram on the distribution of the Herfindahl index

The histogram in Figure 37 highlights the fact that reports with high Herfindahl indices are rather extreme outliers. The large majority of reports show low HHI values in an acceptable range between 0.22 and 0.36. The first two columns (including reports with HHI values up to 0.36) make up a combined 75 reports. There are only a few outliers on the right tail that dominantly focus on one risk subject. All these banks share a focus on credit risk which can be attributed to the particular situation of the bank during the reporting period.

Overall, the problem of too high HHI index values is not widespread in the sample. For the large majority of reports, Figure 37 confirms the findings from Miihkinen (2011) that disclosure is well spread across several risk categories.

6.2.3 Evaluation of Quality Criterion 3 Meaningfulness

This section presents results on the meaningfulness of disclosure reports which considers how useful disclosed information is to stakeholders. Prior research shows that often boilerplate language is used and a copy-and-paste approach from one report to the next is applied (International Accounting Standards Board, 2017; UNCTAD, 2017). For a report to be meaningful, the content must be relevant to the needs of the users. This is the case if the information summarises the current risk profile of a bank well. However, in risk management it is even more relevant for readers to get an outlook and guidance on the impact of potential future economic scenarios on the current risk profile (Enhanced Disclosure Task Force, 2012; IFRS, 2019).

The meaningfulness criterion measures the extent to which disclosure reports include forward-looking information on risks and their impacts. Based on a list of forward-looking words (see Appendix 8.3), the empirical indicator for meaningfulness counts the amount of information provided on potential future developments (see section 4.5.2.3). The scoring model assumes that the more forward-looking the information given by a bank is, the higher the quality of the disclosure report becomes.

Table 24 shows the total number of forward-looking words published per bank and year in the research sample.

Number of Forward-looking Words per Bank and Year			
Banks	2016	2017	2018
Bank from AT	1,085	1,148	1,208
Bank from BE	641	705	756
Bank from CH	278	339	337
Bank 1 from DE	931	1,090	1,055
Bank 2 from DE	460	555	844
Bank 3 from DE	903	971	1045
Bank 4 from DE	438	804	834
Bank 5 from DE	937	961	1115
Bank 6 from DE	352	703	564
Bank from DK	824	979	753
Bank 1 from ES	829	961	1099
Bank 2 from ES	1,166	1,220	1,182
Bank 3 from ES	1,991	2,238	2,572
Bank from FI	626	660	719
Bank 1 from FR	1,616	1,659	1,688
Bank 2 from FR	1,035	1,111	1,802
Bank 3 from FR	1,684	1,874	2,030
Bank 4 from FR	1,097	1,244	1,796
Bank 5 from FR	170	368	563
Bank 1 from GB	655	671	598
Bank 2 from GB	2,019	1,941	1,911
Bank 3 from GB	761	1,089	977
Bank 4 from GB	572	766	722
Bank 5 from GB	315	338	345
Bank 6 from GB	597	581	693
Bank 1 from IT	2,703	2,919	2,530
Bank 2 from IT	1,946	1,892	2,165
Bank 1 from NL	341	238	262
Bank 2 from NL	773	963	908
Bank from SE	626	716	390
Averages per year	946	1,057	1,115
Total average			1,039

Table 24: Number of forward-looking words per bank and year

Figure 38 compares the average amount of information provided on current risk exposures (data is reused from quality criterion 2 on quantity) with the average information provided on potential future impacts of these exposures.

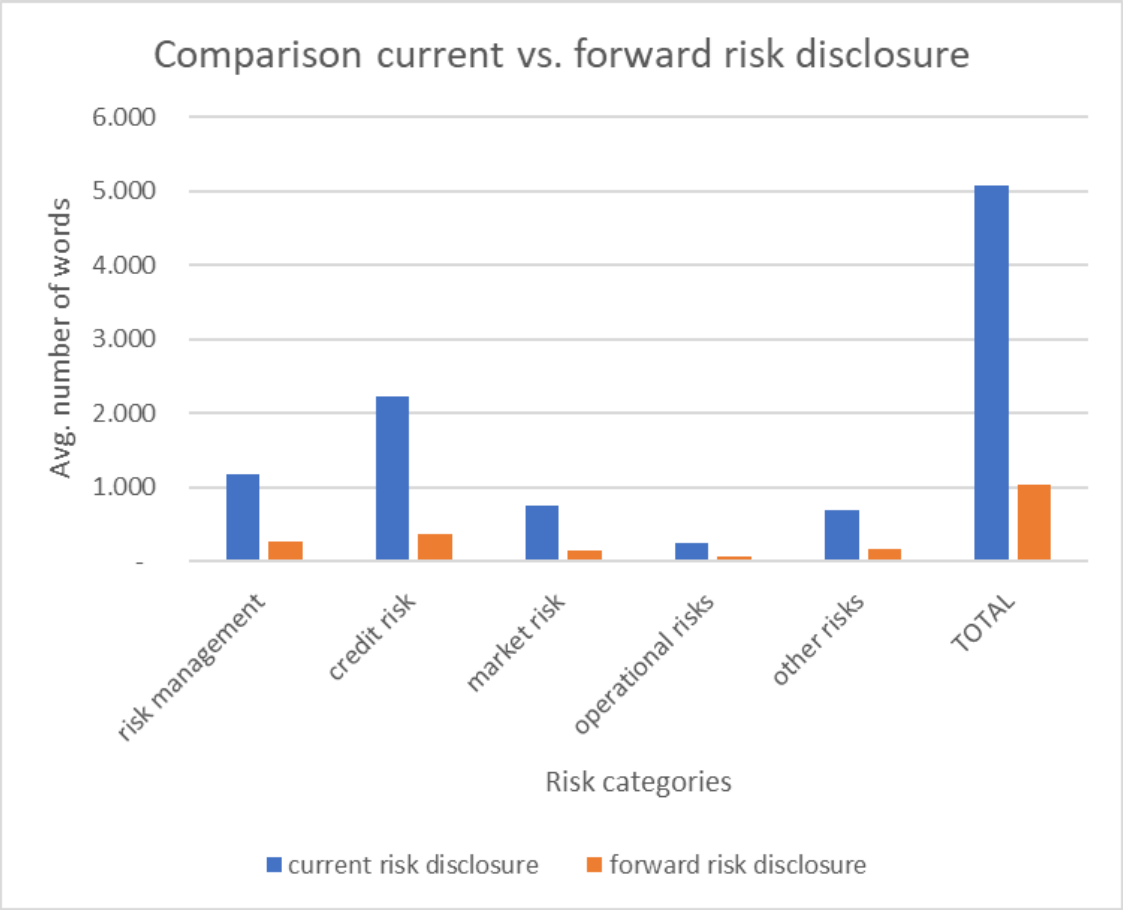

Figure 38: Comparison of current versus forward risk disclosure

At first sight, the figure shows that there is a huge difference in the raw amount of current and future risk disclosure. Much information is given on current risk exposures across all risk categories, but only about one fifth of the information is given on the future impacts. This discrepancy is a major concern as expectations from stakeholders are possibly not met by banks. There are several explanations for this mismatch. For banks, it appears to be easier to summarise their current risk profile only as a discussion on future uncertainties needs a lot more management discretion. Banks are often reluctant to forecast developments as the legal impact of potential misguidance can be devastating (Leuz & Verrecchia, 2000; Verrecchia, 1990). Another reason lies in the objective of regulatory risk reporting itself. Banks tend to view regulatory risk disclosure as

just another report to prepare in order to fulfil a legal requirement. and are not yet aware of the power of risk disclosure to differentiate themselves from others with higher quality reports (UNCTAD, 2017).

Some further insights on meaningfulness of risk disclosure reports can be seen in Table 25.

Descriptive Statistics	
Mean	1,039
Standard Error	65.63
Median	906
Mode	626
Standard Deviation	623
Kurtosis	0.56
Skewness	1.06
Minimum	170
Maximum	2,919
Count	90

Table 25: Descriptive statistics on meaningfulness

On average, disclosure reports in the sample include 1,039 forward-looking words. Considering the minimum and maximum numbers of forward-looking words, it can be seen that the disclosure policy pursued differs much across banks. There is a group of banks that basically refrains from giving forward-looking information at all (a meagre 170 words only per report) and settle on summarizing the current risk profile. Other banks are more proactive and discuss future economic impacts on their risk exposures with a maximum of about 2,900 forward-looking words. Still, these overall low numbers on forward-looking information confirm the observation that for the research period, banks view disclosure reports mainly as a tool to convey their current risk profile.

The trend of the meaningfulness criterion across individual risk categories over the period of study can be seen in Figure 39.

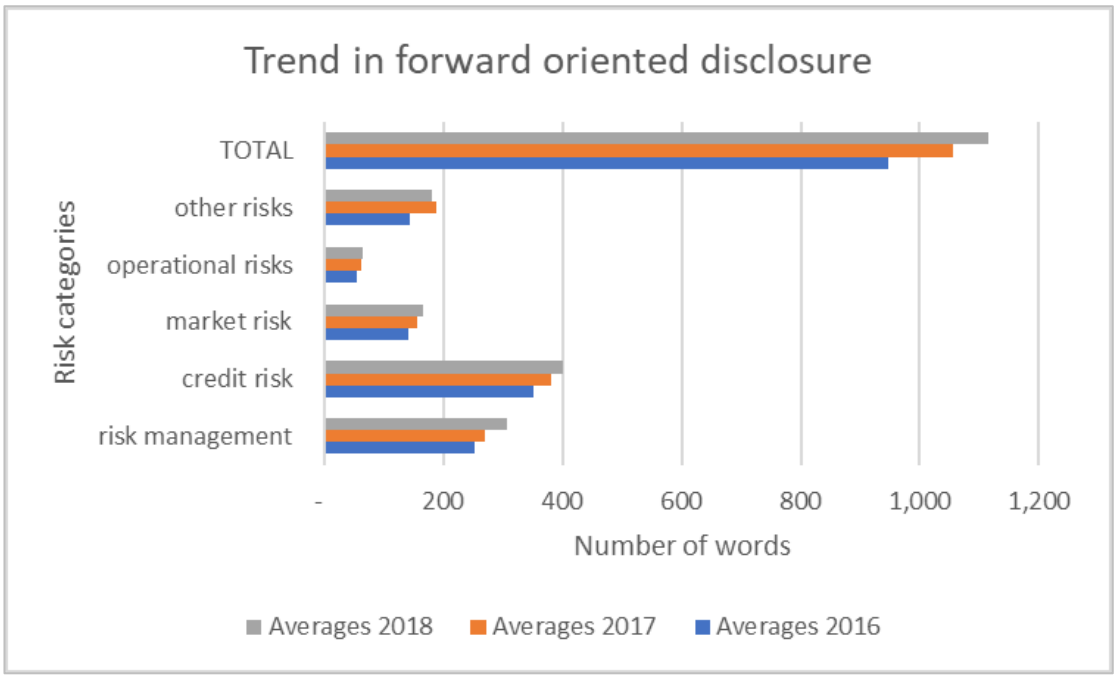

Figure 39: Trend in forward-looking disclosure

Figure 39 shows that in absolute amounts the most forward-looking information is provided on credit risks, followed by the risk management category. The least forward-looking information is given on operational risks (less than hundred words on average). These observations are in line with the findings from quality criteria quantity and coverage over the period of study where credit risk dominates the other risk categories (European Banking Authority, 2017). Table 26 shows the total Risk-Weighted Asset (RWA) values for the banks in the sample for 2018. Credit risk is by far the most important risk category (5,809.67 bEUR) and banks must give priority to a discussion of this category. Considering that the RWA of operational risk is the second-largest value, it is a matter of concern why relatively little forward-looking disclosure is made on this risk category (see Figure 39 with the lowest number of forward-looking words on operational risks).

Total RWA Values per 2018 (in bEUR) for the sample				
Credit risk	Counterparty risk	Market risk	Operational risk	Other risks
5,809.67	331.02	336.35	920.17	105.69

Table 26: Total RWA values per risk category

Figure 39 also reveals that there is not much progress made with regards to increasing the absolute amount of forward-looking information provided for the period 2016 to 2018. Professional bodies such as the International Accounting Standards Board (IFRS, 2019) and banking authorities (EBA, 2020) make such a recommendation to enhance the usefulness of disclosure reports. Although there is a slight increase from one year to the next the improvements in disclosing forward-looking information are small.

6.2.4 Evaluation of Quality Criterion 4 Time comparability

Banks are expected to disclose their current risks (quality criterion quantity and coverage) as well as discuss the potential future impacts on their risk exposures (quality criterion meaningfulness) (EBA, 2020; IFRS, 2019). This would increase stakeholders' understanding of the bank management's insights on current and future risks and how they will be managed. However, often it is not only the absolute values of risk exposures that concern stakeholders, but the relative changes in exposures from one reporting period to the other. Stakeholders can analyse such changes by comparing the figures from two consecutive disclosure reports themselves which, however, would be burdensome. Alternatively, this task can be done by the preparers of the risk reports. Often, banks have the data readily available, allowing them to directly provide comparative information in their disclosure reports. Quantitative comparisons in the form of adding the numerical changes from one period to the other are standard in many reports. The time comparability criterion captures the number of qualitative comments and explanations provided by banks on changes in risk exposures over time. It does so by counting the occurrences of words that indicate a qualitative time comparison (see Appendix 8.3). Table 27 shows the number of words on time comparisons published per bank and year in the research sample.

Number of Words on Time Comparisons per Bank and Year			
Banks	2016	2017	2018
Bank from AT	121	150	167
Bank from BE	225	233	213
Bank from CH	68	97	97
Bank 1 from DE	256	246	197
Bank 2 from DE	119	132	243
Bank 3 from DE	125	146	159
Bank 4 from DE	95	137	174
Bank 5 from DE	101	125	162
Bank 6 from DE	73	89	68
Bank from DK	141	172	147
Bank 1 from ES	148	185	207
Bank 2 from ES	232	226	239
Bank 3 from ES	283	329	387
Bank from FI	220	197	240
Bank 1 from FR	313	315	309
Bank 2 from FR	190	211	371
Bank 3 from FR	342	377	445
Bank 4 from FR	177	162	283
Bank 5 from FR	22	33	80
Bank 1 from GB	105	122	109
Bank 2 from GB	408	385	334
Bank 3 from GB	142	233	224
Bank 4 from GB	189	208	178
Bank 5 from GB	76	99	106
Bank 6 from GB	115	100	122
Bank 1 from IT	457	539	449
Bank 2 from IT	297	303	385
Bank 1 from NL	157	118	121
Bank 2 from NL	163	191	170
Bank from SE	262	279	160
Averages per year	187	205	218
Total average			203

Table 27: Number of words on time comparisons per bank and year

Results in the next Table 28 show that qualitative comments on time comparisons per risk category are not very common in regulatory risk disclosures of the sample banks.

Averages on Time Comparisons per Risk Category						
	Risk mgmt.	Credit risk	Market risk	Oper. risks	Other risks	Total
2016	39	77	36	7	28	187
2017	43	79	38	9	36	205
2018	51	85	40	8	34	218

Table 28: Averages on time comparisons per risk category

The total average of time comparison words (far right column) shows very low absolute values of around 200 words per disclosure report. This figure is low compared to the much higher values found in section 6.2.2.1 on the total quantity of disclosed risk information and in section 6.2.3 on the amount of forward-looking information. Commenting on changes over time is not very common in disclosure reports yet, despite the identified need of stakeholders for such information (Enhanced Disclosure Task Force, 2012; International Accounting Standards Board, 2017; UNCTAD, 2017).

The descriptive statistics on time comparisons for the whole sample are presented in Table 29. They suggest that besides a rather low level of time comparison disclosure in general, individual disclosure reports in the sample are by far not a homogeneous group.

Descriptive Statistics	
Mean	203
Standard Error	11.17
Median	178
Mode	68
Standard Deviation	106
Kurtosis	0.46
Skewness	0.90
Range	517
Minimum	22
Maximum	539
Count	90

Table 29: Descriptive statistics on time comparisons

There are some reports that basically do not comment on exposure changes over time at all (minimum value of 22 time comparison words only), while others that are more proactive include 539 occurrences of time comparison words. The table also shows that the distribution for time comparison data is skewed to the left (indicated by a positive skewness factor of 0.90). This means that the disclosure reports with the maximum values of time comparison words are rather large outliers with only a low number of reports. Still, these outliers move the average number of time comparison words up to 203, otherwise the average would be even lower. The problem with low time comparison comments in disclosure reports is serious, and can be captured in Table 30.

Grouped Time Comparisons per Report	
Number of words with time comparisons	Number of reports
less than 100 occurrences	12
100 - 250 occurrences	52
more than 250 occurrences	26

Table 30: Grouped time comparisons per report

There are twelve out of ninety disclosure reports that include one hundred or less time comparison words. These reports do not give stakeholders many explanations for periodic changes and, therefore, need management attention and potential improvements. About half of the reports provide between 100 and 250 time comparison words, while 26 reports include more than 250 words. However, the maximum amount is limited by 539 words. Despite these low values, Table 31 shows a slight positive trend in time comparisons disclosures over 2016 - 2018.

Trend in time comparison disclosures (2016 – 2018)	
% changes in the number of words on time comparisons	number of banks
+20%	14
stable	13
-20%	3

Table 31: Trend time comparison disclosures

About half of the thirty banks in the sample increased their time comparison disclosures by more than 20% over the three-year period, and another thirteen banks remained on a stable disclosure level. Only a small minority of three banks reduced their disclosures on time comparisons. Considering that stakeholders appreciate support when making time comparisons of banks' disclosure reports (EBA, 2020), the positive trend seen in Table 31 is encouraging but starting from a rather low level (see Table 28).

Finally, a closer look at a comparison of time comparability across all risk categories in Figure 40 shows that the highest effort for explaining the changes in risk profiles is put into the credit risk category.

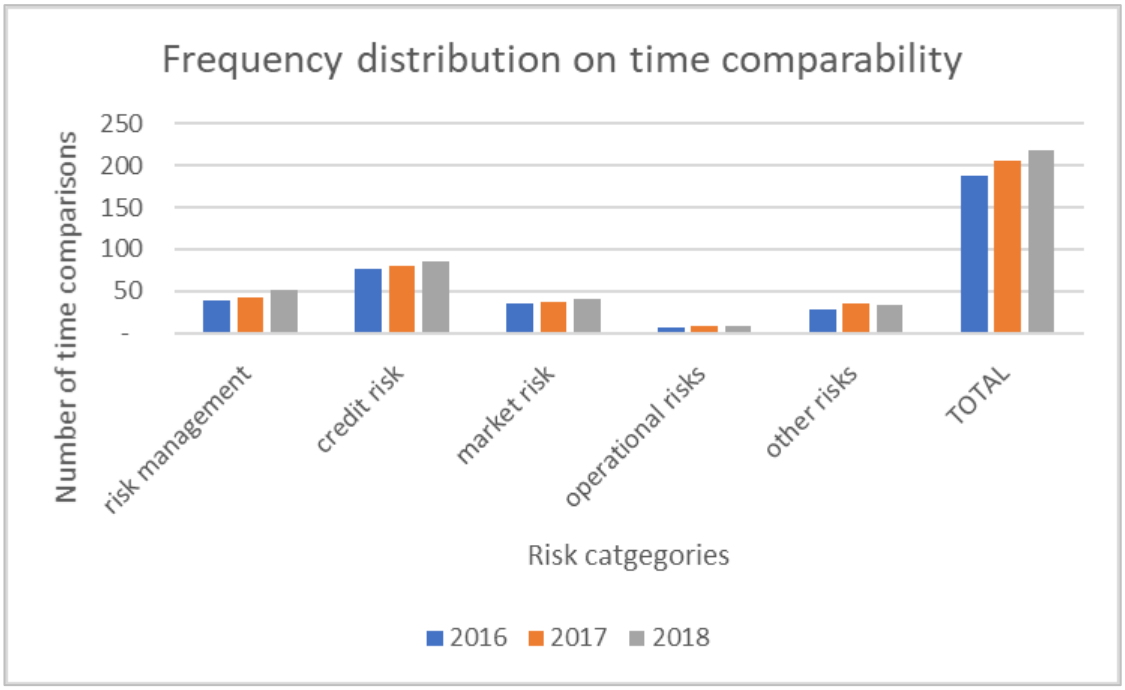

Figure 40: Frequency distributions on time comparability

The number of time comparison words is nearly double for credit risk compared to those of risk management and market risk. On the other hand, it is a matter of concern to stakeholders that time comparisons for operational risk are almost non-existent. An explanation of this could be that changes in operational risks tend to occur more slowly than in other more volatile risk categories such as market risks. However, management needs to be aware that, in the rare event of an operational risk becoming imminent, the damage can be threatening for the entire bank. In such cases, stakeholders would demand sufficient information to understand these ongoing changes.

6.2.5 Evaluation of Quality Criterion 5 Sector Comparability

Readers of regulatory risk disclosure reports benefit from comparing reports of one bank over a number of periods. They also benefit from comparing reports of different banks across the banking industry. Peer group comparisons help the readers to evaluate how one bank ranks in risk profile and management compared to its competitors.

Comparing reports of different banks, however, is a burdensome task for the readers. Experience from the coding process (see section 5.5.6) shows that banks make much use of their freedom of how they disclose their risk profile. No report structure of one bank is identical to the other. Although there are a number of tables with quantitative content that are standardised, the presentation of qualitative information is not. Banks customise their comments and explanations so that they fit their disclosure needs. In addition, there is no industry standard yet established for the structure of disclosure reports. Every bank can prepare its disclosure report in whatever way it deems most efficient and effective to communicate its risk profile.

The proposed model uses a disclosure benchmark template which is derived from the report structures of the largest five banks in the sample and applies it to all other banks (see Appendix 8.4). Table 32 shows the number of matched items on sector comparisons per bank and year in the research sample.

Matched Items on Sector Comparisons per Bank and Year			
Banks	2016	2017	2018
Bank from AT	16	17	17
Bank from BE	15	15	13
Bank from CH	12	12	12
Bank 1 from DE	14	19	19
Bank 2 from DE	13	13	13
Bank 3 from DE	11	14	14
Bank 4 from DE	15	15	15
Bank 5 from DE	17	18	18
Bank 6 from DE	15	18	18
Bank from DK	13	13	14
Bank 1 from ES	11	11	13
Bank 2 from ES	13	13	13
Bank 3 from ES	17	15	15
Bank from FI	14	14	14
Bank 1 from FR	15	15	15
Bank 2 from FR	13	12	12
Bank 3 from FR	15	15	15
Bank 4 from FR	17	16	16
Bank 5 from FR	14	14	13
Bank 1 from GB	15	15	15
Bank 2 from GB	13	13	13
Bank 3 from GB	13	15	16
Bank 4 from GB	7	6	6
Bank 5 from GB	16	17	17
Bank 6 from GB	18	18	18
Bank 1 from IT	12	12	12
Bank 2 from IT	15	17	17
Bank 1 from NL	4	4	4
Bank 2 from NL	9	9	9
Bank from SE	14	13	12

Table 32: Matched items on sector comparisons per bank and year

The variations from the benchmark structure can be found in Table 33 which includes the descriptive statistics for the sector comparability criterion.

Descriptive Statistics	
Mean	14
Standard Error	0.34
Median	14
Mode	15
Standard Deviation	3.20
Sample Variance	10.23
Kurtosis	1,93
Skewness	-1.18
Range	15
Minimum	4
Maximum	19
Count	90

Table 33: Descriptive statistics on sector comparisons

The mean (average) number of structural items that individual reports share with the benchmark template is 14. This number means that on average 14 out of 25 items of the benchmark template are easy to find in the disclosure reports and easy to compare with other reports. The figure shows that disclosure reports remain rather individual reports, although they share some common properties. If the goal of improving comparison is to be pursued by regulatory authorities (Basel Committee on Banking Supervision, 2015; EBA, 2020), they must introduce more standardisation on reporting structures.

The standard deviation of the distribution of sector comparability scores is 3.2. By applying the standard deviation to the mean of 14, the range within which two thirds of the scoring results on this quality criterion lie is between 11 and 17 items. It is interesting to note that no bank comes close to the full score of 25 items. A closer look at the table of contents of the sample reports reveals that most banks' share some items with the benchmark template. However, banks also often add

individual items to their report structures and neglect other items that appear to be of lesser importance to them compared to other banks.

The analysis of the minimum/maximum values shows that there are not many extreme outliers to the upper side of the distribution. The maximum number of matched items between one report structure and the benchmark is 19 out of 25 items. On the lower end, there are few reports that score only 4 matched items. Reports in this group pose an unwanted challenge to the users as the structures of such reports are very individual. They are difficult to compare with other reports, thereby reducing the information gains (relative performance versus absolute performance of a bank) that can be derived from such a peer group review.

Figure 41 highlights the number of matched items that occur most of the period of study.

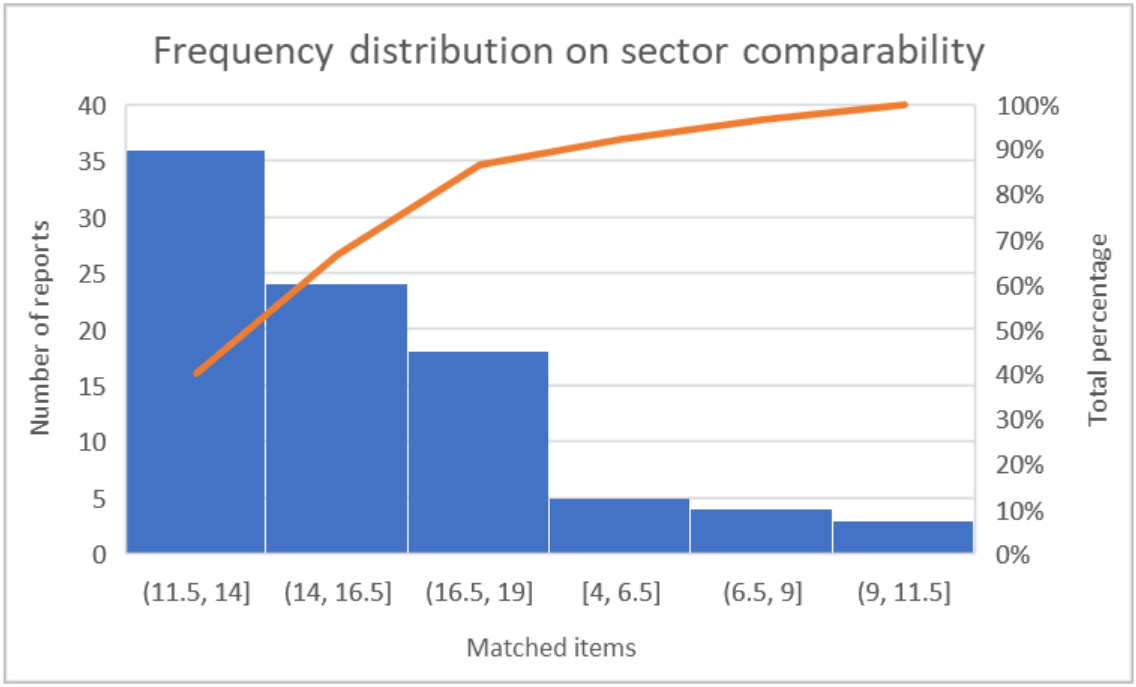

Figure 41: Frequency distributions on sector comparability

Thirty-six reports have item matches between 11.5 and 14. An additional twenty-four reports have slightly more item matches of 14 to 16.5, and finally a further group of eighteen reports has up to 19 item matches. In total, reports in these three groups cover a large majority of 78 out of 90 reports. The remaining twelve reports are in the two groups with the lowest number of matched items of 4 to 11.5. These reports share only few structural similarities with other reports and

need management attention in case it is interested in facilitating comparisons with competing banks.

The analysis of individual disclosure scores on this quality criterion reveals another interesting fact. Banks appear to be very reluctant to make changes to their report structures once they have established a structure that fits their needs. Table 34 summarises the item changes per bank over the research period. There are thirteen banks that do not make any material structural changes in their disclosure reports. There are eight banks that change one item, and nine banks make more than one item change.

Structural changes on disclosed items per bank	
Items changed	Number of banks
no change	13
+/- 1 item change	8
>1 item change	9

Table 34: Structural changes on disclosed items per bank

6.2.6 Evaluation of the Composite Risk Disclosure Score

In a final step, the regulatory risk disclosure scoring model requires the consolidation of the five quality criteria scores into one composite disclosure score per report. Such a composite disclosure score represents the total quality score for a report. It can be used for comparing one report to another, but also for analysing a particular report in detail in an effort to improve its overall quality.

The results from the scoring model are listed in appendix 8.5. This list includes individual scores on each of the quality criteria, as well as the composite disclosure scores per report and year. The frequency distribution in Figure 42 shows the composite disclosure scores for all ninety reports in the sample (covering the period 2016 – 2018).

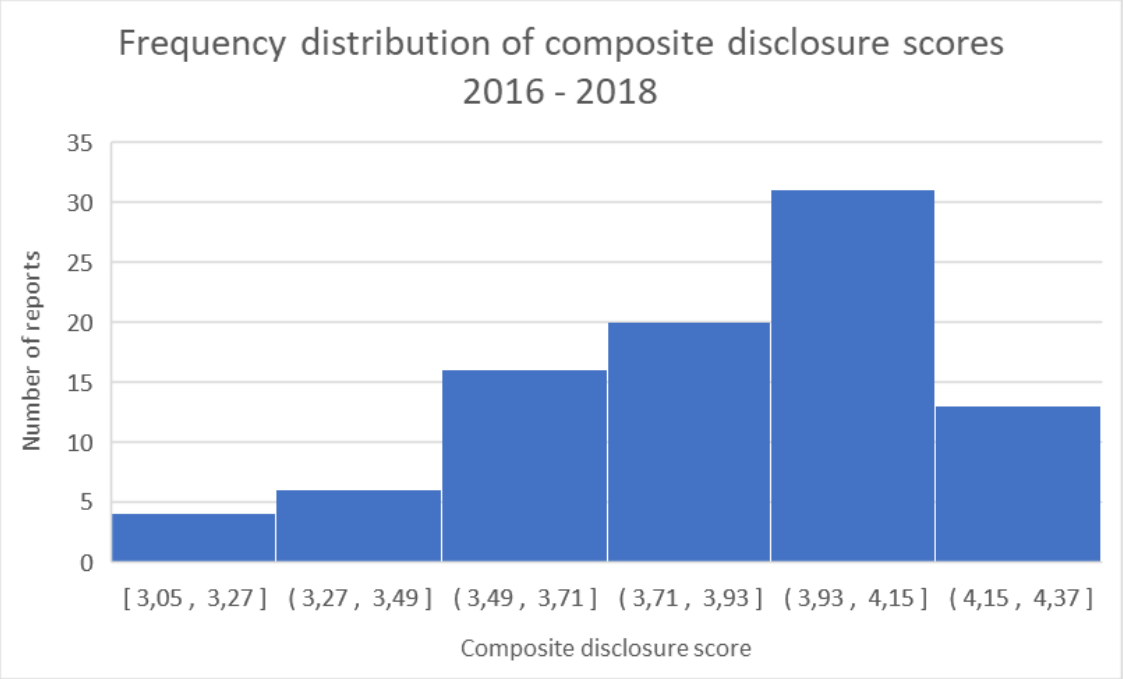

Figure 42: Frequency distribution of the composite disclosure scores

About a third of the ninety reports have disclosure scores between 3.93 and 4.15 (second column to the right). Thirteen reports come closer to the maximum possible score of 5 with scores that range between 4.15 and 4.37 (first column to the right). About another third of the reports ends up in two groups covering the upper half of scores in the range of 3 (between 3.49 and 3.93). Only a few reports score below 3.49 (in total ten reports, first and second column to the left).

The descriptive statistics in Table 35 reveal additional insights on the shape of the distribution of composite disclosure scores for the three-year period.

Descriptive Statistics	
Mean	3.86
Standard Error	0.03
Median	3.92
Standard Deviation	0.2863
Sample Variance	0.08
Kurtosis	0.14
Skewness	- 0.66
Range	1.30
Minimum	3.05
Maximum	4.34
Count	90

Table 35: Descriptive statistics on the composite disclosure scores

The mean (average) composite disclosure score of all ninety reports is 3.86. Considering the potential maximum value of five, it can be seen that there is room for further quality improvements for a large number of reports. The highest disclosure score achieved is 4.34 by a bank from Spain. This bank prepared a disclosure report where quantitative and qualitative elements were well-balanced. The lowest score is 3.05 from a bank from the Netherlands. The disclosure report of this bank consisted of mostly quantitative figures with rather little qualitative explanatory text. In percentage terms, the difference between the highest and lowest quality disclosure score is about 42%. This rather high value suggests that the quality among the reports differs substantially. This is insofar interesting as all reports share the same legal basis (the CRD IV/CRR framework, see section 2.3.3.2). Despite this fact, actual reports are implemented rather differently as the analysis on the quality criteria below shows.

The negative skewness of -0.66 implies that the distribution is left skewed (also see the histogram in Figure 42). A majority of reports convene around the mean with few outliers can be found on the tail of the distribution to the left. These outliers represent reports with low composite disclosure scores and require management attention for the reasons of this low quality. Again, the analysis of

individual results on the quality criteria will point the management to the areas for improvement.

Finally, the standard deviation of the distribution of 0.2863 confirms the findings from the frequency histogram in Figure 42. Two thirds of the reports lie in a composite disclosure score range of 3.58 to 4.14.

The year-by-year comparison in Figure 43 shows the trend in composite disclosure scores over the years 2016 to 2018. A slight upward trend can be observed (2016: 3,81; 2017: 3,87; 2018: 3,89) that is promising for the development over the next years.

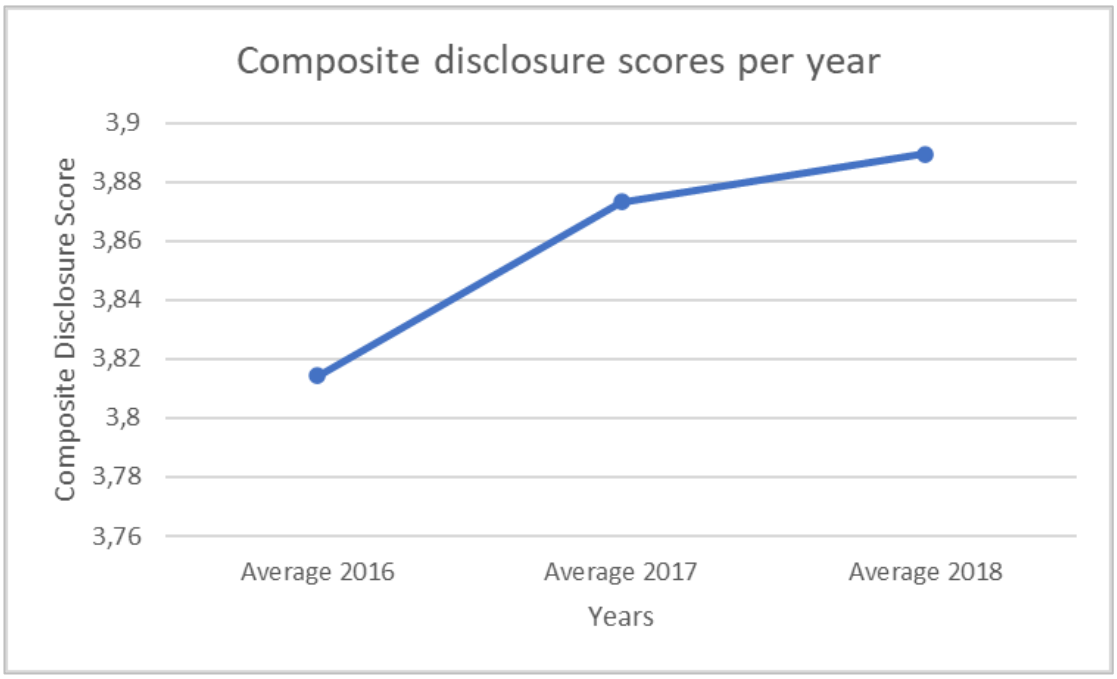

Figure 43: Composite disclosure scores year-by-year

The breakdown of the composite disclosure scores in Figure 44 shows the impact of each quality criterion on the overall disclosure scores.[35]

[35] The reason for the six columns in the figure is that the model splits quality criterion 2 on comprehensiveness in the two components: quantity and coverage.

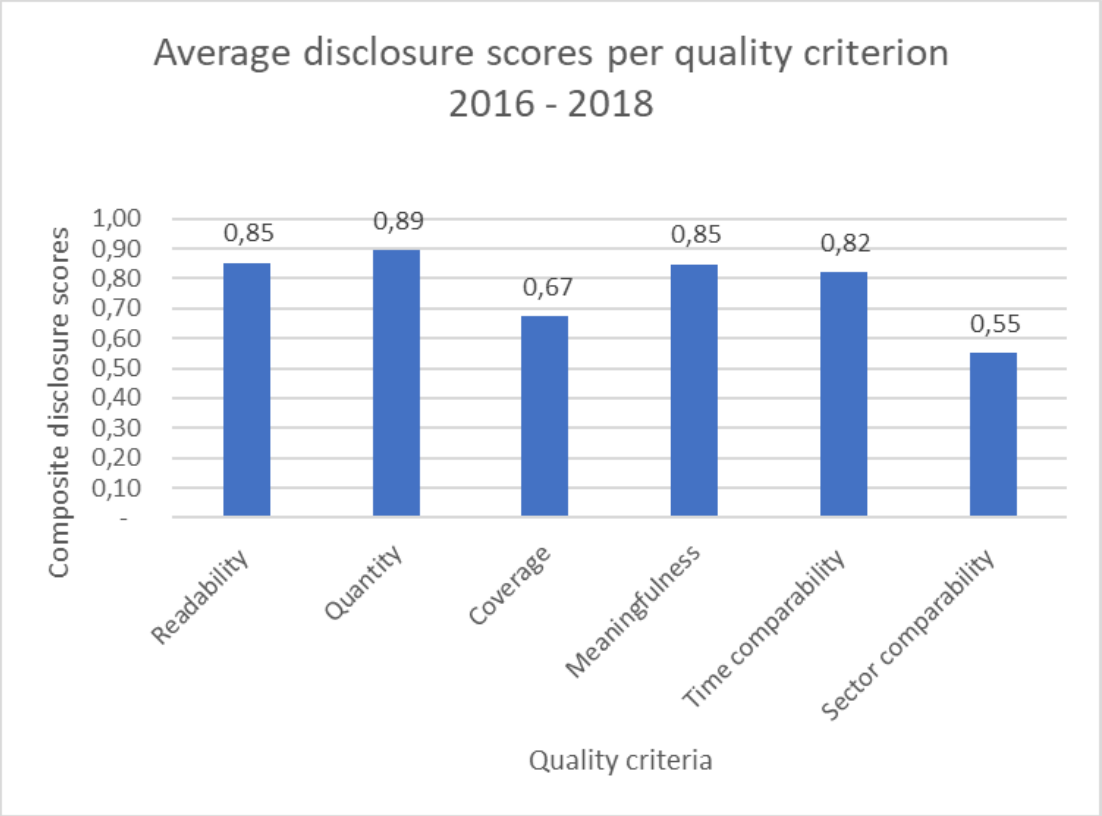

Figure 44: Average disclosure scores per quality criterion

On average, banks are doing best on the quantity criterion where they score a high 0.89 (a maximum value of 1 being the best for each criterion). This value suggests that the pure quantity of information disclosed is well received by the readers of regulatory risk disclosure reports. As the literature review shows (see section 2.2.7), quantity is often found to be an indicator for disclosure quality. The results on this quality criterion confirm this observation.

The average scores on the readability and meaningfulness criteria are both 0.85. This value is in the upper range of disclosure scores and again shows a good performance. However, the critical comments in the previous evaluation on these two quality criteria (see sections 6.2.1 and 6.2.3) need to be considered about overall low absolute values and rather large standard deviations in the sample.

The score on time comparison comes in fourth place with an average score of 0.82, already about 10 % less than the top score on quantity. This shows that at this stage, disclosure reports largely focus on disclosing the current risk situation of a bank than comparing it to previous risk exposures.

The disclosure scores on the coverage and sector comparability criteria are of concern. The low score on coverage (0.67) means that banks are focusing too much on a limited number of subjects in their disclosure reports. For achieving a higher score on this criterion, they would have to prepare more balanced reports covering all subjects proportionate to their importance in risk-weighted assets (RWA) terms. The very low disclosure score on sector comparability (0.55) is due to the fact that report structures are very different from bank to bank. On average they share only 14 out of 25 potential structural items and are therefore very difficult to compare for the readers. Improvements on this quality criterion are not only the responsibility of banks alone. Banking supervisory authorities are called upon to coordinate a common reporting structure benchmark which banks can follow in the interests of their stakeholders.

The evaluation of the scoring model results presented in this section provides banks with insights into the quality of their risk disclosure reporting which form a basis that they can use to improve each quality criterion separately as well as overall disclosure quality.

From an academic point of view, there remains an important question. So far, many research papers (e.g., Beretta & Bozzolan, 2008; Miihkinen, 2011) treat the quality criteria independently of each other. For ease of calculation, these papers assume that there exist no interdependencies among the variables. However, this assumption is critically challenged in the next section. With the help of statistical factor analysis, the relationships between the five quality criteria are analysed and screened for underlying patterns that consolidate the understanding of measuring risk disclosure quality.

6.3 Factor Analysis of the Scoring Model Indicators

In quantitative factor analysis, the structure of a data sample is analysed in order to identify underlying factors that cannot be observed directly with the defined variables (Hutcheson & Sofroniou, 2011). Factor analysis assumes that variables are related, and the reason for this correlation is the effect of (hidden) underlying factors. Factor analysis attempts to find these underlying factors with statistical means. The result is a reduced number of previously latent variables that represent major underlying themes in the data set.

Translated into the regulatory risk disclosure setting in this thesis, factor analysis helps to (1) understand the relationships among the quality criteria and (2) map the quality criteria to a smaller number of major themes in the regulatory risk disclosure area. The factor analysis in this section is performed on the composite disclosure scores data that can be seen in Appendix 8.5. The set covers the disclosure scores on the quality criteria of all ninety disclosure reports for the period 2016 – 2018.

Technically, the factor analysis is run in the statistical software package IBM SPSS. The extraction method applied is principal components analysis. The Kaiser stopping rule criterion with factors' eigenvalues greater than 1 is used when deciding on how many underlying factors are extracted from the quality criteria. The rotation method applied is varimax. Here, factors are selected in a way that they are as different from each other as possible. Such a strong difference is the case in an orthogonal solution where variables show low correlations.

6.3.1 Analysis of the Correlation Matrix

The correlation matrix in Table 36 shows how the disclosure scores on all quality criteria (QC) are related to each other. A high correlation between variables indicates that they tend to move together, meaning that the behaviour of one variable may predict the behaviour of the other. The matrix below shows which quality criteria show a similar behaviour and which are rather independent from each other.

Correlation Matrix						
Quality Criteria	Readability	Quantity	Coverage	Meaningfulness	Time comparability	Sector comparability
Readability	1.000	-0.165	0.034	-0.189	-0.212	0.231
Quantity		1.000	0.355	0.942	0.893	0.181
Coverage			1.000	0.494	0.211	0.583
Meaningfulness				1.000	0.831	0.245
Time comparability					1.000	-0.039
Sector comparability						1.000
Determinant = ,007						

Table 36: Correlation matrix for disclosure scores per quality criterion

As can be seen in the table, readability is negatively correlated with quantity, meaningfulness, and time comparability, although the negative correlation is rather weak (between -0.165 and -0.212). The correlation analysis suggests that scoring high on these three quality criteria comes at the expense of readability, and vice versa. It can be argued that disclosure reports are more difficult to read the more voluminous they are (quantity), the more detailed they are (meaningfulness), and the more comparative information over time they include.

Quantity (part of quality criterion 2) is very highly correlated with meaningfulness and time comparability (0.94 and 0.89 respectively). This high correlation can be explained with the observation that more voluminous reports (quantity) often include, as a consequence, more detailed disclosure (meaningfulness) and also more comparative information (time comparability).

Coverage (also part of quality criterion 2) is positively correlated with all other quality criteria, although the correlation with readability is very weak (0.034).

Meaningfulness is highly correlated with time comparability implying that both quality criteria share a similar behaviour.

Time comparability is very weakly correlated with sector comparability (correlation of -0.039). A reason for this low correlation is possibly that disclosure on time comparability information can be decided upon by the bank, while sector comparability depends on a structural benchmark which has not yet been agreed upon in the banking industry.

Sector comparability is also weakly correlated with most of the other quality criteria apart from coverage.

6.3.2 Results from Factor Analysis

Before factor analysis can be performed, the variables in the underlying datasets have to be analysed for their suitability for factor analysis (Kaiser, 1974). The variables are considered suitable only if they share a low common variance. Kaiser (1974) suggests using the KMO Kaiser-Meyer-Olkin statistic to measure sampling adequacy. The statistic is expected to return values between 0 and 1 and results can be seen in Table 37.

Suitability Tests for Factor Analysis		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.668
Bartlett's Test of Sphericity	Approx. Chi-Square	430.657
	df	15
	Sig.	0.000

Table 37: Suitability tests for factor analysis

Kaiser (1974) recommends accepting values higher than 0.5, while values below 0.5 are deemed unacceptable for factor analysis. A value of 0.668 (as seen in Table 37) is considered “mediocre” but still sufficiently above 0.5.

In factor analysis, the underlying patterns of variables are statistically analysed. The goal is to identify underlying factors that are at this stage of the analysis unknown to the observer (Hutcheson & Sofroniou, 2011). Principal

components analysis therefore analyses the structure in the data to find uncorrelated components that capture the variation in the data (Hutcheson & Sofroniou, 2011). At the start of the analysis, it is also not known how many relevant underlying factors there are in the dataset.

Table 38 shows the eigenvalues and variances from the principal component analysis. SPSS extracts as many components as there are variables (in this research these are six variables). From the table, it can be seen that only the first two components meet the extraction criterion of having eigenvalues greater than one. Therefore, only the first two components are considered for further analysis.

Results for Principal Component Analysis						
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	**3.080**	51.330	51.330	2.964	49.400	49.400
2	**1.565**	26.079	77.409	1.681	28.009	77.409
3	.828	13.807	91.216			
4	.372	6.204	97.420			
5	.115	1.924	99.344			
6	.039	.656	100.000			

Table 38: Eigenvalues of components and total variance explained

The last three columns in the table under the label “Rotation Sums of Squared Loadings” include essential information on the components and their explanatory power. The (so far unknown) component 1 with a high eigenvalue of 3.08 explains 49.4% of the total variance of the distribution. This component alone has an explanatory power of about 50% of the composite disclosure score. The second component with an eigenvalue of 1.565 explains a further 28.009% of the total variance of the distribution. The individual percentages of variances are cumulative. Therefore, component 1 and component 2 together already explain 77.049% of the total variance of the distribution. The other four components do

not pass the test of an eigenvalue greater than 1 and are therefore not considered further in the principal component analysis.

The scree plot in Figure 45 adds further insight into the component cut off decision.

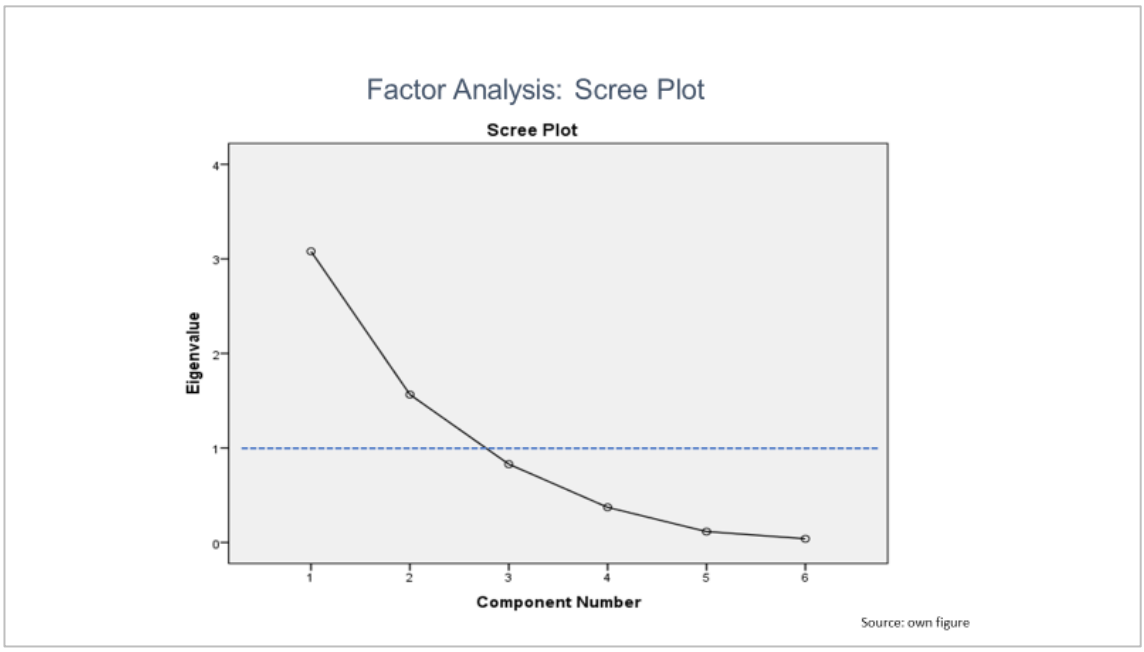

Figure 45: Factor analysis: scree plot on eigenvalues

The scree plot maps the components on the horizontal axis to their eigenvalues on the vertical axis. Of particular interest are the components that come close to the cut-off line. This line is drawn parallel to the horizontal axis at an eigenvalue of 1. Component 2 lies above the line, while component 3 lies below the line. The more negative the slope of these two points is, the better the cut-off decision is justified (Kaiser, 1974). With an eigenvalue of 0.828 component 3 is well below the line at eigenvalue = 1 and is therefore excluded from further analysis.

So far, the factor analysis has resulted in the identification of two principal components in the dataset that explain about 77% of the total variability. The next step is to relate these two components to the quality criteria of the proposed disclosure scoring model in the attempt to find out what themes these two components represent. The rotated component matrix in Table 39 shows the links between the quality criteria of the disclosure scoring model and the two components identified.

Factor Analysis: Rotated Component Matrix		
Quality criteria	Component	
	1	2
Readability	-.358	**.493**
Quantity	**.959**	.119
Coverage	.372	**.758**
Meaningfulness	**.948**	.219
Time comparability	**.934**	-.098
Sector comparability	.074	**.890**

Table 39: Factor analysis: rotated component matrix

The values in the table show the factor loadings for each quality criterion on the two components. The higher the values, the stronger the quality criterion impacts on the component. The bold characters in the table denote which of the quality criteria loads more strongly on each of the two components. Figure 46 shows the mapping of overarching themes constructed by assigning quality criteria to the components on which they most strongly load on.

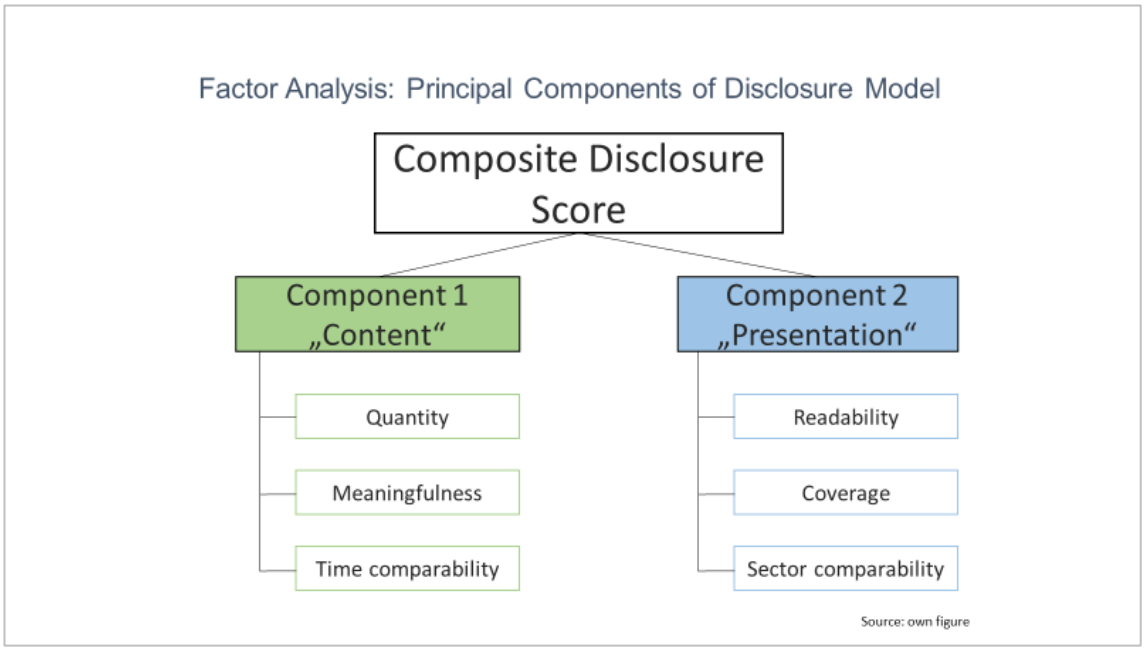

Figure 46: Result of the factor analysis

Component 1 is most strongly impacted by quantity, meaningfulness and time comparability (all values in Table 39 are above 0.9). Component 2 is most strongly impacted by coverage and sector comparability (all values in Table 39 are above 0.75).and to some degree by readability (0.49).

Analysis of the quality criteria loading on component 1 reveals that these criteria are all related to the information disclosed. Consequently, the quantity, meaningfulness and time comparability criteria are grouped together to the summary statistic “Content”. This suggests that the information provided in regulatory risk disclosure reports is truly of high importance to the quality level of the composite disclosure score.

The quality criteria readability, coverage and sector comparability all load highly into component 2. These criteria can be grouped together under the heading “Presentation”. They relate to the ease of reading and to the structure of the disclosure reports. Although these variables do not load as strongly into component 2 as the other variables load into component 1, they still show the importance of a quality presentation in the disclosure reports besides the content provided.

6.4 Empirical Model Results and Agency Theory

Section 4.2.1 discusses optimisation strategies for the agency cost and benefit relationship. It shows that it is in the interest of investors (“principals”) that a rather small investment in monitoring in form of disclosure reports should make a rather large impact on the disclosure quality achieved and on the behaviour of managers (“agents”). This section therefore evaluates the scores on the quality criteria with respect to agency theory and highlights their impact on banks and their investors.

6.4.1 Agency Theory and Readability

The evaluation in 6.2.1 on the readability of disclosure reports based on the Gunning-Fog index poses a major implication for the agent-principal relationship. The average Gunning-Fog index for the disclosure reports is about 18 to 19. This rather high value suggests that a university level education is needed to comprehend the disclosure reports well. In agency theory, shareholders are not differentiated by their educational level. This thesis suggests that, in practice, the group of less educated shareholders would be practically excluded from the information sharing. Reports are written in a style that makes it hard for this group to comprehend the risk profile of their bank investments. The assumption in agency theory that all shareholders act rationally in an informed way does not hold in this case. There is a certain group of shareholders that cannot act as rationally as others because the information is not adequately accessible to them. One way to improve the situation is to prepare reports that use less technical language and a writing style that is more user friendly (i.e., less long and complicated sentences).

6.4.2 Agency Theory and Comprehensiveness

Agency theory is very specific in its recommendation that information-sharing is one important method for reducing the information asymmetry between agents and principals. However, the theory is rather vague in suggesting how much information should be given to principals. Receiving no information is not in the interest of principals, while receiving an overload of boilerplate information also does not serve the purpose. The analysis in section 6.2.2.1 on the quantity

of disclosed risk information provides a first insight into what banks actually assume to be a sufficient level of information-sharing on their regulatory risk profile. It is interesting to observe that this assumed level differs substantially from bank to bank. Considering the identified trend in the amount of information provided, it appears that the banking industry has not yet settled on the optimal amount. However, it can be noted that regulatory risk disclosure is consistently gaining importance over time as the overall disclosure amount increased by about 20% even in the rather short period of three years in this research (see section 6.2.2.1).

Looking at the distribution of the quantity of disclosed information on a country-by-country basis, it can be concluded that agency theory is not interpreted in the same way by banks across different countries (see section 5.5.3 on quantity). The amount of disclosed risk information differs substantially from one country to another. Agency theory so far does not differentiate the information needs of principals according to their location. At this stage of disclosure research, it is not clear who is the driving force behind the demanded quantity of risk information. It can be the agent (in this study: the bank) headquartered in a particular country who makes assumptions about the optimal level of disclosure to its principals (here: the stakeholders). It can also be the principals residing in a particular country themselves who expect more or less information compared to principals residing in other countries. A link to the discussion on cultural backgrounds may provide some explanation for the different information needs across cultures (Hofstede, 1980).

The analysis of the results from the Herfindahl index (see section 6.2.2.2) further challenges agency theory. The risk information disclosed by banks is not proportionally allocated across risk categories. There are a few reports that heavily concentrate their risk disclosure on one risk category only, while some others (the majority) attempt a more balanced approach. At this point in agency theory, it is not yet determined what the desired provision of information actually should be. In the case of obvious problems of a specific bank in one particular risk area, principals potentially require over-proportionate information on this risk category. On the other hand, disclosure on other risk categories cannot be neglected. The discussion on the Herfindahl index also shows that the risk information content can be very different in nature with many different

consequences. Agency theory does not divide the term “information” into different categories. It takes information as a placeholder for “information about a firm in general”. This thesis shows that the question boils down to the discussion of which kind and quality of information shall be communicated, and in what kind of medium. In urgent cases, principals expect short-term information and remedies from agents supporting the case of focusing disclosure on one risk category. Principals interested in the longer-term prospect and sustainability of a bank may require a more balanced disclosure approach on all risk categories.

6.4.3 Agency Theory and Meaningfulness

The analysis of the model results on meaningfulness (see section 6.2.3) shows that there is a large gap between the information content principals expect and what agents actually disclose. Several research papers stress that investors appreciate forward-looking information (Beretta & Bozzolan, 2008; Miihkinen, 2011). This is a kind of information that supports investors in evaluating the risk profile of a bank with respect to planned developments in the future. However, a large majority of banks prepare disclosure reports that are very descriptive in nature. These reports summarise the current risk profile without providing much guidance on the future. This lack in transparency poses a problem for the principals who need to evaluate the performance of their investments regularly and require relevant forward-looking information. On the other hand, agents are reluctant to disclose forward-looking information. They must bear the high (agency) costs of preparing the information. They also fear the high litigation risk of misleading principals with forward-looking statements. Both cases restrict agents’ incentives to disclose forward-looking information. The data analysis in this thesis shows that this discrepancy between expected and actual disclosure is probably the single most important factor that creates an additional conflict of interest.

6.4.4 Agency Theory and Time Comparability

Agency theory finds three different kinds of costs that are incurred due to the separation of management and ownership of a firm (see section 2.2.6.1). The

theory divides the agency cost for closing the information gap into the categories monitoring, bonding, and residual loss costs. The analysis performed on the time comparability criterion (see section 6.2.4) provides a good field for studying the trade-off between monitoring and bonding costs.

Principals benefit from quantitative and qualitative time comparability on the risk profile over consecutive periods. Banks and their management (the "agents") are generous in providing quantitative data comparisons in their disclosure reports as such data are regularly available at low cost in their software systems. On the other hand, providing qualitative comments on time comparisons are much more costly for a bank. It takes additional research to analyse the reasons for changes and their impact on future exposures. There is also the potentially high cost of litigation involved if forecasts turn out to be unreliable. The observed very low number of cases of qualitative time comparability (see section 6.2.4) in disclosure reports shows that banks are reluctant to bear these costs in the form of bonding costs. They often leave the effort and cost to compare to the principals who, in this case, incur higher monitoring costs.

Agency theory says that in the end it does not matter who initially bears the cost. An agent's bonding cost reduces the firm value that ultimately belongs to the principals. Principals monitoring cost reduces their wealth directly. There remains the question who of the involved parties can perform the time comparison task more efficiently at lower cost. It makes a cost difference whether each principal makes the time comparisons individually, or whether it can be done centrally at the agent's site.

6.4.5 Agency Theory and Sector Comparability

Investors in the equity of a firm face two information problems. Before they make an investment they need company information for selecting the right investment, while after the investment they need to monitor its performance. Beyer, Cohen, Lys, & Walther (2010a) describe this information demand as the valuation and stewardship problem (see section 2.2.4.3). Particularly for valuation purposes, reports that can easily be compared to each other are helpful for the decision-making process. The mediocre results on sector comparability of only 14 out of 25 structural items match on average (see section 6.2.5) demonstrates

that agents do not promote comparability with their competitors. Investors need to analyse disclosure reports of various investment targets themselves, thereby raising their “pre-investment” monitoring costs substantially. The same applies to situations after the investment is made. Even at this privileged stage, it is costly for the principals to compare the performance of their investment to alternatives. With respect to agency theory, it is interesting to note that in the case of sector comparability, monitoring costs are mostly incurred by the principal as opposed to bonding costs by the agents.

6.5 Chapter Summary

In this chapter, the scoring model results from the sample of 90 regulatory risk disclosure reports were evaluated. Scores were analysed in the context of disclosure quality as well as agency theory. This was first done on an individual bases for each quality criterion (readability, comprehensiveness, meaningfulness, time comparability and sector comparability). Then the scores were consolidated and analysed on a composite basis. Each analysis consisted of a time-series analysis (years 2016 – 2018), a risk category analysis, and an EU regional analysis (where applicable). Further analysis was performed where it was deemed useful for understanding results. Results were explained and reasons and explanations for specific conclusions given. Furthermore, much could be learned from the scoring results. Often, recommendations were given to banks but also supervisors on how to improve disclosure quality in the reports on individual quality criteria.

Finally, a statistical factor analysis was performed to gain a better understanding of the underlying patterns of the quality criteria. The analysis resulted in the confirmation that the quality of disclosure reports depends on quantitative and qualitative elements which cover presentation but also the content of the reports.

7 Chapter Seven: Conclusion

7.1 Research Activities and Results

This thesis examines how the quality of bank regulatory risk disclosure reports can be measured with a scoring model. The proposed model supports banks in preparing these reports, facilitates the investors' evaluation of the reports, and informs policymakers and supervisory authorities on the successful implementation of their policies and regulations.

Banking regulation in the European Union offers the setting for this thesis. The Basel III guidelines were implemented in 2014 with the EU CRD IV/CRR framework. Regulation has since been largely stable which provided a suitable basis for the analysis. All banks in the EU are required to publish disclosure reports covering their risk exposures, the measurement and the management. Banks, but also policymakers (e.g., Basel Committee on Banking Supervision, Financial Stability Board, International Accounting Standards Board) and supervisory authorities (e.g., European Central Bank, Bank of England), view these reports as an important tool for investors' decision making and for overall financial markets' resilience (Basel Committee on Banking Supervision, 2015).

The proposed scoring model is the first model developed specifically for the requirements of regulatory risk disclosure of banks. It complements research on general disclosure based on the work of Abraham & Cox (2007), Beretta & Bozzolan (2008), Jia et al. (2016), Miihkinen (2011), and Verrecchia & Clinch (2015) by adding the regulatory risk perspective to the dominant accounting perspective, and by focusing on the banking industry in the EU.

Banks are "learning organisations" when it comes to disclosing risk information. So far, no regulatory disclosure standard is agreed among banks (UNCTAD, 2017). As learning by experience forms an important constituent of disclosure, this thesis is guided by a pragmatic research philosophy. Furthermore, prior research shows that research methodologies focusing only on quantitative methods do not sufficiently capture the qualitative elements of disclosure (e.g., Beretta & Bozzolan, 2004). Therefore, a multi-methods research approach is applied covering semantic content analysis, but also statistical analysis such as factor analysis.

A key result of this thesis is the development of the regulatory risk disclosure scoring model. The main research activities performed comprise the analysis of the disclosure environment, the conceptual development of the model, and the implementation of the model. Furthermore, the model is applied to a sample of disclosure reports, and the model results are empirically evaluated with respect to disclosure quality and agency theory. Figure 47 summarises the main research activities performed.

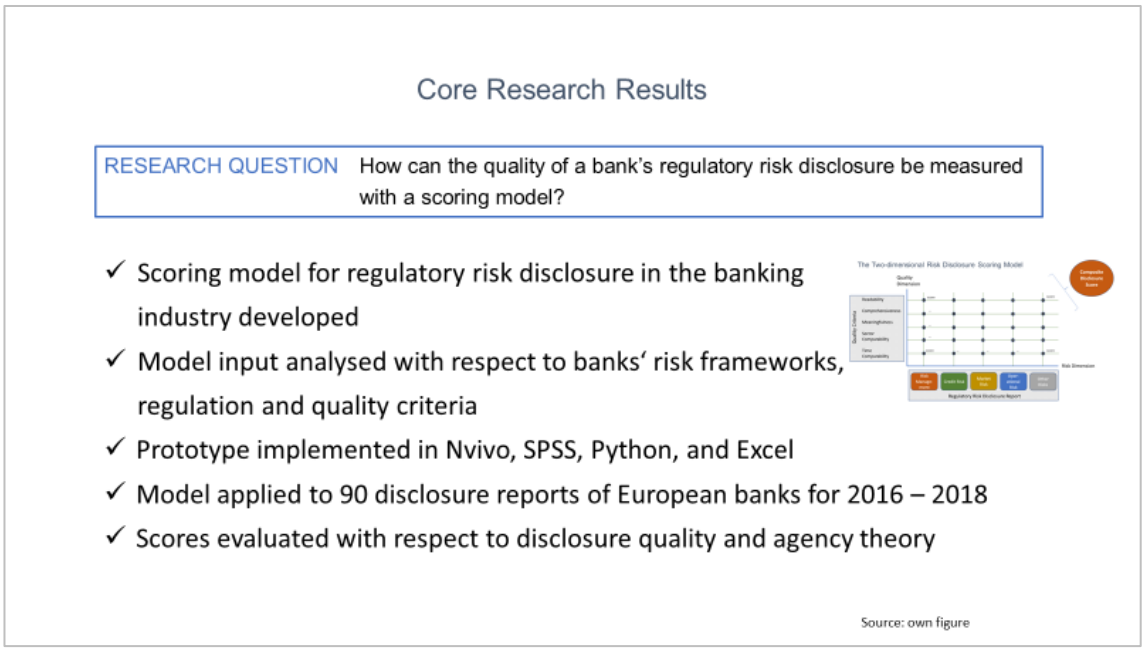

Figure 47: Core research results

This thesis proposes a scoring model built on a two-dimensional framework namely "risk" and "quality". The risk dimension structures the financial risks into the risk categories credit risk, market risk, operational risk, other risks including liquidity risk, and risk management. These risk categories are in line with the EU banking regulation requirements (European Parliament, 2013b). The quality dimension takes input on potential quality indicators from the three leading institutions and policymakers in the regulatory field (Basel Committee on Banking Supervision, 2015; Enhanced Disclosure Task Force, 2012; International Accounting Standards Board, 2017) and consolidates them into five quality criteria namely readability, comprehensiveness (quantity and coverage), meaningfulness, time comparability, and sector comparability.

Before the quality criteria are applied to the risk categories, the quality criteria are operationalised through the identification of empirical indicators. This process benefits conceptually from prior research (Ajina et al., 2016; Beretta & Bozzolan, 2004, 2008; Miihkinen, 2011), although several adjustments, amendments and new developments are made for addressing the specific requirements of regulatory risk disclosure. In particular, new indicators for time and sector comparability are developed, and comprehensive word lists for regulatory risk reporting purposes are compiled.

The implementation of the scoring model results in a composite disclosure score that summarises the disclosure quality of individual banks' regulatory risk disclosure reports. For that, the detailed data requirements are defined and the processing logic described. Furthermore, the model introduces a new, risk weighted (RWA) method that takes the relative importance of each risk category for disclosure into account.

In technical terms, the prototype of the model is implemented in Nvivo (coding, data extraction and functionalities) and SPSS (statistical analysis) with additional functionalities programmed in Python (e.g., Gunning-Fog index calculation) and MS Excel (consolidation of results).

The scoring model is successfully applied to ninety disclosure reports of European banks for the period 2016 to 2018 and tested for its suitability to measure disclosure quality. Composite disclosure scores and scores per quality criterion are calculated to support the empirical analysis of disclosure quality and its impact on agency theory.

The empirical results summarised in Figure 48 show that regulatory risk disclosures are very heterogeneous making it difficult to speak about integrated regulatory risk disclosure policies of banks. By analysing banks' individual disclosure reports, the thesis finds that although there are some good examples of reports with high scores on all quality criteria, there is room for quality improvements in many other reports. The empirical scoring results support banks in identifying deficiencies in their own reports and guides them to areas where they perform worse than their competitors and need improvements.

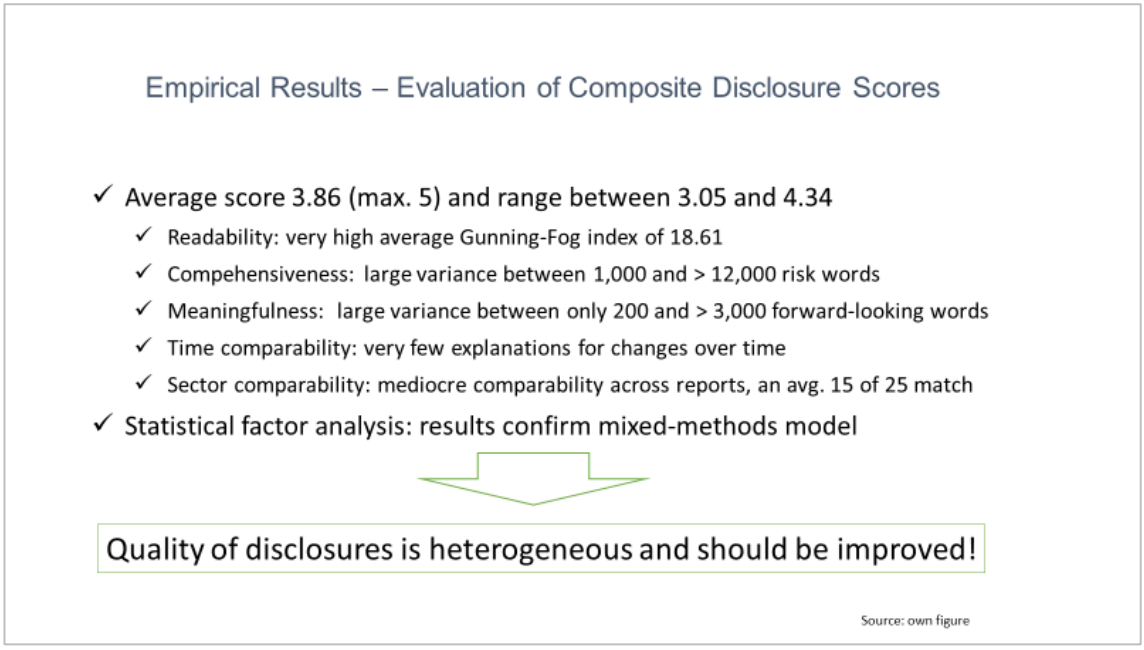

Figure 48: Empirical results on composite disclosures scores

The thesis finds that the average composite disclosure score of the ninety disclosure reports for the period 2016 – 2018 is 3.86 out of a maximum of 5. The scores range from the lowest value of 3.05 to the highest value of 4.34. Scores are strongly impacted by the way banks use the opportunities of disclosure. Reports on the lower end publish only minimal information on each risk category, whereas reports on the upper end extensively provide risk information and explanations on their exposures in a structured way.

The evaluation of the results on the readability quality criterion shows that a large number of banks fail to address the needs of broader stakeholder groups. The average Gunning-Fog index for the entire three-year period is a high 18.61. This value means that it takes more than eighteen years of formal education to comprehend current disclosure reports well. As a result, banks exclude a large group of potential investors by writing reports in a very technical style.

Furthermore, the thesis demonstrates that the pure quantity of disclosed information varies substantially from bank to bank. The average report consists of 5,080 risk words with a promising upward trend over the three-year period. The model results show that banks put different efforts into the preparation of their disclosure reports. Some banks extensively disclose information (about 12,000 risk words), while others manage to write reports with about 1,000 risk words only, thereby missing out on the opportunities of effective communication with

their external stakeholders. With respect to agency theory, no optimal quantity of information necessary to reduce the information gap is defined. This thesis follows prior research results (Abraham & Cox, 2007; Jia et al., 2016) suggesting that more information leads to better disclosure quality. Consequently, banks score higher if they disclose a higher quantity of risk information. The thesis also finds that the quantity disclosed depends strongly on the country of origin of a bank. Banks located in the southern countries of the European Union tend to communicate much more risk information compared to their peers in the central and northern countries of Europe. The analysis shows that agency theory is not interpreted in the same way in every country and also Hofstede's cultural elements such as different national levels of uncertainty avoidance make an impact on the quantity of information disclosed.

On the meaningfulness quality criterion, the thesis finds that there is a large expectation gap between banks and stakeholders. The empirical model results reveal that banks disclose much current and past information but are reluctant to disclose forward-looking material. However, prior research shows that external stakeholders benefit most from forward-looking disclosure (Beretta & Bozzolan, 2008; Beyer et al., 2010; Li, 2010). Also, agency theory does not comment on the kind of information it considers relevant for reducing information asymmetry, so the theory can be supplemented with the empirical research results of this thesis. The average number of forward-looking words in reports is about 1,000 words per report, with a minimum of only 200 and a maximum of 3,000 forward-looking words. These figures are low compared to the total number of risk words disclosed. In result, current disclosure reports do not provide enough forward-looking information that external stakeholders may expect for their investment decision-making.

Results on time comparability show that banks are very hesitant to support the users of their disclosure reports with comments and explanations on changes of their risk profile over time. The model reveals that there are several banks that basically do not comment on exposure changes at all. Some other banks assume a more active role, but still achieve only low maximum values of about 500 time-comparison words. Banks can learn from this analysis that they have to adjust their disclosure policies in order to meet stakeholders' needs on time comparability as highlighted by the BCBS.

Finally, the empirical results on sector comparability send a clear signal to supervisory authorities showing that banks prepare disclosure reports in a format that reflects their individual risk profiles. As banks' risk profiles differ substantially from each other, comparisons of disclosure reports are difficult to make for stakeholders across the banking industry. The scoring model supports this finding that on average only 15 out of 25 structural items in disclosure reports match with an industry benchmark structure. For supervisory authorities aiming to promote comparability across the banking industry, they must develop common and mandatory templates each bank shall use for their disclosures. Such an initiative which is already considered by current consultative documents on the future of disclosure, also has an impact on agency theory. In agency theory, an important question is who should bear the cost for reducing the information asymmetry. The results of the scoring model suggest that the costs for sector comparisons are currently borne by investors, thereby falling into the category of "monitoring costs". The establishment of disclosure standards would shift the costs to the firms in the form of "bonding costs". Still, it has to be noted that in agency theory terms, both kinds of costs ultimately reduce shareholders' wealth.

The scoring model provides additional insights into the nature of disclosure quality by applying statistical factor analysis to the composite disclosure scores. The analysis reveals that there are two main themes underlying the five quality criteria which banks are advised to consider when preparing their risk disclosure reports. The themes are content and presentation, where the first refers to qualitative elements, and the second to quantitative elements. The results on factor analysis also provide a strong argument for applying a multi-methods approach in this and further research. Both themes contribute to the overall quality of risk disclosure. Therefore, a good disclosure policy must consider both, qualitative and quantitative elements.

7.2 Academic and Professional Contributions

Pragmatism, the research philosophy of this thesis, contends that topics such as the nature of knowledge, language and concepts are all best viewed in terms of their theoretical and practical uses and successes. A model built on this foundation must therefore offer academic and professional contributions to justify its use.

For long, academic research on disclosure focused on defining the content of disclosure and its theoretical impact on the wealth of the firm and its stakeholders (Berger, 2011; Beyer et al., 2010). Berger (2011) identifies a research gap on practical methods for measuring disclosure quality and calls for the development of practice-based models that complement the academic discussion. The main contribution of this thesis is proposing a practice-based scoring model to measure disclosure quality based on the guidelines of Basel III and their EU implementation. Therefore, it contributes to academic knowledge by developing a framework for reliably measuring the quality of bank regulatory risk disclosure that can be applied widely in practice.

Furthermore, the model complements the academic research on general disclosure. Disclosure is done through various communication channels of which regulatory risk reporting is an important one. One strand of disclosure research studies how the quality of an entire firm's communication can be captured in order to get a statistic for overall disclosure quality. A building block of such an overarching disclosure model is risk communication in the way it is covered by the proposed scoring model in this thesis. Another stream of disclosure research focuses on analysing the relationship between the level of disclosure quality and factors such as cost of capital, stock price liquidity and credit rating. All such studies require as input the measurement of disclosure quality before any relationships to other factors can be analysed. The proposed scoring model supports these studies by measuring the disclosure quality with a composite score that can then be related to performance indicators.

This thesis also adds the regulatory risk perspective to the so far dominant financial accounting perspective in disclosure research. Many prior studies have their roots in analysing disclosures of financial and performance indicators, often found in annual reports or ad hoc messages. The banking industry is a highly regulated industry that makes regulatory disclosure an additional source of

information on banks' risks. This scoring model is the first that evaluates the quality of regulatory risk reports, and therefore advances in this respect the academic discussion on disclosure (UNCTAD, 2017).

Furthermore, this thesis focuses explicitly on the banking industry. Banks are often excluded in prior disclosure studies due to the specific nature of banks as risk-taking enterprises (Elshandidy et al., 2013; Elzahar & Hussainey, 2012). The thesis, therefore, complements the range of industries for which disclosure quality can be measured.

As far as the contribution to the discussion on methodologies is concerned, the thesis pursues a multi-method approach rather than a single-method approach as often applied in a more traditional positivist setting. The justification lies in the nature and content of regulatory risk disclosure itself. For gaining a comprehensive quality score of disclosure, quantitative (how much is disclosed?) and qualitative (how meaningful is the content?) aspects must be evaluated. Prior research (Beretta & Bozzolan, 2008; Elshandidy et al., 2018) regularly suggest studies that use more than one method to capture the richness of disclosure. This thesis suggests quantitative and qualitative criteria for calculating the composite disclosure scores. It, therefore, applies quantitative statistical as well as qualitative semantic content analysis methods.

The research also contributes to semantic content analysis. Analysing the meaning of financial texts requires understanding the properties of the financial and regulatory language. For the development of the scoring model, the thesis collects extensive word lists on regulatory risk, forward orientation and time comparability in risk reports that facilitates the coding and analysis of financial texts.

The disclosure quality measurement and the evaluation of results in this thesis advances the discussion in agency theory on information and agency costs. The results on the scoring model highlight the heterogeneous nature of information and show that the level of disclosure quantity, report readability and forward-looking information are among the factors that are interpreted differently across banks in Europe. The analysis of agency costs benefits from the model twofold: first, it distinguishes the costs for preparing disclosure reports into bonding and monitoring costs and therefore sheds light on the question who actually has to bear the costs of disclosure; and second, the costs incurred for

preparing the reports can now be compared to the quality of reports for finding an optimal balance.

As far as professional contributions are concerned, the proposed disclosure scoring model supports banks in defining, structuring, and preparing their regulatory risk disclosure reports. Banks must decide on the - optimal – content and presentation of their risk disclosure reports with respect to the benefits received and the costs incurred. The detailed analysis of the scores on the quality criteria gives banks guidance on which areas they need to improve in order to achieve higher scores and provide better risk disclosure. By considering the expectations on risk disclosure content of their external stakeholders, banks can use the scoring model as a tool to tailor their reports to the needs of their stakeholders. Furthermore, the scoring model also helps to analyse disclosure reports of competitors, so that the own competitive position can be evaluated.

Moreover, the scoring model supports supervisory authorities such as the European Banking Authority (EBA) or the Prudential Regulation Authority (PRA) at the Bank of England in performing their regulatory duties. These institutions are key players in setting disclosure policies, rules, and regulations. Once established, they must monitor the implementation and the impact on financial markets and banks' business operations. The scoring model facilitates the analysis of a large number of disclosure reports and therefore makes banking supervision more efficient and effective.

Lastly, another group of users of the disclosure scoring model are consultancies, analyst houses and software developers. For consultancies, the scoring model opens many opportunities for consulting banks on improving their risk communication. The work of analyst houses is facilitated by providing them with a tool that makes the analysis of disclosure reports easier and faster. Software houses can implement the scoring model prototype in their business software, integrate it in their enterprise resource planning (ERP) systems, and market it to banking customers.

7.3 Limitations of the Research

Measuring the quality of text and specifically that of regulatory risk disclosure reports is a complex task that cannot be performed in a 100% objective

way. Despite the efforts taken by the preparers and users of the disclosure reports to objectively report and interpret the content, there remains a certain degree of subjectivity in the process of semantic content analysis (Saunders, 2013). Banks as the authors of the reports use their discretion when compiling the content of these reports. Investors as the users of the reports also selectively decide what content they deem relevant for their investment decision making. In a similar way, researchers themselves bring further subjectivity to the content interpretation when assessing the quality of a report through their own perceptions.

Furthermore, the coding of reports is a central task in applying the scoring model to disclosure reports. It requires decision-making on assigning text to content nodes and cases, and thereby is a potential source of coding bias. Although in this thesis several measures are taken to ensure reliability and validity, and avoid coders' bias (e.g., four-eye principle, double-coding, percentage agreement analysis in Nvivo, statistical tests with the analysis of the Kappa coefficient), it cannot be ruled out that some subjectivity remains. When evaluating the composite disclosure scores, a potential coding bias must be taken into account.

The regulatory risk disclosure scoring model is a two-dimensional model with both risk and quality dimensions. For the quality dimension, five quality criteria are suggested which define the quality of a report. These criteria are selected based on the recommendations of leading policymakers and standard setters that are familiar with the information needs of the banking industry (Basel Committee on Banking Supervision, 2015; Enhanced Disclosure Task Force, 2012; International Accounting Standards Board, 2017). The model assumes that the selected criteria represent the quality of a disclosure report well. However, other quality criteria may exist that have a significant impact on the quality of a disclosure report. Furthermore, based on the five quality criteria, the model suggests several proxies that operationalise each criterion. The model makes use of previous research findings (Beretta & Bozzolan, 2008), develops some proxies further (Miihkinen, 2011) and suggests new proxies where no previous research is available. Although each proxy was selected deliberately and its use is justified, there remains the possibility that the selected proxies do not fully capture the content of the respective quality criteria.

Finally, the literature stresses several factors that influence disclosure levels and quality. Although prior research findings are mixed on most of these factors, ”industry” and “size” are often found to have a significant impact on disclosure (Beretta & Bozzolan, 2004; Jia et al., 2016). The scoring model, therefore, takes both factors into account, although with some limitations. The factor “industry” is largely neutralised by limiting the model to the banking industry. The impact of the factor “size” is mitigated by selecting a homogeneous sample of the thirty largest banks in Europe. In case the scoring model is applied to other industries, or within the banking industry to smaller capitalised banks, the model parameters must be adjusted for industry and size effects.

A final matter of concern is language. In international settings, English is the working language of choice for many people with other native languages. In this research, it was a requirement that all risk disclosure reports are available in English. Otherwise, the scoring model could not have been applied to the sample of disclosure reports. It must be noted that only the reports from banks with UK headquarters were originally written in the English language. All other reports were first written in local languages before they were translated into English. This fact leaves room for potentially missing out on some of the original meaning of the disclosure report, and reference should be made to the original text before a final judgement on a report is made.

7.4 Recommendations for Further Research

Regulatory risk disclosure is an important, but only one part of the external communication of a firm. Disclosure research on the information content of financial statements is well advanced. This research adds to the full picture of disclosure by developing a scoring model that captures the quality of regulatory risk disclosure. Research on the disclosure quality of non-financial reports such as reports on environmental, social and governance issues (ESG) is still outstanding. Once all disclosure areas are researched, and models developed and accepted, an overarching disclosure model could be defined that can be used for measuring and improving firm-wide communication.

The scoring model results in composite disclosure scores for the regulatory risk disclosure of banks. In a next research step, these scores could be used to analyse the relationship of disclosure quality with other key performance indicators (KPI) such as cost of capital, stock price liquidity and credit rating. Theoretical research papers (e.g., Cheynel, 2013) suggest that there is an inverse relationship between disclosure quality and cost of capital. With this scoring model, such relationships can be further analysed and tested by making use of empirical information.

Agency theory puts much emphasis on studying the nature of agency costs and their impact on the wealth of investors. Once an overarching model for disclosure is agreed, many new routes for empirical research on agency relationships and costs appear. An interesting research path forward is linking disclosure quality to the (often substantial) cost incurred for preparing disclosure reports. It is an open question whether more spending on disclosure results in better quality reports and other measurable benefits. Furthermore, validation is needed for the so-called agency cost constraint (see Figure 14) implying that an initially small investment in disclosure results in higher wealth gains before the curve flattens and finally incremental wealth gains turn negative.

Many research papers on general disclosure focus their work on the development of proprietary theoretical models and the evaluation of their results. The papers do not publish the data used in their models nor the algorithms/the coding rules applied. These black box approaches leave much room for interpretation of research findings. Without a transparent and open-access documentation of the data and the processing logic underlying the models, it is

impossible to replicate the research findings of such studies in other research settings. This research makes all data used in this thesis accessible to the research community so that other disclosure models can be applied to the data basis of this thesis and results can be checked for consistency for the benefit of advancing disclosure research.

8 Chapter Eight: Appendix

8.1 List of the Largest Banks in Europe (2017)

Europe's 50 largest banks

Current rank^	Previous rank^^	Current vs. previous	Company (ticker-exchange)	Headquarters	Accounting principle	Total assets (€B)
1	1	NC	HSBC Holdings PLC (HSBA-LON)	U.K.	IFRS	2,234.27
2	2	NC	BNP Paribas SA (BNP-PAR)	France	IFRS	2,040.84
3	3	NC	Crédit Agricole Group	France	IFRS	1,854.76
4	5	▲	Banco Santander SA (SAN-MAD)	Spain	IFRS	1,459.27
5	4	▼	Deutsche Bank AG (DBK-FRA)	Germany	IFRS	1,348.14
6	7	▲	Société Générale SA (GLE-PAR)[1]	France	IFRS	1,297.70
7	8	▲	Groupe BPCE[2]	France	IFRS	1,277.52
8	6	▼	Barclays PLC (BARC-LON)	U.K.	IFRS	1,261.53
9	9	NC	Lloyds Banking Group PLC (LLOY-LON)	U.K.	IFRS	887.86
10	10	NC	ING Groep NV (INGA-AMS)	Netherlands	IFRS	887.03
11	15	▲	UBS Group AG (UBSG-SWX)	Switzerland	IFRS	837.14
12	11	▼	UniCredit SpA (UCG-MIL)	Italy	IFRS	831.47
13	14	▲	Crédit Mutuel Group*	France	IFRS	813.20
14	13	▼	Intesa Sanpaolo SpA (ISP-MIL)	Italy	IFRS	787.72
15	12	▼	Royal Bank of Scotland Group PLC (RBS-LON)	U.K.	IFRS	772.80
16	16	NC	Credit Suisse Group AG (CSGN-SWX)	Switzerland	U.S. GAAP	682.52
17	17	NC	Banco Bilbao Vizcaya Argentaria SA (BBVA-MAD)	Spain	IFRS	676.69
18	20	▲	Standard Chartered PLC (STAN-LON)	U.K.	IFRS	601.56
19	18	▼	Rabobank	Netherlands	IFRS	590.44
20	19	▼	Nordea Bank Abp (NDA SE-OME)[3]	Finland	IFRS	557.24
21	21	NC	DZ BANK AG	Germany	IFRS	518.73
22	22	NC	Danske Bank A/S (DANSKE-CSE)	Denmark	IFRS	479.37
23	23	NC	Commerzbank AG (CBK-FRA)[4]	Germany	IFRS	461.91
24	27	▲	CaixaBank SA (CABK-MAD)	Spain	IFRS	386.62
25	26	▲	ABN Amro Group NV (ABN-AMS)	Netherlands	IFRS	381.30
26	25	▼	PAO Sberbank of Russia (SBER-ME)[5]	Russia	IFRS	359.84
27	29	▲	Svenska Handelsbanken AB (publ) (SHBA-OME)	Sweden	IFRS	292.69
28	28	NC	KBC Group NV (KBC-BRU)	Belgium	IFRS	283.81
29	31	▲	Nationwide Building Society (NBS-LON)	U.K.	IFRS	267.27
30	30	NC	DNB ASA (DNB-OSL)	Norway	IFRS	265.54
31	32	▲	Skandinaviska Enskilda Banken AB (SEBA-OME)	Sweden	IFRS	252.34
32	34	▲	La Banque Postale SA	France	IFRS	245.20
33	33	NC	Landesbank Baden-Württemberg	Germany	IFRS	241.21
34	38	▲	Erste Group Bank AG (EBS-WBO)[6]	Austria	IFRS	237.43
35	36	▲	Banco de Sabadell SA (SAB-MAD)	Spain	IFRS	222.32
36	35	▼	Swedbank AB (publ) (SWEDA-OME)	Sweden	IFRS	220.75
37	39	▲	Bayerische Landesbank AöR	Germany	IFRS	220.23
38	37	▼	BFA Sociedad Tenedora de Acciones SAU	Spain	IFRS	207.67
39	40	▲	Raiffeisen Gruppe Switzerland	Switzerland	Swiss GAAP	200.01
40	41	▲	Nykredit A/S	Denmark	IFRS	193.97
41	42	▲	VTB Bank PJSC (VTBR-LON)[7]	Russia	IFRS	187.81
42	47	▲	Landesbank Hessen-Thüringen Girozentrale[8]	Germany	IFRS	181.39
43	44	▲	Belfius Banque SA	Belgium	IFRS	164.17
44	46	▲	Banco BPM SpA (BAMI-MIL)	Italy	IFRS	160.46
45	45	NC	Norddeutsche Landesbank Girozentrale	Germany	IFRS	154.01
46	48	▲	Zürcher Kantonalbank	Switzerland	Swiss GAAP	150.37
47	43	▼	Dexia SA (DEXB-BRU)[9]	Belgium	IFRS	140.39
48	50	▲	OP Financial Group	Finland	IFRS	140.38
49	-	▲	Raiffeisen Bank International AG (RBI-WBO)	Austria	IFRS	140.12
50	49	▼	Banca Monte dei Paschi di Siena SpA (BMPS-MIL)[9]	Italy	IFRS	128.93

Banks and institutions with significant lending business are ranked by total assets for the most recent period available. Only one institution per corporate structure is included. Rankings account for completed and pending SNL-covered bank deals on a best-efforts basis. Deals, where the assets sold are in excess of €300 million or the deal value is in excess of €200 million, have been adjusted using the most recent available assets of the target company or the deal announcement/completion assets where available. The rankings have been created on a best-efforts basis and exclude development banks and entities that act as central banks/banking associations/supervisors for banking groups.
Data reported in native currencies converted to euros using the end-of-period exchange rates.
Total assets are as of Dec. 31, 2018, unless stated otherwise.
^ Pro forma for mergers as of March 31, 2019.
^^ Based on previous ranking published April 16, 2018.
* Financial data is as of Dec. 31, 2017.
NC = no change
Dash indicates the company was not a part of the top 50 banks in the previous ranking.
Cassa depositi e prestiti SpA has been excluded from the ranking due to the nature of its business model.
[1] Financial data adjusted for the pending sale of Macedonia-based Ohridska banka AD, Moldova-based BC Mobiasbancă – Groupe Société Générale SA, Poland-based Euro Bank SA, Serbia-based Societe Generale Banka Srbija ad Beograd and completed sale of Albania-based Banka Societe Generale Albania Sha, Bulgaria-based Societe Generale Expressbank AD and Madrid-based Self Trade Bank SAU.
[2] Financial data adjusted for the pending purchase of France-based Oney Bank SA.
[3] Financial data adjusted for the completed purchase of Norway-based Gjensidige Bank ASA.
[4] Financial data adjusted for the pending sale of Germany-based European Bank for Financial Services GmbH.
[5] Financial data adjusted for the pending sale of Turkey-based Deniz Bank AŞ.
[6] Financial data adjusted for the pending purchase of Macedonia-based Ohridska banka AD, a subsidiary of France-based Société Générale SA.
[7] Financial data adjusted for the completed purchase of Russia-based PJSC SAROVBUSINESSBANK and PJSC West Siberian Commercial Bank.
[8] Financial data adjusted for the pending purchase by Landesbank Hessen-Thüringen Girozentrale of Germany-based Dexia Kommunalbank Deutschland GmbH, a subsidiary of Belgium-based Dexia SA.
[9] Financial data adjusted for the pending sale of Belgium-based Banca Monte Paschi Belgio SA.
Source: S&P Global Market Intelligence

Note: This table shows the largest banks in Europe as of 2017 ranked by total asset size. The list includes non-EU banks to which the CRD IV/CRR legal package is not applicable, e.g. banks from Russia or Norway.

8.2 Coding Protocol

Coding Protocol

- Kick-off Meeting Jan 2nd, 2020, 14 – 16 h, Johannes, Veronica, Bernhard

  Introduction to subject, organisation, handling of Nvivo, distribution of coding work

  Johannes: German banks
  Veronica: French banks
  Bernhard: English banks
  Other banks will be assigned on progress.

- 1 to 1 coding Jan 3rd, 2020, 20 – 21 h, Veronika – Johannes

  Team coding of reports from BNP Paribas (4-eyes approach)

- 1 to 1 coding Jan 4th, 2020, 20 – 21 h, Bernhard – Johannes

  Team coding of reports from HSBC (4-eyes approach)

- Status meeting Jan 11th, 2020, 10h, online Telco, Johannes, Veronika, Bernhard
  - Veronica: done with 4 reports of 2 banks
  - Bernhard: done with 3 reports from 2 banks
  - Johannes: done with German and Austrian banks, currently working on Belgian bank, then Spanish banks

  Mapping rules:

  - Capital -> risk management
  - Encumbered assets -> other risks
  - Remuneration -> other risks
  - Leverage -> other risks
  - Equities, interest rate NOT in trading book -> market risk

  The list of words with risk, forward orientation and comparability already consists of about 250, 40 and 50 items respectively.

  Deadline for coding: Jan 26th, 2020

- Status meeting Jan 18th, 2020, 10h, online Telco, Johannes, Veronika, Bernhard

  Regularly update coding status in dropbox
  Coding of 19 out of 30 banks is completed
  - Veronica: done with 8 reports of 3 banks
  - Bernhard: done with 7 reports from 3 banks
  - Johannes: done with Spanish, Swiss and Scandinavian banks, currently working on Dutch bank, then on all other remaining banks.
- Status meeting Jan 21st, 2020, 10h, online Telco, Johannes, Veronika, Bernhard
  - All 90 disclosure reports are coded
  - Coding complete.

8.3 Word Lists

Regulatory Risk Disclosure Words									
word	source*	word	source*	word	source*	word	source*	word	source*
active	1	country	1	gain	1	nominal	1	settle	1
activity	1	covenent	1	gain	2	non-performing	1	settlement	1
actual	1	coverage	1	general	1	notional	1	severity	1
add-on	1	CRD	1	geographic	1	NSFR	1	shareholder	1
adequacy	1	credit	1	government	1	obligation	1	short	1
adequate	1	crisis	1	guarantee	1	officer	1	shortage	2
adjustment	1	CRR	1	guideline	1	operational	1	significant	2
advance	1	customer	1	hedge	1	organisation	1	simulation	1
advisory	1	danger	1	holding	1	originate	1	solvency	1
against	2	debt	1	ICAAP	1	outstanding	1	specific	1
allowance	1	decline	2	ILAAP	1	parameter	1	sponsor	1
amount	1	decrease	2	impair	1	partial	1	spread	1
approach	1	deduct	1	increase	2	party	1	stable	1
appropriate	1	default	1	incremental	1	passive	1	standard	1
approve	1	de-risking	1	inform	1	past	1	strategy	1
assess	1	derivative	1	insitution	1	PD	1	stress	1
asset	1	differ	2	instruction	1	peak	2	subordinate	1
AT	1	difficult	1	instrument	1	period	1	supervisory	1
audit	1	disclose	1	insurance	1	pillar	1	swap	1
average	1	disclosure	1	intensive	1	plan	1	sythetic	1
avoidance	1	discretion	1	intermediary	1	policy	1	tax	1
backtesting	1	distribution	1	internal	1	portfolio	1	term	1
bank	1	diversification	1	invest	1	probability	1	test	1
bear	1	diversify	2	investigation	1	probable	2	threat	2
behaviour	1	due	1	investor	1	procedure	1	threshold	1
business	1	EAD	1	IRB	1	process	1	tier	1
calibration	1	economic	1	issue	1	profile	1	tolerance	1
capacity	1	economy	1	LCR	1	protection	1	trading	1
capital	1	effective	1	lend	1	prudent	1	traditional	1
care	1	encumbered	1	less	2	prudential	1	transaction	1
carry	1	encumbrance	1	leverage	1	quality	1	transfer	1
cash	1	endanger	1	LGD	1	rating	1	type	1
catastrophe	2	enforcement	1	liability	1	ratio	1	unable	2
central	1	equity	1	limit	1	refinance	1	uncertain	2
CET	1	estimate	1	liquid	1	regulate	3	underlying	1
challenge	2	event	1	liquidity	1	regulation	3	undertaking	1
chance	2	expect	1	litigation	1	regulatory	3	unencumbered	1
charge	1	exposure	1	loan	1	report	1	use	1
class	1	fail	2	location	1	reputation	1	valuation	1
collateral	1	fair	1	long	1	requirement	1	value	1
commitment	1	finance	1	loss	2	resilience	1	value-at-risk	1
commodity	1	financial	1	low	2	responsible	1	viable	2
compliance	1	floor	1	mark	1	retail	1	volatility	1
concentration	1	flow	1	market	1	reverse	2	waive	1
conduct	1	fluctuate	2	material	1	risk	2	warning	1
confidence	1	forego	1	maturity	1	rule	1	weight	1
consolidate	1	foundation	1	medium	1	RWA	1		
contingent	1	framework	1	mitigation	1	save	1		
control	1	fraud	1	model	1	scenario	1		
corporate	1	frequency	1	monitor	1	score	1		
correlation	1	fund	1	net	1	secure	1		
counterparty	1	future	1	netting	1	security	1		

Sources:
1: Own analysis of disclosure reports; 2: Elshandidy, Fraser & Hussainey (2015)

Note: Word lists are used to capture the relevant content in disclosure reports. For each regulatory risk disclosure word identified, the source is given to the right.

Forward-looking Words												
word	source*		word	source*		word	source*		word	source*		word	source*
active	1		feasible	1		intend	3, 4		outlook	1		success	1
amend	1		forecast	3, 4		manage	1		pending	1		take place	1
analyse	1		foresee	1		may	4		plan	4		transition	1
anticipate	3, 4		forward	3		might	4		positive	1		trend	1
believe	3, 4		fourthcoming	1		monitor	1		potential	3		unexpect	1
can	4		future	3		negative	1		predict	1		unfeasible	1
continue	1		goal	3, 4		new	1		project	4		update	1
could	4		grow	1		next	1		propose	1		will	4
decline	1		guidance	3		notification	1		recommend	1			
deteriorate	1		hope	4		objective	3, 4		result	1			
develop	1		impact	1		ongoing	1		revise	1			
estimate	3		impediment	1		onwards	1		schedule	1			
exit	1		initiate	1		optimise	1		seek	4			
expect	3, 4		initiative	1		outcome	1		should	4			

Sources:
1: Own analysis of disclosure reports; 3: Burks & Cuny (2018); 4: Li (2010)

Note: Word lists are used to capture the relevant content in disclosure reports. For each forward-looking word identified, the source is given to the right.

Time Comparability Words												
word	source*		word	source*		word	source*		word	source*		word	source*
above	1		deter	1		experience	1		major	1		shift	1
below	1		develop	1		fall	1		minor	1		stable	1
cease	1		differ	1		high	1		move	1		trigger	1
change	1		downward	1		historical	1		previous	1		unchange	1
compare	1		drive	1		impose	1		reduce	1		upward	1
contribute	1		equal	1		increase	1		reflect	1		year-end	1
decline	1		exceed	1		last	1		result	1		year-on-year	1
decrease	1		excess	1		low	1		rise	1		year-to-year	1

Sources:
1: Own analysis of disclosure reports

Note: Word lists are used to capture the relevant content in disclosure reports. For each time comparability word identified, the source is given to the right.

Exclusion list							
word	source*		word	source*		word	source*
financial	1		disclosure	1		organisation	1
corporate	1		government	1			

Sources:
1: Own analysis of disclosure reports

Note: This table includes words that are excluded from the readability analysis with the Gunning-Fog index. Although they are three-syllables words, they are assumed to not pose a problem for understanding in the financial context.

8.4 Benchmark Report Structure Template

Benchmark Report Structure	
Structural Item	Match in Report
Executive summary	
Key risk factors	
Regulatory framework	
Accounting framework	
Scope of consolidation	
Regulatory capital management	
Economic capital management (ICAAP)	
Leverage ratio	
Capital requirements (RWA)	
Risk management	
Recovery and resolution plans	
Credit risk management	
credit risk mitigation	
Credit risk standard approach	
Equities in banking book	
Interest rate in banking book	
Credit risk IRB approach	
Counterparty risk	
Securitisation	
Market risk	
Operational risks	
Liquidity	
Remuneration	
Asset encumbrance	
Other risks	

Note: This benchmark table is used to evaluate the structures of disclosure reports for quality criterion 5 sector comparability. It includes in the left column the structural items that are shared by the industry leaders. In the right column, the matches per report are recorded.

8.5 Results for the Composite Disclosure Score

Disclosure Scoring Model Results							
Bank	Quality Criterion 1 Readability	Quality Criterion 2 Quantity	Quality Criterion 2 Coverage	Quality Criterion 3 Meaningfulness	Quality Criterion 4 Time comparability	Quality Criterion 5 Sector comparability	**Composite Disclosure Score**
Bank_01_2016	0,99	0,86	0,71	0,81	0,74	0,60	**3,93**
Bank_01_2017	1,00	0,86	0,71	0,82	0,76	0,60	**3,96**
Bank_01_2018	0,98	0,85	0,75	0,80	0,75	0,60	**3,93**
Bank_02_2016	0,96	0,93	0,76	0,93	0,91	0,60	**4,25**
Bank_02_2017	0,95	0,93	0,76	0,93	0,91	0,60	**4,24**
Bank_02_2018	0,94	0,94	0,76	0,93	0,91	0,60	**4,23**
Bank_03_2016	0,97	0,90	0,72	0,87	0,83	0,52	**4,00**
Bank_03_2017	0,96	0,91	0,71	0,88	0,85	0,48	**3,97**
Bank_03_2018	0,97	0,94	0,73	0,94	0,94	0,48	**4,17**
Bank_04_2016	0,66	0,87	0,65	0,84	0,79	0,44	**3,49**
Bank_04_2017	0,75	0,88	0,67	0,86	0,83	0,44	**3,66**
Bank_04_2018	0,71	0,89	0,69	0,88	0,85	0,52	**3,75**
Bank_05_2016	0,92	0,92	0,70	0,86	0,88	0,56	**4,03**
Bank_05_2017	0,99	0,94	0,70	0,88	0,88	0,76	**4,33**
Bank_05_2018	0,91	0,94	0,68	0,87	0,84	0,76	**4,19**
Bank_06_2016	0,88	0,94	0,73	0,93	0,93	0,60	**4,17**
Bank_06_2017	0,64	0,95	0,71	0,94	0,94	0,60	**3,95**
Bank_06_2018	0,66	0,95	0,72	0,95	0,97	0,60	**4,02**
Bank_07_2016	0,86	0,88	0,70	0,88	0,82	0,68	**4,02**
Bank_07_2017	0,90	0,91	0,76	0,89	0,81	0,64	**4,08**
Bank_07_2018	0,87	0,93	0,73	0,94	0,90	0,64	**4,18**
Bank_08_2016	0,88	0,96	0,70	0,95	0,96	0,52	**4,15**
Bank_08_2017	0,91	0,96	0,70	0,95	0,95	0,52	**4,15**
Bank_08_2018	0,90	0,96	0,68	0,95	0,92	0,52	**4,11**
Bank_09_2016	0,90	0,88	0,61	0,83	0,79	0,52	**3,79**
Bank_09_2017	0,81	0,92	0,58	0,88	0,87	0,60	**3,91**
Bank_09_2018	0,83	0,91	0,59	0,86	0,86	0,64	**3,95**
Bank_10_2016	0,85	0,84	0,35	0,73	0,80	0,16	**3,14**
Bank_10_2017	0,88	0,81	0,41	0,69	0,76	0,16	**3,10**
Bank_10_2018	0,87	0,82	0,29	0,70	0,76	0,16	**3,05**
Bank_11_2016	0,88	0,80	0,66	0,71	0,67	0,48	**3,47**
Bank_11_2017	0,93	0,83	0,57	0,73	0,73	0,48	**3,57**
Bank_11_2018	0,97	0,84	0,60	0,73	0,73	0,48	**3,62**
Bank_12_2016	0,70	0,99	0,69	0,99	0,97	0,48	**3,98**
Bank_12_2017	0,69	1,00	0,70	1,00	1,00	0,48	**4,02**
Bank_12_2018	0,74	0,99	0,64	0,98	0,97	0,48	**3,98**
Bank_13_2016	0,84	0,72	0,68	0,64	0,49	0,56	**3,24**
Bank_13_2017	0,81	0,80	0,73	0,74	0,56	0,56	**3,43**
Bank_13_2018	0,90	0,82	0,77	0,79	0,70	0,52	**3,71**
Bank_14_2016	0,82	0,97	0,70	0,95	0,91	0,60	**4,11**
Bank_14_2017	0,76	0,97	0,68	0,95	0,91	0,68	**4,11**
Bank_14_2018	0,65	0,98	0,68	0,96	0,95	0,68	**4,07**
Bank_15_2016	0,88	0,86	0,36	0,80	0,83	0,28	**3,40**
Bank_15_2017	0,83	0,89	0,50	0,83	0,85	0,24	**3,44**
Bank_15_2018	0,83	0,89	0,52	0,82	0,82	0,24	**3,42**
Bank_16_2016	0,59	0,91	0,75	0,88	0,87	0,52	**3,69**
Bank_16_2017	0,56	0,91	0,77	0,89	0,86	0,52	**3,67**
Bank_16_2018	0,64	0,91	0,77	0,89	0,87	0,52	**3,76**
Bank_17_2016	0,87	0,81	0,57	0,72	0,69	0,64	**3,61**
Bank_17_2017	0,95	0,83	0,67	0,73	0,73	0,68	**3,83**
Bank_17_2018	0,89	0,83	0,68	0,73	0,74	0,68	**3,79**
Bank_18_2016	0,74	0,88	0,73	0,83	0,81	0,36	**3,54**
Bank_18_2017	0,71	0,89	0,72	0,86	0,84	0,36	**3,57**
Bank_18_2018	0,81	0,90	0,71	0,85	0,82	0,36	**3,64**
Bank_19_2016	0,75	0,88	0,65	0,81	0,86	0,56	**3,74**
Bank_19_2017	0,74	0,88	0,67	0,81	0,84	0,56	**3,73**
Bank_19_2018	0,73	0,89	0,72	0,82	0,87	0,56	**3,79**
Bank_20_2016	1,00	0,88	0,68	0,77	0,76	0,52	**3,83**
Bank_20_2017	0,91	0,90	0,70	0,79	0,78	0,52	**3,80**
Bank_20_2018	0,98	0,93	0,73	0,84	0,87	0,52	**4,05**
Bank_21_2016	0,84	0,87	0,77	0,84	0,79	0,52	**3,81**
Bank_21_2017	0,90	0,89	0,78	0,86	0,82	0,52	**3,94**
Bank_21_2018	0,89	0,87	0,75	0,83	0,79	0,56	**3,88**

Disclosure Scoring Model Results							
Bank	Quality Criterion 1 Readability	Quality Criterion 2 Quantity	Quality Criterion 2 Coverage	Quality Criterion 3 Meaningfulness	Quality Criterion 4 Time comparability	Quality Criterion 5 Sector comparability	**Composite Disclosure Score**
Bank_22_2016	0,65	0,88	0,66	0,85	0,77	0,44	**3,48**
Bank_22_2017	0,64	0,90	0,66	0,86	0,79	0,56	**3,63**
Bank_22_2018	0,65	0,91	0,65	0,87	0,81	0,56	**3,67**
Bank_23_2016	0,97	0,94	0,73	0,95	0,90	0,68	**4,34**
Bank_23_2017	0,97	0,96	0,77	0,97	0,92	0,60	**4,32**
Bank_23_2018	0,91	0,96	0,76	0,98	0,95	0,60	**4,30**
Bank_24_2016	0,70	0,89	0,71	0,81	0,89	0,56	**3,74**
Bank_24_2017	0,70	0,90	0,70	0,82	0,90	0,52	**3,74**
Bank_24_2018	0,81	0,85	0,47	0,75	0,81	0,48	**3,50**
Bank_25_2016	0,99	0,88	0,73	0,81	0,86	0,60	**4,07**
Bank_25_2017	0,99	0,89	0,70	0,82	0,87	0,60	**4,07**
Bank_25_2018	0,99	0,88	0,72	0,83	0,85	0,52	**3,99**
Bank_26_2016	0,97	0,84	0,70	0,80	0,75	0,72	**4,01**
Bank_26_2017	0,98	0,84	0,68	0,80	0,73	0,72	**3,99**
Bank_26_2018	0,99	0,85	0,68	0,82	0,76	0,72	**4,06**
Bank_27_2016	0,87	0,82	0,66	0,76	0,72	0,60	**3,69**
Bank_27_2017	0,87	0,88	0,67	0,84	0,78	0,60	**3,86**
Bank_27_2018	0,87	0,89	0,67	0,84	0,82	0,60	**3,91**
Bank_28_2016	0,98	0,90	0,71	0,88	0,76	0,64	**4,06**
Bank_28_2017	0,95	0,92	0,71	0,88	0,80	0,68	**4,12**
Bank_28_2018	0,98	0,93	0,71	0,89	0,81	0,68	**4,18**
Bank_29_2016	0,93	0,89	0,71	0,86	0,73	0,68	**4,00**
Bank_29_2017	0,92	0,89	0,72	0,86	0,77	0,72	**4,07**
Bank_29_2018	0,92	0,90	0,72	0,88	0,81	0,72	**4,14**
Bank_30_2016	0,91	0,84	0,57	0,73	0,68	0,60	**3,63**
Bank_30_2017	0,90	0,88	0,64	0,82	0,71	0,72	**3,92**
Bank_30_2018	0,70	0,87	0,61	0,79	0,67	0,72	**3,63**

Note: This table includes the results from the disclosure scoring model. The column to the left shows the anonymized banks (30 banks in total with annual disclosure reports for 2016, 2017 and 2018). The column to the very right includes the Composite Disclosure Scores, the columns in between show the scores on the quality criteria.

9 Chapter Nine: Bibliography

Abraham, S., & Cox, P. (2007). Analysing the determinants of narrative risk information in UK FTSE 100 annual reports. *The British Accounting Review*, *39*(3), 227–248.

Adkins, A. (2011). The Regulatory Leverage Ratio. In F. Cannata & M. Quagliariello (Eds.), *Basel III and Beyond: A Guide to Banking Regulation After the Crisis*. Risk Books.

Ajina, A., Laouiti, M., & Msolli, B. (2016). Guiding through the Fog: Does annual report readability reveal earnings management? *Research in International Business and Finance*, *38*, 509–516.

Ajina, A., Sougne, D., & Lakhal, F. (2015). Corporate disclosures, information asymmetry and stock-market liquidity in France. *Journal of Applied Business Research*, *31*(4), 1223–1238.

Ali, W., Frynas, J. G., & Mahmood, Z. (2017). Determinants of Corporate Social Responsibility (CSR) Disclosure in Developed and Developing Countries: A Literature Review. *Corporate Social Responsibility and Environmental Management*, *24*(4), 273–294.

Allen, L. (2004). *Understanding market, credit, and operational risk : the value at risk approach* (J. Boudoukh & A. Saunders (eds.)). Blackwell.

Alvesson, M., & Svensson, P. (2013). Interviews. In R. Thorpe & R. Holt (Eds.), *The Sage Dictionary of Qualitative Management Research* (pp. 118–120). SAGE Publications Ltd.

Andrae, S., Hellmich, M., & Schmaltz, C. (2018). *Bankaufsichtliches Risikomanagement*. Schäffer-Poeschel.

Arbib, M., & Hesse, M. (1986). *The construction of reality*. Cambridge University Press.

Argimon, I., Arque, G., & Rodriguez, F. (2011). Regulating Remuneration Schemes in Banking. In F. Cannata & M. Quagliariello (Eds.), *Basel III and Beyond: A Guide to Banking Regulation After the Crisis*. Risk Books.

Ari, A., Chen, S., & Ratnovski, L. (2020). The dynamics of non-performing loans during banking crises: a new database. In *ECB: Working Paper Series* (Issue No 2395).

Awolowo, I., Garrow, N., Clark, M., & Somerset, N. (2019). Trust : The critical factor in theory and practice, from banks to cakes. *BAM 2019 Conference*.

Banal-Estanol, A., Benito, E., & Khametshin, D. (2017). *Asset encumbrance and bank risk: First evidence from public disclosures in Europe* (No. 12168).

Basel Committee on Banking Supervision. (2004). *International Convergence of Capital Measurement and Capital Standards - A Revised Framework*.

Basel Committee on Banking Supervision. (2006a). *Core principles for effective banking supervision (129)*.

Basel Committee on Banking Supervision. (2006b). *International Convergence of Capital Measurement and Capital Standards, Part 4: The Third Pillar – Market Discipline (128c)*.

Basel Committee on Banking Supervision. (2006c). *International Convergence of Capital Measurement and Capital Standards A Revised Framework Comprehensive Version*.

Basel Committee on Banking Supervision. (2009). *Enhancements to the Basel II framework (157)*.

Basel Committee on Banking Supervision. (2011). Basel III: A global regulatory framework for more resilient banks and banking systems. In *Basel Committee on Banking Supervision* (Vol. 2010).

Basel Committee on Banking Supervision. (2013). *Revised Basel III leverage ratio framework and disclosure requirements*.

Basel Committee on Banking Supervision. (2015). Revised Pillar 3 disclosure requirements (309). In *Basel Committee on Banking Supervision*.

Basel Committee on Banking Supervision. (2016). *Pillar 3 disclosure requirements – consolidated and enhanced framework (356)*.

Basel Committee on Banking Supervision. (2017a). *Basel Committee on Banking Supervision Basel III : Finalising post-crisis reforms*.

Basel Committee on Banking Supervision. (2017b). *Pillar 3 disclosure requirements – consolidated and enhanced framework - consultative document (400)*.

Basel Committee on Banking Supervision. (2018). *Consultative Document. Pillar 3 disclosure requirements – consolidated and enhanced framework (455)*.

Bazeley, P. (2013). Mixed Methods in Management Research. In R. Thorpe & R. Holt (Eds.), *The Sage Dictionary of Qualitative Management Research* (pp. 133–136). SAGE Publications Ltd.

Becker, A., Gruber, W., & Wohlert, D. (2012). *Handbuch MaRisk und Basel III*

(2nd editio). Fritz Knapp Verlag.

Beretta, S., & Bozzolan, S. (2004). A framework for the analysis of firm risk communication. *The International Journal of Accounting*, *39*(3), 265–288.

Beretta, S., & Bozzolan, S. (2008). Quality versus Quantity: The Case of Forward-Looking Disclosure. *Journal of Accounting, Auditing & Finance*, *23*(3), 333–376.

Berger, P. G. (2011). *Challenges and opportunities in disclosure research—A discussion of "the financial reporting environment: Review of the recent literature."*

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

Bhasin, M. L. (2012). *Determinants of Voluntary Disclosure in the Banking Sector : An Empirical Study*. *2001*, 60–71.

Botosan, C. A. (1997). Disclosure Level and the Cost of Equity Capital. *The Accounting Review*, *72*(3), 323–349.

Brealey, R. A., Myers, S. G., & Allen, F. (2014). Principles of Corporate Finance Global Edition. In *McGraw-Hill Irwin*.

Brown, S., & Hillegeist, S. A. (2007). Disclosure quality and IR. *Review of Accounting Studies*, *12*, 343–366.

Buchmüller, P. (2019). *Manual ICAAP/ILAAP*. Bank-Verlag GmbH.

Burks, J. J., Cuny, C., Gerakos, J., & Granja, J. (2018). Competition and voluntary disclosure: evidence from deregulation in the banking industry. *Review of Accounting Studies*, *23*(4), 1471–1511.

Cannata, F., & Quagliariello, M. (2011). *Basel III and Beyond: A Guide to Banking Regulation After the Crisis*. Risk Books.

Chakravarty, A., & Grewal, R. (2016). Analyst earning forecasts and advertising and r&d budgets: Role of agency theoretic monitoring and bonding costs. *Journal of Marketing Research*, *53*(4), 580–596.

Cheynel, E. (2013). A theory of voluntary disclosure and cost of capital. *Review of Accounting Studies*, *18*(4).

Cohen, J. (1960). A Coefficient of Agreement for Nominal Scales. *Educational and Psychological Measurement*, *20*(1), 37–46.

Core, J. E. (2001). A review of the empirical disclosure literature: Discussion. In

Journal of Accounting and Economics.

Core, J. E., Hail, L., & Verdi, R. S. (2015). Mandatory Disclosure Quality , Inside Ownership , and Cost of Capital Mandatory Disclosure Quality , Inside Ownership , and Cost of Capital. *European Accounting Review*, *0*(0), 1–29.

Cuevas-Rodríguez, G., Gomez-Mejia, L. R., & Wiseman, R. M. (2012). Has Agency Theory Run its Course?: Making the Theory more Flexible to Inform the Management of Reward Systems. *Corporate Governance: An International Review*, *20*(6), 526–546.

Culp, C. (2012). *Structured finance & insurance – the ART of managing capital and risk*. John Wiley & Sons, Inc.

Deloitte. (2015). *Understanding Risk Assessment Practices at Manufacturing Companies* (Issue March).

Deumes, R., & Knechel, W. R. (2008). Economic incentives for voluntary reporting on internal risk management and control systems. *Auditing*, *27*(1), 35–66.

Deutsche Regierungskommission. (2017). German Corporate Governance Code. *European Parliament.*, *February*, 1211–1218.

deVaus, D. (2011). Survey Design. In L. Moutinho & G. Hutcheson (Eds.), *The Sage Dictionary of Quantitative Management Research* (pp. 318–320). SAGE Publications Ltd.

Dhaliwal, D. S., Li, O. Z., Tsang, A., & Yang, Y. G. (2011). Voluntary nonfinancial disclosure and the cost of equity capital: The initiation of corporate social responsibility reporting. *Accounting Review*, *86*(1), 59–100.

Dobler, M. (2008). Incentives for risk reporting — A discretionary disclosure and cheap talk approach. *The International Journal of Accounting*, *43*(2), 184–206.

Dobler, M., Lajili, K., & Ze, D. (2011). *Attributes of Corporate Risk Disclosure : An*. *10*(2), 1–22.

Donaldson, L. (1996). *For positivist organization theory : proving the hard core*. Sage.

Donnellan, J. T. (2016). Agency Theory in Banking - ‘ Lessons from the 2007-2010 Financial Crisis .’ *International Journal of Business and Applied Social Science*, *2*(3), 38–49.

Douglas, S. (1994). Why Firms Voluntarily Disclose Bad News. *Journal of*

Accounting Research, *32*(1), 38–60.

Draghi, M. (2011). *Basel III and Beyond: A Guide to Banking Regulation After the Crisis* (F. Cannata & M. Quagliariello (eds.)). Risk Books.

EBA. (2020). *EBA Report on assessment of institutions' Pillar 3 disclosures*.

Elshandidy, T., Fraser, I., & Hussainey, K. (2013). Aggregated, voluntary, and mandatory risk disclosure incentives: Evidence from UK FTSE all-share companies. *International Review of Financial Analysis*, *30*, 320–333.

Elshandidy, T., Fraser, I., & Hussainey, K. (2015). What drives mandatory and voluntary risk reporting variations across Germany, UK and US? *British Accounting Review*, *47*(4), 376–394.

Elshandidy, T., & Neri, L. (2015). Corporate Governance, Risk Disclosure Practices, and Market Liquidity: Comparative Evidence from the UK and Italy. *Corporate Governance: An International Review*, *23*(4), 331–356.

Elshandidy, T., Shrives, P., Bamber, M., & Abraham, S. (2018). Risk reporting: A review of the literature and implications for future research. *Journal of Accounting Literature*, *40*(September 2017), 54–82.

Elzahar, H., & Hussainey, K. (2012). Determinants of narrative risk disclosures in UK interim reports. *Journal of Risk Finance*, *13*(2), 133–147.

Enhanced Disclosure Task Force. (2012). Enhancing the Risk Disclosures of Banks. *Report of the Enhanced Disclosure Task Force*.

Estrella Arturo. (2004). Bank Capital and Risk: Is Voluntary Disclosure Enough? *Journal of Financial Services Research*, *26*, 2–145.

European Banking Authority. (2013). *EU-wide Transparency Exercise 2013 Summary Report*. *December*, 1–14.

European Banking Authority. (2014). *Guidelines on disclosure of encumbered and unencumbered assets*. *GL_2014_03*.

European Banking Authority. (2017). Risk Assessment of the European Banking System - 2017. In *EBA Risk Assessment Reports* (Issue November).

European Banking Authority. (2018). *Single Rulebook*.

European Central Bank. (2018). *ECB publishes Consolidated Banking Data for end-December 2017*.

European Commission. (2002). EG Nr. 1606/2002: On the application of international accounting standards. *Official Journal of the European Communities*, *1606*, 1–15.

European Commission. (2019). *The European Green Deal*.

European Parliament. (2010). DIRECTIVE 2010/76/EU as regards capital requirements for the trading book and for re-securitisations, and the supervisory review of remuneration. *European Parliament.*, 3–35.

European Parliament. (2013a). DIRECTIVE 2013/36 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms (CRD IV). *Official Journal of the European Union*, *October 2010*, 338–436.

European Parliament. (2013b). Regulation (EU) No 575/2013 Prudential requirements for credit institutions and investment firms. *Official Journal Of The European Union*, *June 2013*.

European Parliament. (2014). DIRECTIVE 2014/95/EU Disclosure of non-financial and diversity information by certain large undertakings and groups. *Official Journal Of The European Union*, *2014*(October).

Fama, E. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance*, *25*(2), 383–417.

Fama, E. (1980). Agency Problems and the Theory of the Firm. *Journal of Political Economy*, *88*(2).

Financial Reporting Council. (2018). *The UK Corporate Governance Code*.

Financial Stability Board. (2017). *2017 list of global systemically important banks (G-SIBs)*. *November 2017*, 1–3.

Francis, J., Nanda, D., & Olsson, P. (2008). Voluntary disclosure, earnings quality, and cost of capital. *Journal of Accounting Research*, *46*(1), 53–99.

Garrow, N., Awolowo, I., & Growe, G. (2019). Annual Reports: Fact or Fiction? Are There Governance Implications? *Journal of Leadership, Accountability and Ethics*, *16*(1), 21–26.

Gray, R. (2014). *Accountability, social responsibility, and sustainability : accounting for society and the environment* (C. Adams & D. Owen (eds.)). Pearson Education Limited.

Guay, W., Samuels, D., & Taylor, D. (2016). Guiding through the Fog: Financial statement complexity and voluntary disclosure. *Journal of Accounting and Economics*, *62*(2–3), 234–269.

Gunning, R. (1952). *The technique of clear writing*. McGraw-Hill.

Guthrie, J., Petty, R., Yongvanich, K., & Ricceri, F. (2004). Using content analysis

as a research method to inquire into intellectual capital reporting. *Journal of Intellectual Capital*, *5*(2), 282–293.

Hall, M. (2013). CAQDAS: Computer-Aided Qualitative Data Analysis. In R. Thorpe & R. Holt (Eds.), *The Sage Dictionary of Qualitative Management Research* (pp. 36–38). SAGE Publications Ltd.

Handley-Schachler, M. (2009). Corporate risk disclosure by UK firms: Trends and determinants. *World Review of Entrepreneurship Management and Sustainable Development*, *June*.

Hassan, O., & Marston, C. (2010). Disclosure Measurement in the Empirical Accounting Literature : A Review Article. *Working Paper No. 18, Brunel University*, *10*.

Healy, P. M., & Palepu, K. G. (2001). Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. In *Journal of Accounting and Economics*.

Henry, E. (2008). Are investors influenced by how earnings press releases are written? *Journal of Business Communication*, *45*(4), 363–407.

Hirschman, A. O. . (1964). The Paternity of an Index. *The American Economic Review*, *54*(5), 761.

Hofstede, G. (1980). *Culture's consequences : international differences in work-related values*. Sage.

Hope, O.-K., Hu, D., & Lu, H. (2016). *The Benefits of Specific Risk-Factor Disclosures*. *ID 2457045*.

HSBC Hongkong Shanghai Banking Corporation. (2018). *HSBC Pillar 3 Disclosure Report*.

Hull, J. (2018). *Options, futures, and other derivatives* (Ninth, Glo). Pearson.

Hutcheson, G., & Sofroniou, N. (2011). Factor Analysis. In L. Moutinho & G. D. Hutcheson (Eds.), *The Sage Dictionary of Quantitative Management Research* (pp. 117–121). SAGE Publications Ltd.

Ibrahim, A. E. A., & Hussainey, K. (2019). Developing the narrative risk disclosure measurement. *International Review of Financial Analysis*, *64*(May), 126–144.

IFRS. (2019). *Disclosure Initiative — Principles of Disclosure Principles of Disclosure*. *March*.

International Accounting Standards Board. (2010). *Management Commentary: A*

framework for presentation. *December*, 827–840.

International Accounting Standards Board. (2016). *IFRS 7 Financial Instruments : Disclosures*. *January*, 223–282.

International Accounting Standards Board. (2017). *IFRS - Discussion paper DP/2017/1 - Disclosure Initiative - Principles of Disclosure* (Issue October).

International Accounting Standards Board. (2018). *IFRS Conceptual Framework for Financial Reporting*. *March*.

International Federation of Accountants. (2018). *Audit Fees Survey 2018*.

International Organization for Standardization. (2010). Guidance on Social Responsibility. *ISO26000:2010(E)*.

Jensen, M. C. (1998). Organization Theory and Methodology. *SSRN Electronic Journal*, *2*, 319–339.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, *3*(4), 305–360.

Jia, J., Munro, L., & Buckby, S. (2016). A finer-grained approach to assessing the "quality" ("quantity" and "richness") of risk management disclosures. In *Managerial Auditing Journal* (Vol. 31, Issues 8–9).

Johnson, P., & Duberley, J. (2000). *Understanding management research : an introduction to epistemology*. SAGE.

Jorgensen, B. N., & Kirschenheiter, M. T. (2003). Discretionary risk disclosures. *Accounting Review*, *78*(2), 449–469.

Jorion, P. (2007). *Financial Risk Manager Handbook* (4th ed.). Wiley.

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, *39*(1), 31–36.

Kasprowicz, T. J., & Klopf, G. (2016). *Neue regulatorische Offenlegungspflichten für Kreditinstitute* (2nd ed). Finanzkolloquium Heidelberg.

Khlif, H., & Hussainey, K. (2016). The association between risk disclosure and firm characteristics : a meta-analysis. *Journal of Risk Research*, *9877*, 1–31.

Kinglsey, S., Rolland, A., Tinney, A., & Holmes, P. (1998). *Operational Risk and Financial Institutions*. Arther Anderson Risk Books.

Kodwani, D., Frecknall-Hughes, J., Ullah, S., Ahmad, S., & Akbar, S. (2020). Governance disclosure quality and market valuation of firms in UK and Germany. *International Journal of Finance and Economics*, *June 2020*, 1–

25.

Kołakowski, L. (1969). *Marxism and beyond: on historical understanding and individual responsibility*. Pall Mall Press.

Krippendorff, K. (2004). *Content Analysis: An Introduction to Its Methodology*. Sage.

Kuritzkes, A., Schuermann, T., & Weiner, S. (2002). Risk Measurement, Risk Management And Capital Adequacy of Financial Conglomerates. *Brookings-Wharton Papers on Financial Services*, *2003*.

Lambert, R., Leuz, C., & Verrecchia, R. (2006). *Accounting Information , Disclosure , and the Cost of Capital*.

Leuz, C., & Verrecchia, R. (2000). The Economic Consequences of Increased Disclosure. *Journal of Accounting Research*, *38*(2000), 91–124.

Li, F. (2008). Annual report readability, current earnings, and earnings persistence. *Journal of Accounting and Economics*, *45*(2–3), 221–247.

Li, F. (2010). The information content of forward- looking statements in corporate filings-A naïve bayesian machine learning approach. *Journal of Accounting Research*, *48*(5), 1049–1102.

Linsley, P., & Shrives, P. (2000). Risk management and reporting risk in the UK. *The Journal of Risk*, *3*(1), 115–129.

Linsley, P., & Shrives, P. (2005a). Examining risk reporting in UK public companies. *The Journal of Risk Finance*, *6*(4), 292–305.

Linsley, P., & Shrives, P. (2005b). Transparency and the disclosure of risk information in the banking sector. *Journal of Financial Regulation and Compliance*, *13*(3), 205–214.

Linsley, P., & Shrives, P. (2006). Risk reporting: A study of risk disclosures in the annual reports of UK companies. *The British Accounting Review*, *38*(4), 387–404.

Lipunga, A. M. (2014). Risk disclosure practices of malawian commercial banks. *Journal of Contemporary Issues in Business Research*, *3*(3), 154–167.

Loughran, T., & Mcdonald, B. (2014). Measuring Readability in Financial Disclosures. *The Journal of Finance*, *69*(4), 1643–1671.

Loughran, T., & Mcdonald, B. (2016). Textual Analysis in Accounting and Finance: A Survey. *Journal of Accounting Research*, *54*(4), 1187–1230.

Lubatkin, M. (2007). An embeddedness framing of governance and opportunism:

Towards a cross-nationally accommodating theory of agency. *Journal of Organizational Behavior*, *28*(1), 69–73.

Malkiel, B. G. (2003). The Efficient Market Hypothesis and Its Critics. *The Journal of Economic Perspectives*, *17*(1), 59–82.

Markowitz, H. (1952). Portfolio Selection. *The Journal of Finance*, *7*(1), 77–91.

McAuley, J. (2014). *Organization theory challenges and perspectives* (Second edi). Pearson.

Mendoza, C. (2015). *Bank capital & Basel III regulations : implementation and effects* (C. R. Mendoza (ed.)). Nova Science Publishers.

Meneau, L., & Sabatini, E. (2011). The New Definition of Regulatory Capital. In *Basel III and Beyond: A Guide to Banking Regulation After the Crisis*. Risk Books.

Miihkinen, A. (2011). Miihkinen, A. (2011). What Drives Quality of Firm Risk Disclosure ? The Impact of a National Disclosure Standard and Reporting Incentives under IFRS. *The International Journal of Accounting*, *Vol.47*(No.4), 437–468.

Morrison, A. D., & White, L. (2009). American Finance Association Level Playing Fields in International Financial Regulation Level Playing Fields in International Financial Regulation. *The Journal of Finance*, *64*(3).

Nouy, D. (2014). *Regulatory and financial reporting essential for effective banking supervision and financial stability*.

Ntim, C. G., Lindop, S., & Thomas, D. A. (2013). Corporate governance and risk reporting in South Africa: A study of corporate risk disclosures in the pre- and post-2007/2008 global financial crisis periods. *International Review of Financial Analysis*, *30*(December), 363–383.

Palia, D., & Porter, R. (2007). *Agency Theory in Banking : An Empirical Analysis of Moral Hazard and the Agency Costs of Equity*. *2*(3), 142–156.

Paper, C., & Models, B. (2018). Measuring Concentration of the Banking Market of the Republic of Croatia. In D. Tipurić & D. Labaš (Eds.), *6th International OFEL Conference on Governance, Management and Entrepreneurship*.

Pepper, A., & Gore, J. (2015). Behavioral Agency Theory. *Journal of Management*, *41*(4), 1045–1068.

Refinitiv. (2019). *Refinitiv ESG score disclosures*.

Renn, O., Lucas, K., Haas, A., & Jaeger, C. (2019). Things are different today:

the challenge of global systemic risks. *Journal of Risk Research*, *22*(4), 401–415.

Rutterford, J. (2006). *Understanding Accounts* (Unit 2). The Open University.

S&P Global Market Intelligence. (2018). *Europe's 50 largest banks by assets, EOY 2017*.

Sanders, W. G., & Carpenter, M. A. (2003). Strategic satisficing? A behavioral-agency theory perspective on stock repurchase program announcements. *Academy of Management Journal*, *46*(2), 160.

Saunders. (2013). Content Analysis. In R. Thorpe & R. Holt (Eds.), *The Sage Dictionary of Qualitative Management Research* (pp. 58–59). SAGE Publications Ltd.

Saunders, A. (2017). *Financial institutions management: a risk management approach* (M. M. Cornett (ed.); Ninth edit). McGraw-Hill Education.

Sayer, A. (1992). *Method in social science: a realist approach* (2nd ed.). Routledge.

Schoenfeld, J. (2017). The effect of voluntary disclosure on stock liquidity: New evidence from index funds. *Journal of Accounting and Economics*, *63*(1), 51–74.

Servigny, A. de. (2004). *Measuring and managing credit risk* (O. Renault (ed.)). McGraw-Hill.

Sharpe, W. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *The Journal of Finance*, *XIX*(3), 425–442.

Shiller, R. J. (2003). From Efficient Markets Theory to Behavioral Finance. *The Journal of Economic Perspectives*, *17*(1), 83–104.

Sincich, T. (1995). *Business Statistics by Example* (3th ed.). Dellen Publishing Company.

Smith, H. W. (1975). *Strategies of social research: The methodological imagination*. Prentice-Hall.

Spence, M. (1973). Job Market Signaling. *The Quarterly Journal of Economics*, *87*(3), 355–374.

Stulz, R. (2014). Governance, Risk Management, and Risk-Taking in Banks. *NBER Working Paper Series*, 20274.

Tapan, M. (2019). Legitimacy Theory and Its Relationship to CSR Disclosures (A Literature Review). *The Keizai Ronkyu*, *163*(March), 1–17.

Tauringana, V., & Chithambo, L. (2016). Determinants of risk disclosure compliance in Malawi: a mixed-method approach. *Journal of Accounting in Emerging Economies*, *6*(2), 111–137.

Thaler, R. (2005). *Advances in Behavioral Finance, Volume II*. Princeton University Press.

The SAGE dictionary of qualitative management research. (2013). In R. Thorpe & R. Holt (Eds.), *Dictionary of qualitative management research*. SAGE.

Turkmen, S. Y., & Yigit, I. (2012). Diversification in Banking and its Effect on Banks ' Performance : Evidence from Turkey. *American International Journal of Contemporary Research*, *2*(12), 111–119.

UNCTAD. (2017). *The Role of Disclosure in Risk Assessment & Enhancing the Usefulness of Corporate Reporting in Decision-making*. *14595*(August).

UNIDO. (2019). *What is CSR? | UNIDO*.

Verrecchia, R. (1983). Discretionary disclosure. *Journal of Accounting and Economics*, *5*, 179–194.

Verrecchia, R. (1990). Information quality and discretionary disclosure. *Journal of Accounting and Economics*, *12*(4), 365–380.

Verrecchia, R., & Clinch, G. (2015). Voluntary disclosure and the cost of capital. *Australian Journal of Management*, *40*(2), 201–223.

Watts, R. L., & Zimmerman, J. L. (1990). Positive Accounting Theory : A Ten Year Perspective. *The Accounting Review*, *65*(1), 131–156.

Westermann, R. (2018). Measuring agency costs over the business cycle. *Management Science*, *64*(12), 5748–5768.

Wiseman, R. M., Cuevas-Rodríguez, G., & Gomez-Mejia, L. R. (2012). Towards a social theory of agency. *Journal of Management Studies*, *49*(1), 202–222.

Wong, S. P. (2012). *The impact of culture on risk management disclosures : an exploratory study of international banks*. Southern Cross University, Lismore, NSW.

World Medical Association. (2013). Declaration of Helsinki: Ethical principles for medical research involving human subjects. *JAMA*, *310*(20), 2191–2194.

Zarzeski, M. (1996). Spontaneous harmonization effects of culture and market forces on accounting disclosure practices. *Accounting Horizons*, *10*(1), 18.