



What is the Effect of IFRS 9 ECL and FinRep on the Stability of Banks in Europe?

Leonard Simon - 152420005

Dissertation written under the supervision of professor Dr. Schliephake

Dissertation submitted in partial fulfilment of requirements for the MSc in
Finance, at the Universidade Católica Portuguesa, 19.11.2021.

Abstract

(English)

What is the Effect of IFRS 9 ECL and FinRep on the Stability of Banks in Europe?

Leonard Simon

In recent years, regulatory and accounting bodies such as the European Banking Authority (EBA) and International Accounting Standards Board (IASB) have pursued new accounting standards and requirements to enhance financial stability in the financial market of the European Union. The expected credit loss model (ECL) of the International Financial Reporting Standard (IFRS) 9 was introduced by the IASB to account for expected future credit losses, expanding the time horizon with significant methodological changes of the previous incurred loss model of International Accounting Standard (IAS) 39. Furthermore, the Capital Requirement Regulation brought new obligations for financial reporting of banks with the goal to increase transparency of systematic risks in the market.

This dissertation assesses the impact of the ECL model of IFRS 9 and regulatory financial reporting (FinRep) on the stability of banks in Europe that was implemented in 2018. The expected credit loss model brings various effects that impact the stability of financial institutions, both positively and negatively. The high dynamics of FinRep led the reporting requirement to develop to a significant component of the Compliance costs of financial institutions, lowering profitability.

This paper finds that IFRS 9 ECL and FinRep have an overall significant positive effect on the stability of banks in Europe. Furthermore, this paper finds that the impact of IFRS 9 ECL and FinRep on financial stability varies over time and in accordance with the regional markets of the banks.

Keywords: Expected credit loss model, financial reporting, accounting standards, bank regulation, financial stability

Abstract

(Portuguese)

Qual é o efeito da IFRS 9 ECL e FinRep na estabilidade dos bancos na Europa?

Leonard Simon

Nos últimos anos, organismos reguladores e contabilísticos como a Autoridade Bancária Europeia (EBA) e o International Accounting Standards Board (IASB) procuraram novas normas e requisitos contabilísticos para reforçar a estabilidade financeira no mercado financeiro da União Europeia. O modelo de perdas de crédito previstas (ECL) da Norma Internacional de Informação Financeira (IFRS) 9 foi introduzido pelo IASB para contabilizar as perdas de crédito futuras previstas, expandindo o horizonte temporal com alterações metodológicas significativas do modelo de perdas anteriormente incorridas da Norma Internacional de Contabilidade (IAS) 39. Além disso, o Regulamento dos Requisitos de Capital trouxe novas obrigações de informação financeira dos bancos com o objectivo de aumentar a transparência dos riscos sistemáticos no mercado.

Esta dissertação avalia o impacto do modelo ECL da IFRS 9 e do Regulamento de Informação Financeira Regulamentar (FinRep) na estabilidade dos bancos na Europa, que foi implementado em 2018. O modelo de perda de crédito esperada traz vários efeitos que têm impacto na estabilidade das instituições financeiras, tanto positiva como negativamente. A elevada dinâmica do FinRep levou a que a exigência de prestação de informação se desenvolvesse para uma componente significativa dos custos de conformidade das instituições financeiras, reduzindo a rentabilidade.

Este documento conclui que a IFRS 9 ECL e a FinRep têm um efeito positivo global significativo na estabilidade dos bancos na Europa. Além disso, este documento conclui que impacto da IFRS 9 ECL e da FinRep na estabilidade financeira varia ao longo do tempo e de acordo com os mercados regionais dos bancos.

Palavras-chave: Modelo de Perdas de Crédito Esperadas, Relatórios Financeiros, Normas Contabilísticas, Regulamentação Bancária, Estabilidade Financeira

Table of Contents

1. Introduction	1
2. Literature Review.....	3
3. Theoretical Background.....	4
3.1 IFRS 9 Expected Credit Loss Model.....	4
3.2 Financial Reporting (FinRep)	9
3.3 Impact of COVID-19	11
4. Methodology	11
4.1 Hypothesis	11
4.2 Data.....	15
5. Results	21
5.1 Regression Results.....	21
5.2 Discussion	24
5.3 Limitations and Future Research.....	27
6. Conclusion	27
7. Appendix	29
Bibliography.....	34

List of Abbreviation

BFA	Bankenfachausschuss
CAR	Capital Adequacy Ratio
CET1	Common Equity Tier 1
COREP	Common Reporting Framework
CPI	Consumer Price Index
CRR	Capital Requirements Regulation
EBA	European Banking Authority
ECB	European Central Bank
ECL	Expected Credit Loss
EEA	European Economic Area
FASB	Financial Accounting Standards Board
FinRep	Financial Reporting
GDP	Gross Domestic Product
IAS	International Accounting Standards
IASB	International Accounting Standards Board
IFRS	International Financial Reporting Standards
II	Interest Income
IR	Main Interest Rate
IRB	Internal Ratings-Based Approach
LGD	Loss Given Default
LR	Leverage ratio
LSI	Less Significant Institutions
NII	Non-Interest Income
OPI	Total Operating Income
PD	Probability of Default
PIT	Point in Time
ROA	Return on Assets
ROID	Income Diversification
RWA	Risk Weighted Assets
SR	Systemical Relevance
SSI	Systemically Significant Institutions
SSM	Single Supervisory Mechanism
Tier 1	Common Equity Tier 1 Capital
TTC	Through the Cycle
UNEMP	Unemployment
US GAAP	United States Generally Accepted Accounting Principles

List of Figures

Figure 1: Approaches to loan loss accounting	6
Figure 2: Decision Tree for Stage allocation	7
Figure 3: Main Financing Rate ECB	14
Figure 4: Overview of Country Distribution of Bank Sample	16
Figure 5: Development of Average RWA in relation to Total Assets	17
Figure 6: Development of Income Diversification 2003-2020	26

1. Introduction

The International Financial Reporting Standard (IFRS) 9 is the new mandatory standard for the accounting of financial instruments that replaced the International Accounting Standard (IAS) 39 in 2018. The introduction of the new standard is a response of the International Accounting Standard Board (IASB) to criticism associated with instability of banks in the financial crisis in 2009. The IAS 39 was too complex and deferred the recognition of the credit losses on loans and receivables through an incurred loss model. IFRS 9 introduced an expected credit loss model, through which the financial institutions (and other applicants) are required to account for the losses of credits and receivables before they occur. With the new standard, the IASB aims to enhance the ability of financial users to adequately assess the amounts, timing, and uncertainty of the entities future cash flows. In addition to changes in accounting standards, regulatory institutions and overseeing bodies such as the European Banking Authority (EBA) and European Central Bank (ECB) have also expanded the requirements for financial institutions to create more transparency and comparability in the European Market. Financial institutions in Europe are required to submit FinRep forms to the EBA in accordance with their size and systemic importance to the market. Both, the implementation of IFRS 9 and the constant expansion of FinRep pose major challenges for financial institutions regarding the technical and administrative requirements, as well as data availability and processing. The reporting requirements thereby pose a significant component to the compliance costs of the entity. In contrast to the stability enhancing effect of the anticipation of future losses in the accounting standard, the increased compliance cost decrease the institutions profitability and equity position, which actually decreases its financial stability.

The main research question derived, is whether the implementation of the standards and regulation has a positive or negative effect on the stability of banks in Europe, and whether there are differences in the impact on the banks according to the geographic market. If the impact on banks varies, the potential reasonings are investigated.

Especially the impact of IFRS 9 on the financial stability of credit institutions remains ambiguous. On the one hand, the expected credit loss model reduces the “cliff effect”, which arises when credit losses are only recognized after they have been objectively occurred. This led especially in 2008 to a sudden and large impairment of assets. On the other hand, the new standard implies a reduction in profitability on the short-term caused by the “front-loading” effect (Kund & Rugilo, 2018). The front-loading effect describes the anticipative recognition

of future credit losses. The earlier recognition directly affects the entities profits and its ability to retain, distribute or reinvest its earnings.

This paper addresses the net impact on financial stability using real historical data, which is regressed on a dummy variable, simulating the introduction of the standards and regulations. To control for associated effects of other regulations in that timeframe, the most significant regulatory requirements as well as main accounting and macroeconomic indicators for financial stability are included as control variables. For the analysis data from Q1 2000 to Q4 2020 of 52 credit institutions in Europe was retrieved.

The results show that the implementation of the IFRS 9 expected credit loss model and FinRep has a significant, positive impact on the stability of banks in Europe. The significance increases with shorter time samples since the implementation and varies across regions in Europe. The main weaknesses of the analysis are due to the small scope of impairment data points since the introduction of IFRS 9. Furthermore, one out of the three annual reports are affected by the COVID-19 pandemic, limiting interpretation of the effects of implementation.

The structure of this paper is organized as follows: Sections two and three provide the status quo of the ongoing literature and a theoretical background to the implemented ECL-model and FinRep. The methodology and data set are presented in sections four with the achieved results elaborated and discussed in section five. Section six concludes this paper.

2. Literature Review

Economists, researchers, as well as leading accounting firms assessed the potential impact of implementation of IFRS 9 on the financial statements, financial stability, and the behaviour of a bank.

Potential consequences for the financial statements of IFRS 9 include more income statement volatility, earlier recognition of impairment losses on receivables and loans (the front-loading effect), as well as new disclosure requirements (PwC, 2018). The classification & measurement of financial assets is based on the firm's business model regarding the asset, as well as the contractual cash flow characteristics of the asset [IFRS 9, paragraph 4.1.2]. The specific assessment is considered to increase the measurement of debt instruments at fair value, potentially increasing income statement and balance sheet volatility (PwC, 2018). The biggest change for the financial statements for retail and investments banks comes from the new impairment requirements from the expected credit loss model (Ernst & Young, 2017). With the recognition of expected and not incurred losses, the new standard contains the front-loading effect, at which the probability of default of a loss affects the income statement and the banks' retained earnings at an earlier point in time, which decreases the institutions financial stability (Kund & Rugilo, 2018).

Financial stability is measured by the World Bank through comparing capital buffers with the volatility of returns (World Bank, 2021). Kund & Rugilo (2018) follow this definition to assess the impact of the front-loading, as well as the cliff-effect through stress-testing simulations. The authors find that the cliff-effect is reduced at the cost of short-term front-loading the expected losses (Kund & Rugilo, 2018). The front-loading effect retards the banks' ability to account for retained earnings and increase its equity position. This lowers overall capital buffers and hence decreases the banks' financial stability. Retained earnings pose a significant component in the calculation of regulatory figures, such as the common equity Tier-1 (CET1) ratio, which presents the highest quality of regulatory capital (BIS, 2021). Krüger et. al. (2018) find that the expected credit loss model of IFRS 9 reduces tier 1 capital. This reduction is more severe during economic downturns, as well as for credit portfolios with low credit quality (Krüger et al., 2018), as the expected losses are calculated at a longer time span. With the equity position being directly affected, the expected credit loss model further impacts the banks' financial stability, as the leverage of an institution influences investments, funding, and dividend policies (Novotny-Farkas, 2016).

Procyclicality in the financial services industry describes fluctuation of financial assets around an economic cycle (Landau, 2009). Financial values tend to correlate with the economic cycle with broader amplitude. Landau (2009) finds that procyclicality can lead to high deviations of the market values of financial instruments from their fundamental trend, which creates distortions in portfolio allocation and risk management. Once these deviations unwind, the economic cycle can be disrupted. The incurred loss model of IAS 39 tended to amplify these effects of procyclicality.

Novotny-Farkas (2016) find that the expected credit loss model of IFRS 9 is likely to lower the undesired effects of the incurred loss model of IAS 39. The amplification is lowered through reducing loss overhangs as well as overstating equity figures in booming periods. With the earlier recognition of expected credit losses, institutions are limited to their distribution of dividends and bonuses in booming periods (Novotny-Farkas, 2016).

Abad & Suarez (2018) further investigate the impact of IFRS 9 on procyclicality and find that it cannot be ruled out that, opposed to the IASB's intention, the expected credit loss model may amplify rather than reduce procyclicality, in certain circumstances. They find later that IFRS 9 does lead to higher impairment of financial assets prior to an upcoming recession, lowering profits and the CET1 ratio. This leads to a sale of financial assets, specifically the loan portfolio at the beginning of the recession. The prompter recognition and the following reactions although help the bank control the crisis in a more effective manner (Abad & Suarez, 2018).

There is little research on the financial reporting requirements of FinRep associated with the adoption of the capital requirements regulation (CRR). While there is research regarding the impact of liquidity and equity requirements on lending behaviours and profitability associated with the CRR, the research on the impact of requiring a broad financial reporting infrastructure is limited. In an analysis for best practice framework, Moody's finds that the introduction of the reporting system brings significant technical and administrative challenges, impacting the profitability of the institution. These challenges would most likely be overcome with automated processes, comprehensive change workflow and audit capabilities, as well as centralized data platforms (Chabanel & Machray, 2013).

3. Theoretical Background

3.1 IFRS 9 Expected Credit Loss Model

The current stage of literature shows that the net effect on financial stability of the institution is strongly determined by the positive effect of reducing the cliff and the negative effect of front

loading and potentially increased procyclicality. The impact of the expected credit loss model on the respective effect is dependent on the stage at which the expected loss is measured. The model for this paper captures the impact of the expected credit loss model through a dummy variable and does not differentiate between the gross effects, as historical data for the research of the individual effects is limited. The dummy variables for IFRS 9 and FinRep capture the point in time at which the cliff- and front-loading effect, and procyclicality of the bank was (on aggregate) affected. This section will provide an overview of the technical specifications of the expected credit loss model to enhance the understanding of the results of this paper.

3.1.1 Expected vs. Incurred Loss Model

The incurred credit loss model of IAS 39 required banks to present credit risk, that has objectively occurred, prior to the reporting date [IAS 39.58]. The institution is then required to measure the expected credit loss and impair the value of the asset to the discounted expected cash flows [IAS 39.63]. In the light of the financial crisis 2008, the IASB as well as the Financial Accounting Standards Board (FASB) published a discussion paper, initiating the replacement of IAS 39, including its impairment model. As the former Chairman of the IASB Hans Hoogervorst mentioned in his speech 2014, the acknowledgement of asset impairments in the financial crisis came ‘too little, too late’ (Hoogervorst, 2014). The institutions recognised the impairments shortly before the loan defaulted. With the late impairment of the assets and too little loan loss provisioning prior to the default, the investors lost trust in the reporting of the financial institutions.

The main objective of IFRS 9 is to present relevant and useful information of the amounts, timing, and uncertainty of an entity’s future cash flows [IFRS 9.1.1]. The goal is to make financial markets aware of any future loss, including the scope at which it may occur. To meet this objective, the IASB, as well as the FASB for the US Generally Accepted Accounting Principles (GAAP), include an expected credit loss model, which recognizes a loss allowance for expected credit losses on a financial asset [IFRS 9.5.5.1], that is measured at amortized cost [IFRS 9.4.1.2] or at fair value through other comprehensive income [IFRS 9.4.1.2A].¹ The loss allowance is determined by the change in the expected credit default after its recognition (Credit-Deterioration-Model).

¹ Applicability of IFRS 9.5.5.1 extends further to a lease receivable, a contract asset or a loan commitment and a financial guarantee contract.

Figure 1 illustrates that the ECL-model of IFRS 9 includes the expected credit default, covering a portion of expected losses, that are only concluded by fair value accounting with the recognition of the changes in interest rate risk (Novotny-Farkas, 2016).

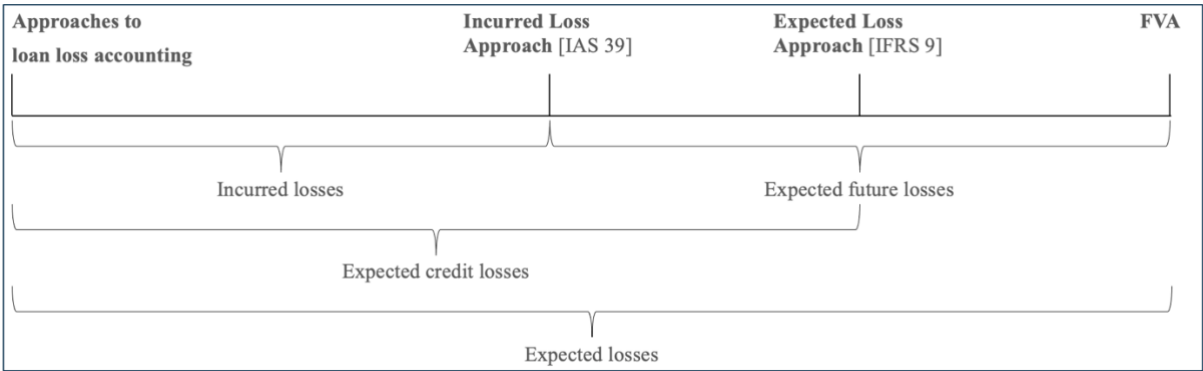


Figure 1: Approaches to loan loss accounting (Adapted from Abad & Suarez, 2018)

3.1.2 Three Stages of Expected Credit Losses

IFRS 9 requires the entity to account for different loss allowances in dependence on the allocation of the credit risk stage of the instrument or portfolio. There are three different stages whereas each stage requires different measurements of expected losses, leading to a presentation of higher loss allowance with the increasing stage.

Stage 1: In accordance with IFRS 9.5.5.5 an entity must measure the loss allowance for the financial instrument at an amount equal to 12-month expected credit losses. The calculation of the interest income is based on the gross carrying amount of the instrument.

Stage 2: In case there is a significant increase in credit risk on a financial instrument [IFRS 9.5.5.9], the expected credit loss has to equal the amount of the lifetime expected credit losses [IFRS 9.5.5.3]. The entity must evaluate by each reporting date, whether there has been a significant increase in credit risk and if a stage-transfer is necessary. For the evaluation the entity has to consider reasonable and supportable information that may affect the credit risk of the financial instrument [IFRS 9.B5.5.15]. The information can come from internal price indicators, other changes in the rates or terms or changes in external market indicators of credit risk [IFRS 9.B5.5.17]. As in stage 1, the interest income is calculated based on the gross carrying amount of the instrument.

Stage 3: For financial instruments that are credit impaired upon reporting date the entity is required to calculate the expected credit loss in accordance with the lifetime expected credit losses [IFRS 9.B5.5.33]. The interest income is calculated based on the net carrying amount.

The assessment and allocation of the respective stages can be summarized as followed:

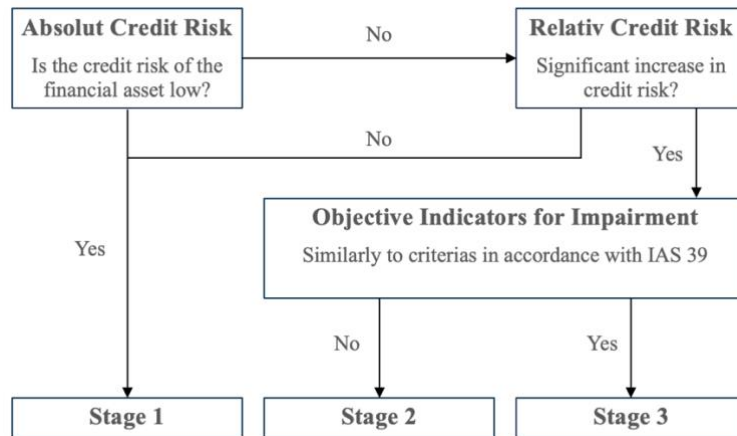


Figure 2: Decision Tree for Stage allocation (Adapted from PwC, 2017)

In addition to the three stages, a financial instrument can be credit-impaired when it is purchased or at the origination. In both cases the entity recognizes the cumulative changes in expected credit losses and applies the credit-adjusted effective interest rate for instruments measured at amortized cost [IFRS 9.5.4.1].

Reclassifications from Stage 3 to 2 and from Stage 2 to 1 are possible if the reason for credit impairment or the significant increase in credit risk no longer exists at the reporting date.

3.1.3 Measurement of Expected Credit Loss

The expected credit loss model is probability weighted and determined by a range of outcomes [IFRS 9.5.5.17]. The expected credit losses reflect the time value of money and include information about past events, current conditions, as well as future economic conditions. The time perspective for the consideration of future conditions, as well as credit risk depends on the allocated stage.

For the calculation of the expected credit loss model three parameters are typically considered.²

Expected Credit Loss

= Probability of Default (PD) x Loss Given Default (LGD) x Exposure at Default (EAD)

For Stage 1 the 12-month expected credit loss is considered in the calculation:

$$ECL_t^{12M} = PD_t^{12M} \times LGD_t \times EAD_t$$

For Stage 2 the lifetime expected credit loss is considered in the calculation:

$$LECL_t = \sum_{t=1}^n PD_t \times LGD_t \times EAD_t$$

² IFRS 9.BC.5.283 requires the institutions to use regulatory parameters as a basis for the calculation.

Stage 3 is calculated as the lifetime expected credit loss as well. The difference to stage 1 and 2 is determined by IFRS 9.B5.5.33 which states that the credit losses are measured as the difference between the gross carrying amount and the present value of the discounted future cash flows.

$$LECL_{Stage\ 3} = GCA - \sum_{s=1}^n \sum_{t=1}^m \frac{CF_{s,t}}{(1 + i_{eff})^t} \times p_s$$

Whereas s and t represent the cash flows at a certain point in time and p the probability of each scenario.

The above displayed formula for the lifetime expected credit loss calculation for Stage 3 can be simplified, which is mostly done for small, defaulted receivables (PwC, 2017). With a $PD = 1$ the formula for a portfolio k can be simplified to:

$$LECL_k^{Stage\ 3} = \sum_{k=1}^n LGD_k \times EAD_k$$

The respective measurement shows that the impact on the cliff and front-loading effect is highly dependent on the allocation of the credit loss stage. The results of this paper will give an indication of the net effect on the financial stability of banks.

3.1.4 The Parameters

The IASB requires that the definition of default for a bank must equal the definition used in the internal risk management. As regulatory bodies require institutions to calculate the 12-Month probability of default as a basis for the internal ratings-based (IRB) approach, institutions have this parameter available for the calculation of the Stage 1 expected credit loss (Novotny-Farkas, 2016).

In contrast, the lifetime probability of default can be estimated either directly or indirectly.

The direct estimation is derived from historical defaults of the clients over a 12-month period. The median PD of a client over a period can be determined and mapped to a rating class. The internal rating class can then be mapped to an external rating provided by e.g., Moody's or S&P.

For the calculation of the long-term probability of default two philosophies may be used, or a hybrid of both: the Point-in-Time-Rating (PIT) as well as the Through-the-Cycle-Rating (TTC) (EBA, 2017a). While the PIT rating is sensitive to macroeconomic conditions, the TTC rating is less attached to economic cycles and allows for more stability, as it only includes information regarding the debtor. With the dependency of PIT on the macroeconomic cycle, the rating philosophy allows for a more precise calibration compared to the TTC. It although does lead

to higher volatility and could lead to a more severe downfall in profitability and capital when the economy enters a recession or a crisis (Abad & Suarez, 2018). This may amplify the procyclicality of the loan loss allowances. The European Banking Authority finds in 2017 that most of the supervised institutions use a hybrid of both, the PIT and the TTC rating (EBA, 2017b). The hybrid is used to remain precise in the estimation and smoothen the volatility through using TTC estimates. The inclusion of TTC estimates reduces the procyclicality of the PD, at the cost of marginally increasing procyclicality regarding the LGD parameters (Novotny-Farkas, 2016).

The institution may estimate its Lifetime Probability of Default indirectly through a migration matrix. The average probability of an institution to migrate from one rating class to another gives an indication on the probability of default over the period of the matrix (Hadad et al., 2008). This methodology is although not commonly used across financial institutions in Europe (EBA, 2017b).

The loss given default can also be computed directly, through LGD-calibrations or indirectly, through historical default rates or expert estimations (PwC, 2017). Most commonly the supervised institutions use the Work-Out LGD methodology for the calibration (EBA, 2017b). The Work-Out LGD is based on historical information and gives an estimation through discounting financial data that was received during the recovery process of the defaulted contracts in a certain point in time (BBVA, 2010). Variables that are used as an input in the calculation are the exposure at default, revenue ratio, the downturn component, the LGD excluding collateral, the cost of recycling the collateral, as well as the original purchase price (PwC, 2017). The downturn component creates the connection of the loss given default to the risk of a potential downturn of the economic cycle and may impact procyclicality of the parameter.

The different philosophies show that the amplitude of procyclicality depends on the weight of PIT rating methodologies. As Abad & Suarez (2018) previously investigated, the economic cycle and dependence on it through the PIT rating, may increase procyclicality, lowering financial stability.

3.2 Financial Reporting (FinRep)

Regulatory financial reporting poses a great challenge to banks and is a significant component in the ongoing compliance costs of the institutions. EBA (2021a) finds that supervisory reporting requirement cost makes up an average of 33,48% of the total compliance costs of the sample of institutions. This comes to an average annual ongoing cost of nearly 3 million Euros

and an average annual implementing cost of 1,3 million Euros per institution in the European economic area banking population (EBA 2021a). In line with the conclusions of Chabanel & Machray (2013), the main challenges leading to that cost are the high complexity, the scale of information required, internal data infrastructure as well as the dynamics of the reporting requirements (EBA, 2021a). Since the publication of the first templates in 2014, the EBA has published 13 new versions of the templates, in retrospect commonly applicable for half a year (EBA, 2021b). The high costs limit the profitability of the institution and its ability to further increase its retained earnings and hence, its financial stability³. The goal of the regulatory reporting framework is for the EBA, as well as the ECB, to receive more transparent and comparable information on the institutions, which allows for more off-site supervisory and risk assessment. This allows the EBA to allocate regulatory resources more effectively. The result should be a more resilient banking system. For the analysis of this paper, both (positive and negative) gross effects are summarized through a dummy variable, controlling for the main components of the underlying capital requirements regulation (CRR) in the model. To fully grasp the scope of the financial reporting requirement, it is important to understand the applicability across Europe.

According to Art. 99 of the CRR all credit institutions that report their annual statements in accordance with IFRS must report financial information to the European Banking Authority. The reporting requirement became mandatory in September 2014. The European Commission adopted the Directive 680/2014 to set the technical standards of reporting. With several updates regarding the scope and technical requirements (e.g., update through IFRS 9) the reporting tables became mandatory for stand-alone institutions that are classified as Systemically Significant Institutions (SSI's) by the EBA in December 2015 [Directive 2015/227/EU]. Since June 2017 the also Less Significant Institutions (LSI's) must report in accordance with their required scope and local accounting standards [Directive 2015/534/ECB & 2017/1538/ECB]. FinRep templates are regarded as highly dynamic. The reporting scope, and with that the associated costs, depend on the systemic significance, asset size, accounting standards and potential waivers. Smaller, less significant institutions with national GAAPs are required to report less data points than larger, significant ones that report their annual statements in accordance with IFRS.

³ Following the definition of financial stability by the Worldbank

3.3 Impact of COVID-19

The COVID-19 pandemic has caused major challenges to the accounting of financial instruments and the recognition of loan loss provisions through the expected credit loss model. For the annual report of 2020, COVID-19 had not delivered sufficient historical data to account for in the ECL-model. The expected credit loss is then adjusted through a Post-Model-Adjustment, or an Overlay-Adjustment, to account for the extreme economic conditions (PwC, 2020).

For the post-model-adjustment the institution must include reasonable and supportable information, which in the case of COVID-19 required estimations on the impact of the Pandemic and the subsequent recovery of the economies. The IASB has stated that there will be no adjustments to IFRS 9 in general, with regards to the COVID-19 pandemic. The European Banking Authority stressed institutions to rely more on the Through-The-Cycle perspectives to smoothen the procyclicality in the loan loss provisioning. Institutions should further review the qualitative and quantitative transfer criteria of Stage 1 and Stage 2 provisions and adjust them to a longer perspective with an increasing importance on qualitative factors.

The Pandemic had also an impact on the FinRep reporting requirements. The European Banking Authority published four additional tables to the FinRep reporting framework on June 2nd with which the institutions were required to report on forbearance measures related to COVID-19 as well as prudential information on interest, fee income and loan exposure from public guaranteed schemes (EBA, 2021b).

4. Methodology

4.1 Hypothesis

The positive and negative effects of the introduction of the expected credit loss model, as well as the introduction of FinRep are extensively discussed in the previous section. As laid out in the literature review, the gross effects of the ECL have been analysed by current researchers, whereas the net effect on financial stability remains an unsolved question. Furthermore, the net effect of regulatory financial reporting on financial stability is yet to be assessed. The main question this paper attempts to answer is whether the implementation of the expected credit loss model and FinRep has increased the financial stability of banks in Europe. The time frame of basic analysis for this paper includes three major crises, namely the financial crisis of 2008, the sovereign debt crisis from 2010 to 2014, and the COVID-19 pandemic in 2020. In the sections above it has been discussed that especially the ECL-model should lead to a different impact of a crisis on the institution in terms of volume of impairment and procyclicality. To further

analyse this effect, shorter overall timeframes will be considered, essentially increasing the portion in which the institutions were exposed to exogenous shocks. Additionally, all crises impacted the regional banking systems in Europe differently, with western and southern countries in Europe being more affected⁴ than Scandinavian countries. This leads us to the Hypotheses:

H1: The introduction of the expected credit loss model and FinRep increased the Z-score of banks in Europe.

H2: The significance of IFRS 9 ECL and FinRep on the Z-score increases when focusing on crisis periods.

H3: The change in the Z-score that is correlated with the introduction of IFRS 9 ECL and FinRep varies among regions in Europe.

A panel regression is defined, to evaluate the impact of the expected credit loss model and FinRep on a bank. i respectively indicates the variable for an individual bank at time t , with a period from Q1 2000 to Q4 2020.

$$z_{i,t} = \delta_1 ECL_{i,t} + \delta_2 FIN_{i,t} + \beta_1 CET1_{i,t} + \beta_2 LR_{i,t} + \beta_3 ROID_{i,t} + \beta_4 SR_{i,t} + \gamma_1 IR_{i,t} + \gamma_2 CPI_{i,t} + \gamma_3 UNEMP_{i,t} + \gamma_4 GDP_{i,t} + \alpha_i + \epsilon_{i,t}$$

The δ variables are dummy variables to account for the introduction of the IFRS 9 ECL-model, as well as FinRep. I denote with β the variables that are considered interbank variables that have large explanatory value for the development of the stability of a bank and γ Variables are macroeconomic variables to control for macroeconomic cycles.

4.1.1 Dependent Variable

I follow the definition of the World Bank (2021) for the stability of a bank, by using the defined z-score and comparing capitalization buffers with the risk of the institution. The capitalization buffers are the indicators Return-on-Assets as well as the Capital-Asset-Ratio. Risk is measured as the standard deviation of the Return-on-Assets. The recommended rolling window for the calculation of the standard deviation is 3-4 years (Li et al, 2017). The regression above, uses a rolling window of 3 years from Q1 2000 to Q4 2002. The Z-score is floored at 0, as negative values for the Z-score cannot exist.

$$z_{i,t} = \frac{ROA_{i,t} + CAR_{i,t}}{\sigma ROA_{i,t}}$$

⁴ In terms of GDP growth

4.1.2 Independent Variables

The applicability of IFRS 9 ECL and/or FinRep on a credit institution is simulated through a time-varying dummy variable. If the requirements are applicable, the institution is simulated through a 1 in the panel-regression, if the requirements are not applicable, the variable equals 0.

The β variables measure the impact of the institution's financial stability control variables. FinRep requirements are included in the Capital Requirements Regulation, with some other obligations that institutions needed to follow due to the new Directives. The requirements to present an increased CET1 Ratio, as well as a leverage ratio, are considered to have significant explanatory value for the stability and health of a bank. By including both, the effects of introduction of the CRR requirements the model increases endogeneity. Other effects that may be included through the applicability of FinRep through the CRR are linked to changes in the capital structure, which are then simulated through the variables CET1 and leverage ratio.

The CET1 Ratio is calculated as the portion of the Tier 1 capital to its Risk-Weighted Assets. To account for the developments of the CET1 Ratio that are due to increasing regulatory requirements, the variable in the Model is calculated as the difference of the actual bank CET1 ratio and the minimum regulatory requirement.

$$CET1_{i,t} = \frac{Tier\ 1_{i,t}}{RWA_{i,t}} - \frac{Tier\ 1_{min,t}}{RWA_{min,t}}$$

The leverage ratio is not calculated as the common figure of leverage D/E, but in accordance with the Basel III definition of Tier 1 equity divided by the total assets of the bank.

$$LR_{i,t} = \frac{Tier\ 1_{i,t}}{Total\ Assets}$$

I follow the approach of Kund & Rugilo (2018) to include income diversification as a bank-specific control variable. The variable is measured as a range between zero and one, with one presenting highest level of diversification towards non-interest income. It gives an indication on the diversification of interest and non-interest income in relation to the total operating income. Non-interest income includes fee income as well as fair value gains and losses. With increasing diversification, the risk of an institution increases, as the income is diversified into riskier business segments. Including the diversification of the income stream will give a clear indication on whether the change in financial stability is correlated with the increase or decrease of riskier business activities.

$$ROID_{i,t} = 1 - \frac{II_{i,t} - NII_{i,t}}{OPI_{i,t}}$$

The financial crisis of 2008 illustrated the problem of government bailouts of stressed financial institutions with the objective to prevent a systemic meltdown (Haan, 2010). The scenario that an institution would be “too-big-to-fail”. Once an institution is considered too-big-to-fail, the financial stability itself plays a secondary role, as there is limited risk of an actual default. As the model of this paper investigates impacts on financial stability, naturally only firms that survived the beforementioned crises can be included. This leads to a level of survivorship bias and a higher skewness of the variable. To give an indication on the potential impact on the designation of too-big-to-fail, the model includes this scenario through a time-varying dummy variable, in dependence on the designation of the ECB as a Systemically Significant Institution.

The third section of the model accounts for macroeconomic cycles through four common indicators: Interest rate levels, inflation, the unemployment rate as well as the gross domestic product.

The main interest rate levels are indicated by the ECB through the main financing rate of the ECB.

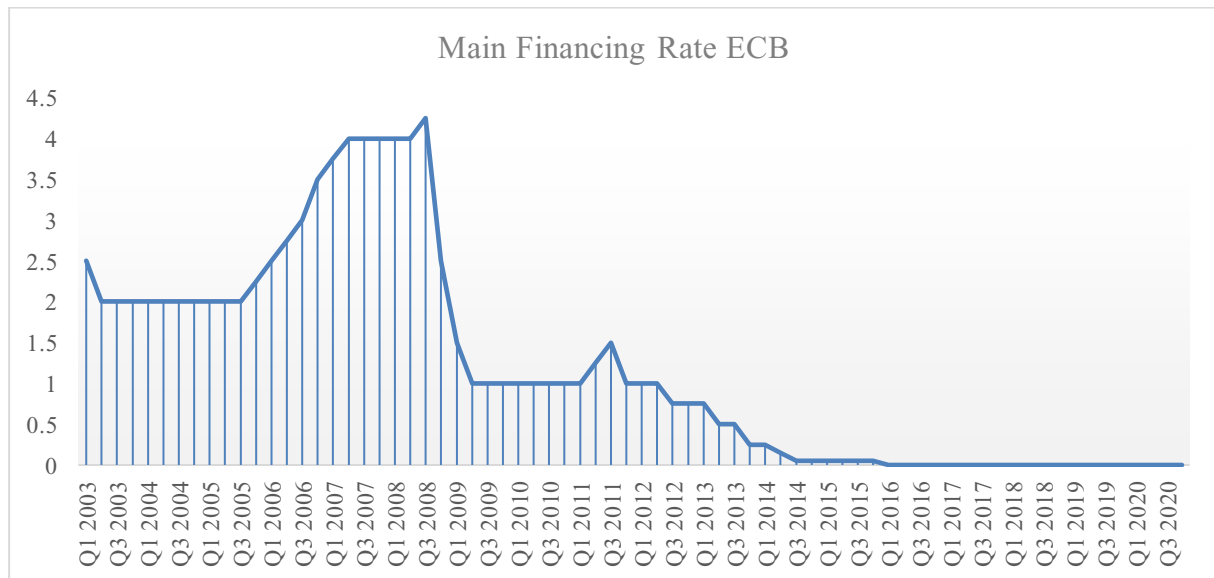


Figure 3: Main Financing Rate ECB (Source: Datastream)

For the considered period of the model the main financing rate has only increased from Q4 2005 to Q3 2008 and shortly between Q1 2011 to Q3 2011. Since Q1 2016 banks have been in an extreme low interest environment, lowering margins on interest income. Restructurings, income diversification into other segments, as well as strict operating cost controlling have

become necessary. The rate for the respective point in time is used for all institutions, as they all operate in the interest rate environment of the ECB.

Following the approach of Kund & Rugilo (2018) The other macroeconomic control variables are the inflation rate, indicated through the Consumer Price Index, unemployment rates, as well as the Gross Domestic Product. The variables consider the value for each respective country of the bank's headquarters.

4.1.3 Testing the Hypothesis

Hypothesis H1 is tested through the basic time sample, using data points from Q1 2003 to Q4 2020. The second Hypothesis H2 is tested through varying the starting point of the sample and comparing the time-series of Q1 2005 to Q4 2020 and Q1 2008 to Q4 2020 to the basic time sample of H1. With the compression of the before crisis period, the results of H2 will give an indication on how the before crisis period influences the variables included in the model. The third Hypothesis H3 is tested through country clustering in accordance with the region of the Headquarters. Three regional clusters are built: Scandinavian, Central and Western European, as well as Southern European. As mentioned in the previous sections, the clustering is based on the regional headquarters, as the several crises in the timeframe have impacted the national markets differently, leading to a higher or lower exposure to the exogenous shocks, depending on the region and national market the bank is operating in. The differences in the impact can be identified in the model through the macroeconomic coefficients.

4.2 Data

4.2.1 An Overview

The data sample covers credit institutions with headquarters that are within the scope of the Single Supervisory Mechanism of the ECB. All bank-specific data was retrieved from Thomson Reuters Refinitiv Datastream and calculated in accordance with the regulatory and accounting requirements. Macroeconomic Data (GDP, inflation, and unemployment rates) was retrieved from the World Bank Database. Data was retrieved from Q1 2000 to Q4 2020 on a quarterly basis. The first Data Point for the model is Q1 2003 through the rolling period of three years for the calculation of the standard deviation of the Z-score. Data was retrieved for 52 Banks, leading to a total of 41,184 data points in the regression. It must be noted that the requirement of a full data set in the respective timeline of a bank leads to a survivorship bias, as merged or defaulted institutions would not allow for a full inclusion into the regression. To counteract on

this bias, special focus was laid on the inclusion of Less Significant Institution as categorized by the ECB, as these would not be considered “too-big-to-fail”. The sample shows 21 SSI’s and 31 LSI’s as of 2020, with only little variance throughout the time sample.

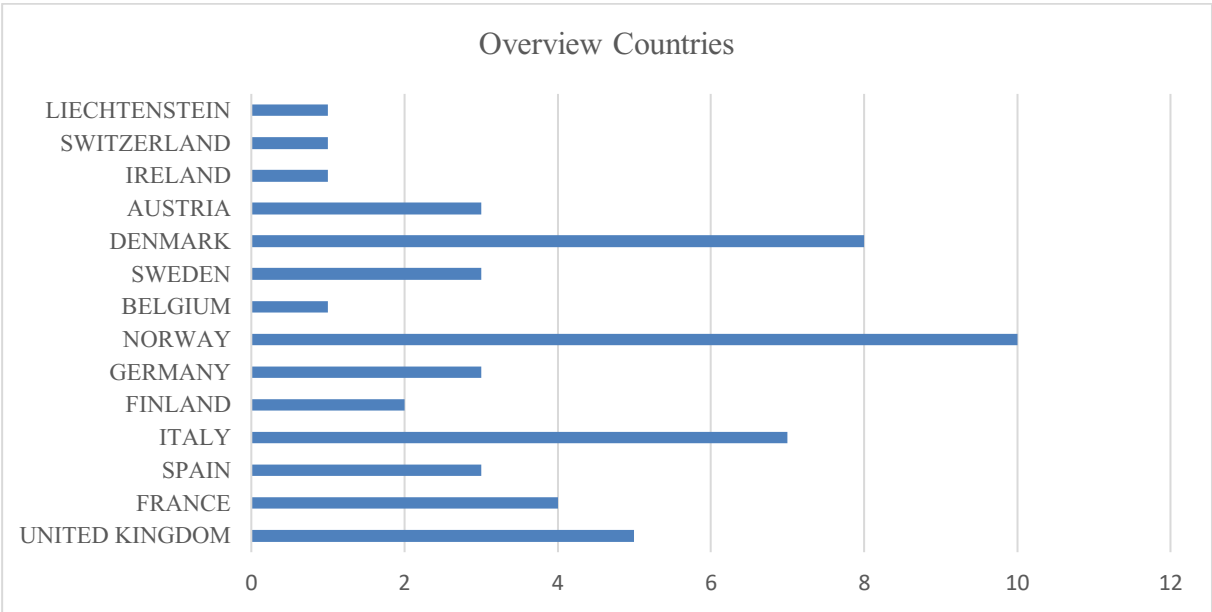


Figure 4: Overview of Country Distribution in the Sample

Figure 4 shows the distribution of banks, according to their respective countries. Most of the institutions are in the Scandinavian region (23), closely followed by the Central and Western region (19). The least banks are in the Southern European Region (10).

According to the definition of the World Bank (2021) for financial stability, a firm would be most stable if it is highly profitable, operates with high equity and has low volatility of the Return on Assets. Throughout the time sample, the overall risk profile has changed.

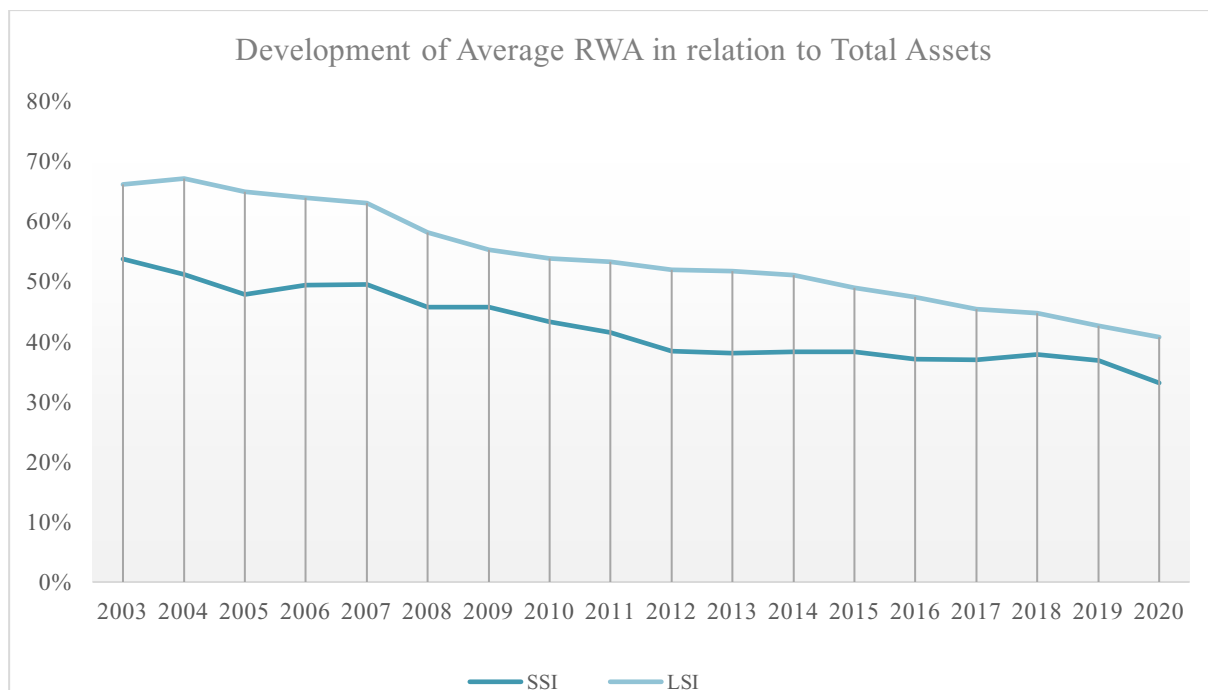


Figure 5: Development of Average RWA in relation to Total Assets (Source: Datastream)

The trend in the time-sample indicates that both, LSI and SSI, institutions have lowered their risk profile, with decreasing regulatory risk weighted assets in relation to their accounting based total assets.

Table I in section 4.2.2 gives a first indication on how the variables of the time-varying panel-regressions have changed throughout the samples. It can be highlighted that the Z-score contains an institution that per definition of the Z-score would have defaulted, as it presents a floored value of 0. The institutions that present this value are the AIB Group (Ireland) throughout all quarters of 2010 and Banca Profilo (Italian) throughout all quarters of 2008. Looking at the development of the Z-score of the respective banks, the financial instability is caused by the financial crisis of 2008-2010. Moreover, an increase in the average surplus of the CET1 ratio and the leverage ratio can be observed, indicating that institutions have increased their capitalization and/or decreased their risk profile throughout time.

Table II in section 4.2.3 shows that the credit institutions from Scandinavia are better capitalized with higher CET1 and leverage ratios and generate proportionally more income through its credit business with the lower income diversification ROID. The statistics for Scandinavia can be derived from multiple factors. Primarily, the sample of Scandinavian banks, especially Norway, contains mainly local credit institutions that serve as a savings bank to the local population and businesses. The banks included in the other regional clusters contain a higher portion of universal banks, leading to an overall riskier business and ROID. Furthermore, the macroeconomic conditions are favourable in Scandinavia, as the countries included in the

cluster were not as impacted by the series of crises from 2008-2020, particularly as countries in southern Europe. It can be expected that these bank specific and macroeconomic conditions will lead to differences in the drivers of financial stability.

4.2.2 Descriptive Statistics Time Samples

Table I: Summary Statistics Time Samples

Table I shows the summary statistics of the three time samples used to test Hypothesis $H1$ and $H2$ with their respective timeframes. The following statistics are used to describe the independent and dependent variables: number of observations, mean, minimum values, maximum values, standard deviation, excess kurtosis, skewness, and the 25th, 50th and 75th percentiles.

Variables	Z-Score	IFRS ECL	FinRep	CET1	ROID	LR	Lead IR	GDP	SI	CPI	UE
<i>H1: Time Sample Q1 2003 - Q4 2020</i>											
Observations in Sample:		3744									
Mean	88,72	0,16	0,36	8,64	0,61	6,20	1,24	1,06	0,40	1,58	6,91
Min	0,00	0,00	0,00	0,29	0,00	1,41	0,00	-10,84	0,00	-4,48	0,00
Max	1.366,39	1,00	1,00	30,97	1,00	17,40	4,25	25,18	1,00	4,90	26,09
Std.	108,71	0,37	0,48	4,37	0,26	2,76	1,30	2,69	0,49	1,06	3,66
Kurtosis	26,65	1,43	-1,65	1,57	-1,04	1,95	-0,39	10,53	-1,85	0,55	6,90
Skewness	4,09	1,85	0,59	1,03	0,01	1,21	0,85	-0,83	0,39	-0,08	2,12
P25	29,20	0,00	0,00	5,37	0,41	4,25	0,00	0,53	0,00	0,76	4,38
P50	54,96	0,00	0,00	7,67	0,58	5,64	1,00	1,43	0,00	1,58	6,08
P75	110,66	0,00	1,00	11,42	0,83	7,60	2,00	2,45	1,00	2,29	8,36
<i>H2: Time Sample Q1 2005 - Q4 2020</i>											
Observations in Sample:		3317									
Mean	86,59	0,18	0,40	8,90	0,62	6,22	1,12	0,94	0,40	1,56	6,95
Min	0,00	0,00	0,00	0,29	0,00	1,41	0,00	-10,84	0,00	-4,48	0,00
Max	1.366,39	1,00	1,00	23,20	1,00	17,08	4,25	25,18	1,00	4,90	26,09
Std.	104,55	0,38	0,49	4,22	0,26	2,69	1,33	2,79	0,49	1,09	3,79
Kurtosis	26,30	0,77	-1,84	0,30	-1,05	1,66	-0,05	10,07	-1,85	0,53	6,55
Skewness	4,03	1,66	0,40	0,70	-0,04	1,09	1,09	-0,76	0,39	-0,05	2,11
P25	28,50	0,00	0,00	5,86	0,41	4,29	0,00	0,48	0,00	0,73	4,38
P50	54,53	0,00	0,00	8,19	0,59	5,67	0,75	1,42	0,00	1,54	6,20
P75	109,00	0,00	1,00	11,69	0,84	7,70	2,00	2,40	1,00	2,29	8,36
<i>H2: Time Sample Q1 2008 - Q4 2020</i>											
Observations in Sample:		2682									
Mean	86,79	0,22	0,50	9,73	0,62	6,42	0,73	0,53	0,40	1,49	7,21
Min	0,00	0,00	0,00	0,29	0,00	1,42	0,00	-10,84	0,00	-4,48	0,00
Max	1.366,39	1,00	1,00	23,20	1,00	17,08	4,25	25,18	1,00	4,49	26,09
Std.	103,08	0,42	0,50	3,97	0,27	2,68	1,11	2,90	0,49	1,15	4,04
Kurtosis	28,89	-0,21	-2,00	0,52	-1,04	1,66	3,57	10,19	-1,85	0,24	5,54
Skewness	4,08	1,34	0,02	0,67	-0,12	1,08	2,06	-0,51	0,39	0,04	2,00
P25	26,62	0,00	0,00	6,84	0,42	4,48	0,00	0,10	0,00	0,56	4,42
P50	55,62	0,00	0,00	9,06	0,61	5,89	0,20	1,12	0,00	1,34	6,41
P75	113,44	0,00	1,00	12,16	0,85	7,95	1,00	1,99	1,00	2,29	8,38

4.2.3 Descriptive Statistics of Country Clusters

Table II: Summary Statistics Country Clusters

Table II shows the summary statistics of the three country clusters used to test Hypothesis H3 with the data set from Q1 2003 to Q4 2020. The following statistics are used to describe the independent and dependent variables: number of observations, mean, minimum values, maximum values, standard deviation, excess kurtosis, skewness, and the 25th, 50th and 75th percentiles.

Variables	Z-Score	IFRS ECL	FinRep	CET1	ROID	LR	Lead IR	GDP	SI	CPI	UE
H3: Cluster 1: Scandinavian											
Observations in Sample:	1656										
Mean	107,99	0,15	0,36	9,73	0,48	7,39	1,24	1,38	0,12	1,63	5,28
Min	0,00	0,00	0,00	1,38	0,00	2,49	0,00	-8,07	0,00	-0,49	2,49
Max	1.292,93	1,00	1,00	26,70	1,00	17,40	4,25	5,95	1,00	4,07	10,47
Std.	108,54	0,36	0,48	4,31	0,23	3,12	1,30	2,01	0,33	0,99	1,85
Kurtosis	15,78	1,76	-1,63	0,28	-0,43	0,55	-0,39	3,18	3,43	-0,57	-0,82
Skewness	3,03	1,94	0,61	0,44	0,55	0,93	0,85	-1,31	2,33	0,23	0,48
P25	39,59	0,00	0,00	6,21	0,31	4,87	0,00	0,70	0,00	0,76	3,69
P50	77,92	0,00	0,00	9,99	0,45	6,86	1,00	1,62	0,00	1,69	4,83
P75	131,43	0,00	1,00	12,58	0,62	9,20	2,00	2,67	0,00	2,31	6,85
H3: Central & Western European											
Observations in Sample:	1368										
Mean	75,65	0,17	0,36	8,32	0,73	4,93	1,24	1,23	0,58	1,52	6,45
Min	0,00	0,00	0,00	0,29	0,00	1,41	0,00	-9,79	0,00	-4,48	0,00
Max	1.366,39	1,00	1,00	30,97	1,00	16,21	4,25	25,18	1,00	4,90	15,45
Std.	109,39	0,37	0,48	4,21	0,25	2,15	1,30	3,03	0,49	1,06	2,39
Kurtosis	45,07	1,21	-1,67	4,04	-0,89	2,61	-0,39	13,74	-1,90	2,73	0,81
Skewness	5,58	1,79	0,58	1,48	-0,49	1,17	0,85	0,06	-0,32	-0,42	0,56
P25	21,96	0,00	0,00	5,24	0,53	3,37	0,00	0,74	0,00	0,89	4,78
P50	42,44	0,00	0,00	7,53	0,77	4,60	1,00	1,72	1,00	1,54	5,62
P75	88,35	0,00	1,00	10,40	1,00	6,05	2,00	2,45	1,00	2,14	8,31
H3: Southern European											
Observations in Sample:	720										
Mean	69,21	0,17	0,36	6,73	0,68	5,90	1,24	-0,03	0,72	1,56	11,51
Min	0,00	0,00	0,00	1,13	0,00	1,85	0,00	-10,84	0,00	-0,50	6,08
Max	936,54	1,00	1,00	23,13	1,00	10,83	4,25	4,10	1,00	4,08	26,09
Std.	100,46	0,37	0,48	4,03	0,20	1,42	1,30	3,09	0,45	1,22	4,83
Kurtosis	24,71	1,22	-1,65	5,32	0,31	0,13	-0,39	2,84	-1,01	-1,12	1,47
Skewness	4,47	1,79	0,60	2,24	-0,33	0,36	0,85	-1,67	-0,99	0,01	1,47
P25	20,18	0,00	0,00	4,35	0,54	4,86	0,00	-0,96	0,00	0,61	8,33
P50	41,22	0,00	0,00	5,94	0,67	5,72	1,00	0,82	1,00	1,53	10,61
P75	77,60	0,00	1,00	7,43	0,83	6,81	2,00	1,67	1,00	2,67	12,15

5. Results

5.1 Regression Results

5.1.1 Panel-Regression

H1: The introduction of the expected credit loss model and FinRep increased the Z-score of banks in Europe.

H2: The significance of IFRS 9 ECL and FinRep on the Z-score increases when focusing on crisis periods.

Table III: Panel Regression Results			
Time Samples vary from the starting point of the data set and all end at Q4 2020. The dependent variable is the calculated Z-score on bank level. The t-statistic is presented in parenthesis. The statistical significance of each coefficient is displayed through the stars *, **, *** at a 10%, 5% and 1% level respectively.			
<i>Dependent Variable (Z-Score)</i>	Q1 2003	Q1 2005	Q1 2008
Constant	119,92*** (11,07)	122,42*** (10,84)	106,55*** (8,82)
IFRS ECL	42,08*** (6,93)	42,18*** (7,30)	35,75*** (6,30)
FinRep	22,04*** (3,86)	23,79*** (4,33)	26,61*** (4,89)
CET1	0,85* (1,65)	1,32** (2,51)	2,55*** (4,60)
Income Diversification	-69,28*** (-9,35)	-76,79*** (-10,29)	-84,03*** (-10,37)
Leverage Ratio	-1,65** (-2,10)	-1,87** (-2,36)	-2,57*** (-3,1)
ECB Base Rate	-4,68** (-2,23)	-6,29** (-3,06)	-15,81*** (-6,17)
GDP	4,57*** (6,79)	4,73*** (7,22)	2,83*** (4,05)
SI	-30,43*** (-7,09)	-27,65*** (-6,43)	-25,38*** (-5,53)
CPI	6,28*** (3,41)	4,55** (2,47)	10,45*** (5,2)
Unemployment	0,42 (0,75)	0,14 (0,25)	1,14** (2,12)
<i>Adj. R-Squared</i>	0,0964	0,1238	0,1585

Table III indicates that the expected credit loss model of IFRS 9 and the inclusion of FinRep has a significant, positive impact on the stability of the banks in Europe throughout all time-varying samples leading to the acceptance of the first Hypothesis *H1*.

Further the levels of statistical significance for both variables remain constant throughout the time sample at a 1% level. It can be concluded that the impact of the ECL-Model decreases marginally throughout the samples whereas the significance of FinRep increases. As this presents a form of variation, the second Hypothesis $H2$ is also not accepted.

Controlling for bank-specific and macroeconomic factors shows similar levels of significance, in dependence on the timeframe that is considered in the sample. In the first sample of Q1 2003, not all bank specific and macroeconomic control variables show the same level of significance as in the later samples. Especially the CET1 ratio as well as the ECB Base Rate show lower levels of significance. This indicates that the CET1 ratio has gained significance as a capital buffer with a higher density of crises periods in the timeframe. Income Diversification has a negative impact on the stability of banks throughout all time samples. It must be noted, as mentioned in the sections above, the income of the institution is diversified away from credit business, towards fee income and gains from fair value valuations. These business sections are considered to carry more risk and therefore have a negative impact on the stability of the institution. In contrast to the CET1 Ratio, the leverage ratio presents a negative impact on the Z-score. Both figures indicate the capitalization of an institution, with the difference that the leverage ratio does not take the riskiness of the assets into consideration. The results show that it is not stabilizing to the institution to increase its Tier 1 capital when disregarding risk profile of the business activities. The ECB main financing rate has a negative effect throughout all samples. As shown in the previous sections, the main financing rate as mostly decreased since the financial crisis of 2008. The results show that the impact of the low interest rate environment increases with the exclusion of prior timeframes which included higher interest rates. Other macroeconomic factors GDP, CPI, SI, and unemployment levels have a significant impact on the stability of banks throughout most time samples.

5.1.2 Country Cluster Panel-Regression

H3: The change in the Z-score that is correlated with the introduction of IFRS 9 ECL and FinRep varies among regions in Europe.

Table IV: Country Cluster Panel Regression Results

Country Clusters include data points from Q1 2003 to Q4 2020 with varying regional clustering. The dependent variable is the calculated Z-score on bank level. The t-statistic is presented in parenthesis. The statistical significance of each coefficient is displayed through the stars *, **, *** at a 10%, 5% and 1% level respectively.

<i>Dependent Variable (Z-Score)</i>	Southern European	Central European	Scandinavian
Constant	45,55 (1,39)	113,50*** (4,82)	136,38*** (8,27)
IFRS ECL	20,06 (1,46)	55,97*** (5,37)	39,05*** (4,48)
FinRep	40,64*** (2,95)	-16,79* (-1,69)	39,70*** (4,64)
CET1	-2,30* (-1,87)	-6,64*** (-6,50)	5,16*** (6,29)
Income Diversification	1,55 (0,07)	6,93 (0,49)	-109,87*** (-8,15)
Leverage Ratio	-0,59 (-0,17)	7,90*** (3,97)	-3,90*** (-3,93)
ECB Base Rate	-4,02 (-0,76)	-10,86*** (-3,09)	1,91 (0,62)
GDP	4,23*** (3,02)	2,04* (1,95)	6,46*** (5,02)
SI	-53,09*** (-5,38)	-18,25*** (-2,76)	-10,85 (-1,24)
CPI	19,91*** (4,25)	-0,35 (-0,11)	0,65 (0,23)
Unemployment	3,14*** (3,20)	-1,21 (-0,82)	-5,29*** (-2,98)
<i>Adj. R-Squared</i>	0,0876	0,0676	0,1587

Table IV presents differences regarding the impact of the ECL-model and FinRep on the stability of banks in Europe when clustering into three different regions. With different levels of statistical significance and fluctuating coefficients, the third Hypothesis *H3* is accepted.

The division of banks into their respective region shows interesting results. The model can best explain the variation of the stability of banks for the Scandinavian region and worst for the Southern Region. While the ECL-model shows high levels of statistical significance in the Central European and the Scandinavian region, it has no impact on the Southern region. FinRep

shows statistical significance across all regional clusters. Interestingly, it has a negative impact on the Central European region.

Considering the bank control variables there is a contrast notable in the consideration of the Scandinavian regions and the rest of Europe. Only the CET1 Ratio shows of significance at a 10% level for banks in the Southern European region. While the CET1 Ratio has a negative impact on the variation of the stability of the banks in Central and Southern Europe, it has a positive impact in Scandinavia. Income diversification is only significant in Scandinavia, with similar results as in the time-varying samples. For the time-varying clusters, as well as for the Scandinavian cluster, not considering the riskiness of the assets has a negative impact on the stability of banks, as the leverage ratio is negative. For banks in the Central European region the opposite conclusion can be drawn, as the CET1 Ratio is positive, and the leverage ratio is positive.

The macroeconomic control variables show a mixed result. While the main financing rate of the ECB only showed a level of significance in the Central European region, the economic development of the regions is significant to across all clusters. The SSI designation has a negative impact on the stability of all regions, although only statistically significant in Central and Southern Europe. The inflation and unemployment rate have a positive, statically significant impact on the Southern European region. Across all clusters, increasing unemployment rates only have a negative impact on the stability of banks in the Scandinavian region.

5.2 Discussion

There are many factors that need to be considered when analysing the significance and the coefficients of the variables for the ECL-model and FinRep in the model.

Primarily, this paper focuses on the effect of the ECL-model of IFRS 9 on the stability of the banks in Europe. The new model for loan loss provisioning is only one out of three major components in the implemented Standard of IFRS 9, as the new classification & measurement and hedge accounting methods pose significant changes in the accounting of financial instruments. While the phase in of the IFRS 9 of hedge accounting is more delayed and banks still make use of the exception included in IFRS 9.7.2.21 of maintaining the hedge accounting policy of IAS 39, the effect of the new policy cannot be isolated in the model. Similarly, the effect of the implementation of the new methodology of classification & measurement cannot be isolated from the ECL-model, although it has a dominant role in determining the eligibility of accounting for a loan loss provision, as the ECL-model is only applicable for instruments

that are measured at amortized cost of fair value through other comprehensive income [IFRS 9.5.5.1]. Accounting Standards that have been implemented in a similar timeframe, namely IFRS 15 and IFRS 16 are considered less impactful for the financial services industry, especially for credit institutions.

As elaborated in earlier sections of this paper, the underlying directive of FinRep is a guide to the implementation of financial reporting requirements of the capital requirements regulation. As the implementation and applicability of FinRep is quantified in the model through time-varying dummy variables, the effects that may be caused through the implementation of the CRR cannot be fully isolated. The model does attempt to isolate the effects to a certain degree, as CET1 and the leverage ratio are included as bank control variables. Effects from other reporting obligations such as COREP with the focus on the reporting of solvency ratios, cannot be isolated.

The main research question of the paper is to analyze if the introduction of the IFRS 9 ECL-model and FinRep increase the stability of banks in Europe. The results of the Regression show that there is a positive, significant impact of IFRS 9 ECL on the variation of the stability, except for banks in the Southern European region. Researchers that are illustrated in the literature review discussed the trade-off of reducing the cliff-effect at cost of front loading (Kund & Rugilo, 2018). This paper gives an indication that the reduction of the cliff effect and the anticipation of loan losses has a stabilizing effect on credit institutions.

The results of the effect of IFRS 9 ECL on institutions in the Southern European region and the effect of FinRep institutions in the Central European region are puzzling. One possible explanation for the contrary influence of the IFRS 9 ECL variable could be the impact of the COVID-19 Pandemic on the respective countries, that is not measured through the GDP or unemployment levels. Influencing factors determining the impact of the crisis such as local government financial aid, demographics and the health care system are not included in the model. As the IFRS 9 ECL dummy variable is applicable starting 2018, 33% of the data points with IFRS applicability are influenced by the COVID-19 Pandemic. In 2020, countries in the Southern Region were impacted most by the Pandemic, and countries in the Scandinavian region were impacted least (European Committee of the Region, 2020).

The results with respect to the income diversification are in line with the expectations of the impact of diversifying into riskier business areas. A study of Busch et al. (2021) on the behaviour of banks in low interest rate environments shows that the longer the low interest rate environment endures, the more impactful the effect is on the net interest income (Busch et al.,

2021). This is in line with the results shown in the time varying cluster, where the negative impact of the main financing rate of the ECB increases as the overall time frame decreases. The last time cluster includes the highest portion in which banks are exposed to the low interest environment. With the longer endurance of the low interest rate levels, the institutions diversify their operational income more into fee and commission income, business segments that carry more risk (Busch et al., 2021).

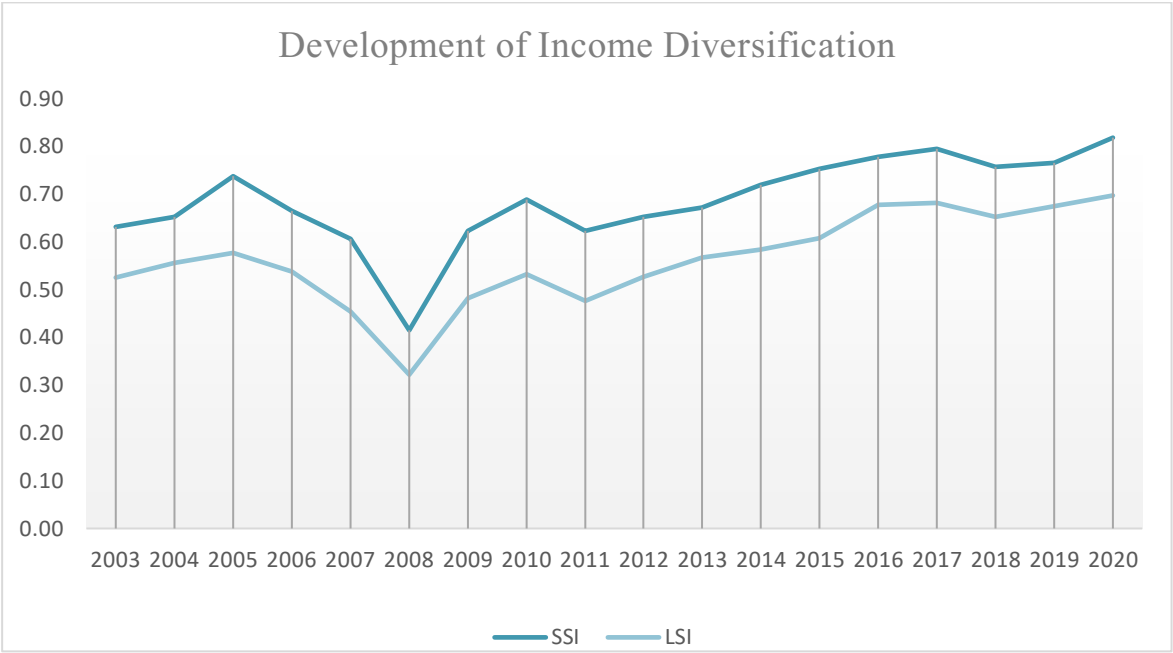


Figure 6: Development of Income Diversification 2003-2020 (Source: Datastream)

Figure 6 indicates the increase in operational income diversification, away from interest income, throughout time. A negative correlation between the main financing rate of the ECB and the ROID of the credit institutions can be inferred from this figure. SSI classified institutions have continuously generated a higher portion of their operational income from other sources than LSI institutions. The significance and impact of income diversification is similar for the Scandinavian region as seen in the time varying clusters. The CET1 ratio is the only bank control variable that shows a level of significance on the variation of bank stability in the Southern European region. Countries included in the cluster for the Southern region are Spain and Italy. More interestingly, the CET1 ratio has a negative impact on the Central European cluster, which includes e.g., Ireland. The overall divers' picture of impact of the bank control variables may indicate that the economic impact of the several crises played a more significant role in the development of bank stability. As seen in the descriptive statistics of the Z-score, there have been minimum values of 0,00, indicating the default of institutions included in the clusters. Italy, Spain, and Ireland showed some of the largest increases of 10-year government bond yields during the eurozone crisis from 2010-2012 (Wijffelaars & Loman, 2015).

Furthermore, as mentioned in the previous sections, the Southern Region was impacted most by the COVID-19 Pandemic in 2020. With the several crises in the time-samples, the regional economic developments have put pressure on the development of bank stability, indicated by the significance of macroeconomic variables of the Southern region. It is possible, that the most explanatory impacts are not captured through the model.

The positive impact of unemployment levels on most of the clusters remains puzzling.

5.3 Limitations and Future Research

There are three main limitations to this paper that could lead to potential modification for future research: Time-varying dummy variables, economic crises, and “too-big-to-fail”.

As mentioned in the previous section the use of dummy variables limits clear interpretation of the results and makes isolation of effects in similar time-frames difficult. A current problem in avoiding the use of dummy variables is the limitation of data points from loan loss provisions in accordance with IFRS 9. As the use of the standard is mandatory since 2018, only three fiscal years could be analysed with complete data sets, with banks being exposed to an adverse scenario that was brought through the COVID-19 pandemic.

The several economic crises throughout the 21st century have impacted the economies and the financial markets. Future researchers could follow the approach of Mileris (2015) and include an independent control variable for the percentage of non-performing loans of institutions to further isolate the effect of economic downturns on loan portfolio.

The last main limitation of this paper is the modelling of the scenario “too-big-to-fail”. The bailout of the financial institutions around Europe during the financial crisis (e.g., Commerzbank in Germany) and the Eurocrisis (e.g., Monte de Paschi die Siena SpA in Italy) raises questions of the real probability of default of larger credit institutions. New regulatory directives, such as the CRR with FinRep inclusion, help identify systemic risks in the financial system. Future researchers could grasp the new directives and conduct further analysis on the impact the new regulations have on the systemic risk, through the inclusion of e.g., volumes of local governmental safety nets.

6. Conclusion

This paper gives a comprehensive review of the qualitative requirements of the IFRS 9 expected credit loss model and Financial Reporting. Current research shows that the introduction of the ECL-model has impacted the credit institutions on several levels positively and/or negatively through the cliff-effect, front loading, and procyclicality.

Furthermore, this paper lays a statistical foundation for the analysis of impact of the beforementioned standard and directive on the stability of banks in Europe. For the analysis three hypotheses are defined. For the definition of financial stability, the Z-score as defined by the World Bank (2021) is used as the dependent variable of the model. Following the laid-out potential for future research of Kund & Rugilo (2018), all data points in this paper are historical, real-world data, retrieved from Thomson Reuters Data Stream. For the model bank and macroeconomic control variables are included to improve explanatory power of the model for the variation of financial stability.

With the sample of 52 Banks in Europe the timeframe of Q1 2003 – Q4 2020 was analysed, the analysis provides evidence that both, the IFRS 9 ECL and FinRep, have a statistically significant, positive impact on the variation financial stability of banks in Europe. The time varying cluster shows that the significance of IFRS 9 ECL and FinRep, and the impact of the bank and macroeconomic control variables, change throughout time. The regional clusters used to analyse the third hypothesis show that the impact and distribution of significance varies throughout the Regions in Europe. While the Scandinavian regions are on average better capitalized and display higher financial stability, the Central and Southern European regions show that macroeconomic factors have a more significant impact on the financial stability of banks.

The discussed limitations and perfects display a potential for future researchers to further conduct studies on the combination of accounting standards and regulatory reporting and their impact on financial stability, while using real-world data points. With the change of local accounting principles towards the expected credit loss model (i.e., ASC 326 [US GAAP] and the German BFA 7) more historical data points will become available for future researchers.

7. Appendix

Appendix A - List of all Banks

Bank	ISIN	Code	Country
AAREAL BANK	DE0005408116	D:ARL	GERMANY
AIB GROUP	IE00BF0L3536	IE:A5G	IRELAND
AKTIA BANK A	FI4000058870	M:AKTA	FINLAND
BANCA MONTE DEI PASCHI	IT0005218752	I:BMPS	ITALY
BANCA PROFILO	IT0001073045	I:PRO	ITALY
BANCO DE SABADELL	ES0113860A34	E:BSAB	SPAIN
BANCO SANTANDER	ES0113900J37	E:SAN	SPAIN
BANK FUR TIROL UND VBG.	AT0000625504	O:TYRO	AUSTRIA
BARCLAYS	GB0031348658	BARC	UNITED KINGDOM
BBV.ARGENTARIA	ES0113211835	E:BBVA	SPAIN
BKS BANK	AT0000624705	O:KAER	AUSTRIA
BNC.DI DESIO E BRZA.RSP	IT0001281374	I:BDBR	ITALY
BNC.DI DESIO E DELB.	IT0001041000	I:BDB	ITALY
BNP PARIBAS	FR0000131104	F:BNP	FRANCE
BPER BANCA	IT0000066123	I:BPE	ITALY
COMMERZBANK	DE000CBK1001	D:CBK	GERMANY
CREDIT AGRICOLE	FR0000045072	F:CRDA	FRANCE
DANSKE BANK	DK0010274414	DK:DAB	DENMARK
DEUTSCHE BANK	DE0005140008	D:DBK	GERMANY
DJURSLANDS BANK	DK0060136273	DK:DJU	DENMARK
DNB	NO0010031479	N:DNB	NORWAY
ERSTE GROUP BANK	AT0000652011	O:ERS	AUSTRIA
GROENLANDSBANKEN	DK0010230630	DK:GRO	DENMARK
HSBC HOLDINGS	GB0005405286	HSBA	UNITED KINGDOM
INTESA SANPAOLO	IT0000072618	I:ISP	ITALY
JYSKE BANK	DK0010307958	DK:JYS	DENMARK
KBC GROUP	BE0003565737	B:KB	BELGIUM
LAN & SPAR BANK	DK0010201532	DK:LAS	DENMARK
LLOYDS BANKING GROUP	GB0008706128	LLOY	UNITED KINGDOM
MELHUS SPAREBANK	NO0006001908	N:MELG	NORWAY
NATIXIS	FR0000120685	F:KN@F	FRANCE
NATWEST GROUP	GB00B7T77214	NWG	UNITED KINGDOM
NORDEA BANK	FI4000297767	W:NDAS	FINLAND
RINGKJOBING LANDBOBANK	DK0060854669	DK:RIL	DENMARK
SANDNES SPAREBANK	NO0006001007	N:SADG	NORWAY
SOCIETE GENERALE	FR0000130809	F:SGE	FRANCE
SPAREBANK 1 NORD-NORGE	NO0006000801	N:NONG	NORWAY
SPAREBANK 1 SMN ORDS	NO0006390301	N:MING	NORWAY
SPAREBANK 1 SR-BANK	NO0010631567	N:SRBA	NORWAY
SPAREBANKEN MORE	NO0006390004	N:MORG	NORWAY

SPAREBANKEN OST	NO0006222009	N:SPOG	NORWAY
SPAREBANKEN VEST	NO0006000900	N:SVEG	NORWAY
STANDARD CHARTERED	GB0004082847	STAN	UNITED KINGDOM
SVENSKA HANDELSBANKEN A	SE0007100599	W:SVK	SWEDEN
SVENSKA HANDELSBANKEN B	SE0007100607	W:SHBF	SWEDEN
SWEDBANK A	SE0000242455	W:SWED	SWEDEN
SYDBANK	DK0010311471	DK:SYD	DENMARK
TOTENS SPAREBANK	NO0006001205	N:TOTG	NORWAY
UNICREDIT	IT0005239360	I:UCG	ITALY
VESTJYSK BANK	DK0010304500	DK:VJK	DENMARK
VONTOBEL HOLDING	CH0012335540	S:VONN	SWITZERLAND
VP BANK	LI0315487269	S:VPBN	LIECHTENSTEIN

Appendix B - Regional Clusters

Scandinavian

Bank	ISIN	Code	Country
AKTIA BANK A	FI4000058870	M:AKTA	FINLAND
DANSKE BANK	DK0010274414	DK:DAB	DENMARK
DJURSLANDS BANK	DK0060136273	DK:DJU	DENMARK
DNB	NO0010031479	N:DNB	NORWAY
GROENLANDSBANKEN	DK0010230630	DK:GRO	DENMARK
JYSKE BANK	DK0010307958	DK:JYS	DENMARK
LAN & SPAR BANK	DK0010201532	DK:LAS	DENMARK
MELHUS SPAREBANK	NO0006001908	N:MELG	NORWAY
NORDEA BANK	FI4000297767	W:NDAS	FINLAND
RINGKJOBING LANDBOBANK	DK0060854669	DK:RIL	DENMARK
SANDNES SPAREBANK	NO0006001007	N:SADG	NORWAY
SPAREBANK 1 NORD-NORGE	NO0006000801	N:NONG	NORWAY
SPAREBANK 1 SMN ORDS	NO0006390301	N:MING	NORWAY
SPAREBANK 1 SR-BANK	NO0010631567	N:SRBA	NORWAY
SPAREBANKEN MORE	NO0006390004	N:MORG	NORWAY
SPAREBANKEN OST	NO0006222009	N:SPOG	NORWAY
SPAREBANKEN VEST	NO0006000900	N:SVEG	NORWAY
SVENSKA HANDELSBANKEN A	SE0007100599	W:SVK	SWEDEN
SVENSKA HANDELSBANKEN B	SE0007100607	W:SHBF	SWEDEN
SWEDBANK A	SE0000242455	W:SWED	SWEDEN
SYDBANK	DK0010311471	DK:SYD	DENMARK
TOTENS SPAREBANK	NO0006001205	N:TOTG	NORWAY
VESTJYSK BANK	DK0010304500	DK:VJK	DENMARK

Central European

Bank	ISIN	Code	Country
AAREAL BANK	DE0005408116	D:ARL	GERMANY
AIB GROUP	IE00BF0L3536	IE:A5G	IRELAND
BANK FUR TIROL UND VBG.	AT0000625504	O:TYRO	AUSTRIA
BARCLAYS	GB0031348658	BARC	UNITED KINGDOM
BKS BANK	AT0000624705	O:KAER	AUSTRIA
BNP PARIBAS	FR0000131104	F:BNP	FRANCE
COMMERZBANK	DE000CBK1001	D:CBK	GERMANY
CREDIT AGRICOLE	FR0000045072	F:CRDA	FRANCE
DEUTSCHE BANK	DE0005140008	D:DBK	GERMANY
ERSTE GROUP BANK	AT0000652011	O:ERS	AUSTRIA
HSBC HOLDINGS	GB0005405286	HSBA	UNITED KINGDOM
KBC GROUP	BE0003565737	B:KB	BELGIUM
LLOYDS BANKING GROUP	GB0008706128	LLOY	UNITED KINGDOM
NATIXIS	FR0000120685	F:KN@F	FRANCE
NATWEST GROUP	GB00B7T77214	NWG	UNITED KINGDOM
SOCIETE GENERALE	FR0000130809	F:SGE	FRANCE
STANDARD CHARTERED	GB0004082847	STAN	UNITED KINGDOM
VONTOBEL HOLDING	CH0012335540	S:VONN	SWITZERLAND
VP BANK	LI0315487269	S:VPBN	LIECHTENSTEIN

South European

Bank	ISIN	Code	Country
BANCA MONTE DEI PASCHI	IT0005218752	I:BMPS	ITALY
BANCA PROFILO	IT0001073045	I:PRO	ITALY
BANCO DE SABADELL	ES0113860A34	E:BSAB	SPAIN
BANCO SANTANDER	ES0113900J37	E:SAN	SPAIN
BBV.ARGENTARIA	ES0113211835	E:BBVA	SPAIN
BNC.DI DESIO E BRZA.RSP	IT0001281374	I:BDBR	ITALY
BNC.DI DESIO E DELB.	IT0001041000	I:BDB	ITALY
BPER BANCA	IT0000066123	I:BPE	ITALY
INTESA SANPAOLO	IT0000072618	I:ISP	ITALY
UNICREDIT	IT0005239360	I:UCG	ITALY

Appendix C - Tables of Correlations

Appendix C1 - Time Varying Panel-Regression

2003	Z-Score	IFRS ECL	FinRep	CET1	ROID	LR	Lead IR	GDP	SI	CPI	UE
Z-Score	1,000										
IFRS ECL	0,156	1,000									
FinRep	0,154	0,585	1,000								
CET1	0,107	0,250	0,376	1,000							
ROID	-0,141	0,170	0,270	0,125	1,000						
LR	0,106	0,059	0,150	0,485	-0,208	1,000					
Lead IR	-0,105	-0,417	-0,703	-0,485	-0,295	-0,216	1,000				
GDP	0,083	-0,280	-0,053	-0,055	-0,074	0,036	0,112	1,000			
SI	-0,166	0,014	0,003	-0,276	0,234	-0,450	0,000	-0,054	1,000		
CPI	0,038	-0,154	-0,342	-0,243	-0,298	-0,015	0,442	0,111	-0,037	1,000	
UE	-0,105	-0,076	0,008	-0,157	0,209	-0,216	-0,161	-0,114	0,456	-0,190	1,000

2005	Z-Score	IFRS ECL	FinRep	CET1	ROID	LR	Lead IR	GDP	SI	CPI	UE
Z-Score	1,000										
IFRS ECL	0,184	1,000									
FinRep	0,193	0,572	1,000								
CET1	0,150	0,249	0,376	1,000							
ROID	-0,146	0,174	0,282	0,118	1,000						
LR	0,128	0,061	0,163	0,441	-0,226	1,000					
Lead IR	-0,142	-0,397	-0,684	-0,503	-0,309	-0,237	1,000				
GDP	0,097	-0,270	-0,021	-0,028	-0,067	0,048	0,090	1,000			
SI	-0,174	0,015	0,003	-0,275	0,237	-0,446	0,000	-0,056	1,000		
CPI	0,021	-0,154	-0,354	-0,249	-0,324	-0,005	0,457	0,131	-0,067	1,000	
UE	-0,115	-0,084	-0,001	-0,162	0,200	-0,206	-0,161	-0,109	0,451	-0,218	1,000

2008	Z-Score	IFRS ECL	FinRep	CET1	ROID	LR	Lead IR	GDP	SI	CPI	UE
Z-Score	1,000										
IFRS ECL	0,211	1,000									
FinRep	0,235	0,539	1,000								
CET1	0,186	0,190	0,277	1,000							
ROID	-0,130	0,179	0,306	0,114	1,000						
LR	0,130	0,029	0,122	0,365	-0,236	1,000					
Lead IR	-0,204	-0,355	-0,642	-0,383	-0,363	-0,196	1,000				
GDP	0,118	-0,221	0,115	0,118	-0,053	0,115	-0,140	1,000			
SI	-0,165	0,018	0,003	-0,287	0,225	-0,438	0,000	-0,070	1,000		
CPI	0,034	-0,132	-0,341	-0,212	-0,375	0,031	0,522	0,090	-0,122	1,000	
UE	-0,102	-0,124	-0,065	-0,240	0,177	-0,205	-0,084	-0,069	0,448	-0,231	1,000

Appendix C2 – Country Cluster Panel-Regression

<i>Southern Europe</i>	<i>Z-Score</i>	<i>IFRS ECL</i>	<i>FinRep</i>	<i>CET1</i>	<i>ROID</i>	<i>LR</i>	<i>Lead IR</i>	<i>GDP</i>	<i>SI</i>	<i>CPI</i>	<i>UE</i>
Z-Score	1,000										
IFRS ECL	0,043	1,000									
FinRep	0,098	0,600	1,000								
CET1	0,001	0,210	0,288	1,000							
ROID	-0,005	0,259	0,343	0,329	1,000						
LR	0,037	0,066	0,183	0,625	0,319	1,000					
Lead IR	-0,047	-0,427	-0,702	-0,408	-0,397	-0,321	1,000				
GDP	0,156	-0,348	-0,060	-0,187	-0,063	-0,080	0,191	1,000			
SI	-0,128	0,078	0,061	-0,349	-0,033	-0,448	-0,047	0,053	1,000		
CPI	0,067	-0,358	-0,662	-0,274	-0,273	-0,213	0,697	0,301	0,012	1,000	
UE	0,062	-0,009	0,211	0,081	-0,103	0,002	-0,466	-0,029	0,286	-0,305	1,000

<i>Central Europe</i>	<i>Z-Score</i>	<i>IFRS ECL</i>	<i>FinRep</i>	<i>CET1</i>	<i>ROID</i>	<i>LR</i>	<i>Lead IR</i>	<i>GDP</i>	<i>SI</i>	<i>CPI</i>	<i>UE</i>
Z-Score	1,000										
IFRS ECL	0,156	1,000									
FinRep	0,093	0,595	1,000								
CET1	-0,062	0,216	0,287	1,000							
ROID	-0,033	0,130	0,220	0,310	1,000						
LR	0,089	0,115	0,196	0,589	-0,130	1,000					
Lead IR	-0,093	-0,427	-0,708	-0,422	-0,289	-0,269	1,000				
GDP	0,021	-0,323	-0,104	-0,089	-0,120	0,114	0,125	1,000			
SI	-0,089	0,000	0,000	-0,218	-0,136	-0,338	0,000	0,016	1,000		
CPI	0,007	-0,115	-0,354	-0,323	-0,268	-0,150	0,437	0,152	0,038	1,000	
UE	-0,068	-0,299	-0,242	-0,325	0,011	-0,357	0,064	0,092	0,325	-0,063	1,000

<i>Scandinavian</i>	<i>Z-Score</i>	<i>IFRS ECL</i>	<i>FinRep</i>	<i>CET1</i>	<i>ROID</i>	<i>LR</i>	<i>Lead IR</i>	<i>GDP</i>	<i>SI</i>	<i>CPI</i>	<i>UE</i>
Z-Score	1,000										
IFRS ECL	0,215	1,000									
FinRep	0,235	0,571	1,000								
CET1	0,209	0,326	0,514	1,000							
ROID	-0,153	0,198	0,357	0,171	1,000						
LR	0,039	0,054	0,156	0,400	-0,038	1,000					
Lead IR	-0,141	-0,405	-0,699	-0,605	-0,344	-0,215	1,000				
GDP	0,069	-0,202	0,011	-0,085	0,070	-0,034	0,055	1,000			
SI	-0,100	-0,033	-0,035	-0,049	0,242	-0,389	0,028	0,008	1,000		
CPI	0,036	-0,077	-0,162	-0,205	-0,375	0,070	0,314	-0,101	-0,110	1,000	
UE	-0,137	-0,040	0,053	0,229	0,429	-0,237	-0,258	-0,036	0,389	-0,355	1,000

Bibliography

- Abad, J. & Suarez, J. (2018). The procyclicality of expected credit loss provisions. *Centre for Economic Policy Research*. Obtido de https://www.cemfi.es/~suarez/Abad-Suarez_October_2018.pdf
- BBVA (2010) *Annual report 2010*. Obtido de https://shareholdersandinvestors.bbva.com/wp-content/uploads/2017/05/Informe_anual_2010_Eng_tcm927-346446.pdf
- Busch, R., Littke, H., Memmel, C., & Niederauer, S. (2021). *German banks' behaviour in the low interest rate environment*. *Duetsche Bundesbank Discussion Paper, 23*. Obtido de https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3903758
- Chabanel, P.- E. & Machray, G. (2013). Integrated COREP and FINREP Reporting: A Best Practice Framework. *Moody's Analytics*. Obtido de <https://www.moodyanalytics.com/-/media/whitepaper/2013/2013-02-10-integrated-corep-finrep-reporting.pdf>
- Ernst & Young. (2017). *Financial Instruments: A summary of IFRS 9 and its effects*. London: EY.
- European Banking Authority (EBA) (2017a). *EBA Report on IRB modelling practices Impact assessment for the GLs on PD, LGD and the treatment of defaulted exposures based on the IRB survey results*. Obtido de <https://www.eba.europa.eu/sites/default/documents/files/documents/10180/1720738/0212ecde-426d-4e18-84f8-04b036dcce00/EBA%20Report%20on%20IRB%20modelling%20practices.pdf?retry=1>
- European Banking Authority (EBA) (2017b). *Guidelines on PD estimation, LGD estimation and the treatment of defaulted exposures*. Otido de <https://www.eba.europa.eu/sites/default/documents/files/documents/10180/2033363/6b062012-45d6-4655-af04-801d26493ed0/Guidelines%20on%20PD%20and%20LGD%20estimation%20%28EBA-GL-2017-16%29.pdf?retry=1>
- European Committee of the Region (2020) *EU annual regional and local barometer: Full report*. Obtido de <https://cor.europa.eu/en/our-work/EURegionalBarometerDocs/4370-Barometer%20optimized.pdf>
- European Banking Authority (EBA). (2021a). *Study of the cost of compliance with supervisory reporting requirements*. Obtido de https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Reports/2021/1013948/Study%20of%20the%20cost%20of%20compliance%20with%20supervisory%20reporting%20requirement.pdf
- European Banking Authority (EBA). (2021b, August 11) *EBA Reporting Framework*. Obtido de <https://www.eba.europa.eu/risk-analysis-and-data/reporting-frameworks>
- European Banking Authority (EBA). (2021c). *Report on the implementation of selected COVID-19 policies*. Obtido de https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Reports/2021/962557/Report%20on%20the%20implementation%20of%20selected%20COVID-19%20policies.pdf
- Haan, J. (2010). *Financial markets and institutions: A European perspective (ed. 2)*. Cambridge University Press.

- Hadad, M., Santoso, W., Santoso, B., Besar, D., & Rutlina, I. (2008). Rating migration matrices: Empirical evidence from Indonesia. *IFC Bulletin*, 31, 260 - 275. Obtido de <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.225.4866&rep=rep1&type=pdf#page=266>
- International Accounting Standards Board (IASB). (2008) *Reducing Complexity in Reporting Financial Instruments*. Obtido de <https://www.asc.gov.sg/Portals/0/attachments/Consultations/dp-%20reducing%20complexity%20in%20reporting%20financial%20instruments.pdf>
- Hoogervorst. (2014) 'Convergence can never be a substitute for adoption of IFRS'. *IAS Plus*. <https://www.iasplus.com/en/news/2014/03/hoogervorst>
- Krüger, S., Rösch, D., & Scheule, H. (2018). The impact of loan loss provisioning on bank capital requirements. *Journal of Financial Stability*, 36, 114-129. <https://doi.org/10.1016/j.jfs.2018.02.009>
- Kund, A.-G. & Rugilo, D. (2018). Does IFRS 9 Increase financial stability? *Social Science Research Network (SSRN)*. <http://dx.doi.org/10.2139/ssrn.3282509>
- Landau, J.-P. (2009). Procyclicality – what it means and what could be done. *BIS Review*, 94. Obtido de <https://www.bis.org/review/r090805d.pdf>
- Li, X., Tripe, D., & Malone, C. (2017). Measuring bank risk: An exploration of z-score. *Social Science Research Network (SSRN)*. <http://dx.doi.org/10.2139/ssrn.2823946>.
- Mileris, R. (2015). The impact of economic downturn on banks' loan portfolio profitability. *Engineering Economics*, 26(1), 12-22. <https://doi.org/10.5755/j01.ee.26.1.6486>
- Novotny-Farkas, Z. (2016). The interaction of the IFRS 9 expected loss approach with supervisory rules and implications for financial stability. *Accounting in Europe*, 13(2), 197-227. <https://doi.org/10.1080/17449480.2016.1210180>
- PricewaterhouseCoopers (PwC). (2017). *IFRS für Banken (6. Auflage)*.
- PricewaterhouseCoopers (PwC) (2018) *IFRS 9, financial instruments: Understanding the basics*. London: PWC.
- PricewaterhouseCoopers (PwC) (2020). *Post-model adjustments for expected credit losses during COVID-19*. Obtido de <https://www.pwc.com.au/assurance/ifrs/assets/post-model-adjustments-for-expected-credit-losses-during-covid19.pdf>
- The Bank for International Settlement (BIS) (2021, August 11) *Definition of capital in Basel III - Executive Summary*. Obtido de BIS: https://www.bis.org/fsi/fsisummaries/defcap_b3.html
- Wijffelaars, M. & Loman, H. (2015). The eurozone debt crisis - causes and crisis response. *Rabobank/RaboResearch*. Obtido de <https://economics.rabobank.com/publications/2015/december/the-eurozone-debt-crisis--causes-and-crisis-response/>
- World Bank (2021, August 11). *Financial Stability*. Obtido de <https://www.WorldBank.org/en/publication/gfdr/gfdr-2016/background/financial-stability>