



Lisbon School
of Economics
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Universidade de Lisboa

MASTER
MASTERS IN ACCOUNTING

MASTER FINAL WORK
DISSERTATION

**THE IMPACT OF IFRS 9 ON CAPITAL STRUCTURE AND RISK OF
EUROPEAN BANKS**

CAROLINA ANTUNES BONIFÁCIO

MARÇO - 2023



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Resumo

A implementação da nova norma contabilística IFRS 9 - *Instrumentos Financeiros*, que substituiu a norma anterior IAS 39 - *Instrumentos Financeiros: Reconhecimento e Mensuração*, trouxe mudanças significativas para o setor bancário. Estas alterações incluíram modificações na estimativa das provisões das perdas por imparidade de empréstimos e simplificação da sua mensuração, resultando em diversas vantagens. No entanto, a aplicação dessas mudanças também trouxe desafios.

Posto isto, este estudo analisa o impacto das alterações introduzidas pela IFRS 9 na estrutura de capital e risco dos bancos europeus. A amostra escolhida é composta por 91 bancos europeus, cotados e não cotados, de 2014 a 2021. A amostra abrange um período total de 8 anos, dividido igualmente pelo período pré e pós implementação da IFRS 9. Todas as instituições financeiras escolhidas são sujeitas ao Mecanismo Único de Supervisão (MUS) para garantir a uniformidade na supervisão e regulação.

Os resultados sugerem que, após a implementação da IFRS 9, o índice de capital Tier 1 aumentou e o risco incorrido pelos bancos diminuiu em comparação com o período de pré-implementação da nova norma. Em suma, os resultados mostram que a adoção da IFRS 9 melhorou a estrutura de capital dos bancos e diminuiu o seu risco.

Palavras-chave: IFRS 9; Estrutura Capital; Risco Bancário; Rentabilidade dos Bancos; Perdas por imparidade de empréstimos; Bancos europeus.

Abstract

The implementation of the new accounting standard IFRS 9 - Financial Instruments, which replaced the previous standard IAS 39 - Financial Instruments: Recognition and Measurement, resulted in significant changes to the banking industry. These changes included revisions to the estimation of loan loss provisions and simplification of their measurement, resulting in several advantages. However, the application of these changes was also challenging.

With this being settled, this study analyses the impact of the changes introduced by IFRS 9 in the capital structure and risk of European banks. The sample chosen is composed by 91 listed and non-listed banks from Europe, from 2014 to 2021. The sample covers a total period of 8 years, divided equally before and after the implementation of the IFRS 9. The banking institutions are all subject to the Single Supervisory Mechanism (SSM) to ensure uniformity in supervision and regulation.

The results suggest that, after the implementation of IFRS 9, the Tier 1 capital ratio increased and the risk incurred by banks decreased compared to the period of pre-implementation of the new standard. Therefore, our findings show that the adoption of IFRS 9 improved the capital structure of banks and decreased its risk.

Keywords: IFRS 9; Capital Structure; Bank Risk; Banks Profitability; Loan Loss Provisions; European Banks.

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List of Abbreviations

BCBS – Basel Committee on Banking Supervision

CET1 – Common Equity Tier 1

EBA – European Banking Authority

ECL – Expected Credit Losses

EU – European Union

GAAP – General Accepted Accounting Principles

IAS – International Accounting Standard

IASB – International Accounting Standards Board

IFRS – International Financial Reporting Standard

LLP – Loan Loss Provisions

RWA – Risk-weighted Assets

SSM – Single Supervisory Mechanism

WACC – Weighted Average Cost of Capital

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1. Introduction

The quality of the financial information influences the decision making and decreases the asymmetry between data, providing a better comparability between institutions.

International Standards are rules that have as principal objective to uniform accounting policies, financial and accounting procedures and ensure that the information shown in the Financial Statements is presented with high quality, transparency and reliability.

Basel accords demand a certain level of transparency and faithfulness from financial institutions, in order to be able to regulate the banking sector and provide security to the economy. The Basel Accords also provide a set of recommendations and rules on bank regulations, with regard to capital for credit risk, market risk and operational risk (Li, X. et al., 2017).

Regarding the banking industry, the use of loan loss provisions is one of the main tools for earnings management (Leventis et al., 2011). Banks use this type of action in order to manage the results to the most wanted scenario. Considering this, some changes were made in standards in order to retain this practice and to improve the quality of the financial information provided (Achim et al., 2020).

The IFRS 9 – *Financial Instruments* was issued to replace the previous standard, IAS 39 – *Financial Instruments: Recognition and Measurement*, in order to amend the gaps and weaknesses that, in the estimation of loan loss provisions (LLP), allowed for the possibility of income smoothing.

IFRS 9 aims to improve the reporting quality of Financial Statements, nevertheless its application has been challenging for the banking industry. This new standard comes with a new classification and measurement criteria for the financial instruments, compared to the former, IAS 39. Besides that, it is also important to mention that this standard is considerably impactful in the management of risk and business model of the banks, in general (Achim et al., 2020).

Comparing the two standards, it is possible to see that IFRS 9 brought benefits to users. The main advantage is the reduction of the complexity that existed in IAS 39. The measurement and classification of the financial instruments is now more effective and faithful to the reality. Also, the detention of credit losses is now better measured and clarified (Gornjak, 2017).

One of the main weaknesses of IAS 39 was related to the recognition of loan loss provisions. LLP is used to be recognized based on losses that occurred. Implementing IFRS 9, the loan loss provisions are now recognized based on expected losses, which means that the provisions are recognized in advance. By adopting this standard, the way that banks account for their loan loss provisions has changed completely. With the new standard it is now expected that the banks' provisions end up being higher than before, due to the uncertainty associated with expected credit losses, being automatically exposed to a larger subjectivity (Leventis et al., 2011).

Loan loss provisions are estimated in order to reflect the expected changes and future losses with loans. There are many reasons for banking managers to get involved in behaviors of earnings management, one of the main reasons is to improve the perception of the risk of a bank for their investors (Kanagaretnam et al., 2003).

This study analyses the impact of the changes introduced by this new standard, in order to understand the influence of the IFRS 9 in the capital structure and risk of European Banks.

The sample chosen corresponds to a period of four years before the implementation of this new standard and four years after its application. In this sense, it is possible to achieve some results with this period of time. This study is mainly focused on European Banks and the sample was collected from the *BankFocus* Database. Also, the institutions chosen were all according to the Single Supervisory Mechanism (SSM), in order to have uniformity in the supervision and regulation. In sum, the sample is composed by 91 listed and non-listed banks from Europe, from 2014-2021.

The main aim of this study is to investigate the impact of IFRS 9 on the capital structure and risk of European banks.

Previous studies provide evidence that the application of IFRS 9 had a positive impact in the capital structure of banks and decreased the risk incurred in the period of post application of the new standard.

This study contributes to the literature related to the topic of the application of IFRS 9 in replacement of IAS 39. First, besides existing many studies when it comes to earnings management in the banking industry, there are less studies when it comes to the change in the capital structure and risk incurred when the standard was updated. There is also a lack of

empirical studies when it comes to IFRS 9, due to the fact that the standard was only applied in 2018.

The current study conducts a brief comparison of the new standard with its predecessor to examine how the changes in the measurement and classification of financial instruments have impacted the capital structure and risk of banks. The study employs two regression models to obtain evidence and results on the capital structure and risk of European banks before and after the implementation of the new standard.

The study is divided by 6 chapters. The next chapter corresponds to the Literature Review and Hypotheses, where previous relevant studies about the impact of financial standards, loan loss provisions, capital structure and bank risk are presented and also the hypotheses are developed. The next chapter explains the sample selection process, the methodology and the description of the models used in the empirical study. The fourth chapter is referent to the empirical analysis of the results, followed by the fifth chapter which corresponds to an additional test regarding the research topic. The last chapter sets forth the conclusions of the present study.

2. Literature Review and Hypotheses

2.1. Banking Supervision

Banks can be characterized as public institutions regarding their direct responsibility in providing and distributing credit and, consequently, stimulating economic growth (Keen, 2017). Generating profit in an efficient way is their primary objective, having the responsibility to present solid and profitable results to their shareholders, which also labors it as being for-profit companies, with an important role in the economic improvement and development (Miklaszewska et al., 2021). Empirical evidence from Fufa & Kim (2018) find that the financial system provides significant support in the economy, leading growth and expansion.

The procedures of bank accounting in Europe used to diverge from country to country. Each country was provided with a certain flexibility on the decision of each level, standards and policies would conduct from. As expected, the respective definitions of what should comprise regulatory capital also varied according to that flexibility. The deviation between the accounting

practices within the European Union has always been a greater matter and, nowadays, there are still some concerning on the recognition, measurement, and disclosure of financial assets under international accounting standards (Albuquerque et al., 2020).

Therefore, banking supervision has a fundamental role in the monitoring of banks' financial reporting quality and transparency. Regarding the banking industry, there are two entities responsible for the supervision: the capital market supervisor and the central bank of the respective country. Research from Albuquerque et al., (2020) provide evidence that the quality of financial reporting and how country-specific circumstances related to regulatory and supervisory environment affect banks' provisioning are influenced by bank supervisors. There are several entities that have the responsibility of oversees and enforces the accounting standards and controlling if the information is disclosed as it is required, resulting in the existence of numerous supervision practices.

In 2014, the European Union launched the SSM as a response to the current global financial crisis, to stabilize the national banking systems, to improve bank supervision in Europe, resolving the heterogeneity in supervisory practices that were felt, and to prevent the fragmentation of European financial markets (Gren et al., 2015). The flexibility of interventions by bank supervisors at a national level was reduced with the implementation of the SSM, because of the transference of the national sovereignty of EU members regarding to banking supervision to the European Central Bank (Gren et al., 2015). The launch of the SSM was the first and main step in the creation a Banking Union.

In order to achieve competitive conditions for banks across different countries and protect the global banking system through a harmonization of banking supervision standards, the Basel Committee on Banking Supervision (BCBS) issued Basel III in 2010, which consists in three pillars (BCBS, 2010). These pillars complement basic principles for establishing the level of capital considered adequate for the safety and stability of the financial system (BCBS, 2010). Central banks, financial institutions and other entities follow the international regulation of the Basel Committee.

Pillar 1 of Basel III refers to the minimum amount of regulatory capital of a financial institution. The following pillar, Pillar 2, represents the supervisory review and evaluation process supervision. This second pillar allows supervisors to assess the risk profile of banks

through their business model, and the risk to capital and liquidity that are not considered by pillar 1. Pillar 3 is focused on the market discipline, defending that bank regulators are responsible for the certification that banks provide sufficient information about the allocation of capital risk. Requiring the financial institutions to be transparent in their reporting and letting the capital market to regulate the behavior of banks (Achim et al., 2020).

Overall, Basel III emerged to strengthen global capital, liquidity and risk assessment rules leading to a higher level of resilience in the segment of banks. This agreement came to change, complement, and improve some of the preceding rules that were present in Basel II, aiming to prevent some of the possible consequences of the financial and economic crisis as, for example, market failure. The main procedures and rules explicit in the agreement in order to achieve that prevention is to introduce liquidity requirements, improve risk coverage and increase and enhance the quantity of capital in banks (Šútorová & Teplý, 2014).

Basel III differentiates two principal types of capital: Tier 1 and Tier 2. These two main types of capital form the Total Regulatory Capital. Tier 1 emphasizes on the going-concern capital and consists of a common equity ratio that comprises mostly issued common shares, retained earnings, and holds instruments classified as subordinated with entirely discretionary non-cumulative dividends or coupons and are not complied with a maturity date or an encouragement to conversion. Also, as defined by the BCBS, encompasses further elements of bank capital. Tier 2 is related to the gone-concern capital and includes chiefly subordinated debt and certain loan loss provisions (Šútorová & Teplý, 2014).

In order to accomplish capital with a high-quality base in banks, Basel III accords establish some limits for the ratios, that were already introduced in Basel II but suffered a raise. It establishes that Minimum Common Equity, calculated as a percentage of risk-weighted assets (RWA's), must be 4.5% or higher. Minimum Tier 1 capital, as a percentage of RWA's should achieve a value of 6% or higher. The ratio that includes both Tier 1 and Tier 2 capital, Minimum Total Capital as a percentage of RWA's, must present a value of, at least 8% (Šútorová & Teplý, 2014).

The guidelines of the BCBS also provide and settle certain supervisory policies concerning the loan loss provisions and the respective judgment of what is defined to be a significant increase in credit risk, resulting in more conservative impairment losses with loans. The

disclosure of credit risk compromises a central role in the market discipline context because the cash flows and default risk of bank loans might take a significant influence on investors' estimations and therefore on stock market values (Novotny-Farkas, 2016). Also, Ertan et al. (2017) study provides evidence of how banks' credit practices and risk-taking are influenced by transparency, leading to an upgrade of the quality of securitized loans.

Evidence from the research of Jayaraman et al. (2019) shows that financial institutions from countries that require a higher level of supervisory power disclose more information about LLPs, which represent some of the largest expenses and decreases banks' profit and loss and capital.

Costello et al. (2019) defend that less regulation enforcement when it comes to transparency and consistency in reporting of banks is frequently related to the instability felt in the financial system from 2007-2009, during the period of crisis. Considering this, the local GAAP presents more faithful results in stricter enforcement settings, according to the findings of Marton and Runesson (2017).

Several studies find evidence that banks who approach stronger supervisory regimes and have interventionist regulators in their countries incur in less earnings management and have an improvement of quality and transparency of financial reporting (Costello et al., 2019).

In sum, regulatory financial reporting is a significant component in the confidence in markets and in the risk assessment, but also represents a great challenge to banks.

2.2. IAS 39 and IFRS 9

The adoption of International Accounting Standards by financial institutions, and any other type of institutions, provides a higher quality presentation of the financial reporting. (Barth et al., 2008).

These standards are conceived on a base of principles that aim to hand over financial and accounting information that faithfully reflects the position of the entities when it comes to the economic environment and performance, restricting any opportunity of smoothing behaviors (Barth et al., 2008). One of the main goals of International Accounting Standards Board is the development of an international acceptable set of reporting standards that limit the presentation of the financial statements and a high-quality information (IASB 2004).

The research from Casta et al. (2019) provides information and evidence that during the period of the financial crisis, from 2007 to 2009, the IAS 39 was severely criticized as a result of its complexity and difficulty in achieving a classification that represents faithfully particular situations. The main critics were related to the lateness in recognizing credit losses and the measurement of financial instruments considering their business model or nature.

According to IAS 39, impairments of financial assets are recognized on the basis of incurred losses. Meaning that there must exist evidence of an event where it is shown a loss of value. Therefore, the loss is only recognized if there is a clear and objective proof of the existence of a prior loss event at the balance sheet date (Camfferman, 2015).

With this being settled, and the incurred loss model being assumed as leading to a delay and insufficient recognition and measurement of credit losses, it can be concluded that the effects of future loss occurrences were not defined even when they are expected to happen in a near future (Novotny-Farkas, 2016). Considering these problems and the financial crisis events, the BCBS projected the Expected Loss Model.

The expected loss model recognizes greater loan loss provisions estimates, when on the other hand, the incurred loss model estimates lower ones. This discrepancy between models creates distinct loan loss provisions estimates (Ozili & Outa, 2017).

For the fiscal year of 2018 and beyond, the International Accounting Standards Board (IASB) required the obligation of the application of the IFRS 9, demanding accounting recognitions and measurements that truly, faithfully and rigorously present a firm's situation when it comes to performance and economic position. Novotny-Farkas (2016) finds that the expected credit loss model is likely to reduce the inconvenient effects of the previous applied model. However, in prosperous periods, it's found less amplification when decreasing loss projections and overstating equity items.

The implementation of IFRS 9 enforces a previous recognition of losses in a more comprehensively method of measure and classification. The expected loss model, unlike the incurred loss model, does not demand an occurrence of any type of event where there was a loss. Although, it requires an occurrence where the value of the financial asset was reduced and an

estimation for expected credit losses from the period that the loan was provided or invested in a financial instrument (Lloyd, 2015).

Regarding the method of recognition of impairments on financial assets imposed by IFRS 9, there are three stages to classify each single loan. In sum, it is required that the financial institution account for different allocations of the credit risk, attributing to the financial instrument different stages concerning its loss allowances. Each stage has its specific measures of expected losses, verifying that the stage proportionally increases concerning the higher the loss allowance (Simon, 2022).

Stage 1 considers that an entity must calculate the impairment for the financial instrument at an amount equal to 12-month expected credit losses. A loan is classified as in stage 1 if it hasn't verified a significant increasing in credit risk since initial recognition, at the reporting date. The financial instrument is classified in Stage 2 when it is verified a significant increase in probability of default since the initial recognition. In this stage, the value of the expected credit loss must be equal to the amount of the lifetime expected credit losses. Stage 3 is attributed to financial instruments where, at the reporting date, the credit is impaired, and the entity is required to calculate the expected credit loss according with the lifetime of the expected credit losses (Simon, 2022).

Although the implementation of IFRS 9 came to increase the stability, the quality and the faithfulness of the financial reporting, aiming to solve the problems of the previous standard applied and comply the financial instruments with a timelier recognition, there are some concerns regarding the model approach.

Research from Novotny-Farkas (2016) find evidence that this model is considered to introduce discretionary management over the timing and measurement of the respective expected losses. The larger the forecast horizon regarded, the greater the subjectivity and uncertainty of evaluation assessment

The expected loss model estimation brings some challenges, requiring a strong governance in order to provide consistent and faithful estimates of loan loss provisions. Nevertheless, the benefits that are expected with this implementation might not be totally achieved. Study from Oberson (2021) finds evidence that managers who approach de loan loss provisions estimates

with some discretion might hinder improvement in its credit-risk relevance. Certain accounting choices lead to a deterioration of bank transparency in the financial reporting. That deterioration can turn cause market-participant uncertainty concerning banks' inherent value, therefore decreasing the relevance of accounting standards (Oberson, 2021).

Distinct from the incurred credit loss model, the expected credit loss approach demands discretion and wariness in the modeling process and higher judgement by the managers. Regarding this, the ECL model could decrease the amount of information disclosure about the loan loss provision reporting due to opportunistic behaviors or measurement error (López-Espinosa et al., 2021).

Several studies defend that the impact of IFRS 9 on the stability of financial institutions and credit impairment results is still considered ambiguous. On the one side, this new standard decreases the “cliff effect”, which refers to the previous concerning of the fact that the credit losses were only recognized after its effective occurrence. On the other side, Kund and Rugilo (2018) find that the ECL model is influenced by the “front-loading” effect, which implies a decrease in banks' profitability on the short-term analysis. The front-loading effect arises from the anticipation of the recognition of future credit losses.

Banks profits and ability to retain, reinvest or distribute its earnings is influenced and limited by the earlier recognition and the higher probability of default of losses, consequently leading to a more income statement volatility at an earlier point in time. Therefore, Kund and Rugilo (2018) find evidence of a reduction in the stability of financial institutions. Nevertheless, results from previous studies show evidence that the implementation of IFRS 9 had a positive and significant impact on the European Banks' stability (Simon, 2022).

Studies from Fatouh et al. (2022) find evidence of higher impairment charges and a decrease in after-tax profits under the implementation of IFRS 9. Consequently, retained earnings and capital ratios present minor values than the ones that could be obtained if the model of measurement of loan loss provisions was under IAS 39.

López-Espinosa et al. (2021) find that this new standard, which implies an accounting change, have other economic consequences for banks when comparing to the previous standard as, for example, the higher expenses in compliance.

Abad and Suarez (2018) and López-Espinosa et al. (2021) research show that under the application of the expected loss model, there is a significant increase in the measurement of provisions than the in the incurred loss model, especially when there is a contraction in the economy or in a situation of difficult credit conditions.

The measurement of expected credit losses by banks involves an effort in collecting nontrivial data, thus requiring knowledge in the application of the respective sophisticated risk modeling. There must be applied forward-looking judgements in the whole process of calculation. Financial institutions use overlays, or post-model adjustments, to give response to specific situations where it is verified that models or data have limitations. (PwC, 2020).

2.3. Capital Structure and Risk of Banks

Nowadays, banks are an essential element in the financial system and its development. Commercial banks have a key role in the economic environment and growth, mainly due to their contribution to the financial system through providing financial facilities to all economic enterprises and individuals and comprehensive financial services that stimulates transactions as compared to any other financial institution (Alhadab et al., 2016).

Commercial banks are increasingly becoming more exposed to risk. The credit risk consists in the risk of customers do not accomplish with their obligations to the bank, when there is a probability of loans, bonds or interest held by banks might not be reimbursed. This risk is one of the major risks faced by the financial institutions (Alhadab et al., 2016).

Aiming to mitigate the later recognition of credit losses that was present in the model of IAS 39, the new standard IFRS 9 applies a forward-looking provisioning model, where the credit loss provisions are like the expected credit losses. The study of López-Espinosa et al., (2021) considers that the provisions of IFRS 9 present a more faithful representation of the projections of future bank risk than the ones applied concerning the previous model of IAS 39. Additionally, when the credit conditions deteriorate, the results prove an existence of more informative provisions.

It is expected that the model of provisioning under the IFRS 9 reduces the pro-cyclicality of financial regulations. Also, this standard increases credit loss provisions charges for banks,

arising a reduction of after-tax profits and retained earnings. For banks, the values of those financial statement line items represent a significant component of Common Equity Tier 1 resources. All other components remaining equal, this conducts to an increase in the levels of leverage (Fatouh et al., 2022).

Financial institutions might decide to hold higher levels of equity capital to preserve their capital ratios under the application of the expected loss model. In capital markets where there is present an efficient and integrated approach, the higher cost of equity and debt totally counterbalances the smaller share of equity in the capital structure, leaving the value of *weighted average cost of capital* (WACC) unaffected. Nevertheless, some inefficiencies have been detected in present capital markets, testing the validity of this proposition. One of the concerns is the “low-risk” deviation, which is related to the empirical reflection that past returns and, later, realized cost of equity present elevated values for shares with minor betas. Thus, lower levels of leverage are not proportionally related with lower cost of equity. Meaning that increasing the share of equity in the capital structure might rise WACC. (Fatouh et al., 2022).

Empirical studies find evidence that the application of the model of expected credit losses affects the capability of banks to retain earnings, consequence of the higher provisions. As already mentioned above, retained earnings are a key component of the Common Equity Tier 1, this decrease of the component leads to a consequent reduction of the ratio and the balance sheet equity (Krüger et. al., 2018). This reduction establishes a remarkable weakness for financial stability.

Krüger et al. (2018) also concludes that with the introduction of model of IFRS 9, Common Equity Tier 1 (CET1) presents a reduction. The results present considerable decreases when there are economic recessions or when it comes to credit portfolios with lower credit quality.

IFRS 9 model is consider to account for greater impairments of loans anticipating an economic downturn, resulting in lower profits of banks and a reduction on the CET1 ratio (Abad & Suarez, 2018).

Kund & Rugilo (2018) provide research concerning the fact that this new impairment model arises the apprehension of banking industry when it comes to the initial set-up costs and the alterations to loan loss payments, which are expected to present higher values compared to the

ones quantified by the policies of the previous model. Corresponding to the findings of other authors, this study also finds evidence that since the loan loss provisions are recognized through the Profit and Loss Statements of the banks, the capacity to retain earnings decreases, thus, the regulatory capital levels are negatively influenced.

Abad and Suarez (2018) and Sánchez Serrano (2018) elaborated studies that indicate that banks might try to convert this situation by reducing their loan support or by selling assets, aiming to reinforce capital levels.

Considering those findings, the following hypothesis is presented:

H1: The implementation of IFRS 9 decreases CET1 ratio of European Banks.

The banks' supervisors use loan loss provision estimates to measure the quality of the loan portfolio of the respective bank. Although, there is no agreement between banks and their supervisors on what they consider adequate provisions to mitigate credit risk, it is required for banks to have adequate and sufficient loan loss provisions in order to mitigate and decrease that risk (Ozili & Outa, 2017).

Since the capital of banks is a vital component in instilling trust in their ability to deal with uncertainty, it is commonly thought of as a cushion to engage unexpected losses that arise from credit risk, interest rate risk and liquidity risk (Li et al., 2017).

Research from Kund and Rugilo (2018) show that the application of the model of expected credit losses led to several adjustments relating to the approach of credit risk methodology.

The study of Oberson (2021) finds evidence that the application of IFRS 9 contributed to the amending and improvement of the credit-risk significance for loan loss provisions, compared to the previous periods and between banks with weaker pre-IFRS 9 information environments.

López-Espinosa et al., (2021) find that the greatness of the impact of IFRS 9 is higher when credit risk increases, considering that the introduction of the expected credit loss model is consistent in provisioning and disclosing information about the bank risk. Furthermore, around the filing date, these disclosures might cause lower short-window stock returns or higher changes in the CDS spreads. Prior research of these authors show that these effects have a higher significance only in countries where there is present a degradation in credit conditions. The same

author also shows in his study that the application of the new model arises the possibility of an increase in the level of loan loss allowances stated in economies where there are present a decrease in credit conditions.

Beerbaum and Ahmad (2015) explain that one of the most important differences between the two models is the that the expected loss model is more subjective in nature, as being mainly supported by the estimations of cash flow expectations. The procedure of evaluating future cash flows is characteristically subjective and can leave space for earnings management. Which, consequently, has an opposite effect on risk.

Research from Porretta et al. (2020) suggests that the forward-looking methodology of the IFRS 9 model might allow a prior action in the credit adjustments when there is an increase in credit risk, which limits the overcharge in the Profit and Loss Statement when there is a loss. Therefore, decreasing the pro-cyclical effect and total risk incurred by the banks.

With this settled, in order to analyze if the risk incurred by banks got lower with the implementation of IFRS 9, it's proposed the resulting hypothesis:

H2: The implementation of IFRS 9 decreases the risk incurred by European Banks.

3. Sample and Methodology

3.1. Sample

The sample data for this paper is taken from Moody's Analytics BankFocus database for European commercial banks. In order to allow a more consistent comparative analysis between the period before and after the application of IFRS 9, the sample comprises a period of 8 years, from 2014 to 2021. In sum, compromising these specific years, the period covers the application of the two international standards IAS 39 and IFRS 9.

To ensure uniformity and consistency in the policies adopted by institutions, the sample chosen for this study includes only banks which are subject to the Single Supervisory Mechanism (SSM) for bank supervision. Accordingly, the initial sample consisted of 112 listed and non-listed banks.

Additionally, this study focusses only in European banks that apply the IFRS as accounting practice to control the differences in the financial information accounting method. Four banks were removed from the initial sample due to the fact they apply the local GAAP and not the IFRS, achieving a sample of 108 banks.

The banks that were in liquidation or dissolved were removed from the sample. Concerning this parameter, 7 banks were removed leading to a total of 101 banks.

In order to avoid the duplication of the information from the institutions regarding the data from the Statement of Financial Position and the Profit and Loss Statement, banks without consolidated Financial Statements were removed, resulting in a sample of 92 institutions. The bank Haspa Finanzholding (Germany) was manually removed due to the fact that there were no values presented regarding that institution.

Table I – Sample distribution by country

| Country | Listed | Non-Listed | Total Banks | % |
|----------------|---------------|-------------------|--------------------|-------------|
| 1 Austria | 3 | 2 | 5 | 5% |
| 2 Belgium | 1 | 4 | 5 | 5% |
| 3 Cyprus | 1 | 1 | 2 | 2% |
| 4 Estonia | 0 | 3 | 3 | 3% |
| 5 Finland | 1 | 2 | 3 | 3% |
| 6 France | 3 | 7 | 10 | 11% |
| 7 Germany | 4 | 7 | 11 | 12% |
| 8 Greece | 4 | 0 | 4 | 4% |
| 9 Ireland | 3 | 2 | 5 | 5% |
| 10 Italy | 7 | 2 | 9 | 10% |
| 11 Latvia | 0 | 2 | 2 | 2% |
| 12 Lithuania | 1 | 1 | 2 | 2% |
| 13 Luxembourg | 0 | 4 | 4 | 4% |
| 14 Malta | 2 | 1 | 3 | 3% |
| 15 Netherlands | 2 | 3 | 5 | 5% |
| 16 Portugal | 1 | 1 | 2 | 2% |
| 17 Slovakia | 1 | 2 | 3 | 3% |
| 18 Slovenia | 1 | 0 | 1 | 1% |
| 19 Spain | 6 | 5 | 11 | 12% |
| 20 Sweden | 1 | 0 | 1 | 1% |
| Total | 42 | 49 | 91 | 100% |

Lastly, the final sample, presented in Table I, is composed by a total of 91 listed and non-listed commercial banks from 20 European countries. Germany and Spain are the countries with

the highest representation, both representing 12% of the sample each, corresponding to 11 institutions respectively. Slovenia and Sweden are the less representative.

Table I is also divided by the Listed and Non-Listed banks, where we can observe that the sample has more non-listed banks than listed ones, having 49 and 42 banks respectively. Italy is the country with more listed banks in the sample and France and Germany are the ones with the highest non-listed banks.

3.2. Methodology

The model used to test the first hypothesis, is based on the models developed by the studies of Anandarajan et al. (2007), Leventis et al. (2011) and Pinto and Picoto (2018):

$$(1) \text{MCAP}_{it} = \beta_0 + \beta_1 \Delta \text{LOANS}_{it} + \beta_2 \text{LLPR}_{it} + \beta_3 \text{NPL}_{it} + \beta_4 \text{EBT}_{it} + \beta_5 \Delta \text{GDP}_{it} + \beta_6 \text{LnTA}_{it} \\ + \beta_7 \text{CFEER} + \beta_8 \text{DLISTED} + \beta_9 \text{DIFRS9} + \varepsilon_{it}$$

Where:

MCAP is the ratio of actual regulatory capital (primary or Tier I Capital) to the minimum required regulatory capital imposed by Basileia, which is 8% since 2013. ΔLOANS is the variation of total loans. LLPR corresponds to the ratio of total Loan Loss Provisions to total of loans. NPL is the non-performing loans to total loans. EBT is the ratio of earnings before taxes and LLP to total assets. ΔGDP is the gross domestic product growth and is used as proxy of economic growth. LnTA measures the dimension of each bank and is computed as the natural logarithm of total assets and CFEER is the ratio of commission and fee income to total assets. DLISTED is the dummy variable that indicates if the bank is listed, presenting a value of 1, or non-listed, presenting a value of 0. The dummy variable DIFRS9 takes the value 1 for period of application of IFRS 9 and the value 0 for the period of application of IAS 39. In line with our first hypothesis, we expect a negative coefficient on DIFRS9.

MCAP is the dependent variable of the model, which is the variable that aims to be explained through the independent variables. It is expected that this variable reflects the value of the ratio of actual regulatory capital (primary or Tier I Capital) to the minimum required regulatory

capital imposed by Basileia, in order to observe its variation regarding the application of the IFRS 9.

Variable Δ LOANS is used in order to observe the variation of loans during the period of pre and post application of the new standard and it is likely to present a negative relation with the dependent variable of the model.

Previous studies indicate that a negative relation between MCAP and LLPR is expected, because lower level of capital ratios can lead to higher amounts accounted in LLPR.

NPL is the ratio of non-performing loans to total loans in order to capture specific provisions that banks set aside for actual loan losses (Ozili & Arun, 2018). This ratio also helps measuring the quality of loans. In the model, this variable captures the help of the bank from the point of view of assets (Šútorová & Teplý, 2014). It is expected a negative relationship between NPL and MCAP.

A positive relationship between EBT and MCAP indicates that the bank is performing well and obtaining good results. In the other hand, a positive relationship between EBT and LLP can possibly indicate existence of earnings management through income smoothing (Ahmed et al., 1999).

GDP is the annual growth rate of the gross domestic product for each country and is used as a proxy for economic growth.

The variable LnTA is used as a control variable of the influence of the banks' dimension in banks capitalization (Leventis et al., 2011).

Finally, similar to Anandarajan et al. (2007), it was included the ratio commission and fee income to total assets. A higher CFEER ratio indicates a banks' greater interest in non-depository activities. It is expected a negative relationship between CFEER and MCAP.

In order to test the second hypothesis of this study, to observe if the implementation of the new standard decreased the risk incurred by European banks, the following model was estimated based on the ones mentioned previously:

$$(2) Z_{it} = \beta_0 + \beta_1 \Delta LOANS_{it} + \beta_2 LLPR_{it} + \beta_3 NPL_{it} + \beta_4 EBT_{it} + \beta_5 \Delta GDP_{it} + \beta_6 LnTA_{it} \\ + \beta_7 CFEER + \beta_8 MCAP_{it} + \beta_9 DLISTED + \beta_{10} DIFRS9 + \varepsilon_{it}$$

Where:

Z – corresponds to the value achieved in the Z-score metric, which was calculated based on the principle developed by Beck and Laeven (2006) and Li et al. (2017) in the following equation:

$$Z - SCORE_{it} = \frac{ROA + (Equity/Asset)}{\sigma(ROA)}$$

ROA – corresponds to the liquid profit after taxes to total assets-

Equity/Asset is the ratio of capitalization given by the division of the Equity to Assets.

σ (ROA) corresponds to the standard deviation of ROA calculated on the total sample of each bank.

The Z-score helps measuring the bank failure risk associated with the financial stability that relates accounting metrics of profitability, leverage and volatility. The basic principle of this index is to relate a bank's level of capital to the change in its returns, so that one can know how much change in a bank's asset returns can be absorbed by capital without the bank becoming insolvent (Li et al., 2017).

There is a negative correlation between the Z-score and the insolvency risk. A low Z-score will refer to a high probability of bankruptcy. The Z is considered as the number of standard deviations under the significance by the respective profits must fall in order to succeed an elimination of equity.

This second model also share the same dummy as the previous one, which takes the value 1 for the application of IFRS 9 and the value 0 for the application of IAS 39. Which means that observations from 2018 forward would be consider as 1, otherwise it will be 0.

4. Empirical Results

4.1. Descriptive Statistics

Appendix I presents the descriptive statistics of the dependent and independent variables of both regression models for the complete sample and for the two periods analyzed, according to the period dummy - DIFRS9. The period between 2014 to 2017 corresponds to the adoption of IAS 39 and the period from 2018 to 2021 corresponds to the period of application of IFRS 9.

The results show that the mean of MCAP is 2,30% in total but presents a higher value in the period of application of IFRS 9 (2,40%) and a lower value in the period of IAS 39 (2,18%). The median presents values of 1,95%, 2,03% and 1,84%, respectively. These results might be supported by the studies of Abad and Suarez (2018) and Sánchez Serrano (2018). Those studies find that greatest values of MCAP are presented in the period of post application of the new standard due to the fact that banks try to reinforce capital levels.

The dependent variable of the second model, Z-score, as the dependent variable presented above, presents higher values in the period of IFRS 9. The mean presents values of 1,55% in the period of IAS 39, 1,76% in the period of IFRS 9 and 1,66% in the total period of the sample. The median presents values of 1,84%, 2,02% and 1,92% respectively. These results indicate that banks incur in less risk in the period of IFRS 9 than in IAS 39.

The variable of Δ LOANS presents higher values in the period of application of IFRS 9. The mean of Δ LOANS is 3,46% in total but presents a higher value in the period of IFRS 9 (4,99%) and a lower value in the period of IAS 39 (1,81%). The median presents values of -0,245%, 1,14% and -3,16%, respectively. In the total period, the variable of Δ LOANS presents a minimum value of -67,89% and a maximum value of 575,87%. It can be observed that this variable is the one with the higher difference between the maximum and minimum values, which could indicate the presence of outliers. In order to analyze if the values were influencing the results, additional analysis was made in order to ensure that it had no influence in the results and that there weren't present significant outliers.

Unlike the other variables presented above, the variable of LLPR presents higher values in the period of IAS 39 than in IFRS 9. As it is presented in Appendix I, we can observe that this

variable presents a mean of 0,78% in the period of pre application of IFRS 9 and a value of 0,48% in the period of post application of IFRS 9. These results can be explained by the fact that, despite an expected increase in LLPs in the period after IFRS 9, there was a decrease in these values that could be associated with the fact that some central banks require an enhancement of loan impairments prior to the introduction of the new standard.

The results show that for the variable of NPL the mean of the total period is 8,21%, for the period of IAS 39 is 10,89% and for the period of IFRS 9 is 5,75%. The median presents values of 3,83%, 4,91% and 3,37%, respectively. The values are greater for the period of application of IAS 39 and lower in the period after IFRS 9, which can indicate that in the period of application of IFRS 9 the non-performing loans to the total portfolio of loans slightly decreased.

The average of results of GDP are 2,04% of total assets for the total sample, and are greater for the period of application of IAS 39 (2,72%) and much lower in the period after IFRS 9 (1,37%) and their medians are 2,0%, 2,05% and 2,0% for the total sample, pre and post IFRS 9 period respectively. The period of post application of IFRS 9 includes 2 years of the pandemic situation, which influence these results.

The LnTA and CFEER variables, do not present significant differences between their means of both groups. The values presented in the pre and post period of application of the new standard are very similar, as it can be observed in Appendix I.

4.2. Pearson Correlation Matrix

Appendix II illustrates the Pearson correlation matrix that allows analyzing the existence of a positive or negative and statistically significant linear association between the variables under this study.

The independent variables of the first hypothesis, Δ LOANS, LLPR, NPL, LnTA and CFEER are negatively correlated with the dependent variable MCAP. The variables EBT, GDP and DIFRS9 are positively related with the dependent variable.

The results show that the MCAP is negatively and significantly correlated with NPL (-0,108), LLPR (-0.161) and LnTA (-0,192). Indicating that when NPL and LLPR are greater the

capital ratio is lower and when the size of the bank is bigger the capital ratio has the tendency to present a lower value. It was expected that LLPR was negative and significantly correlated with the MCAP, the dependent variable, confirming that lower regulatory capital ratios are accompanied by increased provisions from banks.

There is also a positive relationship and significant difference between LLPR and bad loans (0,563), which indicates that an increase in the NPL implies an increase in loan impairment losses.

The independent variables of the second hypothesis, Δ LOANS, LLPR, EBT, NPL, GDP, LnTA, CFEER and MCAP, which is a dependent variable in the first hypothesis and an independent variable in the second one, are positively correlated with the dependent variable Z-score, except for LLPR, NPL and LnTA which are negatively related. The dummy variable DIFRS9 is also positively related. In the second model the variables CFEER and LnTA are not statistically significant.

We can observe in Appendix II that the Z-score is positively and significantly correlated with LOANS (0.114), MCAP (0,102) and GDP (0,154), indicating that the risk that banks incur is lower when the variation of loans, the ratio of capital and the gross domestic product present higher values.

Regarding the correlations of the control variables presented in Appendix II for the independent variables, there is a negative and significant relationship between the LnTA and other two variables, EBT and GDP. Meaning that the larger the size of the bank, the smaller the result.

The results presented show that the correlation coefficients are not high enough to bias the results.

4.3. Regression Results Analysis

Appendix III presents the results obtained for the estimation of equation (1) for the first model of regression that makes it possible to analyze if the implementation of IFRS 9 decreased

the CET1 ratio. Results show that the coefficient for DIFRS9 is positive ($\beta_9 = 0.227$) and statistically significant at 1% level.

Therefore, in contrast to our hypothesis, results provide evidence that the implementation of IFRS9 leads to an increase in capital ratio. The results may be justified by the fact that, contrary to our expectation, we observe a decrease in LLPs after the implementation of IFRS9.

The negative coefficient of LLPR (-0.063) is statistically significant at 10% level. This result is an indication of the fact that several central banks require an enhancement of loan impairments. An increase in LLPR can lead to a reduction of bank financial results and, consequently, a decrease in capital ratios.

The variable NPL has a negative coefficient (-0.003) and statistically significant at 1%, which indicates that when banks in have less non-performing loans to total loans after the introduction of IFRS 9, the capital ratios increase.

The coefficient of the variable LOANS is negative (-0.001) at a significant level of 1%, indicating that the higher the variation of loans in banks the lower the levels of capital after the implementation of the new standard.

The coefficient correspondent to the variables of LnTA and CFEER are both statistically significant at a 1% significant level, presenting values of -0.195 and -0.157, respectively. Meaning that the greater the size of the bank and the higher the ratio of fee and commission income, the lower the ratio of capital. Further analysis will be performed in order to justify these results.

Regarding the control variables, the EBT is directly related to MCAP, as it presents a positive coefficient, which implies that banks present higher capital ratios when their earnings before taxes and LLPs to total assets is greater. Although is not statistically significant.

As expected, the variable of GDP is negative and not statistically significant for this model. Although, this result supports the evidence of pro-cycle behavior of banks on economic fluctuations, found by Leventis et al. (2011).

We also control for DLISTED as this type of banks may have other incentives in terms of control variable. We also include the dummies of countries in order to control for regulation effects.

Regarding the second model, which aims to test if the implementation of the IFRS 9 decreased the risk incurred by European banks, findings provide evidence that the risk incurred by banks has decreased since the implementation of the new standard, confirming the second hypothesis (H2). The coefficient on DIFRS9 shows a value of 0.234 significant at a 1% level.

Previous studies refer that banks are required to have adequate and sufficient loan loss provisions in order to mitigate and decrease credit risk (Ozili & Outa, 2017) and that the application of the new standard contributed to the amending and improvement of the credit-risk significance for loan loss provisions (Oberson, 2021).

The variable of LOANS is positive (0.002) and statistically significant at a 1% level indicating that after the implementation of the new standard when the loans increase, the risk incurred by banks also increase.

The variable of LLPR presents a negative value (-0.396) at a significant level of 1%, which is related to the fact that some central banks require an enhancement of loan impairments in the period of pre-application of the IFRS9, which lead to this decrease, as it was explained before.

The variable of DLISTED is not statistically significant in this model, meaning that the state of the bank being listed or non-list does not influence the results. The variables of GDP, CFEER and MCAP are also not statistically significant and present negative values.

5. Conclusion

The present work intends to analyze the impact of the implementation of the IFRS 9 in European Bank's capital structure and risk.

The application of this standard brought several challenges and difficulties for the banking industry, especially when it came to the introduction of new models of credit losses and the reinforcement of effort in order to correspond to the expectations of supervisors on the continuing improving with the implementation of the norm. Considering this, is one of the

reasons for the selection of this topic, due to its importance and complexity that result in considerable alterations.

This research aims to investigate how the implementation of IFRS 9 in replacement of IAS 39 influenced the capital structure (hypothesis 1) and risk (hypothesis 2) of European Banks. Previous literature indicates that there is a negative relation when it comes to the application of the new standard and the capital structure. In other hand, the relation to the application of IFRS 9 and the variable of risk presents a positive association, meaning that the implementation of the new standard decreased the risk incurred by banks.

The period of application, the geographical area and the criteria used, were carefully chosen in order to create a sample that better correspond to the aim of what is intended to be studied in this research.

One of the limitations present in the research is that the effect of covid was not included and we only considered one main dummy variable which was related with the period of IAS 39, assuming a value of 0, and the period of implementation of IFRS 9, presenting a value of 1. The study could have accomplished different results if a control variable of covid-19 was included.

This study brings contributions to the literature because the application of this new standard in the banking industry implied many alterations that had significative impacts in a global level. This study presents important results to the literature because we can conclude that the capital structure increased with the application of the new standard, which means that banks now present a greater and stronger capital structure than they did with the application of IAS 39 and regarding the risk it is possible to verify that there is a decrease comparing the two periods.

The study presents results that lead to the conclusion that the implementation of IFRS 9 brought benefits to European banks.

Further research can focus on including a variable to study the influence of covid-19 in the years studied and other control variables, as one for controlling bank supervision. With this considerations, it might be achieved greater values and present results that more faithfully describe the risk of banks even with the pandemic situation that many changes brought to the world and to the economic and financial cycle.

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Appendix

Appendix I – Descriptive Statistics

| | | $MCAP_{it}$ | Z_{it} | $LOANS_{it}$ | $LLPR_{it}$ | EBT_{it} |
|---------------|----------------|-------------|----------|--------------|-------------|------------|
| IAS 39 | Mean | 2.176 | 1.549 | 1.809 | 0.779 | 0.940 |
| | Median | 1.84 | 1.84 | -3.16 | 0.32 | 0.825 |
| | Minimum | 0.69 | -2.36 | -67.89 | -6.6 | -0.58 |
| | Maximum | 9.53 | 3.91 | 575.87 | 8.75 | 3.98 |
| IFRS 9 | Mean | 2.403 | 1.761 | 4.987 | 0.478 | 0.762 |
| | Median | 2.025 | 2.015 | 1.14 | 0.24 | 0.66 |
| | Minimum | 0.96 | -2.62 | -63.44 | -1.25 | -2.04 |
| | Maximum | 16.59 | 4.91 | 563.85 | 11.6 | 2.62 |
| Total | Mean | 2.295 | 1.657 | 3.455 | 0.628 | 0.851 |
| | Median | 1.95 | 1.92 | -0.235 | 0.27 | 0.72 |
| | Minimum | 0.69 | -2.62 | -67.89 | -6.6 | -2.04 |
| | Maximum | 16.59 | 4.91 | 575.87 | 11.6 | 3.98 |

MCAP corresponds to the ratio of actual regulatory capital (primary or Tier I Capital) to the minimum required regulatory capital imposed by Basilea, which is 8% since 2013; Z corresponds to the value achieved in the Z-score metric, which is a ratio of risk measurement; LOANS corresponds to the variation of total loans; LLPR corresponds to the ratio of total Loan Loss Provisions to total of loans.

| | | NPL_{it} | GDP_{it} | $LnTA_{it}$ | $CFEER_{it}$ |
|---------------|----------------|------------|------------|-------------|--------------|
| IAS 39 | Mean | 10.891 | 2.718 | 18.168 | 0.769 |
| | Median | 4.91 | 2.05 | 18.135 | 0.67 |
| | Minimum | 0 | -1.8 | 13.57 | 0 |
| | Maximum | 100.71 | 24.4 | 21.65 | 6.38 |
| IFRS 9 | Mean | 5.753 | 1.366 | 18.353 | 0.772 |
| | Median | 3.37 | 2 | 18.245 | 0.65 |
| | Minimum | 0.07 | -11.3 | 14.77 | 0 |
| | Maximum | 70.22 | 13.6 | 21.84 | 6.58 |
| Total | Mean | 8.214 | 2.042 | 18.263 | 0.771 |
| | Median | 3.835 | 2 | 18.21 | 0.66 |
| | Minimum | 0 | -11.3 | 13.57 | 0 |
| | Maximum | 100.71 | 24.4 | 21.84 | 6.58 |

NPL corresponds to the non-performing loans to total loans; EBT corresponds to the earnings before taxes and LLP to total assets; GDP corresponds to the variation of the gross domestic product for each country and is used as proxy of economic growth; LnTA corresponds to the natural logarithm of total assets; CFEER – ratio of commission and fee income to total assets.

Appendix II - Pearson Correlation Matrix

| | Z_{it} | LOANS_{it} | LLPR_{it} | MCAP_{it} | EBT_{it} | NPL_{it} | GDP_{it} |
|---------|-----------------------|---------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|
| Z-score | 1 | | | | | | |
| LOANS | 0.114** | 1 | | | | | |
| LLPR | -0.489*** | -0.081* | 1 | | | | |
| MCAP | 0.102** | -0.010 | -0.161** | 1 | | | |
| EBT | 0.211*** | -0.021 | 0.196** | 0.039 | 1 | | |
| NPL | -0.416*** | -0.064 | 0.563*** | -0.150** | 0.114** | 1 | |
| GDP | 0.154** | -0.065 | -0.176** | 0.017 | 0.059 | 0.017 | 1 |
| LnTA | -0.026 | -0.069 | 0.024 | -0.192** | -0.336*** | -0.107** | -0.197** |
| CFEER | 0.038 | -0.000 | -0.029 | -0.021 | 0.175** | -0.029 | -0.008 |
| DIFRS9 | 0.078* | 0.044 | -0.120** | 0.079* | -0.146** | -0.188** | -0.158** |

| | LnTA_{it} | CFEER_{it} | DIFRS9_{it} |
|--------|--------------------------|---------------------------|----------------------------|
| LnTA | 1 | | |
| CFEER | -0.195** | 1 | |
| DIFRS9 | 0.056 | 0.002 | 1 |

MCAP corresponds to the ratio of actual regulatory capital (primary or Tier I Capital) to the minimum required regulatory capital imposed by Basilea, which is 8% since 2013; Z corresponds to the value achieved in the Z-score metric, which is a ratio of risk measurement; LOANS corresponds to the variation of total loans; LLPR corresponds to the ratio of total Loan Loss Provisions to total of loans; NPL corresponds to the non-performing loans to total loans; EBT corresponds to the earnings before taxes and LLP to total assets; GDP corresponds to the variation of the gross domestic product for each country and is used as proxy of economic growth; LnTA corresponds to the natural logarithm of total assets; CFEER – ratio of commission and fee income to total assets.

*** Significance level of 1%; ** Significance level of 5%; * Significance level of 10%.

Appendix III – Regression Model 1

| Independent Variables: | Coefficient | Coefficient | P-Value |
|----------------------------|-------------|--------------|---------|
| LOANS | β_1 | -0.001*** | 0.099 |
| LLPR | β_2 | -0.063* | 0.007 |
| NPL | β_3 | -0.003*** | 0.087 |
| EBT | β_4 | 0.044 | 0.464 |
| GDP | β_5 | -0.011 | 0.155 |
| LnTA | β_6 | -0.195*** | 0.000 |
| CFEER | β_7 | -0.157*** | 0.000 |
| DLISTED | β_8 | -0.144** | 0.016 |
| DIFRS9 | β_9 | 0.227*** | 0.001 |
| DCOUNTRY | - | Yes | |
| R² | | 0.398 | |
| N.º of observations | | 605 | |

MCAP corresponds to the ratio of actual regulatory capital (primary or Tier I Capital) to the minimum required regulatory capital imposed by Basilea, which is 8% since 2013; LOANS corresponds to the variation of total loans; LLPR corresponds to the ratio of total Loan Loss Provisions to total of loans; NPL corresponds to the non-performing loans to total loans; EBT corresponds to the earnings before taxes and LLP to total assets; GDP corresponds to the variation of the gross domestic product for each country and is used as proxy of economic growth; LnTA corresponds to the natural logarithm of total assets; CFEER – ratio of commission and fee income to total assets.

*** Significance level of 1%; ** Significance level of 5%; * Significance level of 10%.

Appendix IV – Regression Model 2

| Independent Variables: | Coefficient | Coefficient | P-Value |
|---|--------------|--------------|---------|
| LOANS | β_1 | 0.002** | 0.039 |
| LLPR | β_2 | -0.396*** | 0.000 |
| NPL | β_3 | -0.013*** | 0.004 |
| EBT | β_4 | 0.810*** | 0.000 |
| GDP | β_5 | 0.066*** | 0.000 |
| LnTA | β_6 | -0.017 | 0.727 |
| CFEER | β_7 | -0.094 | 0.166 |
| MCAP | β_8 | 0.017 | 0.636 |
| DLISTED | β_9 | 0.109 | 0.333 |
| DIFRS9 | β_{10} | 0.234*** | 0.010 |
| DCOUNTRY | - | Yes | |
| R² | | 0.474 | |
| N.° of observations | | 605 | |
| <p>MCAP corresponds to the ratio of actual regulatory capital (primary or Tier I Capital) to the minimum required regulatory capital imposed by Basilea, which is 8% since 2013; Z corresponds to the value achieved in the Z-score metric, which is a ratio of risk measurement; LOANS corresponds to the variation of total loans; LLPR corresponds to the ratio of total Loan Loss Provisions to total of loans; NPL corresponds to the non-performing loans to total loans; EBT corresponds to the earnings before taxes and LLP to total assets; GDP corresponds to the variation of the gross domestic product for each country and is used as proxy of economic growth; LnTA corresponds to the natural logarithm of total assets; CFEER – ratio of commission and fee income to total assets.</p> | | | |
| <p>*** Significance level of 1%; ** Significance level of 5%; * Significance level of 10%.</p> | | | |