Risk-Weighted Assets and Market Value: How relevant is Audit Quality?

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Master's in International Management

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Acknowledgments

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My sincere thanks to everyone who supported me,
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Resumo

Os constantes escândalos financeiros e as recentes crises económicas mundiais, têm vindo a pôr em causa a Qualidade de Auditoria e a confiabilidade do relato financeiro no mercado de capitais. Uma supervisão bancária mais robusta e uma eficiente gestão de risco contribuem para uma melhor adequação de capital nos bancos e, consequentemente, promovem a estabilidade financeira no setor bancário.

O presente estudo tem como objetivo analisar a relação entre o Risk-Weighted Assets de vários bancos Europeus e o seu respectivo valor de mercado, a fim de identificar a influência da qualidade da auditoria nesta relação**.** Para o efeito, é utilizada uma amostra de 94 bancos de 22 países europeus, entre o período de 2007 a 2020. As variáveis em análise assumem a forma de variáveis específicas do banco, institucionais e macroeconómicas.

Os resultados demonstram que o *Risk-Weighted Assets, a* dimensão dos bancos e os empréstimos em incumprimento têm uma influência negativa no *valor de mercado*. Por outro lado, a rendibilidade e a qualidade de auditoria têm uma influência positiva.

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Abstract

The constant financial scandals and the recent world economic crises have intensified the debate on Audit Quality and the reliability of financial reporting in the capital markets. More robust banking supervision and efficient risk management contribute to better capital adequacy in banks and, consequently, promote financial stability in the banking sector.

The present study aims to analyse the relationship between the Risk-Weighted Assets of several European banks and their respective market value, in order to identify the influence of audit quality on this practice. For this purpose, a sample of 94 banks from 22 European countries is used, covering the period from 2007 to 2020. The variables under analysis take the form of bank-specific, institutional, and macroeconomic variables.

The results show that Risk-Weighted Assets, the size of banks, and Non-performing loans have a negative influence on the market value. On the other hand, Profitability and Audit Quality have a positive influence.

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List of Acronyms

Big 4 – Four largest accounting firms Deloitte, EY, KPMG and PwC

CEO – Chief Executive Officer

CFO – Chief Financial Officer

CRO – Chief Risk Officer

CAR – Capital Adequacy Ratio

EU – European Union

ECB – European Central Bank

ESFS – European System of Financial Supervision

ESA – European Supervisory Authority

EBA – European Banking Authority

ESMA – European Securities and Markets Authority

EIOPA – European Insurance and Occupational Pensions Authority

ESRB – European Systemic Risk Board

EBIT – Earnings Before Interest and Taxes

SSM – Single Supervisory Mechanism

SRM – Single Resolution Mechanism

EDIS – European Deposit Insurance Scheme

SRB – Single Resolution Board

SRF – Single Resolution Fund

BCBS – The Basel Committee on Bank Supervision

BIS – Bank for International Settlements

NIM – Net Interest Margin

NCA – National Competent Authority

CRR – Capital Requirements Regulation

CRD – Capital Requirements Directive

BRRD – Bank Recovery and Resolution Directive

ERM – Enterprise Risk Management

RM – Risk Management

COSO – Committee of Sponsoring Organizations of the Treadway Commission

BLRC – Board-level Risk Committee

ROE – Return on Equity

ROA – Return on Assets

RWA – Risk-Weighted Assets

SR – Solvency Ratio

IRB – The Internal Ratings-Based Approach

BIA – Basic Indicator Approach

GDP – Gross Domestic Product

BHC – Bank Holding Company

NPL – Non-performing loans

IIA – Institute of Internal Auditors

EBIT – Earnings Before Interest and Taxes

1 – Introduction

The so-called financial crisis, which spread to Europe in 2007 and 2008, had a strong impact on the banking sector, leading to serious problems with financial instability around the world and the bankruptcy of large international financial institutions.

This financial instability highlighted the need to upgrade the prudential and supervisory measures in the European Union. Thus, the Single Rulebook provides legal and administrative standards to regulate, supervise and govern the financial sector more efficiently in all EU countries (European Central Bank, 2022). However, according to European Parliament (2018), "regulation alone is not enough, [which means that] without good supervision, regulation can be worthless".

In this context, the Basel Committee on Banking Supervision has been establishing the "Basel Accords" with the aim of strengthening and improving the quality of banking regulation and supervision. In turn, strengthening the capital adequacy ratio, calculated as the ratio between regulatory capital and Risk-Weighted Assets (RWA), became one of the priorities after the financial instability occurred. However, the rules imposed by Basel Accord III only focused their attention on the numerator of the capital adequacy ratio (Regulatory Capital), rather than its denominator (RWA). Therefore, it has become evident how critical it is to understand more about RWA and bank's risks to provide reasonable assurance regarding the achievement of entity objectives (COSO, 2004).

Audit Quality has an important role in providing a complete "picture" of firm's performance, strategic position and business risks to the investors and participants of the market. Thus, it is possible to increase the transparency of the financial reports and the ability to create value to the market. It is in this context that the present investigation results, where it is intended to perceive the influence that some characteristics of the banks' structure, as well as institutional and macroeconomic factors have on the firm value. The sample consists of 94 banks from 22 European countries with securities admitted to trading on European stock exchanges, obtained through the Eikon Darabase.

In the next sections, the characteristics of the European banking sector are presented, the literature review where the main concepts related to the study theme are developed and finally, the study methodology is described, and the results are discussed.

1.1 – Characterization of the European banking sector

The financial system contributes to the development and the stability of the economy. Institutions and financial markets are both key components of every contemporary economy. The basic economic purpose of a financial institution is to assist in channeling money from entities with savings to entities that need funds (Bank of Portugal, 2019). According to European Central Bank (ECB), 88% of the Monetary Financial Institutions (MFIs) in the European Union (EU27) are credit institutions, which include banks and all institutions that receive deposits and grant credits (European Central Bank, 2022) (Appendix 1). As, we can see in appendix 2, from december 2007 to december 2021, the number of credit institutions in the European Union's countries decreased considerably (Statista, 2022) (Appendix 2), which can be explained by the decline of bank branches in these countries.

Banks extends loans to both people and businesses. Individuals will save and invest for the future, and their funds will be directed into permissible savings. Enterprises and households can manage risks more effectively and protect themselves from dangers, while also simplifying the payment. In July 2022, there was a total of 5,171 banks operating in the European Union 27 (Statista, 2022) (Appendix 3). Germany is the European country with the highest number of operating banks (1,427) and its banking industry have total assets of approximately 4,1 billion euros, which is higher comparing with the mean of Euro Area with 1,06 billion euros (European Banking Authority, 2021) (Appendix 4). Globally, the total assets in the Eurosystem grew from 2013 to 2021, underlining a substantial rise between 2019-2021 (Statista, 2022) (Appendix 5).

Even though it maintains an EU perspective, many of the trends can also be observed in other regions and some are truly global in nature. In fact, financial markets are strongly connected, and the recent financial crisis revealed it. No EU's country can manage the financial sector or monitor potential threats to financial stability on its own.

Despite the positive results of the economic growth in the first half of 2022 related to the controlling of the Covid-19 pandemic, the world economy is still experiencing moments of instability due to the economic consequences of the war in Ukraine. Inflation in the euro area increased from 0.9% in January 2021 to 9.1% in August 2022 (European Central Bank, 2022). The extremely high prices of energy products and food raw materials, as well as the upward pressure resulting from the reopening of the economy, the scarcity of supply and the restrictiveness of labor markets are some examples of this instability (European Central Bank, 2022). In this context, banks began to demand greater compensation for exposure to dynamics

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of inflation, revising its long-term interest rates (European Central Bank, 2022). The expected impact of rising interest rates on bank's profitability in Europe was analyzed in Appendix 6 (Statista, 2022). Considering this survey conducted in the first quarter of 2022, the vast majority (77% and 10%) expect a positive impact of the increasing of interest rates on their banks.

The Net Interest Margin (NIM) – a measure of profitability for banks – displays positive results in all European members. The mean of the euro area was 1.30% (European Banking Authority (2021) (Appendix 7), which not represent a high NIM across the Euro area, so it could represent a risk in the future.

To conclude, Covid-19 boosted the adoption of online banking and the use of digital payments. Around 40% of adults in developing economies made a digital payment using a card, phone, or internet (World Bank Group, 2022). This population had at least one banking connection, such as demand deposit accounts, savings deposit accounts, or investment deposit current accounts. As we could see in appendix 8, online banking is becoming one of the most popular payment methods in Europe and Europeans' confidence in electronic payment has increased too (Statista, 2022).

1.2 – Prudential and Supervisory Measures

1.2.1 – Context and Objectives

The financial sector is subject to a rigid regulatory and supervisory framework that is intended to promote financial stability and protect consumers from financial services. To make sure that financial organizations appropriately follow the established rules and regulations, supervision is the control procedure. Supervision is a process of control designed to ensure that financial institutions correctly apply these rules and regulations (European Parliament, 2018).

The global financial crisis highlighted the need to enhance and upgrade the European regulatory and supervisory architecture (European Parliament, 2018). As a result, the EU implemented several changes to reassess how the EU financial industry is governed and overseen. The European System of Financial Supervision (ESFS) was introduced in 2010 and went into operation on January 1, 2011. The ESFS is composed by the European Supervisory Authorities (ESAs), which are the European Banking Authority (EBA) in the banking sector, the European Securities and Markets Authority (ESMA) in the field of financial instrument markets, and the European Insurance and Occupational Pensions Authority (EIOPA) in the

insured and supplementary retirement pensions sector. On cross-sectoral and horizontal issues, ESAs work together in the Joint Committee. On the other hand, ESFS is also composed by the European Systemic Risk Board (ERSB), and the national supervisors (European Central Bank, 2022; European Parliament, 2018; Portuguese Association of Banks, 2019).

According to the European Parliament (2018), the ESFS's main objective is to ensure that the rules applicable to the financial sector are properly implemented in all Member States in order to preserve financial stability, promote confidence and protect consumers. The ESFS also aims to develop a common supervisory culture and facilitate the realization of a single financial market at European level (European Parliament, 2018). The following figure presents the European financial supervisory model to better understand the structure of ESFS.

Figure 1.1 - EU's Supervision Framework
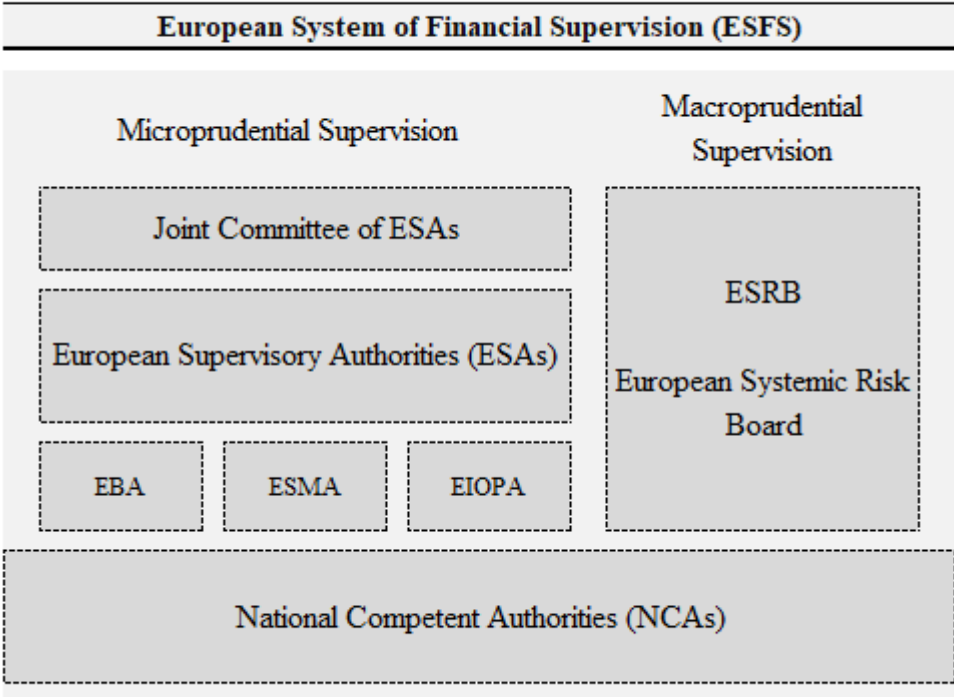
Source: Adapted from Council of the EU and the European Council's website

1.2.2 – Micro and Macroprudential Supervision

The ESFS combines micro and macroprudential supervision. In the EU, ESAs are responsible for the *microprudential supervision* which are concerned with the supervision of individual institutions such as banks, insurance companies or pension funds (European Central Bank, 2022). These individual institutions are separated according to the sectoral area and distinguished by the level of supervision and regulation (European and national). The main objective of microprudential supervision is to reduce the probability and limit the impact of a financial institution's default, while protecting the clients of those institutions (European Parliament, 2018). The intention was not to take the role of National Competent Authorities (NCAs), but to establish a network with national authorities in charge of day-to-day supervision and, if necessary, European authorities' arbitration between national authorities.

Thus, the ESAs contribute to the harmonization of financial supervision in EU. By defining a single set of prudential rules, ESAs are responsible for ensuring a consistent application of that rules in EU, and for assessing potential risks and vulnerabilities of the financial sector (European Central Bank, 2022).

The global financial crisis demonstrates how the EU's pre-crisis supervisory architecture emphasis the regulation of individual financial institutions and underemphasized the macroprudential dimension. The ESRB was therefore established, and it assumed responsibility for the *macroprudential supervision* of the EU financial system (European Systemic Risk Board, 2022). The objective consists of mitigating the systemic risks. The ESRB assess the vulnerabilities to the financial system's stability that arise from macroeconomic developments, and it proposes recommendations on how to manage systemic risks in order to protect the global economy from significant losses in terms of real production (European Commission, 2013).

This network of authorities contributes to the harmonization of standards that, when applying to financial institutions under a single set of regulations, promotes consistency, integrity and transparency in supervisory practice.

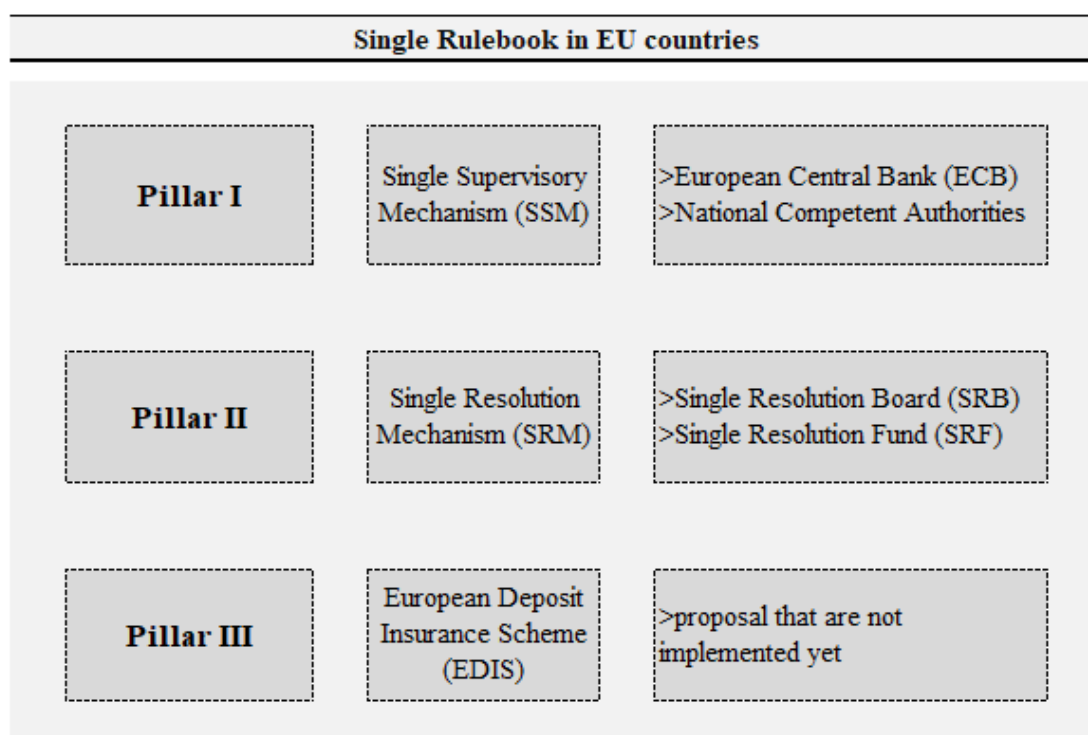**1.2.3 – A Robust Financial Framework for the Single Market**

The EU's regulatory and supervisory framework has continued to develop over time. The pre-crisis framework was unable to respond to the financial crisis. In fact, there were no resources available to deal with the collapse of large cross-border banks, as well as, when the financial

crisis spread to Europe in 2008, we had 27 different regulatory frameworks for banks in place (European Commission, 2013). Most of these systems were based on national regulations and procedures, so that only certain limited European regulations and coordination mechanisms existed. Thus, European Commission implemented a robust financial framework for all 28 Member States in EU, which established a single regulatory framework with better regulation and supervision of the financial industry. A *Single Rulebook* – a stronger prudential requirement for banks across the EU with a single set of rules – was implemented. With this basic framework, it was possible to achieve regulatory harmonization for the European Union's financial sector and a single market for financial services (European Commission, 2013; European Commission, 2014). A single market for financial services benefits consumers and millions of enterprises when enable them to purchase financial services from any commercial operator under equal conditions and contractual obligations throughout the European Union.

To strengthen the banking sector and restoring confidence in the euro zone, the so-called "Banking Union" was created in 2013 (European Parliament, 2018). The banks hold more and better quality of capital, strengthen their risk governance as well as reinforced the stability and resilience to crises of financial services infrastructure. Consumers started to take better informed decisions, which results in a higher rate of return on investment and a larger influence on the single market's competitiveness, innovation, and development. The purpose of the banking union is to make European banking more transparent, unified and safer (European Central Bank, 2022).

In this context, it was decided to create a model based on three pillars: a Single Supervisory Mechanism (SSM), a Single Resolution Mechanism (SRM) and a European Deposit Insurance Scheme (EDIS). The Figure 1.2 summarizes the single banking supervision mechanisms in the euro area that are represented by the three pillars.

Figure 1.2 - Pillars of the Banking Union

Single Rulebook in EU countries		
Pillar I	Single Supervisory Mechanism (SSM)	>European Central Bank (ECB) >National Competent Authorities
Pillar II	Single Resolution Mechanism (SRM)	>Single Resolution Board (SRB) >Single Resolution Fund (SRF)
Pillar III	European Deposit Insurance Scheme (EDIS)	>proposal that are not implemented yet

Source: Own Elaboration

The Single Supervisory Mechanism (SSM) is composed by the ECB and the appropriate national authorities of the euro area's Member States. The main task of the ECB and the national supervisory authorities, which corporate closely in an integrated system, is to verify if banks comply with EU prudential rules and if they quickly resolve financial problems. The ECB is responsible for: a) ensuring the consistent and effective application of regulations and supervisory policies; b) for taking harmonized supervisory and corrective action; and c) for establishing a common approach to day-to-day supervision of significant institutions while national supervisors continue to control the others (European Central Bank, 2022)

The second pillar (the Single Resolution Mechanism) contributes to an efficient management of the bank's resolution through a centralized resolution authority, the Single Resolution Board (SRB), and a common mechanism for funding resolution actions, the Single Resolution Fund (SRF) (European Council Council of the European Union, 2020). This fund is financed exclusively by contributions from all banks in participating countries. This rule ensures that shareholders and creditors – not taxpayers – are the first to pay the bill in the event of a bank's insolvency. In this context, the Single Resolution Mechanism have clear decision-making rules for resolving cross-border banking crises, which enables more

efficiency in the implementation of resolution than the current multiplicity of national resolution authorities (European Central Bank, 2022).

The last pillar, which is still to be implemented, is the European Deposit Insurance Scheme (EDIS). This is a commission proposal for a deposit guarantee mechanism in Europe that ensures protection of deposits below a certain amount in all institutions across the euro area.

1.3 – Basel Accords

The Basel Committee on Bank Supervision (BCBS) was created in 1974 by representatives of the central governments of Belgium, Canada, the United States, France, the Netherlands, Italy, Japan, the United Kingdom, West Germany, Sweden, and Switzerland (G-10 Group) in response to instabilities that occurred in the international financial and currency markets. The meetings are conducted at the Bank for International Settlements (BIS) headquarters in Switzerland. This Bank is the certifying authority for international transactions and the creator of suggestions that became global standards for central banks, with the Basel Committee as its primary body.

In 1988, the BCBS published the so-called Basel I Accord, by publishing the "*International Convergence of Capital Measurement and Capital Standards*". The main purpose was to maintain the banking system's strength and security, and to significantly reduce the competitive disparities between banks and worldwide banking systems (Caiado & Caiado, 2018) through the harmonization of minimum capital requirements – banks are required to always have a minimum capital that would serve as collateral for unexpected losses. The minimum capital requirements is relate to the capital required for creditors and counterparties to see the financial institution as viable in terms of continuity and healthy operation, minimizing the possibility of bankruptcy in the banking system.

With the increase of market volatility, the collapse of large companies affecting financial institutions, and the limitations of the first agreement, the Basel II Accord – "*International Convergence of Capital Measurement and Capital Standards: A Revised Framework*" – was implemented in the EU in 2004, as an extension of regulations for minimum capital requirements as defined under Basel I. The objectives of this new agreement were to align bank capital requirements with the risks they face, to increase the sensitivity of capital requirements, as well as to develop efficient risk management. However, it also intended to adapt to market innovation and to complement the minimum capital requirements through the

action of supervisory authorities and market discipline. In this context, whereas Basel I focused only on minimum capital requirements, the Basel II framework is structured on three complementing pillars:

i. **Minimum Capital Requirements (Pillar I):** specifies distinct options for computing capital requirements for each risk category, such as credit, market, and operational risks (Caiado & Caiado, 2018). It was possible to establish the formula for calculating the minimum own funds taking into account the various options for calculating those risks. These calculation methods will be presented in the session 2.2 of this study.

ii. **Supervision Review Process (Pillar II):** focuses on the reinforcement of the evaluation process by the supervisory authority, which aggregates a set of principles intended to improve the relationship between the financial institution's risk profile, risk management, risk mitigation systems and its own funds. This pillar promotes the development of strategies, procedures, and control mechanisms to calculate and maintain adequate capital to cover the nature and magnitude of the risks they are likely to be exposed to (Leal, 2017). The Supervisory Authorities (including, for instance, the European Central Bank, in the context of the Single Supervisory Mechanism), have the responsibility for assessing the adequacy of such strategies and control these procedures, imposing corrective measures when consider that the own funds held are not compatible with the institutions' risk profile.

iii. **Market Discipline (Pillar III):** introduce requirements for institutions to disclose information to the public (for example customers, counterparties, investors, and analysts) about their solvency and risk profile, with the goal of maintaining an effective market discipline by promoting transparency and market participants' awareness of risks incurred by the institution (Caiado & Caiado, 2018). It promotes a better distinction between institutions, rewarding those that manage risk effectively and punishing those that do not (Leal, 2017).

According to Caiado and Caiado (2018) and Mohanty (2008), these pillars contributed to the financial system's confidence and credibility, as well as to the strengthening of market discipline and transparency. However, with the financial crisis that occurred at the beginning of 2007, it became clear that banks built up an excessive degree of leverage and maintained an

inadequate level of capital. This volatility was mainly accompanied by a lack of liquidity in the banking system, which naturally caused a decrease in the confidence of market players. In response to the international financial crisis, the **Basel III Accord** "*A global regulatory Framework for more resilient banks and banking systems*" was established. The Basel III Accord consists of the development of a set of measures to strengthen the regulation, supervision, and post-crisis risk management of banks (Neves, 2020), by enhancing the capacity of the banking sector to absorb shocks, enhancing risk management, and strengthening bank transparency and disclosure information (Caiado & Caiado, 2018).

According to Bank for International Settlements (2008), "liquidity is the ability of a bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses". To address banks' shortage of liquidity during the time of financial instability, minimum liquidity requirements were implemented based on two strategies:

i. **Liquidity Coverage Ratio (LCR):** guarantee that banks maintain exceptional asset quality to survive during stress circumstances within 30 days (promotion of short-term liquidity resilience).

ii. **Net Stable Funding Ratio (NSFR):** is represented by the quotient between Stable Funding Available and Stable Funding Required, so that banks can finance their operations through more stable funding, while guaranteeing independence from short-term funding (promotion of medium-term liquidity resilience – 1 year).

1.4 – Adoption of the Basel Accords in the EU banking sector

The Basel III Accord is a set of rules that were adopted by the European Union to face the liquidity and solvency crisis of the banking sector. The European banking regulatory framework is based on the previously mentioned Basel Accord, whose consistent implementation at the global level is fundamental to have a solid financial system (Neves, 2020). While the proposed EU regulations are similar to those developed by the Basel Committee, they are not an exact copy of them: the legal and institutional frameworks are different and the specific features of the European financial system, such as the role of the single market, justify some deviations too (Dierick et al., 2005).

The Basel III Accord was implemented in the European Union through Regulations and Directives with the purpose of creating post-crisis risk management measures and

strengthening the banking sector's resilience to absorb shocks across the European Union while ensuring financial stability (Rubio & Carrasco-Gallego, 2016):

i. **Capital Requirements Regulation (CRR):** Regulation 575/2013, approved by the European Parliament in April 2013 and implemented in 2014. This regulation establishes prudential requirements for own funds, liquidity and credit risk for credit institutions and investment firms (Caiado & Caiado, 2018).

ii. **Capital Requirements Directive (CRD IV),** Directive 2013/36/EU, approved by the European Parliament in April 2013, and it was transposed to Portuguese law through the Decree-Law in 2014. This Directive is related to access to the banking activity of credit institutions and the prudential supervision of credit institutions and investment firms.

In the European regulatory framework of the European Parliament and of the Council, it was also stablished the **Bank Recovery and Resolution Directive (BRRD)**, Directive 2014/59/EU, which includes rules to set up a national resolution fund that must be established by each EU member. Contributions to these funds are required from all financial institutions, and they are determined by the size and risk profile of the institution.

The scope of application is one of the main diverging aspects between EU regulations and the Basel Accords ((Dierick et al., 2005). These rules were not only applicable to active international banks, but also extendable to all banks (over 8000) as well as investment entities, independently of their size or their geographical scope of the activity.

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2 – Literature review

2.1 – Enterprise Risk Management and Risk Reporting

The financial crisis in 2007 had a strong impact on the banking sector, leading to the bankruptcy of large corporate companies, for instance Lehman Brothers, Beal Stearns and Merrill Lynch (Buckby et al., 2015). As a result of this widespread instability, it has become evident how critical it is to understand more about banking risk factors and to use the right regulatory tools to keep the financial system stable. According to Lackovic (2017), the crisis highlighted the ineffectiveness of risk management practices and the need for a risk management approach within organisations.

Pinto et al. (2019) defines risk as "the probability that a given situation will have an outcome that is not the desired one". Srinivasan and Dhankar (2015) consider that this output is often an unexpected volatility of results, and therefore, includes losses or results greater than expected. According to the Bank of Portugal (2007), risk represents "the probability of occurrence of events that significantly affect the financial condition of the institution (...)". In the context of the banking sector, Raghavan (2003) emphasizes that risk is associated with potentiality of expected and unexpected events to act on the bank's capital and results.

With the development of the financial institutions' activities, banks are subject to several risks. From the perspective of the Bank of Portugal (2007), the bank's risks may be classified into four categories: credit risk, market risk, interest rate risk, and exchange rate risk. In this context, Al-Tamimi and Al-Mazrooei (2007) concluded that the bank is a risky business, and for this reason efficient risk management is needed. Along the same line, Shad and Lai (2018) considered that the awareness and understanding of enterprise risk management are useful to the board of directors, top management, auditors, and other relevant stakeholders when creating policies and evaluating organizations' businesses performance.

Enterprise Risk Management (ERM) is now rapidly becoming popular among organizations and people all over the world. The existing literature stated several definitions of the concept of Risk Management (RM). According to the Committee of Sponsoring Organizations of the Treadway Commission (COSO) (2004):

"Enterprise risk management is a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite – level of risk accepted by the organization – to provide reasonable assurance regarding the achievement of entity objectives.".

Malik et al. (2019), Callahan and Soileau (2017) and Amran et al. (2009) stated that ERM consists of methods and processes through which organisations manage their risks and capture opportunities consistent with their strategic objectives. In the banking context, the concept of RM is understood as the process of identification, assessment, and classification of the bank's risks, as well as the methods and procedures used for their measurement, monitoring, and control (Angelopoulos Mourdoukoutas et al., 2001).

Given the concern with RM and the need for a structure capable of identifying, assessing, and managing risks, the COSO implemented a risk management framework which identifies 8 components that represent the means needed for the organization to achieve its objectives: Internal environment, Objective setting, Event identification, Risk assessment, Risk response, Control activities, Information and communication and Monitoring (COSO, 2004). Amran et al. (2009) considered that this framework typically involves a few processes: firstly, the careful identification, measurement, and assessment of risk types that a company might face; secondly, it involves the formulation of a response model or strategic action to face the risks (both threats and opportunities); finally, it requires the monitoring and checking of the implementation of all the actions planned as proposed by the response strategy. COSO questionnaire (2010) on the understanding extent of the use of ERM indicates that its framework is the most widely recognised among enterprises (36.7% of respondents stated that they were familiar with its structure and only 7.9% indicated that they were completely unaware).

Table 2.1 indicates the main studies on ERM and the influence on the capital market.

Table 2.1 - ERM and the influence on the capital market

Authors	Sample	Findings
Malik et al. (2019)	260 observations from FTSE350 listed firms in the UK during 2012–2015	Effective ERM processes improve firm performance, ERM is positively related to firm performance. Strong board-level risk committee (BLRC) improves the ERM and firm performance relationship.
Callahan and Soileau (2017)	Web-based survey responses of internal audit management of U.S based publicly traded firms that provide an assessment of overall ERM processes and the maturity related to each objective (strategy, operations, reporting, compliance) during a three year period from 2006 to 2008	Positive association between ERM Maturity and operating performance (ROA and ROE).

Hoyt and Liebenberg (2011)	117 firms or 687 firm-year obeservations from the insurance industry for the period 1998–2005	Positive relation between ERM and firm value.
Gordon et al. (2009)	112 US firms that disclose the implementation of their ERM activities in their 2005 10K and/or 10Q reports	Positive relation between ERM and firm performance. This relation is contingent on the proper match between ERM and the following five variables: environmental uncertainty, industry competition, firm complexity, firm size, and monitoring by the board directors.
Shad and Lai (2018)	Malaysian oil and gas companies for five years over the period (2013–2017)	ERM implementation in organizations promotes competitiveness and enhance firm's value.
Liebenberg and Hoyt (2003)	All U.S. firms that announced the appointment of a CRO between 1997 and 2001	CRO appointment signals the initiation of ERM because CROs are generally appointed to implement and manage ERM programs.
Beasley et al. (2008)	120 firms announcing the appointment of a senior executive overseeing the ERM processes from 1992-2003	Market response to ERM adoption, as proxied by CRO appointment, is firm specific.
Pagach and Warr (2010)	106 firms that announce the hiring of a Chief Risk Officer (CRO) from 1992 to 2004	Firms that have a positive market reaction to the announcement of a CRO, have lower earnings volatility. ERM encourages to deliver organisational benefits by reducing volatility of earnings and equity prices, increasing investment efficiency, and creating synergy in the overall RM process.
Baxter et al. (2013)	165 firm-year observations from insurance and financial institutions over a three-year period (2006-2008)	Firms with higher ERM quality exhibit a stronger financial position and higher market value. ERM processes are strongly associated with improved firm performance. Standard & Poor's ERM Quality ratings have a positive association with operating performance and firm value within the financial sector.
McShane et al. (2011)	82 firm observations from the insurance industry	Positive association between the Standard & Poor's (S&P) ERM Quality rating and firm value (Tobin's Q) within the insurance industry.
Farrell and Gallagher (2015)	Data from the industry leading Risk and Insurance Management Society Risk Maturity Model over the period from 2006 to 2011, which scores firms on a five-point maturity scale	ERM maturity levels are positively associated with firm value. Top-down executive engagement and organisational ERM culture are important elements from a value generation perspective.
Grace et al. (2015)	Firms that are not viable operating entities because they are under regulatory supervision or experiencing other financial difficulties, and firms not actively participating in the insurance market from 2004 to 2006.	The use of economic capital models and dedicated risk managers improve operating performance. ERM increases cost and revenue efficiency. Report ERM initiatives increase efficiency where there is a link between the economic capital model and dedicated RM reporting to the board or CEO.

Source: Own Elaboration

These findings indicate the relationship between ERM, firm value and firm performance (Malik et al., 2019; Callahan & Soileau, 2017; Hoyt & Liebenberg, 2011; Gordon et al., 2009; Baxter et al., 2013; McShane et al., 2011; Farrell and Gallagher, 2015).

Malik et al. (2019) and Hoyt and Liebenberg (2011) found a positive association between ERM and firm performance. In fact, firms with mature ERM processes should achieve greater operational performance than those with less mature risk management processes. This result infers the higher the effectiveness of a firm's ERM, the greater the ability of the firm to achieve its strategic objectives i.e. strategy, operations, reporting, and compliance (COSO, 2004).

Multiple studies have concluded that RM is the mechanism through which a business may minimise earnings volatility and reduce external capital costs (Hoyt & Liebenberg, 2011; Grace et al., 2015). According to Albasteki et al. (2019), ERM improve decision making, efficient gathering of information, and strengthen corporate governance. Shad and Lai (2018) illustrates that there is substantial evidence that ERM implementation in organizations promotes competitiveness and enhance firm's value. ERM might be considered a strategic asset that can provide a competitive advantage (Saeidi et al., 2019) while developing objectives and strategies that increase the probability of the firm.

Callahan and Soileau (2017), Baxter et al. (2013) and Grace et al. (2015) concluded that there is a positive association between ERM Maturity and operating performance (ROA and ROE). If the ERM maturity levels increase, the profitability also increase.

Beasley et al. (2008) argue that the magnitude of the market reaction to the announcement of a Chief Risk Officer (CRO) is conditional on firm-specific characteristics. Pagach and Warr (2010) concluded that firms that have a positive market reaction to the announcement of a CRO have lower earnings volatility. ERM encourages to deliver organisational benefits by reducing volatility of earnings and equity prices, increasing investment efficiency, and creating synergy in the overall RM process (Pagach and Warr, 2010).

Nocco and Stulz (2006) present the benefits of ERM both at the macro and micro level. ERM focuses on quantifying and managing organizational risk-return trade-offs, which makes it easier to access the market and other resources for corporate strategy at the macro level. At the organizational level, ERM guarantees that decision-making happens at all levels, ensuring that every business unit evaluates risk as part of its decision-making processes. ERM's benefits strives to create and maximise value for its shareholders by integrating the management of several types of risks (Renzi & Vagnani, 2020). ERM has been considered as a key factor in attaining organizations goals and wealth creation.

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According to the COSO (2004), "companies will continue to face a future full of uncertainty, complexity, and volatility". Stulz (2014) stated that risk management can destroy the value of a bank in two ways. The first relates to ineffective risk management, in the sense that it does not adequately identify the relevant risks. The second is characterised by rigid and inflexible risk management, in which banks avoid risks as much as possible, even when they are valuable. The inefficiencies in the banks' risk management were also perceived by the Basel Committee when implemented different Basel Accords as mentioned before. ERM will be essential for organisations to manage and succeed with the intention to increase the firm's long and short-term value for its stakeholders.

Several studies have been conducted around the world on the management risk practices exercised by banks and on the techniques used to manage the multiple types of risk. Bledow et al. (2019) compared the regulation of ERM between Australia, Germany, and the USA, and this research found clear differences in each country's approach, with USA having the highest level of ERM's regulation, followed by Australia and finally Germany. From a management perspective, and to mitigate the differences in each country's approach, Zeghal and El Aoun (2016) propose global cooperation in the harmonisation of worldwide ERM regulations to stabilize the global financial system and to prevent enterprises from taking unnecessary risks. The adoption of a comprehensive and organic ERM can lead to the effectiveness of a corporate governance system in a firm, which is conceived as a set of rules according to which a firm is managed and governed by its top managers (Renzi & Vagnani, 2020). This interconnection between risk management and the characteristics of corporate governance was investigated by Aebi et al. (2012), during the 2007-2008 financial crisis. The research indicated that banks perform significantly better when the Chief Risk Officer reports to the board of directors instead of to the Chief Executive Officer (CEO). This result is justified by the presence of potential conflicts of interest between the CEO and the CRO. However, characteristics such as CEO ownership, board independence, and shareholder rights also influence positively the financial performance of banks (Aebi et al. (2012). As a result, it is acknowledged that the existence of a CRO is fundamental to ensure the implementation of the ERM Framework as a whole.

From an investor perspective, risk disclosure, risk appetite, and risk management are fundamental components of decision making (Lajili, 2009). Risk disclosure is defined as the disclosure of information regarding any opportunity, danger and threat that may have caused or is likely to cause consequences for companies in the future (Linsley & Shrives, 2006). The fact that the risk is explained more adequately contributes to investors having a better

understanding of the operations and risks, which in turn facilitates their decision making and improve portfolio-investment decisions (Nahal et al. 2016c). An efficient communication of risk management practices is a critical component for the quality of the disclosure and for an effective corporate governance (Buckby et al. 2015). Miihkinen (2013) studies the impact of risk disclosure on information asymmetry in Finland, and concluded that the quality of risk disclosure has a direct negative influence on information asymmetry. He also shows evidence that risk disclosures are more useful when provided by small enterprises, high-tech firms, and firms with little analyst coverage. The stock market condition has also an effect on the relevance of corporations' risk disclosures (Miihkinen, 2013). The results are in line with those of Campbell et al. (2014) who demonstrate a negative association between information asymmetry and corporate risk disclosures in the US, being able to be incorporated by investors in quoted prices, influencing the liquidity of the capital market. These results could be also generalized to Canada, UK, and Germany (Campbell et al., 2014).

Lower quality disclosures may reduce the information value of firms' risk reviews. In this way, high-quality risk disclosure reduces information asymmetry, boosts the creation of value for enterprises and strengthens investor decision-making with risk transparency and comprehensive risk reporting requirements.

Meanwhile, we can see that both stakeholders and investors do not receive effective information about the risk profile, as well as the way it is managed. Disclosures are limited and companies and banks are not transparent in their information. (Linsley & Shrives, 2006). Sometimes, banks forget that risk reporting is crucial, and it must be reliable, and rich in high-quality information. Abraham and Shrives (2014) develops a model for assessing the quality of risk disclosures and the quality of risk reporting. The results suggest that managers prefer providing disclosures that are symbolic rather than substantive. Beretta and Bozzolan (2004) proposed a framework for the analysis of risk communication which contends that "the quantity of disclosure is not a satisfactory proxy for the quality of disclosure. The quality of disclosure depends both on the quantity of information disclosed and, on the richness, offered by additional information". The richness of the information determines whether the information helps outside investors appreciate the expected impact of disclosed risks on the firms' capability to create value (Beretta & Bozzolan, 2004).

Financial scandals have increased the demand for more disclosures. However, risk management disclosure is still very much voluntary in many parts of the world (Amran et al., 2009). Elshandidy and Neri (2015) emphasize the importance of distinguishing mandatory and voluntary risk disclosure when studying the impact of corporate governance. The results

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suggest that, while voluntary risk disclosure seems to be informative to investors, mandatory risk disclosure is seen as generic or subjective. (Elshandidy & Neri, 2015). Large-scale businesses, high dividend-yield, strong board independence, and effective audit environments are likely to provide higher levels of aggregated and voluntary risk disclosures than other firms (Elshandidy et al., 2013).

2.2 – Capital Adequacy Ratios and Risk-Weighted Assets

The Capital Adequacy Ratios (CAR) expresses the relationship between the Bank's Own Funds (Regulatory Capital) and its Risk-Weighted Assets (RWA) (Dierick et al., 2005). The concept of capital adequacy refers to the extent to which the assets of a bank exceed its liabilities, and it is a measure of the ability of the bank to withstand a financial loss and prevent bankruptcy.

To understand the concept of capital, the Basel I Accord divided it into two components which contribute to two Tiers of Regulatory Capital, as they represent different loss capacities (Leal, 2017):

i.   **Core capital (Tier I)**: consists of capital stock, reserves, retained earnings, and annual net income, less the value of own shares, unconsolidated capital, accumulated losses, pre-operating expenses, and intangible fixed assets.

ii. **Supplementary Capital (Tier II):** consists of revaluation reserves, general provisions, and provisions for credit risk, as well as hybrid capital instruments (comprising perpetual preferred shares and subordinated debt).

The Bank for International Settlements (2017) defines RWA as an indicator that reflects the value of the assets (loans to companies or to individuals, securities, and liquid assets that the bank holds), adjusted for its level of risk. RWA essentially means that safer assets are subject to a lower capital allocation, while riskier assets are assigned a higher risk weight coefficient (Caiado & Caiado, 2018). The RWA is a critical component of the capital adequacy ratio since banks can only enhance their respective ratios by reducing their RWA or increasing their capital (Das & Sy, 2012). According to Posner (2015), the RWA component was included in the capital adequacy calculation to reduce the lack of quality in the application of existing capital rules on assets.

Over the years the calculation of the capital adequacy ratios underwent major changes. However, it continued heavily dependent on RWA (Le Leslé & Avramova, 2012). When the Solvency Ratio (SR) implemented by Basel I Accord was introduced, the Regulatory Capital was composed by Tier I and Tier II, and the calculation of RWA only contemplated the category of Credit Risk. Credit Risk was considered one of the main risks of the banking sector and it is associated with a customer's future capacity to pay credit commitments established with the institution (Leal, 2017). The Basel Committee established two approaches to determine the Credit Risk of RWA: The Standardised Approach and The Internal Ratings-Based Approach (IRB) (Dierick et al., 2005). The minimum value of the Solvency Ratio of each credit institution and investment firms could not be less than 8%.

With the establishment of an **"*Amendment to the Capital Accord to Incorporate Market Risks*"**, the third category of Regulatory Capital was introduced:

iii.   **Tier III** include net income from the trading book and short-term subordinated debt, exclusively to be allocated to market risks.

The RWA was restructured, and the Market Risk started to be considered in the calculation. Market Risk is associated with the possibility of incurring losses arising from unfavorable market movements (Caiado & Caiado, 2018), for instance, unfavorable changes in interest rates, exchange rates and real estate market prices. To determine the Market Risk of RWA, two approaches were considered: The Standardised Approach and The Internal Models Approach (Dierick et al., 2005).

The Operational Risk was only considered when the Basel II Accord was established. This risk category includes losses incurred as a consequence of insufficient or failing internal procedures, people, or systems, or as a result of external occurrences. Therefore, considering the changes, the total amount of the RWA is now obtained by adding the Credit Risk and the multiple of 12.5% of the Market Risk and the Operational Risk (Dierick et al., 2005). In the area of operational risk, a bank can calculate its capital requirements considering three approaches: The Basic Indicator Approach (BIA), The Standardized Approach and The Advanced Measurement Approach.

These approaches to calculate each capital requirements for each risk would not be specified in this investigation. With a range of sophisticated approaches and risk-sensitive options available for determining bank's capital requirements, banks, in collaboration with the

supervisory authority, should select an approach that most adequately allows the development of practices used in the management of credit, market and operational risks (Mohanty, 2008).

Since the 2007/2008 financial crisis, capital strengthening has been a priority. The 2007/2008 financial crisis made it clear that banks had built up excessive debt and maintained insufficient capital (Keef & Pfleiderer, 2011). In this context, Basel III Accord strengthened the numerator of the Capital Adequacy Ratio and recreated a more rigorous definition of Regulatory Capital. In order to increase the capacity to absorb losses and restore confidence in market participants, the Basel Committee focused on increasing the quality and consistency of capital. Regarding the limits imposed, banks are still required to hold at least 8% of the RWA. However, Tier I become composed by two components:

i.   **Common Equity Tier I** which is the sum of the bank's share capital excluding dividends and retained earnings. According to Bank of Portugal (2011), Common Equity Tier I constitutes the institution's best quality capital, in terms of permanence and loss-absorbing capacity.

ii. **Additional Tier I** which are hybrid equity and debt instruments.

In this approach, the Capital Adequacy Ratio was considered the relationship between the Core Tier I (Common Equity Tier I and Additional Tier I) and the RWA. Thus, it is possible to analyse the solvency of banking institutions, establishing a minimum level of capital that institutions must have according to their own funds' requirements arising from the risks associated with their activity (Bank of Portugal, 2011).

RWA became a significant issue, forcing the attention to move from the numerator to the denominator. The primary reason for this focus was the RWA's dispersion and inconsistency between banks. The Basel Committee on Banking Supervision (2017) stated that this unwarranted variation makes it difficult to compare capital ratios across banks and undermines confidence in capital ratios. Some research also indicated that this indicator demonstrated international heterogeneity among European banks (Ferri & Pesic, 2017; Bank for International Settlements, 2013; Bruno et al. 2015; Le Leslé & Avramova, 2012; Ledo, 2011). In this context, a wide range of stakeholders – including academics, analysts, and market participants – lost faith in banks' reported risk-weighted capital ratios (Neves, 2020). The European Bank Authority (2013) examined the differences in the value of the RWA among European banks and concluded that credit risk is the component that significantly contributes 77% to the dispersion of this indicator. According to EBA (2013), Le Leslé and

Avramova (2012) and Bruno (2015), part of the divergences is explained by the adoption of internal models, and by the risk weights applied to the Standard Method. Beltratti & Paladino (2013) state that one of the main determinants of the differences in the RWA is found in the characteristics of the countries, being necessary to take into account all the elements of the institutional environment such as the laws.

By the publication of a complementary document to the Basel III Reform, called *Basel III: Concluding post-crisis reforms*, it was possible to reestablish credibility in the calculation of RWAs and reduce the indicator's excessive variation (Bank for International Settlements, 2017). Le Leslé and Avramova (2012) focused their study on improving consistency in the methodology used to calculate this indicator, rather than on total harmonization.

Table 2.2 synthesizes 13 studies carried out with the objective of understanding which factors are at the origin of banks' risky behavior, which in turn can influence the RWA risk indicator.

Table 2.2 - Research based on RWA

Authors	Sample	Findings
Das and Sy (2012)	808 publicly-listed deposit-taking institutions in 35 countries, spanning North America, Europe, Asia and Australia over 2007-2008 crisis period.	Banks with highter RWA performed worse during the severe phase of the crisis (2007-2008). Negative relationship between RWA and stock returns over periods of financial crisis. This relationship is weaker in countries where banks have more dicretion in the calculation of RWA. The more stable a bank's funding, the less positive the effect of higher capital on its stock return; the more liquid a bank's assets, the less an increase in capital will increase its stock return.
Bruno et al. (2015)	50 largest European banking groups from 17 countries (by total assets in 2012) over a 5-year window (2008-2012).	Negative relationship between bank's size and risk. RWA are affected by the bank's business model and asset mix. The adoption of Internal Ratings-Based Approach (IRB) is a powerful driver of RWA. Lower risk weights are positively linked to the banks' capital cushion. IRB adoption is more widespread in countries where supervisory capture is potentially stronger, due to a banking industry that is both larger (compared to GDP) and more concentrated. Regulatory risk weights are not entirely disconnected from market-based measures of bank risk.

Klepczarek (2015)	Randomly selected sample from the group of banks examined by the European Central Bank authorities that covers 22 European countries, includes 49 banks and consists of 441 observations of 2013 financial and macroeconomic data.	Negative impact of bank size and the risk indicators (RWA to total assets ratio and the share of loans in total assets) on banks' capital adequacy. Positive relationship between the percentage of loans in total assets and the RWA. Impact of profitability indicators and the inflation rate on the Capital adequacy ratio. RWA to total assets ratio negatively affects the Capital Adequacy Ratio. Negative correlation between bank adequacy and the deposits to non-equity liabilities ratio.
Laeven and Levine (2009)	270 banks from 48 countries, includes the 10 largest listed banks in the country in terms of total assets, if available. Statistics based on annual data for the year 2001.	Negative relationship between bank's size and risk. Positive correlation exists between bank risk-taking and the relative influence of shareholders within each bank's corporate governance structure. The relation between bank risk and capital regulations, deposit insurance policies, and restrictions on bank activities depends critically on each bank's ownership structure; The same regulation has different effects on bank risk taking depending on the bank's corporate governance structure. Banks with more powerful owners tend to take greater risks.
Abou-El-Sood (2017)	Sample of U.S. bank holding companies (BHCs) during 2002-2014.	Negative relationship between bank's size and RWA. Positive relationship between the size of the Board of Directors and the risk of the bank. Negative relationship between Loans in Default and RWA. BHCs with more concentrated shareholders, more managerial ownership, smaller boards, and less outside directors undertake less risky investments with respect to total assets, loans, and off-balance-sheet items. Capital adequacy effect is overpowering pushing for more risky positions. Banks with good governance push for less risky positions, even with larger capital ratios, during the financial crisis period relative to the pre-crisis boom.
Altunbas et al. (2007)	Large sample of European banks between 1992 and 2000.	Negative relationship between inefficiency and bank risk-taking. Positive relationship between risk on the level of capital (and liquidity). Financial strength of the corporate sector has a positive influence in reducing bank risk-taking and capital levels.
González (2005)	251 banks in 36 countries over the 1995–1999 period.	Positive relationship between bank's size and risk. Regulatory restrictions on bank activities have a negative influence on bank charter value: banks in countries with stricter regulation have a lower charter value. Negative relation between regulatory restrictions and the stability of a banking system. Positive influence of deposit insurance on bank charter value reduces the benefits to be gained from high-risk policies for bank shareholders.
Roy (2008)	576 G-10 commercial banks (but no holding companies) with assets of more than $100 million over the 1988-1995 period.	Positive relation between bank's size and risk. Negative relation between bank's size and Capital Adequacy ratio: large U.S banks have easier access to capital markets and operate with lower amounts of capital. Positive relationship between the percentage of loans in total assets and the RWA. Negative impact between Loan losses and risk. The return on assets (ROA) has a significantly positive effect on changes in capital: banks with higher earnings can improve more easily their capital position.

Rajhi & Hmadi (2011)	31 European commercial listed banks, during the period 2004-2009.	The presence of large shareholders increases the capital and the risk: they take more risk in order to maximize their profit. The board size have a positive influence on the insolvency risk. The percentage of independent directors have a positive influence on the ratio of loan loss provisions. Negative relationship between CEO power and the risk. Negative relationship between capital adequacy ratio and bank risk.
Pathan (2009)	212 large US bank holding companies over 1997–2004 (1534 observations).	Strong bank boards (small board size, more independent directors, less restrictive shareholders rights) positively associate with bank risk-taking. CEO power (CEO's ability to control board decision) negatively affects bank risk-taking.
Ferri e Pesic (2017)	239 European banks from 29 European countries, 1128 bank-year observations over 2007–2013	Positive relationship between non-performing loans (NPL) and RWA.
Ahmad et al. (2008)	42 domestic financial institutions covering 8 year period, 1995 to 2002.	Non-performing loans (NPL) and risk index show a positive association between bank capital and risk-taking. Negative relationship between bank's size and capital adequacy ratio. The high capital ratio regulations have greater positive effects on the equity capital for the well-capitalized banks than on the low-capitalized ones.
Beltratti and Paladino (2013)	548 banks from 45 countries over the period 2005-2011 (around 1000 bank-year observations).	Banks with high level of capital may have less motivation to pursue RWA optimization policies. The ratio of non-performing loans to gross loans should boost the stock of risk weighted assets as it worsens the risk profile of the loan portfolio.

Source: Own Elaboration

Some literature investigated the relationship between the size of the bank and the RWA itself (Abou-El-Sood, 2017; Klepczarek, 2015; Bruno et al., 2015; Laeven & Levine, 2009). Their results suggest that there is a statistically significant negative relationship between these variables. This negative relationship is explained by the fact that larger banks have a more diversified portfolio of assets, substantially reducing their risk. However, there is also a body of research that concluded a positive relationship between bank size and risk (González, 2005; Roy, 2008). González (2005) and Roy (2008) suggest that the larger the bank size, the higher the RWA value. This result is consistent with the "too-big-to-fail" argument that states that banks with a larger dimension have greater incentives to make risky investments, as they naturally have more security.

Roy (2008) argues that a higher percentage of loans granted correspondes to a high investment in RWA, greater credit risk and, in turn, a greater need for capital, having proven the existence of a positive relationship between Loan to Assets and the bank's risk. In the same line, Klepzareck (2015) studied the determinants of the capital adequacy ratio, where he

concluded a positive relationship between Loan to Assets and RWA, stating that riskier assets increase the bank's risk.

Regarding Rajhi & Hmadi (2011), there is a negative relationship between the capital adequacy ratio and the bank's risk. The direction of this association is quite intuitive, since a high capital, as a result of the imposed requirements, implies a very prudent behavior in terms of risk. However, Ahmad et al. (2008) concluded that there is a positive relationship between the capital adequacy ratio and bank risk. Bank for International Settlements (2017) stated that an adequate capital levels contribute to the public's confidence in the banking sector.

Ahmad et al. (2008) and Ferri and Pesic (2017) discovered a positive correlation between non-performing loans (NPL) and RWA, stating that it was reasonable to anticipate that this variable would raise the indicator's value given its inherent characteristics. The research by Abou-El-Sood (2017), on the other hand, demonstrated a negative relationship between this variable and the RWA, supporting the idea that banks with a higher base of NPL in one year tend to reduce the riskiness of their loans in the year that follows.

The return on assets (ROA) has a significantly positive effect on changes in capital. Banks with higher earnings can improve more easily their capital position (Roy, 2008).

The presence of large shareholders increases the capital and the risk (Rajhi & Hmadi, 2011). Bank holding companies (BHCs) with more concentrated shareholders, more manager ownership, smaller boards, and less outside directors undertake less risky investments with respect to total assets, loans, and off-balance-sheet items (Abou-El-Sood, 2017). Pathan (2009) argue that strong bank boards (small board size, more independent directors, less restrictive shareholders rights) is positively associate with bank risk-taking. Rajhi & Hmadi (2011) and Pathan (2009) defended that there is a negative relationship between CEO power and the bank risk-taking. Banks with good governance push for less risky positions, even with larger capital ratios, during the financial crisis period relative to the pre-crisis boom (Abou-El-Sood, 2017).

A bank with a high capital-asset ratio will be more resilient to a catastrophic loss than one with an inadequate capitalization (Poster, 2015). Das and Sy (2012) demostrated that banks with higher RWA performed worse during the severe phase of the crisis (2007-2008).

2.3 – Impact of financial audit on the capital market

Given the lack of a common consensus for the definition of audit quality in the literature review carried out, this section will present definitions on audit quality developed in the literature, and it will also analyze the main characteristics of audit quality that may contribute to the increase of both transparency and credibility in capital markets.

2.3.1 – Audit and the business information asymmetry

According to Jensen and Meckling (1976), agency theory assumes a conflict of interests or an agency problem, which arises from the relationship between the principal (shareholder) and the agent (manager).

In this context, managers make opportunistic choices that would maximize their self-interest (Healy and Palepu 2001), and they disclose information in such a way that firm's future prospects appear to be positive, in terms of both cash flows and risk profile (Klerk et al., 2015). Jensen and Meckling (1976) discuss the need to institute controls and mechanisms that can prevent managers' self-interested behavior and improve the alignment of incentives between managers and external investors. Several studies recognize that disclosure more transparent and reliable information is an adequate solution and mechanism to the agency's problems (e.g., Obeng et al., 2020; Bushman & Smith, 2001; Dechow et al., 1996; Kaplan & Stromberg, 2003; Kothari, 2001). The increase in transparency by providing investors 'insight' into the organization's strategy can have a favorable impact on how incentives are aligned and on how it relates to the organization's ability to create value in the short, medium, and long term (Obeng et al., 2020; Barth et al., 2018). Obeng et al. (2020) stated two options that are associated with lower agency problems between outside investors and managers: greater information or better presentation of information. By expanding the information set, it is possible to provide a more complete picture of firm's performance to competitors and participants of the market and enhance the efficiency of external market forces (Obeng et al., 2020).

Thus, associated with this conflict of interests between managers and shareholders, auditing plays an important role in mitigating agency conflicts: reduce information asymmetry between managers and shareholders, and increase the reliability of corporate financial reports (Chen et al., 2011; Lin et al., 2011; Lin & Hwang, 2010; Jensen & Meckling, 1976; Watts & Zimmerman, 1979).

Recent financial scandals such as Enron, WorldCom, Lehman & Brothers, and even in the Portuguese case, the highly publicized cases BPN and BES, allied to the world economic crisis, intensified the debate on the quality and reliability of corporate financial reporting and, consequently, raised serious issues that jeopardize the performance and quality of the audit (Arcay et al., 2013; Ball, 2009; Neri & Russo, 2014; Santos et al., 2015). Thus, the concept of audit quality emerged, and it will be analyse in the next section.

2.3.2 – Audit Quality

Although audit quality is under increasing scrutiny worldwide, there is still little consensus on how to define and how to measure the audit quality. According to DeAngelo (1981), audit quality is defined as the joint probability that an existing material error is detected and reported by an auditor. As mentioned in the previous section and considering that audit quality can reduce the information asymmetry and increase the trust of the principal in the agent, it is important to analyse the influence exercised by the audit quality, in relation to the exposed risk in the financial sector.

In line with Knechel et al. (2008), an organisation can confront a range of risks and employs a variety of measures to limit their potential influence on operations, performance, compliance with regulatory requirements, and on quality of financial information. Given its primary emphasis on the reliability of financial statements, the auditor must pay particular attention to the risks of financial information.

According to the Institute of Internal Auditors (IIA) (2009), the main role of internal audit in the process of managing the risk is to provide an objective assurance about the effectiveness of the RM activities of organizations, while ensuring not only if the main risks of the activity are being managed properly, but also if the internal control systems operate efficiently. In addition, Knechel et al. (2008) stated that external auditors must understand the entity's strategic position, inherent business risks, and trust in the entity's internal systems.

Despite being difficult to measure both theoretically and practically, the quality of audit has been associated with circumstances or characteristics of the auditor, which literature indicates as factors that determine a better performance of auditors and, therefore have an impact on improving their quality.

Audit quality is usually seen from the perspective of financial information quality, based on the premise that the financial information will be the best quality, when the audit has certain characteristics such as: (1) company size: to be carried out by one of the large auditing

companies (Big 4); (2) auditor mandate: be performed by an auditor who has known the company for a longer time, or that is, when the auditor-client relationship is longer; (3) related audit fees and the provision of extra-audit services and (4) the level of specialization of the auditing (Arcay et al., 2013; Habib, 2012; Lin & Hwang, 2010). Some of these characteristics and attributes associated with audit quality are identified in the literature and described in the following table.

Table 2.3 - Determinants of audit quality

Authors	Sample	Findings
Chen et al. (2011)	3,310 firm-year observations over 2001 to 2004.	Higher audit quality will lead to greater reduction in earnings management and cost of equity capital. Positive association between the level of work intensity and the quality of corporate financial reporting. Auditing reduces information asymmetry. The stronger the effect of audit quality on constraining earnings management, the stronger the effect of audit quality on reducing information risk faced by investors.
Arcay et al. (2013)	153 listed companies that among 2007 and 2009 suffered a decline in the magnitudes involved with its operation.	Negative relationship between audit fees and the presence of asymmetric information in the financial statements. Positive relationship between audit fees and audit quality. Financial information have better quality, when the audit is performed by an auditor who has known the company the longest, that is, when the auditor-client relationship is longer.
Habib (2012)	89,300 sample observations	Financial information will be better quality, when the audit has relative fees for the audit and the provision of extra-audit services
Lin and Hwang (2010)	-	Positive relation between audit quality and company size; financial information will be better quality, when the audit is carried out by one of the large auditing companies (Big 4). Negative association between the use of large company auditors (Big 4) and earnings management.
DeAngelo (1981b)	-	Larger audit firms have more incentives to provide better quality audit services. The quality of the audit work depends on degree of presence of competence and independence audit.
Bakar et al (2005)	86 commercial loan officers in Malaysia	High fees influence the auditor's behavior and reduce stakeholder confidence in the the audited financial statements. Smaller audit companies, audit firms operating in more competitive markets, audit firms serving a given client for longer period, larger audit fees, and the non-existence of an audit committee, are perceived as having a higher risk of losing independence. Audit firm size appears to be the most important factor that affects the auditor independence, followed by tenure, competition, audit committee, audit firms providing managerial advisory services and size of audit fee.

Caramanis and Lennox, 2008	9,738 annual audits in Greece between 1994 and 2002.	Negative association between misstatements in financial reporting and the level of audit work intensity. Positive association between the level of audit work intensity, measured through the number of hours worked and earnings management, concluding that it directly influences the quality of corporate financial reporting.
Lobo and Zhao (2013)	-	Positive association between the level of work intensity and the quality of corporate financial reporting.
Ettredge et al. (2014)	3039 public firms that are covered by both Audit Analytics and Compustat in 2008.	Positive association between the level of work intensity and the quality of corporate financial reporting. Larger auditors have more incentives to maintain audit quality and to preserve their reputations.
Cahan and Sun (2015)	1,917 firm-year observations over the period 2007 to 2010.	Positive relationship between auditor experience and audit quality.
Gul et al. (2013)	-	Positive relationship between the auditor's individual characteristics (training, experience in Big 4 companies, affiliation) and audit quality.

Source: Own Elaboration

DeAngelo (1981b) and Ettredge et al. (2014) conducted a study that demonstrates that larger auditors (Big-4 auditors) have greater incentives to deliver higher-quality audit services. Schneider (2010) study, conducted in the USA, found that stakeholders' perceptions of the audit's quality have an impact on their choices. Porter et al. (2012) revealed that the name of the audit firm and the auditor is the most crucial information in the auditor's report, suggesting that the stakeholders of the audit report confirm the auditor's name and the size of the auditing company. Lin and Hwang (2010) verify the previous study, concluding positive evidence between audit quality and company size. Companies audited by Big-4 auditors are more likely to have an extensive and better-quality RM disclosures than those audited by non-Big-4 auditors (Buckby et al., 2015). The authors concluded that the level of RM disclosure is positively related to the engagement of a Big-4 external auditor.

According to Arcay et al. (2013), a high level of audit fees reduces the presence of asymmetric information in the financial statements, which in turn imply a higher quality of business narrative reporting. Assuming the research of Bakar et al. (2005), high fees influence the auditor's behavior and reduce stakeholder confidence in the audited financial statements.

As stated by Caramanis and Lennox (2008), the level of intensity of the audit work affects the auditor's likelihood of detecting an existing problem. In this context, the results of several empirical studies demonstrate a negative association between misstatements in financial reporting and the level of audit work intensity (Chen et al., 2011; Caramanis & Lennox, 2008; Ettredge et al. (2014); Lobo & Zhao, 2013). In Greece, Caramanis and Lennox (2008) confirmed this association between the level of intensity of the audit work, measured through the number of hours worked and the earnings management, concluding that it directly

influences the quality of the report business finance. The results of the studies by Chen et al. (2011) in China, as well as by Lobo and Zhao (2013) and Ettredge et al. (2014) in the USA, also evidenced this influence of the level of intensity of audit work on the quality of corporate financial reporting.

Some empirical studies highlight certain individual characteristics that also have a significant influence on the quality of the audit. Cahan & Sun, (2015) suggested that more experienced audit partners can perform top quality audits, and Gul et al. (2013) evidenced a positive effect between the auditor's individual characteristics on the audit quality, such as their training, experience in Big 4 auditing firms and their affiliation, whose influence was confirmed both in large and in small audit firms.

Considering DeAngelo (1981b), the quality of the audit work depends on degree of presence of competence and independence audit. Smaller audit companies, audit firms operating in more competitive markets, audit firms serving a given client for longer period, larger audit fees, and the non-existence of an audit committee, are perceived as having a higher risk of losing independence (Bakar et al., 2005). Because of the information asymmetry between corporate managers and outside shareholders, auditors are hired to provide independent assurance that financial statements are prepared following generally accepted accounting principles (Habib, 2012).

Dabari and Saidin (2016) examined the implementation of ERM in banks and its relationship with internal audit. The study suggests that internal audit effectiveness influences the implementation of ERM in banks. In addition, the connection to a Big4 audit firm is an essential feature for ERM implementation (Golshan & Rasid, 2012).

3 – Methodology

3.1 – Problem, Objectives and Questions of Investigation

Over the years, information asymmetry has been a problem. Even if the audit quality may reduce information asymmetry between managers and shareholders (Chen et al., 2011), an inefficient and insufficient report of the risks may intensify this specific problem (Linsley & Shrives, 2006). Investors do not receive effective information about firm's risks and they overestimate its results, which drives them to make inappropriate investment decisions or decisions under uncertainty (Klerk et al., 2015).

Figure 3.1 - Disequilibrium in the Capital Markets

An inefficient audit quality increases the problem of asymmetric information

Investors overestimate firm's results in terms of cash flows and risk profile

Inappropriate capital market investment decisions

Source: Own Elaboration

In view of the previous problems, and within the scope of the topic of audit quality, this research aims to generate knowledge that will help managers and investors to anticipate risks with greater precision in the banking sector. In this sense, the present investigation aims to answer the following research questions: 1) In which way RWA influences firm's market value? How relevant is audit quality as a moderator of this relationship?

Over the years, there has been an increase in the development of literature involving the analysis of audit quality in corporate narrative reporting in the capital markets. However, in most of the research in this area, there have been few studies carried out the analyses of the influence of audit quality on RWA and market value, as revealed by the literature review carried out in tables 2.1, 2.2 and 2.3, in section 2. Given this research gap, the present investigation seeks to analyse two issues: a) the relationship between RWA and European banks' market value; b) the moderating role audit quality may have on this relationship.

In the following sessions, it will present the hypotheses of this study, the characteristics of the population and the variables used in the estimation model.

3.2 – Investigation Hypothesis

Based on agency theory, information asymmetry considerations between managers and shareholders affect the decisions by companies (managers) to voluntarily provide high levels of market value (Jensen and Meckling, 1976). Some researchers concluded that there is a negative relation between the capital adequacy ratio and bank risk, which means that the higher RWA, the lower the capital adequacy ratio (Pathan, 2009; Rajhi & Hmadi, 2011). However, there is also a set of investigations that concluded that there is a positive relationship between the capital adequacy ratio and bank risk (Ahmad et al. 2008; Pathan, 2009; Shrieves & Dahl, 1992), not corroborating the results of the previous studies.

As mentioned in section 2.2, capital adequacy ratio expresses the relationship between the bank's own funds and its RWA. Thus, lower capital adequacy ratio reduces the bank's creditworthiness level, which consequently decreases the level of bank's own funds to mitigate the risks to which the bank is exposed.

In this context, with a higher RWA, the amount of capital available to mitigate the risk on the market capital is lower, so the firm's market value will be lower too. The first hypothesis of this study is, therefore, stated as follows:

H1. Banks with higher values of RWA have a lower Market Value.

Following agency theory arguments, managers have an incentive to provide high audit quality to decrease the risk of the bank, and consequently increase firm's value on the capital markets. Considering that audit quality provides an objective and independent assurance about the risks and increases the credibility of information (Chen et al., 2011), banks with high levels of RWA tend to exert greater efforts towards audit quality to offset the impact of RWA can have on the capital markets (Li et al., 2018).

According to Chen et al. (2011), auditing is a great monitoring device designed to improve firm's performance information, while reducing the risk of the bank and increasing the firm's value. Based on the above discussion, the second hypothesis of this study is stated as follows:

H2. The negative association between RWA and bank's market value is less intense in banks with higher audit quality.

3.3 – Sample Selection

Using the Eikon Database, banks from 22 European countries with securities admitted to trading on European stock exchanges were selected. The variables needed for the study were obtained through the Eikon Database and the World Bank Database.

Table 3.1 presents the constitution of the sample. The initial sample is made up of 212 European Union banks with listed securities between the years 2007-2020. However, 118 banks were eliminated due to the reason of not having data in the Eikon Database. The final sample consists of 94 banks from 22 European Union countries. The study period begins in 2007, to obtain data for the years of the beginning of the recent global financial crisis (2007/2008), where major inefficiencies in risk management in the financial sector were noted. In addition to the crisis, it also includes the entry into force of Basel III, which appears due to the instability that occurred. Thus, the total number of observations is 1316.

Panel B presents the geographical dispersion of the banks in the sample across the 22 European countries. It is observed that the vast majority of banks in the sample belong to Italy (14), Denmark (14), Poland (10), United Kingdom (8), Spain (7), and Austria (6). In turn, the remaining 16 countries represent a small part of the sample.

Table 3.1 - Sample

Panel A: Number of banks	N
European banks included in the initial sample	212
Banks without information on RWA in the Eikon database	-118
Final sample	94

Panel B: Number of banks per country	N	%		N	%
Austria	6	6%	Lithuania	1	1%
Belgium	2	2%	Malta	3	3%
Bulgaria	1	1%	Netherlands	2	2%
Croatia	2	2%	Poland	10	11%
Czech Republic	1	1%	Portugal	2	2%
Denmark	14	15%	Romania	1	1%
Finland	2	2%	Slovakia	2	2%
France	4	4%	Spain	7	7%
Germany	2	2%	Sweden	3	3%
Greece	4	4%	United Kingdom	8	9%
Ireland	3	3%			
Italy	14	15%	Final sample	94	100%

Source: Own Elaboration; data from Eikon Database

3.5 – Estimation Model

Based on the literature review and the research hypothesis, an econometric model was defined to analyze the firm value from several European banks practice in relation to specific bank's variables mentioned in the previous section, including year fixed effects.

The econometric model is as follows:

(1) Firm value$_{it}$ = $\beta 0$ + $\beta 1$ RWA$_{it}$ + $\beta 2$ Size$_{it}$ + $\beta 3$ Profitability$_{it}$ + $\beta 4$ Losses$_{it}$ + $\beta 5$ Non-performing loans$_{it}$ + $\beta 6$ Gross Domestic product$_{it}$ + Year fixed effects + $\varepsilon_{\Box t}$

This model **(1)** will be used to test the hypothesis 1 through the analysis and the significance level of the coefficient β1. Hypothesis 1 will be supported if β1 assumes a statistically significant negative value.

(2) Firm value$_{it}$ = β0 + β1 RWA$_{it}$ + β2 Audit Quality$_{it}$ + β3 RWA*Audit Quality$_{it}$ + β4 Size$_{it}$ + β5 Profitability$_{it}$ + β6 Losses$_{it}$ + β7 Non-performing loans$_{it}$ + β8 Gross Domestic product$_{it}$ + Year fixed effects + ε$_{\square t}$

This model **(2)** will be used to test the hypothesis 2 through the analysis and the significance level of the coefficient β3. Hypothesis 2 will be supported if β3 assumes a statistically significant negative value.

Firm Value, the dependent variable, reflects the Tobin's Q (market value of equity plus book value of preferred stock and debt divided by the book value of total assets).

Table 3.2 lists the independent and control variables as well as their measurement. RWA reflects the value of assets adjusted to their risk level and is measured by the logarithm of risk-weighted assets, retrieved from Eikon database (Ferri & Pesic, 2017; Klepczarek, 2015; Bruno et al. 2015; Beltratti & Paladino, 2013; Mariathasan & Merrouche, 2013; Le Leslé & Avramova, 2012).

Size was measured by total assets (Branco and Rodrigues, 2008). Both the levels of agency expenses and public awareness will be represented by this proxy. According to the literature, larger businesses have higher agency costs, and they are more complex and riskier (Oliveira et al., 2006). However, a different body of research contends that larger businesses are more publicly visible and more easily scrutinized by their relevant stakeholders (Oliveira et al., 2013).

Table 3.2 - Definition of the independent and control variables

Variables	Measurement	References
Risk-weighted assets (RWA)	Reflects the value of assets adjusted to their risk level and is measured by the logarithm of risk-weighted assets retrieved from Eikon database.	Ferri and Pesic (2017); Beltratti and Paladino (2013); Bruno et al. (2015); Klepczarek (2015); Le Leslé and Avramova (2012); Mariathasan and Merrouche (2013).
Size	Capture the effects of bank size and is measured by the logarithm of total assets.	Abou-El-Sood (2017); Ben Jabra et al. (2017); Bruno et al. (2015); Klepzareck (2015); Beltratti & Paladino (2013).
Profitability	Return on assets (ROA) ratio: earnings before interest and taxes divided by total of assets.	Helbok and Wagner (2006); Miihkinen (2013); Oliveira at al. (2011b); Linsley et al. (2006); Sensarma and Jayadev (2009).
Non-performing loans (NPL):	Risk profile: Total non-performing loans divided by total of assets.	Ginet et al. (2020) Abou-El-Sood (2017); Konishi & Yasuda (2004); Shrieves & Dahl (1992).
Gross Domestic Product (GDP):	Natural logarithm of gross domestic product for each country in which the bank has its headquarters.	Ledo (2011); Ben Jabra et al. (2017); Salas and Saurina (2002); Bruno et al. (2015).
Audit quality	Dummy variable that assumes 1 if the value of audit fees is higher than its mean value, and 0 otherwise.	Oliveira et al. (2011c); Mokhtar and Mellet (2013); Li et al. (2018).
Losses	Dummy variable that assumes 1 if the value of earnings before interest and taxes is lower than 0, and 0 otherwise.	Dang et al. (2020).

Source: Own Elaboration

Profitability was measured by return on assets ratio (ROA) (Linsley et al., 2006; Helbok and Wagner, 2006), calculated as earnings before interest and taxes (EBIT) to total assets (Helbock and Wagner, 2006; Miihkinen, 2013; Oliveira et al., 2011b). According to Linsley et al. (2006), one of the reasons a bank discloses its risk management is because there is a correlation between profitability and enterprise risk management capabilities. Sensarma and Jayadev (2009) argue that better risk management systems can have a negative impact on profitability due to regulatory capital requirements. Tonello (2007) found a positive relation between ERM and profitability, and consequently firm value. This study suggests that by integrating risk management, the investment decisions would be more profitable and objective

in terms of resource allocation. This effectiveness allows cost reduction and increase firm's cash flows which may have further positive effects on market value.

Non-performing loans (NPL) represents a proxy for the risk inherent in loans (credit risk) (Abou-El-Sood, 2017; Konishi & Yasuda, 2004; Shrieves & Dahl, 1992). The variable is measured through the logarithm of loans in default. Banks that report greater defaults on loans are exposed to greater credit risk, and consequently to a greater value of RWA, conclusions that are consistent with the studies by Ferri & Pesic (2017) and Ledo (2011).

Gross Domestic Product (GDP) represents the logarithm of the current value of GDP for each country in which the bank has its headquarters, originally obtained from the Eikon database. According to Ledo (2011) GDP represents one of the macroeconomic factors that is associated with variations in the RWA. The studies by Ben Jabra et al. (2017), Salas & Saurina (2002) suggest that there is a negative relationship between GDP and risk in the bank. On the other hand, Bruno et al. (2015) showed a positive relationship between GDP and RWA: an increase in the value of GDP is associated with a higher value of RWA. However, the authors stated that the effect of GDP can be ambiguous on RWA, for two reasons: i) if the economic environment deteriorates, banks may exhibit less risky behavior, causing a decrease in RWA; and, ii) an economic slowdown can trigger high default rates, which consequently also lead to an increase in estimates of the default probability parameter used to determine the capital adequacy ratio.

Audit quality was measured by a dummy variable that assumes "1" if the value of audit fees is higher than its mean value, and 0 otherwise. This dummy variable will capture the high-quality auditing firms (Oliveira et al., 2011c) with international affiliations (Mokhtar & Mellet, 2013). To safeguard their public reputation of high-quality auditing firms, it is expected that firms audited by them would report more risk information (Chen et al., 2011). Prior literature also concludes that banks tend to exert greater efforts towards high-quality auditing processes because they reduce bank-specific risk and systemic risk exposures (Li et al., 2018).

Losses was measured by a dummy variable that assumes "1" if the value of earnings before interest and taxes (EBIT) is lower than 0, and 0 otherwise. Companies that have negative results (losses=1) are associated with a lower firm value (Dang et al., 2020).

Some variables are also added to capture the fixed effects associated with the time factor. Thus, a variable is introduced for each year of the observations, which takes the value 1 for each specific year and 0 in the remaining cases.

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4 – Results and Discussion

4.1 – Descriptive analysis

Table 4.1 shows the descriptive statistics of the variables used in the study between the period 2007 to 2020. By analyzing the total sample, we can conclude that, on average, European banks have a mean Firm Value of 0.418, with minimum and maximum values of 0.074 and 8.846 respectively. The RWA presents average values of 16,956, with a minimum of 12,860 and a maximum of 20,538. Considering the size of banks, it fluctuates from a minimum of 13,244 to a maximum of 21,469 as the sample includes both small and large European banks and it has a mean value of 17.424, higher than reported by Ben Jabra et al. (2017) with 8,917, Abou-El-Sood (2017) with 13.91, Bruno et al. (2015) with 12.50 and Beltratti & Paladino (2013) with 16,650. Regarding the NPL, we can observe that the average credit risk level for European banks is low (0.134), but higher than 0.01 reported by Abou-El-Sood (2017). NPL reaches a maximum value of 6.430.

Table 4.1 - Descriptive Analysis

Variables		N	Minimum	Maximum	Mean	Std. Deviation
Firm value		1316	0.074	8.846	0.418	0.524
Risk-weighted assets		1316	12.860	20.538	16.956	1.958
Size		1316	13.244	21.469	17.424	2.139
Profitability		1316	-0.033	2.212	0.076	0.261
Non-performing loans		1316	0.000	6.430	0.134	0.502
Gross domestic product		1316	22.020	29.390	27.177	1.326
			N	%		
Audit quality	Dummy=1		542	41%		
	=0		774	59%		
Losses	Dummy=1		107	8%		
	=0		1,209	92%		

All variables, excluding Audit Quality and Losses, were winsorised at the 1 and 99 percentiles.
Definition of variables: Firm value = Tobin's Q (market value of equity plus book value of preferred stock and debt divided by the book value of total assets); Risk-weighted assets = natural logarithm of risk weighted assets retrieved from Eikon database; Size = natural logarithm of total of assets; Profitability = Return on assets ratio (earnings before interest and taxes divided by total of assets); Non-performing loans = non performing loans divided by total of assets; Gross domestic product = natural logarithm of gross domestic product; Audit quality = dummy variable that assumes 1 if the value of audit fees is higher than its mean value, and 0 otherwise; Losses = dummy variable that assumes 1 if the value of earnings before interest and taxes is lower than 0, and 0 otherwise.

Source: Own Elaboration; data from Eikon Database

The average values for profitability and gross domestic product are 0.076 and 27.177, respectively. This value for profitability is lower than 0.1 reported by Bruno et al. (2015).

4.2 – Bivariate analysis

Table 4.2 presents the correlations between the dependent, independent and control variables. We can see that the dependent variable Firm Value is only correlated positively with profitability (p-value<0.01) and correlated negatively with audit quality (p-value<0.05).

Table 4.2 - Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Pearson correlation for continuous variables								
(1) Firm value	1.00							
(2) RWA	-0.03	1.00						
(3) Size	-0.04	0.86 **	1.00					
(4) Profitability	0.19 **	-0.29 **	-0.33 **	1.00				
(5) NPL	-0.01	-0.16 **	-0.22 **	0.13 **	1.00			
(6) GDP	-0.03	0.03	0.01	-0.01	0.02	1.00		
Panel B: Spearman correlation for categorical variables								
(7) Audit quality	-0.07 *	0.36 **	0.35 **	-0.06 *	-0.10 **	0.06 *	1.00	
(8) Losses	0.05	0.02	0.01	-0.37 **	0.18 **	0.00	-0.03	1.00

Correlation is significant at the **0.01 and *0.05 level (2-tailed).
All variables, excluding Audit Quality and Losses, were winsorised at the 1 and 99 percentiles.
Definition of variables: Firm value = Tobin's Q (market value of equity plus book value of preferred stock and debt divided by the book value of total assets); Risk-weighted assets = natual logarithm of risk weighted assets retrieved from Eikon database; Size = natural logarithm of total of assets; Profitability = Return on assets ratio (earnings before interest and taxes divided by total of assets); Non-performing loans = non performing loans divided by total of assets; Gross domestic product = natural logarithm of gross domestic product; Audit quality = dummy variable that assumes 1 if the value of audit fees is higher than its mean value, and 0 otherwise; Losses = dummy variable that assumes 1 if the value of earnings before interest and taxes is lower than 0, and 0 otherwise.

Source: Own Elaboration, data from Eikon Database

The correlations between the independent and control variables are also low, which allow us to assume that multicollinearity problems are minimal. The analysis of the Variance-Inflated Factors (VIF) corroborates this conclusion (VIF<10).

4.3 – Regression model

Table 4.3 presents the results of the OLS regression analysis of the model equation (1) and the model equation (2). It should be noted that dummy variables were included in the analysis for each respective year (controlling for their effects), and that the assumptions of normality were verified.

Proceeding with the analysis of the column of Model 1, we found that the F-test of the global significance of the model allows us to conclude that the model is adequate to explain the relationship between the Firm Value and the independent variables (F test =19.71; p-value<0.001).

The results also show that the Adjusted R^2 is 22%, more specifically, the model explains 22% of the Firm Value variation, which allows us to conclude that it has a very reasonable explanatory power between the Firm Value and the respective independent and control variance.

Table 4.3 shows that in model 1 the RWA is associated negatively with Firm value (p-value < 0.05). This means that H1 is supported: banks with higher RWA have lower firm value. This finding corroborates such prior literature such as Farrell and Gallagher (2015), Hoyt and Liebenberg (2011) and Baxter et al. (2013). These studies concluded that a bank that recognises their risks, capture opportunities to set their objectives and have a consistent and mature risk management, have potential to reduce risk (RWA) and increase market value.

Table 4.3 - Regression Model Analysis

Variables	Predicted Sign	Firm value	
		Model 1 Coefficients	Model 2 Coefficients
Intercept		-0.44 ***	-0.15
		(-5,09)	(-1,55)
Risk-weighted assets	-	-0.09 **	-0.35 ***
		(-2,29)	(-6,09)
Audit quality	+	-	0.24 ***
			(4,52)
Risk-weighted assets x Audit quality	-	-	-0.46 ***
			(-8,49)
Size	?	0.23 ***	0.23 ***
		(5,53)	(4,90)
Profitability	?	0.27 ***	0.22 ***
		(9,71)	(7,00)
Losses	?	0.67 ***	0.56 ***
		(7,14)	(5,38)
Non-performing loans (NPL)	?	-0.05 **	-0.05
		(-2,23)	(-1,86)
Gross domestic product (GDP)	?	-0.03	-0.02
		(-1,41)	(-0,85)
Fixed year effects		Included	Included
Model fit:			
R^2		0.23	0.22
Adjusted R^2		0.22	0.20
F Statistic		19.71 ***	17.10 ***
Observations		1,316	1,316
VIF		<3.43	<4,72

Statistically significant at the level of ***0.01 and **0.05 (2-tailed). Standard errors are heteroskedasticity-adjusted and clustered at the firm level. The t-values are given in parenthesis. All variables, excluding Audit Quality and Losses, were winsorised at the 1 and 99 percentiles.

Definition of variables: Firm value = Tobin's Q (market value of equity plus book value of preferred stock and debt divided by the book value of total assets); Risk-weighted assets = natual logarithm of risk weighted assets retrieved from Eikon database; Size = natural logarithm of total of assets; Profitability = Return on assets ratio (earnings before interest and taxes divided by total of assets); Non-performing loans = non performing loans divided by total of assets; Gross domestic product = natural logarithm of gross domestic product; Audit quality = dummy variable that assumes 1 if the value of audit fees is higher than its mean value, and 0 otherwise; Losses = dummy variable that assumes 1 if the value of earnings before interest and taxes is lower than 0, and 0 otherwise.

Source: Own Elaboration, data from Eikon Database

Proceeding with the analysis of the column of Model 2, we found that the F test of the global significance of the model allows us to conclude that the model is adequate to explain the relationship between the Firm Value and the independent variables (F test =17.10; p-value < 0.001).

The results also show that the Adjusted R^2 is 20%, more specifically, that the model explains 20% of the Firm Value variation, which allows us to conclude that it has a very reasonable explanatory power between the Firm Value and the respective independent and control variables.

Table 4.3 shows that in model 2 the RWA*Audit Quality is associated negatively with Firm value (p-value < 0.05). This means that H2 is supported: the negative association between RWA and bank's market value is less intense in banks with higher audit quality. Consistent with agency theory, banks with high levels of RWA tend to focus on audit quality to eliminate asymmetric information in financial statements and minimize the risk for investors. This finding corroborates the prior literature such as Li et al. (2018) and Chen et al. (2011).

As can be seen in Table 4.3, the VIF has low values of 3.43 for model 1 and 4.72 for model 2, which is much lower than 10, the benchmark of having multicollinearity. allows us to conclude that there are no multicollinearity problems (Ayyangar, 2007).

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5 – Conclusion

The present study aims to analyse two issues: a) the relationship between RWA and European banks' market value; b) the moderating role audit quality may have on this relationship. For this purpose, a sample of 94 banks from 22 European countries is used, covering the period from 2007 to 2020, obtained through the Eikon Database.

The results suggest that RWA is negatively associated with *Firm Value, and* on the other hand, Audit Quality have a positive influence in *Firm Value.* Audit Quality has an important role in reducing agency conflicts between managers and shareholders. In fact, the process of managing the bank's risks and provide objective assurance about the effectiveness of the risk management activity of banks as well as adequately identify the relevant bank's risks may contribute to reduce information asymmetry between managers and shareholders (Chen et al., 2011; Lin et al., 2011; Lin & Hwang, 2010). By promoting transparency and market's awareness of the risks incurred by banks (Caiado & Caiado, 2018), investors may have a complete overview of the bank and can make appropriate capital investment decisions. To safeguard public reputation, banks with higher RWA tend to be more scrupulous with high levels of audit quality in terms of balancing the impact of RWA in the capital market (Chen et al, 2011).

These findings of the present investigation contribute to the scarce literature about the impact of audit quality on RWA and market value. In this sense, this research allows banks to gain greater insight into goals to generate knowledge that will help managers and investors to anticipate risks with greater precision in the banking sector.

5.1 – Limitations and Future Investigations

This study has some limitations. One of the limitations results from the dimension of the sample, which, despite the total number of observations not being small (1316 observations), does not include information on a significant number of banks operating in the 22 countries under study due to the lack of data available in the Eikon Database that would allow measuring all variables used. This limitation, however, can become an opportunity for future research, adding a greater number of international banks, expanding the sample to other countries, and increasing the reliability of the results. The reduced size of the sample could be overcome by increasing the analysis period.

This study could also be enriched, in future opportunity research, with independent variables that capture the use of internal models (IRB models), given that the studies by Bruno et al. (2015), Ferri & Pesic (2017), Ledo (2011) and Mariathasan & Merrouche (2013) argue that it has the ability to reduce the Risk-Weighted Assets indicator through the manipulation of risk weights. Thus, it would be essential to understand whether the legitimacy of this manipulation remains, and especially if it occurs mostly in banks that use IRB Advanced or IRB Foundation.

Other independent variables may also be introduced that can be tested to identify other potentially explanatory for the impact of audit quality on RWA and Market Value.

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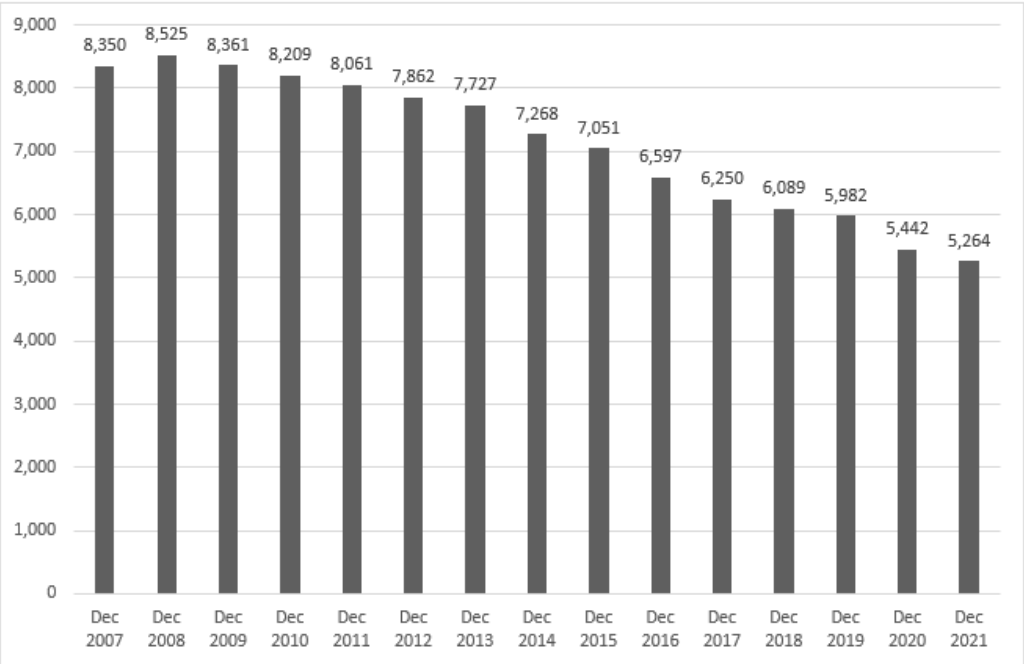
Appendix

Appendix 1 - Percentage of monetary financial institutions (MFIs) in the Europe Union (EU27) as of August 2022, by type
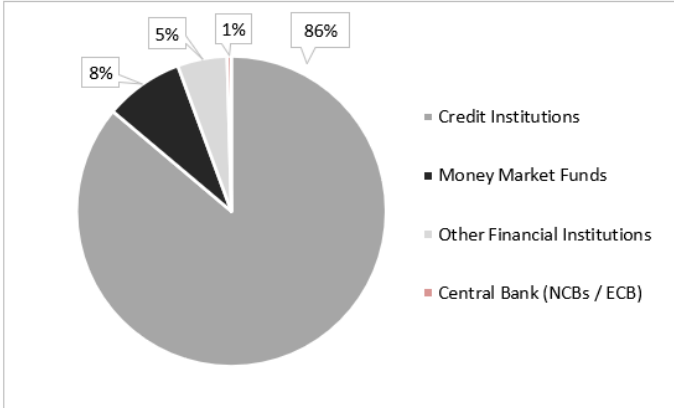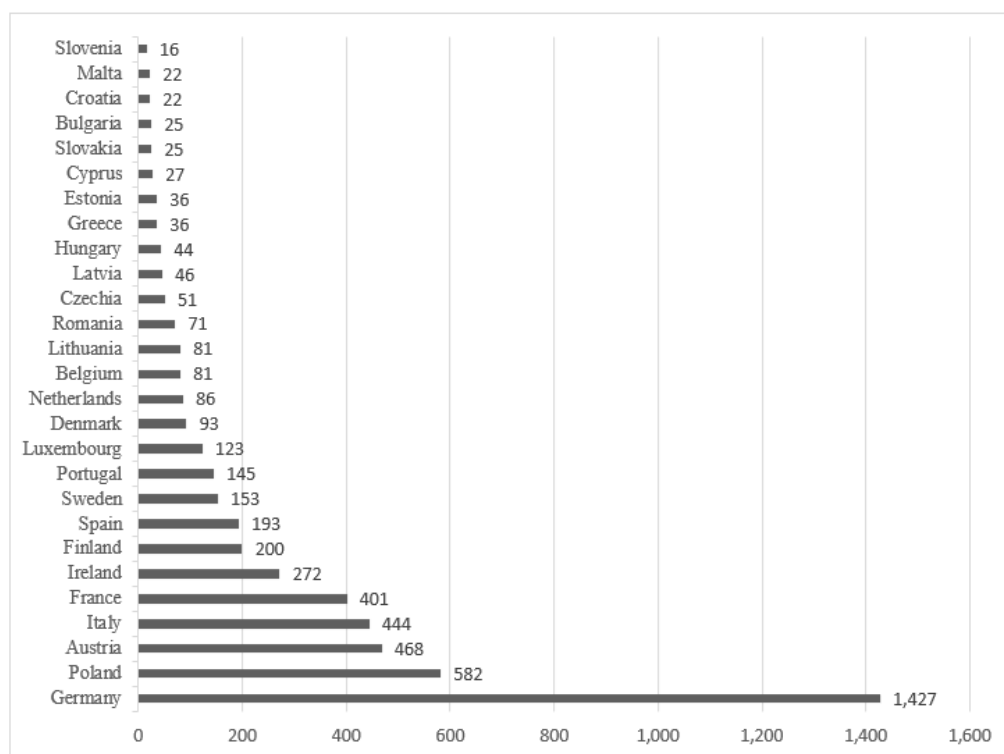

Source: Own Elaboration, data from European Central Bank (2022)

Appendix 2 - Number of credit institutions in the European Union (EU) from December 2007 to December 2021
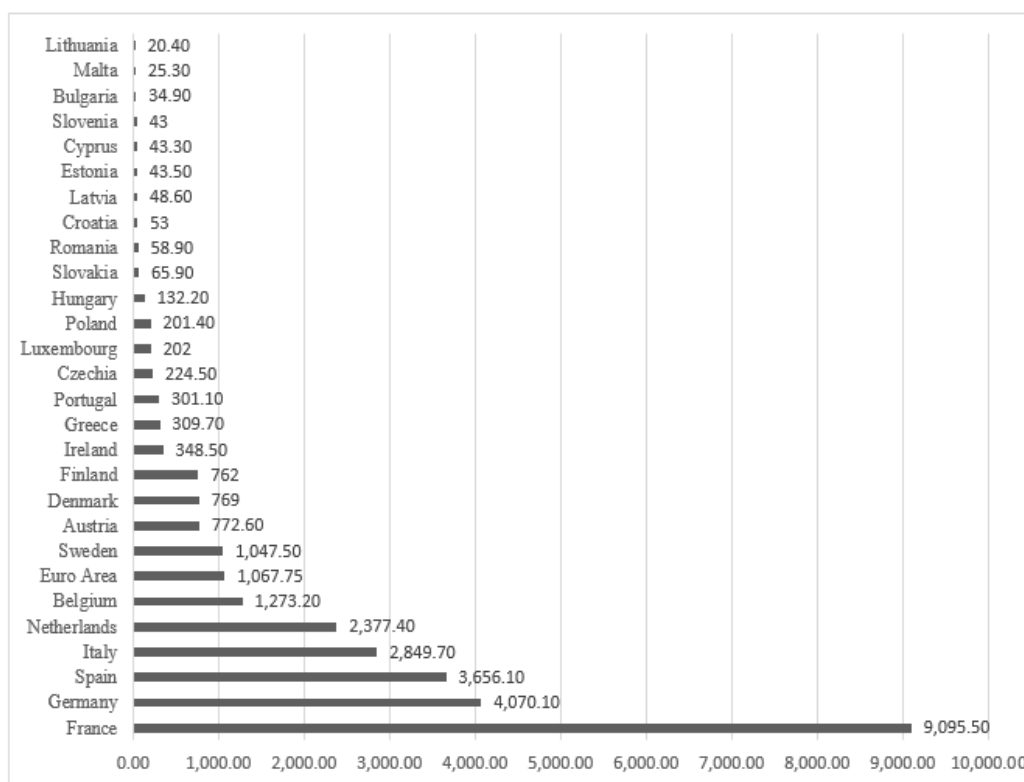

Source: Own Elaboration, data from Statista (2022)

Appendix 3 - Number of banks in EU28, July 2022, by country

Country	Number
Slovenia	16
Malta	22
Croatia	22
Bulgaria	25
Slovakia	25
Cyprus	27
Estonia	36
Greece	36
Hungary	44
Latvia	46
Czechia	51
Romania	71
Lithuania	81
Belgium	81
Netherlands	86
Denmark	93
Luxembourg	123
Portugal	145
Sweden	153
Spain	193
Finland	200
Ireland	272
France	401
Italy	444
Austria	468
Poland	582
Germany	1,427

Appendix 4 -Total assets of banks in the European Union as of December 2021, by country (in billion euros)

Country	Total assets
Lithuania	20.40
Malta	25.30
Bulgaria	34.90
Slovenia	43
Cyprus	43.30
Estonia	43.50
Latvia	48.60
Croatia	53
Romania	58.90
Slovakia	65.90
Hungary	132.20
Poland	201.40
Luxembourg	202
Czechia	224.50
Portugal	301.10
Greece	309.70
Ireland	348.50
Finland	762
Denmark	769
Austria	772.60
Sweden	1,047.50
Euro Area	1,067.75
Belgium	1,273.20
Netherlands	2,377.40
Italy	2,849.70
Spain	3,656.10
Germany	4,070.10
France	9,095.50

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Appendix 5 - Total assets of the Eurosystem from 2012 to 2021 (in billion euros)
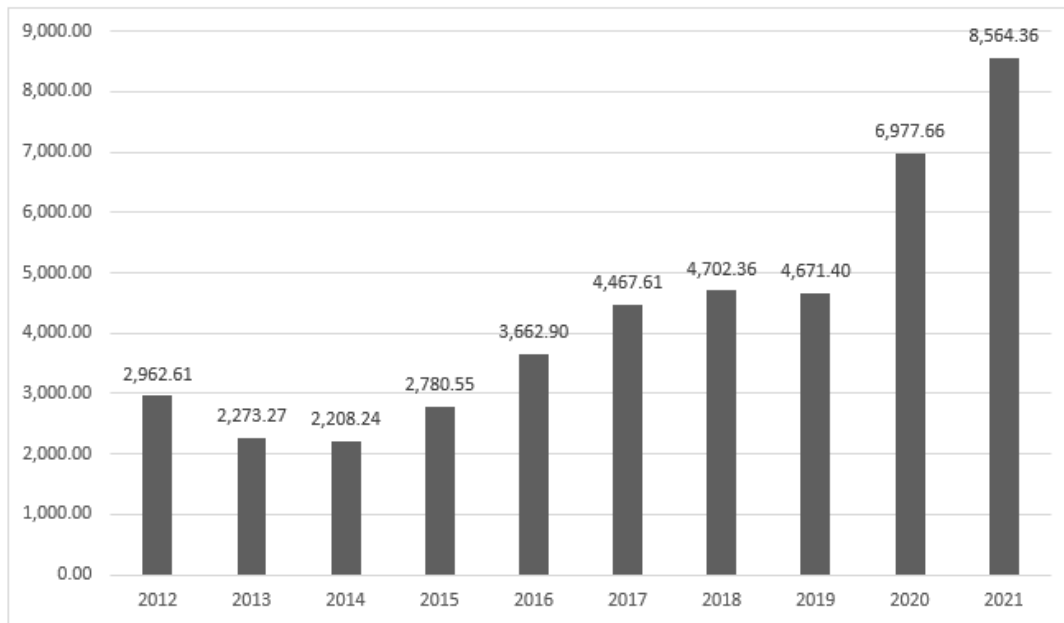
Appendix 6 - Expected impact of rising interest rates among European banks' profitability in 2022
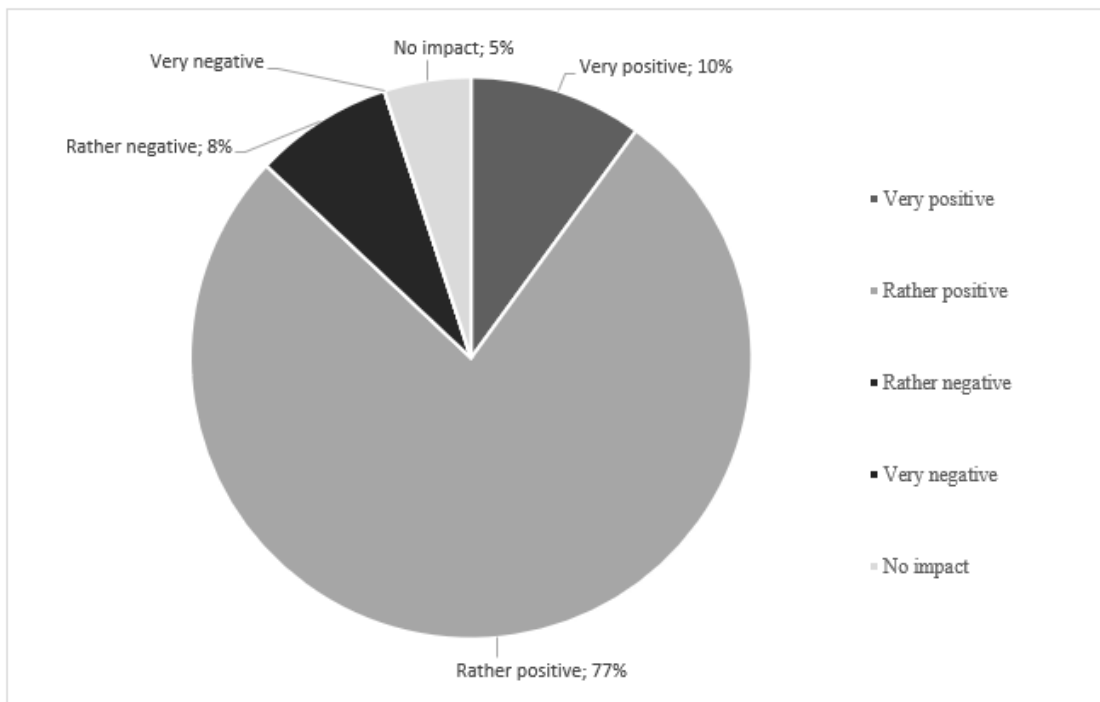
Appendix 7 - Net interest margin (NIM) for banks in Europe as of December 2021, by country

Country	NIM
Latvia	0.60%
Denmark	0.80%
Germany	0.90%
France	1.00%
Lithuania	1.10%
Sweden	1.10%
Luxembourg	1.10%
Finland	1.10%
Italy	1.20%
Euro Area	1.30%
Malta	1.30%
Belgium	1.30%
Netherlands	1.40%
Cyprus	1.50%
Ireland	1.50%
Portugal	1.50%
Estonia	1.60%
Austria	1.60%
Slovakia	1.70%
Czechia	1.80%
Slovenia	1.90%
Croatia	2.00%
Spain	2.10%
Greece	2.20%
Bulgaria	2.30%
Poland	2.60%
Romania	2.90%
Hungary	3.00%
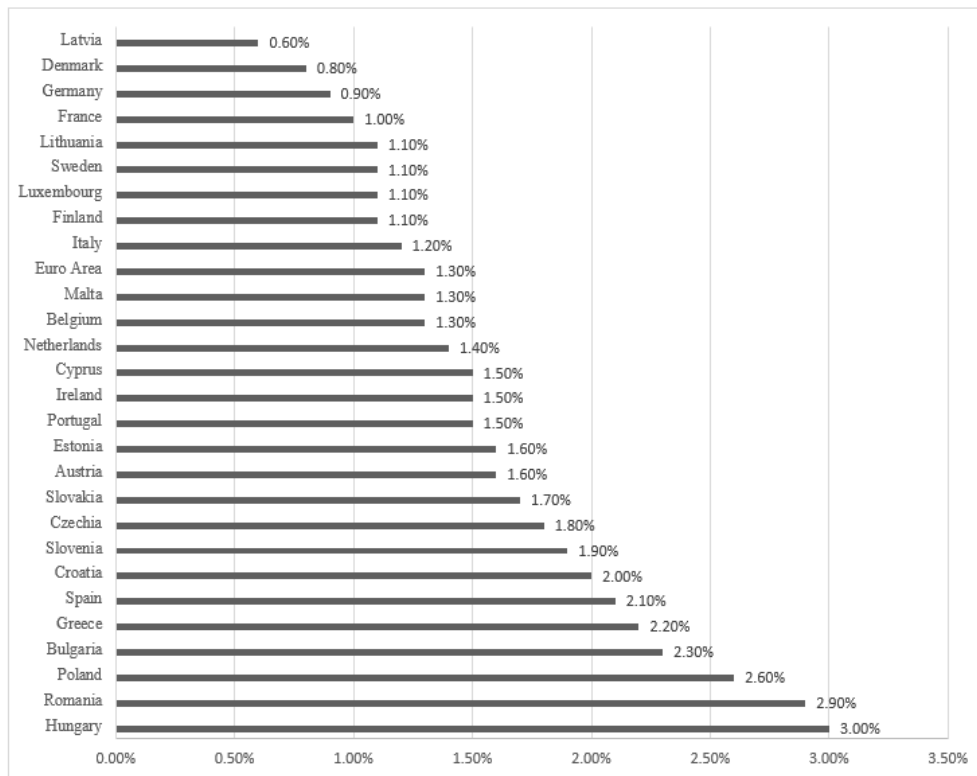
Source: Own Elaboration, data from European Banking Authority (2021)

Appendix 8 - Online banking penetration in selected European markets in 2021

Country	Penetration
Romania	15%
Bulgaria	15%
Greece	42%
Italy	45%
Germany	50%
Poland	52%
Portugal	53%
Hungary	56%
Croatia	56%
Slovenia	57%
Slovakia	58%
Euro Area	61%
Malta	63%
Cyprus	65%
Spain	65%
Austria	71%
Luxembourg	72%
Lithuania	72%
France	72%
Czechia	73%
Belgium	75%
Ireland	77%
Switzerland	77%
Latvia	80%
Estonia	82%
Netherlands	91%
Denmark	95%
Norway	96%

Source: Own Elaboration, data from Statista (2022)

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