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Corporate governance in European banks: board composition effects on risk

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1 – INTRODUCTION

World economies recently faced the largest financial crisis in Human history, the so-called great financial crisis (2007–2008); it led to the great recession of 2007–2009, which in turn aggravated the European debt crisis of 2009–2014. The origins of the great financial crisis are debated: some blame banks because of regulation circumvention, others blame supervision because it did not control financial markets and rating agencies properly. Yet, the great financial crisis is only the last of the products of banking malpractice. In every crisis originated by banks, there is a common denominator: their lacklustre corporate governance.

Corporate governance studies focus on the interactions between players that influence firm behaviour. According to agency theory (Fama & Jensen, 1983), whenever player interests diverge, agency problems arise and must be corrected to avoid dangerous outcomes, like defaults. The most investigated relation is between management and shareholders: management typically pursues own interests, like remuneration or control over the firm, while shareholders pursue share value maximisation; interest realignment mechanisms have to be put in place to avoid management from shirking its obligations to shareholders. Agency theory posits that the board of directors has control over firm outcomes by monitoring management behaviour and that board ability to monitor depends on its composition (Adams et al., 2010), the subjective qualities of its directors. If the board is inefficiently designed, too much leeway is given to management, and management will shirk its duties, leading to suboptimal firm outcomes. Every industry has its particularities; because of banks' unique characteristics (Laeven, 2013), their board composition assumes an even more relevant role in monitoring management. Several board composition attributes influence board's ability to monitor: its size, the number of independent directors, the number of female directors, the presence of board committees, its quality, the presence of the CEO and their role.

Bank literature measures the effects of board composition attributes on two firm outcomes: financial performance (John et al., 2016) and level of risk (Srivastav & Hagedorff, 2016). Neither stream of literature comes to univocally conclusive evidence on these relations. Because of the difficulty of measuring risk in banks, risk-related research is scarcer than performance-related research. Empirical literature suggests that whenever banks accumulate risks beyond what they can sustain, they default (Berger et al., 2016). Banks are systemic, and their failure spreads financial instability to the economy at large, leading to crises and recessions. Bank risk-related research often uses uniform samples (Srivastav & Hagedorff, 2016): most are centred on United States or United Kingdom banks, as their banking data is more readily available and underlying culture and regulation do not vary sensitively; analysis periods concentrate around the

great financial crisis; risk is proxied by measurements that are not always comparable or available in other countries. This thesis seeks to fill this gap: its focus is set on European banks during the post-financial crisis period of 2013–2019, and it proxies risk with capital adequacy risk, a bank-specific risk that is indifferent to country-specific regulation, as it originates from the Basel Accords. Expanding this scarcely researched field would profit all bank stakeholders, making them aware of which board attributes to seek and which to avoid. This thesis tries to answer the following research question:

RQ *Which attributes of board composition influenced the level of risk in European banks after the great financial crisis?*

To investigate this research question, four composition attributes are investigated by adapting extended agency theory to banks: board size, board independence, CEO duality and board gender diversity. A fixed effects regression method is used to analyse the sample, an unbalanced panel data set composed of 100 European banks observed during years 2013–2019. Two hypotheses are confirmed, in agreement with extended agency theory and existing empirical literature: independent and female directors decrease bank risk (Abdelbadie & Salama, 2019). Two hypotheses are rejected, as they show different results than proposed by extended agency theory: larger boards increase bank risk, and CEO duality decreases bank risk. As prospected above, this thesis contributes to literature by filling an existing gap in empirical bank corporate governance, finding relevant determinants of bank risk in a sample of unexplored characteristics. This thesis also poses the theoretical question whether agency theory is the most fitting model for analysing bank governance.

Hereby, an outline of thesis' chapters is given. Chapter 2 – Literature review provides a review of existing theoretical and empirical literature on banks and their specificities, on extended agency theory in banks, on board composition attributes and their relations with bank risk. Chapter 3 – Methods introduces the sample, variables and the analytical method. Chapter 4 – Results describes the sample analytically, investigates outliers and collinearity, and analyses regression results, confirming or rejecting the hypotheses. Chapter 5 – Discussion examines results, providing implications and insights. Chapter 6 – Conclusion summarises the thesis.

2 – LITERATURE REVIEW

This chapter presents existing theory and literature in order to formulate hypotheses that answer the following research question:

RQ *Which attributes of board composition influenced the level of risk in European banks after the great financial crisis?*

The chapter is structured as follows: bank business and risks are explained (2.1 – Bank business and risk); bank-specific agency issues are outlined after defining agency theory (2.2 – Agency issues in banks); bank-specific governance and board composition are discussed (2.3 – Board composition and bank risk); hypotheses on relations between board composition attributes and bank risk are formulated, after reviewing existing empirical analyses (2.3.1 – Board size, 2.3.2 – Board independence, 2.3.3 – CEO duality, 2.3.4 – Board gender diversity).

2.1 – BANK BUSINESS AND RISK

Many studies highlight that financial institutions are radically different from non-financial companies, like manufacturing or services firms. Banks belong to financial institutions, but literature also points out that banks are different from other financial institutions and are, in fact, unique (Laeven & Levine, 2009; John et al., 2016; Srivastav & Hagendorff, 2016).

Banks are defined as firms that perform allocation of financial resources under governmental authorization¹. Their core business is to collect liquidity from liquidity-providers (depositors) and to lend it to liquidity-takers (borrowers) or invest it in other profitable ways. There are several bank business model types, depending on the choice of asset utilization: retail-funded, wholesale-funded and capital market-oriented (Roengpitya et al., 2014). Each bank chooses its own business model, but all banks share their liquidity intermediation function. Their role in the economy is to be efficient allocators of liquidity: if they act efficiently, the resource allocation is efficient, and the economy as a whole positively profits from this (BCBS, 2015); if they act inefficiently, they create unstable financial systems (Adams et al., 2010; BCBS, 2015).

Banks are radically different from other firms because of six unique characteristics (Laeven, 2013). First, they have high debt leverage: their debt-to-equity ratio is

¹ Many newcomers in the banking industry, like some fintech companies or challenger banks, design their business models to actively avoid following incumbents' regulation and capital-intensive areas. This definition excludes these competitors to establish level playing field.

drastically higher than most other firm types. High debt leverage is optimal for banks and caused by their role in the economy as a liquidity intermediary (DeAngelo & Stulz, 2015): they leverage their equity more than other firms because they collect liquidity in the form of debt from the wide public. Second, banks have opaque portfolios: traditional information sources are insufficient and wider knowledge gaps ensue between banking-skilled and banking-unskilled stakeholders. For this reason, banks show higher information asymmetry levels between their stakeholders, and their portfolios are opaquer than in other industries. Literature argues that portfolio opacity might not be a concern in banking because of regulation-mandated transparency, but there is no consensus on the matter (John et al., 2016). Third, banks have diffuse debt: their debt is fragmented between a multitude of low-share depositors. Diffuse debt is a direct consequence of gathering liquidity from the wide public; comparatively, other firm types have more concentrated debt sources. Fourthly, banks have a marked maturity mismatch between assets and liabilities: their debt is mostly collected as short-term liquidity (deposits), while their assets are mostly lent on longer terms (mortgages). Fifth, banks are large creditors: they hold large shares of debt in other firms in the form of assets, horizontally across the economy. The interrelation system they create makes them systemic, as their risk of default is partially shared with the rest of the economy. Sixth, banks are heavily regulated: governments feel the need to correct for their systemicity by imposing specific laws to decrease the likelihood of bank defaults and, consequently, the negative externalities they impose on the economy. Summarising, compared to traditional firms, banks are unique financial firms that have higher debt leverage, opaque assets portfolios, diffuse debt, maturity mismatch between assets and liabilities, are large creditors and are heavily regulated. Because of these factors, bank risk management is more complex than in traditional firms.

Banks face more risk types than traditional firms, as their uniqueness factors cause bank-specific risks: capital adequacy risk, credit risk, liquidity risk, reputational risk and systemic risk. Capital adequacy risk is the risk of banks being uncompliant with capital requirements: under Basel Accords, banks must maintain a mandatory share of capital calculated on their risk weighted assets. Capital adequacy risk depends on their ability to correctly evaluate on-sheet and off-sheet assets, related risks, and then to assign proper risk weights. Lower capital adequacy risk provides higher stability by increasing crisis resilience through easier credit lending (ECB, 2020; Popov & Udell, 2012) and signals that banks have adequately provided for eventual losses. Higher capital adequacy risk is often signalled by lower levels of capital or by higher levels of riskier assets (Srivastav & Hagedorff, 2016). Credit risk is the risk of not receiving payoffs from investments and loans, originating from temporarily illiquid or defaulting borrowers. This risk is often signalled by increased non-performing exposures (NPE) or higher loan insolvency ratios. Liquidity risk is the risk of not being able to pay deposit withdrawals to depositors, and the risk of not being able to lend because of illiquidity caused by the

lack of cash or marketable assets. Liquidity risk is often signalled by higher deposit ratios, as banks in need of liquidity incentivise deposits by distributing higher interest ratios on deposited amounts (Chen et al., 2020). Reputational risk is the risk of negatively affecting business operations that specifically arises from stakeholder negative perceptions. It is caused by information asymmetry, as stakeholders need to “trust” banks on asymmetric information; the higher the trust in the bank, the higher its reputational risk. It is often measured by comparing abnormal returns with corporate announcements (Fiordelisi et al., 2013; Gillet et al., 2010) or with corporate social responsibility indicators (Jizi et al., 2014). Systemic risk is the risk of transmitting other risks to other firms or the economic system. It is caused by the large network of interrelations bank create with their activities. To better understand systemic risk, it is useful to exemplify a bank default case. When a bank defaults and is not recapitalized, it must recall its loans and investments to generate liquidity and repay its creditors. Banks lend liquidity to firms and individuals, which in turn employ those in projects or investments: recalling loans and investments moves illiquid lendees in default as well, leading to cascading effects across the economy. Banks, because of their unique characteristics, are the most likely financial institutions to transmit systemic shocks to the economy, but their systemicity remains difficult to measure (Billio et al., 2012).

Systemic risk also poses as the main rationale for heavy bank regulation (Barth et al., 2013). As already mentioned, whenever a bank defaults, heavy negative externalities are imposed on the economy, directly through loan recall and indirectly as spillover from other firms defaulting. In theory, bank regulation is instated to prevent bank defaults and their negative externalities². In practice, bank regulation acts by avocating decision power from banks: parts of bank regulation are not based on empirical or scientific evidence as much as on political pressure, and their effects are detrimental to the same bank stakeholders regulation intends to protect (Laeven, 2013). To the detriment of legislator goodwill, “bad” regulation hinders market functioning by creating distortions that in time call for more regulation (Boyd & Nicoló, 2005). In this sense, banks suffer from regulation inconsistency, as it fails to properly address their problems (Laeven, 2013). A clear example is given by deposit insurances: they are state-issued guarantees on deposits that allow depositors to recover their deposits in case of bank

² Default prevention is an inefficient policy if applied to traditional markets (Zame, 1993), but it may be efficient when applied to avoid systemic defaults. Defaults are a means by which inefficient firms are pushed outside of the market so that their resources are employed more efficiently. It may not be the case for banks, because of their systemicity. Avoiding bank defaults prevents negative externalities but also partially eliminates any chance to re-employ inefficiently managed resources. Governments and supervision authorities resolved to have inefficient banks acquired or merged, but this might provide worse results. For an example, take the incorporation of Banca Tercas by Banca Popolare di Bari, audited and guided by the Italian national bank, Bank of Italy (2016).

default. They are instated to reduce liquidity risk by preventing bank runs. Without a deposit insurance, when a bank is close to defaulting, its depositors have a strong interest in withdrawing all their savings before the default to avoid losses; with a deposit insurance, depositors have a weaker interest in withdrawing their money before default because they will be compensated by the insurer in case the default happens (Keeley, 1990). Deposit insurances achieve the intended effect of reducing liquidity risk, but they also create a relevant side-effect: a decrease in depositor monitoring. As with insurances, depositors covered by deposit insurances care less about monitoring bank activities because the insurer will refund them in case of default (Keeley, 1990). Regulation fails to address this side-effect: in order to raise the level of depositor monitoring, governments impose higher transparency duties on banks that, in turn, shift transparency costs on bank stakeholders. Lower depositor monitoring also prompts bank management to act more freely.

Bank business models, risks and regulation together create a complex system from which counterintuitive effects sprout. For example, banks become less risky if they face more competition, and more risky when their markets become concentrated (Boyd & Nicoló, 2005); they also become riskier when they possess surplus liquidity, as they employ it in riskier loans to achieve larger profits (Acharya & Naqvi, 2012). Banks' inherent complexity calls for a thorough analysis of the interaction between actors that play a role in bank governance and on mechanisms that shape those interactions. For this reason, in the next paragraph, bank-specific players and their interaction issues are analysed under an agency theory framework.

2.2 – AGENCY ISSUES IN BANKS

In order to analyse bank governance, this thesis follows the agency theory model hereby described. Shareholders pursue firm outcome maximization, in the form of risk minimization (Eisenhardt, 1989; Fama & Jensen, 1983; Jensen & Meckling, 1976); directors pursue the same objectives of shareholders; management pursues higher remuneration, the level of which is chosen by shareholders. Shareholders and management together select and nominate directors (Adams et al., 2010; Hermalin & Weisbach, 1998; Hermalin & Weisbach, 2003); the board monitors and advises management; management decides the level of business-specific information to be given to the board (Adams & Ferreira, 2007). Management likes to control the bank; board monitoring reduces management control on the bank but improves risk minimization; board advising improves risk minimization; more business-specific information to the board improves both board monitoring and board advising effects (Adams & Ferreira, 2007).

Agency theory posits that conflicts arise between players when they pursue conflicting goals (Berle & Means, 1932). Within this model, because of their inherent complexity, banks face additional and specific agency problems.

A first bank-specific agency problem arises between shareholders and debtholders because of high debt leverage. With high debt leverage, debtholders possess most of bank liabilities, and their debt is used as a financial lever to invest in assets (Laeven, 2013). Shareholders might push management to take on riskier projects than efficient in order to receive more dividends. In this case, excess risk from riskier projects is shifted on debt rather than on equity (Laeven, 2013); consequently, shareholder-aligned incentives to management are not efficient for debtholders, and for the economy at large because of systemicity (John et al., 2016). This goal conflict can be avoided by designing appropriate debtholder-aligned incentive systems for management (Bebchuk & Spammann, 2010; Laeven, 2013).

A second bank-specific agency problem arises between management and stakeholders because of liquidity risk. Debtholders have the right to withdraw their deposits at any time; if a bank has insufficient liquidity to fulfil all withdrawal orders, it defaults. To avoid default, banks hold wider cushions of liquidity than traditional firms, facing higher opportunity costs. The decision on the most fitting liquidity level is taken by management in compliance with regulatory frameworks (BCBS, 2015). Management might willingly select a lower-than-efficient liquidity level, reducing opportunity costs, to pursue own interests. In this case, to the detriment of other stakeholders and the economy at large, liquidity risk increases and default draws nearer (Laeven, 2013).

A third bank-specific agency problem arises between management and stakeholders because of high bargaining power with borrowers. Banks lend large amounts of liquidity to illiquid firms, so they are powerful stakeholders in lendees' strategies and governance (Shleifer & Vishny, 1997). Goal conflict arises whenever management decides to exert influence on borrowers, leveraging bank bargaining power to pursue own interests. This is a common case in large banks that possess large shares of debt in ailing companies: powerful managements might decide to postpone ailing companies' defaults to avoid large losses on the next financial report³.

A fourth bank-specific agency problem arises between management and directors because of information asymmetry. Bank stakeholders face higher information asymmetry on industry-specific information than in traditional firms; this is also true for their directors. Owing to bank complexity, banking-skilled directors possess industry-specific knowledge that banking-unskilled directors lack; thus, the knowledge gap between industry-skilled directors and industry-unskilled directors is wider in banking than in other industries. This creates opportunities for board capture (Jensen, 1993):

³ The NORD/LB (Norddeutsche Landesbank Girozentrale) case is a clear example. The German bank was specialized in "shipping loans", servicing mainly German sea shippers. Despite the long decline in the servicing industry, the bank held high concentration in the industry for several years, keeping sea shipper firms in quasi-life (Osman, 2017). This resulted in a large non-performing exposure (NPE) accumulation that forced a state recapitalization of 2,8 € billions (European Commission, 2019).

management might try to have an inefficient board appointed to exploit its improper monitoring and act more freely, pursuing own interests instead of shareholders' (Adams & Ferreira, 2007).

In all bank-specific agency problems, management might shirk from its contractual obligations to pursue own interests, at the expense of other stakeholders. According to agency theory, stakeholders are able to avoid management shirking by raising their monitoring on management (Eisenhardt, 1989); in banks, though, debtholders have less monitoring power than in traditional firms for two main reasons. First, bank debt is diffuse and it causes the absence of large debtholders: the average debtholder bargaining power becomes lower and opportunist managements might exploit this to shirk more easily than in other industries (Jensen, 1993; Laeven, 2013). Second, deposit insurances also cause lower debtholder monitoring, as mentioned in 2.1 – Bank business and risk.

Summarising, banks face additional agency problems compared to traditional firms. More frequent goal conflicts offer management more opportunities to shirk and lower debtholder monitoring eases opportunistic behaviour from management. As highlighted by supervision authorities (BCBS, 2015; ECB, 2020), a more efficient bank governance is needed to offset agency issues and their impact on bank risk. Bank corporate governance, though, is different from that of traditional firms.

2.3 – BOARD COMPOSITION AND BANK RISK

Corporate governance decides how strategy is set, how day-to-day business is carried out, how control is enacted, how law compliance is fulfilled, how stakeholder interests are protected, and is crucial for firms' efficient functioning (Shleifer & Vishny, 1997). Differently from other industries, bank governance is limited by governments and supervision authorities through additional governance regulation; this is not necessarily efficient, as governance regulation is at least “partly responsible for ineffectiveness [...] to align the interests of managers and outside investors” (Laeven, 2013, p. 68). As a result, two relevant governance mechanisms are affected: the market for corporate control, and the selection of directors and managers.

The bank market for corporate control is limited in order to exclude ownership complexity and commingling with other industries. In most legal frameworks, regulation bans or restricts concentrated ownership in banks from non-financial firms (Laeven, 2013); in most countries outside of the United States and the United Kingdom, regulation also prohibits hostile takeovers (Laeven, 2013). As a result, the bank market for corporate control is less efficient and management enjoys less pressure to fulfil shareholders' objectives, with consequently higher power and more frequent entrenchment occasions (Holderness, 2009).

The selection of directors and managers is limited by regulation to safeguard board

monitoring efficiency and management expertise. Central banks and other supervision authorities have the power to block, limit or overrule it: directors and managers are individually evaluated, and minimum thresholds are mandated (BCBS, 2015; OECD, 2019). In the European Union, for example, the European Central Bank (ECB) instituted minimum thresholds on previous experience and absence of conflict of interest in order to sit on bank boards (ECB, 2018). Board specific regulation alters the selection of directors and managers by restricting access to the industry.

More frequent management shirking opportunities and lower debtholder monitoring ask for more efficient bank governance, which in turn is impaired by governance regulation. All factors call for bank boards to be more efficient at controlling management; but how do boards become more efficient at controlling? Extensive literature points at board composition (Adams et al., 2010; Adams & Ferreira, 2007; de Andres et al., 2005; Rediker & Seth, 1995).

Defined as the resulting configuration of board attributes after director election, board composition is a relevant aspect of board of directors features: director characteristics influence board process, the ability of the board to be an efficient monitor and advisor and, ultimately, firm outcomes (Adams & Ferreira, 2007; Rediker & Seth, 1995). Board composition affects board decision making, as it provides the bedrock for interactions between directors, between board and management, and between board and other stakeholders (Adams et al., 2010; Oxelheim et al., 2013). Board composition has been under empirical scrutiny for more than thirty years, but literature results are mixed. Board composition is deeply interrelated with business characteristics and varies by industry and firm type; banks, for example, have a tendency towards larger boards that is not replicated in other industries (Barth et al., 2013).

Bank boards are different from traditional boards: their directors have to abide by stricter selection processes and their accountability is extended to the economy at large, both on individual and collective levels. According to the Basel Committee on Banking Supervision, the board has “ultimate responsibility for the bank’s business strategy and financial soundness, key personnel decisions, internal organization and governance structure and practices, and risk management and compliance obligations” (BCBS, 2015, p. 8). Directors are individually responsible for bank actions, risk appetite, corporate culture alignment, management control; regulation also imposes mandatory prerequisites, both individual and collective. The Basel Committee on Banking Supervision puts special emphasis on collective responsibility aimed to achieve better monitoring and board process: “the board must be suitable to carry out its responsibilities and have a composition that facilitates effective oversight” (BCBS, 2015, p. 13). To be suitable, a bank board needs to have such a composition that its actions’ results are efficient and effective in practice (Adams & Ferreira, 2007; de Andres et al., 2005). Several board composition attributes influence risk minimisation: how large a board is (board size), how independent from management it is (board independence), what type of interaction

with management it has (CEO duality), how diverse it is (board gender diversity), are all relevant attributes that affect bank risk (John et al., 2016; Srivastav & Hagendorff, 2016).

This thesis analyses board composition attributes in relation with bank risk. Bank risk is defined as the level of risk that a bank undergoes at a given moment. It varies depending on board and management choices; as of extended agency theory, board monitoring and advising actions influence the level of risk reached by the firm, conditioned on board composition (Adams & Ferreira, 2007; Eisenhardt, 1989; Srivastav & Hagendorff, 2016). Bank risk is constantly under scrutiny from supervision authorities because of its variety and its relevance for bank stability (ECB, 2020). Empirical literature has analysed several types of risk, but evidence on the matter is scarce and hardly comparable, so no unambiguous relations are found (Srivastav & Hagendorff, 2016). This thesis seeks to partially fill this literature gap, answering this research question:

RQ *Which attributes of board composition influenced the level of risk in European banks after the great financial crisis?*

In the following subparagraphs, relations between single board composition attributes and bank risk are analysed and hypotheses are formulated.

2.3.1 – BOARD SIZE

Board size is a fundamental element of board composition; it is defined as the number of directors composing the board at a given moment. Agency theory implies that board size has a relevant role in board process, directly influencing firm outcomes (Minichilli et al., 2009): too large and too small boards imply suboptimal risk levels. Larger boards provide more unique skills than smaller boards, but they are more difficult to coordinate as it is increasingly difficult to provide time, resources, and space for every director to express themselves and to contribute actively (de Andres & Vallelado, 2008). In essence, a board too large provides lower monitoring and advising than optimal because of higher cooperation costs and increased goal conflicts; a board too small brings too few unique skills and abilities to efficiently monitor and advise management (Jensen, 1993; Mamatzakis & Bermppei, 2015). Thus, increasing or decreasing board size beyond certain thresholds imply suboptimal board monitoring and advising. The optimal board size lies between upper and lower thresholds; beyond these thresholds, board size becomes suboptimal, implying higher than efficient levels of risk.

While this reasoning is applicable to all firms, the effects of board size are industry-specific: different industries have different skill needs, and different board skills have different influences on board processes (Minichilli et al., 2009). Because of additional bank-specific risks, bank-specific agency problems and altered corporate governance, banks theoretically need larger board sizes to foster greater numbers of useful skills to efficiently monitor and advise management. Empirical research confirms this theoretic proposition: board size is larger in US banks than in non-financial US firms, with similar

results in most countries (Barth et al., 2013).

Empirical literature on the relation between board size and bank risk has not reached consensus, and few articles exist on this topic (John et al., 2016; Srivastav & Hagendorff, 2016). Furthermore, studies on this relation are hard to compare as they analyse different risk types during different time periods. Berger et al. (2016) find a positive linear relation between probability of default and board size two years before a bank default, while Wang & Hsu (2013) find a negative U-shaped relation with operational risks, setting the upper threshold for optimal board size at 14 directors; Abdelbadie & Salama (2019) find a linear, positive relation with credit risk.

According to agency theory, there is a trade-off between bank risk and board size: too small boards and too large boards are inefficient. Recalling the Wang & Hsu (2013) approach, the following hypothesis is formulated:

H.1 *Board size has a negative, U-shaped relation with bank risk.*

2.3.2 – BOARD INDEPENDENCE

Different countries use different definitions of independence; most OECD countries “have established code recommendations for a majority of the board to be independent on a comply or explain basis” (OECD, 2019, p. 126), and many have set lower standards by hard law. Firms tend to observe code prescriptions to legitimize their position in the eyes of markets rather than to truly improve their practices (Zattoni & Cuomo, 2008); furthermore, depending on code rulings and definitions, an independent director might not be really “independent” from its firm. Director independence is defined as a subjective quality achieved when directors and their next of kin have no relation with the firm they sit on the board of, except the directorship. Independents are included in boards because of their more unaligned and impartial judgement on management actions compared to executive directors and because of their lack of conflicts of interest, while they hold the same accountability of other directors (BCBS, 2015). To analyse the impact of board independence on firms, literature uses the fraction of board independent directors to total board size as a proxy, implying that the more a board is composed by independents, the more the board is independent (Adams & Mehran, 2012; Pathan & Skully, 2010).

Agency theory posits that independents are better monitors on management than non-independents because they have no other ties with the firm and because they bring outside expertise that can be beneficial for business (Fama & Jensen, 1983; Linck et al., 2008). Higher shares of independents on the board are more efficient at monitoring management: adding more independents fosters different skills, needed to recognize potential external risks, to avoid agency problems, to advise management properly and more easily recognise management shirking (Pathan & Skully, 2010). If the share of independents is too small, board monitoring becomes suboptimal and management

shirks more easily. All other things equal, the greater the number of independents in a board, the better the board becomes at monitoring and advising management, and overall firm risk is minimized. According to Adams & Ferreira (2007), independents have no industry-specific or firm-specific skills because of their lack of links with the firm and its industry; this concern can be dismissed as the ability of a director to properly understand the business and to be an efficient director depends on director education and expertise, not on their independence quality (Srivastav & Hagendorff, 2016).

As with board size, different industries require different levels of monitoring (Minichilli et al., 2009). Banks suffer from additional bank-specific risks, bank-specific agency problems and altered corporate governance; theoretically, they need more independents than other firms. The same is postulated by the Basel Committee on Banking Supervision: “the board must be suitable to carry out its responsibilities and have a composition that facilitates effective oversight. For that purpose, the board should be comprised of a sufficient number of independent directors” (BCBS, 2015, p. 13). Empirical research confirms this theoretic proposition: Adams (2012) verified that board independents are more numerous in US banks than in non-financial US firms.

Empirical literature has not reached consensus on the relation between board independence and bank risk. Results are mixed: Jizi et al. (2014) find that board independence has a positive relation with corporate social responsibility disclosure, as larger boards are better able to control management activity; Berger et al. (2016) find linearly positive relations with default risk; Abdelbadie & Salama (2019) find a negative relation with credit and insolvency risks; Haynes et al. (2019) consider board independence a moderating factor of management power.

According to agency theory, in banks larger numbers of independent directors are needed to perform better monitoring and advising actions on management. Recalling the Abdelbadie & Salama (2019) approach, the following hypothesis is formulated:

H.2 *Board independence has a negative linear relation with bank risk.*

2.3.3 – CEO DUALITY

In agency theory models, boards serve as monitors and advisors to management, while management conducts day-to-day business; their functions are separated in order to ensure their principal-agent relation is efficient and interests are correctly aligned (Fama & Jensen, 1983). The board is headed by the chairperson, that serves as reputation figure and board process facilitator, while management is headed by the chief executive officer (CEO), the apical firm manager. Their roles are different and distinct; relations between board and management drastically change whenever the CEO also becomes the board chairperson (Finkelstein & Daveni, 1994). CEO duality occurs whenever the CEO also serves as board chairperson. On one side, CEO duality favours CEO entrenchment and power accumulation by reducing board ability to control management; on the

other, it establishes “unity of command” by clearly identifying a strong and authoritative figure that may more easily reassure stakeholders (Finkelstein & Daveni, 1994). Which of the two sides prevails depends on the context: firms in turnaround might become more efficient with CEO duality, while firms in riskier environments profit more from CEO-chair separation.

In banks, emphasis is firmly put on board control on management (BCBS, 2015) because management shirking opportunities are more frequent and goal conflicts abound. Banks live in a riskier environment than most other firms and their defaults are avoided whenever possible because of their magnitude. Agency theory suggests that in banks, unless mightier reasons like turnaround or default risk arise, CEO duality should be avoided as it negatively influences board monitoring and advising.

Contradicting results come from empirical literature on the relation between CEO duality and bank risk. Pathan (2009) finds that CEO duality reduces bank risk because of CEO propension not to further put at risk position and power; Jizi et al. (2014) find that CEO duality is positively linked to corporate social responsibility disclosure but it is unclear if it is caused by market ability to profit from powerful CEO positions or the result of market pressure on CEOs to be more transparent; Berger et al. (2016) argue that CEO duality reduces bank default probability for two years preceding a default, indicating that CEO duality is linked to default-postponement moral hazard; they also find that failed banks have CEO duality less frequently than non-failed banks, either because powerful CEOs become more risk averse to avoid negative public image, or because non-CEO chairpersons cannot understand complex risk correctly, indirectly increasing default risk; Farag & Mallin (2017) find no significant relation with financial fragility.

According to agency theory, in banks CEO duality increases the level of risk by lowering board control on management. Recalling Berger et al. (2016), the following hypothesis is formulated:

H.3 *CEO duality has a positive linear relation with bank risk.*

2.3.4 – BOARD GENDER DIVERSITY

Gender diversity in corporations is an often-discussed argument and has become a focus point in many legal frameworks (Adams & Ferreira, 2009). Many OECD countries introduced mandatory quotas for the least represented gender on listed boards, while others use codes of good governance as nudge to increase female representation (OECD, 2019). Board gender diversity is a part of a wider research field on diversity and gender, afferent to many disciplines. Psychology observes that females possess unique leadership characteristics that indirectly create the “glass ceiling” problem: prejudicial reactions that negatively affect female access to male-dominated roles, as females need more competences than male peers to fill the gap created by prejudice (Eagly & Carli, 2003). Organizational psychology argues that diversity, intended as variety across several

dimensions like skills, education, gender, age, experience, *et cetera alia*, fosters better results for organizations (Cox & Blake, 1991). Social psychology argues that more diversity implies slower decision making (Garcia-Meca et al., 2015). Business ethics argues that increasing least represented gender presence in boards leads to firm value increase (Isidro & Sobral, 2015; Terjesen et al., 2015).

Board gender diversity, defined as the percentage of directors of the least represented gender, female or male, has become a relevant topic in management journals because of two reasons (Terjesen et al., 2015). First, as a dimension of variety, gender diversity has social implications: it has to be carefully designed and managed as a board composition characteristic to take advantage of economic, ethic and social compliance spillover effects (Isidro & Sobral, 2015). Second, board gender diversity as a social theme can be reconducted to three cases: the “business case”, a positive effect that might be prompted by higher diversity through finding more and better decision alternatives; the “individual justice” rationale, the aim towards equal treatment of people by increasing the share of the least represented group, provided other skills and characteristics are similar; the “social justice” rationale, by which as females are half of the population, they should occupy half of the board seats (Kumar & Zattoni, 2018). All these cases compel to observe that board gender diversity has governance implications and needs to be considered a crucial dimension of board composition to design an efficient board.

Agency theory is not indifferent to subjective director characteristics, and gender diversity is a clear-cut attribute of board composition that influences board efficiency. Under the assumption that each gender’s directors possess unique characteristics that the other lacks (Eagly & Carli, 2003), agency theory implies that the board must encompass both genders in sufficient numbers as not to lack any gender-specific skill. More gender varied boards are more efficient, and increased gender diversity fosters indirect and positive effects from social and ethical compliance, with positive reverberations on firm conditions (Adams & Ferreira, 2009; Isidro & Sobral, 2015). Yet, adding a female (or male) director to a board does not necessarily lead to an increase in board efficiency *per se*; board efficiency is achieved if monitoring and advising become more efficient. This happens whenever substituting a male (female) director with a female (male) director causes no useful-skill loss to the board; in this sense, mandating gender quotas can worsen firm outcomes in already efficient firms (Adams & Ferreira, 2009).

To assess gender diversity relations with bank risk, it is useful to explore relations between the banking industry and gender diversity. According to Adams & Ferreira (2009), boards are less gender-varied when operating in riskier industries, and females are better controllers than males because they are less risk-oriented and less power-driven. According to Adams & Ferreira (2009), female would be the least represented gender in banking, a risky business, but also the better controller. This surmise is found to be at least partially true: in banking, female is almost always the least represented gender, and female presence on bank boards decreases bank risk levels (Farag & Mallin,

2017; Mateos de Cabo et al., 2012).

Several considerations emerge from empirical literature on the relation between board gender diversity and bank risk, but no consensus is achieved. Adams & Ferreira (2009) find that more gender diverse boards are more efficient monitors and choose lower levels of firm risk; Mateos de Cabo et al. (2012) find that female presence is higher in less risky banks; Berger et al. (2014) find a positive relation between female presence and portfolio risk, due to female lower experience at nomination compared to men, confirming the “glass ceiling” theory; Jizi et al. (2014) find that board independence is positively related to corporate social responsibility disclosure; Farag & Mallin (2017) find an inverse U-shaped relation between gender diversity and financial fragility, as female directors are not less risk-averse than male counterparts and optimal board gender diversity lies within thresholds; Abdelbadie & Salama (2019) find that female presence is related to higher bank risk aversion and lower bank risk taking. On the methodologic side, Ferreira (2015) suggests that board gender diversity might be partially endogenous and linked to other variables like independence, board size, supervisory activities, and that for this reason relations with firm outcomes might be partially spurious.

According to agency theory, too low representation of each gender is detrimental to boards, and this would suggest a reverse U-shaped relation between board gender diversity and bank risk, as in Farag & Mallin (2017); in banks, though, female is the least represented gender but also the better controller; this bias leads to support a negative linear relation, as in Abdelbadie & Salama (2019). Therefore, the following hypothesis is formulated:

H.4 *Board gender diversity has a negative linear relation with bank risk.*

3 – METHODS

3.1 – SAMPLE SELECTION AND DATA COLLECTION

This thesis uses an unbalanced panel data sample collected from Thomson Reuters Refinitiv Eikon; the sample consists of 100 listed European banks observed during the period 2013–2019. Selection criteria are as follows: banks pertain to the same industry, “banking services”; they are listed; they are not inactive; they have their headquarters located in 23 selected European countries. The resulting sample is highly descriptive of European banks in said countries, representing to 89,5% of the total market capitalization for year 2019. For the full set of countries and a statistic breakdown of the sample, see Table 1. Refinitiv Eikon financial data is in US \$, it is referred to the end of the year to ensure comparability and it is gathered directly from financial reports; governance data is gathered from corporate documents and financial reports (Thomson Reuters, 2020). Extracted from the Eikon database in early March 2020, the resulting panel data is unbalanced: it consists of 100 banks over 7 years, accruing to 467 bank-year observations. Missing financial data is due to different regulation frameworks and missing 2019 financial statements; board composition missing observations are due to different regulation frameworks and firm-side lack of reporting and disclosure.

A breakdown of banks by country is displayed in Table 1. The full list of banks in the sample is shown in Appendix 1.

3.2 – DEPENDENT VARIABLE

In this thesis, the dependent variable is the level of risk. Risk can be analysed by segregating it into several risk types (Srivastav & Hagendorff, 2016); this thesis follows an existing literature approach that analyses capital adequacy risk using the ratio of Common Equity Tier 1 to risk weighted assets (CET1) as a proxy (Abdelbadie & Salama, 2019; Srivastav & Hagendorff, 2016). CET1 ratio is a fit capital adequacy proxy because it is a worldwide recognised international standard, horizontal to the wide set of European countries represented in the sample (BCBS, 2015, 2020). It must be noted that the relation between the level of risk and its proxy, CET1 ratio, is reversed: lower capital adequacy risk corresponds to higher levels of CET1 ratio.

3.3 – INDEPENDENT VARIABLES

In this thesis, four independent variables are used: board size (BSIZE) is the number of directors on the board (Pathan & Skully, 2010; Wang & Hsu, 2013); board independence (BINDEP) is the proportion of independents on the board (Pathan & Skully, 2010;

Wang & Hsu, 2013); CEO duality (CEODUAL) is a dummy variable that assumes positive value (1) when the CEO and the chairperson are the same person, and null (0) otherwise (Berger et al., 2016; Pathan & Skully, 2010); board gender diversity (BGENDER) is the proportion of female directors on the board (Adams & Ferreira, 2009; Farag & Mallin, 2017).

Table 1 – Sample statistics by country

<i>Country</i>	<i>Country Name</i>	<i>Banks</i>	<i>Market Cap</i>	<i>Total Assets</i>	<i>Total Assets %</i>
AT	Austria	3	2.22%	497.23	1.90%
BE	Belgium	1	2.45%	325.91	1.25%
CH	Switzerland	7	4.94%	1087.00	4.16%
CY	Cyprus	1	0.05%	25.32	0.10%
CZ	Czech Republic	2	0.65%	56.77	0.22%
DE	Germany	5	2.80%	619.76	2.37%
DK	Denmark	4	1.62%	698.23	2.67%
ES	Spain	8	11.10%	3617.92	13.85%
FI	Finland	2	2.88%	632.86	2.42%
FR	France	3	11.10%	3947.07	15.11%
GB	Great Britain	11	24.24%	7191.11	27.52%
GR	Greece	5	0.73%	404.46	1.55%
HU	Hungary	1	1.09%	52.16	0.20%
IE	Ireland	3	0.96%	275.55	1.05%
IT	Italy	14	8.96%	2718.97	10.41%
LI	Lithuania	1	0.16%	23.33	0.09%
NL	Netherlands	2	3.85%	1420.08	5.43%
NO	Norway	7	3.09%	411.20	1.57%
PL	Poland	10	3.19%	343.90	1.32%
PT	Portugal	1	0.24%	87.08	0.33%
RO	Romania	2	0.44%	35.03	0.13%
RU	Russia	4	8.17%	768.76	2.94%
SE	Sweden	3	5.07%	890.25	3.41%

Notes: Market Cap indicates the market capitalization for year 2019; *Total Assets* are in US \$ billions; *Total Assets %* represents the share of the sum of total assets. German banks' low market capitalization and total assets are explained by heavy fragmentation and by the scarcity of listed German banks (Morris et al., 2019).

3.4 – CONTROL VARIABLES

Consistent with existing literature, in this thesis three control variables are employed: debt-to-assets ratio (DTAR), as an indication of bank debt (Abdelbadie & Salama, 2019; Jizi et al., 2014); revenues (REVENUES), as an indication of bank size (Adams &

Ferreira, 2009; Haynes et al., 2019); return on assets (ROA), as an indication of profitability (Frag & Mallin, 2017; Jizi et al., 2014).

3.5 – ANALYTICAL PROCEDURES

In this thesis, fixed effects regression models are used to analyse the sample. To explain the rationale behind this choice, it is useful to recall econometric practice on panel data samples (Baltagi, 2011). First, a Breusch-Pagan test must assess whether the analysis is more explanatory as a simple one-year regression, or as a panel data regression (Breusch & Pagan, 1979; Cook & Weisberg, 1983); in the first case, an ordinary least squares (OLS) regression model is the most apt to infer from the sample, while in the second case a random effects (RE) regression model is more fitting. Second, a Durbin-Wu-Hausman test must assess which between a random effects regression model and a fixed effect (FE) regression model is more explanatory (Nakamura & Nakamura, 1981). As reported in Table 2, test results confirm that the most fit model for this inquiry is fixed effects.

Table 2 – Homoscedasticity tests

	Breusch-Pagan		Durbin-Wu-Hausman	
	χ^2	DoF	χ^2	DoF
CET1	414.18***	1	60.979***	8

Notes: CET1 is the dependent variable. χ^2 indicates the chi-square value, with p-values, for each regression (p-value levels: * = p<0,1; ** = p<0,05; *** = p<0,01). DoF indicates degrees of freedom. In Breusch-Pagan tests, the single degree of freedom indicates that data is pooled and then regressed.

Fixed effects models assume that single-year intercepts are identical and that all omitted variables are time-invariant (their value does not change in the analysed period). Fixed effects result interpretation is bound to the sample and cannot be generalized on its population (Gelman, 2005): in this thesis' case, any inference from the model cannot be generalized on all banks and is contingent to the observed sample. All used variables are time-variant and therefore robust to fixed effect regression models.

In order to test the hypotheses formulated in chapter 2 – Literature review, the following regression equations are tested:

$$CET1_{i,t} = \alpha_{i,t} + \beta_6 \times DTAR_{i,t} + \beta_7 \times \ln(REVENUES_{i,t}) + \beta_8 \times ROA_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$CET1_{i,t} = \alpha_{i,t} + \beta_1 \times BSIZE_{i,t}^2 + \beta_2 \times BSIZE_{i,t} + \beta_6 \times DTAR_{i,t} + \beta_7 \times \ln(REVENUES_{i,t}) + \beta_8 \times ROA_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$CET1_{i,t} = \alpha_{i,t} + \beta_3 \times BINDEP_{i,t} + \beta_6 \times DTAR_{i,t} + \beta_7 \times \ln(REVENUES_{i,t}) + \beta_8 \times ROA_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$CET1_{i,t} = \alpha_{i,t} + \beta_4 \times CEODUAL_{i,t} + \beta_6 \times DTAR_{i,t} + \beta_7 \times \ln(REVENUES_{i,t}) + \beta_8 \times ROA_{i,t} + \varepsilon_{i,t} \quad (4)$$

$$CET1_{i,t} = \alpha_{i,t} + \beta_5 \times BGENDER_{i,t} + \beta_6 \times DTAR_{i,t} + \beta_7 \times \ln(REVENUES_{i,t}) + \beta_8 \times ROA_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$CET1_{i,t} = \alpha_{i,t} + \beta_1 \times BSIZE_{i,t}^2 + \beta_2 \times BSIZE_{i,t} + \beta_3 \times BINDEP_{i,t} + \beta_4 \times CEODUAL_{i,t} + \beta_5 \times BGENDER_{i,t} + \beta_6 \times DTAR_{i,t} + \beta_7 \times \ln(REVENUES_{i,t}) + \beta_8 \times ROA_{i,t} + \varepsilon_{i,t} \quad (6)$$

In these equations: i indicates the observation, from bank 1 to bank 100; t indicates the year of observation, from 2013 to 2019; α indicates unobserved time-invariant individual effects; β indicates coefficients assigned to independent and control variables; ε indicates the remaining stochastic disturbance.

4 – RESULTS

This chapter presents the analytical results of this thesis' inquiry. It is structured as follows: descriptive statistics of the sample are presented (4.1 – Descriptive statistics); outliers are highlighted and treated (4.2 – Outliers); absence of collinearity is tested (4.3 – Variable correlation); regression results are analysed quantitatively (4.4 – Regression results).

4.1 – DESCRIPTIVE STATISTICS

Descriptive statistics of sample variables are laid out in Table 3.

Table 3 – Descriptive statistics

	<i>N</i>	<i>Mean</i>	<i>St. Dev.</i>	<i>Min</i>	<i>Q₁</i>	<i>Median</i>	<i>Q₃</i>	<i>Max</i>
<i>CET1</i>	608	0.15245	0.04676	0.05800	0.12400	0.14600	0.17200	0.50880
<i>BFSIZE</i>	542	12.94280	4.88788	5	10	12	16	32
<i>BINDEP</i>	542	0.53959	0.24791	0	0.35016	0.56386	0.72727	1
<i>CEODUAL</i>	542	0.08856	0.28437	0	0	0	0	1
<i>BGENDER</i>	542	0.22571	0.13849	0	0.12500	0.22222	0.33333	0.60000
<i>DTAR</i>	691	0.91921	0.03715	0.70305	0.89920	0.92952	0.94246	1.04549
<i>REVENUES</i>	690	9.26153	17.59838	0.02405	0.62893	1.85854	7.25215	120.95000
<i>ROA</i>	694	0.00799	0.01338	-0.05755	0.00292	0.00699	0.01358	0.08386

Notes: *N* indicates the number of observations for each variable; *Q₁* indicates the first quartile (25th percentile); *Q₃* indicates the third quartile (75th percentile). *REVENUES* are in US \$ billions.

The number of observations varies because the sample is in the form of unbalanced panel data. CET 1 ratio is always above the minimum requirement imposed by banking supervision except in one case, Banca Carige in 2014, as it faced restructuring after supervision corrections. Board size is higher than in other industries, with similar results to Barth et al. (2013). Board independence is high, in line with Basel Committee on Banking Supervision corporate governance principles (BCBS, 2015); as shown in Figure 1, the board independence median increased of about 10% over seven years. Female gender representation is often below one third of the board, a common threshold imposed by several codes of good governance (OECD, 2019); as shown in Figure 2, female representation shows a strong increase during the seven years of observation, starting at a median of about 13% and concluding around 30%. CEO duality is largely absent. Debt-to-asset ratio shows four observations larger than 1, a theoretically impossible value: these

observations belong to four Greek banks that accumulated enough losses to totally offset their capital during the Greek government-debt crisis (2013). In the same year, they were recapitalized by the Hellenic Financial Stability Board, re-establishing acceptable levels of capital. Revenues show strong right-side skewness, as their mean and median greatly differ.

Figure 1 – Board independence

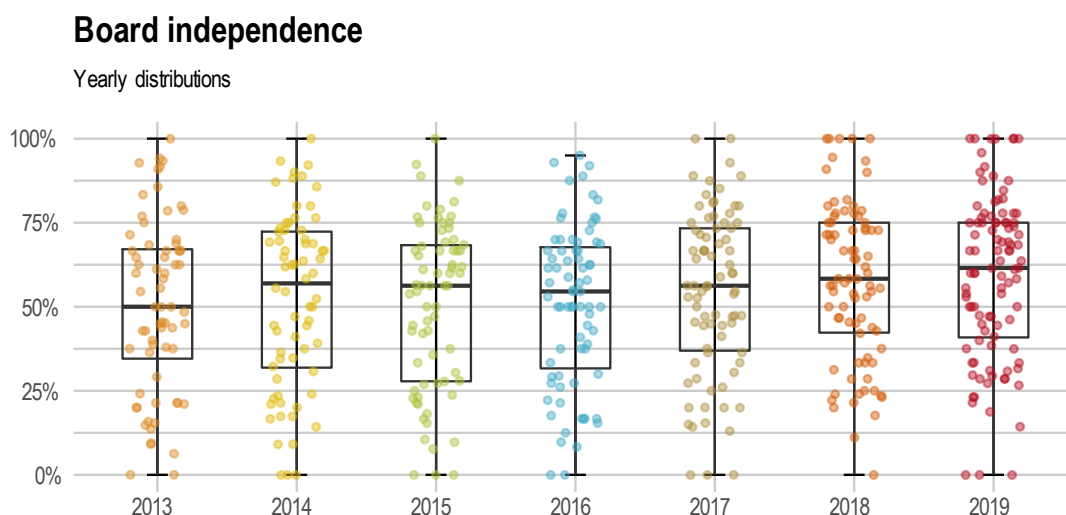
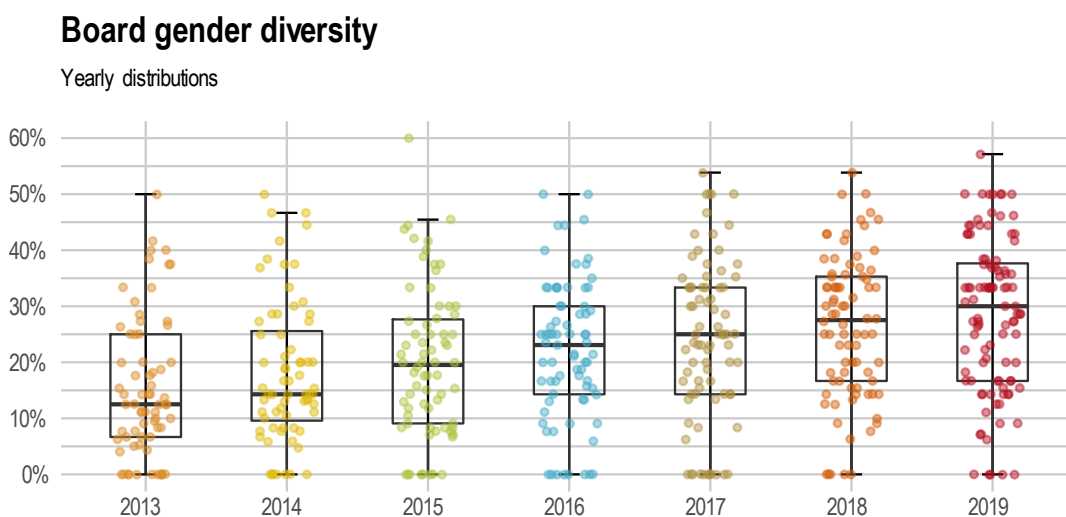


Figure 2 – Board gender diversity



4.2 – OUTLIERS

If unchecked, outliers might distort results. Following an existing literature

approach (Aguinis et al., 2013), variables are analysed univariately to identify outliers that are then individually checked. Outliers are included in the sample if they represent valid observations, because deleting them would alter the analysis by artificially restricting variable ranges; they are excluded only if they are identified as measurement errors. Overall, four variables in the sample show outliers; only one, REVENUES, needs treatment. For graphical visualization, see Appendix 2.

CET1 outliers are valid; they lie in the right part of the boxplot and are composed of specialized banks, like Banca Farmafactoring SpA, and direct banks, like Comdirect Bank AG. BSIZE outliers are valid; they belong to banks that have two tier boards; its maximum value, 32, refers to the two-tier board of Unione di Banche Italiane SpA in 2015. DTAR's left side outliers are valid and correspond to Moneta Money Bank a.s. (2014-2015) and Metro Bank PLC; both banks temporarily raised their equity levels, respectively because of restructuring and growth strategy, lowering their DTAR. DTAR's single right side outlier is valid, and it refers to Greek government-debt crisis worst-hit bank, Piraeus Bank SA, already analysed in 4.1 – Descriptive statistics. REVENUES presents strong positive skewness (or right-side skewness); following existing empirical literature (Haynes et al., 2019), the variable is log transformed to normalise its distribution. No outliers are detected on its logarithmic scale version.

4.3 – VARIABLE CORRELATION

Collinearity, or strong relations between variables, might skew regression results by leading to higher standard errors and less significant results. To assess whether selected variables are collinear, two methods are applied. Overall results support the absence of collinearity between chosen variables.

First, a Pearson's correlation matrix analysis is conducted on the sample; results are shown in Table 4. Pearson's correlation values range from -1 to +1, respectively a perfectly negative linear relation and a perfectly positive linear relation; a correlation equal to 0 indicates the absence of linear relations between the variables. Most relations are statistically significant at the highest level; this result is driven by the large number of observations in the sample upon which Pearson's correlations are calculated (Adams, 2017; Wasserstein et al., 2019). In this sample, no strong relations are identified; instead, three mild linear relations are found. The first relation, between control variables ROA and DTAR, is linearly negative (-0.54) and it can be explained as a consequence of lending proficiency: more profitable banks have comparatively lower levels of debt, as they use collected resources more efficiently. The second relation, between variables REVENUES and BSIZE, is linearly positive (0.41) and it can be explained as an effect of increasing business complexity: the larger the bank, the larger its complexity, the more board directors it needs to address complexity. The third relation, between control variables REVENUES and DTAR, is linearly positive (0.37) and it can be explained as a by-

product of economies of scale: the larger the bank, the better its ability to lend.

Table 4 – Pearson’s correlation matrix

	<i>CET1</i>	<i>BSIZE</i>	<i>BINDEP</i>	<i>CEODUAL</i>	<i>BGENDER</i>	<i>DTAR</i>	<i>REVENUES[†]</i>	<i>ROA</i>
<i>CET1</i>		470	470	470	470	607	605	608
<i>BSIZE</i>	-0.31 ^c		542	542	542	534	533	537
<i>BINDEP</i>	0.18 ^c	-0.08 ^a		542	542	534	533	537
<i>CEODUAL</i>	0.06	-0.16 ^c	0.09 ^a		542	534	533	537
<i>BGENDER</i>	0.27 ^c	0.07	0.32 ^c	-0.02		534	533	537
<i>DTAR</i>	-0.09 ^b	0.28 ^c	0.13 ^c	-0.11 ^c	0.21 ^c		688	691
<i>REVENUES[†]</i>	-0.14 ^c	0.41 ^c	0.25 ^c	-0.11 ^c	0.29 ^c	0.37 ^c		689
<i>ROA</i>	0.25 ^c	-0.23 ^c	-0.06	0.09 ^b	0.06	-0.54 ^c	-0.10 ^c	

Notes: the upper triangle indicates the number of observations used in analysing each pair of variables; the lower triangle indicates correlation coefficients; ^a, ^b, ^c, indicates asymptotic significance at 10%, 5%, 1% levels respectively. [†] indicates that the variable is log-transformed.

Second, a variance inflated factor (VIF) analysis is conducted on the sample; results are shown in Table 5. VIF values indicate the degree to which independent variables are collinear with each other: higher values correspond to higher degrees of multicollinearity (Thompson et al., 2017). As a rule of thumb, values higher than 5 should be either statistically corrected or removed from the analysis as they confound results (O’Brien, 2007). Another way of assessing collinearity is through tolerance, the inverse of the VIF result; as a rule of thumb, if tolerance is lower than 0.1, corrections have to be applied.

It can be concluded that in neither of the analyses variables are collinear.

Table 5 – Variance inflated factors

	<i>BSIZE</i>	<i>BINDEP</i>	<i>BGENDER</i>	<i>CEODUAL</i>	<i>DTAR</i>	<i>REVENUES[†]</i>	<i>ROA</i>
<i>VIF</i>	1.34	1.20	1.20	1.06	1.67	1.56	1.44
<i>1/VIF</i>	0.75	0.83	0.83	0.95	0.60	0.64	0.69

Notes: [†] indicates that the variable is log-transformed.

4.4 – REGRESSION RESULTS

In this thesis, analysed equations are modelled as fixed effects regressions. Fixed effects models control for absent regression variables under the assumption that they

are time-invariant (their value and effect do not change in the period of analysis). Therefore, bank characteristics that are time-invariant within the sample cannot influence results. Fixed effects models also imply a strict exogeneity assumption: explanatory variables cannot be correlated with the error term, as that would imply that the regression has an omitted variable in its error term (Gelman, 2005). This has two implications: in case a variable is collinear with the dependent variable, that variable has to be excluded; omitting time-variant variables leads to biased regression results (Baltagi, 2011).

Results are presented in Table 6. Regressions are composed as follows: (1) uses control variables only; (2) to (5) use independent variables singularly with control variables; (6) uses the full set of variables. Hypotheses are tested in regressions (2) to (5) singularly and in regression (6) together. All regressions pass their F-test with the highest level of statistical significance, determining that fixed effects are different from zero in all regressions and that they are correlated with explanatory variables. Before the analysis, it might be useful to recall that the relation between capital adequacy risk and its proxy, CET 1 ratio, is reversed: lower capital adequacy risk corresponds to higher CET 1 ratio.

In regression (1), results support statistically significant linear relations between the dependent variable, CET 1 ratio, and two control variables, the debt-to-asset ratio and return on assets. DTAR is negatively related with CET1: on average, an increase of 1% in debt-to-asset ratio implies a decrease of 0.56581% in CET 1 ratio. ROA, instead, is positively related to CET1: an increase of 1% in ROA determines an increase of 0.35511% in CET 1 ratio. Both relations are quite strong, as they depend on the low variance of the involved variables. DTAR serves as an indication of debt, so it can be inferred that within this sample higher levels of bank debt are correlated with higher bank capital adequacy risk. ROA, instead, serves as an indication of profitability, so within this sample more profitable banks tend to face lower capital adequacy risk. Despite slight changes in coefficients, these results are similar in all regressions.

Regression (2) results do not support the existence of a relation between board size and bank risk, as board size coefficients are not statistically significant. REVENUES⁺, the log transformed version of the variable, become statistically significant and show a negative relation with CET1, although their effect is weak. REVENUES⁺ serve as an indication of bank size, so it can be inferred that within this sample larger banks are correlated with higher levels of capital adequacy risk; this apparently weak effect is moderated by the logarithmic scale used to correct for REVENUES skewness.

Regression (3) results support the existence of a negative linear relation between board independence and capital adequacy risk. The effect is small: for every 1% increase of board independence, CET 1 ratio increases by 0.03136%, and capital adequacy risk reduces consequently. A more practical comparison: adding an independent to the median board (12 directors) would raise board independence by 8.3% (one twelfth) and CET 1 ratio by 0.260288%. This result is consistent with precedent empirical findings (Abdelbadie & Salama, 2019), and it supports a common agency theory proposition

according to which independent directors are subject to fewer goal conflicts and provide the board with relevant skills for monitoring and advising on management (Adams & Ferreira, 2007; Adams & Mehran, 2012). This relation confirms that independents are more fit for controlling and advising than other directors and that their presence reduces bank capital adequacy risk.

Table 6 – Regression results

<i>Dependent variable:</i>						
CET1						
	(1)	(2)	(3)	(4)	(5)	(6)
BFSIZE ²		-0.00001 (0.00004)				0.00006 (0.00004)
BFSIZE		-0.00035 (0.00129)				-0.00296** (0.00132)
BINDEP			0.03136*** (0.00847)			0.03387*** (0.00884)
CEODUAL				0.01227** (0.00509)		0.01367*** (0.00493)
BGENDER					0.04541*** (0.01102)	0.03811*** (0.01144)
DTAR	-0.56581*** (0.05425)	-0.49510*** (0.06231)	-0.49627*** (0.06062)	-0.55676*** (0.06341)	-0.48372*** (0.06063)	-0.49595*** (0.06207)
REVENUES [†]	-0.00593 (0.00407)	-0.01244** (0.00504)	-0.01450*** (0.00491)	-0.01587*** (0.00503)	-0.01210** (0.00491)	-0.01293*** (0.00491)
ROA	0.35511*** (0.12585)	0.32385** (0.12735)	0.28067** (0.12510)	0.28186** (0.12682)	0.27418** (0.12462)	0.24413** (0.12243)
N	605	467	467	467	467	467
R ²	0.25476	0.26314	0.28195	0.26681	0.28803	0.33522
Adj. R ²	0.10512	0.06692	0.09320	0.07408	0.10088	0.15126
F Statistic	57.316***	26.283**	36.223***	33.570***	37.320***	23.006***
DoF	3–503	5–368	4–369	4–369	4–369	8–365

Notes: the table presents within fixed effects regression results for equations (1) to (6); variable coefficients are in roman, and their p-value levels are represented by stars (*p<0,1; **p<0,05; ***p<0,01); standard errors are within parentheses; *N* corresponds to the number of observations used in the corresponding regression; *Adj. R²* corresponds to the R² coefficient, adjusted for the number of variables in the model; *F Statistic* indicates the coefficient of the regression's F-test; *DoF* indicates the degrees of freedom between which the F Statistic is calculated. *CET1* is the CET 1 ratio; *BFSIZE* indicates the size of the board of directors; *BINDEP* indicates the share of independents on the board; *CEODUAL* is a dummy variable with positive value (1) when the CEO is also the chairperson, and null (0) otherwise; *BGENDER* indicates the share of the female directors on the board; *DTAR* is the debt-to-asset ratio; *REVENUES[†]* is the logarithmic scaled version of revenues; *ROA* is the return on assets.

Regression (4) results support the existence of a negative linear relation between CEO duality and capital adequacy risk. The effect is relevant: CEO duality increases CET 1 ratio by 1.227%, reducing capital adequacy risk; similar results are found on different samples by other researchers (Berger et al., 2016; Pathan, 2009). This effect might be driven by several players: chairpersons in non-duality positions might be less apt at analysing bank risk; CEOs in dual positions might prefer more cautious management styles because of closer monitoring from supervision; supervision might introduce a

survivor bias by having riskier banks renounce their CEO duality.

Regression (5) results support the existence of a negative linear relation between board gender diversity and bank risk. Adding a female director to the median board (12 directors) increases the CET1 ratio by 0.36328%, a stronger effect than that of independent directors. This result confirms diversity and corporate governance literature on the matter (Adams & Ferreira, 2009; Eagly & Carli, 2003): female directors appear to be better monitors and advisors than male directors, as they directly reduce capital adequacy risk, but their gender is the least represented, implying the existence of the glass ceiling problem within the sample.

All variables are regressed together in (6). In fixed effects models, analysing single variables provides biased results because other time-variant variables are deliberately omitted. Since the employed model is fixed effects and variables are not collinear, a complete regression is the best fitting regression model to describe bank-year variation. This theoretical surmise is confirmed by the value of adjusted R^2 of regression (6), 15.126%, markedly higher than in other regressions. Regression results confirm coefficient signs for all variables, and all variables except the quadratic term of board size are statistically significant. Linear board size becomes statistically significant with a negative coefficient, meaning that larger boards imply lower CET 1 ratio and, consequently, higher capital adequacy risk. The effect is strong: on average, the incremental director erodes 0,296% in CET 1 ratio. Consistent with other authors that propose that adding directors to bank board does not lead to board efficiency gains (Abdelbadie & Salama, 2019; Berger et al., 2016), this result rejects this thesis' board size hypothesis. Compared to single-variable regressions, in regression (6) board independence and CEO duality effects strengthen while the board gender diversity effect weakens.

It can be inferred that board independence, board gender diversity and CEO duality had negative linear relations with bank capital adequacy risk in European banks during the after-crisis period of 2013–2019; instead, board size had a positive relation with bank capital adequacy risk, on the same sample. Overall, results support **H.2** and **H.4** and reject **H.1** and **H.3**.

5 – DISCUSSION

This thesis aims to understand which factors of board composition had an impact on risk levels in European banks during the period after the great financial crisis. To test hypotheses formulated within agency theory, a sample of 100 banks from 23 European countries is retrieved from Thomson Reuters Refinitiv Eikon and analysed with fixed effects regression models, proxying bank risk with a bank-specific type of risk, the capital adequacy risk. Results show that in the sample board independence and board gender diversity have negative relations with bank risk, consistent with agency theory. Contrary to agency theory, board size is found to be positively correlated with bank risk and CEO duality is found to be negatively correlated with bank risk.

This thesis contributes to bank corporate governance literature by discerning board composition attributes that have relevant effects on risk in an unexplored set of banks. Its findings contribute to widen the scarce literature on this subject, helping the governance “designer” and, more generally, bank stakeholders to choose board compositions that improve risk efficiency (Srivastav & Hagendorff, 2016). Broader corporate governance studies could apply similar methods to investigate other industries. This thesis empirically supports other study fields’ hypotheses on the positive effects of gender diversity by contextualising them in banks (Eagly & Carli, 2003; Terjesen et al., 2015).

Theoretical implications of this thesis arise from agency theory. Extended agency theory, encompassing friendlier boards (Adams & Ferreira, 2007) and management-selected directors (Hermalin & Weisbach, 2003), is either incomplete or improperly contextualised in the banking industry as it cannot explain board size and CEO duality relations with bank risk without making further assumptions. This result suggests that to analyse banks, the extended agency theory model should be improved or changed.

This thesis’ empirical implications involve supervision authorities and generalisation. On supervision authorities: to the best of the author’s knowledge, the Basel Committee on Banking Supervision, the European Central Bank, and other bank supervision authorities do not relate to any conclusive evidence on CEO duality in banks; furthermore, literature on CEO duality in banks does not reach consensus, while the effects of CEO power as proposed by Haynes et al. (2019) remain to be investigated in the banking industry. On result generalisation: because of legal and cultural diversities, corporate governance analytical results cannot be easily generalised in heterogeneous groups of countries (Kumar & Zattoni, 2016); because of the impact of regulation, this renders the comparison of bank governance studies particularly difficult. Further empirical studies on bank governance and board composition would profit from the inclusion of legal framework characteristics.

Practitioner implications are as follows. This thesis identifies useful board

composition attributes that bank stakeholders might use as indication, leading to more efficient board compositions. For example, this thesis proposes that female directors provide bank boards with stronger monitoring abilities; several OECD countries still lack soft clauses to push for gender parity (OECD, 2019), and by following these insights they could improve bank risk efficiency. Literature also argues that bank regulation is hypertrophic and too often related to political aspects (Laeven, 2013): policy would profit from paying closer attention to research on board composition attributes.

This thesis has limitations. First: the regression model, fixed effects, although chosen following econometric practice, restricts result generalisation to the sample; results are strictly pertinent to the analysed sample, European banks during the period 2013–2019. Second: regulation impact on banks is considered horizontal to the sample and, thus, time-invariant. This assumption might not necessarily be true, even in a relatively calm post-crisis period. Third: well-established board composition attributes are used to describe a complex model, a common concern for corporate governance studies (Haynes et al., 2019); for example, board size hides director turnover. Fourth: the sample originates from a corporate database and may hide selection biases beyond what is detectable with used statistical methods. Fifth: this study does not account for management ability to drive risk taking and board process, an implicit assumption carried from extended agency theory (Adams & Ferreira, 2007).

6 – CONCLUSION

An animated debate about corporate governance in banks and its relations with bank risk sparked after the great financial crisis, but literature on the matter is scarce and presents mixed results. This thesis aims to understand which attributes of board composition had an impact on risk in European banks during the after-crisis period 2013–2019. To do so, a sample of 100 banks from 23 European countries is retrieved from Thomson Reuters Refinitiv Eikon and analysed within extended agency theory. Results show that including more independent directors and more female directors in the board decrease bank risk. Contrary to extended agency theory, larger boards increase bank risk while CEO duality decreases bank risk. It can be inferred that board composition attributes are critical drivers of bank risk and that bank governance behaves differently than in other industries.

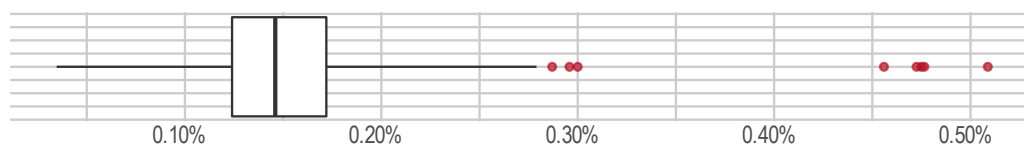
APPENDIX 1 – BANK LIST

Aareal Bank AG	Credit Suisse Group AG
ABN Amro Bank NV	Credito Emiliano SpA
AIB Group plc	Danske Bank A/S
Aktia Bank Abp	Deutsche Bank AG
Alior Bank SA	Deutsche Pfandbriefbank AG
Alpha Bank SA	DNB ASA
Banca Carige SpA Cassa di Risparmio di Genova e Imperia	EFG International AG
Banca Farmafactoring SpA	Erste Group Bank AG
Banca IFIS SpA	Eurobank Ergasias SA
Banca Monte dei Paschi di Siena SpA	FinecoBank Banca Fineco SpA
Banca Piccolo Credito Valtellinese SpA	Getin Holding SA
Banca Popolare di Sondrio ScpA	Getin Noble Bank SA
Banca Transilvania SA	HSBC Holdings PLC
Banco Bilbao Vizcaya Argentaria SA	ING Bank Slaski SA
Banco Bpm SpA	ING Groep NV
Banco Comercial Portugues SA	Intesa Sanpaolo SpA
Banco de Sabadell SA	Julius Baer Gruppe AG
Banco Santander SA	Jyske Bank A/S
Bank Handlowy w Warszawie SA	KBC Groep NV
Bank Millennium SA	Komercni Banka as
Bank of Cyprus Holdings PLC	Liberbank SA
Bank of Georgia Group PLC	Liechtensteinische Landesbank AG
Bank of Ireland Group PLC	Lloyds Banking Group PLC
Bank Polska Kasa Opieki SA	mBank SA
Bank VTB PAO	Mediobanca Banca di Credito F. SpA
Bankia SA	Metro Bank PLC
Bankinter SA	Moneta Money Bank as
Banque Cantonale Vaudoise	Moskovskiy Kreditnyi Bank PAO
Barclays PLC	National Bank of Greece SA
BAWAG Group AG	Nordea Bank Abp
BNP Paribas SA	Norwegian Finans Holding ASA
Bper Banca SpA	OneSavings Bank PLC
BRD Groupe Societe Generale SA	OTP Bank Nyrt
Caixabank SA	Permanent TSB Group Holdings PLC
Cembra Money Bank AG	Piraeus Bank SA
Close Brothers Group PLC	Powszechna Kasa Oszczednosci Bank P. SA
Comdirect Bank AG	Raiffeisen Bank International AG
Commerzbank AG	Royal Bank of Scotland Group PLC
Credit Agricole SA	Santander Bank Polska SA
	Sbanken ASA

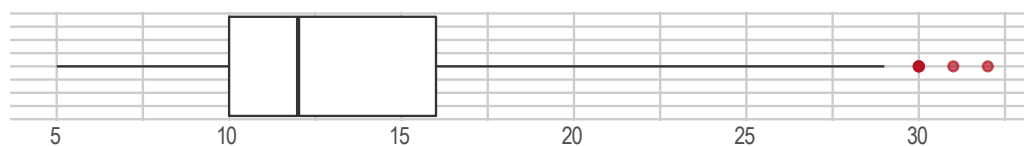
Sberbank Rossii PAO
Skandinaviska Enskilda Banken AB
Societe Generale SA
Spar Nord Bank A/S
Sparebank 1 Nord-Norge
Sparebank 1 Ostlandet
Sparebank 1 SMN
Sparebank 1 SR Bank ASA
St Galler Kantonalbank AG
Standard Chartered PLC
Svenska Handelsbanken AB
Swedbank AB
Sydbank A/S
TBC Bank Group PLC
Unicaja Banco SA
UniCredit SpA
Unione di Banche Italiane SpA
Valiant Holding AG
Virgin Money UK PLC
Vozrozhdenie Bank

APPENDIX 2 – OUTLIERS

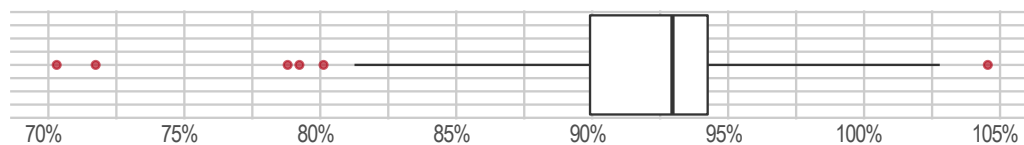
Common Equity Tier 1 ratio



Board size

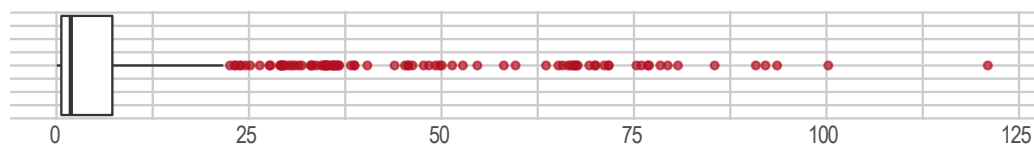


Debt-to-asset ratio



Revenues

US\$ billions



Revenues

Logarithmic scale



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SUMMARY

This thesis analyses the impact of board composition on bank risk, a topic deserving of more attention as its mixed results and possible improvements testify.

Banks have several characteristics that make them a unique type of firm. Their business model is centred on the intermediation of liquidity; because of this, they face specific risks that mandate regulatory interventions, increasing the complexity of their business further. Their complexity implies that banks have different corporate governance than other firms. To analyse it, agency theory (Fama & Jensen, 1983) is extended to encompass endogenously-chosen directors (Hermalin & Weisbach, 1998) and friendlier boards (Adams & Ferreira, 2007). The resulting framework is employed to identify agency issues that shape governance in banks. The relation between board composition, a critical component of corporate governance, and bank risk is then investigated by formulating hypotheses for four board composition attributes: board size, board independence, CEO duality and board gender diversity.

To test hypotheses, an unbalanced panel data sample of 100 European banks observed over years 2013–2019 is retrieved from Thomson Reuters Refinitiv Eikon. The dependent variable, bank risk, is identified as capital adequacy risk, a bank-specific type of risk, and is proxied by the CET 1 ratio, an international bank capital measurement. Econometric tests are conducted to assess the most appropriate model, and the fixed effects regression model is chosen accordingly.

The sample is analysed descriptively and by investigating the presence of outliers and collinearity. Afterwards, results for individual relations are presented: board size is negatively related to bank risk, while board independence, CEO duality and board gender diversity are positively related to bank risk. Board size and CEO duality relations with bank risk are not correctly predicted by extended agency theory, suggesting the existence of unspotted relations between players in the banking industry. The analytical model, fixed effects, does not allow to generalise the results to wider populations of banks; therefore, results are confined to the analysed sample, European banks during the period 2013–2019. This thesis helps bank stakeholders to design more efficient boards, regulators to devote more attention to efficient design of policy and suggests that extended agency theory might not be an optimal describer of bank governance.