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Corporate Governance and Risk Management in the Banking Sector

Ph.D. Thesis

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Abstract

The recent global financial crisis has called into question the effectiveness of the existing corporate governance and regulatory framework for banks. Taking into consideration that banks have unique characteristics that affect and interact with corporate governance mechanisms, it is not surprising that during the financial meltdown several economists and policymakers, among others, have criticized the governance of banks and in particular the board of directors. Sound corporate governance in conjunction with the appropriate regulation lead to well-functioning financial systems.

However, despite the increased interest in this field, the previous empirical studies that focused on the impact of corporate governance on the banking sector are mixed and thus, need to be further examined. In this direction, this dissertation consists of two essays. The first essay examines the relationship between corporate governance, bank performance and risk-taking. The second essay focuses on the impact of economic freedom, credit, labor and business regulation on bank performance and risk-taking.

More precisely, the first essay investigates the impact of several characteristics of the board of directors on the performance and risk-taking of banks. Using different econometric methods and several measures of performance and risk we provide new evidence as we use a sample of European banks during the period 2004-2016. Moreover, we add to the existing literature as we consider corporate governance for the first time and we also control for any differences regarding the bank governance, taking into account the location of banks and the time period. Our results reveal that bank governance variables have a significant impact both on bank performance and risk-taking. We find that in most cases, female directors, financial experience, the one-tier system, compensation and board size lead to better bank performance and less risk-taking. However, the results may differ depending on the location and the time period.

In the second essay, we examine the impact of economic freedom and regulation on bank performance and risk-taking. More precisely, we use the Fraser economic freedom index and its sub-components, namely credit, labor and business market

regulation. To our knowledge, this essay is the first which examines the impact of corporate variables in combination with the Fraser economic freedom and regulation. Through this research, we want to check for any differences regarding the impact of bank governance on bank performance and risk-taking when we implement macroeconomic factors and to reach in more robust results concerning the mechanisms of corporate governance. Indeed, our findings reveal that bank governance variables affect the performance and risk-taking of banks in a different way according to whether banks operate in a more liberal or stricter environment.

Περίληψη

Η πρόσφατη παγκόσμια χρηματοπιστωτική κρίση έχει εγείρει ερωτήματα σχετικά την αποτελεσματικότητα της εταιρικής διακυβέρνησης και του κανονιστικού πλαισίου των τραπεζών. Λαμβάνοντας υπόψη ότι οι τράπεζες έχουν κάποια ιδιαίτερα χαρακτηριστικά τα οποία επηρεάζουν και αλληλεπιδρούν με τους μηχανισμούς της εταιρικής διακυβέρνησης, δεν αποτελεί έκπληξη το γεγονός ότι κατά τη διάρκεια της χρηματοπιστωτικής κατάρρευσης πολλοί οικονομολόγοι και υπεύθυνοι χάραξης πολιτικής μεταξύ άλλων, αμφισβήτησαν τη διακυβέρνηση των τραπεζών και ιδιαίτερα τον ρόλο του διοικητικού συμβουλίου. Η καλή εταιρική διακυβέρνηση σε συνδυασμό με την κατάλληλη κανονιστική ρύθμιση οδηγούν σε υγιή τραπεζικά ιδρύματα.

Ωστόσο, παρά το αυξημένο ενδιαφέρον σε αυτόν τον τομέα, τα αποτελέσματα από τις προηγούμενες εμπειρικές μελέτες που επικεντρώθηκαν στον αντίκτυπο της εταιρικής διακυβέρνησης στον τραπεζικό τομέα είναι μεικτά και, ως εκ τούτου, κρίνεται απαραίτητη η περαιτέρω διερεύνησή τους. Σε αυτή την κατεύθυνση, η διατριβή αυτή αποτελείται από δύο δοκίμια. Το πρώτο δοκίμιο εξετάζει τη σχέση μεταξύ της εταιρικής διακυβέρνησης, της απόδοσης και του κινδύνου των τραπεζών. Το δεύτερο δοκίμιο μελετά εάν και σε τι βαθμό η οικονομική ελευθερία μιας χώρας αλλά και η πιστωτική, εργασιακή και επιχειρηματική ρύθμιση επηρεάζουν την απόδοση και τον κίνδυνο του τραπεζικού συστήματος.

Πιο συγκεκριμένα, το πρώτο δοκίμιο ερευνά τις επιπτώσεις των χαρακτηριστικών του διοικητικού συμβουλίου στην απόδοση και τον κίνδυνο των τραπεζών. Χρησιμοποιώντας διαφορετικές οικονομετρικές μεθόδους και διάφορα μέτρα απόδοσης και κινδύνου, προσφέρουμε νέα εμπειρικά στοιχεία καθώς χρησιμοποιούμε ένα δείγμα ευρωπαϊκών τραπεζών για την χρονική περίοδο 2004-2016. Επιπλέον, προσθέτουμε στην υπάρχουσα βιβλιογραφία καθώς εξετάζουμε το σύστημα της εταιρικής διακυβέρνησης για πρώτη φορά ενώ ελέγχουμε επίσης για τυχόν διαφορές στη διάρθρωση του διοικητικού συμβουλίου, λαμβάνοντας υπόψη την χρονική περίοδο και την χώρα στην οποία εδρεύουν οι τράπεζες. Τα αποτελέσματά μας δείχνουν ότι τα χαρακτηριστικά του συμβουλίου έχουν σημαντικό αντίκτυπο τόσο στην απόδοση όσο και στον κίνδυνο των τραπεζών. Συγκεκριμένα, διαπιστώνουμε ότι στις περισσότερες περιπτώσεις οι γυναίκες διευθυντές, η χρηματοοικονομική εμπειρία, το ενιαίο σύστημα εταιρικής διακυβέρνησης, η αποζημίωση και το μέγεθος του διοικητικού συμβουλίου συμβάλουν στην χρηματοοικονομική σταθερότητα ενώ σύναμμα οδηγούν σε υψηλότερα επίπεδα απόδοσης. Ωστόσο, τα αποτελέσματα μπορεί να διαφέρουν ανάλογα με την χώρα λειτουργίας του τραπεζικού ιδρύματος και την χρονική περίοδο.

Στο δεύτερο δοκίμιο εξετάζουμε τον αντίκτυπο της οικονομικής ελευθερίας και της ρύθμισης, στην απόδοση και τον κίνδυνο των τραπεζών. Συγκεκριμένα, χρησιμοποιούμε τον δείκτη οικονομικής ελευθερίας του Fraser Institute καθώς και τις επιμέρους συνιστώσες του, δηλαδή τον πιστωτικό, εργασιακό και επιχειρηματικό κανονισμό. Το συγκεκριμένο δοκίμιο αποτελεί την πρώτη προσπάθεια που εξετάζει την επίδραση των μεταβλητών της εταιρικής διακυβέρνησης σε συνδυασμό με τον δείκτη οικονομικής ελευθερίας και τους πιστωτικούς, εργασιακούς και επιχειρηματικούς κανονισμούς. Μέσω της έρευνας αυτής, θέλουμε να ελέγξουμε για τυχόν διαφορές σε ότι αφορά τον αντίκτυπο της διάρθρωσης του διοικητικού συμβουλίου στην απόδοση και τον κίνδυνο των τραπεζών, όταν λαμβάνουμε υπόψη και μακροοικονομικούς παράγοντες. Απώτερος σκοπός, είναι να καταλήξουμε σε πιο ισχυρά αποτελέσματα σχετικά τους μηχανισμούς της εταιρικής διακυβέρνησης. Πράγματι, τα ευρήματά μας δείχνουν ότι ο τρόπος με τον οποίο τα χαρακτηριστικά του διοικητικού συμβουλίου επηρεάζουν την απόδοση και τον κίνδυνο των τραπεζών, διαφέρει ανάλογα με το εάν το τραπεζικό σύστημα λειτουργεί σε ένα φιλελεύθερο ή αυστηρό περιβάλλον.

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Introduction

The collapse of financial markets in 2008 and the credit crunch that followed had significant effects on the real economy; liquidity problems, defaults and excessive leverage combined with weaknesses in supervision and poor corporate governance led to financial instability. More precisely, in many instances, corporate governance weaknesses such as the inability of the board of directors to understand the characteristics of the new, complex financial products and the insufficient board oversight resulted in excessive risk-taking by banks and thus, contributed to the global financial crisis.

Corporate governance determines the allocation of responsibilities by which the affairs of a bank are carried out by its board, including how the board of directors set the bank's goals, manage day to day operations, meet shareholders obligations, protect the interests of depositors and take into account the interests of other stakeholders, such as creditors, and regulators. Supervisors have a keen interest in sound corporate governance as it is critical to the proper functioning of the banking sector. Therefore, a number of important reforms took place to overhaul the principles of governance. Especially, in an increasingly open banking competition environment, there is more need for banks to have sound corporate governance mechanisms.

Sound corporate governance may allow supervisors to have more reliance on the bank's internal processes. In this regard, establishing and maintaining effective systems and controls for compliance with applicable requirements and standards, promote good corporate governance which in turn leads to less need for supervisory intervention. Given the importance of the financial system in the economy and the challenges and risks that banks face today, it is not surprising that effective corporate governance is crucial for safety and soundness of banks. This increased interest on governance and regulation of banks motivates to provide an in-depth analysis of the impact of corporate governance mechanisms on the European banking sector both in microeconomic and macroeconomic level.

More precisely, the purpose of the first essay of this thesis is to investigate the impact of bank governance on bank performance and risk-taking. Our research extend the previous literature by examining a broad set of bank governance characteristics, namely board size, age of directors, financial experience, the percentage of independent directors, gender diversity, governance system and compensation. While the vast majority of the existing empirical studies focus on the United

States, we provide new empirical evidence using a sample of banks from 18 different European countries for the period 2004-2016.

Furthermore, the existing literature on the relationship between corporate governance, performance and risk-taking indicated mixed results. One reason for these inconclusive findings is that the endogeneity issue which exists in corporate governance literature may alter the impact of bank governance on bank performance and risk-taking. Thus, in order to check the robustness of our results, we employ different performance and risk measures and several estimation methods such as the Fixed-Effects method and the two-step system GMM method. Indeed, our findings reveal that the impact of bank governance characteristics on bank performance and risk-taking differs depending on the estimation method.

Moreover, this essay add to the literature by considering for the first time the impact of corporate governance system (one-tier and/or two-tier) on bank performance and risk-taking. Our results indicate that there are significant differences between these types of system, as the one-tier system appears to be more effective for banks. In addition, we provide new empirical evidence by controlling for any region specific bank governance differences on the effect on bank performance and risk-taking. For this purpose, we divide our sample in three groups of countries based on their geographic location. Our results show that the impact of bank governance on bank performance and risk-taking changes between these groups of countries.

We also contribute to the previous literature, by analyzing the extent to which a global shock, such as the recent financial crisis may change bank governance and thereby may alter its impact on bank performance and risk-taking. To this end, we divide our sample into two periods, the first concerning the period before and during the global financial crisis (2004-2009) and the second concerning the period after the crisis (2010-2016). Our results show that corporate variables such as the presence of women, the percentage of independent directors and the compensation of directors have changed over time. Moreover, our findings indicate that bank governance variables affect bank performance and risk-taking in a different way depending on the time period.

The second essay examines whether and to what extent economic freedom and regulation affect bank performance and risk-taking. For this purpose, we use the Fraser economic freedom index and its sub-components, namely credit, labor and business market regulation. The previous empirical studies focus on the impact of economic freedom and regulation on bank efficiency and thus, little is known about the impact of economic freedom and regulation on bank risk. This essay aims to fill this gap,

by examining the impact on both bank performance and risk-taking. Our results show that economic freedom and regulation affect in a different way the performance and risk-taking of banks.

Moreover, this essay constitutes the first attempt to examine the effect of corporate governance on the performance and risk-taking of banks, in conjunction with macroeconomic variables, namely economic freedom, credit, labor and business market regulation. In the well corporate governed banks, regulation may be less important, as the sound corporate governance could substitute stricter regulation. Hence, in order to check for any differences in the impact of bank governance on bank performance and risk-taking, we take into account the freedom and regulation of the macroeconomic environment in which banks operates. Indeed, our results reveal that the effect of bank governance characteristics on bank performance and risk-taking changes in some cases with the implementation of macroeconomic factors.

While the existing literature addresses the impact of economic freedom and regulation on bank performance in the countries of Central and Eastern Europe, we provide new empirical evidence by employing a sample of European banks consists of both developed and developing countries. Moreover, we check for any changes concerning the impact of economic freedom and regulation on bank performance and risk-taking according to location. For this purpose, we grouped countries in three separated groups according to their geographic location, such as South, North and Central Europe. Our results show that financial freedom, entry barriers and supervisory intervention differ between these groups of countries. Also, our findings reveal that the impact of economic freedom and regulation on bank performance and risk-taking is not the same in all groups of countries.

Furthermore, in order to control for any changes caused by the global financial crisis to the impact of economic freedom and regulations on bank performance and risk-taking, we divide our sample into two periods. More precisely, the first time period refers to the years before and during the crisis (2004-2009), while the second concerning the period after the global financial crisis (2010-2016). Indeed, our findings indicate that the impact of financial freedom and regulation on bank performance and risk-taking changes depending on the time period. Finally, this thesis offers insights not only to bank directors but also to policymakers and bank regulators by showing whether governance mechanisms and regulatory framework matter in especially microeconomic and macroeconomic conditions.

Essay 1

Do board structure and compensation matter for bank stability and bank performance?

1.1. Introduction

The global financial crisis of 2008 in conjunction with corporate scandals involving companies such as Enron and WorldCom (Stiglitz, 2009) brought in the forefront the question of the effectiveness of governance mechanisms and practices in the banking sector (Belhaj and Mateus, 2016; James and Joseph, 2015). Many academics, regulators and international organizations argued that inadequate corporate governance systems and excessive risk-taking by banks were some of the most important causes of the crisis (BCBS, 2015; European Commission, 2012; Kirkpatrick, 2009).

The Basel Committee on Banking Supervision (BCBS, 2015) has called attention to the need to enhance the effectiveness of corporate governance and build more resilient financial institutions (EBA, 2017; Hagendorff et al., 2016). The Committee especially supports that bank safety and soundness are crucial factors for financial stability. Failure in bank governance can create significant costs (IMF, 2014; Srivastav and Hagendorff, 2016). Such costs occur because banks are "special" economic units relating to their specific roles in financial intermediation. More precisely, banks facilitate the allocation of resources from depositors to borrowers by transforming short-term liquid deposits into long-term illiquid loans (Srivastav and Hagendorff, 2016; Berger et al., 2016). If this intermediation is undertaken in an efficient way, then the cost of capital for firms can be low and the productivity growth can be stimulated (Barth et al., 2008).

Furthermore, corporate governance weaknesses can affect the risk profile of banks and, hence, can lead to a loss of depositor confidence and high constraints. For instance, regulators issued various guidelines in order to control and mitigate bank risk-taking (Zalewska, 2016, DeYoung et al., 2013). These guidelines concern restrictions on compensation packages or "clawback"[1] clauses for bonus payments (Berger et al., 2012). Due to the fact that bonuses are associated with higher bank risk-taking, risk shifting incentives are only likely to be constrained if compensation practices align the interests of managers and debt-holders (Curi and Murgia, 2018).

[1] *A clawback or malus is a feature of compensation arrangement that reduces the amount of deferred bonus so that the amount of the payout is less than the amount of the bonus award (BCBS, 2010).*

Hence, it is not surprising that executive compensation has received a great deal of attention, especially, after the global financial crisis of 2008 (IMF, 2014; FSB, 2009). It is widely believed that compensation practices in the banking sector have led to misaligned incentives and excessive risk-taking, contributing to bank losses and financial instability (Curi and Murgia, 2018; Bai and Elyasiani, 2013; Bebchuk and Spamann, 2010). Moreover, the fact that payment of CEOs in the banking sector increased tremendously in the decade of the global financial crisis, trigger debates about the optimal level and structure of managerial compensation (Curi and Murgia, 2018). To tackle the issue of excessive risk-taking and insufficient corporate governance, the post crisis financial reform agenda has focused on improving the regulation of banks and understanding the structure of bank board remuneration (Benczur et al. 2017; BCBS, 2015; IMF, 2014).

In this context, policy makers have implemented many changes and introduced many new financial regulatory reforms such as the Dodd-Frank Act and Basel III, in order to contribute to the creation of a single integrated banking sector. However, many studies (Kumbhakar and Lozano-Vivas, 2004; Demirguc-Kunt et al., 2004) have mentioned that bank deregulation can lead to increased competition and, thus, contribute to the growth of the economy. This is because competition reduces conditions for borrowers, allowing small businesses to borrow and creates new opportunities (Barth et al., 2008).

Despite the large literature in the field of corporate governance only few papers have focused on the governance of financial institutions (Belhaj and Mateus, 2016; Berger et al., 2016; Dang and Nguyen, 2016; Fernandes et al., 2017). However, empirical results based on non-financial firms cannot be generalized to apply to banks (Belhaj and Mateus, 2016; Adams and Mehran, 2012). The reason for this difference is the specific characteristics of banks that make them different from other firms, namely complexity, opacity, high leverage and strict regulatory framework. These characteristics may cause problems and weaken corporate governance mechanisms (Caprio et. al 2007; Hermalin and Weisbach, 2003; Levine, 2004). More precisely, the complexity of banks increases the problem of information asymmetry and consequently eliminates the stakeholder's capability to monitor the decision of bank managers (Hermalin and Weisbach, 2003). For this reason, many rules, such as Volcker Rule Proprietary[2] have been set up in order to protect investors and depositors (Kemp, 2010).

[2] *Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, § 619, 124 Stat. 1376, 1620-31 (2010).*

The board of directors plays a decisive role in the implementation of effective corporate governance (Pathan and Faff, 2013; Fernandes et al., 2017). It monitors and evaluates the role of management, defines objectives and protects the interests of shareholders (Belhaj and Mateus, 2016; Pathan and Faff, 2013; Adams and Mehran, 2012). However, as mentioned by Berger et al. (2016) little is known about how the socioeconomic characteristics of board affect corporate governance in banks. The findings of the existing literature on bank governance-performance and risk-taking are mixed and inconclusive (Andres and Vallelado, 2008; Pathan and Faff, 2013) and, hence, need to be further considered.

The purpose of our essay is to examine whether and to what extent the bank governance according to different determinants and socioeconomic characteristics such as size, age of directors, financial experience, independent directors, gender diversity, governance system and compensation, affects the performance and risk-taking and if there are any changes before, during and after the period of the global financial crisis. Due to the lack of knowledge about the effects on banks of having more female or more experienced or older board members or different corporate governance systems we address the following questions:

- *Do female board members really implement a less risky conduct of business?*
- *Do experienced board members increase or reduce bank risk-taking and performance?*
- *Do independent board members increase or reduce bank risk-taking and performance?*
- *Does the corporate governance system (TIER-SYSTEM) matter?*
- *Does the age of executive board members matter?*
- *Does the managerial compensation matter for bank stability?*

Our essay contributes to the existing literature in four directions: First, using a sample of commercial banks from 18 different European countries for the period 2004-2016 we extend the previous research focused on the United States on the impact of bank governance determinants on bank performance and risk-taking (Berger et al., 2016; Belhaj and Mateus, 2016; Grove et al., 2011). Also in order to check for any differences according to location we grouped countries in three separate groups according to their geographic location, such as South, North and Central Europe.

Second, we provide new empirical evidence on the relationship between bank governance, risk-taking and performance considering for the first time the corporate governance system (one-tier and/or two-tier system). For instance, some countries like the UK, use the one-tier system known as Anglo-Saxon system, other countries such as Germany use the two-tier system while others prefer a

mixed approach (Sironi and Pellegrini, 2017). These corporate governance systems are differentiated and adapted to the economic, political and social needs of nations (Brogi and Lagasio, 2019; Carsten, 2006). Examining the effect of executive board composition on bank performance and risk-taking in the context of a two-tier or one-tier system offers the benefit of a clear distinction between inside directors and outside directors, important to explain changes in banks' risk and performance.

Third, by analyzing the extent to which a major global shock, that is, the recent financial crisis may have altered boards' formation bank performance and risk-taking. More precisely, we investigate the period before, during and after the global financial crisis paying particular attention to the effects of bank governance and regulatory reforms on bank performance and risk-taking. Fourth, we check the robustness of the findings with different measures of bank performance and risk and several estimation methods to control for unobserved heterogeneity, simultaneity and reserve causality in the explanatory variables.

The remainder of the essay is organized as follows. Section 2 presents a review of the literature and develops the hypotheses. Section 3 describes the data and methodology. Section 4 provides the empirical results and explores some extended analysis and robustness tests. Section 5 concludes.

1.2. Literature review and hypotheses development

This session presents the literature review and develops the hypotheses for each specific characteristic of bank governance, such as board size, age, financial experience, independence, gender diversity, corporate governance system and managerial compensation.

The board of directors is one of the main corporate governance mechanisms since its primary objective is to protect the shareholders' interests (Nahar Abdullah, 2004). Especially, in financial institutions where the fiduciary responsibilities of the board extend to depositors and regulators, the role of directors is of considerable importance (Pathan and Faff, 2013; Adams and Mehran, 2012). Moreover, the fact that the failure of corporate governance of banks can cause significant costs, explains the crucial role of the board of directors in ensuring the proper functioning of banks and in the adoption of appropriate strategies (Andres and Vallelado, 2008).

In corporate governance literature, the most common theories which are used in the explanation of bank board diversity are the agency theory (Raheja, 2005; Carter et al., 2003) and the resource dependence theory (Macey and O'Hara 2003; Carter et al., 2010). Banks are founded on the concept of relationships between different interested parties such as shareholders (principal) and managers

(agents). The conflict of interests between managers and shareholders leads to the creation of the well-known principal-agent problem (Jensen and Meckling, 1976; Fama and Jensen, 1983; Hermalin and Weisbach, 2003). On the one hand, shareholders aim at protecting and maximizing their own interests while managers who act on behalf of shareholders may be unwilling to increase bank risk to the level that would maximize shareholders' wealth (Felicio et al., 2018). On the other hand, managers want to increase their own wealth and strengthen their position (Srivastav and Hagendorff, 2016).

Moreover, the inability of shareholders to monitor more closely managers' behavior in combination with the fact that governments protect bondholders and depositors, weaken their incentives to monitor risk-taking, giving rise to a second agency problem (Srivastav and Hagendorff, 2016). This problem is also known as moral hazard and is associated with deposit insurance (Rose, 1992). The Basel Committee claims that the deposit insurance weakens the incentives for outsider control and, hence, causes banks to take more risks by pursuing a riskier strategy (BCBS, 2015). According to Keeley (1990) moral hazard is responsible for the high failure rates of banks in the aftermath of deregulation and is also associated with bank losses.

Another factor which contributes to the agency problems is the existence of information asymmetry as shareholders and managers do not share the same information. More precisely, managers have all the appropriate information about the bank, concerning, inter alia, issues regarding banking processes and activities in contrast to the shareholders who have limited knowledge (Nan, 2008; Rose, 1992). In this context, Fama and Jensen (1983) in their analysis of the decision-making process, supported that the solution to the potential agency problems may be found by separating the decision management from decision control. In the same line Carter et al. (2003) indicate that board diversity can lead to monitoring management more efficiently, as it increases board independence. Moreover, Jensen (1993) argues that large boards are less effective at monitoring management because of free-riding problems among directors and, hence, increase decision-making time.

Moving on to the resource dependence theory, board diversity is considered an instrument that provides easy access to critical resources. Having taken into consideration that each director has a different background, experience and skills, it is an undisputed fact that every member of the board can bring unique attributes and resources to the bank (Dang and Nguyen, 2016). Moreover, according to this theory, it is believed that board diversity will contribute to external linkages due to the network and the financial legal expertise of each director (Peterson and Philpot, 2007).

1.2.1 Board size, bank performance and risk-taking

1.2.1.1 Board size and performance

The impact of board size on decision-making and economic frauds (Boone et al., 2007) has been extensively studied in international literature (Battaglia et al., 2014). A large board may be less effective in exercising its supervisory role because size exacerbates agency problems among directors vis-à-vis the monitoring of management (Hermalin and Weisbach, 2003).

Despite the principles issued by the Basel Committee on Banking Supervision (BCBS, 2015) no exact number has been specified regarding the ideal number of members a board should have, since this number depends on many factors, such as the size of the bank and its risk profile (El-Faitouri, 2014; BCBS, 2015). However, it has been argued that board size should be sufficient enough to ensure balance and exploit the different experiences and background of board members in an efficient way (BCBS, 2015).

The size of the board of directors is one of the characteristics that many researchers have analyzed in the banking sector (Fernandes and Fich, 2013; Staikouras et al., 2007; Pathan and Faff, 2013; Pathan, 2008). Pathan and Faff (2013) based on a sample of 212 large US banks from 1997 to 2011, found that board size has a negative impact on bank profitability. One possible explanation is that a large number of members on the board may be linked to the decision-making process, as it will be more difficult for directors to express their opinions and reach a common decision.

Moreover, Staikouras et al. (2007) using a sample of 58 European banks from 2002 to 2004 find a negative relationship between board size and the profitability of banks measured by return on assets (ROA), return on equity (ROE) and Tobin's Q. Consistent with the aforementioned findings, Liang et al. (2013) by examining a sample of Chinese banks during the period of 2003-2010, report that board size has a negative impact on bank performance when measured by return on assets (ROA) and return on equity (ROE). The strong negative relationship which is found in the studies mentioned previously supports the hypothesis that large boards are less effective due to the problems of coordination, control and flexibility in decision-making process (Jensen, 1993).

In line with the previous empirical studies, Peni and Vahama (2012) analyze a sample of US banks during a period of financial crisis (2007-2008) and show that smaller boards are associated with higher profitability during the crisis as they increase the return on assets (ROA) and Tobin's Q

measures. These types of boards tend to make decisions more quickly and as a result, are more effective than larger ones.

Using a sample of 347 banks from 57 countries all over the world during the financial crisis of 2007-2008, Hoque and Muradoglu (2013) indicate that board size has a negative impact on bank performance, measured by return on assets (ROA) and return on equity (ROE).The results indicate that the coordination and communication problems associated with large boards may outweigh the benefit of providing collective information.

However, other empirical studies find a positive relationship between board size and bank performance. For instance, Andres and Vallelado (2008), based on a sample of 69 commercial banks from different developed countries such as France, the UK, the US, Canada, Spain and Italy from 1996 to 2006, illustrate that board size is positively related to bank performance as it increases the return on assets (ROA) and shareholder market return. According to the authors, board size enhances the effectiveness of its advisory and monitoring role via the unique characteristics of each director.

Similarly, Aebi et al. (2012) examining a sample of 372 US banks during the financial crisis of 2007-2008 show that the number of directors increases bank performance measured by return on equity (ROE) and bank stock returns. In addition, Adams and Mehran (2012) analyze a sample of US banks for the period 1965-1999 and record that board size is positively linked to the performance of banks measured by Tobin's Q.

Finally, García-Meca et al., (2015) using a sample of 159 banks in nine countries during the period 2004-2010, find that the board size has a positive impact on Tobin's Q and consequently improves bank performance. The view that large boards may be beneficial as they increase the pool of expertise can explain the positive relationship between the number of directors and bank performance.

The above argument gives rise to following hypotheses

Hypothesis 1.a (H1.a): Board size is positively related with bank performance

Hypothesis 1.b (H1.b): Board size is negatively related with bank performance

1.2.1.2 Board size and risk-taking

Minton et al. (2011) examining a sample of US banks for the period 2000-2008 report that as the number of board members increases, the risk-taking of banks is reduced. This is explained by the fact that large boards are more diversified and consequently, less vulnerable to shocks (Minton et al, 2011). Moreover, Battaglia et al. (2014) examining a sample of European banks for the period 2006-2010 argue that a large number of members on the board can increase the risk-taking of bank.

Similarly, Adams (2012) analyzes a sample of US banks from 2007 to 2009 and shows that the numbers of directors has a positive impact on the possibility of bankruptcy due to increased risk. One possible explanation for the above findings is that boards with many members may suffer from coordination issues and may also lack flexibility in the decision-making process.

On the contrary, Wang and Hsu (2013) using a sample of US banks for the period 1996-2010 find that board size is negatively linked to the operational risk of banks. More precisely, a large number of members on the board tend to minimize risk-taking. Board diversity and specific individual characteristics, such as experience, knowledge and qualifications of each member, may contribute to the timely identification of risks and may also lead to beneficial decisions for the bank.

Finally, Berger et al. (2012) considers that the effect of board size on risk-taking is negative; meaning that a board with many directors gives rise to more diverse opinions resulting in the rejection of "too risky" and "too good" projects and hence reducing risk-taking on balance.

The above argument gives rise to following hypotheses:

Hypothesis 1.c (H1.c): Board size is positively linked to bank risk-taking

Hypothesis 1.d (H1.d): Board size is negatively linked to bank risk-taking

1.2.2 Board age, bank performance and risk-taking

1.2.2.1 Age and performance

One important component of board diversity is the age of directors. There is a limited number of empirical studies which examine the impact of board age on bank performance (Grove et al., 2011; Nguyen et al., 2015). On the one hand, Berger et al. (2016) using a sample of German banks from 1994 to 2010, argue that older directors have more experience which facilitates cooperation among board members and hence leads to beneficial decisions for the bank. This finding is supported by Fernandes et al. (2017) who examine a sample of 72 European banks during the financial crisis of

2007-2008 and report that age diversity on a board increases bank performance measured by bank's stock returns. One possible explanation for the previous finding is that age diversity may contribute to the experiences, knowledge and network of the board, and consequently, it improves bank performance.

On the other hand, Grove et al. (2011) examine a sample of 236 US commercial banks during the period from 2005 to 2008 and show that the age of directors is negatively and linearly related to bank performance measured by return on assets (ROA). Similarly, Talavera et al. (2018) using a sample of 97 Chinese banks from 2009 to 2013 find that board age has a negative impact on bank performance measured by return on assets (ROA) and return on equity (ROE). In this sense, younger aged boards are more likely to have the skills and cognitive resources needed to evaluate risk effectively as well as the willingness to take the risks that result in higher returns for shareholders.

Regarding the different empirical results mentioned above we expect that:

Hypothesis 2.a (H2.a): Age of directors is positively related with bank performance

Hypothesis 2.b (H2.b): Age of directors is negatively related with bank performance

1.2.2.2 Age and risk-taking

According to Grable et al. (2009) older people are usually more tolerant towards dangers than younger people. One possible explanation for this result is that older directors have more experience and are therefore able to recognize and avoid dangerous situations. In the same line, according to the theoretical study of Gervais and Odean (2001) it is mentioned that the lack of experience in young people combined with excessive self-confidence could lead to excessive risk-taking. In addition, Felicio et al. (2018) analyzing a sample of European banks for the period 1996-2010, find that the age of directors reduces the overall risk of banks. This means that older managerial age is associated with less risk-taking which seems to suggest that older directors are not inclined to take risky decisions due to their financial experience.

On the contrary, older members of the board may not have the proper energy and incentives to actively monitor managers, thereby increasing agency problems (Fernandes et al., 2017; Laeven, 2013). According to the agency theory, the main responsibility of the board is to act on behalf of the shareholders through the improvement of monitoring and controlling management. However, this monitoring role of the board can only be fulfilled when it is combined with high-quality and

impartial advice. For instance, Lehman Brothers was criticized for having 50% of its board members older than 70 years (Grove et al., 2011) and hence, they were less familiar with complex financial products such as securitization of mortgage securities and credit default swaps (Berman, 2009).

Regarding the different empirical results mentioned above we expect that:

Hypothesis 2.c (H2.c): Age of directors is positively linked to risk-taking

Hypothesis 2.d (H2.d): Age of directors is negatively linked to risk-taking

1.2.3 Financial experience, bank performance and risk-taking

1.2.3.1 Financial experience and performance

Several studies (Fernandes et al., 2017; Hau and Thum, 2009) argue that the strict and effective exercise of the board's dual role namely advising and monitoring depends on the directors' experience (Aebi et al., 2012). An experienced bank board may identify potential risks and ensure financial stability. Especially, after the financial crisis of 2008, regulators have mentioned that the board of directors should include experienced and more educated members (BCBS, 2015). However, as far as Europe it concerns, empirical findings indicate that bank directors do not have extensive relevant experience (Cuñat and Garicano, 2010).

According to Fernandes et al. (2017), from a sample of US banks during the financial crisis of 2007-2008, it has been mentioned that banks with more experienced directors on their boards are exposed to lower risks and as a consequence they record higher percentages of performance as they have fewer losses. One possible explanation is that experienced and educated directors performed better both before and during the crisis because they have better understanding of more complex issues (Minton et al., 2011).

Similarly, examining a sample of European banks over the financial crisis of 2007-2008 Fernandes et al. (2017) show that financially experienced directors increase bank performance. Furthermore, Hau and Thum (2009) analyzing a dataset of 29 German banks over the period of 2007-2008, find that directors' financial expertise has a positive impact on the profitability of banks. A more experienced board can identify risks that will affect the financial stability and, hence, can advise managers how to handle these risks to avoid losses.

In contrast to previous empirical studies, Nguyen et al. (2015) using a sample of US banks from 1999 to 2011, show that prior work and financial experience has no significant impact on bank performance. However Aebi et al. (2012) examining a sample of US banks during the crisis period of 2007-2008, report that a high percentage of experienced directors is negatively related with bank performance measured by stock returns. One possible explanation is that in many cases the bank board lacked sufficient financial expertise.

Based on the existing literature our hypotheses are as following:

Hypothesis 3.a (H3.a): The experience of board members is positively related with the performance of banks

Hypothesis 3.b (H3.b): The experience of board members is negatively related with the performance of banks

1.2.3.2 Financial experience and risk-taking

According to Fernandes et al. (2017) experienced directors can recognize which risks are beneficial to shareholders and consequently, encourage managers to take on those risks in normal times. A more financially experienced board may recognize the risks which are unsound for the financial stability and, thus, they are more able to avoid those risks (Harris and Raviv, 2008). Moreover, Beltratti and Stulz (2012) claim that poorly governed banks can be considered as a major cause of financial crisis due to the fact that these banks with more shareholder-friendly boards were associated with higher risk-taking and larger stock losses during the crisis.

However, Minton et al. (2011) based on a sample of US banks over the period 2000-2008, show that experienced directors in US banks increased risk-taking prior to the crisis and, hence, led to significant losses in banks. One possible explanation for this result is that managers often operate in the interest of shareholders and as a consequence, are led to take more risks (Srivastav and Hagendorff, 2016).

Based on the existing literature our hypotheses are as following:

Hypothesis 3.c (H3.c): The experience of board members is positively linked to risk-taking

Hypothesis 3.d (H3.d): The experience of board members is negatively linked to risk taking

1.2.4 Board independence, bank performance and risk-taking

1.2.4.1 Board independence and performance

According to the Basel Committee (BCBS, 2015) independent directors are any non-executive directors with no management responsibility that have no social or business relationships with management and are not under any internal or external influence. Different empirical studies on this issue (Pathan and Faff, 2013; Erkens et al., 2012; Cornet et al., 2009) record that the percentage of independent directors on bank board is higher than the relevant percentage in non-financial firms. However, the findings from the existing literature on the relationship between bank performance, risk-taking and board independence are inconclusive.

According to Francis et al. (2012) in a context of high information asymmetry the inclusion of more inside directors may be beneficial as they have greater specific information about the firm's activities. Moreover, Fernandes and Fich (2013) believe that independent directors are more effective as they are interested in their reputation and thus contribute to improving bank performance.

Similarly, Andres and Vallelado (2008) using a sample of large international banks for the 1996-2006 period, they find an inverted U-shaped relation between bank performance and the proportion of independent directors. This result indicates that a not excessive number of independent directors in the board might prove more efficient in monitoring and advising and, thus, create more value for the bank. Additionally, Beltratti and Stulz (2012) based on a sample of 98 banks over the period 2007 until the end of 2008 find that banks with more independent directors performed better.

Furthermore, employing a sample of 159 banks from 9 different countries around the world from 2004-2010, Garcia-Meca et al. (2015) indicate that there is a positive and significant relationship between board independence and bank performance measured by Tobin'sQ and return on assets (ROA). Moreover, Staikouras et al. (2007) find that the proportion of independent directors of European banks has significantly positive impacts on bank performance from 2002 to 2004. This is supported by the fact that independent directors appear to have a more objective opinion and guarantee more efficient control (Belhaj and Mateus, 2016).

On the contrary, Masulis et al. (2012) examining a sample of US banks during the financial crisis of 2007-2008 show that there is a negative relationship between board independence and bank performance. This is in line with the findings of Pathan and Faff (2013). Using a sample of 212 US BHC from 1997 to 2011 they find evidence that when the percentage of independent directors is

higher, bank performance is lower. This suggests that independent directors are less likely to have sufficient expertise to understand the complexity of banks.

Based on the existing literature our hypotheses are as following:

Hypothesis 4.a (H4.a): Board independence is positively related with bank performance

Hypothesis 4.b (H4.b): Board independence is negatively related with bank performance

1.2.4.2 Board independence and risk-taking

Independent directors play a crucial role on the board as they are responsible of protecting the shareholders' interests (Fama and Jensen, 1983). More precisely, independent directors are believed to be better managers as they have more incentives to create effective monitoring function (Hermalin and Weisbach, 2003). In the same line, the Basel Committee highlighted the importance of independent directors on the board, claiming that banks should have a large number of independent directors who have sufficient knowledge of the banking activities (BCBS, 2006).

It is believed that if independent directors act in the interest of regulators and depositors then risk-taking will be reduced in banks (Minton et al., 2011). Similarly, Pathan (2008) using a sample of 212 large US bank holding companies over 1997-2004 illustrate that independent directors are associated with less risk-taking measured by Z-Score. According to the author, one possible explanation is that independent directors may be more sensitive to regulatory compliance (Pathan, 2008).

Moreover, Wang and Hsu (2013) analyze a sample of American banks for the period 1996-2010 and show that a high proportion of independent directors is negatively linked to operational risk. One possible explanation for this result is that independent directors monitoring the course of banks can contribute to less risk.

On the contrary, Minton et al. (2011) based on a sample of US banks for the period 2000-2008 report that there is a positive relationship between the percentage of independent directors and risk-taking in banks. In the presence of moral hazard, a strong bank board may be positively linked to risk-taking, due to the fact that independent directors are better managers regarding shareholders' interests (Pathan, 2008).

Finally, Erkens et al. (2012) considering a sample of international banks from 2007 to 2008 report that the presence of independent directors had no statistically significant impact on risk-taking.

Independent directors may lack sufficient knowledge of bank specific information and, thus, lead to sub-optimal decisions (Liang et al., 2013; Adams and Mehran, 2003; Harris and Raviv, 2008).

Based on the existing literature our hypotheses are as following:

Hypothesis 4.c (H4.c): Board independence is positively linked to risk-taking

Hypothesis 4.d (H4.d): Board independence is negatively linked to risk-taking

1.2.5 Gender diversity, bank performance and risk-taking

1.2.5.1 Gender diversity and performance

Gender diversity has received increased attention in recent years. Despite the undisputed fact that board diversity is considered necessary for the profitability of banks unfortunately it is mentioned that nowadays women still face many barriers in their attempt to pursue their professional career and gain a job in top levels of hierarchy (European Commission, 2012). Thus, the issue of women's participation in a board of directors remains a challenge both in Europe and in the US.

Ramano et al. (2012) using a sample of Italian banks from 2006 to 2010 find that the presence of women on boards of directors has a positive effect on banks' performance measured by return on assets (ROA) and return on equity (ROE). Additionally, García-Meca et al., (2015) using a sample of 159 banks in nine countries from 2004 to 2010, show that gender diversity increases bank performance measured by Tobin'sQ and return on assets (ROA). One possible explanation is that women contribute to board effectiveness through their knowledge and skills.

In their research, Pathan and Faff (2013) analyzing a sample of 212 large US banks from 1997 to 2011, indicate that gender diversity improves bank performance in the pre-SOX period. However, this positive effect decreases in both post-SOX and the crisis period. Similarly, Owen and Temesvary (2018) from a sample of 90 US banks during the period 1999-2015 show that there is a positive relationship between female directors and bank performance until a certain level and then becomes negative. Women directors may lack sufficient financial experience and, thus they do not know how to handle difficult situations such a financial crisis.

Consistent with the previous empirical studies, Belhaj and Mateus (2016) support that a high proportion of female directors on the board of European banks, is positively associated with bank performance from 2002 to 2011. However, the findings of this research seem to change during the

financial crisis of 2007 to 2008. More specifically, it is recorded that the participation of women in the board of directors does not affect the profitability of banks during the period of crisis.

The above arguments give rise to the following hypotheses:

Hypothesis 5.a (H5.a): A high percentage of female directors is positively related with bank performance

Hypothesis 5.b (H5.b): A high percentage of female directors is negatively related with bank performance

1.2.5.2 Gender diversity and risk-taking

The existing literature shows little empirical evidence concerning the relationship between gender diversity and risk-taking in banks. Also, the results from these limited studies are inconclusive. Muller and Lewellyn (2011) examine a sample of 74 US banks from 1997 to 2005 and support that a great presence of female directors is related to more risk-taking and destabilizing of banks.

According to Goel and Thakor (2008) it is supported that women have to face more obstacles in obtaining information than men. Consequently, it is more likely to provide poorer investment decisions. Moreover, Berger et al. (2016) using a sample of German banks from 1994 to 2010, provide evidence that a higher proportion of female executives leads to riskier activities. One possible explanation for his result is that women directors are less experienced than male executive.

On the contrary, De Cabo et al. (2012) analyze the data from 20 European countries for 2006 and indicate that there is a negative relationship between the percentage of women and risk-taking of banks. This means that when a bank assumes a high level of risk, it is less likely to hire women for the board. Female directors are usually not willing to take dangerous decisions which may be necessary for a bank's success (De Cabo et al., 2012). Similarly, Gulamhussen and Fonte Santa (2015) examining a sample of 461 large banks from OECD countries for the year 2006, find that the presence of female directors on the board has a negative influence on risk-taking measured by Z-Score. Women are less over-confident and more risk averse in financial decision-making process than men (Barber and Odean, 2001).

The above arguments give rise to the following hypotheses:

Hypothesis 5.c (H5.c): A high percentage of female directors is positively linked to risk-taking

Hypothesis 5.d (H5.d): A high percentage of female directors is negatively linked to risk-taking

1.2.6 Corporate governance system, bank performance and risk-taking

1.2.6.1 Corporate governance system and performance

Bank board composition in Europe varies according to the corporate governance system which is adopted in each country. In practice, there are different board structures such as the one-tier system, two-tier system and a mixed model which applies to countries like Ireland (Brogi and Lagasio, 2019). In most countries board of directors have a one-tier structure which is known as the Anglo-Saxon model of corporate governance system (IMF, 2014). According to this, executive directors and non-executive directors are all members of one and the same board (Sironi and Pellegrini, 2017). It is common in France, Italy, the UK and the United States.

In two-tier system, members of executive board must not be members of the supervisory board and vice versa to avoid conflicts of interest. This clear distinction is significant in the context of risk-taking and consequently on bank performance. The management board is responsible to carry out the day-to-day activities and acts as an independent board of directors. The supervisory board is responsible for monitoring and advising the managing directors (IMF, 2014). This model is known as the German approach to corporate governance. Regarding the countries that adopt a mixed approach, there may be regulations in order to prevent executive directors from be elected on the board (BCBS, 2015).

Some researchers believe that the Anglo-Saxon corporate governance system is better than the classic German one (Hansmann and Kraakman, 2000). Relative flexibility of entry and exit at low cost makes this system attractive for many. However, the legal and regulatory standards for the operation of this corporate governance system are relatively high, making the Anglo-Saxon system suitable only for developed countries with well-developed capital markets.

Moreover, Adams and Mehran (2012) analyze the relationship between the corporate governance system and bank performance from a theoretical perspective and show that there is no clear findings concerning the best-suited corporate governance model. However, most surveys conducted in the banking sector are focused on CEO duality. More precisely, in the two-tier system each of the supervisory and management boards have their own separate role and duties and, thus, the CEO and chairman are two different persons (Hagendorff et al., 2016). However, in the case of the one-tier system the chairman and CEO is the same person.

Belkhir (2009) using a sample of 174 US bank holding companies over the period 1995-2002 reports that there is a positive and significant relationship between CEO duality and bank performance measured by return on assets (ROA) and Tobin'sQ. One possible explanation is that if the CEO is also the chairman, the board will coordinate and set strategies more quickly and, therefore, contribute to increasing of performance (Finkelstein and Hambrick, 1996).

By contrast, Pi and Timme (1993) analyzing data form 112 US banks from 1987 to 1990, illustrate that the banks in which the CEO and the chairman are two separate persons performed better than the banks with dual CEO. In the same vein, Mishra and Nielsen (2000) examining a sample of US large bank holding companies during the period 1975-1989 find that there is a negative relationship between CEO duality and bank performance measured by return on assets (ROA) and return on equity (ROE).According to Fama and Jensen (1983) the concentration of power may worsen the conflicts of interest and, thus, decreases the supervision of the board manager (Belhaj and Mateus, 2016).

Based on the different findings mentioned above we expect that:

Hypothesis 6.a (H6.a): The two-tier system is positively related with bank performance

Hypothesis 6.b (H6.b): The two-tier system is negatively related with bank performance

1.2.6.2 Corporate governance system and risk-taking

As it has been mentioned above, the different approaches of corporate governance system are widely used around the world and as a consequence they have drawn the attention of academics (Bezemer et al., 2014; Millet-Reyes and Zhao, 2010). More precisely, Adams and Ferreira (2007) and Gillette et al. (2008) analyze the consequences of the board's dual role and find that it may be optimal for risk reduction to apply the two-tier system. In the same line, Aebi et al. (2012) claims that due to the complex and opaque bank structure, the existence of a separate risk committee or independent Chief Risk Officer (CRO) is highly important.

On the contrary, Pathan (2008) based on a sample of 212 large US bank holding companies over the period of 1997-2004, records that CEO duality negatively affects bank risk-taking because bank mangers including CEOs may prefer lower risk due to their non-diversifiable wealth, including human capital invested in their banks, and comparatively fixed compensation such as salary.

Based on the different findings mentioned above we expect that:

Hypothesis 6.c (H6.c): The two-tier system increases risk-taking

Hypothesis 6.d (H6.d): The two-tier system decreases risk-taking

1.2.7 Compensation of board members, bank performance and risk-taking

1.2.7.1 Compensation of board members and performance

Despite the importance of the relationship between the CEO's compensation and the performance of banks which is known as pay-for-performance relationship, surprisingly only a few empirical studies (Crawford et al., 1995; Ang et al., 2002) have examined this issue. Barro and Barro's (1990) using a sample of US commercial banks during the period from 1982 to 1987, find that there is a positive relationship between the increase of compensation and accounting earnings and stock returns. One possible explanation for this result is that the increase in compensation depends on relative and aggregate performance.

A few years later, Crawford et al. (1995) based on a sample of 37 commercial banks from 1976 to 1982 provide evidence that during the deregulation period there was an increase in pay-performance sensitivities. In the same line, Houston and James (1995) using a sample of 134 banks over the period from 1980 to 1990, show that there is a positive relationship between stockholder wealth and bank performance. This means that CEO's compensation is sensitive to stock market performance and also, it indicates that CEOs are more willing to search out and invest in positive Net Present Value projects (Curi and Murgia, 2018).

Moreover, Ang et al. (2002) analyzing data of 166 US banks from 1993 to 1996 find that the compensation of top executives is determined by bank performance and the size of the bank. More precisely, this means that when the performance achievements concern long-term investments then the payment tends to be higher.

In addition, Cuñat and Guadalupe (2009) based on a sample of commercial banks over the period from 1992 to 2002 show that there is a positive relationship between CEO compensation levels and bank performance measured by shareholder values. Also, the authors indicate that the structure of pay compensation is affected by banking competition; higher competition reduces the fixed component of pay while it increases performance-related pay.

However, Fahlenbrach and Stulz (2011), examining a sample of banks from 2006 to2008 find some evidence which show that banks in which CEOs interests were better aligned[3] with those of the shareholders had worse stock returns and also worse return on equity. Nevertheless, the authors find that banks with higher compensation for their CEOs did not perform worse during the crisis. They support that the poor performance of these banks during the period of the financial crisis is attributable to the negative realization of their high-risk investment and trading strategies (Curi and Murgia, 2018). A possible explanation for their findings is that CEOs focus on the interests of their shareholders and, hence, take actions that they believe the market will welcome (Curi and Murgia, 2018).

The above arguments give rise to the following hypothesis:

Hypothesis 7.a (H7.a): The compensation of directors is positively related with bank performance

Hypothesis 7.b (H7.b): The compensation of directors is negatively related with bank performance

1.2.7.2 Compensation of board members and risk-taking

According to Curi and Murgia (2018), executive compensation is a key mechanism of corporate governance which is designed to attract, retain and motivate CEOs and senior management. In the aftermath of the global financial crisis, the structure of the executive remuneration has received a great attention. Many authorities and supervisors proposed rules to regulate compensation in financial institutions such as CRD III (2010) and CRD IV (Directive 2013/36/EU, Art. 94(m)).

Several studies have examined the association between managerial compensation and risk of banks (John and Qian, 2003; Chen et al., 2006; DeYoung et al., 2013). However, results are inconclusive and further analysis is needed. Using a sample of banks from 1993 to 2007, Hagendorff and Vallascas (2011) find support for the view that increased incentive-based compensation leads banks to make riskier choices in their mergers and acquisition decisions.

In addition, Bai and Elyasiani (2013) investigate the relationship between insolvency risk and executive compensation for bank holding companies over the 1992-2008 period. They show that higher CEO vegas[4] are linked to greater bank instability when measured by Z-Scores. Similarly, Bhagat and Bolton (2014) based on a sample of US banks from 2000 to 2008 find that incentives

[3] *According to Fahlenbrach and Stulz (2011) managers' interests are better aligned with those of shareholders if managers' compensation increases when shareholders gain and falls when shareholders lose.*

[4] *Vega is used in order to measure the change in CEO wealth associated with a 1% change in a bank's stock return volatility.*

generated of executive compensation have a positive and statistically significant impact on excessive risk-taking of banks. According to Jensen and Meckling (1976) the high leverage of banks allows shareholders to capture most of the gains from risky projects. As a consequence, shareholders of banks have an incentive to increase their CEOs' equity-based compensation to encourage them to increase risk.

Concerning the bonus-risk relationship, Vallascas and Hagendorff (2013), based on 117 listed US and European banks during the period 2000-2008, they find that increases in CEO cash bonuses lower banks' default risk. This is because bonuses can only be received in a solvency situation, forcing CEOs to avoid permanent bankruptcy (Curi and Murgia, 2018). Although, they show that there is a positive relationship between pay incentives and risk-taking in weak regulatory environments and at financially distressed institutions.

Furthermore, DeYoung et al. (2013) examining a sample of US banks from 1994 to 2006, provide mixed evidence regarding the effect of CEO compensation on bank risk. More precisely, they support that increased equity-based compensation is associated with riskier bank investment choices in the post-deregulation period. They find that ex-ante executive compensation in financial institutions after the deregulation of 1999 encouraged excessive risk-taking. However, ex-post, bank boards have adapted the risk-taking incentives from CEOs in a manner according to the mitigation or improvement of higher than average risk-taking levels (Curi and Murgia, 2018).

The above arguments give rise to the following hypothesis:

Hypothesis 7.c (H7.c): The compensation of directors is positively linked to the risk-taking

Hypothesis 7.d (H7.d): The compensation of directors is negatively linked to the risk-taking

1.2.8 The impact of global financial crisis (GFC) on bank performance and risk-taking

1.2.8.1 The impact of global financial crisis (GFC) on performance

The board of directors per se is considered to be the "apex body" of an organization's internal governance system (Fama and Jensen, 1983). More precisely, except for its advisory role, the board of directors is also responsible for supervising the managers in order to ensure that their decisions are in line with the shareholders' interests. In addition, the board is considered to have an essential role in the implementation of an effective system of risk management (Srivastav and Hagendorff, 2016). According to recent academic studies (Aebi et al., 2012; Diamond and Rajan, 2009), the failure of

risk management procedures and the weaknesses of corporate governance contributed to the poor performance of banks, during the financial crisis.

Thus, the board of directors and its composition are the focus of regulators after the global financial crisis. One of the biggest challenges for supervisors was to identify and encourage the best practices to assist banking organizations with the maintenance of an efficient and cost-effective supervisory system (BCBS, 2015; Adams and Mehran, 2012). For this reason, the Basel Committee issued principles applicable to all types of banks regardless of their governance system, their legal form and their ownership structure. According to these principles, the board of directors should include an appropriate number of independent directors. Independent directors are believed to be better in exerting their monitoring duties (Hermalin and Weisbach, 2003).

Moreover, the Basel Committee highlighted the importance of the financial experience of directors. Board members should be qualified and have an adequate knowledge of each type of banking activities. Taking into consideration, that the board is responsible for the operations of the banks, the directors, inter alia, should have a comprehensive understanding including the overall risk policy and risk management procedures (BCBS, 2015).

Hence, from what is mentioned above it is clear that the structure of the boards in banks varies over time and especially after the global financial crisis. In some countries boards have become independent or smaller in terms of board size. There are some evidence that a small board of directors contributes to "good" governance and also reduce the free-rider and coordination problems (Jensen, 1993; Aebi et al., 2012).

Another characteristic of the board of directors which has changed during the time, concerns the participation of women in managerial positions. Many European countries such as France, have introduced a threshold, regarding the minimum proportion of female directors on boards (De Cabo, et al, 2012). Overall, all these changes of the board characteristics may have a significant impact on bank performance. Thus, as the board becomes more independent and the directors are more educated and experienced, bank performance will increase (Pathan and Faff, 2013).

The above arguments give rise to the following hypothesis:

Hypothesis 8.a (H8.a): Compared to 'normal times', the predicted relation between bank governance such as board size, age, board independence, financial experience, gender diversity, governance system, compensation and bank performance varies following the financial crisis.

1.2.8.2 The impact of global financial crisis (GFC) on risk-taking

As it has been mentioned above, the board of directors is responsible for risk management and financial stability by evaluating whether the risk-exposure is consistent with risk appetite (Srivstav and Hagendorff, 2016). Since the financial crisis happened, regulators and supervisors believe that executive compensation is one of the main reasons of the crisis. Hence, it is not surprising that the European Banking Supervisors (2010) and the European Banking Authority (2015) issued principles on sound compensation policies (Curi and Murgia, 2018). More precisely, according to the Basel Committee the board should ensure that compensation policies are consistent with the bank's corporate culture, long-term objectives and strategies (BCBS, 2015).

In addition, another key development in the regulatory landscape was the implementation of the Dodd-Frank Act in the US which regulated executive compensation in order to discourage inappropriate risk-taking (Curia and Murgia, 2018). Similarly, at the multinational level the Financial Stability Forum issued the Principles for Sound Compensation Practices (FSB, 2009). Moreover, the European Union approved directives CRD III in 2010 and CRD IV in 2013 which contain provisions that regulate compensation at financial institutions (Ferrarini, 2015). CRD IV[5] requires diversity in board composition and improves transparency of bank activities (Curia and Murgia, 2018). Diversity in board composition may contribute to effective risk oversight by boards, providing for a broader range of views and opinion.

Another characteristic of boards which is considered to play a vital role in the risk-taking of banks is the presence of independent directors. According to Pathan (2008) boards characterized by a higher percentage of independent directors are related to less risky policies. Moreover, women are more risk averse and are not willing to take risks even though they may be necessary in some cases for the success of banks (Pathan and Faff, 2013).

It is believed that a "good" board structure, which means a small-sized one, more independent directors, a higher proportion of women and experienced directors and better aligned interest between directors and shareholders, is expected to exert better monitoring in risk-taking (Srivstav and Hagendorff, 2016). Based on what is mentioned above, we expect that the changes which have occurred due to the issuing of the principles and guidelines regarding the board of directors, have a significant impact on board composition and, hence in the risk-taking of banks.

[5] *According to the CRD IV, the variable component of remuneration (bonus) is capped at 100% of the fixed component for material risk takers. The bonus can be raised to 200% of fixed remuneration with shareowner approval.*

The above arguments give rise to the following hypothesis:

Hypothesis 8.b (H8.b): Compared to 'normal times', the predicted relation between bank governance namely board size, age, board independence, financial experience, gender diversity governance system, compensation and risk-taking is less pronounced following the financial crisis.

1.3. Data and methodology

This section presents and analyzes the sample on which our empirical research was based, the categories of variables used, and the regression models.

1.3.1 Sample and Data

The data used in this study was extracted from the BoardEx and Bankscope databases[6] for the period 2004 to 2016. The BoardEx database provides data on all characteristics of board members such as board size, age, financial experience, percentage of independent directors, percentage of female directors, corporate system and managerial compensation. Also, the BankScope database provides balance sheet and income data. The research comprises samples of 75 commercial European banks from 18 European countries namely Spain, Italy, Ireland, the United Kingdom, Denmark, France, Germany, Holland, Belgium, Portugal, Luxembourg, Hungary, Poland, Greece, Sweden and Finland. Moreover, after removing errors and inconsistencies, we end up with an unbalanced panel of 861 bank-year observations.

1.3.2 Variables

1.3.2.1 Dependent variables

In line with previous studies (Belhaj and Mateus, 2016; Erkens et al., 2012; Pathan and Faff 2013; Andres and Vallelado 2008; Setiyono and Tarazi 2014; Laeven and Levin, 2009), we employ alternative proxies of bank performance (PERFOR) and risk-taking (RISK) that are commonly used in the existing literature (Pathan and Faff, 2013; Bai and Elyasiani, 2013; Fernandes et al., 2017) as they provide us with different types of information on governance the multiple proxies of performance and risk. Finally, we will check the robustness of our findings using these different proxies of bank performance and risk. These are, return on average assets (ROAA), return on

[6]*We are grateful to the University of Sussex for providing us with access to these databases.*

average equity (ROAE), net interest margin (NIM) and Tobin's Q ratio for bank performance, Z-Score, non-performing loans (NPL) and Tier1-capital ratio for risk-taking.

Return on average assets (ROAA) is calculated as the net income after taxes, as a percentage of total assets (Pathan and Faff, 2013). This index shows how effectively the bank can manage its assets to generate profit. Another characteristic is that it can be used to compare the profitability of banks with a similar risk. Return on average equity (ROAE) is the net income after taxes as a percentage of equity (Aebi et al., 2012). It refers to the return earned by the owners of the bank from their investment. Therefore, if the owners wish to have higher profitability, they would prefer to use external borrowing despite their own capital, because it significantly increases bank performance.

Net interest margin (NIM) is the net interest income as a percentage of the average profit (Pathan and Faff, 2013). Banks are keenly interested in this index as it is a measure of success in their investment strategy on interest rates on lending. Tobin'sQ is the sum of the market value of equity and the book value of liabilities divided by the carrying amount of total assets (Pathan and Faff, 2013). Several studies have used this efficiency measure as a dependent variable in the banking sector (Staikouras et al, 2007; Belhaj and Mateus, 2016). Its importance derives from the fact that it records the value of future investment opportunities. Therefore, a high value of the index means that the market believes that the bank will increase its value due to various factors.

One measure of bank risk is Z-Score. It is used in bank governance literature (Bai and Elyasiani, 2013; Beltratti and Stulz, 2012; Levine, 2004) referring to the relationship between bank risk and capital regulations, deposit insurance and other regulatory policies. It is defined as the mean of (ROA) +CAR/σ (ROA) where ROA is the return on assets and CAR is the capital-asset ratio. Hence, Z-Score represents a bank's distance from insolvency (Bai and Elyasiani, 2013). A higher Z-Score indicates that the bank is more stable.

Non-performing loans (NPL) is used as a proxy for credit risk and financial stability measured by the ratio of loans loss provisions divided by total loans (Pathan et al., 2008). According to the European Central Bank (ECB, 2017), it is a credit risk measure that directly affects the profitability of banks and, consequently, financial stability. It is argued that the consequences of the high rate non-performing loans are not limited only to banks as they will not be able to issue loans due to the lack of liquidity. On the contrary, the consequences of non-performing loans spread across the economy, negatively affecting employment prospects and growth (ECB, 2017).

Finally, the Tier 1 capital ratio[7] is the ratio of a bank's core equity capital to its total risk-weighted assets (RWA). Risk-weighted assets[8] are the total of all assets held by the bank weighted by credit risk according to a formula determined by the Basel rules (BCBS, 2010). It is a key measure of a bank's financial strength.

1.3.2.2 Bank governance variables

We use the seven measures of bank governance, analyzed in the previous section, that are likely to influence bank performance and risk-taking such as: board size (BS), board independency (INDEP), gender diversity (FEMALE), age (AGE), board financial experience (EXPER), compensation (compensation and wealth) and a dummy variable to account for the corporate governance system (TIER-SYSTEM). According to Pathan and Faff (2013), Staikouras et al. (2007), board size (BS) is defined as the sum of the directors within a board (executive and supervisory). Age (AGE) is defined as the average age of the directors of the board. Financial experience (EXPER) is the average number of financial experience relevant either on the supervisory or executive board on which the director sits (Fernandes and Fich, 2013). The percentage of female directors (FEMALE) is defined as the percentage of women on the board (Owen and Temesvary, 2018).

The percentage of independent directors (INDEP) is the number of nonexecutive directors on the board (Pathan and Faff, 2013). An independent is one who has only a business relationship with the bank and is not linked to family ties (BCBS, 2015). Finally, in order to examine whether the corporate governance system affects the profitability of financial institutions, we introduce a dummy variable (TIER-SYSTEM) which takes the value one when the corporate governance system is two-tier and zero otherwise. Finally, according to BoardEx definitions, compensation (COMPENSATION) is the sum of salary and bonus and the wealth variable (WEALTH) is defined as the total value of equity linked wealth at the end of the period for the individual based on the closing stock price of the annual report.

1.3.2.3 Control variables

In accordance to (Fernandes et al., 2017; Pathan and Faff, 2013; Adams and Mehran, 2012) we use four control variables to control for bank characteristics. The first is bank size (LNTA), which is calculated as the natural logarithm of total assets (Fernandes et al., 2017). The use of the logarithm

[7] *Tier1 capital increases from 4%in Basel II to 6% applicable in 2015. This 6% is composed of 4.5% of CET1, plus an extra 1.5% of additional Tier1.*

[8] *Risk-weighted assets include the credit risk of the banking book, the market risk of the trading book, the operational risk, the counterparty credit risk/CCR and credit valuation adjustment/CVA (BCBS, 2010).*

eliminates the outliers observed in the sample used as there are banking institutions with very high total assets and others with very low.

The equity of assets (CAPITAL) ratio is included as a proxy for capital adequacy or capital risk (Belhaj and Mateus, 2016; Pathan and Faff, 2013). According to the Basel Committee (BCBS, 2017), the first pillar which define the capital requirements of banks has gradually increased the thresholds for this indicator. It is worth noting that Basel III puts a minimum of 8% on capital ratio, thus trying to ensure the solvency of banking institutions and avoid excessive borrowing (BCBS, 2017). The next variable refers to the leverage of banks (LEVEGARE) and is calculated as the ratio of total debt to total assets. It is used to capture fluctuations in the capital structure of banks (Pathan et al., 2008).

1.3.3 Empirical model and methodology

1.3.3.1 Fixed Effects

Our sample is a mixture of time series and cross-sectional analysis and as a consequence the most efficient tool to use is panel data analysis (Andres and Vallelado, 2008). The advantage of this method is that it takes into account the heterogeneity, which is the specific characteristics of each bank, such as the quality of management, business activity among others (Belhaj and Mateus, 2016).

The first econometric method we apply to control the impact of bank governance characteristics on bank performance and risk-taking is Fixed-Effects.[9] When the unobserved effect is correlated with independent variables, then this method gives unbiased estimators in contrast with Pooled OLS method which produces biased and inconsistent estimators.

Bank performance model

$$\textbf{(PERFOR) i, t} = \beta_0 + \beta_1 BS\ i,\ t + \beta_2 AGE\ i,\ t + \beta_3 EXPER\ i,\ t + \beta_4 INDEP\ i,\ t + \beta_5 FEMALE\ i,\ t + \beta_6 TIER\text{-}SYSTEM\ i,\ t + \beta_{7a} COMPENSATION\ i,\ t + \beta_{7b} WEALTH\ i,\ t + \beta_8 LNTA\ i,\ t + \beta_9 CAPITAL\ i,\ t + \beta_{10} NPL\ i,\ t + \beta_{11} LEVERAGE i,\ t + ui + \varepsilon i,\ t \quad (1a)$$

[9] *Applying Hausman Test (Wooldridge, 2012) we conclude that the methodology to be used is Fixed Effects.*

Bank risk model

$(\boldsymbol{RISK})\ i, t = \beta_0 + \beta_1 BS\ i, t + \beta_2 AGE\ i, t + \beta_3 EXPER\ i, t + \beta_4 INDEP\ i, t + \beta_5 FEMALE\ i, t + \beta_6 TIER\text{-}SYSTEM\ i, t + \beta_{7a} COMPENSATION\ i, t + \beta_{7b} WEALTH\ i, t + \beta_8 LNTA\ i, t + \beta_9 CAPITAL\ i, t + B_{10} LEVERAGE\ i, t + ui + \varepsilon i, t$ (1b)

Where ***PERFOR*** and ***RISK*** denote performance and risk-taking respectively for bank ***i***, ***t*** the time period, ***ln*** the natural logarithmic, ***β*** the parameters to be estimated, ***u*** the unobserved fixed-effect for bank ***i*** and ***ε*** the remaining disturbance term.

1.3.3.2 Endogeneity issues and Two-step system GMM

To address the endogeneity problem in corporate governance literature, we use the two-step system estimator approach, proposed by Arellano and Bover (1995) and Blundell and Bond (1998). This estimator involves the use of dynamic effect by adding a lagged dependent variable to the explanatory variable. Moreover, by applying the two-step system GMM, we can build instruments for endogenous variables. More precisely, to treat all potentially endogenous variables, we use their past values as their respective instruments (Vallascas and Hagendorff, 2013).

To test the validity of the multiple lags as an instrument, we calculate the Hansen/Sargan test (Pathan and Faff, 2013; Andres and Vallelado, 2008). The *AR(1)* and *AR(2)* measure first and second degree serial correlation. The residuals of the first differences *AR(1)* may be correlated but there should be no correlation in the second differences *AR(2)* (Cameron and Trivedi, 2009).

Bank performance model

$\boldsymbol{(PERFOR)\ i, t} = \beta_0 + \beta_1 PERFOR\ i, (t\text{-}1) + \beta_2 BS\ i, t + \beta_3 AGE\ i, t + \beta_4 EXPER\ i, t + \beta_5 INDEP\ i, t + \beta_6 FEMALE\ i, t + \beta_7 TIER\text{-}SYSTEM\ i, t + \beta_{8a}\ COMPENSATION\ i, t + \beta_{8b} WEALTH\ i, t + \beta_9 LNTA\ i, t\ \beta_{10} CAPITAL\ i, t + \beta_{11} NPLi, t + \beta_{12} LEVERAGEi, t + ui + \varepsilon\ i, t$ (2a)

Bank risk model

$\boldsymbol{(RISK)\ i, t} = \beta_0 + \beta_1 RISK\ i, (t\text{-}1) + \beta_2 BS\ i, t + \beta_3 AGE\ i, t + \beta_4 EXPER\ i, t + \beta_5 INDEP\ i, t + \beta_6 FEMALE\ i, t + \beta_7 TIER\text{-}SYSTEM\ i, t + \beta_{8a} COMPENSATION\ i, t + \beta_{8b} WEALTH\ i, t + \beta_9 LNTA\ i, t + \beta_{10} CAPITAL\ i, t + \beta_{11} LEVERAGE\ i, t + ui + \varepsilon\ i, t$ (2b)

Where ***PERFOR*** and ***RISK*** denote performance and risk-taking respectively for bank i, t the time period, **ln** the natural logarithmic, **β** the parameters to be estimated, **u** the unobserved fixed-effect for bank **i** and **ε** the remaining disturbance term.

Table 1.1 summarizes the definitions of the variables used in this study. More precisely, the first group concerns the dependent variables which are bank performance and bank risk. Moving to the second group, Table 1.1 represents the definitions of bank governance variables which are board size, age of directors, financial experience, percentage of independent directors, proportion of female directors, corporate governance system, compensation and wealth of directors. Moreover, in the third group, Table 1.1 below provides the definitions of control variables (bank size, capital ratio and leverage). Finally, except for the definitions of variables, Table 1 also presents the Databases which we used to extract the data.

Table 1.1: Definition of variables

	Variables	*Definition*	*Database*
Panel A: Dependent Variables			
Tobin'sQ	Tobin'sQ	The sum of the market value of equity and the book value of liabilities divided by the carrying amount of total assets	BankScope
ROAA	Return on average assets	The net income after taxes, as a percentage of total assets	BankScope
ROAE	Return on average equity	The net income after taxes as a percentage of equity	BankScope
NIM	Net interest margin	The net interest income as a percentage of average earning assets.	BankScope
Z-Score	Z-Score ratio	The ratio of: mean(ROAA)+CAR / st.dev (ROAA)	BankScope
NPL	Non-performing loans	The ratio of loans loss provisions divided by total loans	BankScope
Tier1-capital ratio	Tier1-capital ratio	The shareholder funds plus perpetual noncumulative preference shares as a percentage of risk weighted assets and off balance sheet risks measured under the Basel rules.	BankScope
Panel B: Bank Governance Variables			
BS	Board size	The number of directors sitting on the board	BoardEx
AGE	Age of directors	The average age of board members	BoardEx
EXPER	Financial experience	The average number of financial experience relevant either on the supervisory or executive board on which the director sits	BoardEx
INDEP	Independent directors	The fraction of nonexecutive directors on the board	BoardEx
FEMALE	Female directors	The percentage of directors on the board who are female	BoardEx
TIER-SYSTEM	Corporate governance system	A dummy variable that takes the value 0 for the one-tier system and the value 1 for the two-tier governance system	BoardEx
COMPENSATION (in 000s)	Compensation	The sum of salary and bonus	BoardEx
EQUITY LINKED WEALTH (in 000s)	Wealth	A valuation of total wealth at the end of the period for the individual based on the closing stock price of the Annual Report Date selected. Equals Estimated Value of Options Held plus Value of LTIP Held plus Value of Total Equity Held	BoardEx
Panel C: Control Variables			
LNTA	Bank size	The natural logarithm of total assets	BankScope
CAPITAL	Capital adequacy ratio	The ratio of equity to total assets	BankScope
LEVERAGE	Leverage ratio	The ratio of total debt to total assets	BankScope

1.4. Empirical results

1.4.1 Descriptive statistics and Correlation matrix

Table 1.2 provides the descriptive statistics on dependent variables, independent variables and control variables for the sample of European banks from 2004 to 2016. More precisely, panel A presents descriptive statistics of bank risk and performance measures. The average Tobin'sQ fluctuates between 0.04 and 1.63. Also the sample mean return on average assets (ROAA) is 0.64%. Our findings are in line with Belhaj and Mateus (2016) and Staikouras et al. (2007) who find that Tobin'sQ average is 1.03% and the mean return on assets (ROA) is 0.75% using a sample of 58 European banks. The average return on average equity (ROAE) is 7.89% while for net interest income (NIM) the mean is 1.72%. In the same direction, Belhaj and Mateus (2016) find an average return on equity ROE of 9.7% over the period 2002-2011. As the sample includes the crisis period we observe some negative values for our performance measures.

Regarding risk measures, we see in Table 1.2 that the average Z-Score is 10.11. This means that many banks face a default risk (Levine, 2004) as a higher Z-Score indicates that a bank has higher returns to cover its liabilities. The mean ratio of non-performing loans (NPL) is 6.91% with a maximum value of 44.86%. The mean of Tier1-capital ratio is 11.11% with a minimum value of 4.20%.

The bank governance variables in Panel B of Table 1.2 show that the average board size (BS) is 16.44 with a minimum of 2 and a maximum of 34 directors. Our results are close to Fernandes et al. (2017) who find that the average number of the board of directors is 16.39 for European banks over the 2007-2008 period. Similarly, the results of Belhaj and Mateus (2016) show that over the 2002-2011 period European banks have an average number of board members of 15.87. According to Booth et al. (2002) the number of directors in banks is usually larger than the one in non-financial firms. A large board in banks can be explained by many factors, such as the large size of banks. More precisely, banks have subsidiaries each of which has its own board of directors.

The average age of directors (age diversity) is 57.05 with a minimum of 23.06 and a maximum of 74.75. Regarding the variable financial experience, Table 1.2 demonstrates that directors have on average 5.77 years of bank experience with a minimum of one year and a maximum of 19.45 years. The proportion of independent directors varies between 0% and 100% with a mean of 42.82%. Our findings are in line with Belhaj and Mateus (2016) who show that the number of independent

directors in European banks fluctuates from 13.79% to 96.30%. The mean percentage of female directors is 13.36% with a minimum value of 0% and a maximum value of 54.45%. Similarly, De Cabo et al. (2012) indicate that the average of women in European banks is only 7%. Moreover, the mean salary plus bonus (total compensation) for the directors is €4.45 million while the mean of annual total wealth is €5.82 million.

Panel C of Table 1.2 presents the descriptive statistics of the control variables considered in our study. The banks in our sample have an average asset size of €7.32 billion. We use the natural logarithm of total assets in order to eliminate the effect of outliers on our results. The average of capital adequacy ratio reaches at 13.92% while the minimum value is 4.10%. Our results are close to Belhaj and Mateus (2016) who find that the average equity to asset ratio (capital ratio) for European banks over the period 2002-2011, is 11.62%. Banks are highly leveraged; the mean ratio of leverage is 12.63% while the maximum value is 89.06%.

Table 1.2: Descriptive statistics (2004-2016) All Countries

Variables	Observations	Mean	SD	Min	Max
Panel A: Dependent Variables					
Tobin'sQ (%)	645	1.02	0.15	0.04	1.63
ROAA (%)	809	0.64	1.17	-12.36	6.23
ROAE (%)	807	7.89	13.84	-48.01	51.46
NIM (%)	809	1.72	1.10	-1.60	10.27
Z-Score (%)	739	10.11	6.55	-3.05	41.14
NPL (%)	767	6.91	6.59	0.17	44.86
Tier1-capital (%)	714	11.11	4.61	4.20	69.25
Panel B: Bank Governance Variables					
BS (No)	861	16.44	5.89	2.00	34.00

AGE (No)	861	57.05	4.14	23.06	74.75
EXPER (%)	861	5.77	2.76	1.00	19.45
INDEP (%)	860	42.82	27.03	0.00	100.0
FEMALE (%)	860	13.36	11.68	0.00	54.54
COMPENSATION (in €mil.)	850	4.45	6.03	1.30	11.46
WEALTH (in €mil.)	850	5.82	16.43	0.75	7.98
Panel C: Control Variables					
LNTA (in €bil.)	811	7.32	1.98	2.59	11.76
CAPITAL (%)	727	13.92	4.67	4.10	68.36
LEVERAGE (%)	807	12.63	16.2	24.02	89.06

Note: This table presents the distribution of each variable by showing mean, standard deviation, minimum (min) and maximum (max) value.

Table 1.3 presents Pearson pair-wise sample correlations between variables. Multicollinearity among the regressors is not a serious concern since the maximum sample correlation is just 0.58 between Capital ratio and Z-Score (Gujarati, 2004). [10]

[10] *The pairwise correlations are below the threshold of 0.8 beyond which multicollinearity is considered a problem (Gujarati, 2004)*

Table 1.3: Correlation Matrix

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	BS	1.00																
2	AGE	**0.13***	1.00															
3	EXPER	-0.01	**0.29***	1.00														
4	INDEP	**-0.15***	**0.07***	**-0.08***	1.00													
5	FEMALE	**0.24***	**0.25***	**0.07***	**0.21***	1.00												
6	LNTA	**0.13***	0.06	**0.14***	**0.25***	**0.27***	1.00											
7	CAPITAL	**-0.22***	**-0.26***	-0.06	0.01	**0.17***	-0.07	1.00										
8	NPL	**-0.09***	**0.15***	-0.03	**0.08***	-0.07	**-0.13***	**0.10***	1.00									
9	LEVERAGE	**0.11***	-0.05	**-0.18***	0.06	**0.18***	**0.28***	**-0.19***	**- 0.22***	1.00								
10	TOBIN'SQ	**-0.26***	**-0.21***	-0.01	0.03	-0.04	**-0.18***	**0.10***	**0.11***	**-0.44***	1.00							
11	ROAA	**-0.08***	**-0.08***	**0.12***	-0.07	0.03	**0.09***	**0.14***	**-0.29***	**-0.40***	**0.33***	1.00						
12	ROAE	-0.01	-0.02	**0.07***	-0.01	-0.03	0.01	0.15	**-0.12***	**-0.19***	**0.13***	**0.39***	1.00					
13	NIM	-0.02	**0.19***	**0.23***	-0.04	**0.27***	**-0.23***	-0.05	**0.27***	**-0.42***	**0.19***	**0.24***	**0.07***	1.00				
14	Z-SCORE	**-0.31***	**-0.14***	0.068	**0.32***	**0.23***	**0.10***	**0.58***	**-0.19***	**-0.15***	**0.19***	**0.25***	**0.21***	-0.045	1.00			
15	TIER1-CAPITAL	**-0.25***	**-0.26***	-0.014	-0.024	**0.24***	**-0.13***	**0.92***	0.12	**-0.18***	**0.09***	**0.15***	0.07	-0.012	**0.50***	1.00		
16	COMPENSATION	0.057	0.021	**-0.10***	**0.24***	**0.09***	**0.48***	0.02	**-0.11***	**0.14***	0.07	0.001	0.03	**0.09***	**0.21***	-0.03	1.00	
17	WEALTH	0.028	-0.002	-0.004	**0.08***	**0.078***	0.09	-0.03	**-0.10***	-0.02	0.001	0.02	0.007	0.04	0.008	-0.02	**0.18***	1.00

Note: The table reports Pearson Correlation Matrix. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

1.4.2 Descriptive statistics per country and per year

Tables 1.4a and 1.4b reports the average value of bank governance variables (Board size, Age diversity, Financial experience, Independent, Female, Compensation and Wealth) per country and per year respectively. Regarding the analysis of the countries (Table 4a), we notice that the average size of directors varies between 8.55 in Finland and 24.25 in Luxembourg. Austria, Germany, Portugal and Luxembourg have the largest boards with an average of 20.72, 21.08, 20.73 and 24.25 respectively, while Finland, Sweden and the Netherlands have smaller boards with an average of 8.55, 11.72 and 11.96 correspondingly. The age of the board members ranges from 62.39 to 52.65 years. Hungary, Luxembourg and Italy have older members on their boards with 61.41, 62.39 and 60.81 years. In contrast, Poland, the Czech Republic, Sweden, Germany and Austria have younger members on the board displaying an average of 52.65, 53.91, 54.01, 54.02, and 54.13 years respectively.

As far as the financial experience of directors is concerned, it varies from 3.53 to 9.86 years. The most experienced executives are observed in Hungary and Luxembourg with an average experience of 9.86 and 9.63 years while less experienced directors are found in UK, Irish and Finnish banks with 3.53, 4.10 and 4.30 years of experience correspondingly. The percentage of independent directors fluctuates as the lowest value is 4.68% in Germany and the highest value stands at 68.91% in the UK. Also, the percentage of independent directors is more than 50% in Ireland, Sweden and Austria with 66.74%, 66.18% and 61.24% respectively.

The presence of women on the board of directors varies in European banks. Finland and Sweden present the highest proportion of female directors on bank boards with an average of 36.51% and 32.95%. Our findings are close to Belhaj and Mateus (2016) who show that Swedish banks have the highest percentage of women on the board with an average of 30.65%. Luxembourg's banks on the other hand, have the lowest proportion namely 0%, followed by Hungarian banks with 2.44%. These results are similar to those of the research conducting by De Cabo et al. (2012).

Germany, UK and the Netherlands have the highest compensation with an average of €5.14, €5.32 and €4.76 million correspondingly, while Denmark, Finland and Sweden have the lowest compensation with an average of €1.07, €1.28 and €1.32 million respectively. The equity-based compensation (wealth) presents the highest value in the UK, Germany and the Netherlands with an average of €5.53, €5.38 and €5.21 million. On the contrary, the minimum values of equity-based

compensation (wealth) are found in Hungary, the Czech Republic and Denmark with an average of €1.08, €1.12 and €1.16 million respectively.

Continuing with the per year analysis (Table 1.4b), we notice that in 2004 the mean of board size was 17.25 members and remained at the same level during the crisis with an average of 17.12 directors. However, over the years there has been a gradual decrease in the number of board members, reaching 14.92 in 2016. This reduction can be explained by the losses suffered by banks due to the crisis.

Regarding the age of directors, Table 1.4b reports that there is a slight decrease as from 57.11 being the average age in 2004 it reached 56.61 in 2012. The financial experience of directors is also of particular interest as from 2004 until 2013 there is a gradual increase without major fluctuations. More precisely, in 2014 and 2016, executives with less financial experience appear to the boards, as the average is at 4.83 and 4.94 years respectively, which can be encouraging and bring new ideas, but on the other hand, it can cause risks due to a lack of experience.

As far as the compensation of directors is concerned, it varies from €2.18 to €3.48 million. More precisely, we notice that total compensation dropped from an average of €3.25 million in 2004 to €2.26 million in 2016 due to the global financial crisis. Regarding the wealth which concerns the variable compensation of the directors, we show from the Table 1.4b that there is a large drop in this variable over the whole period.

More precisely, the wealth fluctuates as the lowest value is €2.34 million in 2016 and the highest value stands at €4.63 million in 2006. One possible explanation for this decline in the wealth is that after the crisis, banks have performed worse and hence, directors received a lower share of variable compensation (BCBS, 2017). Moreover another reason which may have affected the wealth is the fact that the financial crisis obliged countries to adopt changes in their prudential policy.[11]

The percentage of independent directors fluctuates as the lowest value is 4.68% in Germany and the highest value stands at 68.91% in the UK. Also, the percentage of independent directors is more than 50% in Ireland, Sweden and Austria with 66.74%, 66.18% and 61.24% respectively.

[11] *All the banks in EU countries adopted the Principles and Standards of Sound Compensation (P&S) through the implementation of the CRD IV.*

Table 1.4a: Descriptive statistics per country

Countries	*Variables*						
	BS	***AGE***	***EXPER***	***INDEP***	***FEMALE***	***COMPENSATION***	***WEALTH***
Austria	20.72	54.13	6.06	61.24%	12.96%	-	-
Poland	16.09	52.65	5.41	28.38%	12.78%	-	-
Czech Republic	14.60	53.91	5.46	12.96%	8.19%	1.54	1.12
Hungary	10.60	61.41	9.86	30.20%	2.44%	1.72	1.08
Luxembourg	24.25	62.39	9.63	28.82%	0%	2.45	2.64
Belgium	15.57	56.32	5.48	16.82%	13.61%	-	-
Germany	21.08	54.02	4.61	4.68%	14.21%	5.14	5.38
Netherlands	11.96	56.63	4.72	51.63%	9.14%	4.76	5.21
France	17.72	58.90	5.54	37.86%	19.04%	3.47	3.59
Ireland	12.86	56.34	4.10	66.74%	11.16%	2.04	-
UK	13.58	56.8	3.53	68.91%	15.85%	5.32	5.53
Denmark	13.74	55.00	7.33	39.43%	18.41%	1.07	1.16
Sweden	11.72	54.01	6.11	66.18%	32.25%	1.32	1.37
Finland	8.55	55.21	4.30	32.78%	36.51%	1.28	1.45
Portugal	20.73	56.64	7.33	30.53%	3.10%	3.01	3.26
Spain	13.95	59.19	7.59	53.09%	9.58%	3.89	4.01
Greece	15.18	59.67	6.49	31.84%	7.87%	1.87	-
Italy	19.01	60.81	5.83	50.37%	6.36%	-	-

Note: This table reports the mean value in each country for bank governance variables.

Table 1.4b: Descriptive statistics per year

Year	*Variables*						
	BS	***AGE***	***EXPER***	***INDEP***	***FEMALE***	***COMPENSATION***	***WEALTH***
2004	17.25	57.11	5.27	36.19%	10.08%	3.25	4.26
2005	16.63	56.95	5.48	39.78%	9.38%	3.31	4.32
2006	17.26	57.08	5.56	40.77%	8.98%	3.48	4.63
2007	17.55	56.99	5.64	37.91%	8.66%	3.27	4.18
2008	17.12	57.25	5.57	39.55%	9.37%	3.18	3.96
2009	16.85	56.91	5.89	40.44%	9.35%	2.87	3.87
2010	17.01	57.94	6.08	41.51%	11.12%	2.80	3.51
2011	16.49	57.05	6.23	43.21%	11.97%	2.54	3.14
2012	15.98	56.21	6.21	46.04%	14.61%	2.63	2.98
2013	15.61	57.12	6.33	46.26%	17.34%	2.58	2.87
2014	15.34	56.96	6.12	47.28%	21.04%	2.34	2.75
2015	14.47	56.30	4.83	51.47%	24.70%	2.18	2.61
2016	14.92	56.61	4.94	52.49%	26.45%	2.26	2.34

Note: This table reports the mean value in each year for bank governance variables.

The percentage of independent directors, as shown in Figure 1.1, has been steadily increasing over time as from 36.19% (Table 1.4b) in 2004, it reached more than 50%, namely 51.47% and 52.49% for the years 2015 and 2016 respectively (Table 1.4b). The trend of European banks to increase the proportion of independent directors is based on the Basel Committee principles in its effort to strengthen corporate governance of banks (BCBS, 2015).

Figure 1.1: Mean of percentage of independent directors per year

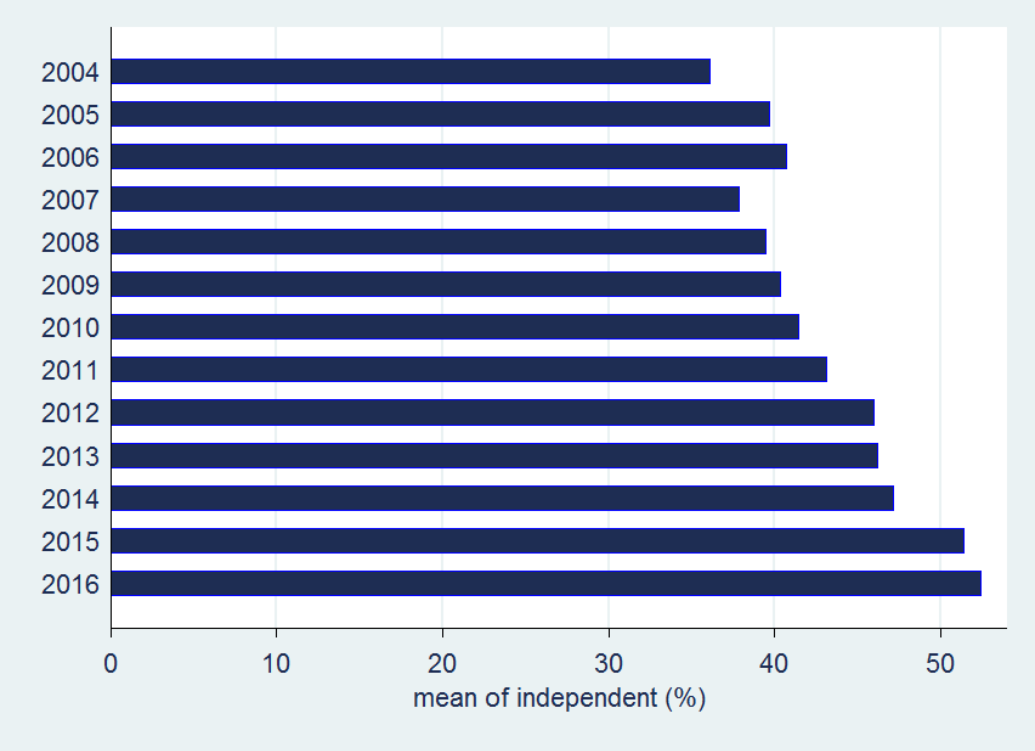
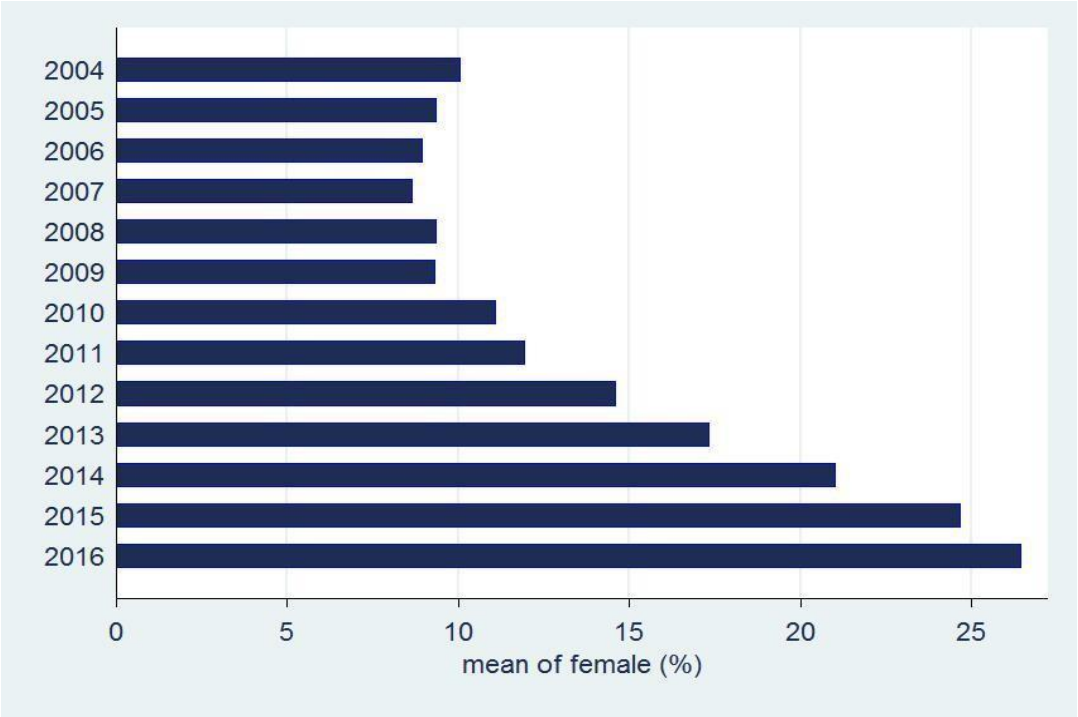


Figure 1.2, shows that while up to 2009 the percentage of women on board was 9.35% (Table 1.4b), suddenly after the crisis there is a constant increase in the number of women reaching 26.45% in 2016 (Table 1.4b). One possible explanation for this result is the fact that international organizations encourage women's participation in managerial positions. Many European countries have introduced a minimum percentage of women on boards such as France, which requires women's participation in the boards of listed companies to reach a minimum of 40% (De Cabo et al., 2012). Of particular interest is, of course, the attitude of some European countries, such as Sweden, the United Kingdom and Finland, who have implemented voluntary standards for the promotion of gender equality (Visser, 2011).

Figure 1.2: Mean of percentage of female directors per year



1.4.3 Descriptive statistics based on the change in the number of women

The fact that the issue of women on boards is receiving more attention in combination with the controversial conclusions drawn from the empirical studies on the effect of female directors on bank performance leads to further analysis of this variable. For this reason, we construct the variable difference (Diff) which estimates the change in the number of women on the board.

More precisely, the variable difference measures for each bank the variation of the number of female directors between 2004 and 2016. The purpose is to calculate the percentage of women directors with whom a bank started in 2004 and the corresponding percentage it recorded each year until 2016. Then we investigate the effect of this change on bank performance.

Based on the results, three categories are formed. The first one in which there is no change in women participation, the second in which there is a decrease in the number of women and the third category in which there is an increase in female directors on the board. Then, having created the variable difference with the three categories, we use descriptive statistics to observe the average value of bank performance measures as it is shown in Table 1.5.

As can be seen from Table 1.5 above, the banks that did not change the number of female directors for the period 2004-2016 recorded the best results in almost all performance measures, with the return on average assets (ROAA) reaches to 0.75%, return on average equity (ROAE) to 11.84% and the Tobin'sQ ratio to 0.085%. However, the net profit margin indicates a rise of 1.75% in banks that increased the number of women. In contrast, lower rates for these measures appear in the category of banks that have reduced women's participation on the board over the years.

Moreover, regarding risk-taking we notice that the banks which did not change the number of women on the board during the period 2004-2016 reported the highest values in Z-Score and Tier1-Capital ratio with an average of 17.229% and 11.9775% respectively. However, the non-performing loans (NPL) record the best value (the lowest) with an average of 4.3105%, for banks which have increased female directors on the board.

Table 1.5: More tests for the effect of female directors

Changes in the number of women directors between 2004 and 2016 (DIFF)	***Tobin'sQ***	***ROAA***	***ROAE***	***NIM***	***Z-SCORE***	***NPL***	***Tier1-Capital***
No change	0.0859%	0.7535%	11.8466%	1.7445%	17.229%	5.9136%	11.9775%
Less women	0.0510%	0.2423%	7.0372%	1.5055%	15.695%	6.1834%	10.8984%
More women	0.0791%	0.4996%	8.9972%	1.7562%	15.797%	4.3105%	11.6743%

Note: This table reports the mean value of each performance and risk-taking measure in all categories of variable DIFF

Therefore, from all the above, it is observed that banks where the number of women on board has remained stable have recorded higher percentages on the profitability proxies in contrast to banks which have increased the number of women. However there is the exception of net interest margin and non-performing loans where an increase in the number of women has led to high levels of

performance and to less credit risk. One possible explanation is that women may be more active in monitoring and controlling the directors, asking more questions and creating different perspectives (Dang and Nguyen, 2016). According to the research conducting by De Cabo et al. (2012) the diversity of a board strengthen bank performance as each manager has different characteristics such as experience, skills, information and potential links. Another view that reinforces our findings is that of Carter et al. (2003), argues that the diversity of the board of directors is associated with a better response to external changes and non-traditional approaches to the various problems faced by banks.

1.4.4 Empirical results based on the Fixed-Effects method

Tables 1.6 and 1.7 report the Fixed-Effects estimation results on equations (1a, 1b) for bank performance and risk-taking as the dependent variables. The effect of board size on performance is positive and significant at the 1% level only for return on average assets (ROAA) and return on average equity (ROAE), rendering support to hypothesis H1.a. Our results are consistent with previous studies, such as those of Aebi et al. (2012) and Andres and Vallelado (2008), which argue that a large number of directors on boards may contribute positively to decision-making process and, hence, improve the performance of banks. However, the effect of board size is not significant regardless of how bank risk is measured. Concerning the age of directors, there is no statistically significant relationship to any bank performance indicator and risk measure. Thus, we reject both hypotheses H2.a, H2.b, H2.c and H2.d.

The estimated coefficient of the financial experience of directors is positive and significant at the 1% level only for net interest margin (NIM) measure. This result is consistent with Fernandes et al. (2017), providing support for hypothesis H3.a. The financial experience of directors involves a deep understanding of the regulatory issues and the complexity of banking activities and hence, has a positive and significant impact as it contributes to increasing the profitability of banks.

Regarding the risk-taking of banks, it is observed from Table 1.7 that the experience of directors reduces the percentage of non-performing loans (NPL) and increases the proportion of Tier1-capital ratio. This means that experienced directors contribute to financial stability (Fernandes et al., 2017). Hence, we accept hypothesis H3.d. Our result is consistent with the principles established by the Committee (BCBS, 2015), which call for more experienced directors on bank boards, as it is argued that a better understanding of banking issues helps directors to oversee the management of banks more effectively.

Furthermore, the positive relationship between board independence and bank performance is explained by the objective view that independent directors are interested in their reputation and aim at increasing bank performance. Consequently, they try to create a good image for themselves as executives and to acquire personal benefits and recognition (Garcia-Meca et al., 2015, Liang et al., 2013, Belhaj and Mateus, 2016). Therefore, hypothesis H4.b is not confirmed. However, the insignificant relationship between the percentage of independent directors and risk measures is consistent with Erkens et al. (2012) who examine a sample of European banks and they show that the proportion of independent directors have no statistically significant impact on risk-taking.

Gender diversity increases bank performance when measured by return on average assets (ROAA), return on average equity (ROAE) and Tobin'sQ ratio. This result is in line with Own and Temesvary (2018), Belhaj and Mateus (2016) and Fernandes et al. (2017) and leads to the acceptance of hypothesis H5.a. However, the results regarding the effect of female directors on risk-taking are mixed. More precisely, the presence of women on boards reduces bank risk when measured by Z-Score ratio and Tier1-capital ratio and, thus, it ensures soundness and safety in banks.

On contrary, the effect of female directors on bank risk-taking is positive and significant for non-performing loans (NPL). Our findings are supported by Muller and Lewellyn (2011) who find that a high percentage of female directors is linked with a high level of risk-taking and, hence, leads to the destabilization of banks. Our results also indicate that women do not have the appropriate experience, unlike male directors, and consequently make dangerous decisions which contribute to more credit risk and more losses for banks. Thus, we accept both hypotheses H5.c and H5.d.

Moreover, we find that the coefficient of tier-system has a negative and statistically significant impact on bank performance when calculated by net interest margin (NIM) at the 10% level. This means that the one-tier system improves bank performance. One possible explanation is that when the board of directors and the supervisory board combine into one, separate decision-making is not required, and hence, boards may not suffer from coordination issues (Battaglia et al., 2014). Therefore, hypothesis H6.b is confirmed. Additionally, the effect of tier-system is negatively related with bank risk-taking when measured by Z-Score. Thus, the one-tier-system is beneficial for risk reduction as the flexible attitude in the decision-making process towards events could be crucial in preventing excessive risk-taking (Battaglia et al., 2014). Consequently, we accept hypothesis H6.c.

In addition, from Table 1.6 we observe that the compensation of directors has a positive but not significant impact on all performance measures. Nevertheless, we find that there is a positive and

significant relationship between Tobin'sQ and wealth at the 5% level, rendering support to hypothesis H7.a. Our results are in line with those of Cuñat and Guadalupe (2009) who show that there is a positive relationship between CEO compensation levels and bank performance measured by shareholder values. One possible explanation is that an increase in equity-based compensation (wealth) is related with the volatility of performance; better rates of performance lead to increase in wealth.

Also, the impact of compensation, which is measured by cash and bonus, on bank risk-taking is positive and significant at the 10% level only for Z-Score measure. Our results indicate that higher compensation contributes to financial stability. However, the insignificant relationship between the wealth and risk measures is consistent with Fahlenbrach and Stulz (2011).

As it concerns the control variables, the bank size appears to be negatively and statistically significant at the 1% and 5% level regardless of how performance is measured. One possible explanation is that the increase of portfolio diversification leads to lower risks and therefore lower return for banks. Our findings support previous research conducted by Staikouras et al. (2007), Belhaj and Mateus (2016), Košak and Čok, (2008), among others. Moreover, the impact of bank size on risk-taking is negative and significant at the 1% level for non-performing loans (NPL) but positive at the 1% level for Tier1-capital ratio. Larger banks have a greater capacity to absorb risk and some institutions are considered to be too important, supporting the "too-big-to-fail" concept (Berger et al., 2012).

The effect of capital ratio is positive and statistically significant in all performance measures except for Tobin'sQ ratio. This positive relationship indicates that banks with high capitalization perform better over a period of time, as it is shown in previous studies (Fernandes et al., 2017, Pathan and Faff, 2013, Das and Ghosh, 2006). As a result, banks with better performance indicators had less leverage before the crisis. One possible explanation for this result is that a bank with more capitals can absorb adverse disturbances and is therefore more protected during a recession period (Lotto, 2018, Thakor, 1996).

However, the results regarding the coefficient of capital ratio on risk-taking are mixed. Banks that are active in lending business have more risky investments. As mentioned by Berger et al. (2012) risky banks also hold on average more off-balance-sheet items. This indicates that these items are not used to offset risks on the balance sheet, but rather as an additional instrument to engage in risky investments.

We also include the ratio of non-performing loans (NPL) accounting for the quality of credit portfolio, as a determinant of bank performance. We find non-performing loans (NPL) to have a significant and negative effect on bank performance which is line with Heffernan and Fu (2008), Fernandes et al (2017) and Pathan et al. (2008). A high non-performing loan ratio reduces the liquidity of banks which are therefore unable to provide new loans to customers.

Finally, we consider the ratio of loans to assets (Leverage) as a proxy for for leverage. Our results show a negative relationship between leverage ratio and performance at the 1% significance level. However, our findings indicate that the effect of leverage ratio on risk-taking is mixed; positive for Z-Score and non-performing loans (NPL) but negative for Tier1-capital ratio.

Table 1.6: Empirical results for bank performance based on Fixed-Effects

Variables	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**
BS	0.0164	**0.707*** **	**0.590*** **	0.0624
	(0.211)	(0.001)	(0.000)	(0.877)
AGE	-0.00656	-0.00328	0.262	0.00524
	(0.265)	(0.171)	(0.203)	(0.490)
EXPER	0.00655	0.0194	0.301	**0.0311*** **
	(0.529)	(0.268)	(0.319)	(0.001)
INDEP	0.00171	0.00428	**0.0872***	0.00507
	(0.217)	(0.385)	(0.10)	(0.110)
FEMALE	**0.00504** **	**0.0126** **	**0.157** **	0.00330
	(0.02)	(0.02)	(0.05)	(0.178)
TIER-SYSTEM	-0.00278	-0.207	-0.101	**-0.186***
	(0.764)	(0.287)	(0.302)	(0.0822)
COMPENSATION	0.00059	0.00085	0.00024	0.00012
	(0.116)	(0.212)	(0.243)	(0.287)
WEALTH	**0.00048** **	0.00067	0.00046	0.00084
	(0.02)	(0.125)	(0.161)	(0.345)
LNTA	**-0.0856*** **	**-0.762*** **	**-0.638** **	**-0.385*** **
	(0.000)	(0.001)	(0.05)	(0.0601)
CAPITAL	0.00267	**0.0343** **	**0.283***	**0.0231*** **
	(0.234)	(0.03)	(0.10)	(0.00475)

NPL	**-0.00761***	-0.0598	**-0.265****	**-0.0190*****
	(0.10)	(0.241)	(0.04)	(0.00265)
LEVERAGE	-0.4052	**-0.6371*****	0.130	**-0.0115*****
	(0.345)	(0.000)	(0.109)	(0.00264)
Constant	**1.632*****	**1.18*****	**2.69*****	**4.503*****
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	649	650	649	650
Adjusted R^2	0.340	0.344	0.163	0.233
N. of Banks	75	75	75	75

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank performance (PERFOR) which measured by Tobin'sQ, ROAA, ROAE and NIM. Definitions of all variables are provided in Table 1.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 1.7: Empirical results for bank risk based on Fixed Effects

Variables	**Z-Score**	**NPL**	**Tier1-Capital**
BS	0.0268	-0.0936	0.0170
	(0.352)	(0.292)	(0.447)
AGE	-0.00208	0.0343	-0.0221
	(0.937)	(0.671)	(0.275)
EXPER	0.0678	**-0.273****	**0.105*****
	(0.108)	(0.042)	(0.001)
INDEP	0.00852	0.0278	0.00125
	(0.887)	(0.130)	(0.788)
FEMALE	**0.0175***	**0.109*****	**0.0281*****
	(0.069)	(0.000)	(0.000)
TIER-SYSTEM	**-1.036***	1.758	-0.280
	(0.052)	(0.272)	(0.494)
COMPENSATION	**0.00113***	-0.00180	-0.002305
	(0.073)	(0.421)	(0.633)
WEALTH	0.001827	-0.002025	0.001256
	(0.946)	(0.617)	(0.547)
LNTA	-0.374	**-2.977*****	**1.486*****
	(0.199)	(0.002)	(0.000)

CAPITAL	**1.013*** **	**0.503*** **	**0.821*** **
	(0.000)	(0.000)	(0.000)
LEVERAGE	**2.012*** **	**6.079*** **	**-2.014*** **
	(0.000)	(0.000)	(0.000)
Constant	**5.88*** **	**-7.031*** **	**-3.137*** **
	(0.000)	(0.000)	(0.000)
Observations	646	581	633
N. of Banks	75	67	74
Adjusted R^2	0.320	0.185	0.343

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank risk (RISK) which measured by Z-Score, NPL and Tier1-Capital. Definitions of all variables are provided in Table 1.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

1.4.5 Empirical results based on the two-step system GMM method

We report the system estimator regression results in Tables 1.8 and 1.9. In contradiction with our previous results board size (BS) is negatively related to Tobin'sQ ratio but positively related to return on average equity (ROAE) as indicated by Fixed-Effects method. As in Beltratti and Stulz, (2012) and Pathan and Faff, (2013), we note that the board of directors becomes less effective when the number of members increases. Thus, hypothesis H1.a is rejected. Also, the coefficient of board size (BS) is negatively related with Z-Score and Tier1-capital ratio. As the board size increases the board has more chance of including more risk lovers members.

Similarly, in contrast with our results based on the Fixed-Effects method, the relationship between board age and performance is now significant at the 1% level for almost all bank performance measures except for return on average equity (ROAE), rendering support to hypotheses H2.a and H2.b. The impact of board age on risk-taking is positive at the 10% level for non-performing loans (NPL). One possible explanation is that older members lack the required energy and motivation to monitor, thereby increasing agency problems (Laeven, 2013).

The effect of financial experience on bank performance is positive and significant at the 10% level as before but only for the return on average equity (ROAE) and not for the net interest margin (NIM), confirming hypothesis H3.a (Table 8). Furthermore, in contradiction with the results of the Fixed-Effects model, the experience of directors has a positive impact on credit risk-taking. One possible

explanation is that managers often operate in the interest of shareholders and hence led to risky decisions. Our findings are in line with Minton et al. (2011).

Concerning the effect of independent directors on bank performance the results are not the same as before. Based on the two-step system GMM method (Table 1.9), we find no significant relationship between the percentage of independent directors and bank performance. Our findings are in line with Belhaj and Mateus, (2016) and Andres and Vallelado, (2008). Moreover, the effect of independent directors (INDEP) on risk-taking is positive and statistically significant for the Z-Score ratio and non-performing loans (NPL), rendering support to hypotheses H4.c and H4.d.

The effect of female directors on bank performance is positive and significant at the 5% level as before but only for return on average assets (ROAA) and return for average equity (ROAE). In contradiction with our previous results, the effect of female directors on bank risk-taking is negative and significant at the 5% level for Z-Score ratio. The relative amount of female board members has a positive effect on bank's insolvency risk.

Similarly, as before the corporate governance system is negatively related to bank performance at the 1% level for both the return on average assets (ROAA) and the return on average equity (ROAE), providing support for hypothesis H6.b. In contradiction to our previous findings, the results regarding the coefficient of corporate governance on risk-taking are mixed. More precisely, the governance system (TIER-SYSTEM) is positively related to bank risk at the 1% level for Z-Score ratio and at the 10% level for non-performing loans (NPL) but negatively related with Tier1-capital ratio. As a consequence, the two-tier governance system increases credit risk. One possible explanation for this result is that in this type of governance system not all the board members have direct access to the same information and, therefore, they make poor decisions which may be dangerous for the soundness of the bank. Thus, we accept hypothesis H6.c.

Concerning the relationship between bank performance and compensation the results are not the same as on the Fixed-Effects model (Table 1.6). More precisely, the compensation of directors is positive and significant at the 5% level for return on average assets (ROAA), rendering support to hypothesis H7.a. One possible explanation for this result is that the increase in compensation depends on the relative performance measure (Barro and Barro's, 1990). Similarly, the results regarding the impact of the wealth variable are different in the two-step system GMM model. According to the Table 8 we find a positive and significant relationship between wealth and bank performance, measured by return on average equity (ROAE) at the 5% level. Thus, we reject

hypothesis H7.b. One possible explanation for our findings is that CEO's compensation is sensitive to stock market performance and, hence, directors are more willing to invest in positive Net Present Value projects (Curi and Murgia, 2018).

In contradiction to our previous results the effect of compensation is negative at the 5% level for non-performing loans (NPL) and Tier1-capital ratio. The findings support DeYoung et al. (2013) who provide mixed evidence for banks. Similar are the findings for the wealth variable. Concerning the effect of wealth the results are not the same as before. Based on the two-step system GMM model in Table 1.9, we show that there is a positive and statistically significant relationship between the wealth of directors and non-performing loans at the 10% level which means that a high level of equity-based compensation leads to more credit risk. Our results are in line with those of Vallascas and Hagendorff (2013) who claim that increasing the equity-based compensation is consistent with the view that options holdings are designed to engage CEOs in riskier types of financial activities. Bank shareholders benefit from high-risk strategies which increase the volatility of bank assets and thus, they may use their control over CEO pay to encourage risk-taking (Vallascas and Hagendorff, 2013; Jensen and Meckling, 1976). Hence, we accept hypothesis H7.c.

Contrary to our previous results the effect of bank size (LNTA) on performance is now positive and significant at the 1% and 5% level only for return on average assets (ROAA) and return on average equity (ROAE) respectively. Larger banks are expected to use better technology, be more diversified and better managed. Larger banks may also enjoy economies of scale. The effect of size (LNTA) on bank risk-taking is positive and significant at the 1% level for Z-Score and Tier1-capital ratio in line with the too-big-to-fail concept mentioned previously.

Our results in Table 1.8 show a positive relationship between tighter capital regulation (Capital) and bank performance for almost all performance measures except for net interest margin (NIM). In contradiction to our previous findings, the effect of capital ratio is negative at the 5% level for non-performing loans (NPL).Well-capitalized banks have the required liquidity in order to manage credit risk. According to the leverage ratio the sign of the relationship remains constant and positive for non-performing loans (NPL) but negative for Tier1-capital ratio. More, precisely, banks with higher leverage tend to decrease the Tier1-capital ratio and to increase credit risk (Table 1.9). One possible explanation for this result is that an increase in the non-performing loans (NPL) means that the bank does not have the necessary capitals to cover its liabilities and, hence, it is led to external sources which are linked to more leverage.

Table 1.8: Empirical results for bank performance based on Two-step system GMM method

Variables	Tobin'sQ	ROAA	ROAE	NIM
Tobin'sQ (t-1)	**0.624*** **			
	(0.000)			
ROAA (t-1)		**0.286*** **		
		(0.000)		
ROAE (t-1)			**0.0137*** **	
			(0.000)	
NIM (t-1)				**0.894*** **
				(0.000)
BS	**-0.0143*** **	0.0626	**1.34*** **	-0.0437
	(0.001)	(0.241)	(0.001)	(0.130)
AGE	**-0.00792*** **	**-0.0253*** **	0.00463	**0.00892*** **
	(0.001)	(0.000)	(0.154)	(0.001)
EXPER	0.00352	0.0140	**0.517***	0.00213
	(0.581)	(0.112)	(0.10)	(0.321)
INDEP	-0.00290	-0.00157	0.00686	-0.00250
	(0.142)	(0.138)	(0.133)	(0.122)
FEMALE	0.031905	**0.00378** **	**0.153** **	0.00221
	(0.674)	(0.04)	(0.02)	(0.149)
TIER-SYSTEM	0.00551	**-0.302*** **	**-1.53*** **	-0.0865
	(0.500)	(0.001)	(0.000)	(0.849)
COMPENSATION	**0.00048** **	0.000087	0.00021	0.00032
	(0.02)	(0.418)	(0.500)	(0.216)
WEALTH	0.000016	**0.00024** **	0.00551	0.00015
	(0.432)	(0.03)	(0.500)	(0.387)
CAPITAL	**0.00386** **	**0.0200*** **	**1.458*** **	0.00277
	(0.02)	(0.000)	(0.00)	(0.200)
LNTA	0.00254	**0.0927*** **	**2.485** **	-0.00639
	(0.174)	(0.01)	(0.05)	(0.337)
NPL	**-0.375*** **	-0.358	-0.541	0.809
	(0.000)	(0.125)	(0.135)	(0.154)
LEVERAGE	**-0.478*** **	**-2.32*** **	**-1.31*** **	**-0.900** **
	(0.01)	(0.01)	(0.000)	(0.05)

Constant	**0.541*** **	**3.26*** **	**6.14*** **	**0.809*** **
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	484	581	579	581
AR(1)	-1.28[0.01]**	-2.03[0.00]*	-1.16[0.05]**	-2.04[0.04]**
AR(2)	0.34[0.64]	-0.20[0.83]	0.45[0.65]	0.58[0.56]
Hansen J-stat	145.2 [0.87]	156.4 [0.70]	184.7 [0.78]	185.9 [0.82]
N. of instruments	214	275	249	235
N. of Banks	75	75	75	75

Note: This table reports regression results obtained via the Two-step system GMM method. The dependent variable is bank performance (PERFOR) which measured by Tobin'sQ, ROAA, ROAE and NIM. Definitions of all variables are provided in Table 1.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 1.9: Empirical results for bank risk based on Two-step system GMM

riables	**Z-Score**	**NPL**	**Tier1-Capital**
L.Z-Score	**0.724*** **		
	(0.000)		
L.NPL		**1.115*** **	
		(0.000)	
L.Tier1-Capital			**0.305*** **
			(0.000)
BS	**-0.0555*** **	**-0.0284***	**-0.0267*** **
	(0.008)	(0.076)	(0.001)
AGE	-0.0171	**0.0460***	0.00222
	(0.587)	(0.060)	(0.857)
EXPER	**0.106** **	**0.0889*** **	0.00875
	(0.016)	(0.006)	(0.599)
INDEP	**0.0260*** **	**0.0134*** **	-0.00223
	(0.000)	(0.001)	(0.252)
FEMALE	**-0.0259** **	-0.0151	0.00747
	(0.032)	(0.106)	(0.112)
TIER-SYSTEM	**1.909*** **	**0.605***	**-0.686*** **
	(0.000)	(0.055)	(0.000)

COMPENSATION	-0.008250	**-0.00858****	**-0.00151****
	(0.230)	(0.058)	(0.062)
WEALTH	-0.003296	**0.00828***	**-0.00133****
	(0.409)	(0.082)	(0.058)
LNTA	**0.585*****	-0.0638	**0.129*****
	(0.000)	(0.471)	(0.000)
CAPITAL	**0.493*****	**-0.0633****	**0.700*****
	(0.000)	(0.030)	(0.000)
LEVERAGE	**-5.116****	**4.178****	**-4.040****
	(0.024)	(0.031)	(0.014)
Constant	**-2.250*****	**-6.969****	**0.706*****
	(0.000)	(0.014)	(0.000)
Observations	571	517	561
AR(1)	-7.76[0.000]***	-6.34[0.000]***	-7.40[0.000]***
AR(2)	1.04[0.297]	-2.32[0.200]	1.39[0.265]
Hansen J-stat	158.2 [0.75]	189.4 [0.68]	198.7 [0.80]
N. of instruments	294	226	258
N. of banks	74	66	73

Note: This table reports regression results obtained via the Two-step system GMM method. The dependent variable is bank risk (RISK) which measured by Z-Score, NPL and Tier1-Capital. Definitions of all variables are provided in Table 1.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

1.4.6 Empirical results for the period before, during (2004-2009) and after (2010-2016) the Global Financial Crisis (GFC)

In this section, we divide the sample into two periods, the first concerning the period before and during the Global Financial crisis (2004-2009) and the second concerning the period after the crisis (2010-2016). Tables 1.10 and 1.11 below show the results based on the Fixed-Effects method (models 1a, 1b).

The sign of the effect of board size (BS) on bank performance changes from negative to positive for the period after the global financial crisis (GFC) which means that the presence of several directors in the board has a positive effect on the advisory functions, the monitoring and the increase of returns. Our findings are consistent with Peni and Vahama (2012) and Beltratti and Stulz (2012)

providing support for hypothesis H8.a. The sign of the effect of board size (BS) on risk-taking remains constant and negative for the period before and after the global financial crisis (GFC) which means that the presence of more directors in the board has a negative effect on the advisory functions, and risk taking (Table 1.11). A possible explanation is that larger boards are slower in taking and implementing better decisions especially during a difficult period, like that of a financial crisis. These findings support Beltratti and Stulz (2012), Peni and Vahama (2012), Hoque and Muradoglu (2013). Hypothesis H8.b is rejected.

In Table 1.10 we find, that the effect of age (AGE) on performance is negative and significant at different levels regardless of the effect of the global financial crisis (GFC). Older people are expected to have more experience and therefore be able to manage better difficult situations. Moreover, the impact of age (AGE) on risk-taking is negative for Z-Score ratio but positive for non-performing loans (NPL) and significant at different levels for the period before and during the financial crisis meaning that older directors increase bank risk-taking. Our findings are consistent with Grove et al. (2011) and hence, we reject hypothesis H8.b.

In addition, the sign of the financial experience (EXPER) variable on bank performance remains constant and positive before, during and after the global financial crisis (GFC). One possible explanation is that a better understanding of banking activities by the directors contributes, on the one hand, to providing valuable advice and, on the other hand, to better management supervision. These findings corroborate the studies conducted by Hau and Thum (2009) and Fernandes et al. (2017). Thus, hypothesis H8.a is not accepted. Furthermore, the effect of financial experience (EXPER) is positive and significant at the 1% level before, during and after the crisis for Z-Score ratio (Table 11). This means that more experienced directors contribute to the financial stability. Our results are in line with those of Beltratti and Stulz (2012) who claimed that banks with less financially experienced directors had larger stock losses during the crisis.

However, in Table 1.11 we show that the financial experience of directors has significant and negative impact at 1% level on the non-performing loans only for the period after the crisis.Therefore, we reject hypothesis H8.b. One possible explanation for this result is that after the global financial crisis banks tend to have more experienced directors on their boards who may have the ability to recognize risks which are associated with lower losses and less credit risk (Harris and Raviv, 2008).

The impact of independent directors (INDEP) on bank performance is inconclusive depending on the measure of performance regardless of the time period. Similar are the results regarding the relationship between the percentage of independent directors and risk-taking.

Gender diversity (FEMALE) has positive and significant impact on bank performance at different levels, when measured by return on average assets (ROAA), return on average equity (ROAE) and net interest margin (NIM) only for the period after the financial crisis. Thus, we reject hypothesis H8.a. However, the effect of female directors (FEMALE) on risk-taking is negative and significant at the 5% level for non-performing loans (NPL) but positive and significant at the 5% level for Tier1-capital ratio only for the period after the crisis (Table 1.11). One possible explanation is that women are more risk-averse in the financial decision making process (Barber and Odean, 2001). Thus, we reject hypothesis H8.b.

We find the same picture for the governance system (TIER-SYSTEM) variable. The tier-system is negatively related to bank performance after the financial crisis and has no significant impact before and during the financial crisis (Table 1.10). The one-tier system seems to increase bank performance providing further support for hypothesis H8.a. Moreover, the impact of the governance system (TIER-SYSTEM) on risk-taking is negative for Z-Score ratio regardless of the time period. This means that banks which use the two-tier system make less risky decisions than those which use the one tier system and as a consequence, we reject hypothesis H8.b.

The sign of the compensation on bank performance is positive and significant at different levels regardless of the effect of the global financial crisis (GFC) and, hence we reject hypothesis H8.a. However, the wealth variable has no significant impact on bank performance during the whole period. Similarly, Fahlenbrach and Stulz (2011) did not find any relationship between equity-based compensation and bank performance, measured by stock returns.

Moreover, the compensation of directors has a positive and significant effect at the 10% level after the financial crisis for the Z-Score variable but a negative and significant impact at the 1% level on Tier1-capital ratio, before and during the global financial crisis. In addition, the effect of wealth on risk-taking is positive and significant at the 5% level for Z-Score ratio, before and during the financial crisis and has no significant impact after the financial crisis. Our results are in line with the view of regulators and supervisors who believe that executive compensation is one of the main reasons of the crisis (BCBS, 2010). Therefore, we accept hypothesis H8.b.

The effect of bank size (LNTA) on bank performance is positive and significant at the 10% level only for Tobin's Q ratio for the period before and during the financial crisis (Table 1.10). One possible explanation is that larger banks have better profitability because they are able to absorb losses. Our results are in line with Belhaj and Mateus (2016). Although, the findings are mixed (positive and negative) after the crisis but the impact of size is significant for most of the proxies of bank performance. The sign of the effect of bank size (LNTA) on risk-taking remains constant and positive for the whole period.

Our results show a positive relationship between tighter capital regulation (Capital) and bank performance regardless of the period considered. This means that banks with more equity can meet their funding needs and increase their efficiency. These findings support Fernandes et al. (2017). However, the effect is significant for most of the proxies of bank performance for the period after the financial crisis. Similar, are the results for the relationship between tighter capital regulation and risk-taking.

According to the non-performing loans (NPL) and leverage variables the sign of the relationship remains constant regardless of the period. More precisely, as before the impact of non-performing loans (NPL) is significant for most of the more proxies of bank performance after the crisis. Finally, the effect of leverage on risk-taking is negative and statistically significant only for the Z-Score ratio for the whole period.

Table 1.10: Empirical results for bank performance before, during and after the global financial crisis

	2004-2009				2010-2016			
Variables	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**
BS	-0.0152	**-0.266***	-1.769	**-0.348***	0.0458	0.130	**1.691***	**0.297*****
	(0.159)	(0.10)	(0.124)	(0.10)	(0.889)	(0.241)	(0.10)	(0.000)
AGE	**-0.0391*****	**-0.0219***	**-0.423***	0.0140	**-0.00178*****	**-0.0226***	-0.0262	0.00793
	(0.001)	(0.10)	(0.10)	(0.175)	(0.000)	(0.10)	(0.195)	(0.116)
EXPER	0.00249	**0.0298***	**1.060*****	0.0303	0.00186	**0.0437****	**0.998*****	**0.0502*****
	(0.187)	(0.01)	(0.000)	(0.245)	(0.104)	(0.05)	(0.000)	(0.000)
INDEP	**-0.0560*****	-0.00763	**0.0644***	**-0.0490****	**0.00187***	0.00542	0.0786	**0.0273***
	(0.000)	(0.166)	(0.10)	(0.05)	(0.10)	(0.278)	(0.124)	(0.10)
FEMALE	-0.00261	0.00838	0.0648	-0.00532	0.00119	**0.0110***	**0.279*****	**0.0177****
	(0.441)	(0.407)	(0.854)	(0.607)	(0.277)	(0.10)	(0.000)	(0.05)
TIER-SYSTEM	0.0129	-0.0753	-0.064	0.325	-0.00918	**-0.366***	**-2.309****	-0.0482
	(0.240)	(0.140)	(0.740)	(0.209)	(0.835)	(0.10)	(0.05)	(0.187)
COMPENSATION	**0.000786*****	**0.00032*****	0.00018	0.00020	0.00034	**0.00025***	0.00015	0.00023
	(0.001)	(0.002)	(0.429)	(0.165)	(0.280)	(0.10)	(0.240)	(0.287)
WEALTH	0.00017	0.00013	0.00036	0.00019	0.00016	0.00010	0.00029	0.00018
	(0.519)	(0.321)	(0.235)	(0.200)	(0.541)	(0.431)	(0.345)	(0.412)
LNTA	**0.00729***	0.0322	0.0868	-0.0644	0.00407	**0.189*****	**1.468****	**-0.116****
	(0.10)	(0.343)	(0.720)	(0.512)	(0.283)	(0.000)	(0.05)	(0.05)
CAPITAL	-0.00126	0.0215	0.280	**0.0806*****	**0.00269*****	**0.0559*****	**0.490****	-0.00682
	(0.278)	(0.167)	(0.350)	(0.000)	(0.001)	(0.001)	(0.05)	(0.449)

NPL	-0.00198	-0.0216	-0.322	**-0.0589*** **	**-0.0021*** **	**-0.0469*** **	-0.0921	**-0.0308*** **
	(0.193)	(0.139)	(0.292)	(0.001)	(0.01)	(0.000)	(0.105)	(0.001)
LEVERAGE	**-1.553*** **	**-1.19*** **	**-2.71*** **	**-1.58*** **	**-0.751*** **	**-2.74*** **	**-3.51*** **	**-2.797*** **
	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Constant	**1.684*** **	**1.19*** **	**7.01*** **	**3.70*** **	**0.834*** **	**2.98*** **	**6.32*** **	**3.696*** **
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	177	226	226	226	339	390	389	390
Adjusted R^2	0.339	0.473	0.164	0.530	0.460	0.404	0.218	0.458
N. of banks	75	75	75	75	75	75	75	75

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank performance (PERFOR) which measured by Tobin'sQ, ROAA, ROAE and NIM. Definitions of all variables are provided in Table 1.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 1.11: Empirical results for bank risk before, during and after the global financial crisis

	2004-2009			**2010-2016**		
Variables	**Z-Score**	**NPL**	**Tier1-Capital**	**Z-Score**	**NPL**	**Tier1-Capital**
BS	**-0.267*** **	**0.0715***	**-0.0440** **	**-0.252*** **	**0.182** **	**-0.0910*** **
	(0.000)	(0.099)	(0.012)	(0.000)	(0.012)	(0.000)
AGE	**-0.176** **	**0.264*** **	0.0218	**-0.184** **	**0.231** **	-0.0185
	(0.038)	(0.000)	(0.464)	(0.014)	(0.024)	(0.471)
EXPER	**0.335*** **	-0.0839	-0.0163	**0.467*** **	**-0.427*** **	0.00437
	(0.005)	(0.364)	(0.678)	(0.000)	(0.001)	(0.897)
INDEP	**0.0590*** **	-0.00964	**-0.00928** **	**0.0810*** **	**0.0517*** **	**-0.00900** **
	(0.000)	(0.299)	(0.017)	(0.000)	(0.004)	(0.034)

FEMALE	0.0326	0.0131	0.00698	-0.00313	**-0.101****	**0.0265****
	(0.288)	(0.558)	(0.513)	(0.919)	(0.018)	(0.015)
TIER-SYSTEM	**-2.993*****	0.350	-0.545	**-3.533*****	**2.428*****	-0.351
	(0.006)	(0.648)	(0.000)	(0.001)	(0.001)	(0.409)
COMPENSATION	0.00118	-0.00148	**-0.00283*****	**0.00329***	-0.000478	-0.05515
	(0.589)	(0.273)	(0.000)	(0.071)	(0.328)	(0.330)
WEALTH	**0.07815****	-0.001745	-0.001518	-0.006506	-0.03805	-0.02458
	(0.013)	(0.429)	(0.113)	(0.461)	(0.862)	(0.388)
LNTA	**0.665*****	0.132	0.0967	**1.042*****	-0.377	-0.0700
	(0.006)	(0.598)	(0.188)	(0.000)	(0.326)	(0.164)
CAPITAL	**0.746*****	**0.280*****	**0.952*****	**0.889*****	-0.164	**0.911*****
	(0.000)	(0.000)	(0.000)	(0.000)	(0.197)	(0.000)
LEVERAGE	**-3.66*****	-5.381	-4.362	**-2.491****	-2.186	-3.806
	(0.004)	(0.386)	(0.267)	(0.018)	(0.167)	(0.299)
Constant	**5.29*****	-6.183	0.761	**7.145***	**2.115***	**6.741***
	(0.001)	(0.365)	(0.487)	(0.091)	(0.085)	(0.062)
Observations	322	287	382	324	294	251
Adjusted R^2	0.314	0.186	0.364	0.310	0.204	0.308
N. of banks	65	62	65	68	61	65

1.4.7 Exploring the Global Financial Crisis effect

In this section, we examine how the global financial crisis (GFC) affects the association between bank governance, bank performance and risk-taking. To address this issue, we add interaction terms to our regression models. The models, described by equations 3a and 3b below, are estimated using the Fixed-Effects method.

Bank performance model

$$\textbf{(PERFOR) i, t} = \beta_0 + \beta_1 CRISIS*BS\ i,\ t + \beta_2 CRISIS*AGE\ i,\ t + \beta_3 CRISIS*EXPER\ i,\ t + \beta_4 CRISIS*INDEP\ i,\ t + \beta_5 CRISIS*FEMALE\ i,\ t + \beta_6 CRISIS*TIER\text{-}SYSTEM\ i,\ t + \beta_{7a} CRISIS*COMPENSATION\ i,\ t + \beta_{7b} CRISIS*WEALTH\ i,\ t + \beta_8 LNTA\ i,\ t + \beta_9 CAPITAL\ i,\ t + \beta_{10} NPLi,\ t + \beta_{11} LEVERAGEi,\ t + ui + \varepsilon\ i,\ t \quad (3a)$$

Bank risk model

$$\textbf{(RISK) i, t} = \beta_0 + \beta_1 CRISIS*BS\ i,\ t + \beta_2 CRISIS*AGE\ i,\ t + \beta_3 CRISIS*EXPER\ i,\ t + \beta_4 CRISIS*INDEP\ i,\ t + \beta_5 CRISIS*FEMALE\ i,\ t + \beta_6 CRISIS*TIER\text{-}SYSTEM\ i,\ t + \beta_{7a} CRISIS*COMPENSATION\ i,\ t + \beta_{7b} CRISIS*WEALTH\ i,\ t + \beta_8 LNTA\ i,\ t + \beta_9 CAPITAL\ i,\ t + \beta_{10} LEVERAGEi,\ t + ui + \varepsilon\ i,\ t \quad (3b)$$

Where ***PERFOR*** and ***RISK*** denote performance and risk-taking respectively for bank **i**, t the time period, **ln** the natural logarithmic, **β** the parameters to be estimated, **u** the unobserved fixed-effect for bank i and **ε** the remaining disturbance term. We consider the dummy variable CRISIS which takes the value one for the period 2004 to 2009 and the value zero for the period 2010 to 2016.

According to the results of Tables 1.12 and 1.13, the negative coefficient of the CRISIS*Bank governance variable means that the effect of the specific bank governance variable such as board size, age diversity, independent directors, financial experience, governance system, gender diversity or compensation is more pronounced for the period after the financial crisis (Wooldridge, 2012).

The effect of the board size variable is negative and significant on the return on average assets (ROAA) at the 5% level means that a small board of directors leads to better bank performance (Table 1.12). Our results are consistent with those of Staikouras et al. (2007) and Beltratti and Stulz (2012), providing support for hypothesis H1.b. One possible explanation is that boards with less members tend to be more effective and flexible in the decision making process for the period before and during the financial crisis. Our findings are the same as those extracted from Table 1.10, as we

find that the effect of board size on the return on average assets (ROAA) was negative from 2004 to 2009.

In addition, the negative impact of the board size variable on non-performing loans (NPL) means that a large board of directors leads to less credit risk (Table 1.13). Board diversity, such as financial experience, different background and knowledge may lead to better decisions and to financial stability (Wang and Hsu, 2013). Thus, we accept hypothesis H1.d. Also, the positive impact of the CRISIS*BS variable on non-performing loans (NPL) shows that the effect of board size on credit risk is more significant before and during the financial crisis period, rendering support to hypothesis H8.b.

Moreover, in Table 1.11, the relationship between the age of directors and bank performance is negative and significant at the 5% level for the Tobin'sQ ratio and return on average assets (ROAA). Our findings are in line with Berger et al. (2016), providing support for hypothesis H2.b. Also, the CRISIS*AGE variable is positive at the 10% level for Tobin'sQ ratio and return on average equity (ROAE), meaning that before and during the financial crisis the linkage is more important. Our results are similar with those in Table 1.10 as we find that the impact of the age diversity on bank performance is negative and significant for Tobin'sQ and return on average assets (ROAA).

The results regarding the coefficient of the age of directors on risk-taking is negative and significant for non-performing loans at the 5% level. This means that the older members contribute to the financial stability and, hence, we accept hypothesis H2.b. Older members may have more experience than younger ones and thus, are more able to recognize risky decisions and projects (Felicio et al., 2018).

However the effect of CRISIS*AGE variable on risk-taking is positive (Table 1.13). More precisely, the estimated coefficient of the variable CRISIS*AGE is positive at the 5% level for non-performing loans (NPL) ratio and at 1% level for Tier1-capital ratio meaning that the effect of age on bank risk is more important for the period before and during the crisis. Thus, we accept hypothesis H8.b.

Form Table 1.12, the impact of the financial experience variable on bank performance is negative and significant at the 5% level for Tobin'sQ but positive and significant at the 5% for net interest margin (NIM). Hence, we accept both hypotheses H3.a and H3.b. Moreover, the negative effect of the CRISIS*EXPER variable on bank performance and especially on return on average assets (ROAA) and return on average equity (ROAE) is negative at the 5% and 1% level respectively, meaning that the impact is more important for the period after the financial crisis. Our results are in

contrast with those from the Table 1.10 as we show that the relationship between the experience directors and bank performance is positive for the period before, during and after the crisis.

Also, the effect of financial experience on risk-taking is negative for non-performing loans (NPL) at the 1% level but positive for Z-Score at the same level (Table 1.13) rendering support to hypothesis H3.d. One possible explanation for this result is that a more financially experienced board is more likely to avoid unsound risks (Fernandes et al., 2017). Moreover, the impact of the CRISIS*EXPER on risk-taking is negative and significant at the 1% level for non-performing loans (NPL), meaning that the effect is more pronounced after the crisis. Our results are in line with those from Table 1.11 where we show a negative relationship between financial experience and non-performing loans (NPL) from 2010 to 2016.

Furthermore, regarding the percentage of independent directors we find that it has no significant impact on bank performance for any measure (Table 1.12) and, hence, we reject both hypotheses H4.a and H4.b. However, the impact of independent directors on risk-taking is positive and significant at the 5% level for non-performing loans (NPL), providing support for hypothesis H4.c (Table 1.13). One possible explanation is that independent directors do not have access to all information and they may lead to poorer and riskier decisions (Minton et al., 2011).

Also, the coefficient of the CRISIS*INDEP variable is negative in different levels for all measures of risk-taking meaning that the impact is more significant after the financial crisis and therefore, we reject hypothesis H8.b. Moreover, our results are similar with those in Table 1.11, as we find that the impact of independent directors is positive and significant at the 1% level for non-performing loans for the period 2010-2016.

Similarly, the impact of the financial crisis on the number of female directors sitting on board (CRISIS*FEMALE) is more important for the period after the financial crisis as the sign is negative and tends to improve bank performance measured by return on average equity (ROAE) in the same period (Table 1.12) which is line with the recommendations of the European Commission of 2012. Thus, we accept hypothesis H5.a. Female directors may contribute to board effectiveness through their knowledge and skills (García-Meca et al., 2015).

Also, we find that female directors have a greater influence on bank risk before and during the financial crisis as the coefficient of CRISIS*FEMALE is positive and significant at the 1% level for Z-Score and non-performing loans (NPL). Thus we accept hypothesis H8.b. Moreover, Table 1.13 indicates that the effect of female directors is positive and significant at the 10% level for Z-Score but negative and significant at the 5% level for non-performing loans (NPL). This means that female

directors are associated with less risk. One possible explanation is that women are less confident than men and, hence, tend to be more risk averse (Barber and Odean, 2001). Moreover, our results are not similar with those in Table 1.11, as we find that the female directors reduce bank risk-taking for the period after the financial crisis (2010-2016).

In addition, the sign of the CRISIS*TIER-SYSTEM variable is positive and significant at the 1% level for return on average assets (ROAA), meaning that the impact of the governance system is more pronounced before and during the financial crisis (Table 1.12). Also, the negative impact of tier-system on return on average assets (ROAA) and return on average equity (ROAE) at the 5% level indicates that the one-tier system improves bank performance. In the one-tier system the members of the board may take decisions more quickly and in a more effective way (Belkhir, 2009). Thus, we accept hypothesis H6.b.

Moreover, the effect of tier-system is negative and significant at the 1% level for Z-Score but positive and significant at the 10% level for non-performing loans (NPL). As a consequence, the two-tier system increases bank risk-taking (Table 1.13) and thus, we reject hypothesis H6.d. Moreover, we find that the governance system has greater influence on bank risk before, during and after the financial crisis accordingly to the measure we consider. Our results are similar with those in Table 1.11, as we indicate that the two-tier system increases risk-taking for the period 2010-2016.

Furthermore, regarding the compensation of directors we find that it has a positive and significant impact at the 10% level for the Tobin'sQ and hence, we accept hypothesis H7.a. However, the impact of the CRISIS*COMPENSATION on bank performance has no significant impact for any measure (Table 1.12). Similar are the results regarding risk-taking as we show that compensation has no significant impact on risk regardless how it is measured (Table 1.13). Thus, we reject hypothesis H8.b. Also, our findings are not the same with those of Table 1.11 as we find a significant relationship between compensation and risk-taking; compensation increases risk-taking before and during the crisis, measured by Tier1-capital ratio but contributes to the financial stability after the financial crisis as it increases the Z-Score measure.

Finally, concerning the wealth variable we find from Table 1.12 that there is a positive and significant impact at the 5% level for return on average assets (ROAA) which means that the equity-based compensation is linked to the relative performance and, hence, we accept hypothesis H7.a. Moreover, the impact of the CRISIS*WEALTH variable is positive and significant at the 10% level for the return on average assets (ROAA), meaning that the effect is more important for the period before and during the financial crisis. Regarding risk-taking (Table 1.13), the wealth variable has no

significant impact on any risk measure and, consequently, we reject hypothesis H8.b. Our results are in contrast to those of Table 1.11 as we show that wealth increases Z-Score before and during the crisis, contributing to the soundness of financial system.

Table 1.12: Empirical results for bank performance with interactions

Variables	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**
BS	-0.0176	**-0.304****	-3.072	-0.245
	(0.0204)	(0.05)	(0.139)	(0.267)
AGE	**-0.00297****	**-0.0272****	-0.232	0.0118
	(0.05)	(0.04)	(0.246)	(0.163)
EXPER	**-0.00357****	0.0177	0.0407	**0.0358****
	(0.05)	(0.387)	(0.534)	(0.05)
FEMALE	0.00307	0.00406	**0.228***	0.00319
	(0.466)	(0.143)	(0.10)	(0.159)
INDEP	0.00259	0.00231	0.0348	0.00173
	(0.200)	(0.315)	(0.460)	(0.304)
TIER-SYSTEM	-0.00140	**-0.341****	**-3.806****	-0.121
	(0.771)	(0.05)	(0.05)	(0.115)
COMPENSATION	**0.00032***	0.00025	0.00075	0.00064
	(0.10)	(0.315)	(0.362)	(0.178)
WEALTH	0.00019	**0.00020****	0.00087	0.00259
	(0.412)	(0.02)	(0.475)	(0.248)
LNTA	**0.00385****	**0.0742****	0.228	**0.0503****
	(0.05)	(0.02)	(0.370)	(0.02)
CAPITAL	-0.00626	**0.0205****	0.149	**0.0249*****
	(0.629)	(0.05)	(0.112)	(0.000)
LEVERAGE	**-0.932*****	**-2.16*****	**-3.32*****	**-1.826*****
	(0.000)	(0.000)	(0.01)	(0.000)
CRISIS*(BS)	-0.0283	**0.548*****	5.425	-0.0332
	(0.210)	(0.01)	(0.159)	(0.275)
CRISIS*(AGE)	**0.00502***	0.0319	**1.011***	0.0220
	(0.10)	(0.406)	(0.10)	(0.376)
CRISIS*(EXPER)	0.00311	**-0.0458****	**-0.524***	0.00240
	(0.117)	(0.05)	(0.10)	(0.154)
CRISIS*(INDEP)	0.00258	**-0.00598***	-0.0350	0.00373
	(0.484)	(0.10)	(0.502)	(0.332)
CRISIS*(FEMALE)	**-0.00340***	0.00228	-0.122	**-0.0156***
	(0.10)	(0.167)	(0.125)	(0.10)
CRISIS*(TIER-SYSTEM)	0.0208	**0.0511*****	0.342	0.041
	(0.168)	(0.01)	(0.175)	(0.215)
Crisis*(COMPENSATION)	0.00063	0.000017	-0.00021	0.00019
	(0.498)	(0.398)	(0.168)	(0.451)
Crisis*(WEALTH)	0.00089	**0.00089***	0.0014	0.00064
	(0.369)	(0.10)	(0.216)	(0.269)
Constant	**1.273*****	**2.52*****	**6.65*****	**2.57*****

	(0.000)	(0.000)	(0.000)	(0.000)
Observations	595	720	719	720
Adjusted R^2	0.292	0.293	0.277	0.407
N. of Banks	75	75	75	75

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank performance (PERFOR) which measured by Tobin'sQ, ROAA, ROAE and NIM. Definitions of all variables are provided in Table 1.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 1.13: Empirical results for bank risk with interactions

Variables	**Z-SCORE**	**NPL**	**Tier1-Capital**
BS	-0.00801	**-0.164***	**0.0435***
	(0.797)	(0.067)	(0.075)
AGE	-0.0389	**0.112****	-0.00743
	(0.125)	(0.029)	(0.708)
EXPER	**0.151*****	**-0.496*****	**0.106*****
	(0.000)	(0.000)	(0.001)
INDEP	0.00898	**0.0477****	0.00252
	(0.160)	(0.010)	(0.613)
FEMALE	**0.0199***	**-0.0753****	0.0123
	(0.084)	(0.027)	(0.173)
TIER-SYSTEM	**-1.616*****	**3.017***	-0.476
	(0.005)	(0.063)	(0.287)
COMPENSATION	0.008195	-0.00323	-0.001635
	(0.263)	(0.362)	(0.773)
WEALTH	-0.00257	-0.00119	0.001006
	(0.937)	(0.376)	(0.616)
LNTA	**-0.168**	1.229	**0.955*****
	(0.550)	(0.160)	(0.000)
CAPITAL	**1.065*****	**0.169****	**0.775*****
	(0.000)	(0.039)	(0.000)
LEVERAGE	**-3.910*****	**2.164****	**-2.158*****
	(0.000)	(0.02)	(0.000)
Crisis*(BS)	**0.0472****	**0.271*****	-0.00332
	(0.042)	(0.000)	(0.855)
Crisis*(AGE)	-0.0505	**0.282****	**0.124*****

	(0.295)	(0.047)	(0.001)
Crisis*(EXPER)	-0.00111	**-0.150*** **	0.00162
	(0.934)	(0.000)	(0.877)
Crisis*(INDEP)	**-0.0108** **	**-0.0471*** **	**-0.00774***
	(0.039)	(0.003)	(0.058)
Crisis*(FEMALE)	**0.0545*** **	**0.194*** **	-0.0116
	(0.000)	(0.000)	(0.242)
Crisis*(TIER-SYSTEM)	**1.603*** **	**-3.466*** **	0.294
	(0.001)	(0.009)	(0.415)
Crisis*(COMPENSATION)	0.00393	0.00569	0.00795
	(0.626)	(0.129)	(0.205)
Crisis*(WEALTH)	0.003361	0.009865	**-0.00184***
	(0.797)	(0.468)	(0.067)
Constant	**5.218*** **	**4.149** **	**2.57*** **
	(0.000)	(0.038)	(0.001)
Observations	646	581	633
Adjusted R^2	0.385	0.309	0.314
N. of Banks	75	67	74

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank risk (RISK) which measured by Z-Score, NPL and Tier1-Capital. Definitions of all variables are provided in Table 1.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

1.4.8 Empirical results by groups of countries

In order to examine for any region specific bank governance differences on the effect on bank performance and risk-taking, we divide our sample in three groups of countries based on their geographic location. Group A consists of countries of Southern Europe such as Greece, Spain, Italy and Portugal. Group B consists of countries of Northern Europe such as Ireland, UK, Sweden, Finland and Denmark. Group C consists of countries of Central Europe such as Germany, France, Luxembourg, Belgium, Netherlands, Austria, Hungary, Poland and Czech Republic.

According to the Committee (BCBS, 2006), principles for corporate governance of banks are aimed at securing the stability of the banking sector across Europe. However, each country is governed by its own legal framework and its own corporate governance code. Banks are therefore given the option of adapting corporate governance principles, taking into account the legal framework and the

specificities of the country in which they operate (BCBS, 2015). Separation between countries therefore allows us to check for any differences in the implementation of corporate governance.

Based on the results of Table 1.14, the effect of board size (BS) is negatively related to bank performance for countries in Group A and positively related for countries in Group B and Group C regardless of how it is measured in different significance levels. Smaller boards of directors perform better than larger ones during the financial crisis in developing countries as they are more quick in the decision-making process (Hogue and Muradoglu, 2010; Belhaj and Mateus, 2016). One possible explanation is that countries of Group A face both a financial crisis and a debt crisis.

More precisely, these economies did not have the equivalent of their financial assets in the real economy and, hence, their current and financial account balances were already negative before the emergence of the crisis (Trabelsi, 2011). Therefore, the difficult budget situations of Group A countries with weaker economic and fiscal fundamentals in combination with high public debts explain why they were exceptionally strongly affected by the global financial crisis (Trabelsi, 2011).

The effect of age is not significant for Group C and the results are mixed for Group B relatively to the measure of performance. For Group A the effect of age is positive and significant at the 1% level only for the net interest margin (NIM) variable (Table 1.14). One possible explanation is that young people in southern Europe countries (Group A) do not have the appropriate opportunities to obtain financial experience and tackle banking issues. Also, the coefficients of board size (BS) and age (AGE) are significant for all risk measures and for all Groups. More precisely, the effect of board size (BS) on bank risk is negative for Central Europe countries and positive for Southern Europe countries. However, the impact of age diversity is positive for Southern and Central Europe countries.

The effect of financial experience is positively and significant related with bank performance at different levels regardless of bank's location, rendering support to hypothesis H3.a. More experienced directors may lead to beneficial decisions for the bank. Nevertheless, the results concerning the coefficient of financial experience on risk-taking are mixed for Central Europe countries. However, the financial experience variable reduces risk-taking in Southern and Northern Europe countries.

Also, the estimated coefficient of independent directors has no effect on performance measures for countries of Group B but positive for countries of Group C. The effect is mixed for countries of Group A. Moreover, the percentage of independent (INDEP) directors has a positive and significant

impact on non-performing loans (NPL) at the 10% level for countries of Group B. However the effect is not significant for countries of Southern Europe.

The relationship between the female directors and bank performance is positive regardless of bank's location providing support for hypothesis H5a. One possible explanation for this result is that women may contribute to the effectiveness of the board due to their specific skills and knowledge (García-Meca et al., 2015). The effect of women directors (FEMALE) on bank risk is significant at different levels regardless of bank's location. We find mixed results for Southern and Central Europe countries. However, the presence of women contributes to financial stability in Northern Europe countries, as it increases Z-Score ratio.

Moreover, the impact of the governance system on bank performance is negative for countries of Northern Europe (Group B): the two-tier system decreases bank's performance. The results are mixed for the other two groups of countries. Additionally, the governance system (TIER-SYSTEM) has no effect on bank risk for countries of Central Europe. We find mixed results for the other two groups.

Also, the estimated coefficient of compensation has no effect on bank performance measures for countries of Group C but positive and significant at different levels for countries belonging to Groups A and B. Thus, we accept hypothesis H7.a. Similarly, the effect of the wealth on bank performance is positive and significant at different levels for all groups.

Therefore, the impact of compensation on bank risk is positive and statistically significant for countries of Southern Europe and Northern Europe. However, the effect is not significant for countries of Central Europe. Finally, the effect of the wealth variable is negative only for countries of Group B, meaning that equity-based compensation reduces credit risk in Northern Europe. Our results are in line with Vallascas and Hagendorff (2013) who find that an increase in CEO cash bonuses in European banks leads to lower risk. Thus, we accept hypothesis H7.d.

With regard to the control variables, the estimated coefficient of size (LNTA) on bank performance is negative and significant at the 1% level, for countries of Group C regardless of how performance is measured and at the 1% and 10% significance level for countries of Group B. Nevertheless, regarding the countries of Southern Europe (Group A) we find the opposite effect: larger banks may enjoy economies of scale and tend to be more efficient. The impact of bank size on risk-taking varies for Southern and Northern Europe countries.

Our results show a positive relationship between tighter capital regulation (Capital) and bank performance for Groups A and B and negative for Group C. Better capitalized banks have stronger incentives in improving their performance and minimizing costs. Also, the capital adequacy ratio (CAPITAL) reduces bank risk for Northern Europe countries. However, the results are mixed for countries of Group A and C.

According to the non-performing loans and leverage variables the effects on bank performance are negative and significant at different levels regardless of bank's location. Therefore, the findings of the leverage variable concerning risk-taking are inconclusive for Northern and Central Europe countries.

Table 1.14: Empirical results for bank performance by Group of Countries

	Group A				Group B				Group C			
Variables	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**
BS	**-0.00252*** **	**-0.0385** **	**-0.0881***	**-0.0246*** **	**0.00539***	**0.0970*** **	**0.857***	**0.0223***	0.0103	**0.285***	**0.450***	0.105
	(0.000)	(0.012)	(0.10)	(0.000)	(0.10)	(0.000)	(0.10)	(0.10)	(0.143)	(0.10)	(0.10)	(0.132)
AGE	-0.00833	0.0160	0.556	**0.0492*** **	**-0.0106*** **	**-0.158*** **	-1.094	**0.0412** **	-0.00525	-0.00570	-0.217	-0.00518
	(0.764)	(0.504)	(0.422)	(0.000)	(0.000)	(0.000)	(0.664)	(0.05)	(0.193)	(0.141)	(0.306)	(0.110)
EXPER	0.00180	**0.0266** **	-0.402	-0.0166	0.00502	**0.110*** **	0.825	-0.00118	0.00117	0.00943	**0.972***	**0.0312***
	(0.175)	(0.04)	(0.588)	(0.129)	(0.360)	(0.000)	(0.577)	(0.141)	(0.134)	(0.235)	(0.10)	(0.10)
INDEP	**-0.00326** **	-0.0102	**0.221*** **	-0.00256	0.00229	0.00421	0.0836	-0.00128	**0.00423** **	**0.00775** **	**0.175** **	0.00276
	(0.02)	(0.457)	(0.000)	(0.216)	(0.369)	(0.449)	(0.894)	(0.156)	(0.05)	(0.05)	(0.05)	(0.282)
FEMALE	-0.00397	**0.0437*** **	**0.464** **	-0.00934	**0.00173** **	0.0115	0.160	-0.00343	**0.00396***	-0.00191	0.0297	0.00384
	(0.463)	(0.000)	(0.05)	(0.699)	(0.05)	(0.834)	(0.166)	(0.289)	(0.10)	(0.114)	(0.178)	(0.114)
TIER-SYSTEM	**-0.1601*** **	**0.1601*** **	0.0641	-0.0654	**-0.0354** **	**-0.00252*** **	0.0157	- 0.1235	-0.0314	**0.0238** **	-0.0547	**-0.0451***
	(0.02)	(0.000)	(0.412)	(0.245)	(0.01)	(0.000)	(0.354)	(0.457)	(0.158)	(0.02)	(0.321)	(0.10)
COMPENSATION	**0.00054*** **	0.00051	0.00095	0.00064	0.00029	**0.00026***	0.00089	0.00075	0.00085	0.00056	0.00061	0.00091
	(0.02)	(0.451)	(0.214)	(0.347)	(0.112)	(0.10)	(0.213)	(0.348)	(0.542)	(0.117)	(0.374)	(0.412)
WEALTH	0.00021	**0.00018***	0.00042	0.00041	0.00031	**0.00037*** **	0.00019	0.00026	**0.00031** **	0.00019	0.00029	0.00024
	(0.265)	(0.10)	(0.369)	(0.520)	(0.451)	(0.002)	(0.298)	(0.492)	(0.02)	(0.216)	(0.321)	(0.354)
LNTA	0.00455	**0.318*** **	2.674	**0.152*** **	**-0.0417***	0.250	-6.282	**-0.419*** **	**-0.0276*** **	**-0.768*** **	**-2.01*** **	**-0.372*** **
	(0.291)	(0.000)	(0.585)	(0.000)	(0.10)	(0.299)	(0.253)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CAPITAL	-0.00916	0.0432	0.629	**0.0550*** **	0.00305	-0.0165	-0.175	**0.0109***	-0.00926	-0.0146	**-0.797*** **	**-0.0202***
	(0.135)	(0.408)	(0.538)	(0.01)	(0.158)	(0.168)	(0.239)	(0.10)	(0.136)	(0.132)	(0.000)	(0.10)
NPL	**-0.00132*** **	**-0.0239** **	-0.0449	**-0.0205***	**-0.00580*** **	**-0.0973*** **	**-1.042*** **	**-0.0310*** **	-0.00115	**-0.0513*** **	**-0.667** **	-0.00368
	(0.000)	(0.02)	(0.183)	(0.10)	(0.000)	(0.01)	(0.000)	(0.000)	(0.155)	(0.01)	(0.05)	(0.114)
LEVERAGE	**-2.873*** **	**-2.99*** **	**-3.71*** **	**-2.997*** **	**-2.647** **	**-4.96*** **	**-4.71*** **	**-5.334*** **	**-0.540*** **	**-3.96*** **	**-5.51*** **	**-5.92*** **
	(0.000)	(0.000)	(0.000)	(0.000)	(0.05)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	**1.978*** **	**4.16*** **	**5.92** **	**5.205** **	**1.800*** **	**7.78*** **	**8.72*** **	**9.77*** **	**1.094*** **	**7.92*** **	**6.07*** **	**8.77*** **
	(0.000)	(0.000)	(0.05)	(0.05)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(4.628)	(0.000)	(0.000)
Observations	193	242	233	234	131	150	150	150	236	259	259	259
Adjusted R^2	0.354	0.459	0.295	0.385	0.592	0.568	0.388	0.445	0.134	0.235	0.165	0.150

N. of Banks	23	23	23	23	22	22	22	22	30	30	30	30

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank performance (PERFOR) which measured by Tobin'sQ, ROAA, ROAE and NIM. Definitions of all variables are provided in Table 1.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 1.15: Empirical results for bank risk by Group of Countries

	Group A			**Group B**			**Group C**		
Variables	**Z-Score**	**NPL**	**Tier1-Capital**	**Z-Score**	**NPL**	**Tier1- Capital**	**Z-Score**	**NPL**	**Tier1-Capital**
BS	-0.0430	-0.0457	**0.0847****	-0.0313	-0.393	**-0.117***	**-0.0956****	**0.237*****	0.0185
	(0.396)	(0.582)	(0.022)	(0.811)	(0.103)	(0.079)	(0.017)	(0.000)	(0.573)
AGE	-0.0111	**0.281****	-0.0449	**-0.432*****	0.363	**0.149***	**0.175****	**0.211****	-0.0573
	(0.802)	(0.027)	(0.150)	(0.007)	(0.216)	(0.062)	(0.012)	(0.022)	(0.280)
EXPER	0.0886	**-0.376*****	**0.0976****	**0.747*****	**-0.498***	-0.0447	**-0.313****	**-0.402*****	**0.198****
	(0.140)	(0.008)	(0.024)	(0.000)	(0.086)	(0.571)	(0.010)	(0.004)	(0.012)
INDEP	0.00874	0.0213	0.00416	-0.0200	**0.0638***	-0.00711	**0.0207*****	**0.0378***	**-0.0210***
	(0.254)	(0.375)	(0.443)	(0.267)	(0.055)	(0.452)	(0.000)	(0.083)	(0.090)
FEMALE	-0.0104	**0.371*****	**0.0309****	**0.103*****	-0.0746	-0.00264	-0.0190	**0.118***	**0.0420*****
	(0.565)	(0.000)	(0.016)	(0.001)	(0.118)	(0.164)	(0.157)	(0.078)	(0.000)
TIER-SYSTEM	**2.018*****	**1.810***	-1.545	**-2.799*****	1.444	-0.155	1.059	-0.714	0.248
	(0.000)	(0.078)	(0.221)	(0.004)	(0.173)	(0.241)	(0.237)	(0.261)	(0.167)
COMPENSATION	**0.00111****	-0.00489	-0.00291	**0.00279****	0.00732	0.00806	-0.00155	-0.00615	0.00271
	(0.021)	(0.321)	(0.171)	(0.014)	(0.254)	(0.172)	(0.214)	(0.214)	(0.125)
WEALTH	0.00137	0.00213	-0.01635	0.00539	**-0.00698*****	-0.001525	-0.00524	0.00345	-0.00332
	(0.419)	(0.147)	(0.245)	(0.532)	(0.000)	(0.254)	(0.541)	(0.448)	(0.259)
LNTA	-0.519	**-0.973***	**1.623*****	**-2.118****	-3.096	**2.532*****	-0.0269	-0.953	**0.949***
	(0.246)	(0.069)	(0.000)	(0.030)	(0.120)	(0.000)	(0.263)	(0.264)	(0.072)
CAPITAL	**0.907*****	**0.372***	**0.880*****	**1.516*****	0.148	**0.796*****	**0.854*****	**0.285*****	**0.688*****
	(0.000)	(0.081)	(0.000)	(0.000)	(0.202)	(0.000)	(0.000)	(0.000)	(0.000)
LEVERAGE	**-4.179*****	**2.451*****	**-2.149*****	**3.050****	**-2.194*****	**-2.184*****	**3.161****	2.457	**-3.077****
	(0.000)	(0.000)	(0.000)	(0.022)	(0.000)	(0.000)	(0.000)	(0.329)	(0.036)
Constant	**2.978*****	**- 3.19*****	**-2.918****	3.057	**3.668*****	**4.06*****	**3.021****	**3.509*****	**5.024*****
	(0.000)	(0.000)	(0.004)	(0.114)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	234	228	234	114	118	111	234	118	225

Adjusted R^2	0.217	0.219	0.315	0.247	0.268	0.318	0.381	0.348	0.352
N. of Banks	27	27	27	14	14	14	25	21	26

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank risk (RISK) which measured by Z-Score, NPL and Tier1-Capital. Definitions of all variables are provided in Table 1.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

1.5. Conclusion

In this essay, we examined the impact of bank governance on bank performance and bank stability in a sample of 75 European commercial banks for the period from 2004 to 2016. To our knowledge this is the first study which relates bank performance and risk-taking with corporate governance determinants before, during and after the global financial crisis of 2008 for European countries. Furthermore we analyze the effects of corporate governance determinants to bank performance and risk-taking according to bank's location. Cultural, socioeconomic and bank characteristics may alter our results.

The empirical findings have revealed a number of critical issues as regards corporate governance practices in the banking industry. To begin with, board size is positively related to bank performance when we use the fixed effects estimators. However, board size has no effect on risk-taking when we use the fixed effect model. Also, the effect is negative before and during the crisis and positive afterwards. With the GMM model our results are mixed depending on the performance and risk measure. Finally, the use of interactions shows that the effect of board size on bank performance and risk-taking is more important for the period before and during the financial crisis. According to the location criteria, for countries of Central and Northern Europe the effect of board size on bank performance is positive but negative for countries of Southern Europe. Furthermore, the impact of board size on risk-taking is negative for countries of Northern and Central Europe and positive for countries of Southern Europe.

Moreover, the age of directors is not significant to bank performance and risk when we use the fixed effects estimators. However, the effect on bank performance is negative before, during and after the crisis. In addition, the impact of age variable on risk-taking is negative during the whole period. In the GMM model our results are mixed depending on the performance measure. However, the age of directors has a positive effect on risk-taking when we use GMM estimators. Furthermore, the use of interactions shows that the effect of age has more impact on risk taking and bank performance before and during the crisis. According to the location criteria, for countries of Northern Europe the effect is positive and negative according to the performance measure and positive for countries of Southern Europe. Similarly, the results regarding are mixed for risk-taking in countries of Northern and Central Europe but positive for countries of Southern Europe.

Also, the effect of financial experience is positively related to bank performance when we use the fixed effects estimators. The sign remains constant and positive regardless of the period considered.

Moreover, experienced directors decrease risk-taking when we use the fixed effect model. The sign remains constant before, during and after the financial crisis. With the GMM model the effect of financial experience on bank performance and risk is positive and significant. Furthermore, the use of interactions shows that the effect of financial experience on bank performance and on risk-taking is more pronounced for the period after the global financial crisis for both variables. According to location the effect is positive on bank performance and mixed on risk-taking regardless of countries' location.

In addition, the effect of independent directors is significant and positive to bank performance when we use the fixed effects estimators or the GMM model. The results are mixed before and during the crisis and positive afterwards. Moreover, the effect of independent directors is positive on risk-taking when we use GMM model. Furthermore, the use of interactions shows that the effect of independent directors on bank performance and risk-taking is more pronounced for the period after the crisis. According to the location criteria the impact on bank performance is positive for countries of Central Europe and mixed for countries of Southern Europe. Similarly, the results are mixed for risk-taking; positive for countries of Northern Europe and mixed for countries of Central Europe.

Moreover, the impact of women on bank performance is positive when we use the fixed effects estimators or the GMM model. The effect of female directors is positive on risk-taking when we use the fixed effects estimators but negative in the GMM model. Also, the effect on performance is positive after the financial crisis. The results are mixed for risk-taking. Furthermore, the use of interactions shows that the effect of female directors on bank performance is more pronounced for the period after the crisis but less pronounced in the same period for risk-taking. According to location the effect on bank performance and risk-taking is positive regardless of bank's location.

Also, the effect of the one-tier system is positively related to bank performance when we use the fixed effects estimators or the GMM model. Furthermore, the effect of two-tier system is negative on risk-taking when we use the fixed effect model. The results are mixed when we apply the GMM model. Moreover, the impact of the one-tier system on bank performance is positive after the crisis. The effect of the one-tier system is positive on risk-taking before and during the financial crisis but the results are mixed afterwards. Furthermore, the use of interactions shows that the effect of the governance system on bank performance is more pronounced for the period before and during the crisis. Additionally, our results show that the two-tier system is negatively related to bank performance but the results are mixed for bank risk. According to the location criteria the effect is

mixed on bank performance. Moreover, the effect on risk-taking is positive for countries of Southern Europe but negative for countries of Northern Europe.

In addition, the impact of compensation is positive on bank performance when we apply the GMM model. The sign remains constant and positive regardless of the period considered. The effect of compensation is positively related to risk-taking when we use the fixed effects estimators but negatively when we use the GMM model. The time period is not significant for risk-taking. According to location the effect is positive on bank performance and risk-taking for countries of Southern and Northern Europe.

Finally, the effect of the wealth variable is positively related to bank performance when we use the fixed effects estimators or the GMM model. The results are mixed for risk-taking. Moreover, the impact of wealth on bank risk is positive before and during the crisis. Furthermore, the use of interactions shows that the effect of the wealth variable on bank performance is more pronounced for the period before and during the financial crisis. The time period is not significant for risk-taking. According to the location criteria the effect is mixed on risk taking. According to the location criteria the effect on bank performance is positive regardless of bank's location. However, the impact of the wealth variable is negative on bank risk for countries in Northern Europe.

Overall, our results show that corporate governance variables have a significant impact on bank performance and bank stability. However, the findings are mixed regardless of measures, time period and geographic location. Moreover, our results have major implications for depositors, regulators, policy makers and investors of the banking industry. The Basel Committee has issued a series of principles on corporate governance of banks and, thus, the current research essay enriches these principles that are particularly important for effective market discipline (BCBS, 2010). According to the latter, issues related to the existence of corporate governance rules, transparency and the recruitment of suitable managers as members of the board of directors, require appropriate management to protect shareholder rights and ensure proper and complete disclosure of depositors and governments on the course of banking institutions and the stability of financial system.

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Essay 2

Do economic freedom and board structure matter for bank stability and bank performance?

2.1. Introduction

Banks play a crucial role in the entire economy as they provide essential financial services and, hence, contribute to economic growth and development (Barth et al., 2006). Because of the importance of banks on economic activities it is not surprising that so much attention has been given on the regulation and supervision of the banking sector (Chortareas et al., 2013; Barth et al., 2006; Laeven and Levine, 2009). More precisely, banks should be regulated and supervised not only to protect investors and consumers but also to safeguard the soundness of the financial system (Barth et al., 2013; Chortareas et al., 2013).

The global financial crisis revealed weaknesses concerning the regulatory framework of financial institutions and, thus, re-activated the debate of whether regulatory reforms can promote well-functioning banking systems (Pasiouras et al., 2009; Sufian and Habibullah, 2010). In this context many rules and recommendations, such as the Sarbanes-Oxley Act of 2002 and the Basel II,III[1], have been issued by regulators and policymakers to promote a more resilient banking sector and enable market participants to make better risk assessments (Chortareas et al., 2013; Barth et al., 2013). However, stricter regulation and direct control of banks by the government may have a negative impact on the economic growth by limiting the economic freedom (Sufian and Majid, 2011; Chortareas et al., 2013). Economic freedom is broadly defined as the freedom to prosper within a country without intervention from a government or economic authority.

Economic freedom plays a vital role to the development of the banking system as it encourages the business environment and contributes to the development of innovative ideas. More precisely, greater economic freedom is likely to lead to a better environment for business and, thus, better economic growth and better banking performance (Sufian and Majid, 2011; Chortareas et al., 2013;

[1] *In 2009 the Basel committee responded to the lessons of the crisis by taking measures to strengthen the Basel II framework and approved for consultation a package of proposal to strengthen global capital and liquidity regulations with the goal of contributing to the financial stability.*

Pasiouras et al., 2009). Despite the fact that the impact of economic freedom on the economy has been extensively studied (Bergh and Karlsson, 2010; Altman, 2008), its impact on the banking sector has attracted the interest of researchers only in recent years (Psillaki and Mamatzakis, 2017; Sufian and Majid, 2011; Sufian and Hassan, 2010; Sufian and Habibullah, 2010).

The aim of this essay is to examine whether and to what extent economic freedom and regulation of credit, labor and business market affect bank performance and risk-taking. In order to investigate the impact of regulation on bank performance and bank stability, we use an assortment of information such as the Fraser economic freedom index[13] (Gwartney et al., 2017), as well as restrictions on credit, labor and business markets. To our knowledge, this essay constitutes the first attempt to consider the impact of economic freedom and credit, labor and business market regulation in combination with bank governance variables, both on bank performance and risk-taking. Using this approach we check for possible changes on the effects of corporate variables on bank performance and stability. Regulators who are concerned with the safety and soundness of the banks may apply additional pressure and legal responsibility on boards and, hence, may affect their impact on bank performance and stability (Barth et al., 2013; Pasiouras et al., 2009).

Moreover, we take into consideration the two different theoretical perspectives that concern the effects of banking regulation; the "public interest view" and the "private interest view" (Shleifer and Vishny, 1998; Barth et al., 2006; Laeven and Levine, 2005). According to the "public interest view", it is believed that banking restrictions would be beneficial as they lead to smaller financial institutions which are easy to monitor. Moreover, when banks operate in a heavily strict environment, they have fewer opportunities to increase risk (Boyd et al., 1998; Barth et al., 2006). In contrast, the "private interest view" holds that there are many advantages when banks are permitted to engage in a broad range of activities (Sufian and Habibullah, 2014; Beach and Kane, 2008). A competitive banking system would limit the ability of regulators to extract bribes, would contribute to the efficient management of financial intermediaries and to the improvement of monetary policy transmission via the interbank market rate and, thus, to the economic growth (Claessens and Laeven, 2004; Beck et al., 2003; Van Leuvensteijn et al., 2008).

Due to the lack of knowledge about the effects of adopting stricter regulation or having more economic freedom on banks, we address the following questions:

[13] *The Fraser economic freedom index consists of size of government, legal structure and security of property rights, access to sound money, freedom to trade internationally and regulation of credit, labor and business sector (Gwartney et al., 2017).*

- *Does economic freedom lead to an increase in bank risk-taking?*
- *Does economic freedom matter for bank performance?*
- *Does credit market regulation affect bank stability and performance?*
- *Does labor market regulation increase bank performance and decrease risk-taking?*
- *Does business market regulation reduce bank risk-taking and improve bank performance?*
- *Do the macroeconomic variables change the impact of bank governance variables on bank performance and risk-taking?*

In order to answer the above questions, we take into consideration our findings from the first essay. More precisely, we use bank governance variables which are considered as main variables of corporate governance (Pathan and Faff, 2013; Belhaj and Mateus, 2016) in conjunction with macroeconomic variables namely, economic freedom, regulation of credit, labor and business market, stock market capitalization and foreign bank assets, to check whether there is any differentiation in the impact of corporate governance variables on bank performance and risk-taking. Moreover, we control for country-level characteristics such as economic conditions taking into account the annual growth of GDP and the annual rates of inflation (Pasiouras, 2008; Maudos et al., 2002; Demirguc-Kunt et al., 2004; Beck et al., 2003).

Moreover, using a sample of commercial banks from 18 different European countries for the period 2004-2016, this essay provides new evidence to the existing literature by considering both developed and developing countries. Prior studies in the literature (Mamatzakis et al., 2013; Sufian and Habibullah, 2010; Sufian and Majid, 2011) analyzed the effect of economic freedom on bank efficiency focusing on Central and Eastern European countries (Psillaki and Mamatzakis, 2017; Mamatzakis et al., 2013; Wah Low et al., 2010; Koutsomanoli-Filippaki et al., 2009b). Also, in order to check for any changes according to location we grouped countries in three separated groups according to their geographic location, such as South, North and Central Europe. Bank regulation differs from country to country as there is a difference in the freedom which permits banks to engage in a range of different activities (González, 2005).

Finally, by analyzing the extent to which a major global shock, that is the recent financial crisis, may have altered regulation and restrictions on banks. More precisely, we investigate the period before, during and after the global financial crisis paying particular attention to the effects of regulatory reforms on bank performance and risk-taking. Due to the fact that today, the largest banks continue to face political and regulatory pressure, the need to rethink bank regulation is of particular

importance. Especially, European banks are in a turning point as they face many challenges and also are forced to better understand and respond to the sources of pressure such as regulators and investors (Barth et al., 2013; Houston et al., 2010).

The remainder of the essay is organized as follows. Section 2 presents a review of the literature and develops the hypotheses. Section 3 describes the data and methodology. Section 4 presents the empirical results and explores some extended analysis and robustness tests. Section 5 concludes.

2.2. Literature review and hypotheses development

This section presents the literature review and develops the hypotheses regarding the impact of economic freedom and regulations (credit, labor, business) on bank performance and risk-taking.

2.2.1 Economic freedom, bank performance and risk-taking

The results from previous empirical studies (Sufian and Habibullah, 2010; Wah Low et al., 2010; Sufian and Majid, 2011) regarding the impact of economic freedom on bank efficiency are mixed and hence, need to be further examined. Sufian and Hassan (2010) using a sample of five South East Asian countries for the period 1994-2008, find that economic freedom improves the environment associated with innovation and entrepreneurship, and, thus has a positive impact on economic development and bank performance. This means that when financial institutions operate in a less restricted environment they are more likely to engage in competitive policies and, hence, achieve higher levels of performance.

Similarly, Sufian and Habibullah (2010) examining a sample of Malaysian banks from 1999 to 2007, show that economic freedom has a positive effect on bank profitability. One possible explanation for this result is that economic freedom allows banks to lead to foreign financial institutions and companies. In addition, Baier et al. (2012) analyzing bank data from different countries during the period 1976-2008 report that greater levels of economic freedom are associated with a lower probability of financial crises, thus suggesting that more freedom is conducive to a more stable financial system.

Moreover, Sufian and Majid (2011) analyzing a sample of Islamic banks during the period 2000-2008, provide evidence that there is a positive and statistically significant relationship between economic freedom and bank performance. Economic freedom contributes to the promotion of a sound banking system which is vital for sustainable economic growth. Furthermore, authors support

that countries with higher level of economic freedom are more likely to enjoy higher living standards. Their findings corroborate the research conducted by Holmes et al. (2008) who claim that a high level of economic freedom is associated with a high level of GDP per capita and, hence, this in turn may lead to a high demand for banking services.

On the contrary, Wah Low et al. (2010) based on a sample of banks from six East Asian countries during the period 1975-2006 examine the impact of economic freedom on bank performance. Their results indicate that the economic freedom index has a positive and significant impact on bank performance in Singapore but the effect is negative on the other countries. One possible explanation for this result is that Singapore is widely recognized as a highly open economy with a well developed banking system (Wah Low et al., 2010) and more economic freedom.

In the same line, Demirguc Kunt et al. (2004) using data from 72 countries over the 1995-1999 period find that better institutional framework, as captured by the index of economic freedom, decreases bank performance, measured by the net interest margin. A possible explanation is that in countries where the economic freedom is high, it tends to increase competition in the banking sector from other financial intermediaries such as hedge funds and private equity and, thus, have a negative impact on bank performance.

Moreover, Ghosh (2016) employing bank data from MENA (Middle East and North Africa) countries during the period 2000-2012, shows that economic freedom has a positive and statistically significant impact on bank risk-taking measured by Z-Score and non-performing loans. According to the author, it is believed that more restrictions on banking activities and, therefore less economic freedom improve bank soundness and lead to less risk-taking.

The above argument gives rise to following hypotheses:

Hypothesis 1.a (H1.a): Economic freedom is positively related with bank performance

Hypothesis 1.b (H1.b): Economic freedom is negatively related with bank performance

Hypothesis 1.c (H1.c): Economic freedom increases bank risk-taking

Hypothesis 1.d (H1.d): Economic freedom reduces bank risk-taking

2.2.2 Credit, labor and business market regulation, bank performance and risk-taking

2.2.2.1 Credit market regulation, bank performance and risk-taking

Credit market regulation index consists of three sub-components namely ownership of banks, private sector credit and interest rate controls (Gwartney et al., 2017). Credit regulation reflects the conditions in the domestic credit market. According to Barth et al. (2006) there are different views regarding the effects of banking regulation, namely the "public interest view" and the "private interest view". From the "private interest view" it is believed that regulatory restrictions on bank activities could reduce the franchise value of a bank and also impede the ability to diversify income streams and, hence, have a negative impact on bank efficiency and lead to greater instability (Laeven and Levine, 2007;).

Moreover, many economists (Barth et al., 2000; Haubrich and Santos, 2005; Claessens and Laeven, 2004; Evanoff, 1998) believe that regulatory restrictions may be inefficient for banks. A possible explanation is that such restrictions on banking activities can limit the exploitation of economies of scale. Also, in the developing countries where state control of bank lending decisions tends to be higher than private control, it is likely to lead to lower bank performance. One possible explanation for this result is that banks lend more to less creditworthy companies.

On the contrary, the "public interest view" supports that there are many theoretical reasons that advocate stricter regulations on bank activities. Firstly, it is believed that when banks are allowed to engage in a broader range of activities then it is more likely to have more opportunities to increase risk (Barth et al., 2006; Boyd et al., 1998; Saunders, 1994). Another reason for tighter regulations is that governments usually act in the interests of the public and regulate banks to ensure financial stability and ameliorate market failures.

Claessens and Laeven (2004) examined the effects of entry and regulations on banking activities in 50 countries for the period 1994-2000 and found that stricter restrictions on banking activities resulted in lower competition and, thus, in lower bank efficiency. This happens because competition in the banking sector is crucial for the quality of financial products, the degree of financial innovation and the efficient production of financial services (Claessens and Laeven, 2004).

Furthermore, Chortareas et al. (2013) examining bank data from 27 European countries over the period 2001-2009, show that financial freedom has a positive and significant impact on bank efficiency. One possible explanation for this result is the fact that when banks operate in a less restricted environment it is likely to increase competition and to achieve higher levels of efficiency. Similarly, Barth et al. (2013) based on a sample of banks from 72 countries for the period 1999-2007

find that tighter regulations reduce bank efficiency. Moreover, they indicate that greater independence of supervisory authority enhances bank efficiency level.

In addition, Sufian and Habibullah (2010) studied the relationship between institutional environment and bank performance in Malaysia. Using data for commercial banks in Malaysia from 1999 to 2007, the authors report that financial freedom has a positive and significant impact on bank performance. This means that less control on banks by the government permits financial institutions to engage in banking activities that lead to economic growth and to financial stability (Boyd et al., 2004).

In the same vein, Mamatzakis et al. (2013) using the Fraser index in a sample of 10 Central and Eastern European countries during the period 2000-2010 provide evidence that certain aspects of credit regulation, such as interest rate controls have a negative and statistically significant impact on bank efficiency. This means that the limitations in the interest rate control can act as a barrier for banks to invest in high-risk and high-return projects (Jimenez et al., 2010).

However, Laeven and Levine, 2005 claim that broad banking activities may lead to the formation of complex entities which are difficult to monitor. In addition, the "public interest view" supports that government can contribute to bank stability and protect the economy from the negative effects of bank failure, through effective screening on bank activities (Barth et al., 2006).

Furthermore, Koutsomanoli-Filippaki et al. (2009b) analyzing a dataset of banks from 11 Central and Eastern European countries over the period 1998-2005 show that there is a positive relationship between profit efficiency and banking reform using the European Bank for Reconstruction and Development (EBRD) index of banking sector. Similarly, Delis et al. (2011) using a sample of commercial banks from 22 transition countries between 1999 and 2009 find that regulations which promote monitoring and restrictions on bank activities have a positive impact on bank productivity. This result is corroborated by González (2009) who claim that banks with stricter regulations reduce risk-taking in poorly developed financial markets and increase bank efficiency over the period 1996-2002.

Moreover, Agoraki et al. (2011) based on a sample of Central and Eastern European banks from 1998-2005 support that increased regulation, through higher capital requirements and activity restrictions in combination with a higher level of market power reduce both credit risk and the risk of default. A possible explanation is that restrictions in banking activities increase the likelihood that banks would suffer during financial crises.

The above argument gives rise to following hypotheses:

Hypothesis 2.1.a (H2.1.a): Credit market regulation is positively related with bank performance

Hypothesis 2.1.b (H2.1.b): Credit market regulation is negatively related with bank performance

Hypothesis 2.1.c (H2.1.c): Credit market regulation increases bank risk-taking

Hypothesis 2.1.d (H2.1.d): Credit market regulation reduces bank risk-taking

2.2.2.2 Labor market regulation, bank performance and risk-taking

Labor market restriction index consists of hiring regulations and minimum wage, hiring and firing regulations, centralized collective bargaining, hours regulations, mandated cost of worker dismissal and conscription (Gwartney et al., 2017). The aim of labor market regulation is to protect employees from arbitrary actions on the part of the employers (Mamatzakis et al., 2013). According to Bertola (2009), factors such as limited wage setting flexibility and regulatory constraints on firing affect labor market dynamics. In many counties, labor market regulations are an important and controversial issue which constrains the ability of businesses to adjust employment levels.

Several studies (Botero et al., 2004; Blanchard and Wolfers 2000; Besley and Burgess 2004; Scarpetta and Tressel, 2004) that relate the labor market regulations to economic outcomes, show that stricter labor regulations tend to decrease economic performance. However, little is known concerning the impact of labor market regulations on bank performance and risk-taking. Mamatzakis et al. (2013) based on a sample of 10 CEE countries during the period 2000-2010 find that there is a positive relationship between liberal labor regulation and bank performance. According to the author, liberal reforms in the labor market may decrease employee complacency and, hence, could lead to an increase in bank performance.

In the same vein, Psillaki and Mamatzakis (2017) using data from 10 Central and Eastern European (CEE) countries for the period 2004 to 2009, show that labor market reforms have a positive and statistically significant impact on bank efficiency. This means that less regulatory restrictions are more likely to increase bank efficiency. One possible explanation for this result is that stricter employment protection legislation affects negatively firm returns and therefore, results in declining productivity growth (Scarpetta and Tressel, 2004; Besley and Burgess, 2004).

On the contrary, other empirical studies claim that stricter labor regulation can increase bank

performance. More precisely, Koutsomaloni-Filippaki and Mamatzakis (2013) using bank data from 15 European countries during the period 2005-2010, report that there is a negative and statistically significant relationship between labor market regulations and bank efficiency. Their findings indicate that greater market liberalization would reduce bank efficiency.

This is also consistent with the findings of Deakin and Sarkar (2008) who find that stricter labor regulations have a positive effect on productivity growth in France, Germany and in the United States from 1970 to 2000. In addition, labor market regulations that are linked to wage pressures could lead to higher labor productivity and to a reduction in bank risk due to the investment in specific skills of employees and to intensive technology (Autor et al., 2007).

The above argument gives rise to following hypotheses:

Hypothesis 2.2.a (H2.2.a): Labor market regulation is positively related with bank performance

Hypothesis 2.2.b (H2.2.b): Labor market regulation is negatively related with bank performance

Hypothesis 2.2.c (H2.2.c): Labor market regulation increases linked to bank risk-taking

Hypothesis 2.2.d (H2.2.d): Labor market regulation reduces linked to bank risk-taking

2.2.2.3 Business market regulation, bank performance and risk-taking

Business market regulation index comprises of administrative requirements, bureaucracy costs, regulation about starting a business, extra payments, licensing restrictions and cost of tax compliance (Gwartney et al., 2017). It refers to entry barriers and constrains that may reduce competition and, thus, may also affect bank performance. It is believed that regulatory entry barriers and bureaucratic procedures lead to a reduction in new firms entering in a business and hence, resulted in decreased competition (Klapper et al., 2006).

Chortareas et al. (2013) supports that revenues generated by new businesses have a significant impact on bank profitability. For instance, business regulations and entry barriers can lead to decreased competition, reduced growth and less productivity (Klapper et al., 2006; Loayza et al., 2005). This, in turn has a negative impact on bank performance as firms would not be able to fulfill their obligations to the banks.

In this context, Sufian and Habibullah (2010) using a sample of Malaysian banks from 1999 to 2007, indicate that business freedom has a positive effect on bank profitability. Similarly, Psillaki and

Mamatzakis (2017) based on a sample of 10 Central and Eastern European (CEE) countries from 2004 to 2009 find evidence that there is a positive and statistically significant relationship between business regulations on bank efficiency. This means that less regulatory restrictions and entry barriers that concern new businesses are more likely to increase bank efficiency through increased competition and economic growth and development.

However, using a stochastic frontier approach for cost efficiency, Sufian and Habibullah (2014) analyze a sample of commercial banks in Malaysia over the period 1995-2008 and find that there is a negative and statistically significant relationship between business freedom and bank efficiency. This means that greater freedom to start, operate and close a business, tends to lower bank entry barriers, and hence, intensify competition and impede bank efficiency.

Moreover, business market regulations may also affect bank risk. More precisely, increased business regulations may prompt informality, and, thus, making it harder for banks to assess the creditworthiness of a company (Loayza et al., 2005). This may lead to high levels of non-performing loans and to more credit risk for banks.

Based on the existing literature our hypotheses are as following:

Hypothesis 2.3.a (H2.3.a): Business market regulation is positively related with bank performance

Hypothesis 2.3.b (H2.3.b): Business market regulation is negatively related with bank performance

Hypothesis 2.3.c (H2.3.c): Business market regulation increases bank risk-taking

Hypothesis 2.3.d (H2.3.d): Business market regulation reduces bank risk-taking

2.2.3 The impact of global financial crisis (GFC) on bank performance and risk-taking

The post-crisis agenda raised questions about regulation and its impact on bank performance and risk-taking. It was recognized that supervision prevents banks from engaging in risky behavior and therefore contribute to bank performance and stability. Shehzad and De Haan (2008) using a sample of developing and developed countries for the period 1981-2002 examine the impact of financial liberalization on systemic and non-systemic banking crises.[14] Their results indicate that financial liberalization reduces the likelihood of systemic crises. Few years later, Barth et al. (2013) show that

[14] *Systemic banking crisis is a crisis in which more or all bank capitals have been exhausted (Caprio and Klingebiel, 1999). Non-systemic crisis is of lesser significance in which large banks fail.*

when banks suffer from banking crisis then stricter regulations would be beneficial as they result in a higher bank performance and in a more stable financial system.

In the same vein, Baier et al. (2012) based on a sample from different countries during the period 1976-2008 find that higher economic freedom is associated with lower probability of a banking crisis. Financial liberalization is considered to enhance financial development as banks can exploit opportunities from increased competition. Also, they report that credit market regulation increases after a financial crisis. A possible explanation for this result is that in the post-crisis period there is a diminution in economic freedom and its components that stems from tighter regulation and slower economic growth. Similarly, De Haan et al. (2009) analyze the effects of crises on economic freedom in Norway and Sweden for 1985-2005 and find that economic freedom falls right after a crisis but then increases.

However, Beltratti and Stulz (2012) using data from different countries over the period 2007-2008 provide evidence that stricter regulation on banking activities resulted in banks performing better during the crisis. Authors believe that traditional bank activities are less exposed to the risks that turn out poorly during the crisis and also support that financial liberalization induces risk-taking behavior and may contribute to banking crises, and hence, to financial instability.

Hypothesis 3.a (H3.a): Compared to 'normal times', the predicted relation between economic freedom, regulation of credit, labor, business market and bank performance varies following the financial crisis.

Hypothesis 3.b (H3.b): Compared to 'normal times', the predicted relation between economic freedom, regulation of credit, labor, business market and risk-taking is less pronounced following the financial crisis.

2.3. Data and methodology

In this section we analyze the bank sample and the data sources. Furthermore, we describe in detail the variables used in the regression equations and, finally, we present the methodology.

2.3.1 Sample and Data

The balance-sheet and income statement data used in this study was extracted from the Bankscope database while the macroeconomic data was extracted from the 2017 version of the Fraser Index of Economic Freedom and the Word Bank database for the period 2004 to 2016. The research

comprises samples of 75 commercial European banks from 18 European countries namely Spain, Italy, Ireland, the United Kingdom, Denmark, France, Germany, Holland, Belgium, Portugal, Luxembourg, Hungary, Poland, Greece, Sweden and Finland. Moreover, after scrutinizing the data to avoid inconsistencies, errors, and double counting of institutions we end up with an unbalanced panel of 861 bank-year observations.

2.3.2 Variables

In this sub-section we describe in detail the set of variables considered in our study namely, the dependent variables, the main explanatory variables and the control variables.

2.3.2.1 Dependent variables

In line with previous studies (Belhaj and Mateus, 2016; Pathan and Faff 2013; Andres and Vallelado 2008; Setiyono and Tarazi 2014), we employ alternative proxies of bank performance (PERFOR) and risk-taking (RISK) that are commonly used in the existing literature as they provide us with different types of information on governance, the multiple proxies of performance and risk. Finally, we will check the robustness of our findings using these different proxies of bank performance and risk. These are, return on average assets (ROAA), return on average equity (ROAE), net interest margin (NIM) and Tobin'sQ ratio for bank performance, Z-Score, non-performing loans (NPL) for risk-taking and Tier1-capital ratio for risk-taking. .

Return on average assets (ROAA) is an accounting-based measure of bank profitability. It is the net income after taxes, as a percentage of total assets (Pathan and Faff, 2013; Andrés and Vallelado, 2008). Return on average assets (ROAA) reflects the capability of a bank to generate profits from its asset management functions. Moreover, it is used as the key ratio for the evaluation of bank performance in the existing literature (Claessens and Laeven, 2004; Mamatzakis and Bermpei, 2016). Return on average equity (ROAE) is the net income after taxes as a percentage of equity (Aebi et al., 2012). It is a direct measure of returns to shareholders and is influenced by the capital structure of a financial institution. Banks with higher leverage, and hence, lower equity, generally record lower percentage of return on average assets (ROAA) but higher percentage of return on average equity (ROAE). Moreover, return on average equity (ROAE) explains how effectively shareholder’s funds are being used by the management of the bank.

Net interest margin (NIM) is the net interest income as a percentage of the average profit (Pathan and Faff, 2013). It is important to bank managers because it indicates whether asset and liability

management is being done properly, meaning that the bank earns income on its assets and has low cost on its liabilities (Raharjo et al., 2014; Marinković and Radović, 2014). Tobin'sQ is the sum of the market value of equity and the book value of liabilities divided by the carrying amount of total assets (Pathan and Faff, 2013). Several studies have used this efficiency measure as a dependent variable in the banking sector (Belhaj and Mateus, 2016; Staikouras et al, 2007). Its importance derives from the fact that it records the value of future investment opportunities. Therefore, a high value of this index means that a bank has high growth potential.

The first measure of bank risk is Z-Score. It is used in bank governance literature (Bai and Elyasiani, 2013; Delis et al., 2012; Beltratti and Stulz, 2012; Laeven and Levine, 2009) referring to the relationship between bank risk and capital regulations, deposit insurance and other regulatory policies. It is defined as the mean of (ROA) +CAR/σ (ROA) where ROA is the return on assets and CAR is the capital-asset ratio. Hence, Z-Score can be defined as a measure of the distance to default (Bai and Elyasiani, 2013). A lower value of Z-Score indicates higher bank risk.

Non-performing loans (NPL) is used as a proxy for credit risk and financial stability. It is the ratio of loans loss provisions divided by total loans (Pathan et al., 2008). According to the European Central Bank (ECB, 2017), it is a credit risk measure that directly affects the profitability of banks and, hence, financial stability. A high percentage of this proxy means that there is an increase on credit portfolio which could spillover and affects the stability of the financial system (ECB, 2017).

Finally, the Tier 1 capital ratio[15] is the ratio of a bank's core equity capital to its total risk-weighted assets (RWA). Risk-weighted assets are the total of all assets held by the bank weighted by credit risk according to a formula determined by the Basel rules (BCBS, 2010). It is a key measure of a bank's financial strength.

2.3.2.2 The Fraser Index of Economic Freedom indicators

According to Gwartney et al. (2017) the Fraser economic freedom index measures the degree to which the policies and institutions of countries are supportive of economic freedom. A country has to provide secure protection of privately owned property and a stable monetary environment in order to receive a high economic freedom index. Moreover, it should have low levels of taxes, refrain from creating barriers to both domestic and international trade and rely more on markets than government

[15] *Tier1 capital increases from 4%in Basel II to 6% applicable in 2015. This 6% is composed of 4.5% of CET1, plus an extra 1.5% of additional Tier1.*

(Gwartney et al., 2017; Pasiouras et al., 2009). Each component of economic freedom is placed on a scale from 0 for no freedom to 10 for maximum freedom.

The credit market regulation (CR-REG) component consists of the following sub-components: i) ownership of banks (CR-OWN), ii) private sector credit (CR-PR) and iii) interest rate controls (CR-IR). The sub-component ownership of banks (CR-OWN) measured as the percentage of deposits held in private owned banks. The other two sub-components, namely private sector credit (CR-PR) and interest rate controls (CR-IR), indicate the extent to which credit is supplied to the private sector and whether controls on interest rates interfere with the market in credit (Gwartney et al., 2017). Higher levels of the credit regulation index denote less regulatory restriction.

However, we also consider the other two sub-components of regulation, namely labor market regulations and business regulation to examine their impact on bank performance and risk-taking. Labor market regulation (LB-REG) component, is designed to measure the extent to which these restraints upon economic freedom are present. In order to earn high marks in the component rating regulation of the labor market, a country must allow market forces to determine wages and establish the conditions of hiring and firing, and refrain from the use of conscription (Gwartney et al., 2017).

Finally, the business regulation (BS-REG) component presents the extent to which regulations and bureaucratic procedures restrain entry and reduce competition. In order to earn high score in this component, countries have to allow markets to determine prices and refrain from regulatory activities that retard entry into business and increase the cost of production. Moreover, they must refrain from using their power to extract financial payments and reward businesses at the expense of others (Gwartney et al., 2017).

2.3.2.3 Control variables

We use a number of bank-specific and country-specific variables. To begin with bank-specific variables, bank size (LNTA), is defined as the natural logarithm of the bank's total assets (Psillaki and Mamatzakis, 2017; Barth et al., 2013; Chortareas et al., 2013). Secondly, we employ the level of capitalization variable which is defined as the equity of total assets (CAPITAL) and it is used as a proxy for capital adequacy or capital risk (Chortareas et al., 2013; Belhaj and Mateus, 2016; Pathan and Faff, 2013). The next variable refers to the ratio of loans to total assets (LOANSTA) used as a proxy for asset utilization (Psillaki and Mamatzakis, 2017; Pasiouras, 2006; Mamatzakis et al., 2013). It is a measure of loan activity and it is expected to be positive as it is associated with well-functioning intermediation by financial institutions (Mamatzakis et al., 2013).

Furthermore, in order to account for macroeconomic conditions within each country, we employ the following variables. Firstly, we use the GDP growth (GDP) which equals the rate of real per capita GDP growth and it is considered as a proxy for the fluctuations in economic activities (Agoraki et al., 2011; Mamatzakis et al., 2013). GDP growth is commonly used as an indicator of the monetary environment. Inflation (INF) equals the annual rate of the change in the Consumer Price Index[16] 2010 (CPI). It is believed that underdeveloped countries are linked to high levels of inflation (Boyd et al., 2001).

Another variable is the stock market capitalization to GDP (MACGDP) used as a proxy for the size of the stock market (Beck et al, 2003; Demirguc-Kunt and Huizinga, 2000; Pasiouras, 2008). Despite the fact that previous studies in the literature (Demirguc-Kunt and Huizinga 1999; Bart et al, 2006, Pasiouras et al., 2009) employed this indicator, their results still remain mixed. Moreover, to capture for the impact of the presence of foreign banks we use the percentage of foreign bank assets among total assets (FOREIGN) as a proxy for market structure (Psillaki and Mamatzakis, 2013; Pasiouras et al., 2009; Weill, 2003).

Finally, we employ some bank governance variables as explanatory variables. We use those that have the most significant impact on both bank performance and risk-taking in accordance with our findings in the first essay. More precisely, we use board size (BS), gender diversity (FEMALE), board financial experience (EXPER) and compensation (COMPENSATION).

According to Pathan and Faff (2013), Staikouras et al. (2007), board size (BS) is defined as the sum of the directors within a board (executive and supervisory). Financial experience (EXPER) is the average number of financial experience relevant either on the supervisory or executive board on which the director sits (Fernandes and Fich, 2013). The percentage of female directors (FEMALE) is defined as the percentage of women on the board (Owen and Temesvary, 2018). Finally, according to BoardEx definitions, compensation (COMPENSATION) is the sum of salary and bonus.

2.3.3 Empirical models and methodology

2.3.3.1 Fixed-Effects model

Our sample is a mixture of time series and cross-sectional analysis and as a consequence the most efficient tool to use is panel data analysis (Andres and Vallelado, 2008). The advantage of this

[16] *Basis year is the 2010.*

method is that it takes into account the heterogeneity, which is the specific characteristics of each bank, such as the quality of management, business activity among others (Belhaj and Mateus, 2016).

The first econometric method we apply to control the impact of bank governance variables on bank performance and risk-taking is Fixed-Effects.[17] When the unobserved effect is correlated with independent variables, then this method gives unbiased estimators in contrast with Pooled OLS method which produces biased and inconsistent estimators.

Bank performance model

$$\textbf{(PERFOR) i, t} = \beta_0 + \beta_1 EC\text{-}FR\ i,t + \beta_2 CR\text{-}REG\ i,\ t + \beta_3 LB\text{-}REG\ i,\ t + \beta_4 BS\text{-}REG\ i,\ t + \beta_5 LNTA\ i,\ t + \beta_6 CAPITALi, + \beta_7 LOANSTAi,t + \beta_8 GDPi,t + \beta_9 INFi,t + \beta_{10} MACGDPi,t + \beta_{11} FOREIGNi,t + \beta_{12} BSi,t + \beta_{13} EXPERi,t + \beta_{14} FEMALEi,t + \beta_{15} COMPENSATIONi, + ui + \varepsilon i,t \quad (1a)$$

Bank risk model

$$\textbf{(RISK) i, t} = \beta_0 + \beta_1 EC\text{-}FR\ i\ t + \beta_2 CR\text{-}REG\ i,\ t + \beta_3 LB\text{-}REG\ i,\ t + \beta_4 BS\text{-}REG\ i,\ t + \beta_5 LNTA\ i,\ t + \beta_6 CAPITALi,t + \beta_7 LOANSTAi,t + \beta_8 GDPi,t + \beta_9 INFi,t + \beta_{10} MACGDPi,t + \beta_{11} FOREIGNi,t + \beta_{12} BSi,t + \beta_{13} EXPERi,t + \beta_{14} FEMALEi,t + \beta_{15} COMPENSATIONi, + ui + \varepsilon i,t \quad (1b)$$

Where ***PERFOR*** and ***RISK*** denote performance and risk-taking respectively for bank i, **t** the time period, **ln** the natural logarithmic, **β** the parameters to be estimated, **u** the unobserved fixed-effect for bank **i** and **ε** the remaining disturbance term.

2.3.3.2 Endogeneity issues and Two-step system GMM model

To address the endogeneity problem in corporate governance literature, we use the two-step system estimator approach, proposed by Arrelano and Bover (1995) and Blundell and Bond (1998). This estimator involves the use of dynamic effect by adding a lagged dependent variable to the explanatory variable. Moreover, by applying the two-step system GMM, we can build instruments for endogenous variables. More precisely, to treat all potentially endogenous variables, we use their past values as their respective instruments (Vallascas and Hagendorff, 2013).

To test the validity of the multiple lags as an instrument, we calculate the Hansen/Sargan test (Pathan and Faff, 2013; Andres and Vallelado, 2008). The *AR(1)* and *AR(2)* measure first and second degree

[17] *Applying Hausman Test (Wooldridge, 2012) we conclude that the methodology to be used is Fixed Effects.*

serial correlation. The residuals of the first differences *AR(1)* may be correlated but there should be no correlation in the second differences *AR(2)* (Cameron and Trivedi, 2009).

Bank performance model

$$(PERFOR)\ i,\ t = \beta_0 + \beta_1 PERFOR\ i,\ (t-1) + \beta_2 EC\text{-}FR\ i,t + \beta_3 CR\text{-}REG\ i,t + \beta_4 LB\text{-}REG\ i,t + \beta_5 BS\text{-}REGi,t + \beta_6 LNTAi,t + \beta_7 CAPITALi,t + \beta_8 LOANSTAi,t + \beta_9 GDPi,t + \beta_{10} INFi,t + \beta_{11} MACGDPi,t + \beta_{12} FOREIGNi,t + \beta_{13} BSi,t + \beta_{14} EXPERi,t + \beta_{15} FEMALEi,t + \beta_{16} COMPENSATIONi, + ui + \varepsilon i,t \quad (2a)$$

Bank risk model

$$(RISK)\ i,\ t = \beta_0 + \beta_1 RISK\ i,\ (t-1) + \beta_2 EC\text{-}FR\ i,\ t + \beta_3 CR\text{-}REG\ i,\ t + \beta_4 LB\text{-}REG\ i,\ t + \beta_5 BS\text{-}REG\ i,\ t + \beta_6 LNTAi,t + \beta_7 CAPITALi,t + \beta_8 LOANSTAi,t + \beta_9 GDPi,t + \beta_{10} INFi,t + \beta_{11} MACGDPi,t + \beta_{12} FOREIGNi,t + \beta_{13} BSi,t + \beta_{14} EXPERi,t + \beta_{15} FEMALEi,t + \beta_{16} COMPENSATIONi, + ui + \varepsilon i,t \quad (2b)$$

Where ***PERFOR*** and ***RISK*** denote performance and risk-taking respectively for bank i, **t** the time period, **ln** the natural logarithmic, **β** the parameters to be estimated, **u** the unobserved fixed-effect for bank **i** and **ε** the remaining disturbance term.

Table 2.1 summarizes the definitions of the variables used in this study. More precisely, the first group concerns the dependent variables which are bank performance and bank risk. Moving to the second group, Table 2.1 represents the definitions of Fraser Index of Economic Freedom Indicators which are economic freedom, credit regulation, labor regulation, business regulation. Moreover, the third group, Table 2.1 below, provides the definitions of control variables (bank size, capital ratio, loans to total assets, GDP, inflation, stock market capitalization to GDP, presence of foreign banks, board size, financial experience, the percentage of female directors and compensation). Finally, except for the definitions of variables, Table 2.1 also presents the Databases which we used to extract the data.

Table 2.1: Definition of variables

	Variables	*Definition*	*Database*
Panel A: Dependent Variables			
Tobin'sQ	Tobin'sQ	The sum of the market value of equity and the book value of liabilities divided by the carrying amount of total assets	BankScope
ROAA	Return on average assets	The net income after taxes, as a percentage of total assets	BankScope
ROAE	Return on average equity	The net income after taxes as a percentage of equity	BankScope
NIM	Net interest margin	The net interest income as a percentage of average earning assets.	BankScope
Z-Score	Z-Score ratio	The ratio of: mean(ROAA)+CAR / st.dev (ROAA)	BankScope
NPL	Non-performing loans	The ratio of loans loss provisions divided by total loans	BankScope
Tier1-capital ratio	Tier1-capital ratio	The shareholder funds plus perpetual noncumulative preference shares as a percentage of risk weighted assets and off balance sheet risks measured under the Basel rules.	BankScope
Panel B: The Fraser Index of Economic Freedom Indicators			
EC-FR	Economic Freedom	It measures the degree to which the policies and institutions of countries are supportive of economic freedom. The cornerstones of economic freedom are personal choice, voluntary exchange, freedom to enter markets and compete, and security of the person and privately owned property. It measures the degree of economic freedom in five broad areas namely, size of government, property rights, access to sound money, freedom to trade international and regulation of credit, labor and business market. This variable takes values between 0 and 10 with higher values indicating greater economic freedom.	The 2017 version of the Fraser index of Economic Freedom
CR-REG	Credit Regulation	It reflects conditions in the domestic credit market. This variable takes values between 0 and 10 with higher values indicating greater economic freedom.	The 2017 version of the Fraser index of Economic Freedom
LB-REG	Labor Regulation	It measures the extent to which these restraints upon economic freedom are present. In order to earn high marks in the component rating regulation of the labor market, a country must allow market forces to determine wages and establish the conditions of hiring and firing, and refrain from the use of conscription. This variable takes values between 0 and 10 with higher values indicating greater economic freedom.	The 2017 version of the Fraser index of Economic Freedom
BS-REG	Business Regulation	It identifies the extent to which regulations and bureaucratic procedures restrain entry and reduce competition. This variable takes values between 0 and 10 with higher values indicating greater economic freedom.	The 2017 version of the Fraser index of Economic Freedom
CR-OWN	Ownership of banks	This sub-component measures the percentage of bank deposits held in privately owned banks. Countries with larger shares of privately held deposits received higher ratings. When privately held deposits between 95% and 100%, countries were given a rating of 10. When private deposits constituted between 75% and	

		95% of the total, a rating of 8 was assigned. When private deposits were between 40% and 75% of the total, the rating was 5. When private deposits are between 10% and 40%, countries received a rating of 2. A zero rating was assigned when private deposits were 10% or less of the total.	The 2017 version of the Fraser index of Economic Freedom
CR-PR	Private sector credit	This sub-component measures the extent to which government borrowing crowds out private borrowing. When data are available, this sub-component is calculated as the government fiscal deficit as a share of gross saving. Higher values are indicative of greater economic freedom.	The 2017 version of the Fraser index of Economic Freedom
CR-IR	Interest rate controls	Data on credit-market controls and regulations were used to construct rating intervals. Countries with interest rates determined by the market, stable monetary policy, and positive real deposit and lending rates received higher ratings. When interest rates were determined primarily by market forces and the real rates were positive, countries were given a rating of 10. A zero rating was assigned when the deposit and lending rates were fixed by the government and real rates were persistently negative by double-digit amounts or hyperinflation had virtually eliminated the credit market.	The 2017 version of the Fraser index of Economic Freedom
Panel C: Control Variables			
LNTA	Bank size	The natural logarithm of total assets	BankScope
CAPITAL	Capital adequacy ratio	The ratio of equity to total assets	BankScope
LOANSTA	Leverage ratio	The ratio of total liabilities to total assets	BankScope
GDP	GDP growth	The rate of real per capita GDP growth.	World Bank
INF	Inflation	Annual rate of inflation.	World Bank
MACGDP	Stock market capitalization to GDP	The ratio of stock market capitalization to GDP. The variable serves as a proxy of financial development.	World Bank
FOREIGN	Presence of foreign banks	Percentage of the total banking assets that are held by foreign banks. A foreign bank is a bank where 50 percent or more of its shares are owned by foreigners.	World Bank
COMPENSATION (in 000s)	Compensation	The sum of salary and bonus	BoardEx
FEMALE	Female directors	The percentage of directors on the board who are female	BoardEx
BS	Board size	The number of directors sitting on the board	BoardEx
EXPER	Financial experience	The average number of financial experience relevant either on the supervisory or executive board on which the director sits.	BoardEx

2.4. Empirical results

2.4.1 Descriptive statistics and Correlation matrix

Table 2.2 provides the descriptive statistics on dependent variables, independent variables and control variables for the sample of European banks from 2004 to 2016. More precisely, panel A presents descriptive statistics of bank risk-taking and performance measures. The average Tobin'sQ fluctuates between 0.04% and 1.63%. Also the sample mean return on average assets (ROAA) is 0.64%. Our findings are in line with Belhaj and Mateus (2016) and Staikouras et al. (2007) who find that Tobin'sQ average is 1.03% and the mean return on assets (ROA) is 0.75% using a sample of 58 European banks. The average return on average equity (ROAE) is 7.89% while for net interest income (NIM) the mean is 1.72%. In the same direction, Belhaj and Mateus (2016) find an average return on equity ROE of 9.7% over the period 2002-2011. As the sample includes the crisis period we observe some negative values for our performance measures.

Regarding risk measures, we see in Table 2.2 that the average Z-Score is 10.11. This means that many banks face a default risk (Levine, 2004) as a higher Z-Score indicates that a bank has higher returns to cover its liabilities. The mean ratio of non-performing loans (NPL) is 6.91% with a maximum value of 44.86%. The mean of Tier1-capital ratio is 11.11% with a minimum value of 4.20%.

The variables in Panel B of Table 2.2 show that the average of economic freedom (EC-FR) is 7.49 with a minimum of 6.43 and a maximum of 8.30. Regarding the variable credit regulation, Table 3.2 demonstrates that credit regulation has an average 8.97 with a minimum of 6.00 and a maximum of 10.00. Moreover, the component of labor regulations has a mean of 6.43. The average of business regulation is 7.14 with a minimum value of 4.77 and a maximum value of 8.57. Our results corroborate those of Mamatzakis et al. (2013) who examined the impact of regulation on bank efficiency in Central and Eastern European countries during the period 2000-2010 and show that credit regulations are more established compared to the reforms of the labor and business market regulation.

Panel C of Table 2.2 presents the descriptive statistics of the control variables considered in our study. The banks in our sample have an average asset size of €7.32 billion. We use the natural logarithm of total assets in order to eliminate the effect of outliers on our results. The average of capital adequacy ratio reaches 13.92% while the minimum value is 4.10%. Our results are close to

Belhaj and Mateus (2016) who find that the average equity to asset ratio (capital ratio) for European banks over the period 2002-2011, is 11.62%. Banks are highly leveraged; the mean ratio of leverage is 12.63% while the maximum value is 89.06%. Moreover, the mean of GDP growth is 0.99% while the average of inflation is 1.83%. Regarding the stock market capitalization to GDP we find that the minimum value is 9.06% and the maximum value is 57.17%. The mean concerning the presence of foreign banks is 23.54% with a minimum value of 0% and a maximum value of 90%. According to Agoraki et al. (2011) a high presence of foreign banks contributes to more benefits for banks and to less risk-taking (Demirguc-Kunt and Serve, 2009).

The bank governance variables in Panel C of Table 2.2 show that the average board size (BS) is 16.44 with a minimum of 2 and a maximum of 34 directors. Our results are close to Fernandes et al. (2017) who find that the average number of the board of directors is 16.39 for European banks over the period 2007-2008. Similarly, the results of Belhaj and Mateus (2016) show that during the period 2002-2011 European banks have an average number of board members of 15.87. According to Booth et al. (2002) the number of directors in banks is usually larger than the one in non-financial firms. A large board in banks can be explained by many factors, such as the large size of banks. Also, Table 2.2 reports that bank directors have on average 5.77 years of bank experience with a minimum of one year and a maximum of 19.45 years. The mean percentage of female directors is 13.36% with a minimum value of 0% and a maximum value of 54.45%. In addition, the mean salary plus bonus (total compensation) for the directors is €4.45 million.

Table 2.2: Descriptive statistics (2004-2016) All Countries

Variables	Observations	Mean	SD	Min	Max
Panel A: Dependent Variables					
Tobin'sQ (%)	645	1.02	0.15	0.04	1.63
ROAA (%)	809	0.64	1.17	-12.36	6.23
ROAE (%)	807	7.89	13.84	-48.01	51.46
NIM (%)	809	1.72	1.10	-1.60	10.27

Z-SCORE (%)	739	10.11	6.55	-3.05	41.14
NPL (%)	767	6.91	6.59	0.17	44.86
TIER1-CAPITAL (%)	714	11.11	4.61	4.20	69.25
Panel B: The Fraser Index of Economic Freedom Indicators					
EC-FR	861	7.49	0.30	6.43	8.30
CR-REG	861	8.97	0.81	6.00	10.00
LB-REG	861	6.43	1.21	3.68	8.46
BS-REG	860	7.14	0.86	4.77	8.57
Panel C: Control Variables					
LNTA (in €bil.)	811	7.32	1.98	2.59	11.76
CAPITAL (%)	727	13.92	4.67	4.10	68.36
LOANSTA (%)	807	12.63	16.2	24.02	89.06
GDP (%)	821	0.99	2.97	-9.13	25.55
INF (%)	821	1.83	1.27	-4.47	7.95
MACGDP (%)	790	49.10	29.30	9.06	57.17
FOREIGN (%)	720	21.55	23.54	0	90
BS (No)	861	16.44	5.89	2.00	34.00
EXPER (%)	861	5.77	2.76	1.00	19.45
FEMALE (%)	860	13.36	11.68	0.00	54.54
COMPENSATION	850	4.45	6.03	1.30	11.46

(in €mil.)

Note: This table presents the distribution of each variable by showing mean, standard deviation, minimum (min) and maximum (max) value.

Table 2.3 presents Pearson pair-wise sample correlations between variables. Multicollinearity among the regressors is not a serious concern since the maximum sample correlation is just 0.50 between Tier1-capital and Z-Score (Gujarati, 2004).

Table 2.3: Correlation Matrix

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	EC-FR	1.00																					
2	CR-REG	**0.21***	1.00																				
3	LB-REG	**0.33***	**0.30***	1.00																			
4	BS-REG	**0.32***	**0.20***	**0.38***	1.00																		
5	INF	-0.14	-0.07	**-0.08***	**-0.13***	1.00																	
6	GDP	0.12	**0.10***	0.11	**0.09***	**0.29***	1.00																
7	LNTA	**0.11***	0.16	**0.15***	**0.12***	0.17	0.16	1.00															
8	CAPITAL	0.19	0.17	0.21	0.25	**-0.13***	0.10	**-0.22***	1.00														
9	LOANSTA	-0.18	-0.16	-0.14	-0.22	0.11	**-0.09***	**-0.07***	0.12*	1.00													
10	MACGDP	0.12	-0.15	0.11	**0.26***	0.09	0.30	**0.16***	**-0.22***	0.16	1.00												
11	FOREIGN	**-0.14***	0.09	0.15	-0.08	**0.12***	**0.09***	**-0.15***	**0.21***	-.0.15	**-0.14***	1.00											
12	BS	**-0.11***	**-0.18***	-0.30	**-0.27***	-0.21	-0.06	**0.13***	**-0.22***	0.12	**-0.24***	0.06	1.00										
13	EXPER	**-0.17***	0.14	-0.07	0.12	0.07	**-0.09***	**0.14***	**-0.26***	**0.19***	0.17	0.07	-0.01	1.00									
14	FEMALE	**0.18***	**0.11***	**0.29***	**0.30***	-0.29	**0.08***	**0.27***	**0.17***	**0.12**	**0.18***	**-0.19***	**0.24***	**0.07***	1.00								
15	COMPENSATION	**0.32***	-0.12	**0.17***	0.15	**0.08***	**0.12***	**0.48***	0.02	**0.14**	0.30	-0.14	0.057	**-0.10***	**0.24***	1.00							
16	TOBIN'SQ	**0.17***	0.08	0.16	0.08	-0.07	**0.24***	**-0.18***	**0.10***	**0.21***	**0.14***	-0.07	**-0.26***	-0.01	0.03	0.07	1.00						
17	NPL	**-0.35***	-0.19	**-0.12**	**-0.20***	-0.26	**-0.19***	**-0.13***	**0.11***	**0.14***	**-0.38***	0.09	**-0.09***	-0.03	**0.08***	**0.14***	**0.11***	1.00					
18	ROAA	**0.12***	**0.24***	**0.15***	**0.18***	-0.10	**0.32***	**0.09***	**0.14***	-0.06	0.15	0.19	**-0.08***	**0.12***	-0.07	0.001	**0.33***	**-0.29***	1.00				
19	ROAE	**0.17***	**0.21***	**0.08***	**0.09***	-0.09	0.23	0.01	0.15	**-0.08***	**0.26***	0.18	-0.01	**0.07***	-0.01	0.03	**0.13***	**-0.12***	**0.39***	1.00			
20	NIM	**-0.23***	0.18	**-0.09***	**-0.33***	0.12	**-0.06**	**-0.23***	-0.05	0.19	-0.24	**0.25***	-0.02	**0.23***	-0.04	**0.09***	**0.19***	**0.27***	**0.24***	**0.07***	1.00		
21	Z-SCORE	**0.25***	0.15	0.32	**0.27***	-0.14	**0.17***	**0.10***	**0.38***	**0.12**	**0.34***	**-0.12***	**-0.31***	0.068	**0.32***	**0.21***	**0.19***	**-0.19***	**0.25***	**0.21***	-0.045	1.00	
22	TIER1-CAPITAL	**0.08***	0.09	**0.21***	0.24	**-0.17***	-0.16	**-0.13***	**0.22***	**-0.28***	-0.06	0.08	**-0.25***	-0.014	-0.024	-0.03	**0.09***	0.12	**0.15***	0.07	-0.012	**0.50***	1.00

Note: The table reports Pearson Correlation Matrix. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

2.4.2 Descriptive statistics per country and per year

Tables 2.4a and 2.4b present the average value of Frazer Index of Economic Freedom Indicators (economic freedom, credit regulations, labor regulations, market regulations) per country and per year respectively. Regarding the analysis of the countries (Table 2.4a) we notice that the average size of economic freedom varies between 6.96 in Greece and 8.05 in the UK. Greece and Poland have the lowest value of economic freedom with an average of 6.96 and 7.11 respectively, while Ireland and the UK have the highest value of economic freedom with an average of 8.01 and 8.05 correspondingly. This means that developed countries are more liberal than developing ones, as they record higher value on the index of economic freedom.

As far as the credit regulation is concerned, it varies from 7.84 to 9.92. At the country level the best performers in terms of credit regulation (CR-REG) are Spain (9.92) and Denmark (9.84) while the worst is Greece (7.84). Regarding labor regulation (LB-REG) the most liberalized labor markets are the UK (8.25) and Sweden (7.96) while Greece (4.46) and Germany (4.61) are the countries with the most rigid labor regulation. Moreover, business regulation (BS-REG) is significantly more liberal in Sweden (8.19) while Italy (5.87) and the Czech Republic (6.03) represent the countries with the most strict business regulation (BS-REG).

Continuing with the per year analysis (Table 2.4b), we notice that in 2004 the mean of economic freedom was 7.58 and remained at the same level during the crisis with an average of 7.40. Regarding the credit regulation (CR-REG), Table 2.4b reports that there is a slight increase as from 9.06 in 2004 it reached 9.14 in 2016 while freedom from labor regulation (LB-REG) has increased from 5.79 to 7.03 over the same period. Similarly, business regulation has improved from 7.29 in 2004 to 7.71 in 2016. Our results corroborate the research conducted by Mamatzakis et al. (2013) who found that credit, labor and business regulation improved during the period 2000-2010 in the Central and Eastern European countries.

Table 2.4a: Descriptive statistics per country

Countries	*Variables*			
	EC-FR	***CR-REG***	***LB-REG***	***BS-REG***
Austria	7.66	9.25	5.99	7.28
Poland	7.11	8.50	5.41	6.03
Czech Republic	7.35	9.53	7.88	5.93
Hungary	7.28	9.61	9.86	6.40
Luxembourg	7.54	9.00	9.63	7.65
Belgium	7.39	9.52	7.10	7.13
Germany	7.62	8.06	4.61	7.38
Netherlands	7.60	9.41	4.72	7.36
France	7.34	9.36	5.65	7.13
Ireland	8.01	8.60	7.70	7.84
UK	8.05	8.64	8.25	7.76
Denmark	7.77	9.84	7.40	8.05
Sweden	7.48	9.27	7.96	8.19
Finland	7.76	9.71	5.36	8.13
Portugal	7.29	7.86	5.39	6.53
Spain	7.45	9.92	5.81	7.67
Greece	6.96	7.84	4.46	6.19
Italy	7.20	8.94	6.46	5.87

Note: This table reports the mean value in each country for economic freedom and regulation variables.

Table 2.4b: Descriptive statistics per year

Year	*Variables*			
	EC-FR	***CR-REG***	***LB-REG***	***BS-REG***
2004	7.58	9.06	5.79	7.29
2005	7.61	9.06	6.05	7.16
2006	7.57	9.11	6.08	6.73
2007	7.53	9.03	6.04	6.61
2008	7.43	9.06	6.10	6.61
2009	7.39	9.00	6.49	6.64
2010	7.41	8.57	6.54	7.31
2011	7.46	8.84	6.75	7.38
2012	7.43	8.85	6.82	7.41
2013	7.46	9.01	6.72	7.45
2014	7.54	9.08	6.66	7.34
2015	7.57	9.07	6.83	7.70
2016	7.56	9.14	7.03	7.71

Note: This table reports the mean value in each year for economic freedom and regulation variables.

2.4.3 Empirical results based on the Fixed-Effects method

Tables 2.5 and 2.6 report the Fixed-Effects estimation results on equations (1a, 1b) for bank performance and risk-taking as the dependent variables. The effect of economic freedom (EC-FR) on performance is positive and significant at the 1% level only for net interest margin, rendering support to hypothesis H1.a. Our results are consistent with Wah Low et al. (2010) who found that economic freedom increased bank performance in Singapore during the period 1975-2006. A possible explanation is that a competitive banking market can exploit the benefits of broad banking activities (Sufian and Majid, 2011). Moreover, the effect of economic freedom is positive for Z-Score and Tier1-capital but negative and statistically significant for non-performing loans, providing support for hypothesis H1.d. According to Barth et al. (2006) in terms of diversification there are many benefits for banks from range activities.

The estimated coefficient of credit regulation (CR-REG) is positive and significant at the 1% level for return on average assets (ROAA) and return on average equity (ROAE). The positive impact of liberal credit regulation on bank performance is in line with previous studies (Chortareas et al., 2013; Sufian and Habibullah, 2010) who show that permitting banks to engage in a range of activities leads to economic growth. Thus, we accept hypothesis H2.1.a. However, the results regarding the effect of credit regulation on bank risk-taking are not significant (Table 2.6) and hence, we reject both hypotheses H2.1.C and H.2.1.d.

Furthermore, the results regarding the coefficient of labor regulation (LB-REG) on bank performance is positive for the net interest margin at the 1% level (Table 2.5), rendering support for hypothesis H2.2.a. As mentioned by Psillaki and Mamatzakis (2017) liberal reforms in the labor market may increase bank efficiency as they reduce employee complacency and associated absenteeism (Riphahn, 2004). Regarding the risk-taking of banks, it is observed from Table 2.6 that labor regulation increases the proportion of Tier1-capital ratio. This means that relaxing regulation contributes to financial stability (Barth et al., 2013). Hence, we accept hypothesis H2.2.d.

Moreover, we find that the coefficient of business regulation (BS-REG) has a positive and statistically significant impact on bank performance for all proxies at the 1% level. This means that liberal business regulation improves bank performance. One possible explanation is that fewer restrictions concerning new companies are more likely to increase bank efficiency (Psillaki and Mamatzakis, 2017). Therefore, hypothesis H2.3.a is confirmed. Additionally, the effect of business regulation is negatively related with bank risk-taking when measured by non-performing loans

(Table 2.6). Thus, liberal business regulations are beneficial for banks as they make it easy for banks to assess the creditworthiness of a company which in turn leads to lower levels of non-performing loans (Loayza et al., 2005). Consequently, we accept hypothesis H2.3.d.

As far as concerns control variables are concerned, bank size (LNTA) appears to be negatively and statistically significant at the 1% for Tobin'sQ and return on average assets (ROAA). A possible explanation is that the increase of portfolio diversification leads to lower risks and therefore lower return for banks. Our findings support previous researches conducted by Staikouras et al. (2007), Belhaj and Mateus (2016), among others. Moreover, the impact of bank size on risk-taking is positive and significant at the 1% level for Z-Score.

The effect of capital ratio (CAPITAL) is positive and statistically significant in all performance measures except for Tobin'sQ and return on average assets (ROAA). This positive relationship indicates that banks with high capitalization perform better (Pathan and Faff, 2013, Das and Ghosh, 2006; Psillaki and Mamatzakis, 2017). As a result, banks with better high capitalization are more stable. However, the results regarding the coefficient of capital ratio on risk-taking are mixed; positive and significant at the 1% level for Tier1-cpaital but negative at different levels for Z-Score and on-performing loans. Banks that are active in lending business have more risky investments. As mentioned by Berger et al. (2012) risky banks also hold on average more off-balance-sheet items. This indicates that these items are not used to offset risks on the balance sheet, but rather as an additional instrument to engage in risky investments.

The GDP growth appears to be positively and statistically significant at different levels regardless of how performance is measured. One possible explanation is that higher levels of GDP growth are associated with less credit risk and more bank performance (Agoraki et al., 2011). In addition, there is no statistically significant relationship to any bank risk indicator and GDP growth. Moreover, the impact of inflation (INF) on bank performance is negative and significant at different levels for all measures except from return on average equity (ROAE). A possible explanation is that a high level of inflation is associated with more costs and therefore, decreases bank performance (Kasman and Yildirim, 2006; Pasiouras et al., 2009). Also, the coefficient of inflation on bank risk-taking is positive and significant at the 1% level for non-performing loans, and thus, contributes to credit risk (Table 2.6).

The effect of capital stock market capitalization to GDP (MACGDP) is negative and statistically significant at the 1% level for all performance measures except for the net interest margin (Table

2.5). Moreover, the impact of stock market capitalization to GDP on bank risk-taking is negative at the 1% level for both Z-Score and Tier1-capital ratio but positive at the 1% level for non-performing loans. A possible explanation is that in a well-developed country, businesses have the opportunity to rely on equity rather than on bank finance (Pasiouras et al., 2009).

Moreover, the presence of foreign banks (FOREIGN) appears to be positively and statistically significant at the 10% level for net interest margin. A possible explanation is that when banks operate within a highly concentrated market, they have the ability to charge high loan rates. Our findings support previous research conducted by Ataullah and Le (2006) among others. However, the impact of the presence of foreign banks on risk-taking is not significant.

Also, we consider the ratio of loans to total assets as a proxy for asset utilization (LOANSTA). Our results are mixed; we show a negative relationship between loans to total assets and bank performance for Tobin'sQ and net interest margin but a positive and significant at the 1% significance level for return on average assets (ROAA) and return on average equity (ROAE); the negative association between asset utilization and bank efficiency may reflect greater pressure in containing costs of credit origination and monitoring for larger loan portfolios. Moreover, our findings indicate that the effect of asset utilization on risk-taking is negative for Z-Score and Tier1-capital ratio at the 1% level.

The effect of board size (BS) on performance is positive and significant at the 1% and 5% level for return on average assets (ROAA) and return on average equity (ROAE) respectively. Our results are consistent with those from Table 1.6 which argue that a large number of directors on boards may contribute positively to the decision-making process and, hence, improve the performance of banks. Regarding the risk-taking the results are not the same as in Table 1.7. More precisely, we show that the effect of board size is negative and significant at the 10% level for non-performing loans but positive and significant at the 5% level for Tier1-capital ratio (Table 2.6). Thus, when we consider macroeconomic variables, the findings regarding the relationship between board size and risk-taking change on the Fixed-Effects model. One possible explanation is that high levels of economic freedom in conjunction with less labor regulation could lead to better decisions and less risk-taking through higher labor force participation. This means that in such environments the different skills and experiences of board members may constitute a large board more efficient.

In Table 2.5 we find that the estimated coefficient of the financial experience (EXPER) of directors is positive and significant at different levels for all measures except for Tobin'sQ, as in Table 1.6.

Experienced directors have a better understanding of the dynamics and complexity of the banking market activity and its regulatory environment. Regarding the risk-taking of banks, it is observed from Table 2.6 that the experience of directors reduces the percentage of non-performing loans (NPL) and increases Z-Score as in Table 1.7. Thus, the impact of macroeconomic variables does not change the effect of financial experience on both bank performance and risk-taking.

Gender diversity increases bank performance when measured by net interest margin (Table 2.5). This result is in line with those in Table 1.6. and hence, indicates that female directors (FEMALE) are more effective than men in monitoring. Moreover, the results (Table 2.6) regarding the effect of female directors on risk-taking are the same as in Table 1.7. More precisely, the presence of women on boards reduces bank risk when measured by Z-Score ratio. Consequently, the implementation of macroeconomic variables does not alter the effect of gender diversity on bank risk-taking.

In addition, from Table 2.5 we observe that the compensation of directors (COMPENSATION) has a positive and significant impact on all performance measures. Also, the impact of compensation, which is measured by cash and bonus, on bank risk-taking is positive and significant at the 10% level only for the Tier1-capital ratio. Therefore, the macroeconomic conditions do not change the impact of compensation on both bank performance and risk-taking. Thus, an increase in cash bonuses lowers bank risk.

Table 2.5: Empirical results for bank performance based on Fixed-Effects

Variables	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**
EC-FR	0.0258	-0.372	0.046	**0.0332****
	(0.276)	(0.330)	(0.142)	(0.05)
CR-REG	-0.0014	**0.0354*****	**0.0604*****	0.0073
	(0.223)	(0.000)	(0.000)	(0.514)
LB-REG	0.0044	-0.055	0.0132	**0.0114*****
	(0.295)	(0.462)	(0.395)	(0.001)
BS-REG	**0.011*****	**0.245*****	**0.085*****	**0.0151*****
	(0.000)	(0.000)	(0.000)	(0.000)
LNTA	**-0.0856*****	**-0.064*****	-0.345	0.0453
	(0.000)	(0.001)	(0.293)	(0.200)
CAPITAL	0.00267	0.016	**0.071****	**0.0353*****
	(0.234)	(0.407)	(0.04)	(0.000)

LOANSTA	**-0.0082*** **	**0.381*** **	**0.0386*** **	**-0.08612*** **
	(0.000)	(0.000)	(0.000)	(0.000)
GDP	**0.015***	**0.0531*** **	**0.119*** **	0.0612
	(0.10)	(0.001)	(0.000)	(0.211)
INF	**-0.0041*** **	**-0.055***	-0.155	**-0.0377** **
	(0.001)	(0.10)	(0.192)	(0.04)
MACGDP	**-0.077*** **	**-0.0126*** **	**-0.213*** **	-0.0119
	(0.000)	(0.001)	(0.000)	(0.221)
FOREIGN	0.00589	-0.00438	-0.232	**0.0821***
	(0.209)	(0.313)	(0.271)	(0.06)
BS	0.0025	**0.0144*** **	**0.0528** **	0.0126
	(0.539)	(0.001)	(0.05)	(0.165)
EXPER	-0.015	**0.0521** **	**0.0985** **	**0.0325*** **
	(0.238)	(0.05)	(0.05)	(0.000)
FEMALE	0.0017	0.0013	0.0596	**0.0564***
	(0.287)	(0.199)	(0.185)	(0.10)
COMPENSATION	0.00289	**0.00625***	**0.0076***	0.00269
	(0.166)	(0.09)	(0.10)	(0.231)
Constant	**1.632*** **	**2.45*** **	**3.78*** **	**2.214*** **
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	758	784	649	657
Adjusted R^2	0.217	0.224	0.267	0.231
N. of Banks	73	73	73	73

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank performance (PERFOR) which measured by Tobin'sQ, ROAA, ROAE and NIM. Definitions of all variables are provided in Table 2.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 2.6: Empirical results for bank risk based on Fixed Effects

Variables	**Z-Score**	**NPL**	**Tier1-Capital**
EC-FR	**0.0865***	**-0.0425*** **	**0.0497*** **
	(0.10)	(0.001)	(0.003)
CR-REG	0.0127	0.0240	0.0159
	(0.178)	(0.179)	(0.189)

LB-REG	-0.01185	-0.0351	**0.0167*** **
	(0.288)	(0.246)	(0.001)
BS-REG	0.0872	**-0.0177*** **	0.0592
	(0.129)	(0.000)	(0.411)
LNTA	**0.02574***	0.0340	0.0432
	(0.10)	(0.143)	(0.107)
CAPITAL	**-0.0866*** **	**-0.0194** **	**0.0778*** **
	(0.000)	(0.027)	(0.000)
LOANSTA	**-0.0285*** **	-0.01305	**-0.0460*** **
	(0.000)	(0.289)	(0.000)
GDP	-0.0306	-0.1144	0.0988
	(0.261)	(0.157)	(0.156)
INF	-0.0206	**0.0670*** **	-0.0074
	(0.175)	(0.000)	(0.198)
MACGDP	**-0.0287*** **	**0.0788*** **	**-0.0967*** **
	(0.000)	(0.000)	(0.000)
FOREIGN	-0.0132	0.0231	0.04752
	(0.257)	(0.151)	(0.109)
BS	0.0372	**-0.1029***	**0.0457** **
	(0.313)	(0.06)	(0.05)
EXPER	**0.0668** **	**-0.0282*** **	0.0102
	(0.05)	(0.000)	(0.128)
FEMALE	**0.0141***	-0.0381	0.0991
	(0.10)	(0.161)	(0.192)
COMPENSATION	0.00635	0.00958	**0.821*** **
	(0.222)	(0.131)	(0.000)
Constant	**2.337*** **	**3.432*** **	**3.752*** **
	(0.000)	(0.000)	(0.000)
Observations	758	612	753
N. of Banks	74	67	74
Adjusted R^2	0.318	0.284	0.243

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank risk (RISK) which measured by Z-Score, NPL and Tier1-Capital. Definitions of all variables are provided in Table 2.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

4.3.1 Decomposing credit market regulation

To investigate further the impact of credit regulation on bank performance and risk-taking we next consider its main components. These are the percentage of deposits held in privately owned banks (CR-OWN), the government borrowing that does not crowd out private sector borrowing (CR-PR) and the limitation in the interest rates controls (CR-IR) that lead to high spreads and/or negative real interest rates (Psillaki and Mamatzakis, 2017). The models, described by equations 3a and 3b below, are estimated using the Fixed-Effects method.

Bank performance model

$$\boldsymbol{(PERFOR)i,t}=\beta_0+\beta_1 CR\text{-}OWNi,t+\beta_2 CR\text{-}PRi,t+\beta_3 CR\text{-}IRi,t+\beta_5 LNTAi,t+\beta_6 CAPITALi,+\beta_7 LOANSTA_{i,t}+\beta_8 GDPi,t+\beta_9 INFi,t+\beta_{10} MACGDPi,t+\beta_{11} FOREIGNi,t+\beta_{12} BSi,t+\beta_{13} EXPERi,t+\beta_{14} FEMALEi,t+\beta_{15} COMPENSATIONi,+ ui + \varepsilon i,t \quad (3a)$$

Bank risk model

$$\boldsymbol{(RISK)i,t}=\beta_0+\beta_1 CR\text{-}OWNi,t+\beta_2 CR\text{-}PRi,t+\beta_3 CR\text{-}IRi,t+\beta_5 LNTAi,t+\beta_6 CAPITALi,+\beta_7 LOANSTA_{i,t}+\beta_8 GDPi,t+\beta_9 INFi,t+\beta_{10} MACGDPi,t+\beta_{11} FOREIGNi,t+\beta_{12} BSi,t+\beta_{13} EXPERi,t+\beta_{14} FEMALEi,t+\beta_{15} COMPENSATIONi,+ ui + \varepsilon i,t \quad (3b)$$

Where ***PERFOR*** and ***RISK*** denote performance and risk-taking respectively for bank i, **t** the time period, **ln** the natural logarithmic, **β** the parameters to be estimated, **u** the unobserved fixed-effect for bank **i** and **ε** the remaining disturbance term.

The results in Table 2.7 indicate that the credit ownership (CR-OWN) variable increases bank performance at different levels when measured by Tobin'sQ and net interest margin. One possible explanation is that private ownership of banks increases performance through better allocation of credit in the economy that results from more adherences to market discipline (Mian, 2003). Moreover, the coefficient of the privately owned banks variable (CR-OWN) has no significant impact on bank risk-taking regardless of risk proxy.

Regarding the private sector variable (CR-PR) variable, we find that the impact on bank performance is negative and significant for return on average assets (ROAA) and return on average equity (ROAE) at the 1% and 5% levels respectively (Table 2.7). Our results are in line with those of Psillaki and Mamatzakis (2017) and Mamatzakis et al. (2013). One possible explanation is that the

private sector is linked to costly monitoring and screening which turn in decreased profitability. However the results are mixed for bank risk-taking (Table 2.8). More precisely, we find that private sector borrowing has a negative and significant impact at the 1% level for non-performing loans which means which reduces credit risk. Also the impact on Tier1-capital is negative and hence, the government borrowing that does not crowd out private sector borrowing leads to a less stable banking system. One possible explanation is that when credit is directed to state the financial system is more stable.

The coefficient of interest rate controls (CR-IR) has a negative and significant impact on bank performance for almost all proxies except for Tobin'sQ at different levels (Table 2.7). Concerning the effect on risk-taking, we show in Table 2.8 that the interest rate control variables (CR-IR) increase bankruptcy. One possible explanation is that interest rate controls act as barriers for banks to take on increased risk and high-return projects (Hellman et al., 2000).

Concerning the impact of board size (BS) on bank performance when we employ the sub-components is positive and significant at the 5% level for return on average assets (ROAA). Our results are consistent with those from Table 2.5 which argue that a large number of directors on boards may contribute positively to the decision-making process and, hence, improve bank performance. Regarding risk-taking the results are the same as in Table 2.6. More precisely, we show that the effect of board size is negative and significant at the 5% level for non-performing loans (Table 2.8).

In Table 2.7 we find that the estimated coefficient of the financial experience (EXPER) of directors is positive and significant at different levels for all measures, as in Fixed-Effects model (Table 2.5). Experienced directors have a better understanding of the complexity of financial activities and its regulatory environment. Regarding the risk-taking of banks, it is observed from Table 2.6 that the experience of directors reduces the percentage of non-performing loans (NPL) and increases Z-Score and Tier1-capital as in Table 2.6.

Gender diversity (FEMALE) has no significant impact on bank performance for any measure (Table 2.7). Moreover, the results regarding the effect of female directors on risk-taking are the same as in Table 2.6. More precisely, the presence of women on boards reduces bank risk when measured by Z-Score ratio. Female directors are more risk averse than men. Finally, from Tables 2.7 and 2.8 we observe that the compensation of directors (COMPENSATION) has no significant impact on bank performance and risk-taking.

Table 2.7: The impact of the Fraser sub-components of the Credit Regulation index on bank performance

Variables	Tobin'sQ	ROAA	ROAE	NIM
CR-OWN	**0.00864***	0.0198	-0.827	**0.126*****
	(0.08)	(0.713)	(0.984)	(0.000)
CR-PR	-0.00216	**-0.227*****	**-0.254****	-0.0501
	(0.361)	(0.001)	(0.04)	(0.327)
CR-IR	-0.00909	**-0.451*****	**-0.3888***	**-0.220*****
	(0.765)	(0.000)	(0.10)	(0.002)
GDP	**0.00048****	**0.112*****	**0.1731*****	0.00514
	(0.02)	(0.001)	(0.000)	(0.732)
INF	-0.0016	**-0.0241****	-0.524	**0.0309****
	(0.432)	(0.03)	(0.546)	(0.04)
CAPITAL	**0.00386****	**0.0394*****	0.274	-0.00741
	(0.02)	(0.001)	(0.194)	(0.649)
LNTA	0.00254	**-0.150*****	**-0.436*****	**-0.177*****
	(0.174)	(0.001)	(0.000)	(0.001)
LOANSTA	**-0.478*****	0.00340	**-0.315*****	**0.0163*****
	(0.01)	(0.354)	(0.000)	(0.002)
MACGDP	**0.0994*****	**0.00693*****	**0.124*****	-0.00169
	(0.000)	(0.002)	(0.000)	(0.152)
FOREIGN	-0.00284	**0.00571****	**0.0624***	**0.00558****
	(0.312)	(0.04)	(0.10)	(0.05)
BS	-0.00749	**0.181****	1.990	-0.0208
	(0.596)	(0.08)	(1.216)	(0.0501)
EXPER	**0.00238****	**0.0714*****	**0.885*****	**0.0317*****
	(0.001)	(0.001)	(0.000)	(0.001)
FEMALE	-0.00426	-0.00849	-0.0157	0.00188
	(0.284)	(0.525)	(0.731)	(0.250)
COMPENSATION	-0.00839	0.00417	0.00617	-0.00130
	(0.179)	(0.328)	(0.452)	(0.151)
Constant	**0.567*****	**1.896****	**1.447*****	**2.494*****
	(0.000)	(0.05)	(0.001)	(0.000)
Observations	482	567	555	567

Adjusted R^2	0.294	0.287	0.257	0.301
N. of Banks	67	73	73	73

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank performance (PERFOR) which measured by Tobin'sQ, ROAA, ROAE and NIM. Definitions of all variables are provided in Table 2.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 2.8: The impact of the Fraser sub-components of the Credit Regulation index on bank risk

Variables	**Z-Score**	**NPL**	**Tier1-Capital**
CR-OWN	-0.00821	0.397	-0.00680
	(0.135)	(0.353)	(0.124)
CR-PR	0.0454	**-0.837*** **	**-0.194***
	(0.115)	(0.000)	(0.10)
CR-IR	**-0.828*** **	0.897	**-0.475****
	(0.000)	(0.619)	(0.05)
GDP	0.0161	-0.125	-0.0357
	(0.255)	(0.780)	(0.247)
INF	-0.0520	**-0.680*** **	-0.0277
	(0.474)	(0.000)	(0.482)
LNTA	0.0341	0.236	-0.0682
	(0.170)	(0.285)	(0.101)
CAPITAL	**0.952*** **	**0.272*** **	**0.903*** **
	(0.000)	(0.000)	(0.000)
LOANSTA	0.0118	-0.0215	**-0.0280*** **
	(0.993)	(0.219)	(0.001)
MACGDP	**0.0301*** **	**-0.0872*** **	-0.0279
	(0.001)	(0.001)	(0.481)
FOREIGN	-0.0160	**-0.0376****	0.00161
	(0.121)	(0.05)	(0.675)
BS	-0.250	**-1.028****	0.0704
	(0.178)	(0.05)	(0.163)
EXPER	**0.0603***	**-0.223****	**0.0574***
	(0.10)	(0.05)	(0.10)
FEMALE	**0.0164***	-0.00642	**0.0210****

	(0.10)	(0.252)	(0.05)
COMPENSATION	0.00435	0.00947	-0.00356
	(0.518)	(0.154)	(0.595)
Constant	**2.129*** **	**1.953*** **	**1.755*** **
	(0.000)	(0.000)	(0.000)
Observations	568	506	559
Adjusted R^2	0.297	0.265	0.258
N. of banks	73	65	72

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank risk (RISK) which measured by Z-Score, NPL and Tier1-Capital. Definitions of all variables are provided in Table 2.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

2.4.4 Empirical results based on the two-step system GMM method

We report the system estimator regression results in Tables 2.9 and Table 2.10. In line with our previous results, economic freedom (EC-FR) is positively related to bank performance at different levels for all measures apart from net interest margin. This positive relationship between economic freedom and bank performance was indicated by the Fixed-Effects method. Thus, hypothesis H1.a is accepted. Countries with heavy regulation reduce opportunities, and hence, decrease competition. Moreover, the effect of economic freedom on risk-taking is positive and statistically significant for the Z-Score ratio and Tier1-capital ratio but negative for non-performing loans (NPL), rendering support to hypothesis H1.d. Our results indicate that more economic freedom is associated with a lower probability of default due to high competition and economic growth. Thus, economic freedom promotes financial system soundness.

Similarly, as before, credit regulation (CR-REG) is positively related to bank performance at the 1% level for the Tobin'sQ ratio, the return on average assets (ROAA) and the return on average equity (ROAE), at different levels, providing support for hypothesis H2.1.a. In contradiction to our previous findings, the results regarding the coefficient of credit regulation on risk-taking are mixed. More precisely, credit regulation (CR-REG) is positively related to bank risk at the 1% level for Z-Score ratio and at the 10% level for non-performing loans (NPL). As a consequence, the liberal credit regulation increases credit risk (Table 2.10). One possible explanation for this result is that stricter regulation in combination with a high level of market power contributes to reduction of credit risk (Agoraki et al., 2011). Thus, we accept both hypotheses H2.1.c and H2.1.d.

The effect of labor regulation (LB-REG) on bank performance is positive and significant, as before, for all proxies at different levels, except for net interest margin Thus, we accept hypothesis H2.2.a. One possible explanation is that greater regulation reduces competition and thus, leads to low levels of bank efficiency (Scarpetta and Tressel, 2004). Concerning the effect of labor regulation on risk-taking the results remain the same, with those from Fixed-Effects model (Table 2.6). More precisely, liberal labor regulation reduces risk-taking, as we find a positive and significant relationship for Z-score but negative for non-performing loans (Table 2.10). Therefore, we accept hypothesis H2.2.d.

The results regarding business regulation (BS-REG) on bank performance are the same as before. Based on the two-step system GMM method (Table 2.9), we find a positive and significant relationship between business regulation and bank performance for all proxies apart from net interest margin. Thus, we accept hypothesis H.2.3.a. Moreover, the effect of business regulation on risk-taking is positive and statistically significant for the Z-Score ratio but negative for non-performing loans (NPL) at the 1% level (Table 2.10), rendering support to hypotheses H2.3.c and H2.3.d. A possible explanation for this result is that liberal regulation of the business market leads to low levels of non-performing loans and therefore to less credit risk.

Contrary to our previous results the effect of bank size (LNTA) on performance is now positive and significant at different levels for almost all proxies except for return on average assets (ROAA). Larger banks are expected to use better technology, be more diversified and better managed. Larger banks may also enjoy economies of scale. Regarding risk-taking, the results remain the same as in the Fixed-Effects model. More precisely, the effect of size (LNTA) on bank risk-taking is positive and significant at the 1% level for Z-Score and Tier1-capital ratio (Table 2.10), in line with the too-big-to-fail concept.

Our results in Table 2.9 show a positive relationship between tighter capital regulation (CAPITAL) and bank performance for all performance measures. In line with our previous findings, the effect of capital ratio is negative at the 5% level for non-performing loans (NPL) but positive at the 1% level for Z-Score and Tier1-capital ratio. Well-capitalized banks have the required liquidity in order to manage credit risk.

According to the GDP growth (GDP) the sign of the relationship remains constant and positive for bank performance as on the Fixed-Effects model. In contradiction to our previous results, we find that the impact of GDP growth on bank risk-taking is positive and significant at the 5% level for Z-Score. More, precisely, banks with higher leverage tend to decrease probability of default (Table

2.10). Our result corroborates research conducted by Agoraki et al. (2011) who claim that high levels of GDP growth increase bank soundness.

Concerning the relationship between bank performance and inflation (INF) the results are the same as on the Fixed-Effects model (Table 2.5). More precisely, the inflation is negative and significant at the 1% level for almost all proxies apart from net interest margin (NIM). One possible explanation for this result is that a lower inflationary environment is more conducive to bank activities (Barth et al., 2013). Similarly, the results regarding the impact of the inflation variable on risk-taking remain the same in the two-step system GMM model. According to Table 2.10 we find a positive and significant relationship between inflation and bank risk-taking, measured by non-performing loans at the 10% level, meaning that high levels on inflation increase credit risk.

In contradiction to our previous results the effect of stock market capitalization to GDP (MACGDP) is positive and significant at the 1% level for return on average assets (ROAA) and return on average equity (ROAE). Our results are in line with those of Barth et al. (2006) and Demirguc-Kunt and Huizinga (1999) among others, who found a positive relationship between stock market capitalization and bank performance. According to the authors, this positive relationship could be explained due to the complementary effect between debt and equity financing (Pasiouras et al, 2009).

Moreover, the results regarding the effect of stock market capitalization (MACGDP) on bank risk-taking are different from those using the Fixed-Effects model (Table 2.6). More precisely, the stock market capitalization is positive and significant at different levels for both Z-Score and Tier1-capital but negative for non-performing loans at the 1% level, meaning that stock market capitalization reduces credit risk and contributes to the financial stability.

Regarding the effect of the presence of foreign banks (FOREIGN) the results are not the same as before. Based on the two-step system GMM model in Table 2.9 we show that there is no significant relationship between bank performance and foreign banks. Moreover, regarding bank risk-taking the results are mixed (Table 2.10) and different from those of the Fixed-Effects model (Table 2.6). More precisely, we find that foreign banks increase credit risk as they are positively linked to non-performing loans but they also enhance the Tier1-capital ratio.

Contrary to our previous results the effect of loans to total assets (LOANSTA) on bank performance is negative and statistically significant at the 1% level for all proxies (Table 2.9). Moreover, our findings indicate that the effect of asset utilization on risk-taking is negative for Z-Score and Tier1-capital ratio at the 5% level but positive and significant at the same level for non-performing loans.

One possible explanation for this result is that loans are usually linked to higher operational risks and, therefore, they need to be monitored (Garcia-Herrero et al., 2009).

In addition, the relationship between board size (BS) and performance is negative and significant at the 1% for return on average assets (Table 2.9). Our findings indicate that the board of directors becomes less effective when the number of members increases (Pathan and Faff, 2013). The impact of board size on risk-taking is negative at the 5% for Z-Score and Tier1-capital ratio (Table 2.10). Our findings differ from the corresponding ones in Table 1.9. A liberal economic environment in conjunction with less credit regulation might give the opportunity to board members to take more risks and hence, to increase the likelihood of default risk.

Based on the results in Table 2.9, we find that the effect of financial experience (EXPER) on bank performance is positive and significant at different levels, except for return on average equity (ROAE). Furthermore, the experience of directors has a positive impact on credit risk-taking as it is positively associated with non-performing loans (Table 2.10). Our results are the same as those in Table 1.8 and Table 1.9. One possible explanation is that managers often operate in the interest of shareholders and hence led to risky decisions. Macroeconomic conditions do not alter the impact of financial experience on bank performance and risk-taking.

Furthermore, in Table 2.9 we find that the effect of female directors on bank performance is positive and significant at different levels except for return on average equity (ROAE). Moreover, the effect of female directors (FEMALE) on bank risk-taking is negative and significant at the 1% level for non-performing loans (Table 2.10). Thus, macroeconomic conditions change the impact of gender diversity on bank performance and risk-taking when we apply the two-step system GMM model. One possible explanation is that in a liberal labor environment the presence of women tends to be high. This in turn, leads to less credit risk as women are considered to be less overconfident than men, and thus, they do not take risks.

Concerning the relationship between bank performance and compensation (COMPENSATION) the results are the same as in Tables 1.8 and 1.9. More precisely, the compensation of directors is positive and significant at the 1% level for Tobin'sQ (Table 2.9). Regarding the risk-taking the impact of compensation is negative and significant at the 1% level for both non-performing loans and Tier1-capital. One possible explanation is that in a more liberal and competitive environment, directors are more willing to invest in positive Net Present Value projects (Curi and Murgia, 2018).

Table 2.9: Empirical results for bank performance based on Two-step system GMM method

Variables	Tobin'sQ	ROAA	ROAE	NIM
L.Tobin'sQ	**0.722*** **			
	(0.000)			
L.ROAA		**0.1196*** **		
		(0.000)		
L.ROAE			**0.3756*** **	
			(0.000)	
L.NIM				**0.748*** **
				(0.000)
EC-FR	**0.0138** **	**0.05317*** **	**0.1310*** **	0.0514
	(0.05)	(0.000)	(0.000)	(0.148)
CR-REG	**0.0443** **	**0.271*** **	**0.0221*** **	0.0145
	(0.02)	(0.000)	(0.000)	(0.241)
LB-REG	**0.0241** *	**0.115*** **	**0.2005** *	0.0129
	(0.10)	(0.001)	(0.10)	(0.371)
BS-REG	**0.0633*** **	**0.0296*** **	**0.0376*** **	0.0831
	(0.001)	(0.000)	(0.001)	(0.184)
GDP	**0.0121*** **	**0.0916*** **	**0.141*** **	-0.0507
	(0.000)	(0.000)	(0.000)	(0.152)
INF	**-0.0094*** **	**-0.0628*** **	**-0.197*** **	0.0415
	(0.000)	(0.000)	(0.000)	(0.387)
CAPITAL	**0.0459** **	**0.0282*** **	**0.0731*** **	**0.0114** *
	(0.02)	(0.000)	(0.000)	(0.10)
LNTA	**0.0505*** **	0.0857	**0.0145** **	**0.0246*** **
	(0.001)	(0.158)	(0.05)	(0.007)
LOANSTA	**-0.4636*** **	**-0.176*** **	**-0.128*** **	**-0.0370*** **
	(0.000)	(0.000)	(0.000)	(0.000)
MACGDP	0.00332	**0.0108*** **	**0.115*** **	-0.0441
	(0.416)	(0.000)	(0.000)	(0.387)
FOREIGN	0.00314	0.01233	0.0157	0.01807
	(0.283)	(0.155)	(0.259)	(0.189)
BS	0.0442	**-0.0203*** **	0.3191	-0.0514
	(0.203)	(0.001)	(0.160)	(0.143)

EXPER	**0.0759****	**0.0453*****	0.5351	**0.0112****
	(0.05)	(0.001)	(0.114)	(0.05)
FEMALE	**0.00276*****	**0.0727*****	0.0257	**0.0240****
	(0.001)	(0.001)	(0.178)	(0.04)
COMPENSATION	**0.4636*****	0.0667	0.00329	0.00113
	(0.000)	(0.133)	(0.241)	(0.136)
Constant	**0.789*****	**1.179*****	**2.301*****	**0.331*****
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	417	596	548	581
AR(1)	**-1.83[0.05]****	**-2.08[0.00]*****	**-3.02[0.00]*****	**-1.93[0.04]****
AR(2)	0.25[0.48]	0.40[0.16]	0.82[0.41]	0.49[0.62]
Hansen J-stat	105.2 [0.65]	167.4 [0.49]	172.7 [0.58]	175.9 [0.82]
N. of instruments	204	257	222	235
N. of Banks	73	75	75	75

Note: This table reports regression results obtained via the Two-step system GMM method. The dependent variable is bank performance (PERFOR) which measured by Tobin'sQ, ROAA, ROAE and NIM. Definitions of all variables are provided in Table 2.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 2.10: Empirical results for bank risk based on Two-step system GMM

Variables	**Z-Score**	**NPL**	**Tier1-Capital**
L.Z-Score	**0.6853*****		
	(0.000)		
L.NPL		**1.115*****	
		(0.000)	
L.Tier1-Capital			**0.305*****
			(0.000)
EC-FR	**0.1145*****	**-0.0284***	**0.0267*****
	(0.003)	(0.076)	(0.001)
CR-REG	**0.2391*****	**0.0460***	0.00222
	(0.008)	(0.060)	(0.857)
LB-REG	**0.2415****	**-0.0889*****	0.00875
	(0.013)	(0.006)	(0.599)
BS-REG	**0.0611*****	**-0.0134*****	-0.00223

	(0.000)	(0.001)	(0.252)
GDP	**0.0259****	-0.0151	0.00747
	(0.032)	(0.106)	(0.112)
INF	**-1.009*****	**0.605***	**-0.686*****
	(0.000)	(0.055)	(0.000)
LNTA	**0.585*****	-0.0638	**0.129*****
	(0.000)	(0.471)	(0.000)
CAPITAL	**0.493*****	**-0.0633****	**0.700*****
	(0.000)	(0.030)	(0.000)
LOANSTA	**-0.916****	**0.178****	**-1.040****
	(0.024)	(0.031)	(0.014)
MACGDP	**0.0316*****	**-0.0681*****	**0.0669****
	(0.000)	(0.000)	(0.005)
FOREIGN	-0.0280	**0.0100**	**0.0123*****
	(0.317)	(0.207)	(0.000)
BS	**-0.1802****	-0.0184	**-0.0233****
	(0.000)	(0.132)	(0.018)
EXPER	**-0.049****	**0.0118*****	**0.0322**
	(0.024)	(0.001)	(0.335)
FEMALE	0.0360	**-0.0302*****	-0.00461
	(0.130)	(0.000)	(0.226)
COMPENSATION	-0.0049	**-0.00349*****	**0.00662*****
	(0.317)	(0.000)	(0.000)
Constant	**-1.157*****	**-6.969****	**0.706*****
	(0.000)	(0.014)	(0.000)
Observations	638	587	582
AR(1)	**-2.76[0.000]*****	**-2.08[0.000]*****	**-2.23[0.000]*****
AR(2)	0.91[0.365]	-1.54[0.125]	0.44[0.663]
Hansen J-stat	167.2 [0.54]	156.4 [0.72]	179.3 [0.78]
N. of instruments	254	183	152
N. of banks	72	71	70

Note: This table reports regression results obtained via the Two-step system GMM method. The dependent variable is bank risk (RISK) which measured by Z-Score, NPL and Tier1-Capital. Definitions of all variables are provided in 2.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

2.4.5 Empirical results for the period before, during (2004-2009) and after (2010-2016) the Global Financial Crisis (GFC)

In this section, we divide the sample into two periods, the first concerning the period before and during the Global Financial crisis (2004-2009) and the second concerning the period after the crisis (2010-2016). Tables 2.11 and 2.12 below show the results based on the Fixed-Effects method (models 1a, 1b).

The sign of the effect of economic freedom (EC-FR) is positively related to bank performance before and during the financial crisis but has no significant impact for the period after the financial crisis (Table 2.11), providing support for hypothesis H3.a. Moreover, the impact of economic freedom on risk-taking is positive for Z-Score ratio but negative for non-performing loans (NPL) and significant at different levels for the period before and during the financial crisis meaning that economic freedom contributes to financial stability. One possible explanation is that financial liberalization promotes financial development through increased competition (Baier et al., 2012). However, the effect of economic freedom regulation is negative for Z-Score and Tier1-capital but positive for non-performing loans at different levels for the period after the global financial (Table 2.12), rendering support to hypothesis H3.b. This means that stricter regulation and the compliance of banks with principles may prevent financial institutions from excessive risk-taking.

In addition, the effect of the credit regulation (CR-REG) variable on bank performance varies. More precisely, we find that there is no significant impact for the period before and during the financial crisis on bank performance (Table 2.11). However, the impact of credit regulation is negative and significant at different levels for both return on average assets (ROAA) and return on average equity (ROAE). One possible explanation is that after a post-crisis period credit regulation tends to increase so as to contribute to financial stability (Baier et al.2012). Thus, we accept hypothesis H3.a.

Moreover, the impact of credit regulation (CR-REG) on risk-taking is positive for Z-Score ratio and Tier1-capital ratio but negative and significant for non-performing loans (NPL) at different levels for the period before and during the financial crisis, meaning that liberal credit regulation reduces bank risk-taking as it promotes competition and gives opportunities to banks to exploit economies of scale. However, the effect of credit regulation on risk-taking changes after the financial crisis (Table 2.12). More precisely, the impact of credit regulation is positive for non-performing loans but negative for Z-Score and Tier1-capital at different levels, rendering support to hypothesis H3.b. This means that liberal credit regulation is less pronounced after the global financial crisis. One possible explanation

for this finding is that stricter credit regulation improves bank soundness and leads to less risk-taking through supervisory power (Ghosh, 2016; Barth et al., 2013).

Labor regulation (LB-REG) has a positive and significant impact on bank performance at 5% level when measured by return on average assets (ROAA) and net interest margin (NIM) for the period before and during the financial crisis (Table 2.11). However, the sign changes for the period after the global financial crisis as the impact of liberal labor regulation is negative and significant at the 1% level for return on average assets (ROAA), providing support to hypothesis H3.a. One possible explanation is that wages pressures would induce higher labor productivity due to capital deepening and therefore, would lead to more bank performance (Autor et al., 2007).

Moreover the sign of labor regulation (LB-REG) on bank risk-taking remains constant and positive at the 1% level for Z-Score before, during and after the global financial crisis (GFC). Thus, we reject hypothesis H3.b. Our results are in line with those of Mamatzakis et al. (2013) who claimed that liberal labor regulation has resulted in productivity gains in Central European Countries during the period 2000-2010. One possible explanation is that increased redundancy of unproductive employees is associated with more productivity (Eslava et al., 2004).

The sign of business regulation (BS-REG) is positive and significant at different levels for return on average equity (ROAE) and net interest margin before and during the global financial crisis (GFC). This means that liberal business regulation increases bank performance. One possible explanation is that heavier regulation of entry has higher corruption and hence, may negatively affect economic growth and bank performance (Djankov et al., 2003). Furthermore, the effect of business regulation (BS-REG) is positive and significant at the 10% level for Tobin'sQ but negative and significant at the same level for net interest margin for the period after the crisis (Table 2.11), rendering support to hypothesis H3.a.

Furthermore, the effect of business regulation (BS-REG) is positive and significant at the 1% level before and during the crisis for the Tier1-capital ratio (Table 2.12). This means that liberal business regulation contributes to financial stability. The impact of business regulation on bank risk-taking remains the same for the period after the global financial crisis as it reduces the non-performing loans ratio and hence, reduces credit risk. One possible explanation is that the fewer number of procedures needed to obtain building permits or reducing the time taken to grant legal identity to a business would lead to increased competition and more productivity which in turn has a positive impact on bank performance. Thus, we reject hypothesis H3.b.

According to the GDP growth (GDP) the sign of the relationship remains constant regardless of the period. More precisely, the impact of the GDP growth (GDP) is positive and significant for most proxies of bank performance for the whole period. One possible explanation is that economic growth can enhance bank profitability through increasing the demand for financial transactions such as the household and business demand for loans. Regarding risk-taking (Table 2.12), the impact of GDP growth is positive and significant at different levels for Z-Score and negative for non-performing loans for the period before, during and after the global financial crisis. This means that strong economic conditions are also characterized by a high demand for financial services, thereby increasing bank profits and hence, lead to less credit risk.

The effect of inflation on bank performance (Table 2.12) is negative and statistically significant at different levels for most bank measures. Also, the sign of inflation on bank risk-taking is positive and significant at the 1% level for non-performing loans only for the period after the global financial crisis (Table 2.11). A possible explanation is that inflation has a negative effect on bank profitability and risk if wages and other costs grow faster than the rate of inflation (Ali, et al., 2011).

The effect of bank size (LNTA) on bank performance is negative and significant at different levels for almost all proxies except for return on average equity (ROAE), for the period before and during the financial crisis (Table 2.11). Although, for the period after the crisis the findings are mixed; negative at the 1% level for return on average assets (ROAA) but positive at the same level for net interest margin. Regarding risk-taking, the impact of bank size (LNTA) has no significant impact on bank risk for any proxy, for the whole period.

Our results show a positive relationship between tighter capital regulation (CAPITAL) and bank performance regardless of the period considered. This means that banks with more equity can meet their funding needs and increase their efficiency. However, the effect is significant for most of the proxies of bank performance for the period after the financial crisis (Table 2.11). Similar, are the results for the relationship between stricter capital regulation and risk-taking (Table 2.12). More precisely, tighter capital regulation reduces credit risk and probability of bankruptcy for the whole period.

The results regarding the loan to total assets variable are mixed for the period before and during the financial crisis (Table 2.11); negative and significant at the 1% level for Tobin'sQ, return on average equity (ROAE) and net interest margin but positive at the same level for return on average assets (ROAA). However the effect of loans to assets after the crisis is positive and significant at different

levels for return on average assets (ROAA) and net interest margin. One possible explanation is that banks with a high intermediation capacity operate more efficiently (Carvallo and Kasman, 2005; Mamatzakis et al., 2013). Regarding the effect of loans to total assets (LOANSTA) the sign remains positive and significant at the 5% level for the Z-Score ratio for the whole period (Table 2.12).

In Table 2.11 we find, that the results regarding the stock market capitalization (MACGDP) variable are mixed for the period before and during the global financial crisis (GFC). Moreover, the impact of stock market capitalization is positive and significant at the 1% level for Tobin'sQ and return on average equity (ROAE) but negative at the same level for net interest margin. The effect is positive and significant at different levels for almost all proxies apart from net interest margin, for the period after the global financial crisis. One possible explanation is that in less developed stock markets firms tend to rely more on bank finance rather than equity (Pasiouras et al., 2009). Moreover, the impact of stock market capitalization to GDP on bank risk-taking remains positive and significant at different levels for both Z-Score and Tier1-capital (Table 2.12).

The results regarding the effect of the presence of foreign banks (FOREIGN) varies for the period before and during the financial crisis (Table 2.11); negative for return on average assets (ROAA) but positive for return on average equity (ROAE). Similarly, the findings regarding the presence of foreign banks are inconclusive for the period after the crisis; negative for Tobin'sQ but positive for return on average assets (ROAA) and net interest margin. One possible explanation is that the more presence of foreign banks may limit the ability of domestic banks to operate efficiently (Lensink et al., 2008). However, the effect of foreign banks on risk-taking (Table 2.12) is positive and significant at the 1% level for Tier1-capital ratio for the whole period.

The sign of the effect of board size (BS) on bank performance (Table 2.11) changes from insignificant to positive for the period after the global financial crisis (GFC). Our results indicate that the presence of several directors on the board has a positive effect on the advisory functions, the monitoring and the increase of returns (Peni and Vahama, 2012). The sign of the effect of board size (BS) on risk-taking remains constant and negative for non-performing loans for the period before and after the global financial crisis (GFC) which means that the presence of more directors in the board reduces credit risk (Table 2.12). Our findings are not the same as those in Table 1.11 and thus, macroeconomic conditions alter the impact of board size on bank risk-taking. A possible explanation is that a large board might operate efficiently in an economic freedom environment and hence, could lead to better decisions with less risk for the banks, through exploiting the different background and skills of directors.

In addition, the sign of the financial experience (EXPER) variable on bank performance remains constant and positive (Table 2.11) before, during and after the global financial crisis (GFC). One possible explanation is that a better understanding of banking activities by the directors contributes to better management supervision. Furthermore, the effect of financial experience (EXPER) is positive and significant at the 1% level before and during the financial crisis for Z-Score ratio but has no significant impact for the period after the crisis (Table 2.12). This means that more experienced directors contribute to the financial stability. Our results are in line with those of Tables 1.10 and 1.11. Macroeconomic conditions do not change the impact of financial experience on bank performance and risk-taking.

Gender diversity (FEMALE) has a positive and significant impact on bank performance at the 5% level for the whole period. However, the effect of female directors (FEMALE) on risk-taking is positive and significant at the 5% level for Tier1-capital ratio only for the whole period but negative and significant at the 5% level for non-performing loans for the period after the crisis (Table 2.12). Our results are the same with those in Tables 1.10 and 1.11. Thus, the implementation of macroeconomic conditions does not change the impact of women on bank performance and risk-taking. One possible explanation is that women are more risk-averse in the financial decision making-process (Barber and Odean, 2001).

The sign of the compensation on bank performance is positive and significant at different levels regardless of the period before and during the global financial crisis (GFC). However, the compensation variable has no significant impact on bank performance after the global financial crisis (Table 2.11). Regarding risk-taking, the effect of compensation of directors is positive and significant at the 10% level for Z-Score. Our results are similar to those in Tables 1.10 and 1.11. In a liberal labor environment directors have more incentives to promote bank soundness which would be linked to more bonuses.

Table 2.11: Empirical results for bank performance before, during and after the global financial crisis

	2004-2009				2010-2016			
Variables	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**
EC-FR	**0.0554*** **	**0.01285***	-0.03948	-0.161	0.0432	0.373	-0.8069	-0.157
	(0.001)	(0.10)	(0.388)	(0.430)	(0.452)	(0.570)	(0.157)	(0.243)
CR-REG	-0.00661	0.00567	0.5748	0.0522	0.00541	**-0.3166****	**-0.571*****	0.0422
	(0.137)	(0.245)	(0.532)	(0.396)	(0.226)	(0.05)	(0.000)	(0.424)
LB-REG	0.00134	**0.09061****	0.5575	**0.1097****	0.0326	**-0.3967*****	-2.158	-0.0164
	(0.230)	(0.05)	(0.468)	(0.05)	(0.187)	(0.003)	(0.444)	(0.509)
BS-REG	0.03431	0.0989	**0.2018***	**0.1518****	**0.0745***	-0.29053	-3.687	**-0.182***
	(0.164)	(0.135)	(0.10)	(0.05)	(0.10)	(0.204)	(0.124)	(0.010)
GDP	**0.00292*****	**0.00321*****	**0.1065*****	-0.00123	0.00412	**0.251*****	**1.488*****	0.00184
	(0.001)	(0.002)	(0.000)	(0.198)	(0.211)	(0.000)	(0.001)	(0.102)
INF	**-0.0484*****	**-0.00245*****	-0.0200	**-0.056****	**-0.0318***	0.0930	-0.00327	**-0.0366****
	(0.001)	(0.001)	(0.597)	(0.05)	(0.10)	(0.0823)	(0.289)	(0.05)
LNTA	**-0.01139***	-0.0315	**-0.180*****	**-0.0227*****	0.0513	**-0.175*****	-1.260	**0.0170*****
	(0.10)	(0.287)	(0.004)	(0.000)	(0.452)	(0.001)	(0.170)	(0.000)
CAPITAL	-0.00126	**0.0215****	0.0271	-0.01837	**0.0457*****	**0.108*****	**0.217*****	-0.00751
	(0.278)	(0.05)	(0.781)	(0.125)	(0.001)	(0.001)	(0.000)	(0.630)
LOANSTA	**-1.553*****	**1.212*****	**-0.8589*****	**-0.788*****	0.6321	**0.0111***	0.153	**0.0270*****
	(0.000)	(0.001)	(0.008)	(0.000)	(0.120)	(0.010)	(0.110)	(0.003)
MACGDP	**0.0659*****	0.00751	**0.1232*****	**-0.0047*****	**-0.4320*****	**0.0216*****	**0.217****	0.00182
	(0.001)	(0.234)	(0.002)	(0.001)	(0.001)	(0.005)	(0.101)	(0.211)

FOREIGN	-0.00102	**-0.00269*** **	**0.0715** **	0.00474	**-0.0692** **	**0.0070*** **	0.0410	**0.00733***
	(0.520)	(0.001)	(0.005)	(0.118)	(0.05)	(0.000)	(0.220)	(0.10)
BS	0.03489	0.00482	-0.3948	0.08081	**0.751*** **	**0.0292***	**0.532***	**0.0150** **
	(0.431)	(0.211)	(0.286)	(0.317)	(0.001)	(0.10)	(0.000)	(0.05)
EXPER	**0.0313** **	**0.0721*** **	**0.6871*** **	**0.0480*** **	**0.129*** **	**0.749*** **	**0.351*** **	**0.795*** **
	(0.05)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
FEMALE	-0.00102	0.00213	0.0267	**0.08556** **	0.0963	0.00997	**0.184** **	-0.00311
	(0.153)	(0.312)	(0.540)	(0.05)	(0.254)	(0.125)	(0.05)	(0.229)
COMPENSATION	0.00802	0.00711	**0.00141*** **	**0.00463** **	0.00657	0.00856	0.00620	-0.0888
	(0.397)	(0.296)	(0.000)	(0.005)	(0.001)	(0.195)	(0.121)	(0.142)
Constant	**1.186*** **	**2.245*** **	**2.281*** **	**1.531*** **	**1.834*** **	**2.103*** **	**2.32*** **	**3.485** **
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.05)
Observations	257	257	257	257	339	375	389	390
Adjusted R^2	0.198	0.202	0.164	0.257	0.230	0.312	0.220	0.258
N. of banks	75	75	75	75	75	75	75	75

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank performance (PERFOR) which measured by Tobin'sQ, ROAA, ROAE and NIM. Definitions of all variables are provided in Table 2.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 2.12: Empirical results for bank risk before, during and after the global financial crisis

	2004-2009			**2010-2016**		
Variables	**Z-Score**	**NPL**	**Tier1-Capital**	**Z-Score**	**NPL**	**Tier1-Capital**
EC-FR	**0.526*** **	**-0.911***	0.589	**-0.4032*** **	**0.812** **	**-1.769*** **

	(0.000)	(0.10)	(0.122)	(0.000)	(0.012)	(0.000)
CR-REG	**0.745****	**-0.672*****	**0.541****	**-0.697****	**1.989*****	**-0.360****
	(0.05)	(0.000)	(0.05)	(0.05)	(0.000)	(0.05)
LB-REG	**0.0362*****	-1.321	0.0962	**1.036*****	-1.050	0.0615
	(0.000)	(0.322)	(0.138)	(0.000)	(0.671)	(0.185)
BS-REG	-0.245	-0.872	**0.611*****	-0.112	**-0.331****	0.361
	(0.126)	(0.407)	(0.001)	(0.676)	(0.000)	(0.034)
GDP	**0.201****	**-0.811*****	0.0745	**0.160****	**-0.941*****	0.0224
	(0.05)	(0.001)	(0.420)	(0.04)	(0.001)	(0.464)
INF	-0.9102	1.012	-0.463	-0.0823	**1.934*****	0.102
	(0.169)	(0.421)	(0.514)	(0.124)	(0.000)	(0.814)
LNTA	-0.181	0.517	-0.520	0.168	0.809	-0.101
	(0.324)	(0.321)	(0.112)	(0.261)	(0.502)	(0.106)
CAPITAL	**0.935*****	**-0.786***	**0.962*****	**0.935*****	0.0998	**0.848*****
	(0.000)	(0.10)	(0.001)	(0.000)	(0.109)	(0.001)
LOANSTA	**0.6210****	-0.0692	-0.0759	**0.0468****	-0.0350	-0.00963
	(0.02)	(0.230)	(0.168)	(0.02)	(0.417)	(0.156)
MACGDP	**0.364*****	-0.0591	**0.0542***	**0.102*****	- 0.0335	**0.0143***
	(0.001)	(0.264)	(0.10)	(0.001)	(0.293)	(0.10)
FOREIGN	0.0981	0.0945	**0.0631*****	0.00990	0.0385	**0.0221*****
	(0.210)	(0.120)	(0.001)	(0.198)	(0.305)	(0.002)
BS	-0.0156	**-0.521***	0.0196	-0.0149	**-0.177***	0.00131
	(0.321)	(0.10)	(0.320)	(0.476)	(0.10)	(0.252)
EXPER	**0.0754***	-1.417	0.754	0.0307	-1.012	0.8971
	(0.10)	(0.104)	(0.120)	(0.287)	(0.152)	(0.275)
FEMALE	0.00296	0.0961	**0.0875****	0.00159	**-0.102****	**0.0259****

	(0.411)	(0.136)	(0.05)	(0.191)	(0.005)	(0.05)
COMPENSATION	0.0547	-0.00857	0.00981	**0.06051***	0.0876	-0.00315
	(0.178)	(0.326)	(1.751)	(0.10)	(0.334)	(1.693)
Constant	**2.243*** **	**-2.953***	**2.158*** **	3.243	**-3.953***	**2.292*** **
	(0.000)	(0.10)	(0.000)	(0.123)	(0.10)	(0.000)
Observations	280	268	254	250	232	244
Adjusted R^2	0.291	0.234	0.236	0.279	0.214	0.298
N. of banks	70	69	68	69	69	67

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank risk (RISK) which measured by Z-Score, NPL and Tier1-Capital. Definitions of all variables are provided in Table 2.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

2.4.6 Exploring the Global Financial Crisis

In this section, we examine how the global financial crisis (GFC) affects the impact of economic freedom and regulation of credit, labor and business market on bank performance and risk-taking. To address this issue, we add interaction terms to our regression models. The models, described by equations 4a and 4b below, are estimated using the Fixed-Effects method.

Bank performance model

$$(PERFOR)i,t=\beta_0+\beta_1 CRISIS*EC\text{-}FRi,t+\beta_2 CRISIS*CR\text{-}REGi,t+\beta_3 CRISIS*LB\text{-}REGi,t+\beta_4 CRISIS*BS\text{-}REGi,t+\beta_5 LNTAi,t+\beta_6 CAPITALi,+\beta_7 LOANSTAi,t+\beta_8 GDPi,t+\beta_9 INFi,t+\beta_{10} MACGDPi,t+\beta_{11} FOREIGNi,t+\beta_{12} BSi,t+\beta_{13} EXPERi,t+\beta_{14} FEMALEi,t+\beta_{15} COMPENSATIONi,+ ui + \varepsilon i,t \quad (4a)$$

Bank risk model

$$(RISK)i,t=\beta_0+\beta_1 CRISIS*EC\text{-}FRi,t+\beta_2 CRISIS*CR\text{-}REGi,t+\beta_3 CRISIS*LB\text{-}REGi,t+\beta_4 CRISIS*BS\text{-}REGi,t+\beta_5 LNTAi,t+\beta_6 CAPITALi,+\beta_7 LOANSTAi,t+\beta_8 GDPi,t+\beta_9 INFi,t+\beta_{10} MACGDPi,t+\beta_{11} FOREIGNi,t+\beta_{12} BSi,t+\beta_{13} EXPERi,t+\beta_{14} FEMALEi,t+\beta_{15} COMPENSATIONi,+ ui + \varepsilon i,t \quad (4b)$$

Where ***PERFOR*** and ***RISK*** denote performance and risk-taking respectively for bank **i**, t the time period, **ln** the natural logarithmic, **β** the parameters to be estimated, **u** the unobserved fixed-effect for bank i and **ε** the remaining disturbance term. We consider the dummy variable CRISIS which takes the value one for the period 2004 to 2009 and the value zero for the period 2010 to 2016.

According to the results of Tables 2.13 and 2.14 the negative coefficient of the CRISIS*(REG) variable means that the effect of economic freedom and regulation of private, labor and business market is more pronounced for the period after the financial crisis (Wooldridge, 2012).

The effect of the economic freedom variable is positive and significant on the return on average assets (ROAA) at the 5% level which means that a high degree of economic freedom is linked to better economic growth and thus, to better bank performance (Table 2.13). Our results are consistent with those of Sufian Hassan (2010) and Sufian and Majid (2011) among others, providing support for hypothesis H1.a. Also, the CRISIS*(EC-FR) variable is negative at the 1% level for net interest margin, meaning that after the financial crisis the linkage is more important. Our results are not the same with those in Table 2.11 as we find that the effect of economic freedom on bank performance

has no significant impact regardless of the risk measure for the period after the crisis. Similarly, the effect of economic freedom on return on average assets (ROAA) is more pronounced for the period after the crisis. However, the positive coefficient of the economic freedom CRISIS*(EC-FR) variable means that a low value in economic freedom increases bank performance when measured by return on average assets (ROAE), for the period before and during the financial crisis. Thus, we accept hypothesis H3.a.

In addition, the positive impact of the economic freedom (EC-FR) variable on Tier1-capital ratio (Table 2.14) means that greater levels of economic freedom increase competition and growth development and hence, contribute to financial stability, rendering support to hypothesis H1.d. Also, the positive impact of the CRISIS*(EC-FR) variable on Tier1-capital ratio shows that the effect of economic freedom is more significant for the period after the global financial crisis. Thus, we reject hypothesis H3.b. Our results are not the same with those in Table 2.12 as we find that the impact of economic freedom on risk-taking is negative and significant for Tier1-capital for the period after the crisis.

Moreover, in Table 2.13, the relationship between the credit regulation and bank performance is positive and significant at the 1% level for return on average assets (ROAA) and return on average equity (ROAE). Our findings are in line with Chortareas et al. (2013) who show that financial freedom has as positive impact on bank efficiency, providing support for hypothesis H2.1.a. Also, the CRISIS*(CR-REG) variable is negative at the 1% level for return on average assets (ROAA), meaning that after the crisis the linkage is more important. Regarding the risk-taking the credit regulation has no significant impact on bank risk. Thus, we reject both hypotheses H2.1.c. and H2.2.d.

Form Table 2.13, the impact of the labor regulation on bank performance is positive and significant at the 1% level for Tobin'sQ and for net interest margin (NIM). One possible explanation is that minimising business start-up regulations and reducing the time and cost required for firm registration are all found to increase the number of new businesses and jobs created and thus, result in increased bank performance (Mamatzakis et al., 2013). Hence, we accept hypothesis H2.2.a. Moreover, the negative effect of the CRISIS*(LB-REG) variable on bank performance and especially on Tobin'sQ and return on average equity (ROAE) is negative at the 1% level, means that the impact of liberal labor regulation is more important for the period after the financial crisis. Our results are similar with those from the Table 2.11 as we show that the relationship between labor regulation and bank performance is positive for the period after the crisis only when measured by Tobin'sQ.

Also, the effect of labor regulation on risk-taking is negative for non-performing loans (NPL) at the 5% level but positive for Z-Score and Tier1-capital at different levels (Table 2.14) rendering support to hypothesis H2.2.d. This means that liberal labor regulation reduces bank risk-taking. One possible explanation for this result is that increasing the flexibility of the labor market increases both the employment rate and the rate of participation in the labor force and hence, lead to a reduction in bank risk. Moreover, the impact of the CRISIS*(LB-REG) on risk-taking is positive and significant for non-performing loans (NPL) and Z-Score at the 1% level but negative at the same level for Tier1-capital, meaning that labor regulation is significant for bank risk for the whole period (Table 2.14). Hence, we reject hypothesis H3.b. Our results are in line with those from Table 2.12 where we show that liberal labor regulation increases bank risk-taking for the period 2004-2016.

Furthermore, regarding the business regulation variable we find that it has a positive and significant impact on bank performance at the 1% level for any measure (Table 2.13) and, hence, we accept hypothesis H2.3.a. One possible explanation is that business economic freedom is associated with more job creation which leads to increased bank performance (Mamatzakis et al., 2013). Also, the coefficient of the CRISIS*(BS-REG) variable is positive at the 1% level for return on average equity (ROAE) but negative at the 1% for the other proxies, meaning that the impact of business regulation on bank performance is significant for the whole period.

Also, we find that business regulation has a greater influence on bank risk after the financial crisis as the coefficient of CRISIS*(BS-REG) is negative and significant at the 1% level for both non-performing loans (NPL) and Tier1-capital. Thus we reject hypothesis H3.b. Moreover, Table 2.14 indicates that business regulation has no significant impact on risk-taking regardless of risk measure. Our results are not similar with those in Table 2.12, as we find that the liberal business regulation reduces bank risk-taking for the period after the financial crisis (2010-2016).

Table 2.13: Empirical results for bank performance with interactions

Variables	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**
EC-FR	0.0754	0.875	-0.058	**0.425****
	(0.132)	(0.230)	(0.196)	(0.05)
CR-REG	-0.0235	**0.0354*****	**0.0721*****	0.0874
	(0.223)	(0.000)	(0.000)	(0.211)

LB-REG	**0.0398*** **	-0.547	0.0245	**0.0122*** **
	(0.001)	(0.162)	(0.411)	(0.001)
BS-REG	**0.0526*** **	**0.745*** **	**0.063*** **	**0.0963*** **
	(0.000)	(0.000)	(0.001)	(0.001)
LNTA	**-0.7852*** **	**-0.0987*** **	-0.411	0.0695
	(0.000)	(0.001)	(0.591)	(0.245)
CAPITAL	**0.0981** **	0.0612	**0.0876** **	**0.0396*** **
	(0.04)	(0.469)	(0.05)	(0.001)
LOANSTA	**-0.0963*** **	**0.482*** **	**0.0410*** **	**-0.0563*** **
	(0.000)	(0.000)	(0.000)	(0.001)
GDP	0.0158	**0.891*** **	**0.248*** **	0.4526
	(0.126)	(0.001)	(0.001)	(0.289)
INF	**-0.0423*** **	0.0574	-0.213	**-0.0396** **
	(0.001)	(0.198)	(0.156)	(0.001)
MACGDP	**-0.826*** **	**-0.256*** **	**-0.378*** **	-0.0274
	(0.000)	(0.001)	(0.001)	(0.312)
FOREIGN	0.0789	-0.00741	-0.496	**0.962** **
	(0.209)	(0.313)	(0.195)	(0.05)
CRISIS*(EC-FR)	-1.120	**-0.652*** **	**0.963*** **	**-0.453*** **
	(0.120)	(0.000)	(0.000)	(0.001)
CRISIS*(CR-REG)	-1.089	**-0.503*** **	-0.789	-0.456
	(0.315)	(0.000)	(0.234)	(0.120)
CRISIS*(LB-REG)	**-0.897*** **	0.6891	**-1.012*** **	-1.164
	(0.000)	(0.112)	(0.000)	(0.189)
CRISIS*(BS-REG)	**-1.123*** **	**-0.962*** **	**0.814*** **	**-0.789*** **
	(0.000)	(0.000)	(0.000)	(0.001)
BS	0.0521	**0.1485*** **	**0.0963*** **	0.0126
	(0.620)	(0.001)	(0.001)	(0.175)
EXPER	-0.891	**0.0521** **	**0.0782** **	**0.0412*** **
	(0.120)	(0.05)	(0.05)	(0.001)
FEMALE	**0.0762** **	0.0856	0.4785	**0.0621** **
	(0.054)	(0.212)	(0.278)	(0.05)
COMPENSATION	0.00812	**0.0693***	**0.0076***	0.01025
	(0.175)	(0.10)	(0.10)	(0.189)
Constant	**2.859*** **	**1.079*** **	**-1.781*** **	**-1.896*** **

	(0.000)	(0.000)	(0.000)	(0.000)
Observations	657	625	636	627
N. of Banks	75	73	74	73
Adjusted R^2	0.289	0.221	0.263	0.302

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank performance (PERFOR) which measured by Tobin'sQ, ROAA, ROAE and NIM. Definitions of all variables are provided in Table 2.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 2.14: Empirical results for bank risk with interactions

Variables	**Z-Score**	**NPL**	**Tier1-Capital**
EC-FR	0.0268	-0.0785	**0.0891***
	(0.201)	(0.296)	(0.10)
CR-REG	-0.0963	0.0456	-0.0147
	(0.364)	(0.245)	(0.269)
LB-REG	**0.0896***	**-0.312****	**0.126*****
	(0.10)	(0.05)	(0.001)
BS-REG	0.0852	0.0245	0.0618
	(0.187)	(0.169)	(0.378)
LNTA	**0.0278***	**0.296*****	**0.0281*****
	(0.10)	(0.000)	(0.002)
CAPITAL	**-1.120****	0.9872	-0.478
	(0.05)	(0.126)	(0.320)
LOANSTA	0.0756	-0.0047	0.0784*
	(0.210)	(0.420)	(0.10)
GDP	-0.374	**-1.077*****	**1.012*****
	(0.104)	(0.002)	(0.000)
INF	**-0.891*****	**0.786*****	-0.821
	(0.001)	(0.001)	(0.423)
MACGDP	**0.775*****	**-0.469*****	**0.821***
	(0.000)	(0.001)	(0.10)
FOREIGN	**-0.0373*****	**-0.793*****	**-0.698*****
	(0.001)	(0.001)	(0.000)
CRISIS*(EC-FR)	**1.013*****	0.478	**0.978*****

	(0.000)	(0.120)	(0.001)
CRISIS*(CR-REG)	-0.8131	-0.7561	0.6541
	(0.436)	(0.489)	(0.355)
CRISIS*(LB-REG)	0.7853	**0.697*** **	**-0.978*** **
	(0.134)	(0.000)	(0.001)
CRISIS*(BS-REG)	-0.846	**-0.478*** **	**-0.821*** **
	(0.245)	(0.000)	(0.000)
BS	**-0.451*** **	**0.364*** **	-0.7218
	(0.000)	(0.001)	(0.125)
EXPER	**0.624*** **	-0.7841	**0.821***
	(0.001)	(0.458)	(0.10)
FEMALE	-0.2471	**-0.503*** **	**-0.631***
	(0.125)	(0.000)	(0.10)
COMPENSATION	**0.0074*** **	**-0.0089*** **	**0.0689*** **
	(0.001)	(0.001)	(0.001)
Constant	**1.891*** **	**2.079*** **	**-2.594*** **
	(0.000)	(0.000)	(0.001)
Observations	696	657	708
N. of Banks	74	73	74
Adjusted R^2	0.287	0.320	0.246

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank risk (RISK) which measured by Z-Score, NPL and Tier1-Capital. Definitions of all variables are provided in Table 2.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

2.4.7 Empirical results by groups of countries

In order to examine for any region specific differences concerning the effect of economic freedom and regulation of credit, labor and business on bank performance and risk-taking, we divide our sample in three groups of countries based on their geographic location. Group A consists of countries of Southern Europe such as Greece, Spain, Italy and Portugal. Group B consists of countries of Northern Europe such as Ireland, UK, Sweden, Finland and Denmark. Group C consists of countries of Central Europe such as Germany, France, Luxembourg, Belgium, Netherlands, Austria, Hungary, Poland and Czech Republic.

Based on the results of Table 2.15, the effect of economic freedom (EC-FR) is positively related to bank performance for countries in Group A and Group B regardless of how it is measured in different significance levels. Thus, we accept hypothesis H1.a. One possible explanation is that economic freedom improves innovation and entrepreneurship and hence, has a positive impact on bank performance. However, economic freedom is positive for countries of Group C which means that a high degree of economic freedom leads to high levels of bank performance. Although, the coefficient of economic freedom has no statistically significant impact and thus, it does not affect bank performance in the countries of Central Europe. Moreover, the effect of economic freedom on bank risk is positive for Z-Score and Tier1-capital ratio meaning that high levels of economic freedom reduce bank risk (Table 2.16). However, the results are mixed for Group B relatively to the measure of risk-taking while the effect of economic freedom is not significant for Group C. Hence, we accept both hypotheses H1.c and H1.d.

Concerning the impact of credit regulation (CR-REG) on bank performance, the results are inconclusive for both Group A and Group B. Also, the effect is positive and significant at the 10% level for return on average equity (ROAE) for Central Europe countries (Table 2.15). Moreover, the estimated coefficient of credit regulation is positive and significant at the 1% level for non-performing loans for countries of Group A. This means that liberal credit regulation increases credit risk (Table 2.16), rendering support to hypothesis H2.1.c. One possible explanation is that in developing countries where there are high levels of corruption banks lend more to less creditworthy companies. However, the effect of credit regulation on risk-taking is negative at the 1% level for non-performing loans in Group B and positive at the 10% level for Tier1-capital in Group C, meaning that stricter credit regulation increases credit risk. Thus, we accept hypothesis H2.1.d.

The relationship between the labor regulation variable (LB-REG) and bank performance is negative at different levels for countries of Group A. This means that stricter labor regulation increases bank performance in developing countries. However, the impact of labor regulation is positive for countries of Group B. Nevertheless, the estimated coefficient of economic freedom is negative but has no significant impact for countries of Group C (Table 2.15). Hence, we accept both hypotheses H2.2.a and H2.2.b. One possible explanation is that employees tend to invest more in skills when they perceive a high risk of losing their jobs because of the absence of employment protection (Koutsomanoli-Filippaki and Mamatzaskis, 2013). The effect of labor regulation (LB-REG) on bank risk is negative (reduces) and significant at different levels for countries of Group B and C (Table 2.16). More precisely, we find that liberal labor regulation reduces risk-taking and probability of

default for Southern and Northern Europe countries. One possible explanation is that liberal labor regulation turn in better bank performance and hence, reduces risk-taking with respect to innovation and technology (Bassanini and Ernst, 2002; Scarpetta and Tressel, 2004). Thus, we accept hypotheses H2.2.c and H2.2.d. However, the estimated coefficient of labor regulation indicates that stricter labor regulation reduces the probability of default while increases the non-performing loans ratio. Nevertheless, labor regulation has no significant impact on countries of Group A.

The results concerning the business regulation (BS-REG) variable are mixed (Table 2.15); positive for return on average equity (ROAE) but negative for the other proxies at different levels, rendering support to hypotheses H2.3.a and H2.3.b. However, the impact of business regulation is positive at the 5% level for Tobin'sQ in Northern Europe countries. One possible explanation is that in a good economy less business regulation promotes business creation which in turn increases profits for banks and, hence leads to high levels of performance (Sufian and Habibullah, 2010). On the contrary, the impact of business regulation on bank performance is negative and significant at the 5% level for return on average assets (ROAA) and return on average equity (ROAE) for countries of Croup C.

Therefore, the impact of business regulation (BS-REG) on bank risk is negatively (reduces) and statistically significant for countries of Southern Europe. This means that liberal business regulation leads to less credit risk and thus we accept hypothesis H2.3.d. One possible explanation is that less restrictions and entry barriers may lead to more businesses which turn in increased demand for financial services and hence lead to more revenues for banks and less risk. However, the effect is positive (increases) for countries of Group B and Group C as more liberal business regulation is associated with more credit risk (Table 2.16). Thus, we accept hypothesis H2.3.c.

According to the GDP growth (GDP) the effect on bank performance is positive and significant at different levels regardless of bank's location. One possible explanation is that a soundly managed bank would profit from loans and securities sale (Sufian and Habibullah, 2010). Therefore, the findings concerning risk-taking indicate that the GDP growth reduces credit risk only for Northern Europe countries. The GDP growth has no significant impact for the countries of Group A and Group C.

Regarding the inflation (INF) variable the effect on bank performance is negative for countries of Group A and Group C. Therefore, the findings concerning risk-taking indicate that inflation increases bank risk-taking at different levels regardless of bank's location. One possible explanation

is that an unexpected rise in inflation causes cash flow difficulties for borrowers that may lead to premature termination of loan arrangements and precipitate loan losses (Perry, 1992).

With regard to the control variables, the estimated coefficient of size (LNTA) on bank performance is negative and significant at different levels, for countries of Group B and Group C regardless of how performance is measured (Table 2.15). Regarding risk-taking we find in Table 2.16 that bank size reduces probability of default in Southern and Northern Europe countries. Nevertheless, regarding the countries of Central Europe (Group C) we find the opposite effect: smaller banks may enjoy economies of scale and tend to be more efficient.

Our results show a positive relationship between tighter capital regulation (CAPITAL) and bank performance for Groups A and B and negative for Group C. Better capitalized banks have stronger incentives in improving their performance and minimizing costs. Also, the capital adequacy ratio (CAPITAL) reduces bank risk for all Groups of countries. The estimated coefficient of loans to total assets (LOANSTA) on bank performance is negative and significant at different levels, for countries of Group B and Group C regardless of how performance is measured (Table 2.15). Nevertheless, regarding the countries of Southern Europe (Group A) we find the opposite effect: asset utilization increase bank performance in developing countries when used efficiently. Regarding risk-taking we find in Table 2.16 that asset utilization reduces credit risk and contribute to bank stability regardless of bank's location.

Moreover, our findings indicate that there is a positive relationship between stock market capitalization (MACGDP) and bank performance for Group A but a negative for Group C. The results are mixed for Group B. In well-developed stock markets, companies tend to rely on equity rather than bank finance (Pasiouras et al., 2009). Regarding risk-taking we find in Table 2.16 that stock market capitalization increases probability of default in Southern and Northern Europe countries. Nevertheless, regarding the countries of Central Europe (Group C) we find the opposite effect; stock market capitalization improves bank stability and decreases credit risk.

Furthermore, the impact of the presence of foreign (FOREIGN) on bank performance is positive and significant at different levels for countries of Group A and Group C. one possible explanation is that banks in concentrated markets may be able to offer lower deposit rates and charge higher loan rates (Ataullah and Le; 2006) However, the results are mixed for countries of Group B (Table 2.15). Concerning risk-taking, the presence of foreign banks reduces bank risk regardless of bank's location (Table 2.16).

Based on the results of Table 2.15, the effect of board size (BS) is negatively related to bank performance for countries in Group A and positively related for countries in Group B regardless of how it is measured in different significance levels. Our findings are similar with those in Table 1.14. meaning that large boards of directors perform worse than smaller ones in developing countries as they are more quick in the decision-making process (Hogue and Muradoglu, 2010; Belhaj and Mateus, 2016). However, the board size variable has no significant impact for countries of Group C (Table 2.15).

Also, the coefficient of board size (BS) is significant for all risk measures and for all Groups (Table 2.16). More precisely, the effect of board size (BS) on bank risk is negative for Southern and Central Europe countries and positive for Northern Europe countries. Our findings are opposite from those in Table 1.15. This means that macroeconomic factors in conjunction with regulation of countries may alter the impact of board size on risk-taking. More precisely, in developing countries where corruption is high it is beneficial for bank to have small boards as the latter are more easy to monitor and to come to a common decision quickly.

The effect of financial experience is positively and significantly related with bank performance at different levels regardless of bank's location (Table 2.15). More experienced directors may lead to beneficial decisions for the bank. Our results are the same with those in Table 1.14. Nevertheless, the findings concerning the coefficient of financial experience on risk-taking are in contrast with those in Table 1.15. More precisely, in Table 2.16 we find that financial experience reduces credit risk for Southern and Northern Europe countries while it has no significant impact for Central Europe countries. Consequently, the implementation of macroeconomic factors changes the impact of financial experience on bank risk. One possible explanation is that in developing countries wage pressures could result in higher labor productivity due to investment in capital-intensive industries (Autor et al., 2007).

The relationship between the female directors and bank performance is positive for countries of Group A and Group C but there is no significant impact for countries of Group B (Table 2.15). Our findings are the same as those in Table 1.14 where we find a positive relationship between women and bank performance. One possible explanation for this result is that women may contribute to the effectiveness of the board due to their specific skills and knowledge (García-Meca et al., 2015). The effect of women directors (FEMALE) on bank risk is significant at different levels. We find mixed results for Southern and Central Europe countries. Hence, the presence of women for Northern

Europe countries has no significant impact on risk-taking. Our results are the same with those in Table 1.15.

Also, the estimated coefficient of compensation has no significant effect on bank performance measures for countries of Group A and Group C but positive and significant at the 1% level for countries belonging to Group B. Therefore, the impact of compensation on bank risk is positive and statistically significant for countries of Southern Europe and Northern Europe. However, the effect is not significant for countries of Central Europe. Our results are in line with those in Tables 1.14 and 1.15 meaning that an increase in CEO cash bonuses in European banks leads to lower risk (Vallascas and Hagendorff, 2013).

Table 2.15: Empirical results for bank performance by Group of Countries

	Group A				Group B				Group C			
Variables	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**	**Tobin'sQ**	**ROAA**	**ROAE**	**NIM**
EC-FR	**0.00930*** **	**0.4391**	**0.2731** **	**0.093*** **	**0.0154***	**0.0970*** **	0.6671	**0.0223***	0.0309	0.0470	0.3671	0.189
	(0.000)	(0.234)	(0.05)	(0.000)	(0.10)	(0.000)	(0.182)	(0.10)	(0.143)	(0.169)	(0.188)	(0.139)
CR-REG	**-0.0117** **	**0.389*** **	2.947	**-0.0117** **	-0.0125	**-0.158*** **	**5.811** **	**0.0412** **	0.00986	0.126	**0.563***	0.0393
	(0.05)	(0.000)	(0.215)	(0.05)	(0.217)	(0.000)	(0.05)	(0.05)	(0.118)	(0.936)	(0.10)	(0.716)
LB-REG	-0.00736	**-0.329** **	**-0.3524***	-0.00736	-0.0203	**0.110*** **	0.864	-0.00118	-0.00240	-0.00192	-0.988	0.0603
	(0.547)	(0.000)	(0.881)	(0.500)	(0.317)	(0.000)	(0.437)	(0.141)	(0.644)	(0.535)	(0.172)	(0.431)
BS-REG	**-0.0245*** **	**-0.552*** **	**0.7582*** **	**-0.0245*** **	**0.0663** **	0.00421	-5.545	-0.00128	-0.00383	**-0.162** **	**-0.792** **	-0.0600
	(0.000)	(0.001)	(0.001)	(0.001)	(0.05)	(0.449)	(4.014)	(0.156)	(0.125)	(0.10)	(0.05)	(0.210)
GDP	**0.00419*** **	**0.0950** **	**0.206*** **	**0.0419*** **	-0.00234	**0.00261***	**0.940** **	0.0075	0.00214	**0.0716*** **	**1.090*** **	0.0091
	(0.001)	(0.05)	(0.000)	(0.001)	(0.341)	(0.10)	(0.05)	(0.348)	(0.185)	(0.001)	(0.000)	(0.212)
INF	**-0.00659*** **	**-0.134***	**-1.775***	**-0.0659*** **	**-0.0109** **	**0.00137*** **	**0.059*** **	0.00026	**-0.00737***	**-0.0746** **	**-0.297** **	0.0024
	(0.001)	(0.10)	(0.10)	(0.001)	(0.05)	(0.002)	(0.000)	(0.192)	(0.10)	(0.05)	(0.05)	(0.354)
LNTA	0.00199	0.0454	1.308	0.00199	**-0.0176** **	0.250	**-2.408** **	**-0.419*** **	**-0.0197*** **	**-0.172*** **	**-1.669*** **	**-0.372*** **
	(0.511)	(0.0973)	(1.404)	(0.511)	(0.05)	(0.299)	(0.10)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
CAPITAL	0.151	**0.150*** **	**1.467*** **	0.00151	**0.0869*** **	-0.0165	**1.601*** **	**-0.0109***	-0.00926	0.00510	**0.0797*** **	**0.0202***
	(0.118)	(0.003)	(0.000)	(0.118)	(0.001)	(0.168)	(0.000)	(0.10)	(0.136)	(0.108)	(0.000)	(0.10)
LOANSTA	-0.00170	**0.0239** **	**0.414*** **	-0.0170	**-1.647** **	**-1.915*** **	**-1.071*** **	**-0.334*** **	**-0.540*** **	-0.00191	**-0.0929** **	**-0.0888** **
	(0.488)	(0.05)	(0.000)	(0.488)	(0.05)	(0.000)	(0.000)	(0.000)	(0.000)	(0.343)	(0.05)	(0.05)
MACGDP	**0.0212*** **	0.0596	**0.0514*** **	**0.0693** **	**0.0212*** **	**-0.964*** **	**0.185** **	**-0.793*** **	0.00121	0.00405	0.00328	**-0.0619*** **
	(0.000)	(0.113)	(0.001)	(0.05)	(0.001)	(0.000)	(0.05)	(0.000)	(0.324)	(0.267)	(0.441)	(0.001)
FOREIGN	-0.1451	**0.2451** **	**0.316*** **	0.0723	0.00259	**-1.964*** **	0.0321	**0.7893*** **	-0.00109	**0.0128*** **	0.0673	**0.0117** **
	(0.131)	(0.05)	(0.001)	(0.144)	(0.776)	(0.000)	(0.197)	(0.000)	(0.711)	(0.000)	(0.615)	(0.05)
BS	**-0.00152***	-0.00195	-0.201	**-0.00152***	-0.00246	**0.9645*** **	0.433	**1.334*** **	-0.00367	-0.0379	0.738	0.0262
	(0.10)	(0.179)	(0.258)	(0.10)	(0.374)	(0.000)	(0.492)	(0.000)	(0.862)	(0.736)	(0.243)	(0.207)
EXPER	-0.00350	**0.0793*** **	**0.884** **	-0.000350	-0.00573	**0.196*** **	0.190	-0.3341	-0.00368	0.00174	**0.674***	0.0258
	(0.111)	(0.000)	(0.000)	(0.111)	(0.355)	(0.000)	(0.458)	(0.235)	(0.225)	(0.196)	(0.10)	(0.157)
FEMALE	**-0.00842** **	**0.0375** **	**0.0448** **	**-0.00842** **	0.08305	**-0.986*** **	**-0.167***	**-0.734*** **	-0.00142	0.00359	0.0627	**0.0789** **
	(0.400)	(0.001)	(0.05)	(0.05)	(0.703)	(0.000)	(0.10)	(0.000)	(0.476)	(0.417)	(0.756)	(0.05)
COMPENSATION	0.001250	0.7781	0.00136	0.1257	**0.0974*** **	**0.0960*** **	-0.00288	**0.334*** **	0.0155	0.0292	0.00698	-0.3510
	(0.250)	(0.196)	(0.114)	(0.256)	(0.001)	(0.000)	(0.296)	(0.001)	(0.321)	(0.281)	(0.474)	(0.230)

Constant	**1.095*** **	**-2.073***	**-2.247*** **	-0.296	**-1.242** **	**1.781*** **	**0.875*** **	**1.977*** **	**0.233** **	**1.926*** **	**1.071*** **	**0.775*** **
	(0.000)	(0.10)	(0.000)	(0.188)	(0.05)	(0.000)	(0.000)	(0.000)	(0.05)	(0.000)	(0.000)	(0.000)
Observations	197	219	243	234	198	170	170	150	245	261	259	275
Adjusted R^2	0.211	0.265	0.291	0.285	0.348	0.273	0.188	0.245	0.134	0.235	0.198	0.212
N. of Banks	25	25	23	23	22	22	22	22	30	30	30	30

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank performance (PERFOR) which measured by Tobin'sQ, ROAA, ROAE and NIM. Definitions of all variables are provided in Table 2.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 2.16: Empirical results for bank risk by Group of Countries

	Group A			**Group B**			**Group C**		
Variables	**Z-Score**	**NPL**	**Tier1-Capital**	**Z-Score**	**NPL**	**Tier1- Capital**	**Z-Score**	**NPL**	**Tier1-Capital**
EC-FR	**0.5372*** **	-0.0891	**1.0867*** **	**0.6142*** **	**3.321** **	-0.1935	-0.517	-1.0186	0.8192
	(0.000)	(0.145)	(0.001)	(0.001)	(0.04)	(0.179)	(0.623)	(0.129)	(0.118)
CR-REG	0.254	**0.978*** **	0.131	0.361	**-0.4402*** **	0.242	-0.118	0.292	**0.587***
	(0.309)	(0.000)	(0.139)	(0.214)	(0.001)	(0.377)	(0.198)	(0.528)	(0.10)
LB-REG	-0.415	-0.672	0.0351	**0.961** **	**-0.4577** **	**1.229*** **	**0.0549***	**-0.915*** **	**0.523*** **
	(0.307)	(0.654)	(0.140)	(0.04)	(0.10)	(0.001)	(0.10)	(0.000)	(0.000)
BS-REG	**0.425*** **	**-0.857*** **	**0.790*** **	0.5762	**0.651*** **	-0.0287	0.189	**0.744***	-0.128
	(0.000)	(0.000)	(0.000)	(0.210)	(0.000)	(0.596)	(0.148)	(0.10)	(0.281)
GDP	0.0868	0.105	0.00862	0.0868	**-0.549*** **	**0.123***	0.0365	-0.0203	-0.0547
	(0.762)	(0.146)	(0.340)	(0.235)	(0.000)	(0.10)	(0.283)	(0.726)	(0.564)
INF	**-0.302** **	**1.333*** **	**-0.233*** **	**-0.302** **	**0.532** **	**-0.139***	0.0779	**0.473*** **	0.103
	(0.05)	(0.001)	(0.000)	(0.05)	(0.04)	(0.08)	(0.583)	(0.000)	(0.120)
LNTA	**1.164*** **	**-1.142***	-0.453	0.9783	0.921	**1.532*** **	**-0.486*** **	0.320	-0.0188
	(0.000)	(0.621)	(0.127)	(0.137)	(0.694)	(0.000)	(0.000)	(0.440)	(0.153)
CAPITAL	**1.030*** **	-0.00827	**0.815*** **	**1.030*** **	**-1.043*** **	**0.987*** **	**0.848*** **	**-0.284*** **	**0.847*** **
	(0.001)	(0.141)	(0.001)	(0.001)	(0.208)	(0.000)	(0.001)	(0.001)	(0.001)
LOANSTA	**0.0899*** **	**-0.164*** **	**0.0206***	**0.0920*** **	-0.2481	-0.120	-0.00810	-0.0191	-0.0202
	(0.001)	(0.001)	(0.10)	(0.000)	(1.899)	(1.233)	(0.862)	(0.253)	(0.131)
MACGDP	**-0.789*** **	0.8750	**-0.685*** **	-0.437	**0.909** **	-0.0193	**0.240*** **	**-0.0361** **	0.0143
	(0.000)	(0.126)	(0.001)	(0.360)	(0.03)	(0.124)	(0.001)	(0.05)	(0.245)

FOREIGN	**0.5960*** **	0.7831	**0.436*** **	**0.5960*** **	0.0246	-0.00421	**0.0198***	**-0.0853*** **	0.0197
	(0.000)	(0.196)	(0.001)	(0.000)	(0.470)	(0.135)	(0.10)	(0.000)	(0.152)
BS	**-0.145*** **	0.0469	0.0325	**0.278*** **	**-0.505***	**0.174****	-0.0940	**0.523*** **	-0.302
	(0.001)	(0.101)	(0.218)	(0.001)	(0.10)	(0.05)	(0.148)	(0.366)	(0.281)
EXPER	**0.181*** **	**-0.251****	0.0283	**0.493*** **	-0.302	0.00469	0.0442	-0.0837	0.0337
	(0.000)	(0.05)	(0.276)	(0.001)	(0.216)	(0.670)	(0.383)	(0.111)	(0.748)
FEMALE	**0.0593****	**0.231*** **	0.00920	0.0593	0.0192	-0.0180	-0.00555	**0.0808*** **	**0.0358****
	(0.000)	(0.001)	(0.122)	(0.349)	(0.432)	(0.137)	(0.802)	(0.0223)	(0.05)
COMPENSATION	**0.00432*** **	-0.00919	**0.00134***	**0.00811*** **	0.00161	-0.00368	-0.00356	-0.00971	-0.00292
	(0.001)	(0.120)	(0.08)	(0.000)	(0.166)	(0.500)	(0.561)	(0.139)	(0.104)
Constant	**-1.763*** **	**1.808*** **	1.085**	**1.920*** **	**-0.7895*** **	**1.774*** **	**1.190****	0.338	**1.014*** **
	(0.000)	(0.001)	(0.04)	(0.000)	(0.000)	(0.000)	(0.05)	(0.139)	(0.000)
Observations	243	228	263	124	148	151	234	175	234
Adjusted R^2	0.228	0.237	0.245	0.272	0.275	0.318	0.279	0.317	0.301
N. of Banks	27	27	27	25	14	14	25	21	26

Note: This table reports regression results obtained via the Fixed-Effects method. The dependent variable is bank risk (RISK) which measured by Z-Score, NPL and Tier1-Capital. Definitions of all variables are provided in Table 2.1. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

2.5. Conclusion

In this essay, we examined the impact of economic freedom and regulation of credit, labor and business market on bank performance and bank stability in a sample of 75 European commercial banks for the period from 2004 to 2016. To our knowledge, this is the first study which relates corporate governance variables with regulation and economic freedom and control for any changes in the impact of board characteristics on bank performance and risk-taking while we employ macroeconomic factors.

The empirical findings provide answers to our main research questions while they reveal a number of critical issues as regards the impact of macroeconomic variables on corporate governance mechanisms. Overall, our results show that economic freedom increases bank performance in many cases. This means that a high degree of economic freedom is associated with high levels of bank performance. One possible explanation for this result is that economic freedom promotes innovation and entrepreneurship, and hence, leads to economic growth and to better banking performance.

Regarding the risk-taking of banks, our findings indicate that economic freedom contributes to financial system soundness. One possible explanation is that more economic freedom is associated with a lower probability of default due to high competition and economic growth. However, the impact of economic freedom on bank risk changes depending on the time period and the location.

Moreover, credit regulation has a positive and statistically significant impact on bank performance, supporting that more liberal credit regulation improves the profitability of banks. One possible explanation is that liberal credit regulation resulted in fewer restrictions on banking activities and hence, allows banks to exploit the economies of scale. Furthermore, the results regarding risk taking are mixed depending on the risk measure, the time period and the location.

In addition, the impact of labor market regulation on bank performance is positive, meaning that liberal labor regulation increases the profitability of banks. One possible explanation is that liberal labor regulation promotes competition and thus, leads to high levels of bank efficiency. Also, the impact of labor regulation is negative on risk-taking. A possible explanation is that liberal labor regulation contributes to better bank performance and hence, reduces risk-taking with respect to innovation and technology.

Furthermore, business regulation increases bank performance, meaning that liberal business regulation enhances bank profitability through the increased competition and increased growth.

However, our results change when we consider the location of banks. Regarding the risk-taking of banks, our findings indicate that stricter business regulation contributes to more risk. Business regulation and entry barriers lead to less revenues from new businesses, decreased productivity and hence, result in less gains for banks and in more risk-taking.

Sound corporate governance is associated with less need for monitoring and supervision and less bank controls. Our findings reveal that the implementation of macroeconomic variables alters the impact of bank governance variables on bank performance and risk-taking in some cases. More precisely, the results regarding the impact of board size on bank performance and risk-taking are mixed and similar with those in the first essay, in the majority of the tests. However, in the two-step system GMM model our results are not the same with those in the first essay. More precisely, we find that a large board increases the probability of default. One possible explanation is that a liberal economic environment in conjunction with less credit regulation might give the opportunity to board members to take more risks and hence, to increase the likelihood of default risk.

Moreover, the impact of financial experience on bank performance and risk-taking does not change in many cases. The results reveal that experienced directors are associated with more bank performance and less risk-taking. One possible explanation for this result is that a more experienced board can identify risks that will affect financial stability and, hence, can advise managers on how to handle these risks to avoid losses. However, our results change when we take into account the location of banks. More precisely, we show that the impact of financial experience is more significant in developing countries as it reduces credit risk and probability of default. One possible explanation is that in developing countries wage pressures could result in higher labor productivity due to investment in capital-intensive industries.

Concerning the impact of female directors on bank performance we find that female directors increase bank performance. One possible explanation is that women contribute to board effectiveness through their knowledge and skills. However, regarding the risk-taking of banks the results are not the same with those in first essay, when we apply the two-step system GMM. More precisely, we find that female directors reduce credit risk. One possible explanation is that in a liberal labor environment the presence of women tends to be high. This in turn, leads to less credit risk as women are considered to be less overconfident than men, and thus, avoid taking more risks.

Finally, the compensation of directors increase bank performance and reduces risk-taking. Our results reveal that when the performance achievements concern long-term investments then the

payment tends to be higher. However, regarding the risk-taking of banks the results differ for those in the first essay, when we apply the two-step system GMM. More precisely, we show that compensation contributes to financial stability. One possible explanation is that in a more liberal and competitive environment, directors are more willing to invest in positive Net Present Value projects.

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Conclusion

Motivated by the renewed interest in the effectiveness of corporate governance mechanisms in conjunction with its importance for shareholders and other stakeholders such as depositors, bondholders and regulators, the main objective of this dissertation is to investigate the impact of corporate governance and regulatory framework on the European banking sector. This thesis is composed of two essays.

The first essay examined the impact of several characteristics of bank governance variables on bank performance and risk-taking during the period 2004-2016. We focused on the board of directors because it is one of the main corporate governance mechanisms with a crucial role in achieving effective governance. Through the thorough research that we conducted, our aim was to examine if and to what extent the special characteristics of the board affect bank performance and risk-taking.

Moreover, another issue that we checked was the impact of the global financial crisis on bank governance variables. More precisely, we examined if the effect of the board of directors on banking sector changed before, during and after the financial crisis. Also, we controlled for differences regarding the impact of corporate governance mechanisms among the European countries that we used in our sample.

The second essay investigated whether and to what extent economic freedom and credit, labor and business regulation affect bank performance and risk-taking. Furthermore, having taken into consideration our results from the first essay, we checked if the impact of corporate variables was changed when we employed macroeconomic factors. To this end, we combined the bank governance variables with the economic freedom and credit, labor and business regulation variables.

Overall, our results show that bank performance is affected positively by a large board of directors. This means that a board which has a sufficient number of directors could be more beneficial by exploiting the different experiences and background of the board members. However, the results change and become mixed when we consider the location and the time period. Moreover, our findings indicate that the age of directors has a significant impact on bank performance but the results are inconclusive. The results do not change when employing macroeconomic variables.

Another characteristic that affect bank performance is financial experience. More precisely, we find that experienced directors increase bank performance. Directors with previous experience on banking activities are able to identify risks which affect financial soundness and thus, they know how to

tackle with difficult situations. However, independent directors affect bank performance only when we consider the location and time period but the results are mixed.

Furthermore, bank performance is positively associated with female directors. This means, that women contribute to board effectiveness through their knowledge and skills. Also, the one-tier system seems to be more beneficial for banks as it increases bank performance. One possible explanation is that in a unitary board all members share the same information, set strategies more quickly and therefore, take better decisions regarding the bank. Our results are the same when we consider macroeconomic factors.

Moreover, compensation and equity linked wealth are positively associated with bank performance. This means that an increase in the bonus of directors or in equity-based compensation contributes to better bank performance. One possible explanation is that high levels of compensation depend on relative and aggregate performance. The implementation of macroeconomic variables does not change the impact of compensation on bank performance.

Moving to the macroeconomic environment we found that bank profitability tends to record high scores in a more economic environment. This happens because economic freedom leads to more gains from new businesses, promotes competition and therefore, contributes to economic development and bank efficiency.

In addition, credit market regulation increases bank performance. In other words, liberal credit regulation permits banks to exploit economies of scale due to less banking restrictions. Similarly, liberal labor regulation promotes competition and economic growth and hence, leads to better bank performance. Also, our results reveal that less business regulation increases bank performance as banks gain more earnings from new businesses.

Regarding risk-taking, our results are mixed in the main tests that we conducted. However, when we take into account the economic freedom and regulation variables the findings change. More precisely, we show that risk-taking increases when a bank has more members on its board. One possible explanation is that in a liberal credit environment, directors who act on behalf of shareholders have more opportunities to take more risks and to contribute to financial instability.

Furthermore, the probability of default and credit risk increases when there are older members on the board. One possible explanation for this result is that older members usually are not familiar with the new, highly complex financial products and thus, have more difficulties in recognizing potential

risks arising from them. Also, the findings regarding the impact of independent directors on risk-taking are mixed.

According to our results, bank risk reduces with the presence of women in most of the cases. The fact that women still face barriers in their attempt to gain a position in managerial level resulted in less confidence and hence, makes female directors avoid taking risks. Moreover, when we employ the macroeconomic variables the impact of female directors remains the same in many cases, meaning that female directors decrease risk-taking. A possible explanation is that in more liberal environments the presence of women tends to be high resulting in less credit risks due to the foresight of female directors.

Moreover, financial stability is positively linked to the one-tier system in most of the tests that we conducted. This means, that the unitary board promotes bank soundness through the better coordination and the quick decisions it offers. Also, risk-taking decreases when the board has more experienced directors. This happens because experienced directors have the ability to manage difficult situations and the knowledge to handle complex banking activities. The results are in general the same when we consider the macroeconomic variables. However, we indicate that the impact of financial experience is more significant in developing countries where the wage pressures tend to be high and thus, result in more labor productivity.

In addition, the results regarding the impact of compensation and equity linked wealth on risk-taking are mixed. Nevertheless, when we apply economic freedom and regulation variables, we show that the probability of default is reduced when the level of compensation increases. One possible explanation is that in a more liberal and competitive environment, directors are more willing to invest in positive Net Present Value projects.

Moreover, financial stability is positively associated with economic freedom, meaning that in more liberal environments the increased competition and economic growth lead to more gain for banks and thus to less risk. Similarly, a more liberal credit regulation reduces risk-taking by exploiting economies of scale.

Finally, we find that less labor and business regulation contributes to the financial soundness through innovation and technology. A more liberal business regulation results to more revenues from businesses and hence leads to more profits and less risk for banks. This dissertation provides contributions for both academics and policymakers. It will help to include relevant findings in a

coherent and robust body of knowledge regarding the corporate governance of banks in a microeconomic and macroeconomic context.