Do board structure and compensation matter for bank stability and bank performance? Evidence from European banks

Mavrakana, Christina and Psillaki, Maria

2019

Do board structure and compensation matter for bank stability and bank performance? Evidence from European banks

Maria Psillaki[1]

Department of Economics, University of Piraeus

Christina Mavrakana[2]

Department of Economics, University of Piraeus

Abstract

This paper investigates the impact of bank governance on European bank performance and risk-taking. More precisely, using a sample of 75 banks from 18 European countries over the 2004-2016 period, we examine the relationship between bank governance variables namely board size, age of directors, financial experience, board independency, gender diversity, governance system and compensation on bank performance and risk-taking. Our empirical analysis shows that experienced directors increase bank performance and reduce risk-taking. Moreover, female directors have a positive impact on bank performance but the results are mixed for risk-taking. We also find that the one-tier system improves bank performance and reduces credit risk. Moreover, compensation is positively related with bank performance. The empirical findings are inconclusive regarding risk-taking. In addition, the impact of board size and age on bank performance differs, depending on the measure. We find that older members increase risk-taking. Finally, equity linked wealth leads to better bank performance but it also increases risk-taking. Our results differ according to time period and location criteria.

Keywords: Bank governance, financial crises, corporate governance, bank performance, executive compensation

JEL Classification: G01; G21; G34; G28

[1] *Corresponding author: Professor, Department of Economics, University of Piraeus, 80 str. Karaoli&Dimitriou 18534 Piraeus, GREECE, Email: psillaki@unipi.gr; Tel: +302104142299.*

[2] *Ph.D. Candidate, Department of Economics, University of Piraeus, 80 str. Karaoli&Dimitriou 18534 Piraeus, GREECE, Email: xristina_2808@hotmail.com*

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"[3] 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).

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

[3] *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).*

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[4] have been set up in order to protect investors and depositors (Kemp, 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

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

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.

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).

2.1 Board size, bank performance and risk-taking

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

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

2.2 Board age, bank performance and risk-taking

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

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

2.3 Financial experience, bank performance and risk-taking

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

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

2.4 Board independence, bank performance and risk-taking

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

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

2.5 Gender diversity, bank performance and risk-taking

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

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

2.6 Corporate governance system, bank performance and risk-taking

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

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

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

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[5] 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

[5]*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.*

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

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[6] 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 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.

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

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

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

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.

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[7] 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.

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

[7] *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.*

governance system, compensation and risk-taking is less pronounced following the financial crisis.

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.

3.1 Sample and Data

The data used in this study was extracted from the BoardEx and Bankscope databases[8] 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.

3.2 Variables

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 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

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

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[9] is the ratio of a bank's core equity capital to its total risk-weighted assets (RWA). Risk-weighted assets[10] are the total of all assets held by the bank weighted by credit

[9] *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.*

[10] *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).*

risk according to a formula determined by the Basel rules (BCBS, 2010). It is a key measure of a bank's financial strength.

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.

3.2.3 Control variables

In accordance to Fernandes et al., 2017, Pathan and Faff, 2013, Adams and Mehran, 2012 we use three 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 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).

3.3 Empirical model and methodology

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.[11] 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

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

Bank risk model

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

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.

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

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

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

Bank risk model

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

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 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 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 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: 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

4. Empirical results

4.1 Descriptive statistics and Correlation matrix

Table 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 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 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 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 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 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 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 Z-Score and capital ratio (Gujarati, 2004). [12]

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

Table 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***	**0.22***	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.

4.2 Descriptive statistics per country and per year

Tables 4a and 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 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 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 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.[13]

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.

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

Table 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 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, has been steadily increasing over time as from 36.19% (Table 4b) in 2004, it reached more than 50%, namely 51.47% and 52.49% for the years 2015 and 2016 respectively (Table 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: Mean of percentage of independent directors per year

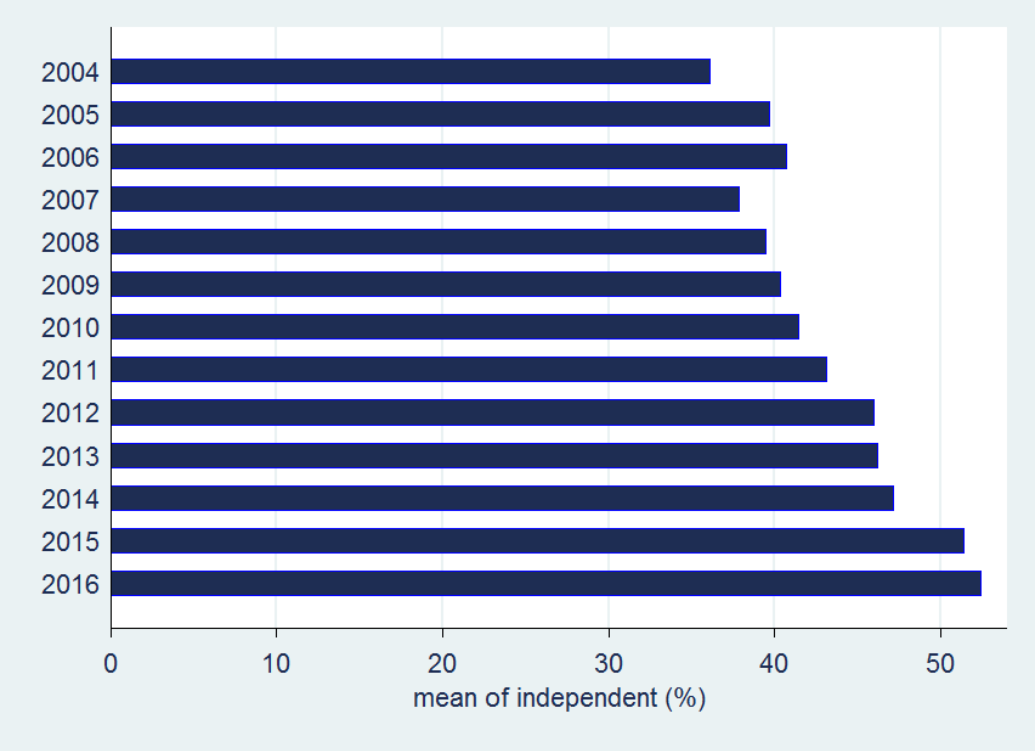
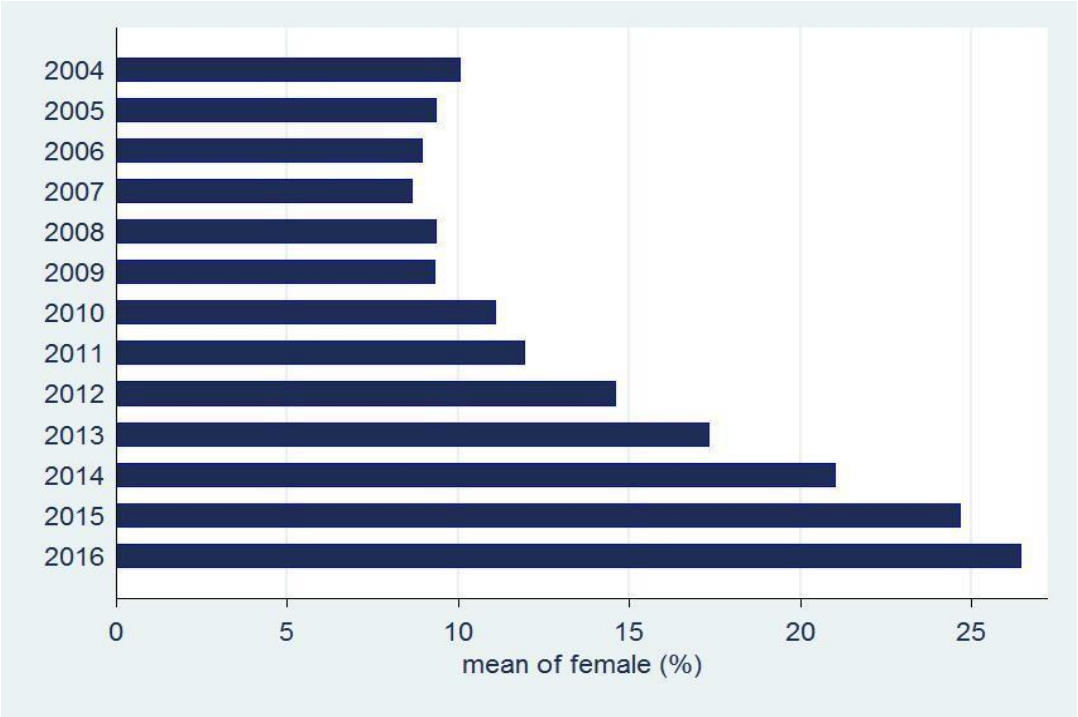


Figure 2, shows that while up to 2009 the percentage of women on board was 9.35% (Table 4b), suddenly after the crisis there is a constant increase in the number of women reaching 26.45% in 2016 (Table 4b). One possible explanation for this result is the fact that international organizations encourage 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 2: Mean of percentage of female directors per year



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 5.

As can be seen from Table 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 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.

4.4 Empirical results based on the Fixed-Effects method

Tables 6 and 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 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 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 debt to assets (Leverage) as a proxy 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 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. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 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	-0.00230
	(0.073)	(0.421)	(0.633)
WEALTH	0.001827	-0.002025	0.00125
	(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. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

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

We report the system estimator regression results in Tables 8 and 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 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 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 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 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 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 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** **	0.00087	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. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 9: Empirical results for bank risk based on Two-step system GMM

Variables	**Z-Score**	**NPL**	**Tier1-Capital**
Z-Score (t-1)	**0.724*** **		
	(0.000)		
NPL (t-1)		**1.115*** **	
		(0.000)	
Tier1-Capital (t-1)			**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	**-0.0085****	**-0.0015****

	(0.230)	(0.058)	(0.062)
WEALTH	-0.00329	**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. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

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 10 and 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 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 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 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 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 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 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 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	**0.00078*****	**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. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 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*** **	**-0.0090** **

	(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	**-0.0028*****	**0.00329***	-0.00047	-0.05515
	(0.589)	(0.273)	(0.000)	(0.071)	(0.328)	(0.330)
WEALTH	**0.07815****	-0.00174	-0.00151	-0.0065	-0.0380	-0.0245
	(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

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. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

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 12 and 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 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 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 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 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 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, 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 13). Thus, we reject hypothesis H8.b. Also, our findings are not the same with those of Table 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 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 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 11 as we show that wealth increases Z-Score before and during the crisis, contributing to the soundness of financial system.

Table 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***	0.0002	0.0007	0.0006
	(0.10)	(0.315)	(0.362)	(0.178)
WEALTH	0.0001	**0.0002****	0.0008	0.0025
	(0.412)	(0.02)	(0.475)	(0.248)
LNTA	**0.0038****	**0.0742****	0.228	**0.0503****
	(0.05)	(0.02)	(0.370)	(0.02)
CAPITAL	-0.0062	**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)	0.0031	**-0.0458****	**-0.524***	0.00240
	(0.117)	(0.05)	(0.10)	(0.154)
CRISIS*(INDEP)	0.0025	**-0.0059***	-0.0350	0.00373
	(0.484)	(0.10)	(0.502)	(0.332)
CRISIS*(FEMALE)	**-0.0034***	0.0022	-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)	0.0006	0.000017	-0.00021	0.00019
	(0.498)	(0.398)	(0.168)	(0.451)
Crisis*(WEALTH)	0.0008	**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. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 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	0.00819	-0.0032	-0.00163
	(0.263)	(0.362)	(0.773)
WEALTH	-0.00257	-0.0011	0.00100
	(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)	0.00336	0.00986	**-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. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

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 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 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 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. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

Table 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. Superscripts *, **, *** indicate statistical significance at 10%, 5% and 1% levels, respectively. P-values are reported in parentheses.

5. Conclusions

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.

References

Adams, R. B., & Mehran, H., 2003. Is Corporate Governance Different for Bank Holding companies?. FRBNY Economic Policy Review, 9(1), 123-142.

Adams, R. B., & Ferreira, D., 2007. A theory of friendly board. The Journal of Finance, 62(1), 217-250.

Adams, R. B., & Mehran, H., 2012. Bank board structure and performance: evidence for large bank holding companies. Journal of Financial Intermediation, 21(2), 243-267.

Adams, R. B., 2012. Governance and the Financial Crisis. International Review of Finance, Vol. 12(1), 7-38.

Aebi, V., Sabato, G., & Schmid, M., 2012. Risk management, corporate governance, and bank performance in the financial crisis. Journal of Banking and Finance, 36(12), 3213–3226.

Andres, P., & Vallelado, E., 2008. Corporate governance in banking: The role of board of directors. Journal of Banking and Finance, 32(12), 2570-2580.

Arellano, M., & Bond, S., 1991. Some tests of specification for panel data: Monte Carlo evidence and application to employment equations. The Review of Economic Studies, 58(2), 277-297.

Arellano, M., & Bover, O., 1995. Another look at the instrumental variable estimation of error-components models. Journal of Econometrics, 68, 29-51.

Ang, J., Lauterbach, B., & Schreiber, B., 2002. Pay at the executive suite: how do U.S. banks compensate their top management teams?. Journal of Banking and Finance 26, 1143–1163.

Bai, G., & Elyasiani E., 2013. Bank stability and managerial compensation. Journal of Banking and Finance, 37(3), 799–813.

Barber, B., & Odean, T., 2001. Boys will be boys: Gender, overconfidence and common stock investment. Quarterly Journal of Economics, 116(1), 261-292.

Barro, J., & Barro R., 1990. Pay, performance and turnover of bank CEOs,' Journal of labor economics, 8(4), 448-481.

Battaglia, F., Gallo, A., & Graziano, E., 2014. Strong boards, risk committee and bank performance: Evidence from India and China. Corporate Governance in Emerging Markets: Theories, Practices and Cases, 79-105.

Basel Committee on Banking Supervision, 2006. Enhancing corporate governance for banking

organizations-Final document. February, http://www.bis.org/publ/bcbs122.htm.

Basel Committee on Banking Supervision, 2010. Principles for enhancing corporate governance-Final document. October, http://www.bis.org/publ/bcbs176.htm.

Basel Committee on Banking Supervision, 2015. Corporate governance principles for banks-Final document. July, http://www.bis.org/bcbs/publ/d328.htm.

Basel Committee on Banking Supervision, 2017. Pillar III disclosure requirements-consolidated and enhanced framework-Final document. March, http://www.bis.org/bcbs/publ/d400.htm.

Barth, J., Caprio, G., & Levine, R., 2008. Bank Regulations Are Changing: But for Better or Worse?. Comparative Economic Studies, 50(4), 537-563.

Bhagat, S., & Bolton, B., 2014.Financial crisis and bank executive incentive compensation. Journal of Corporate Finance, 25, 313–341.

Bebchuk, L., & Spamann, H., 2010. Regulating Bankers' Pay. Georgetown Law Journal, 98(2), 247-287.

Belkhir M., 2009. Board of Directors' Size and Performance in the Banking Industry, the International Journal of Managerial Finance, 5(2), 201-221.

Benczur P., Cannas G., Cariboni J., Di Girolamo F., Maccaferri S., & Giudici M., P., 2017. Evaluating the effectiveness of the new EU bank regulatory framework: A farewell to bail-out?. Journal of Financial Stability 33, 207-223.

Beltratti, A., & Stulz, R., 2012. The credit crisis around the globe: Why did some banks perform better during the credit crisis?. Journal of Financial Economics, 105(1), 1-17.

Berman, N., 2009. Financial Crises and International Trade: The Long Way to Recovery, Max Weber Programme Working Paper, European University Institute.

Berger, A., Kick, T., & Schaeck, K., 2012. Executive board composition and bank risk taking. Bundesbank Discussion Paper, 3.

Berger, A., N., Imbierowicz, B., & Rauch, C., 2016. The roles of corporate governance in bank failures during the recent financial crisis. Journal of Money, Credit and Banking, 48(4), 729-770.

Belhaj, S., & Mateus, C., 2016. Corporate governance impact on bank performance, Evidence from Europe. Corporate Ownership & Control, 13(4), 583-597.

Bezemer, D., Grydaki, M., & Zhang, L., 2014. Is Financial Development Bad for Growth?. Research

Report 14016-GEM, University of Groningen, Research Institute

Blundell, R., & Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics, 87, 115-143.

Boone, A., Casares Field, L., Karpoff, J., & Raheja, C., 2007. The determinants of corporate board size and composition: An empirical analysis. Journal of Financial Economics, 85(1), 66-101.

Brogi, M., & Lagasio, V., 2019. Do bank boards matter A literature review on the characteristics of banks' board of directors. International Journal of Business Governance and Ethics, 13(3), 244.

Caprio, G., Laven L, & Levine, R., 2007. Governance and bank valuation. Journal of Financial Intermediation, 16(4), 584–617.

Carter, D., Simkins, B. J., & Simpson, W. G., 2003. Corporate governance, board diversity, and firm performance. Financial Review, 38(1), 33–53.

Carter, D., D'Souza, F., Simkins, B., & Simpson, G., 2010. The gender and ethnic diversity of US boards and board committees and firm financial performance. Corporate Governance: An International Review, 18, 396–414.

Carsten, 2006. The Effectiveness of Corporate Governance in One-Tier and Two-Tier Board Systems-Evidence from the UK and Germany. European Company and Financial Law Review, 3(4), 426-474.

Chen, C. R., Steiner, T. L., & Whyte A.M., 2006. Does stock option-based executive compensation induce risk-taking? An analysis of the banking industry. Journal of Banking & Finance, 30(3), 915-945.

Crawford, A.J., Ezzell, J. R., & Miles, J. A., 1995. Bank CEO pay-performance relations and the effects of deregulation. Journal of Business 68, 231–256.

Cunat, V., & Garicano, L., 2010. Did good Cajas extend bad loans? Governance, Human Capital and Loan Portfolios. In the crisis of the Spanish Economy. Madrid, Spain, FEDEA.

Cuñat, V., & Guadalupe, M., 2009. Executive compensation and competition in the banking and financial sectors. Journal of Banking and Finance, 33(3), 495-504.

Curi C., & Murgia M., 2018. Bank CEOs-characteristics, compensation policies and impacts on bank performance. 1st ed. America: Springer.

Dang, R., & Nguyen, D. K., 2016. Does Board Gender Diversity Make a Difference? New Evidence from Quantile Regression Analysis. Management international, 20(2), 95-106.

DeYoung, R., Peng, E. Y, & Yan, M., 2013. Executive compensation and business policy choices at U.S. Commercial Banks. Journal of Financial and Quantitative Analysis, 48(1), 165–196.

De Cabo, R., M., Gimeno, R., & Nieto, M., 2012. Gender Diversity on European Banks' Boards of Directors. Journal of business Ethics, 109(2).

Diamond, D., W., & Rajan, G., R., 2009. The Credit Crisis: Conjectures about Causes and Remedies. American Economic Review, 99(2), 606-10.

Das, Abhimaan, & Saibal Ghosh., 2006. Financial deregulation and efficiency: An empirical analysis of Indian banks during the post reform period. Review of Financial Economics, 15, 193–221.

Demirguc-Kunt, A., Laeven, L., & Levine, R., 2004. Regulations, Market Structure, Institutions, and the Cost of Financial Intermediation. Journal of Money, Credit and Banking 36, 593-622.

El-Faitouri, R., 2014. Board of Directors and Tobin's Q: Evidence from UK Firms. Journal of Finance and Accounting, 2(4), 82-99.

Erkens, D., Hung, D., & Matos, P. P., 2012. Corporate governance in the 2007–2008 financial crisis: Evidence from financial institutions worldwide. Journal of Corporate Finance, 18(2), 389-411.

European Commission, 2012. Women in economic decision-making in the EU: Progress report, Luxembourg: Office of the European Union, 1-23.

European Banking Authority, 2017. Guidelines on internal governance under Directive 2013/36/EU. EBA/GL/2017/11.

European Central Bank, 2017. Guidance to banks on non-performing loans.

Fahlenbrach, R., & Stulz, R., 2011. Bank CEO incentives and the credit crisis. Journal of Financial Economics, 99(1), 11–26.

Fama, E. F., & Jensen, M. C., 1983. Agency problems and residual claims. Journal of Law and Economics, 26(2), 327–350.

Financial Stability Board, 2014. Guidance on supervisory interaction with financial institutions on risk culture. April 7 2014. http://www.financialstabilityboard.org/wp-content/uploads/140407.pdf

Financial Stability Board, 2009. FSB principles for sound compensation practices. September 2009, http://www.fsb.org/wp-content/uploads/r_090925c.pdf

Felício, J. A., Ricardo Rodrigues, R., Grove, H., & Greiner, A., 2018. The influence of corporate governance on bank risk during a financial crisis, Economic Research, 31(1), 1078-1090.

Fernandes, N., & Fich, E. M., 2013. Does financial experience help banks during credit crises?, Available at SSRN: http://ssrn.com/abstract=1409557 or http://dx.doi.org/10.2139/ssrn.1409557.

Fernandes, N., Farinha J., Vitorino Martins F., & Mateus C., 2017. Supervisory boards, financial crisis and bank performance: Do board characteristics matter?, Journal of Banking Regulation, 18(4), 310-337.

Ferrarini, G., 2015. CRD IV and the mandatory structure of bankers' pay. ECGI Law Working Paper, 289.

Finkelstein, S., & Hambrick, D., C., 1996. Top executives and their effects on organizations. The Academy of Management Review, 22(3), 802-805.

Francis, B. B., Hasan, I., Koetter, M., & Wu, Q., 2012. Do corporate boards matter during the current financial crisis?. Journal of Financial Research, 35, 521–552.

Garcia, Meca, E., Garcia-Sanchez, I. M., & Martinez-Ferrero, J., 2015. Board diversity and its effects on bank performance: An international analysis. Journal of Banking and Finance, 53(4), 202-214.

Gillette, A. B., Noe, T. H., & Rebello, M. J., 2008. Board structures around the world: an experimental investigation. Review of Finance 12, 93-140.

Grable, J., Roszkowski, M., So-Hyun, J., O'Neill, B., & Lytton, R., 2009. A Test of the Relationship between Self-Classified Financial Risk-Tolerance and Investment Risk-Taking Behaviour. International Journal of Risk Assessment and Management, 12(2/3/4), 396–419.

Gervais, S., & Odean, T., 2001. Learning to be overconfident. Review of Financial Studies, 14(1), 1-27.

Gujarati, D. N., 2004. Basic econometric. Fourth Edition, The McGraw-Hill Companies.

Gulamhussen, M., & Fonte Santa, S., 2015. Female directors in bank boardrooms and their influence on performance and risk-taking. Global Finance Journal, 28. 10-23.

Goel, A., M., & Thakor, A., 2008. Overconfidence, CEO selection, and corporate governance. Journal of Finance, 63, 2737-2784.

Grove, H., Patelli, L., Victoravich, L., M., & Xu, P., 2011. Corporate governance and performance in the wake of the financial crisis: Evidence from US commercial banks, Corporate Governance. An International Review, 19(5), 418–436.

Harris, M., & Raviv, A., 2008. A Theory of Board Control and Size. The Review of Financial Studies, 21(4), 1797-1832.

Hagendorff J., Ngyen D., & Eshraghi A., 2016. Can banks board prevent misconduct?. Review of Finance, 1-36.

Hagendorff, J., & Vallascas, F., 2011. CEO pay incentives and risk-taking: Evidence from bank acquisitions. Journal of Corporate Finance 17(4), 1078–1095.

Hansmann, H., & Kraakman, R., H., 2000. The End of History for Corporate Law. Harvard Law School Discussion Paper, 280.

Hau, H., & Thum, M., 2009. Subprime crisis and board (in-)competence, Private versus public banks in Germany. Economic Policy 24(60), 701-52.

Hermalin, B., E. & Weisbach, M. S., 2003. Boards of Directors as an Endogenously Determined Institution: A Survey of the Economic Literature. FRBNY Economic Policy Review, 9, 7-26.

Heffernan, S., & Fu, M., 2008. The Determinants of Bank Performance in China, Rep. No. ID 1247713. Social Science Research Network, Rochester, NY.

Hoque, H., & Muradoglu, G., 2013. Bank Boards, CEO Characteristics and Performance: Evidence from Large Global Banks during the Crisis.

Houston, J. F., & James, C., 1995. CEO compensation and bank risk. Journal of monetary economics, 36(2), 405-431.

International Monetary Fund, 2014. Risk taking by banks: The role of governance and executives. Global Financial Stability Report-October 2014: Chapter 3, IMF, Washington.

James B., J., & Joseph C., 2015. Corporate governance mechanisms and bank performance: resource-based view. Procedia Economics and Finance 31, 117-123.

Jensen, M. C., & Meckling,W. H., 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. Journal of Financial Economics, 3, 305–360.

Jensen, M. C., 1993. The modern industrial revolution, exit, and the failure of internal control systems. Journal of Finance, 48, 831–880.

John, K., & Qian, Y., 2003. Incentive Features in CEO Compensation in the Banking Industry. Economic Policy Review, 9(1).

Kirkpatrick, 2009. The corporate governance lessons from the financial crisis. Financial Market Trends, N 96, 1-30.

Keeley, M. C., 1990. Deposit insurance, risk, and market power in banking. American Economic Review, 80, 1183–1200.

Kemp J., 2010. Volcker Rule Unexpectedly Revived by Dodd Bill. REUTERS, March, http://blogs.reuters.com/great-debate/2010/ 03/16/volcker-rule-unexpectedly-revived-by-dodd-bill/.

Košak, M., & Čok, M., 2008. Ownership structure and profitability of the banking sector: The evidence from the SEE region. Zb. Rad. Ekon. Fak. U Rijeci Časopis Za Ekon. Teor. Praksu 26, 93-122.

Kumbhakar, S., & Lozano-Vivas, A., 2004. Does Deregulation Make Markets More Competitive? Evidence of Mark-Ups in Spanish Savings Banks. Applied Financial Economics 14, 507–515.

Laeven, Luc A., 2013. Corporate Governance: What's Special About Banks?. Annual Review of Financial Economics, 5, 63-92.

Laeven, L. & Levine, R., 2009. Bank governance, regulation and risk taking. Journal of Financial Economics, 93(2), 259-275.

Lotto J., 2018. The Empirical Analysis of the Impact of Bank Capital Regulations on Operating Efficiency. International Journal of Financial Studies, 6, 34.

Levine, R., 2004. The Corporate Governance of Banks: A Concise Discussion of Concepts and Evidence. World Bank Policy Research Working Paper 3404.

Liang, Q., Xu, P., & Jiraporn, P., 2013. Board characteristics and Chinese bank performance. Journal of Banking and Finance, 37(8), 2953-2968.

Macey, J., & O' Hara, M., 2003. The corporate governance of banks. Economic Policy Review, 9(1), 91-107.

Masulis, R. W., Wang, C., & Xie, F., 2012. Globalizing the boardroom-The effects of foreign directors on corporate governance and firm performance. Journal of Accounting and Economics 53(3), 527-54.

Millet-Reyes, B., & Zhao, R., 2010. A comparison between one-tier and two-tier board structures in France. Journal of International Financial Management and Accounting, 21(3), 279-310.

Minton, B., Taillard, J., & Williamson, R., 2011. Do independence and financial expertise of the board matter for risk taking and performance?. SSRN Electronic Journal.

Mishra, C., & Nielsen, J., 2000. Board independence and compensation policies in large bank holding companies. Financial Management 29(3), 51–69.

Muller-Kahle, M., & Lewellyn, K, B., 2011. Did board configuration matter? The cases of US subprime lenders, Corporate Governance. An International Review, 19(5), 405–417.

Nahar Abdullah, S., 2004. Board composition, CEO duality and performance among Malaysian listed companies. Corporate Governance: The international journal of business in society, 4(4), 47-61.

Nan, L., 2008. The Agency Problems of Hedging and Earnings Management. Contemporary Accounting Research, 25(3), 859-890.

Nguyen, D. D., Hagendorff, J., & Eshraghi, A., 2015.Which executive characteristics create value in banking? Evidence from appointment announcements, Corporate Governance: An International Review, 23, 112–128.

Owen, A. L., & Temesvary, J., 2018. The performance effects of gender diversity on bank boards, Journal of Banking and Finance, 9(C), 50-63.

Pathan, S., Skully, M., & Wickramanayake, J., 2008. Reforms in Thai Bank Governance: The Aftermath of the Asian Financial Crisis. International Review of Financial Analysis, 17(2), 345-362.

Pathan, S., & Skully, M., 2010. Endogenously structured boards of directors in banks, Journal of Banking and Finance, 34(7), 1590-1606.

Pathan, S., & Faff, R., 2013. Does board structure in banks really affect their performance?, Journal of banking and finance, 37(5), 1573-1589.

Peni, E., & Vähämaa, S., 2012. Did good corporate governance improve bank performance during the financial crisis?, Journal of Financial Services Research, 41(2), 19–35.

Peterson, C. A., & Philpot, J., 2007. Women's roles on US Fortune 500 boards: Director expertise and committee memberships. Journal of Business Ethics, 72, 177–196.

Pi, L., & Timme, G., S., 1993. Corporate control and bank efficiency. Journal of Banking and Finance, 17(2), 515-530.

Raheja, C. G., 2005. Determinants of board size and composition: A theory of corporate boards. Journal of Financial and Quantitative Analysis, 40(2), 283–306.

Ramano, G., Ferretti, P., & Quirici M. C., 2012. Corporate Governance and Performance in Italian Banking Groups. Managerial Auditing Journal, 27(7), 622-638.

Roodman, D., 2009. How to do xtabond2: An introduction to "difference" and "system" GMM in Stata. Stata Journal, 9(1), 86-136.

Rose, P., 1992. Agency Theory and Entry Barriers in Banking. The Financial Review, 27(3), 323-353.

Setiyono, B., & Tarazi, A., 2014. Does Diversity of Bank Board Members Affect Performance and Risk? Evidence from an Emerging Market.

Srivastav, A., & Hagendorff, J., 2016. Corporate governance and bank risk-taking. Corporate Governance: an International Review, 24(3), 334-345.

Stiglitz J. E., 2009. The financial crisis of 2007/2008 and its macroeconomic consequences. Initiative for Policy Dialogue Working Paper Series.

Sironi E., & Pellegrini C., 2017. Does a one-tier board affect firms' performance? Evidences from Italian unlisted enterprises. Small Business Economics, 48(1), 213-224.

Staikouras, P., Staikouras, C., & Agoraki, M. E., 2007. The effect of board size and composition on European bank performance. European Journal of Law and Economics, 23(1), 1-27.

Talavera, O., Yin, S., & Zhang, M., 2018. Age diversity, directors' personal values, and bank performance. International Review of Financial Analysis, Elsevier, 55(C), 60-79.

Trabelsi, M., A., 2011. Impact of the sovereign debt crisis on the Eurozone countries. Procedia-Social and Behavioral Sciences, 62, 424-430.

Thakor, Anjan V., 1996. Capital requirements monetary policy and aggregate bank lending: Theory and empirical evidence. The journal of American Finance Association 51: 279–324.

Vallascas, F., & Hagendorff, J., 2013. CEO bonus compensation and bank default risk: Evidence from the US and Europe. Financial Markets, Institutions & Instruments 22(2), 47–89.

Visser, M., 2011. Advancing gender equality in economic decision making, Paper presented at the conference on equality between women and men (European Commission, Brussels). Retrieved from http://ec.europa.eu/justice/gender-equality/files/backgroundpaper- decision-making_en.pdf

Wang, T., & Hsu, C., 2013. Board composition and operational risk events at financial institutions. Journal of Banking and Finance (37), 2042-2051.

Wintoki, M., Linck S., & Netter M., 2012. Endogeneity and the dynamics of internal corporate governance. Journal of Financial Economics 105(3), 581-606.

Zalewska, A., 2016. A new look at regulating bankers' remuneration. Corporate Governance: An International Review, 24(3), 322–333.