The Impact of Board Diversity on Bank’s Risk taking in Europe

Author: Cordy van Werven
University of Twente
P.O. Box 217, 7500AE Enschede
The Netherlands

ABSTRACT,
The aim of this paper is to find the effect of board characteristics in terms of board diversity in gender, age, and ethnicity. Literature examined in this paper suggests a positive relation between these variables and policies to secure for risk. The measurements for the level of risk are in accounting standards Total capital ratio, and Tier-1 capital ratio and for risk in market-based standards the Z-score. This is examined through the conduction of a multiple regression analysis for the separate board characteristics being tested. The control variables are the total amount of board members, total assets, and return on assets. This study is performed on European banks in the year 2015. The results show that female diversity is positive related to the assurance against risk by providing more reserves, but does not reduce insolvency risk. Average age is not significant related to risk policies in the form of assurance or insolvency risk in this study. Ethnic diversity measured as board members from other countries than the banks head office show a positive relation on the secure risk policies and insolvency risk. These results suggest that a difference in personal characteristics, through culture difference and gender difference has a positive effect towards secure risk policies.

Graduation Committee members:
M.R. Kabir, S.A.G. Essa, H. van Beusichem

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Keywords
Gender diversity, Age diversity, Ethnic diversity, Board of directors, Accounting standards risk, Market-based risk, Banks
1. INTRODUCTION
Banks are the heart of the financial world, and play a key part in the payment system. They gain and collect financial resources and redistribute these among society. Economies depend and build on banks to grow and to have a stable monetary economy. Citizens, businesses and governments use banks to stall their financial resources. They are also highly leveraged firms, due mainly to the deposits taken from customers. For all these reasons, banks are indicated as a separate industry including being subject to more intense regulation than other firms. This banking industry is responsible for safeguarding depositors’ rights, guaranteeing the stability of the payment system, and reducing systemic risk. The high regulation, also in form of restrictions, can be described as an additional mechanism of corporate governance, as it takes over high percentage governance within banks. The main goal of the regulator to protect the bank, introduces a new agency problem within banks. This agency problem is a conflict between the regulator, who wants to reduce risk, and the shareholders, whose main objective is to increase value. In order to redeem this conflict, a bank’s board takes charge of the links with the regulator. The board is required to have a broad scale of knowledge on the financial, in particular banking, complex activity, in order to monitor and advice managers efficiently. (De Andres and Valletaldo, 2008)

The impact of board diversity on companies has been studied for many industries on different kind of policies (e.g. Kang, Cheng and Gray, 2007, Brammer, Millington and Pavelin, 2007). Some of these papers about board diversity, focus (for a part) on the influence this has on corporate risk taking in particular. Sila, Gonzalez and Hagendorf (2016), focus on the role of gender diversity within boards and risk taking. Serfling (2014) focuses on CEO age and its impact on corporate risk policies. Only a few papers can be found about board diversity of banks and risk in particular, even while the financial crisis has shown the instability of banks and the high level of risk these banks bears. The financial crisis of 2008 has for a high part been blamed to incapable management of financial institutions such as banks (Illeuecal, Norden, Udell, 2011). The aspects of the corporate boards that are hold responsible for the financial crisis and caused this crisis (according to a variety of articles and newspapers) are described to a wide extent. However the actual risk decisions a board of a bank faces on daily basis, or the internal cooperation by a board to construct strategies is rarely mentioned.

This paper will research one aspect within one industry (geographically districted to Europe) in depth in order to contribute a concrete finding to the discussion whether and for what part the diversity of a bank’s board influences the risk policy of a bank. Investors will be given (in case this study will find significant results) a new indication for expected risk policies through examining a banks’ board diversity. Banks will get new insight on the effect of board diversification in terms of possible consequences for risk policies, and regulators are able to further reduce bank riskiness through board diversification regulation, if connections are found.

This research will be done by addressing the following research question:

Does diversity in the board of directors within European banks have an impact on the level of risk taken by European banks in terms of capital investment policies?

In order to further narrow down the board diversity aspects taken into account in this study, this question is divided into 3 sub-categories:

Does the diversity in gender of board members within the European banking sector influence the level of risk taken by these banks with their capital assets?

Does the diversity in age of board members within the European banking sector influence the level of risk taken by these banks with their capital assets?

Does the diversity in ethnicity of board members within the European banking sector influence the level of risk taken by these banks with their capital assets?

2. LITERATURE REVIEW
The literature review will give an in-depth view on aspects that, according to existing literature, have an impact on the risk policies of banks adopted by the board, diversity aspects in particular. Unfortunately, there is not much research done on the impact of board diversity and risk policies, let stand in the financial sector alone. To bridge this problem studies that give empirical evidence and descriptive literature about corporate risk, board diversity, and regulation, in general are used in this paper. This is also done in papers with the topic similar to this paper.

2.1 Board policies on corporate risk
According to Hermlain and Weibach (2003) the effectiveness of boards in the banking industry is to a great extent underexposed as many studies on corporate boards exclude the financial sector explicit, due own regulation of the financial sector world-wide. However, many studies about the financial sector use empirical results from studies about other industries in order to substantiate their findings and theories, as there is a lack of studies about the financial sector on many topics.

2.1.1 Agency theory
The agency theory within corporate governance of banks is in this case a type 1 agency problem about the complicated understanding between board members and shareholders. Shareholders, owners of banks which in this case frequently are governments as well, have the goals to increase the value and dividend of their shares, while board members, who act on behalf the shareholders aim to increase their own wealth and stronger their position. The inability to fully monitor the action of board members (agents) by the shareholders (principles) is called moral hazard (Thomson and Conyon, 2012). The principles of banks have conflicting interests as well. Some banks are (partly) in hand of governments, as results of bail outs, who want to see a stable sector again, while other principles have as main goal a value increase as fast as possible. This implies that firm behaviour should be modelled as a common agency problem (Bernheim and Whinston, 1986). An additional aspect of moral hazard is the phenomenon “too-big-to-fall”. Some banks have accomplished such a big size and importance within a country’s economy that governments are somewhat obligated to bail out the banks when they threaten to fall. At long last can rescuing a bank from failing be less expensive than a bank going bankrupt. These banks are aware that governments will save them giving CEO’s an incentive to take additional risk. (Pathan, 2009) This will increase banking system fragility and can be described as a form of subsidization exclusive to large banks (Mishkin, 1999).

A second issue of the agency problem is stressed by Macey and O’Hara (2003), who report the duty of governments as regulators to have the fiscal duty to insurance tax payers of a safe heaven for their income. Furthermore, governments have a high interest in banks. A study of La Porta, Lopez-de-silanes, and shleifer (2002) for example indicates that in 1995 42% of the equity of the ten largest banks in each country was
government owned. The interference of governments in the financial industry is indicated as the reason why the banking industry is a unique industry on its own. Levine (2003), who seems to have in mind commercial, deposit taking and loan making banks, suggest banks are special because of two main reasons. The first is the greater opacity of banks compared to other (financial and non-financial) firms. This is due the fact that borrowers of banks know more about the investments, and so the credit worthiness than the lenders, the banks (Mishkin, 2003). This also causes asymmetry between the bank management and the depositors (stakeholders) who are in a disadvantage position compared to the banks (Ackerlof, 1970). This also applies to governmental stakeholders. Stakeholders only can get information through revelation of the management (e.g. annual reports and rare meetings). The second main reason of Levine (2013) is the fact, again, that they are more heavily regulated than most other firms in most economies. Studies find, as can be expected from the agency theory, a positive relation between company results as a consequence of risky corporate policies and board compensation (Coles, Daniel, Naveen, 2006, Rajgopal and Shevlin, 2002). On the other hand, compensation in terms of pension cause CEOs to take less risk as they value their current position more (Cassell, Huang, Sanchez, and Stuart, 2012).

2.1.2 Internal control
Nowadays banks have their own risk auditing and controlling divisions. In the last centuries the importance of these divisions has grown. The rise of internal control systems and their public role can be explained by the following factors. Organizations, banks in particular, have come to recognize the importance of auditing and controlling as the basis for reducing unnecessary risk and increasing insurance. Second, the control systems are important for measurement and enforcement of, internal as well as external, regulation. Finally, internal control systems help banks to indicate, guide and respond to crisis situations and failures within banks and with their interacting environment (Power, 2004).

The board of directors is hold responsible for the policies conducted, monitoring policies and change where might to be necessary. A framework has been set for solid corporate governance exciting of six elements. These are: clear and measurable strategy, clear assignment of responsibilities, strong and adequate auditing and control system for risk, adequate standard and guidelines, appropriate financial incentives for all involved parties, and transparency of information internal as well as external, regulation. Finally, internal control systems help banks to indicate, guide and respond to crisis situations and failures within banks and with their interacting environment (Power, 2004).

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2.2 Board diversity on corporate risk policies
Board diversity is studied mainly as impact on the financial performance of a company, with in some studies risk policy as side subject. The diversity within boards within the banking sector is low and has to make a retrieval compared to other industries. It has been stated that banking and finance sector companies have boards which are “too big, too old, and too male” (Engen, 2002).

2.2.1 Gender diversity
Bruce and Johnson (1994) studied the difference in betting behaviour between male and females. Their study shows that female have a lower tendency to take risks compared to males. The reason is that female bettors overthink their bets more and are less confident about their choices in betting, discouraging females to bet. A second study indicating the risk aversion of women compared to men is of Bernasek and Shwiff (2001), showing that women take less risk in the allocation of their pension wealth. Johnson and Powell (1994) confirm these statements in terms of managerial decisions. Women have a hard time getting into the higher hierarchies in companies reaching levels such as CEO. This phenomenon is called “glass ceiling”. The risk adverse attitude of women is also argued to be one of the reasons why women do not reach top positions within companies compared to men, as achieving a CEO position within a firm requires a somewhat risky attitude (Powell and Butterfield, 1994). Nevertheless have the chances for women in Europe to achieve a job level as CEO increased.

In the past years the discussion to introduce female quotas within boards has been seriously conducted within welfare states. An example of a country is Norway that passed a law in 2003 requiring all public listed boards to have at least a percentage of 40% women in their board by July 2005 (the final date shifted to January 2008). At the moment of announcement of the law it caused a drop in stock value for Norwegian listed firms and a decrease in Tobin’s Q for the following years (Ahern and Dittmar, 2012). This shows the unpopularity of women in boards in the eyes of the stock market. In contrast to most studies about the effect of female board members on risk, the study of Ahern and Dittmar (2012) found, insignificant increasing risk policies within their Norwegian sample. The relation found in this study can also be assigned to third variables such as the inexperienced new female board members and the high level of acquisitions in the years that law passed, which can be blamed on the new law as well. According to Weber and Zulehner (2010) company start-ups that include women in their board have a higher change of survival compared to start-ups with only male board members, while start-ups are generally known for their high risk level.

Evidence shows that there is a statistical and economic significant role for CEO gender diversity and corporate risk decisions (Faccio, Marchica, and, Mura 2016). This study also controlled for difference in industries. Another aspect taken into account, more directly linked to this study, is the allocation of capital assets and gender diversity. This study also shows that, even while women CEO’s are more risk averse, the risk taken by women CEO’s does give better results in terms of capital asset allocation. Better results in asset allocation, on the other

1 The definition of financial expertise is stated in Section 407 of the Sarbanes-Oxley (2002) Act (definition of audit committee financial experts). It is defined under the following criteria of an individual: Education and expertise in the field of auditing and controlling and understanding of general accepted underlying principles and financial statements.

2 Tobin’s Q is a ratio of the market value of a firm to the replacement costs of all the firm’s assets. If the Q ratio (the market value of a firm to the replacement cost of its assets) is greater than one, showing efficient use of assets by a firm, the firm should invest more in order to increase its capital stock. At that moment investments are seen as profitable (Tobin, 1969).
hand, could be expected as studies also show that female directors are more extensive in monitoring than male colleagues (Adams and Ferreira, 2009, Dang, Bender and, Scotto, 2014). According to Meteos de Cabo, Gimeno and, Nieto (2011), banks with a lower level of riskiness in their policies tend to have more females on their board.

2.2.2 Age diversity

Campbell (2006) conducted a study on the effect of age within households and the risk those households take with their income. According to this study, younger people take riskier decisions with their income. On the other hand, this study also shows that only a small percentage take the risk because of naivety, while most households take risk due unavailable information. The risk can be found in the portfolio of households with the expenses of their income. A counter argument is the available time horizon for investments, which is lower for older person who thus have a lower incentive to take risk. (Bodie, Merton, and, Samuelson, 1992)

By far most board members became on their position through executive experience, working up on the ladder within a company or other companies within a similar industry. By the time that career developers achieve the level of CEO most board members are already of middle to retirement age. Some studies encourage a spread of age in board diversity. These studies suggest that different age categories in a board complement each other. The older board members can use their expertise and wisdom to adjust problems, while younger board members are more energetic and up to date to the latest innovation possibilities. (Kang, Cheng and, Gray 2007) Many boards have a regulation concerning a maximum age for certain positions within a board. In general, supervisory directors are allowed to be older compared to executive directors. Nevertheless, exceptions are common. (e.g. Argenta Spaarbank, IFRS annual report 2015)

The discussion about age influences on a boards risk policy also brings in the adverse selection theory. In this theory managers that are been selected to perform the job as CEO, hide (on purpose or by accident) certain elements of their capabilities, due which the best applicant is not always selected for the job. (Thomsen, and Conyon 2012) An empirical study in which individuals had to estimate their own risk tolerance for example, gave as results that only 4% is able to accurate estimate this element. (Hallahan, FaP, and McKenzie, 2004). Payne, Bettman, and Luce (1998) give as explanation for this phenomenon that people tend to assign too much importance to third variables. Roszkowski and Grable (2005) report individuals within the financial sector are better in the estimation of their risk tolerance than average. However the most reliable way, according to Roszkowski and Grable (2005), to estimate risk tolerance is computer technology by far.

Gervais and Odean (2001) indicates inexperience in younger individuals causes misattribution of success resulting in upward correction of the ability to control risk. Individuals learn from their past mistakes or successes in terms of risk taking and adjust their skills. Over time people better assess and estimate their abilities while risk tolerance decreases. Survey evidence from MacCrimmon and Wehrung (1990) on self-ratings about executives, suggests that mature executives take less risky decisions.

Some studies suggest the opposite in risk taking behaviour for young CEO members. They suggest that young CEO members are less willing to take risk as they have not yet build up a quality reputation allowing them to take risk, or that they are afraid to take risks because of the harder consequences in their career when it backfires. This will encourage them to follow more conservative risk policies. (Hirshleifer and Thakor, 1992, Holmstrom, 1999)

Prendergast and Stole (1996) have found evidence suggesting that young CEO’s tend to prove their abilities for what it is worth and so are more willing to take risk. They constructed a model to indicate the more aggressive attitude of young CEO’s towards risk taking. An example of taking age into consideration in board selection is Yahoo Japan, where they hired a 44-year-old CEO along with seven other young managers. The argument for this decision was a need of an executive team that would not be afraid to take risks to remain competitive. (Serfling, 2014)

2.2.3 Ethnic diversity

According to Hillman, Cannella, and Harris (2002) ethnic diversity within executive boards is one of the biggest trends, along with gender diversity, within the US. Karen J. Curtin, a former executive vice president of Bank of America, describes the debate on gender and ethnic diversity in the following statement, “There is real debate between those who think we should be more diverse because it is the right thing to do and those who think we should be more diverse because it actually enhances shareholder value. Unless we get the second point across and people believe it, we’re only going to have tokenism”. (Carter, D’Souza, Simkins, and Simpson, 2010) Hillman, Cannella, and Harris (2002) show that ethnic diversity also means that individuals have a different background. This is applicable on the resources dependence theory of Pfeffer and Salancik (1978) in which they suggest four primary benefits for the external linkages board members should have: (1) provision of resources such as information and expertise; (2) creation of channels of communication with constituents of importance to the firm; (3) provision of commitments of support from important organizations or groups in the external environment; and (4) creation of legitimacy for the firm in the external environment.” On which ethnic diversity has a positive influence (Carter, D’Souza, Simkins, and Simpson, 2010). The resource based theory in terms of board diversity is also substantiated by Putnam (1995) in the perspective of connections.

Within the agency theory on board diversity the board functions, monitoring and controlling are a fundamental part of board related tasks (Jensen & Meckling, 1976). Carter, Simkins, and Simpson (2003) suggest that a more diverse board is more suitable to monitor and controlling within a board than a less diverse board. The reason for this is that a more diverse board ought to be more independent than comparable boards. Even while theory suggests this statement, a clear direct link in terms of a predicting relationship between board diversity and a company’s financial performance has not been found yet. Erhardt, Werbel, and Shrader (2003) and Mariimuthu and Kolandaisamy (2009) report evidence for a positive relation between a firm’s financial performance and ethnic diversity. Barako and Brown (2008) studied the effect of ethnic diversity within bank boards of Kenia, but did not find any significant results on the bank’s performance. This was partly due that many of these foreign board members are representatives of foreign owners of the banks.

Overall it seems like board ethnic diversity is poorly argued in general. The main support comes from a general view on board diversity and moral aspects. (Van der Walt, and Ingleby, 2003) Nevertheless does most evidence support that ethnic diversity has a positive effect on financial decisions and monitoring, partly due a higher independence level of more diverse boards, in this paper higher risk policies is valued as a negative aspect within the banking sector.
2.3 Regulation towards the banking sector about risk policies

The financial crisis of 2008 was blamed for a large portion on the banking sector by journalists (e.g. Mathiason, The guardian, 2008). Regulators took action to increase banking regulation in order to prevent these crises from happening again. Before 2008 banks underwent an increasingly deregulation in the United States, due to passage of the Riegle-Neal Act of 1994 and the Gramm-Leach Biley Act in 1999 (Adams and Mehran, 2005). Different new measurements arise in the banking sector to control for the risk factor. A risk measurement for banks tries to assign a single numerical value to the random loss of an assets portfolio. This value will give an estimation of what future outcome can be expected from an assets portfolio in terms of riskiness (Kou, Peng, and Heyde, 2013). This level of determined riskiness is used as control by regulators, investment decisions, self-evaluation, and as benchmark between banks.

2.3.1 Basel accords

The Basel accords refer to the banking supervision accords set by the Basel Committee on Banking Supervision (BCBS). This committee was established in 1974 by the bank governors of the G-10, Luxembourg, and Spain. Their head office is located in Basel, Switzerland. The BCBS was the result of some serious disturbances in international currency and banking markets. The goal of the BCBS is to enhance financial stability by improving the quality of banking supervision worldwide and serve as a forum for regular cooperation between member countries on banking supervision matters. The BCBS does not issue binding regulation, but rather give standards and guidelines.

Nevertheless, member countries are expected to implement these standards and guidelines. These days a list of other countries joined as well, giving the BCBS a membership list of currently 45 institutions within 28 jurisdictions.

The Basel accords where from the start on intended to be further developed. The first Basel accord was released in 1988 and had the focus on capital adequacy. The main statement was that banks needed a minimum ratio of capital to risk-weighted assets (RWA) to be implemented by 1992. In 2004 the BCBS published a new accord (Basel II), replacing the first accord. The new accord comprised three pillars: minimum capital requirements, supervisory review of capital adequacy and internal assessment process, and effective use of disclosure to strengthen market discipline and encourage sound banking practices. Basel II was designed to improve regulatory capital requirements reflecting underlying risks and to address innovation. In 2010 Basel accord III, the currently final accord, was issued. Basel III accord is a reaction of the BCBS to the financial crisis, which tested the banking regulation for its robustness. The banking sector failed for the test as credit and liquidity risks were mispriced. Besides too low capital buffers, the banking sector had to deal with poor governance, poor risk management, and inappropriate incentive structures. In the new accord the capital buffers increased, including a boundary when breached pay-outs will be restricted. Furthermore, restriction on credit booms, a leverage ratio for losses, liquidity requirements, and an increase in supervision and resolutions on augmented contingent capital (Bank for International Settlements, 2016).

There are also objections against such a kind of regulation. These risk measure set capital requirements for the banking books and trading books of financial institutions. The regulation of this financial sector causes for a lot debates about whether this has a positive effect on the banking industry (Kou, Peng, and Heyde, 2013). For example, a study shows that imposing trading book capital requirements may postpone recapitalization of bank and so increase its default probability (Keppo, Kofman, and Meng, 2010).

2.3.2 Tier capital buffers

In order to ensure banking stability in times of economic distress banks are obligated to have capital ratio buffers in order to cover any losses. The height of these buffers is issued by the Basel accords. A distinction is made in different forms of capital buffers. There are two tiers, Tier-1 and Tier-2. Tier-1 and Tier-2 accumulated is the total regulatory capital also referred to as Total capital. In the Basel II accord a Tier 3 was also applicable, but this tier is eliminated in the Basel III accord. The tier ratio is the tier capital to RWA. Tier-1 consists of shareholders’ equity, retained earnings, and other disclosed reserves. Tier-1 capital is common seen as the core measurement from a regulators view. Tier-2 capital, also known as supplementary capital, comprises all other equity such as, undisclosed reserves, revaluation reserves, general provisions, hybrid instruments and subordinated term debt. Basel accord III sets a minimum for the Tier-1 ratio of 6% and a minimum for Total capital ratio of 8% (PricewaterhouseCoopers, 2011).

2.4 Hypotheses construction

In this study, as argued before, three different board characteristics on diversity are examined. These board characteristics are gender diversity, age diversity, and ethnic diversity. The correlation between these characteristics and a bank’s policy on risk is researched, including an estimation of the level of influence per characteristic with the selected variables. The level of risk avoidance is measured to determine the risk policy.

The first hypothesis is whether the ratio of female board members has an impact on the risk policy. According to most cited studies females are more risk avoiding than men (Bernaske and Shwiff, 2001, Ahern and Dittmar, 2012). According to Meteos de Cabo, Gimeno and, Nieto (2011) banks with lower levels of riskiness tend to have more females on their board. This study will ascertain whether there is a correlation between levels of risk of banks within Europe and female board members. The next hypothesis follows from this statement:

H1: A board of directors with relative more female (more male) members is more (less) risk averse with firm assets than a board with relative less female (less male) members

Most found studies found that age has an impact on risk aversion as well. Younger persons tend to take more risk in

1 Undisclosed reserves are profits not appearing in normal retained profits or in general reserves.
2 A revaluation reserve is created when assets are revalued and an increase in value is brought to account.
3 General provisions are losses with uncertain origin. IFRS accounting standards define general provisions as calculated expected losses that did not occur. Regulators count this as capital as well.
4 Hybrid debt capital instruments consist of instruments which combine characteristics of equity as well as debt. They are included in Tier 2 capital when they support losses on an ongoing basis without triggering liquidation.
5 Subordinated debt is to control for maturing capital. It prevents a labile capital ratio due maturing.

G-10 is a group of 9 countries and 2 central banks. The G-10 includes Belgium, Canada, France, Italy, Japan, The Netherlands, United Kingdom, United States, the central bank of Germany, and the central bank of Sweden.

Credit booms are the excessive issuing of credit loans by credit distributors due peaks in the economic conjuncture.
An advantage of the selected method to create an optimal multiple linear regression analyses is an increase in the significance level of the models. A disadvantage on the other hand is that endogeneity problems can arise because of omitted variables that affect both the selection of diverse directors and financial performance (Adams and Ferreira, 2009), or in this case risk performance. A second disadvantage is that this regression analyse assumes a linear relation, which is not always perfectly present. Sometimes this can be fixed with adding a natural logarithm to the variable.

3.2 Variables

3.2.1 Dependent variables

The dependent variable in this research is the risk policy of European banks. Risk policy as defined in this paper is the counter measurements taken against risk. So a higher or better risk policy in this paper means a more secure and less risky policy, also referred to as risk avoidance. The risk policy conducted by a bank’s board is measured by three different dependent variables modelled in an own equation.

The first two dependent variables as measurement for risk are Total capital ratio and Tier-1 ratio. These two variables measure the risk according to accounting standards. The Tier-1 ratio (e.g. Ellul, and Yerramilli 2013) measures the core capital of bank. Tier-1 capital indicates the reserves held by banks for risk-weighted assets relative to equity. The total tier capital includes the supplementary capital of banks (Tier-2 capital) as well. The reason that these are split is because of the high differences between banks in issuing supplementary capital. For this reason most studies prefer the use of Tier-1 capital ratio instead of Total capital ratio. This can lead to a distorted picture in the comparison of bank reserves, as, in some cases, there are large differences between the Tier-2 ratios of banks. The supplementary capital takes into account special bonds distributed by banks with priority shares, if any of these are distributed at all. Tier capital risk measurements are as well used by the ECB (Basel accords) as a benchmark between banks, with minimum requirement standards set by regulation. When the total capital ratio or the Tier-1 capital ratio is higher a bank has higher reserves for its core capital, and thus takes less risk. This same principle is applicable to the Total capital ratio. A more optimal measurement for accounting risk would be the direct measurement of risk-weighted assets, which is processed in the Tier capital ratios. Unfortunately, this raw data is not available.

The third dependent variable used to measure risk is the Z-score of banks (Laeven, and Levine, 2009). This variable is a market-based risk measurement. The Z-score equals return on assets, measured before taxes, plus the capital-asset ratio divided by the standard deviation of asset returns. The Z-score measures the distance from insolvency, originally constructed by Roy (1952), a higher Z-score indicates more stability and a lower probability of failure (Boyd, and Graham, 1986). Insolvency is defined as a state where losses, measured in profits before taxes (π), surmount equity (E), E≤π (as losses cannot exceed equity). The total assets (A), the return on assets (ROA= π/A), the standard deviation (σ), capital assets ratio (CAR=E/A). Insolvency is measured as the probability that losses in terms of return on assets exceeds the capital asset ratio (-ROA>CAR). In the case that profits are normally distributed the resulting formula:

\[ Z\text{-score} = \frac{(ROA+C\text{AR})}{\sigma(ROA)} \]

This is the inverse of the probability of insolvency. The Z-score indicates the number of standard deviation that a bank’s ROA has to drop below the expected value in order to deplete equity.
The Z-score is expected to be positive related to risk policy. A higher Z-score indicates that the bank is more stable. The Z-score measures risk in the form of risk outcome from conducted policies by a board (Laeven, and Levine, 2009) Variations of this calculation can be found all over the literature (e.g. Lepetit, Nys, Rous, and Tarazi, 2008, Stiroh, 2004, Stiroh, and Rumble, 2006, Mercieca, Schaeck, and Wolfe, 2007).

3.2.2 Independent variables

The independent variables are used to measure the board diversity. In this research the board of directors is examined. These are the executive board members as well as the non-executive board members. The independent variables for board diversity taken into account are gender diversity, age diversity, and ethnic diversity. The most common researched variable for board diversity is gender diversity (De Cabo, Gimeno, and Nieto, 2012, Silva, Gonzalez, and Hagendorff, 2016). Gender diversity will be measured in terms of percentage of females on a board of directors. The percentage of females in a board of directors is found annual reports as well as personal background research. All personal background research for board member characteristics in this study is done through researching the name of a director in social media such as, LinkedIn and Facebook or searching for the name in director databases, pending on the availability of required data in a certain database (e.g. Bloomberg, Boardroominsiders, Checkdirector). Secondly, age diversity is measured as an average of a board of directors. The influence of age on company performance and risk is as well broadly researched (Berger, Kick, and Schaeck, 2014, Hagendorff, and Keasey, 2012). The age of directors is found in annual reports as well as through personal background research. A less common researched variable is ethnic diversity. This is partly due the lack of instant data. The ethnic diversity will be measured in terms of percentage of foreign (not born in the country where the bank is located). Some might argue that board members born outside a country but moved to the country from a young age or are adopted are almost completely integrated, yet these board member have a different culture from their childhood on and have been affected by looking like a social outsider, both influencing their character. (Carter, D'Souza, Simkins, and Simpson, 2010, Brammer, Millington and Pavelin, 2007).

3.2.3 Control variables

In this study we take three control variables into account. The selected control variables are the ones that are most common used in previous studies with as topic board diversity or bank risk policies. Firm size is the first control variable used. The firm size affects the available resources for a board as input and to bear risk. Within the banking sector are bigger banks more secure that the government will step in when things go wrong. This is described as the “too-big-to-fall” concept. A positive relation between risk and the bank size is expected, meaning a negative relation in the models. The bank size is measured, as it does not show a desired deviation, (see appendix 2), through the log of the total assets. (e.g. Jose Manuel Campa and Simi Kedia 2002, Lepetit, Nys, Rous, and Tarazi, 2008, Belkhir, and Chazi 2010, Ahern, and Dittmar, 2012, Meteos de Cabo, Gimeno and, Nieto 2011). The second control variable will control for a board composition aspect. This variable is the board size, the executive board as well as the supervisory board. As the board size increases the board has more chance of including female or ethnic diverse members. The measurements in this study, such as female and ethnic diverse members, are relative to the total amount of board members. Meaning that a greater board is expected to have more female en ethnic diverse members but at the same time have an expected lower relative score. It is expected that diversity in board drops exponential. Thus, a negative relationship is expected between board size and diversity of the board. The third control variable is the management skill of boards. This is measured through bank performance of a bank’s board. Besides board diversity, the performance of a board has an impact on the risk policy as well. As this paper investigates the link between risk policy and board diversity, this paper controls for performance. As risk increases returns we expect a positive relation between a firm’s performances. The most common measurement for financial performance for a firm, in all industries including the banking sector, is the return on assets before taxes (ROA). ROA is calculated by dividing the profit/losses before taxes by the total assets of a bank. The before taxes variant is used to make the banks international comparable. (Lepetit, Nys, Rous, and Tarazi, 2008, Farag, and Mallin, 2016, Gulamhussen, and Santa 2015)

3.3 Data

This study will focus itself on banks within the European Union (28 member states), including Switzerland and Norway as these two countries are operating in a similar environment and similar regulation. The focus year of this study will be 2015. Only one year is selected, 2015, to exclude changes within the sample due environment changes (“ceteris paribus”). The high regulated banking sector still undergoes changes and implementation of new regulation. The selected year 2015 is the most recent year with required data available. The data used in this study is for a high proportion supplied by ORBIS. This data includes the Total capital ratio, Tier-1 capital ratio, Z-score (raw data), Total assets, ROA. Furthermore the criterion of a minimum turnover in 2015 for the banks of €500.000 is added in order to make the different banks comparable. This is to control for company strategic policy and live stage of the bank. The data concerning the independent variables gender diversity, average age, and ethnic diversity, on executive as well as non-executive director board members, are conducted from a variety of resources including board member databases, online director search engines, social media and general media. Gender information on directors is well available, through the mentioned sources and otherwise by a photo and name research of directors. Age and ethnicity is far harder to find. These variables cause a lot of samples to be dropped as data is not available or too uncertain. Ethnic diversity of board members, if not concrete available, is also conducted from background research in the form of minor assumptions. When there is no concrete information on the ethnicity of a director, background information such as university participation, career history, and name are in one line an assumption is made of the country of origin. This is to avoid that to many samples will fall off because of a minority of directors within a board that do not have any data on ethnicity. Through the field work a collection of in total 104 companies with all required data is collected. ORBIS supplied 225 samples meeting the search criteria. Over the half of these samples were dropped due unavailable information about the independent variables. As a start the data is controlled for outliers. Many comparable studies on which this paper is based do not mention outliers. One exemption is Faccio, Marchica, and, Mura (2016), using the Winsor test. This test is not common used for outliers. In this paper the Mahanalobis Distances analysis is chosen to identify outliers, as this analysis is designed for multivariate outliers detection (De Maesschalck, Jouan-Rimbaud, and Massart, 2000). The Mahanalobis Distances analysis\(^\text{10}\), with as degree of freedom the amount of independent variables in this case 6. The original

\(^{10}\) The Mahanalobis Distances test for outliers is a common used test to check for outliers at a critical level of 0.001. Degree of freedom is 6.
selected data, satisfying the criteria, had a sample size of 104, this became 102 after the controlling for outliers. The data sample of 102 will be used for further investigation in this study. Many countries fell off the intended country sample list due to the transparency of firms, as not all dependent variables, Total capital ratio and Tier-1 capital ratio in particular, were not available in all bank sample countries. This also explains why some countries are more represented compared to others as they have a more transparent policy in their corporate culture. In appendix a table can be found with the amount of bank samples (Table 3) taken from each country participating in this study. The countries are widely geographical distribute among the European area. A total of 23 of ought to 30 (European Union (28), Switzerland, and Norway) different countries are taken into account in this study. Some countries are more represented (Italy, 15 representatives) than other countries (Croatia, Cyprus, Hungary, Luxembourg, and Slovenia, 1 representative). The countries not taken into account in this study are: Bulgaria, Estonia, Finland, Latvia, Lithuania, Malta, and Slovakia. In previous data Finland was taken into the sample with one representative bank, this sample was considered an outlier.

4. RESULTS

4.1 Descriptive statistics

As can be indicated from Table 1, the Total capital ratio and Tier-1 capital ratio are highly correlated with each other. This can be explained by Tier-1 capital ratio being a high proportion of the total capital. In total the Tier-1 capital ratio makes up for over 88% of the Total capital ratio is made up for by the Tier-1 capital ratio. The minimums of the Total capital ratio and Tier-1 capital ratio can be explained by regulation set in the Basel III accord which is respectively 8% and 6%. The relative high standard deviations for the risk measurements show a high variation in the risk policy of banks.

Gender diversity and ethnic diversity within board of directors are in general low. This result is expected in advance. The low amount of female in boards is due more men aiming for a director position. The low ethnic diversity can be explained as most boards prefer board members from the same culture, speaking the same language to smooth the communication within a board. Many boards with foreign board members have these due foreign investors or foreign parent companies that want people in the board to look after their interests, often from their own environment. For (almost) all companies the country in which the head office is located is taken as base nationality. There is only one exception (Goldman Sachs International bank located in the United Kingdom) in which 8 board members have an American identity and only one member being British. As the main goal is to measure the degree of ethnic diversity, in this bank the American nationality is taken as base. In all other samples the board members of a different nationality than the country in which the head office is located have no absolute majority (which is taken as boundary). The average age is high (min: 47,071 and mean: 57,341) as experienced board members, obtained a respective career, are commonly preferred.

In order to construct linearity for the deviation of the firm size, a natural logarithm is used on the total assets of the banks (see appendix 2). This can be seen in table 1, as the total assets have a scale deviation instead of representing the actual total assets of banks. As there is no regulation among the size of a board, there is a high deviation on this size. The average size is among 14 board members of which most of these members are non-executive board members. The ROA had a standard deviation of almost 5 because of outliers; this had been corrected to 1,099. The minimal ROA is -4,757 and the maximal ROA is 3,520. The negative number can be explained because some banks are not making any profit but losses over the year 2015. The mean (0,374) and median (0,535) are near zero, indicating that 2015 was not a good year for banks.

![Table 1. Descriptive statistics](image)

**Table 1. Descriptive statistics**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TC %</td>
<td>102</td>
<td>17,31</td>
<td>16,75</td>
<td>4,40</td>
<td>8,128</td>
<td>32,10</td>
</tr>
<tr>
<td>T1C %</td>
<td>102</td>
<td>15,25</td>
<td>14,10</td>
<td>4,31</td>
<td>6,653</td>
<td>31,10</td>
</tr>
<tr>
<td>ZS</td>
<td>102</td>
<td>5,135</td>
<td>4,802</td>
<td>2,34</td>
<td>1,096</td>
<td>19,02</td>
</tr>
<tr>
<td>FEM %</td>
<td>102</td>
<td>0,227</td>
<td>0,200</td>
<td>0,12</td>
<td>0,000</td>
<td>0,600</td>
</tr>
<tr>
<td>AGE</td>
<td>102</td>
<td>57,34</td>
<td>57,05</td>
<td>4,03</td>
<td>47,07</td>
<td>66,90</td>
</tr>
<tr>
<td>ETH %</td>
<td>102</td>
<td>0,205</td>
<td>0,133</td>
<td>0,20</td>
<td>0,000</td>
<td>0,769</td>
</tr>
<tr>
<td>Control variables</td>
<td>N</td>
<td>Mean</td>
<td>Med.</td>
<td>Std. Dev.</td>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
<td>TA</td>
<td>102</td>
<td>18,45</td>
<td>18,36</td>
<td>1,42</td>
<td>15,18</td>
<td>21,41</td>
</tr>
<tr>
<td>TBM</td>
<td>102</td>
<td>14,38</td>
<td>14</td>
<td>5,08</td>
<td>5</td>
<td>32</td>
</tr>
<tr>
<td>ROA</td>
<td>102</td>
<td>0,374</td>
<td>0,535</td>
<td>1,09</td>
<td>-4,757</td>
<td>3,520</td>
</tr>
</tbody>
</table>

4.2 Correlation analysis

The following described data can be found in table 2. The dependent variables Total capital ratio and Tier-1 capital ratio show a high correlation as could be expected at a significance level of 99%. This is because the Tier-1 capital is for a high proportion part of the Total capital ratio. They also show a high correlation with the Z-score, of 99% for Tier-1 capital ratio and 95% Total capital ratio variable that measures risk security level as well. Nevertheless, these three variables not show the same significance level towards other variables. This is unforeseen. Only Tier-1 capital ratio has a high significance level for the correlation, according to the Pearson correlation analysis, with the other variables, 99% and 95% (except for the independent variable of average age). The Total capital ratio has a less significance correlation with the dependent and control variables, but is significant to a satisfying level with most variables, except for average age and the log for total assets. This indicates that the policy towards Tier-2 capital as reserves is less correlated with the independent and control variables and should be explained to other better fitting variables. The Z-score shows only a significant correlation with the independent variable of a 95% level.

The independent variables female board members and ethnic diversity seem to correlate positively, as expected, with the level of risk reserves hold by banks. The average age, on the other hand, does not correlate with the dependent variables in the expected direction. A negative relation between the height of the average age and the independent variables is measured, while a positive relation is expected. There is also no significant
relation found between average age and the effect on risk policy.

The Pearson correlation analysis shows that the control variables have the expected relation with the dependent variables. The log of the total assets variable shows a significant relation found between average age and the effect on risk policy.

The Pearson correlation analysis shows that the control variables have the expected relation with the dependent variables. The log of the total assets variable shows a significant correlation for Tier-1 capital ratio of 95% and for the Z-score of 99%, but show no correlation with the Total capital ratio. The variable total board members show a 99% correlation with the Tier-1 capital ratio and the Total capital ratio and a 90% significance level for the Z-score. The control variables ROA, used to control for management skill, shows a significant level for all independent variables of 99%.

### Table 2. Correlation matrix

<table>
<thead>
<tr>
<th></th>
<th>TC</th>
<th>T1C</th>
<th>ZS</th>
<th>FEM%</th>
<th>AGE</th>
<th>ETH%</th>
<th>TA</th>
<th>TBM</th>
<th>ROA%</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>-</td>
<td>0.926***</td>
<td>-</td>
<td>0.228**</td>
<td>-0.055</td>
<td>0.322***</td>
<td>0.190**</td>
<td>-0.290***</td>
<td>0.312***</td>
</tr>
<tr>
<td>T1C</td>
<td>0.926***</td>
<td>-</td>
<td>0.290***</td>
<td>-0.017</td>
<td>-0.129</td>
<td>0.239**</td>
<td>0.323**</td>
<td>-0.079</td>
<td>0.265***</td>
</tr>
<tr>
<td>ZS</td>
<td>0.228**</td>
<td>0.290***</td>
<td>-</td>
<td>-0.017</td>
<td>-0.010</td>
<td>0.241**</td>
<td>0.323**</td>
<td>-0.079</td>
<td>0.241**</td>
</tr>
<tr>
<td>FEM%</td>
<td>-0.055</td>
<td>-0.017</td>
<td>-0.129</td>
<td>-0.010</td>
<td>-</td>
<td>-0.008</td>
<td>-0.072</td>
<td>-0.229**</td>
<td>-</td>
</tr>
<tr>
<td>AGE</td>
<td>0.322***</td>
<td>0.239**</td>
<td>0.241**</td>
<td>-0.008</td>
<td>-0.006</td>
<td>0.212**</td>
<td>0.206**</td>
<td>-0.127</td>
<td>0.259***</td>
</tr>
<tr>
<td>ETH%</td>
<td>0.190**</td>
<td>0.323**</td>
<td>0.323**</td>
<td>-0.079</td>
<td>-0.229**</td>
<td>0.676**</td>
<td>0.264***</td>
<td>0.259***</td>
<td>-</td>
</tr>
<tr>
<td>TA</td>
<td>-0.290***</td>
<td>-0.229**</td>
<td>-0.127</td>
<td>-0.259***</td>
<td>-</td>
<td>-0.006</td>
<td>-0.006</td>
<td>-0.127</td>
<td>-</td>
</tr>
<tr>
<td>TBM</td>
<td>0.312***</td>
<td>0.265***</td>
<td>0.319</td>
<td>0.319</td>
<td>0.319</td>
<td>0.264***</td>
<td>0.264***</td>
<td>-0.147</td>
<td>-</td>
</tr>
<tr>
<td>ROA%</td>
<td>0.265***</td>
<td>0.311***</td>
<td>0.319</td>
<td>0.319</td>
<td>0.319</td>
<td>0.264***</td>
<td>0.264***</td>
<td>-0.147</td>
<td>0.113</td>
</tr>
</tbody>
</table>

This table represents a Pearson correlation (two-tailed) matrix, N=104, the significance level is illustrated in the parentheses, ***significance level 99%, **significance level 95%, *significance level 90%.

### Table 3. Results regression analyses

<table>
<thead>
<tr>
<th>Multiple regression components</th>
<th>Total capital ratio (1a)</th>
<th>Tier-1 capital ratio (2a)</th>
<th>Z-score (3a)</th>
<th>Total capital ratio (1b)</th>
<th>Tier-1 capital ratio (2b)</th>
<th>Z-score (3b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant (α)</td>
<td>18.295***</td>
<td>21.677***</td>
<td>15.631</td>
<td>16.778***</td>
<td>27.938***</td>
<td>17.673***</td>
</tr>
<tr>
<td>(2.582)</td>
<td>(3.167)</td>
<td>(4.554)</td>
<td>(11.073)</td>
<td>(5.643)</td>
<td>(7.253)</td>
<td></td>
</tr>
<tr>
<td>FEM % (β1)</td>
<td>9.686***</td>
<td>8.193**</td>
<td>-0.976</td>
<td>8.724***</td>
<td>9.334***</td>
<td>-</td>
</tr>
<tr>
<td>(2.851)</td>
<td>(2.496)</td>
<td>(-0.593)</td>
<td>(2.745)</td>
<td>(2.965)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGE (β1)</td>
<td>0.048</td>
<td>0.109</td>
<td>0.037</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(0.466)</td>
<td>(1.095)</td>
<td>(0.754)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETH % (β1)</td>
<td>4.831**</td>
<td>4.476**</td>
<td>2.509**</td>
<td>4.527**</td>
<td>4.277**</td>
<td>2.355**</td>
</tr>
<tr>
<td>(2.394)</td>
<td>(2.296)</td>
<td>(2.567)</td>
<td>(2.326)</td>
<td>(2.259)</td>
<td>(2.527)</td>
<td></td>
</tr>
<tr>
<td>TBM (β2)</td>
<td>-0.164**</td>
<td>-0.209***</td>
<td>0.006</td>
<td>-0.186**</td>
<td>-0.223***</td>
<td>-</td>
</tr>
<tr>
<td>(-2.005)</td>
<td>(-2.653)</td>
<td>(0.146)</td>
<td>(2.408)</td>
<td>(-2.826)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TA (β2)</td>
<td>-0.263</td>
<td>-0.684**</td>
<td>-0.721***</td>
<td>-</td>
<td>-0.676**</td>
<td>-0.720**</td>
</tr>
<tr>
<td>(-0.854)</td>
<td>(-2.302)</td>
<td>(-4.837)</td>
<td></td>
<td>(-2.358)</td>
<td>(-5.497)</td>
<td></td>
</tr>
<tr>
<td>ROA % (β2)</td>
<td>0.755**</td>
<td>0.547</td>
<td>0.749***</td>
<td>0.787**</td>
<td>-</td>
<td>0.699***</td>
</tr>
<tr>
<td>(2.003)</td>
<td>(1.501)</td>
<td>(4.102)</td>
<td>(2.139)</td>
<td></td>
<td>(4.084)</td>
<td></td>
</tr>
</tbody>
</table>

| N                              | 102                      | 102                      | 102          | 102                      | 102                      | 102          |
| R² adjusted                    | 0.216                    | 0.237                    | 0.353        | 0.226                    | 0.228                    | 0.366        |
| F-statistic                    | 5.638***                 | 6.238***                 | 10.166***    | 8.358***                 | 8.462***                 | 20.411***    |

*** significance level 99%, **significance level 95%, *significance level 90%. 

8
4.3 Regression analyses

4.3.1 Control for assumptions & robustness

Before the actual regression analyses were made the bank dataset was first checked for several linear regression assumptions and homoscedasticity. This is done through the inspection of different plots in which the regression standardized residual is plotted against the regression standardized predicted value and the dependent value for all dependent variables separately. The assumption of homoscedasticity is met. There is no indication from the outcome of these plots to assume that the distribution is non-linear, except for the variable total assets. This was also indicated in previous studies and already expected (Lepetit et all., 2008). Therefore the logarithm of total assets is used to control for linearity. The Shapiro-Wilk test is used to control for the assumption of normal deviation of the variables. Unfortunately, this assumption was not met for most variables indicating a high type I or type II error. But, when using the skewness and kurtosis as indication, most variables do have a normal deviation. When histograms are checked for normality it is found that the main reasons for the non-normal deviation are some outliers. It is tried to remove these outliers, but this had a serious negative impact on the significance of the correlations in the Pearson correlation test. Using the comparison the histogram as normal deviation indicator, only the variables total capital ratio and ROA do not meet this assumption criteria (even controlled for outliers). The non-multicollinearity assumption is tested with the variance inflation factor (vif) and the tolerance level. All vif’s measured between the independent and control variables are satisfying as there were no vif’s found above 2 and the tests showed high tolerance levels (Osborne, and Waters, 2002).

The robustness is checked by using multiple variables for the measurement of risk taking. This will indicate whether the variables used to estimate the dependent variable change strongly or stay the same. From table 3 we can conclude that the models for the measurement of risk through accounting standards differ in the control variables Total assets ratio and ROA. For the Z-score, the dependent variable of relative amount of female board members is not significant, indicating that this dependent variable is not a good predictor of market-based risk measured. The F-statistics is also show in table 3. As all F-values are significant at a level of 99%, there is an indication that the constructed models are fitting and the t-test is appropriate to use as there is an equality of variance ($\sigma_1^2 = \sigma_2^2 = \sigma_3^2 = \ldots = \sigma_n^2$). Furthermore, the robustness is also checked by the control of assumptions as described before. (Moore, and Mccabe, 2014)

4.3.2 Regression results

Including all variables show implications in the results, as not all variables have a significant effect, or even the expected effect. As can be seen in table 3 age is not significant for any model and has a low impact, this did not change by shifts in the model. None of the control variables is fit for all models, and therefore left out when ought necessary.

The three optimal equations can be found in table 3 (1b, 2b, and 3b) and should be read from top to bottom. All dependent variables have an own equation from a selection of the independent and control variables available. The selection of which variables should be taken into account for an optimal equation is based on the significance of correlation of the variable and dependent variables (see table 2) in combination with the adjusted R-square (see table 3). According to the F-statistic, all equation are significant for a level of 99% indicating a satisfying fit as model for the dataset. The T-value is represented in the parentheses.

The testing of the hypotheses is done through the modelling of three equations for different measurements of risk policy. The fit and the value of the independent variables indicate whether the independent variables are good predictors of risk and to what degree.

The Total capital ratio (2a) is modelled with the independent variables % Female board members (99% significance) and % Ethnic diverse board members (95% significance) in combination with the control variables Total amount of board members (95% significance) and ROA (99% significance). The variables Average age board members and Log (total assets) do not show any significant correlation with the Total capital ratio so are left out. The adjusted R-square is 0,226 and would be 0,216 when all variables would be taken into account in this model. The small difference is due the adjustment because of the amount of variables taken into account. The small difference also suggests that the variables left out from the model are of low value to the model.

Tier-1 capital ratio (2b) has the same independent variables into account as the total capital ratio for the same confidence interval. The control variable of Total amount of board members (99% significance) is still significant even at a higher level. However notable is that for the control variables the Log (total assets) (95% significance) is exchanged for ROA. This was unexpected as Tier-1 capital ratio and Total capital ratio are strongly related. Tier-1 capital makes on average up for 88% of the total capital ratio. This suggests that choice of a company to increase its reserves for Tier-2 capital is more dependable on booked results (ROA), and so in this study management expertise, while the height of Tier-1 capital seems to be more dependent on the size of banks. As the bank is getting bigger, the total reserves crimp relatively. This confirms the “too-big-to-fall” theory as suggested before, or at least suggests that bigger banks are more confident and less cautious on reserves. The adjusted R-square for the Tier-1 capital ratio equation is 0,228, which would be 0,237 when all variables were taken into account and 0,209 if the same variables were taken into account as Total capital ratio.

The Z-score (2c) is a different kind of measurement for risk. The Z-score is a risk measurement based on the outcome of risk policy with available assets and equity, measuring the market-based risk. The control variables for the Z-score are Log (total assets) (99%significance) and ROA (99% significance), which can be expected as the measurement is based on ROA performance and available assets. The notable aspect of the Z-score lies with the independent variables as this is this equation does not show a significance relation with female board members, which is a highly significant variable for the other two variables. This suggests that female board members do not influence the risk policy with available assets itself. Ethnic diversity (95% significance) has the same significance level for this variable as for the other two equations. The adjusted R-square for the Z-score equation is the highest as it is 0,385. When all variables are taken into account the adjusted R-square is 0,353. This is again the result of amount of variables in the equation, the variables seem to be of almost no added value.

4.3.3 Independent variables results

The independent variable female board members as indication for the impact of female board members on risk, seems to be a good predictor for the amount of reserves a bank keeps with a high impact and high significance, as it is a good predictor for the accounting risk measurement Total tier capital ratio and Tier-1 ratio. This suggests that banks with more female board
The independent variable Average age board members, is not significant for any of the equations. From the Pearson correlation matrix it could be found that this variable has a low impact on the equations and even has a negative impact on the scores while a positive impact is expected from the theory. Furthermore the variable has a relative negative influence on the adjusted R-square for the equations. In this study we took the average age as this should indicate the total relative experience in a board, which would indicate the level of risk, as done by Berger, et all. (2014). It could be possible that the effect of risk is not significant, and not in the expected direction, because of this particular sample. A second option is that the measurement taken in this study is not representative enough for the actual effect of age on a board. This is contradicting with the results of Prendergast, and Stole (1996) and Serfling (2014). In this study we reject hypothesis 2 that the age has an effect on the risk factor taken by banks in their policy towards risk counter measurements, risk reserves, and insolvency risk.

The final independent variable stated as hypothesis is the variable % ethnic diverse board members, measuring the amount of board members with a different ethnicity the settlement of the bank’s head office. This variable is present in all three equations at a stable high impact on equations and significance at a 95% level. This significance level is not found by Barako and Brown (2008), probably due the differences in the measured environment which is Kenia for Barako and Brown (2008). The results in this paper are in line with Power (2004) supporting diversity in boards. Therefore this study suggests that the impact of members from other countries than the country of origin for a bank has a positive influence on risk counter measurements in the form of reserves and insolvency risk. The final third hypothesis is accepted as well in this study.

5. CONCLUSION & LIMITATIONS

5.1 Conclusion
The aim of this paper is to find the effect of board characteristics in terms of board diversity in gender, age, and ethnicity. Literature examined in this paper suggests a positive relation between these variables and policies to secure for risk. The policies to measure the level of risk are Tier-1 capital ratio, Total capital ratio, which control for risk-weighted assets and have been set on a minimum by regulation, and the Z-score, which measures insolvency risk for banks. This is examined through the conduction of a multiple regression analysis for the separate board characteristics tested. The control variables used multiple regression analysis, selected if seemed to fit, are; the total amount of board members, total assets, and return on assets. This study is performed on European banks in the year 2015. The results show female diversity is positive related to the assurance against risk by providing more reserves, but does not reduce insolvency risk. Average age is not significant related to risk policies in the form of assurance or insolvency risk in this study. The final hypothesis tested in this study is the impact of diversity measured as board members from other countries than the banks head office. A positive relation on this and secure risk policies has been found. These results suggest that a difference in personal characteristics, through culture difference and gender difference has a positive effect (or compared to age, a more positive effect) towards secure risk policies.

5.2 Limitations & Suggestions
Unfortunately this study has some limitations in it. First of all is the sample dataset limited through the low free public availability of all the details needed for this study. The dataset is also selective as commonly better performing and more famous banks distribute more information, such as board members details. Besides the distribution of information from banks, more details are available of board members within better performing banks. A bigger dataset should be constructed with the samples in it chosen randomly on for hand instead of by availability. The size of the dataset and the high amount of variables taken into account cause multiple validity implications.

For the measurement of risk by board members with assets a more direct measurement, such as the common used risk-weighted assets should be chosen. The data for risk-weighted assets is not free public available, or in annual reports. While there are regulations set about capital reserves taking into account risk-weighted assets.

The variable of age is in this study taken as average. As it was significant in other studies (Berger, et all. 2014), it should be considered to redo this study with the measurement of age in terms of different categories as done by Hagendorff, and Keasey, 2012, to check whether this measurement has a positive significant impact as suggest by the literature.

The variable ethnic diversity is in this study measured as the percentage of foreign board members. A better indicator for this variable would be to divide the ethnic diversity in groups to measure the degree of diversity itself. This is not done in this study due unavailability of information and time. Furthermore is a high amount of the foreign directors, investors in the bank with shares and interests in the bank. This could influence the risk behaviour of the board members as well.
References:


Appendix

Appendix 1. Abbreviation

<table>
<thead>
<tr>
<th>Variables</th>
<th>Abbreviations</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total capital ratio</td>
<td>TC</td>
<td>ORBIS</td>
</tr>
<tr>
<td>Tier-1 capital ratio</td>
<td>T1C</td>
<td>ORBIS</td>
</tr>
<tr>
<td>Z-score</td>
<td>ZS</td>
<td>ORBIS</td>
</tr>
<tr>
<td>Female board members</td>
<td>FEM</td>
<td>Research</td>
</tr>
<tr>
<td>Average age of board members in years</td>
<td>AGE</td>
<td>Research</td>
</tr>
<tr>
<td>Foreign board members</td>
<td>ETH</td>
<td>Research</td>
</tr>
<tr>
<td>Log total assets</td>
<td>TA</td>
<td>ORBIS</td>
</tr>
<tr>
<td>Total board members</td>
<td>TBM</td>
<td>ORBIS</td>
</tr>
<tr>
<td>Return on assets (with profit/losses before taxes)</td>
<td>ROA</td>
<td>ORBIS</td>
</tr>
<tr>
<td>Capital to total assets ratio</td>
<td>CAR</td>
<td>ORBIS</td>
</tr>
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Appendix 2. Sample countries

<table>
<thead>
<tr>
<th>Country</th>
<th>ISO code</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>AT</td>
<td>4</td>
</tr>
<tr>
<td>Belgium</td>
<td>BE</td>
<td>2</td>
</tr>
<tr>
<td>Switzerland</td>
<td>CH</td>
<td>8</td>
</tr>
<tr>
<td>Cyprus</td>
<td>CY</td>
<td>1</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>CZ</td>
<td>2</td>
</tr>
<tr>
<td>Germany</td>
<td>DE</td>
<td>8</td>
</tr>
<tr>
<td>Denmark</td>
<td>DK</td>
<td>4</td>
</tr>
<tr>
<td>Spain</td>
<td>ES</td>
<td>8</td>
</tr>
<tr>
<td>France</td>
<td>FR</td>
<td>9</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>GB</td>
<td>9</td>
</tr>
<tr>
<td>Greece</td>
<td>GR</td>
<td>4</td>
</tr>
<tr>
<td>Croatia</td>
<td>HR</td>
<td>1</td>
</tr>
<tr>
<td>Hungary</td>
<td>HU</td>
<td>1</td>
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<tr>
<td>Ireland</td>
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<td>3</td>
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<tr>
<td>Italy</td>
<td>IT</td>
<td>15</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>LU</td>
<td>1</td>
</tr>
<tr>
<td>Netherlands</td>
<td>NL</td>
<td>3</td>
</tr>
<tr>
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<td>3</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
<td>Romania</td>
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</tr>
<tr>
<td>Sweden</td>
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<td>6</td>
</tr>
<tr>
<td>Slovenia</td>
<td>SI</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23</strong></td>
<td><strong>102</strong></td>
</tr>
</tbody>
</table>

In total 23 of the 30 ought countries are taken into account in this study.