Board composition and firm performance: gender diversity, board independence and the combination of the two.

Master thesis

Lisanne Frijling (350136)

Financial Economics

Erasmus University Rotterdam

Dr. R. Wang

Dr. J.J.G. Lemmen

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Abstract

This paper investigates the relation between composition of the board of directors and firm performance. I focus on gender diversity, board independence and the combination of the two, concerning board composition. This research is unique in the sense that it investigates the impact of independent female directors on firm value and profitability, measured as the ROE, the ROA and Tobin's Q. I will also examine the influence of the Sarbanes-Oxley Act on the composition of the board of directors. The relations will be investigated using a dataset which consists of 2883 U.S. listed companies and a period of 1 January 1998 up to 31 December 2014. This paper finds that gender diversity has no impact on firm performance, whereas board independence is positive related to firm value before the introduction of the Sarbanes-Oxley Act, and negative related after the introduction. It shows that the Sarbanes-Oxley Act has not been beneficial for a company's wealth. From the other conclusions drawn in this research one could learn that, although gender diversity increases the independency of the boards and independence alone decreases firm performance these days, gender diversity alone and the combination of gender diversity and independence do not decrease firm performance.

Keywords: Corporate governance, board of directors, gender diversity, board independence, firm performance, Sarbanes-Oxley Act

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1. INTRODUCTION

1.1 BACKGROUND

Failures in corporate governance regulations played an important role in the originate of the financial crisis. The corporate governance systems of most firms weren't able to prevent financial institutions to take excessive risks, which had dramatic consequences (Kirkpatrick, 2009). Therefore, it can be said that corporate governance is very important. Studies that set the economic theory state that the board of directors is essential for the governance structure of large corporations (Fama and Jensen, 1983, Williamson, 1983). In other words, the functioning of the board of directors is strongly related to the corporate governance of a firm. The composition of the board of directors seems to have an effect on their performance and has been the subject of many previous literature. This research will focus on the composition concerning the gender diversity and the board members' independency and will give a new inside in the combination of the two related to firm value and profitability, which has not been found a clear evidence for in past literature.

The past couple of years the subject of gender diversity within companies has received a lot of attention in the academic literature as well as in the press. In certain countries in Europe companies are obliged to stick to certain laws that set gender quota. This, among others, in order to decrease the "glass ceiling effect", which refers to the barrier women face when they try to climb the corporate ladder (Li and Wearing, 2004). Partly due to these laws, the number of women serving on corporate boards clearly increased (Farrell and Hersch, 2005). An increase of the proportion of females is said to be beneficial as it could create new and creative perspectives and it could increase the quality of the monitoring role of the board (Brancato & Patterson, 1999). Better monitoring is beneficial for the shareholders of the company, as it reduces agency costs, which is the primary goal of corporate governance (John & Senbet, 1998). Past research that relate gender diversity to firm value have mixed results. For instance, Campbell & Minguez-Vera (2008) and Carter, Simkins and Simpson (2003) find a positive relation between firm value and the percentage of female directors within a company. Farrell and Hersch (2005) do not find a significant relation between firm value and gender diversity. Ahern & Dittman (2012) also find a negative relation between gender diversity and firm value in Norway, which is explained by the

introduction of female directors quota. They find that the law that sets rules on the proportion of females on a board has negative implications on firm value.

Most researchers believe that a higher proportion of independent board members has a negative impact on firm value. For instance, Core, Holthausen and Larcker (1999) find a negative relation between the percentage outside directors and their firm profitability measures. Also Yermack (1996) investigates the relation between firm value and independent board members and he finds a negative relation too, using Tobin's Q as a firm value measure. Fich and Shivdasani (2006) use accounting data as a measure of firm performance and find a negative relation with the percentage of independent directors. Lastly, Bhagat and Black (1999) look at the proportion of independent directors minus proportion of inside directors and its relation to firm value and also find a negative relation. Despite the negative relation with firm performance, the independence of boards of directors of American public companies has increased a lot over the last 30 years. About fifty years ago, most firms had a majority of insiders on the board. However today, almost all boards have a majority of independent directors, with most of the times only a maximum of two inside directors (Faleye, Hoitash and Hoitash, 2011). The increase of the proportion of independent directors on a board could be due to new legislations concerning board composition. For instance, on July 30 2002, the Sarbanes-Oxley Act was introduced, which main goal was to improve the accuracy of information provided to boards and to the shareholders. They tried to achieve this by, among others, setting rules to increase the percentage independent board members (Ge & Vay, 2005). The reason for the stricter and new legislation is because of past defaults of corporate governance structures of large companies which had dramatic consequences, such as bankruptcy of Enron (Brian, 2003). In this research I will elaborate on the consequences of the changes in board composition, partly due to the Sarbanes-Oxley Act. I will contribute to the existing literature by showing that laws, such as the Sarbanes-Oxley Act, from now on referred to as the SOX, have negative implications on companies' wealth. A suggestion resulting from this finding could be to change the SOX from mandatory to voluntary.

1.2 RESEARCH QUESTION AND EXPECTATIONS

In this paper I will test for the impact of board members who are independent as well as female on a firm's value. This is the main question of the research. In order to answer this question I first test for the relation between gender diversity and firm value. I expect to find a positive relation, as the number of female directors on a board is not legislated in the U.S., which means that firms choose their own optimal level of female directors. This optimal level of gender diversity for a firm is likely chosen to benefit the firm's profitability. Furthermore, I test for the relation between the percentage of independent directors and firm value, before and after the introduction of the Sarbanes-Oxley act. I expect that this percentage has no or an positive impact on firm value before 2002, as the firm chooses its own optimal level. After 2002, I expect to obtain a negative relation between the two. The third relation I test for is the one between gender diversity and the percentage of independent board members. I want to investigate whether a higher amount of female directors within a firm leads to a higher amount of independent directors. I expect to find a positive relation, due to the concept of the "glass ceiling effect" as explained above. For woman it is harder to climb the corporate ladder within their company and thus to make it to the board of directors. For this reason I expect that when the amount of female directors serving on a board is higher, the amount of independent directors is also likely to increase. These relations lead to the main question, which is do independent female directors increase firm value/profitability. The results of this mean question will be very interesting as firms can choose their own optimal level of female directors, however they cannot choose the optimal level of independent directors.

1.3 RESEARCH METHOD

In this paper I examine the composition of the board of directors and its relation to firm performance (measured as ROE, ROA and Tobin's Q), using a dataset which consists of 2883 U.S. listed companies for the period of 1 January 1998 up to 31 December 2014. As mentioned before, I will focus on gender diversity, board independency and the combination of the two and test their relations to firm performance using a panel data regression model with fixed effects.

1.4 FINDINGS

The results of this study show that gender diversity has no impact on firm value/profitability but that independent board members do have an impact. This paper shows that before the introduction of the SOX board independence is positively related to firm performance, but after the introduction a negative relation is found. What the results also show is that gender diversity has an impact on a board's independence, as it increases independency. The combination of the two has no significant implications for a firm's profitability. Furthermore, I will elaborate on the impact of the Sarbanes-Oxley Act on the composition of the board of directors. I show that in the year of the introduction of the SOX the percentage of female directors and the percentage of independent directors increased heavily. Next to that I show that these percentages increase in every year, except for the years 2007 (a decrease in the percentage females) and the year 2009 (a decrease in the percentage independent directors). What one could learn from the results is that regulations, such as the SOX, do not increase firm value and in fact lead to a lower profitability.

1.5 CONTRIBUTION AND IMPLICATIONS

This paper adds to past literature of two different research fields, namely corporate governance and political mandates. Concerning corporate governance, I will focus on the composition of the board of directors. Concerning the political mandates, I will elaborate on the consequences of the Sarbanes-Oxley Act on a board's composition and a firm's profitability. I will contribute to the existing body of past literature in the sense that I elaborate on the combination of two factors of board composition and on its link with the Sarbanes-Oxley Act.

The subject of this paper and its findings are not only relevant for the stakeholders and the shareholders of companies, but also for legislators and people involved in these legislations. The results provide valuable insights for legislators and show the downsides of board composition regulations. It is valuable to show the impact of these regulations and show that the U.S. should not follow certain European countries that have set quota for the amount of female directors in a board.

The rest of this paper is organized as follows. Chapter 2 will discuss the theoretical background, which contains the concepts and the previous literature in the empirical field of corporate governance and board composition. Second, chapter 3 will elaborate on the hypothesis development. Third, chapter 4 explains the data and methodology and chapter 5 contains the empirical results of this paper. Chapter 6 contains the conclusion and discussion and lastly, chapter 7 and 8 contain the references and the appendix respectively.

2. THEORETICAL BACKGROUND

2.1 CONCEPTS

This research focuses on one of the important mechanism of the internal corporate governance of firms: the board of directors. In this section I will elaborate on the corporate boards and their composition. Also, I will discuss the concept of the Sarbanes-Oxley Act, as it plays a role in changes in board composition and an important role in this research.

2.1.1 BOARD OF DIRECTORS

The main goal of a corporate governance structure is to reduce the costs due to the agency problems. The agency problems refer to the issue that comes with a separation of ownership and control (Fama and Jensen, 1986). The stakeholders of a company, who own the company, are subject to the control of the executive managers. Stakeholders of a company include i.a. equity holders, capital suppliers, and employees. The board of directors can reduce the costs of the agency problem by monitoring the company and the managers. It is believed that the board effectiveness in its monitoring role is determined by three factors, namely independence, size and composition. The composition of a board can be determined by its diversity: gender, ethnicity, independence, age and professional backgrounds. Whereas board diversity increases its effectiveness, diversity is often not priority for most corporations. Other business operations with evidence on actual tangible return on investments are often perceived to be more important (John & Senbet, 1998).

The board's composition is affected by the complexity of the operations of a corporation. The reason for this is that, the larger the size of the company the more significant the agency problems are. As outside directors improve the quality of the monitoring function of the board, it can be said that larger firms need more outside directors (Boone et al., 2007). This paper will focus on the board of directors and its independency and gender diversity. Consequently I will control for, among others, board size and firm size.

2.1.2 SARBANES-OXLEY ACT

The subject of this research, corporate governance, has been a major issue in recent news. Especially since Enron went bankrupt, which is the largest bankruptcy in United States history. Since then, the accuracy of corporate financial reports and the conduct of high-ranking executives have been examined heavily by the public eye. After the bankruptcy of Enron a series of other corporate scandals were uncovered, which involved companies such as WorldCom, Global Crossing, Adelphia Communication, and Tyco. The disclosures of these scandals declined the public's confidence and had a negative effect on the stock market. This led to the introduction of the Sarbanes-Oxley Act on July 30, 2002 (Brian, 2003). The SOX, is a law which set standards for all U.S. public companies. The overall intent of the law was to decrease the costs of the agency problems. They tried to achieve this by among others, more outsiders on boards and more financial experts on boards (Ge & Vay, 2005), in other words by diversifying the composition of the board of directors. Due to many changes the SOX brings with it, it is likely that the SOX has not only an impact on the board composition, but also an impact on the market. It is likely that the SOX brings benefits and costs for companies.

2.2 LITERATURE REVIEW

There has been done a lot of research within the field of board composition in the board of directors. In this section I will elaborate on the previous research done on the relation between female directors and firm value and the effect of board independence. I will also discuss the past literature done on the previously described concept of the Sarbanes-Oxley Act, as it plays an important role in the board formation.

2.2.1 GENDER DIVERSITY

It is believed that gender diversity in a board is valuable as women could provide important information to the board which leads to an improvement in decision making (Fama & Jensen (1983). Next to that, it is believed that board diversity creates new and creative perspectives on the strategic decisions of the firm (Brancato & Patterson, 1999). Also, an increase in gender

diversity within a board can affect the quality of the monitoring role of the board of directors. This, in turn, could have an effect on the firm performance (Campbell & Minguez-Vera, 2008).

The results of past research done on gender diversity is very varied. For instance, Campbell and Minguez-Vera (2008) who test for the relation between gender composition and firm performance, concentrated on Spain, find that the percentage of women on a board has a positive impact on firm value (measured with Tobin's Q). However, the presence of females on the board does not, in itself, affect firm value. In their research they use panel data analysis among non-financial firms in Madrid during the period January 1995 and December 2000. Carter, Simkins and Simpson (2003) also find a positive relation between board diversity, which is measured by the presence of women and minorities on the board of directors, and firm value. Their results, based on 2SLS regression analysis on publicly traded Fortune 1000 firms in 1997, suggest that a higher proportion of women and minorities on corporate boards can increase firm value. The study also suggests that the proportion of women on boards determines the fraction of minority directors on boards. Farrell and Hersch (2005) find no relation between the addition of a female to the board and the ROA or market return to shareholders. They use Poisson regression and an event study in their research.

In this paper I do not only elaborate on board composition but also on the impact of legislations concerning the board of directors. A recent paper of Ahren and Dittmar (2012) relates the relation between gender diversity and firm value (measured with Tobin's Q) to the female directors quota in Norway. In Norway a new law was introduced, which required that 40 percent of firm's directors are females. Ahren and Dittmar (2012) find that this law has negative implications on Tobin's Q in the years after the introduction. The law on gender quota was announced in 2002 and the researchers' dataset consists of public Norwegian firms that are traded on the Oslo Stock Exchange from 2001 to 2009. They explain the results and state that after the introduction of the law, firms could no longer set their own optimal proportion of females on the board. Also, several endogenous reactions to the addition of a female directors could result in a negative effect on firm value.

Past literature on gender diversification has varied conclusions. The differences could be due to the different use of firm performance measures or the different ways of conducting the tests. A

clear summary of the previous literature on the relation between gender diversity and firm value/profitability is illustrated in table I, which can be found in the appendix.

2.2.2 INDEPENDENCE

The relation of independent directors on a board is a subject of a major group of researchers on corporate governance. Outside directors are widely believed to a larger role in monitoring management than inside board members (Fama, 1980). Shareholders benefit from a monitored management, due to agency problems, according to Rosenstein & Wyatt (1990). They provide evidence that shareholder wealth is affected by the proportion of outside directors by showing a relatively higher stock price at the announcement of the appointment of an additional outside director. It suggests that shareholders are better off when the board contains more outside directors than inside directors, but it does not say anything about the relation with firm performance. Weisbach (1988) shows that CEO turnover is significant more highly correlated with firm performance in companies having a majority of outside directors, implying that outside directors play an important role in monitoring management.

The above mentioned literature does not directly elaborate on the relation between the proportion of independent directors and firm value. What they do find is a positive relation between monitoring and outside directors. However monitoring also comes at a cost. The costs of monitoring are among others, weaker strategic advising, greater managerial myopia, worse acquisition performance and less corporate innovation (Faleye, Hoitash and Hoitash, 2011). Next to these costs, Core, Holthausen and Larcker (1999), find that the higher the proportion of independent directors, the higher is the compensation paid to the CEO. They report that board compensation correlates negatively with firm performance, measured as return on assets and the yearly stock market return on the common stock. To conclude, the proportion of independent directors is found to be negatively related to firm performance.

Do the benefits of outside directors outweigh the costs and thus have a positive impact on firm performance? Most authors that investigated whether independent boards of directors improve corporate performance and firm performance answer this question with “no” because they found that an increase in independent board members does not improve performance and that boards

with too many outsiders may, in fact, have a negative impact on performance (Romano, 2004). For instance, Yermack (1996) finds a negative relation between his performance measure, Tobin's Q, and the percentage of independent directors on the board. He used a sample of 452 large U.S. industrial corporations in the period 1984 to 1991 and estimated both ordinary least squares regressions (OLS) and fixed effect models in his research. Also Fich and Shivdasani (2006) find a negative relation. They use a dataset that contains firms that appear in the 1992 *Forbes* 500 lists of largest corporations between 1989 and 1995 and use multivariate regression models. They conclude that firms with more outside directors than inside directors have lower market-to-book ratios and lower profitability. In their research they use return on assets (ROA), sales over assets and return on sales (ROS) as profitability measures. Bhagat and Black (1999) compare board composition with firm performance in their research and they test their hypothesis on large American public companies with multivariate regression models. They show that there is no significant evidence that a higher percentage of independent board members leads to greater firm profitability or faster growth. As their profitability measure they use among others: Tobin's Q, return on assets and the turnover ratio. For growth they use assets, sales, operating income, employees and cash flow as measures. In their results they mention that there is evidence that in fact supermajority-independent boards lead to lower profitability than other boards.

Whereas the evidence on gender diversity is mixed, most of literature done on board independency have the same conclusion: board independence has a negative effect on firm performance. This means that the costs of independent directors (weaker strategic advising, less corporate innovation etc.) outweigh the benefits (better monitoring). A clear picture of the previous evidence is illustrated in table II, which can be found in the appendix.

2.2.3 INDEPENDENCE & FEMALE

In this research I test whether a relation exists between board independency and the amount of females on the board, next to that I test whether the combination of independency and being a female increases firm performance. Some researchers of previous literature have discussed the relation between the proportion of women on boards and the number of outside/inside directors. For instance, Kang, Ding and Charoenwong (2010) elaborate on this relation in the sense that

they investigate investors' reactions to certain board appointments in Asia. Their analysis show that investors are most receptive when the women that enter the board are independent directors.

Carter, Simkins and Simpson (2003), who examine the proportion of females on a board and firm value in their research, find that a gender mixed board means that the board is more diverse and thus is more likely to be an independent board. Fondas (2000) has a similar reasoning, he finds that female directors, and especially when they are outside directors, contribute to the independent view of the board. In this research I will show that a higher percentage of female in the board leads to a more independent board.

2.2.4 SARBANES-OXLEY ACT

Since the introduction of the SOX in 2002, businesses have spoken out their concerns about its compliance costs. They do not believe that the benefits outweigh the costs of compliance (Zhang, 2007). The reason for this is not only the incremental dollars paid for compliance, but mainly the height of the opportunity costs. The opportunity costs exists in having employees focused on checking whether the company is following the rules, while they should be focused on the business (Solomon & Bryan-Low, 2004). Zhang (2007) investigates the costs and the benefits of the SOX by examining the market reactions to the rulemaking events related to SOX and the market reactions to the introduction of the SOX itself. Hereby he assumes that stock prices correctly incorporate all the private benefits and costs of the act. What he finds is that the cumulative abnormal return are significantly negative around the legislative events leading to the act. He also finds that the abnormal returns around the implementation of the SOX are insignificant. This could be due to the fact that firms can no longer choose their optimal board composition. Another explanation is that the requirement of the SOX for internal control tests are costly. Zhang (2007) also finds that firms with perceived weak governance experience more negative abnormal returns due to the incorporation of more strict governance rules. This finding questions the value of SOX, as it focuses on improving corporate governance to increase shareholder value.

Many literature was done in the field of the effectiveness of the SOX and a lot of them conclude that the mandates do not benefit firm value and thus do not benefit the investors, which was goal

of the mandates (Li et al., 2008). Romano (2004) also elaborates on the costs that come with the SOX and says that the rules concerning the corporate governance of the SOX should not be mandatory. He points out the importance to educate the media, the political leaders, the shareholders and the public on the reality that the SOX was a public policy blunder and that they have to change from mandatory to voluntary rules.

The rules of the SOX have such a major impact on firms' corporate governance that it is very likely that the law has impact on the board composition. Linck, Netter and Yang (2009) studied the impact of the SOX on the reforms on directors and boards, due to the change of supply and demand for directors. They find that post-SOX boards are more independent and contain more directors. Also, post-SOX directors are less likely to be current executives. In my research I will show how the level of independency of directors is influenced by the SOX. I find the same relation as Linck, Netter and Yang do in their research. Valenti (2007) also investigates the changes in board composition due to the Sarbanes-Oxley Act. He tests several hypothesis, such as: "the percentage of women sitting on corporate boards will increase significantly after the passage of the SOX". He finds that the proportion of women on a board has steadily increased both before and after the introduction of the SOX.

Previous literature done on the introduction of the Sarbanes-Oxley Act and its relation to firm performance, show that the SOX comes with costs (i.a. opportunity costs, compliance costs) and that this is negatively related to firm performance. Studies even suggest to change the SOX from mandatory to voluntary. Not only had the SOX impact on firm performance, but also on a firm's board, as mentioned above.

3. HYPOTHESIS DEVELOPMENT

This paper aims to contribute to past empirical research relating to board composition and firm performance. As mentioned in the previous section, the past literature relating to gender diversity and firm performance is very mixed. For this reason I will test for this relation with my dataset and methodology, which I will also use for the relation between independency and firm value/profitability and gender diversity. I will use a different dataset, as it does not exactly incorporate the exact same U.S. companies and years as in any other past research. However, I will use the same sort methodology as for example Campbell & Minguez-Vera (2008) do, as I measure gender diversity by the percentage of woman. I add a gender diversity measure by setting a dummy variable for at least one female director in a board. I use ROE, ROA and Tobin's Q as a firm performance measure which is not done before in the previous literature, as they only used one or two of these measures. This leads to the first hypothesis, namely:

I. Does gender diversity increase firm value/profitability?

Whereas the previous literature is very mixed on gender diversity in board composition, past empirical results almost all show a negative relation between outside directors and firm performance, and thus are very consistent. For this reason I expect to find that independence of board members decreases firm performance. As a measure of independence I take the proportion of outside directors. Just as, for instance Yermack (1996) in his paper does, I also use the percentage of independent directors as an indicator of board independency. I will test this relation before and after the introduction of the Sarbanes-Oxley Act, as I expect to find a different outcome for these years. As mentioned in section 2.2.1 Ahern and Dittmar (2012) explained that due to regulations firms can no longer set their own optimal board composition, which negatively affects firm value. Whereas before the SOX firms could choose their own optimal level of independent directors, after the SOX they were obliged to a certain proportion outside directors.

II. Does the independence of board members increase the firm value/profitability and does a difference between the years before and after the introduction of the SOX exist?

The next hypothesis is important in the sense that when gender diversity increases independency, it could mean that more female on a board would increase board monitoring. Fondas (2000) and Carter, Simkins and Simpson (2003) believe that a more diverse board is more independent. When this is the case it could have implications for the main question of this paper, as a higher proportion of independent females leads to even higher quality of monitoring, which has its implications towards firm performance. Previous literature has been clear about the monitoring costs and addresses the negative relation between independency and firm performance towards the weight of these costs.

III. Does gender diversity increase the independence of board members?

The previous hypotheses all lead to an explanation for a possible relation between independent female directors and firm value. In this hypothesis I will again make use of the three firm performance measures that are stated before. As the main question is a unique one, I do not base the methodology on previous literature. However, it is very logical to measure independent females as the percentage of directors which are indicated by the ISS database as being female and independent. The main question of this paper is the following:

IV. Do independent female board members increase the firm value/profitability?

4. DATA AND METHODOLOGY

In this section I describe the data that I use in this research and the methodology used to come to the results of this paper. Here I will elaborate on the collection of the data, the variable description, the time-series evaluation including the analysis of the impact of the introduction of the SOX and the description of the panel data regression model I use.

4.1 DATA DESCRIPTION

The dataset will be limited to data of companies listed on the market of the United States during the period of 1 January 1998 – 31 December 2014. This means that I only use companies of the United States and directors who are employed in the USA. The years chosen are the years which have information on all variables needed. Before 1 January 1998 there was no information available on the director's board affiliation and the director's gender. I consciously choose this period for the data set in order to incorporate the year 2002, in which the Sarbanes-Oxley Act was introduced.

The sample for this research is collected from the available databases ISS (formerly Risk Metrics) and Compustat (U.S. firms). ISS is used for information on the board of directors of firms in the United States. I used Compustat to match the companies with their financial values. Private firms are excluded from the dataset, because their financial data will not be publicly available.

After I collected the variables of the two different databases, I added the Legacy database of ISS to the new database (starting at 2007), this resulted in 246,621 director-firm-year observations of ISS data. After this was done, I merged the Compustat file with the combined file of ISS. This was done in STATA. In order to merge the file the CUSIPS and the date year were used as unique variables. When these were missing I deleted the data on that specific director and year. Hereafter the dataset contained 198,534 observations.

In order to obtain a sufficient dataset I removed missing values and outliers. When the performance measures ROA and ROE were missing, I removed the values from the dataset. Also, 39 observations had no information on board affiliation so these were removed too. After

correcting for the missing values I corrected for the outliers. First, I checked for outliers concerning the ROE. One company, named Kulicke & Soffa Industries had a return on equity of -790.61, which is clearly an outlier when you relate that including all the outliers the average ROE was 0.063. Three other companies, Medaphis (in 1998), Akamai Technologies (in 2001) and Western Union Co (in 2008), had ROE below -100. I also removed the data on which the ROE was larger than 50. In total 89 values are removed when ROE was an outlier.

After this, I corrected for the outliers in the ROA. I removed the data in which the ROA is smaller than -2, which are 138 values in total. At last, I removed outliers in the net income. The values below -20,000 were removed, which were 29 values in total. The dataset I obtained after making these changes, contained 775 duplicate directors for the same year and same company. I removed one director of the double directors each time. After these changes the total dataset contains 197,720 values and 2883 companies. I will use this dataset to obtain the results of my research.

4.2 VARIABLE DESCRIPTION

In this section clarifies the variables that I will use in this research. Table III, as stated in the appendix, gives an overview of the variables with its related explanation.

First I will describe the dependent variables. The performance measures I use in this research are return on equity (ROE), return on assets (ROA) and Tobin's Q. These measures are calculated as follows: ROE = Net Income (loss)/Equity, ROA = Net Income (loss)/Total Assets and Tobin's Q = Total Market Value of Firm/Total Asset Value. The return on equity is an accurate measure of company performance because it gives shareholders a quick and an easy way to understand the return on their equity. Next to that, the return on assets is a valid measure for firm performance, because it analyses the long-term profitability and it avoids the potential distortions created by financial strategies (Hagel, Brown Seely & Davinson, 2010). I also use Tobin's Q as a performance measure as it plays an important role in many financial interactions and is been used a lot in previous literature as an accurate performance measure (Chung & Pruitt, 1994). I think a combination of these three measures will give the best insight into the firm's

performance. The firm performance measures are obtained from the Compustat database for the years 1998 up to 2014.

Next to these dependent variables I make use of independent variables. The variable for the proportion of female directors (*PFemale)* is calculated as the amount of female directors divided by the total directors of a board within a certain company within a certain year. *PIndependent* and *PIndFemale* are calculated in the same way, only the amount of female directors was replaced by the amount of independent directors and the amount of independent females respectively. Information on the board of directors, needed to calculate these variables, are obtained from the ISS database. These percentages give an indication concerning the board composition. However, I added dummies to the analysis to not only see the relative impact of female, independent or independent females in a board, but also the absolute impact of at least one director with these characteristics. The dummies I use for these indications are *DFem1* and *DIndFem1*. The dummy variable *DFem1* indicates whether at least one director in de board is a woman. The dummy variable *DIndFem* indicates whether at least one director in the board is an independent female.

In the analysis I use control variables: *LogTA, LogTD* and *Busyness*. *LogTA* which is the logarithm of the company's total assets, is an indication of the company size. The reason I control for the firm size is because literature shows that larger firms are more likely to have higher percentage of women on a board (Farrell & Hersch, 2005). Also, firm size is positively related to board size and the proportion of independent board members (Boone et al., 2007). Next to that, Yermack (1996) finds that board size decreases firm value. For these reasons I use board size (*LogTD)* as a control variable. *LogTD* is the logarithm of the number of directors within a company. *Busyness* is the percentage of busy directors. A director is considered to be busy when he/she serves on more than 1 board at a time. Table IV shows the busyness of the directors in my sample. It illustrates that 139,870 times, which is 71% of the total sample, the director only serves on one board and thus is not busy. The percentage of directors that serve on 2 boards at the same time is 20%. The table also shows that the maximum boards a director serves on is 8.

Table IV – Board members' busyness

This table represents the busyness of the directors in my sample. The frequency of the amount of boards served in and the percentages are given.

Boards	Frequency	Percent
1	139870	70.742%
2	39470	19.963%
3	13626	6.892%
4	3608	1.825%
5	825	0.417%
6	198	0.100%
7	91	0.0460%
8	32	0.0162%
Total	197,720	100.%

Table V, which is stated below, shows the descriptive statistics of these variables, including the dependent variables. It shows that the average board consists of 10 directors of which 11.3% are women. Of these 10 directors 72.3% is independent and 10.2% are independent and female. It also shows that in 72.3% of all boards contains at least one female directors and 67.8% of the board contains at least one independent female.

Table V - Descriptive statistics

For the variables ROE, ROA, Q, NI, TA, Equity, LogTA, LogTD, Busyness, DFemale, DIndependent, PFemale, PIndependent, PIndFem, DFem1 and DIndFem1, which are defined as stated in Table III, the mean, standard deviation, minimum and maximum are given in this table. The data related to firm performance are collected from Compustat and the data related to the board of directors is collected from the ISS database. The values relate to the dataset period, which is 1998 – 2014.

Variable	Mean	Std. Dev.	Min	Max
ROE	0.0634	5.599	-790.608	76.585
ROA	0.0358	0.149	-6.0562	0.872
Q	1.267	1.491	0.00179	78.423
NI	547.419	2285.976	-98696	45220
TA	22067.52	108658.3	16.767	2573126
Equity	4226.037	13354.47	-17311	243471
TD	10.101	2.932	1	34
LogTA	8.0993	1.745	2.819	14.761
LogTD	2.274	0.317	0	3.526
Busyness	0.294	0.456	0	1
DFemale	0.113	0.317	0	1
DIndependent	0.723	0.448	0	1
PFemale	0.113	0.0944	0	0.667
PIndependent	0.723	0.162	0	1
PIndFemale	0.102	0.0894	0	0.5
DFem1	0.723	0.447	0	1
DIndFem1	0.678	0.467	0	1

4.3 TIME-SERIES EVALUATION

As mention in part 4.1, I choose my dataset in order to incorporate as much values as possible and to include the year in which the Sarbanes-Oxley Act was introduced and the years before and after that. In this section I show that the percentage of female and independent board members within a company has steadily increased over time. Also, I show that this increase is especially high in the year of the introduction of the SOX, namely 2002.

Table V contains the average percentage females and average percentage independent directors within a company and the year they belong to. What the table, among others, shows is that the percentage increase of the average percentage for females and independent directors in 2002 is

relatively high, namely 0.966% and 3.105% respectively. The SOX was introduced in July 2002 which is likely to be the reason for the increases.

Table VI - Average percent Female and Independent directors per firm per year

This table represents the outcomes of the time-series evaluation. It shows the years in the first column and its corresponding percentages female and independent directors in the two columns thereafter. The third and fourth column represent the increase in the percentages stated in the second and third columns. Data related to the board of director characteristics are collected from the ISS database.

year	PFemale	PIndependent	% increase PFemale	% increase Pindependent
1998	7.262%	60.295%		
1999	8.304%	60.762%	1.043%	0.467%
2000	8.619%	61.257%	0.315%	0.495%
2001	8.862%	63.013%	0.244%	1.757%
2002	9.828%	66.118%	0.966%	3.105%
2003	10.274%	69.007%	0.445%	2.889%
2004	10.742%	70.635%	0.468%	1.628%
2005	11.075%	71.965%	0.332%	1.330%
2006	11.719%	72.674%	0.645%	0.709%
2007	11.354%	77.326%	-0.366%	4.652%
2008	12.204%	77.822%	0.850%	0.496%
2009	12.389%	77.589%	0.185%	-0.233%
2010	12.763%	78.779%	0.374%	1.190%
2011	13.124%	79.368%	0.361%	0.589%
2012	13.677%	79.619%	0.553%	0.251%
2013	14.552%	80.105%	0.876%	0.486%
2014	15.359%	80.838%	0.807%	0.733%

The figures I, II and III give a graphical image of the average percentages female and independent directors. Figure IV shows the increase of these percentages. One could again see from this figure that the percentage increase of the proportion of female directors and independent directors is relatively high in 2002. What it also shows is that the percentage increase of female directors is second highest in the year 2002, and is highest in the year 1999. Also, the percentage increase of independent directors is second highest in 2002 and highest in 2007. The reason that the increase of independent directors within a firm is highest in 2007 could

be that the ISS database is split up in this year, namely the legacy part and the new part from 2007 onwards. It is possible that due to a change in classification of independent board members or due to a lower amount of observations, the percentage of independent directors heavily increased.

Figure I - Average percent female directors within a company before and after SOX

This figure shows the gradient of the average percentage female directors within a company over the years. The x-axis shows the years, which are examined in this research and the y-axis shows the average percentages of a company.

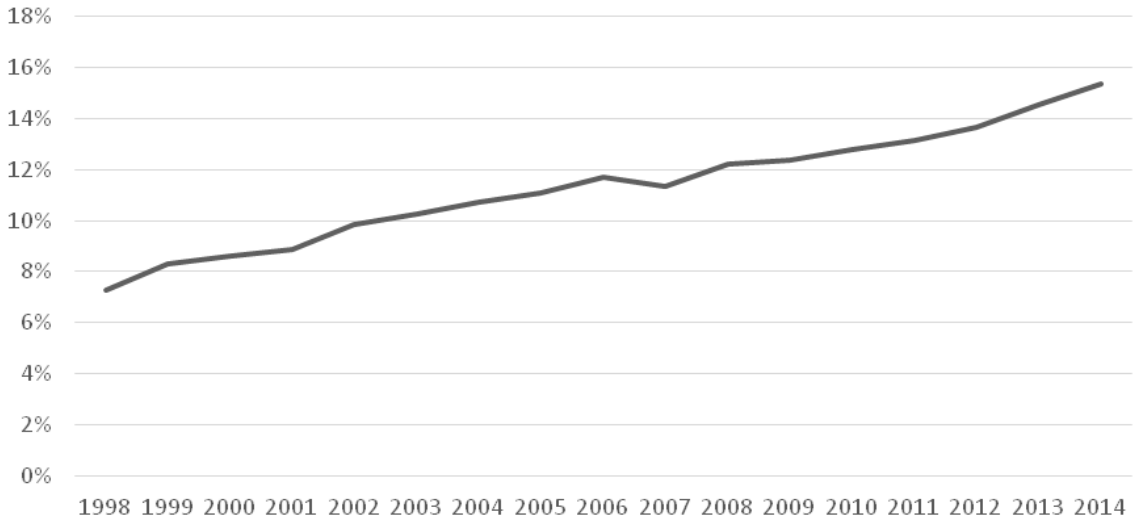


Figure II - Average percent independent directors within a company before and after SOX

This figure shows the gradient of the average percentage independent directors within a company over the years. The x-axis shows the years, which are examined in this research and the y-axis shows the average percentages of a company.

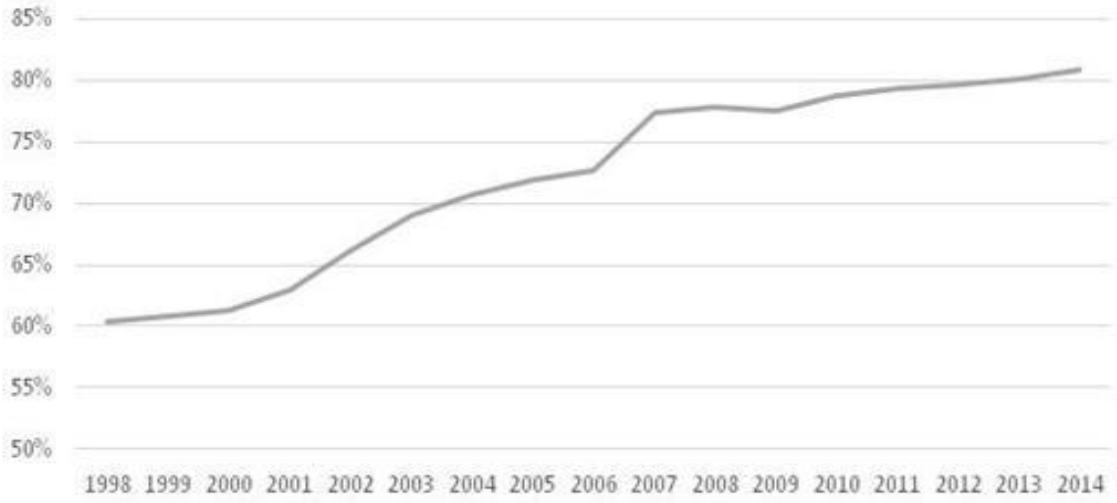


Figure III - Average percent Female and percent Independent directors within a company before and after SOX

This figure shows the bar graph of the average percentage female directors and independent directors within a company over the years. The x-axis shows the years, which are examined in this research and the y-axis shows the average percentages of a company.

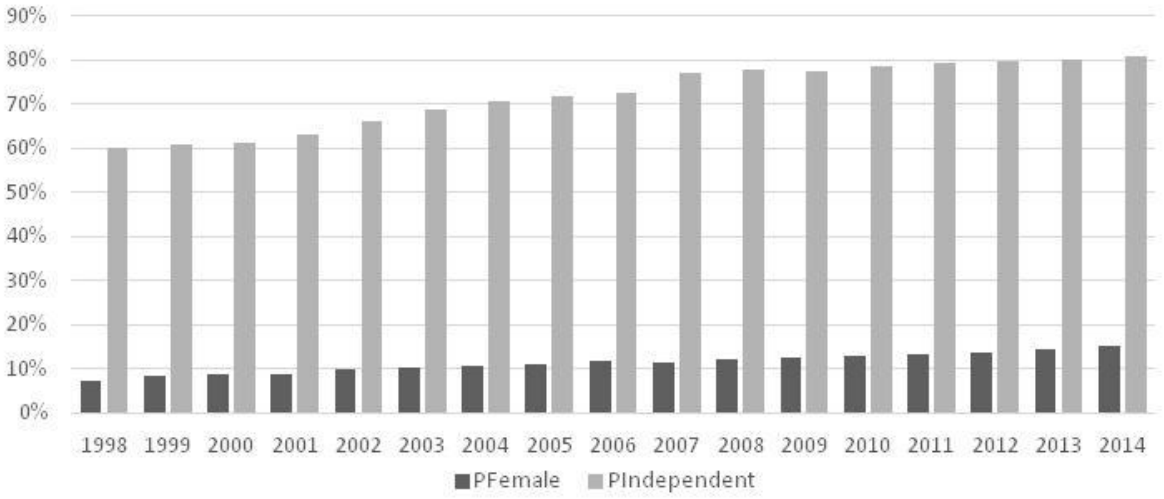
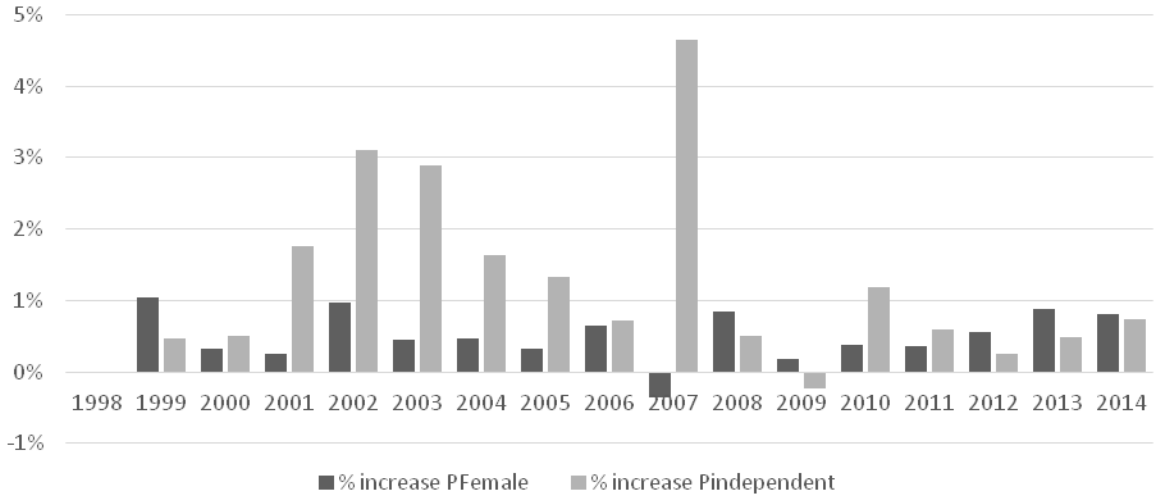


Figure IV - Percent increase of the average percentage Female and Independent directors within a firm

This figure shows the increase/decrease of the average percentage female directors and independent directors within a company over the years in percentages. The x-axis shows the years, which are examined in this research and the y-axis shows the average percentages of the increase or decrease of the variables.



4.4 METHODOLOGY

In this section I describe the method used to obtain the empirical results of this paper. I make use of a panel regression model, which will be explained below.

In this research I use a panel data regression model. The dataset is two dimensional: it has cross-sectional information (company ID (c)) and time-series information (year (t)). I want to perform tests on the directors of a certain company within a certain year, a use of panel data analysis is necessary here. Also, panel data allows me to control for variables one cannot measure or observe. This means that it accounts for individual heterogeneity (Hsiao, 2014). The technique I make use of is the fixed effects technique. The reason for this is that with fixed effects I can explore the year variance. These firm fixed effects control for observed and/or unobserved firm characteristics that are constant over time and may influence the performance measures. So, if I would not use fixed effects I will have unobservable variables in my dataset which could influence the results.

Before making the regressions I changed the observations from firm-year-directors observations to firm-year observations. This led to a shrink of the original dataset size (197,720) to 21,142 observations.

The following hypothesis will be tested, the regressions that will be used for them are stated below.

I. Does gender diversity increase firm performance?

$$FP_{ct} = \alpha_i + \alpha_t + \beta_1 * DFem1 + \beta_2 * PFemale_{ct} + \beta_3 * PIndependent_{ct} + \beta_4 * LogTA_{ct} + \beta_5 * LogTD_{ct} + \beta_6 * Busyness_{ct} + \varepsilon_{ct} \quad (1)$$

II. Does the independence of board members increase the firm performance?

This regression is split into two separate periods, namely the period before the introduction of the SOX (1998-2001) and the period after the introduction (2002-2014).

$$FP_{ct} = \alpha_i + \alpha_t + \beta_1 * PIndependent_{ct} + \beta_2 * LogTA_{ct} + \beta_3 * LogTD_{ct} + \beta_4 * Busyness_{ct} + \varepsilon_{ct} \quad (2)$$

III. Does gender diversity increase independency of the board members?

$$PIndependent_{cdt} = \alpha_i + \alpha_t + \beta_1 * DFem1_{ct} + \beta_2 * PFemale_{ct} + \beta_3 * LogTA_{ct} + \beta_4 * LogTD_{ct} + \varepsilon_{ct} \quad (3)$$

IV. Do independent female board members increase the firm performance?

$$FP_{cdt} = \alpha_i + \alpha_t + \beta_1 * DIndFem_{ct} + \beta_2 * PIndFemale_{ct} + \beta_3 * LogTA_{ct} + \beta_4 * LogTD_{ct} + \beta_5 * Busyness_{ct} + \varepsilon_{ct} \quad (4)$$

In the regressions above *FP* stands for firm value/profitability and represents the three dependent variables ROE, ROA and Tobin's Q. The dummy variable *DFem1* takes on the value of 1 when at least one director in de board is a woman. *PFemale* represents the percentage of female directors within the board and *PIndependent* captures the proportion of independent directors. *DIndFem* indicates whether at least one director in the board is an independent female and *PIndFemale* represents the proportion of independent female directors within a board. As mentioned before, I will control in all tests for firm size (*LogTA*), board size (*LogTD*) and busy directors (*Busyness*).

The standard errors in all of the firm fixed effect regressions are clustered at firm level. This means that I control for variation at firm level, and that I allow the error terms within a company to be correlated. In other words, it account for serial correlation. Each regression has 2,883 clusters.

5. EMPIRICAL RESULTS AND ANALYSIS

In this section I discuss the results of this research, divided into the different tests as explained in the previous section.

5.1 GENDER DIVERSITY AND FIRM PERFORMANCE

First, I test how gender diversity is related to firm value. The results of the tests concerning this relation, are presented in table VII below. What this table shows is that no significant relation is found between the proportion of women within a board and firm performance, for all three performance measures. It indicates that an increase or decrease of the proportion of female directors within a board does not affect firm value. Also, no relation is found between the dummy variable *DFem1* and the firm performance measures. Which means that the presence of at least one female director does not affect firm value. These results concerning the presence of one female director on the board is not unexpected, as previous literature, such as Farrell and Hersch (2005) and Campbell & Minguez-Vera (2008) find no relation between the presence of a female director and firm performance. However, I expected that the proportion of female directors on the board is positive related with firm value. The reason for this is that no regulations in the U.S. exist on the amount of women on a board. This means that the firms in my sample were able to choose their own optimal amount of females on the board. One would expect that this optimal level would increase a firm's profitability. However, the results show differently, but are in line with some of the previous literature, as the percentage of female directors is in past literature mostly found to have a negative impact on firm performance or no impact at all. This is consistent with the results in table VII, as the coefficient of *PFemale* has a negative sign, but is not found to be significant.

Table VII – Results gender diversity and firm performance

This table presents the results of the panel regressions of the three dependent variables *ROE, ROA* and *Q* with firm and year fixed effects. The sample consist of U.S. listed firms over the period 1998-2014, collected from Compustat and ISS. The independent variables tested for are *PFemale* and *DFem1* and the controls include the board's independence, firm size, the board's size and the percentage busy directors. The number of observations concerning the test with Tobin's Q are somewhat lower, due to a lower amount of available values. The robust standard errors (t-statistics) are stated in parentheses and *** indicates a significance level below 0.01, ** a significance level below 0.05 and * a significance level below 0.1.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**ROE**	**ROE**	**ROA**	**ROA**	**Q**	**Q**
PFemale	-0.649		-0.0125		-0.179	
	(1.278)		(0.0294)		(0.233)	
DFem1		-0.299		0.000333		0.0194
		(0.370)		(0.00448)		(0.0447)
PIndependent	-0.345	-0.295	-0.0311**	-0.0328***	-0.399**	-0.429**
	(0.220)	(0.193)	(0.0122)	(0.0119)	(0.201)	(0.203)
LogTA	0.174	0.180	0.0263***	0.0260***	-0.513***	-0.518***
	(0.132)	(0.136)	(0.00532)	(0.00536)	(0.0556)	(0.0554)
LogTD	-0.00393	0.115	-0.0167	-0.0169	-0.402***	-0.412***
	(0.318)	(0.214)	(0.0116)	(0.0112)	(0.121)	(0.122)
Busyness	0.995	0.999	0.00810	0.00816	-0.276	-0.276
	(0.762)	(0.766)	(0.0244)	(0.0244)	(0.202)	(0.202)
Constant	-1.027	-1.247	-0.112**	-0.109**	6.527***	6.579***
	(0.772)	(0.860)	(0.0463)	(0.0466)	(0.655)	(0.658)
Observations	21,142	21,142	21,142	21,142	20,087	20,087
R-squared	0.000	0.000	0.007	0.007	0.052	0.052
Number of companies	2,883	2,883	2,883	2,883	2,860	2,860
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Clustered by firm	YES	YES	YES	YES	YES	YES

5.2 INDEPENDENCE AND FIRM PERFORMANCE

The relations tested hereafter all include a variable on independence. The first relation with independence that I test for is the relation between the firm performance and independence of board members. I split the regression in the period before the introduction of the SOX and after the introduction. This means that I obtained results for both the period 1998 – 2001 and the period 2002-2014. As shown in table VIII, no relation is found between independent board members and the return on equity, for both periods. However, I found a positive relation between the return on assets and the percentage of independent board members before the SOX. The period after the SOX, namely 2002-2014, shows a negative relation between these variables. Also concerning the Tobin's Q, the relation is found to be positive before the introduction of the SOX and changed to a negative relation after the introduction of the SOX. This means that the regulations of the SOX had a negative impact for a company's ROA and Tobin's Q. This negative impact can be explained by the reasoning of the paper of Ahern and Dittmar (2012), in which they say that firms no longer can choose their optimal proportion of independent board members. But it could also be the case that the firm value is significantly decreasing after the introduction of the SOX due to the high costs of extra internal controls and the compliance costs (Zhang, 2007).

When one would relate the found relation between the percentage independent directors and firm performance to the time series-evaluation, made in 4.3 section, it means that the average firm performance in 2007 (in this case measured with the ROA and Tobin's Q), is likely to be lower than in other years. Because this is after the introduction of the SOX and the percentage of independent board members increased the most in this year, as shown in figure IV. Also in the year the SOX was introduced (2002), the percentage of independent directors increased heavily. This implies that in the year of the introduction, the ROA and the Tobin's Q of the average firm already declined due to the regulations.

Table VIII – Results independence and firm performance

This table presents the results of the panel regressions of the three dependent variables *ROE, ROA* and *Q* with firm and year fixed effects. The sample consist of U.S. listed firms over the period 1998-2014, collected from Compustat and ISS. The independent variable tested for is *PIndependent* and the controls include firm size, board size and the percentage busy directors. The number of observations concerning the test with Tobin's Q are somewhat lower, due to a lower amount of available values. The robust standard errors (t-statistics) are stated in parentheses and *** indicates a significance level below 0.01, ** a significance level below 0.05 and * a significance level below 0.1.

VARIABLES	(1) ROE 1998-2001	(2) ROE 2002-2014	(3) ROA 1998-2001	(4) ROA 2002-2014	(5) Q 1998-2001	(6) Q 2002-2014
PIndependent	0.146	-0.175	0.0234***	-0.0227***	0.269***	-0.267***
	(0.219)	(0.209)	(0.00655)	(0.00567)	(0.0601)	(0.0478)
LogTA	0.155	0.179	0.0286***	0.0306***	-0.490***	-0.465***
	(0.135)	(0.151)	(0.00581)	(0.00601)	(0.0648)	(0.0604)
LogTD	-0.0208	-0.0275	-0.0191	-0.0194	-0.432***	-0.435***
	(0.348)	(0.350)	(0.0119)	(0.0119)	(0.119)	(0.122)
Busyness	0.957	0.959	0.00298	0.00394	-0.335*	-0.325
	(0.734)	(0.740)	(0.0244)	(0.0244)	(0.202)	(0.205)
Constant	-1.181	-1.233	-0.152***	-0.150***	6.074***	6.078***
	(0.882)	(0.886)	(0.0515)	(0.0509)	(0.684)	(0.644)
Observations	5,238	15,904	5,238	15,904	5,238	15,904
R-squared	0.000	0.000	0.008	0.008	0.052	0.054
Number of companies	1,776	2,229	1,776	2,229	1,776	2,229
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Clustered by firm	YES	YES	YES	YES	YES	YES

5.3 INDEPENDENCE AND GENDER DIVERSITY

The second relation I test on the percentage of independent board members is its relation with gender diversity. As shown in table IX, the relation between the proportion independent board members and gender diversity is significant and positive. This indicates that the proportion of independent board members increases when the board contains relatively more female directors. This is as expected, as due to the glass ceiling effect, few women make it to the top within their company as it is more difficult for them to climb the corporate ladder. Due to this phenomenon it is likely that women that serve in a board are capable as they were able to get to the top. Due to their capability, these women might be on more boards than only the board of their own company and thus also serve on boards other companies in which they are independent directors.

Table IX – Results board independence and gender diversity

This table presents the results of the panel regressions of the dependent variable *PIndependent* with firm and year fixed effects. The sample consist of U.S. listed firms over the period 1998-2014, collected from Compustat and ISS. The independent variable tested for is *PFemale* and the controls include board size and firm size. The robust standard errors (t-statistics) are stated in parentheses and *** indicates a significance level below 0.01, ** a significance level below 0.05 and * a significance level below 0.1.

	(1)
VARIABLES	**PIndependent**
PFemale	0.419***
	(0.0278)
LogTA	0.0826***
	(0.00409)
LogTD	-0.0232*
	(0.0134)
Constant	0.0777*
	(0.0402)
Observations	21,142
R-squared	0.192
Number of companies	2,883
Firm FE	YES
Year FE	YES
Clustered by firm	YES

5.4 INDEPENDENT FEMALE DIRECTORS AND FIRM PERFORMANCE

The last relation I test for, is the main question of this research and the relation between independent females serving on a board and a firm's value. Table X shows no significant relation between the proportion of independent female directors and the performance of a firm. This means that firm value/profitability, measured as ROE, ROA and Tobin's Q is unaffected by an increase or decrease of independent female directors within a board. Also, the presence of at least one independent female director on the board is not found to be related to firm value. The relation could be affected by the male directors on the board, but also by the introduction of the SOX regulations.

Table X – Results independent female directors and firm performance

This table presents the results of the panel regressions of the three dependent variables *ROE, ROA* and *Q* with firm and year fixed effects. The sample consist of U.S. listed firms over the period 1998-2014, collected from Compustat and ISS. The independent variables tested for are *PIndFem* and *DIndFem1* and the controls include firm size, board size and the percentage busy directors. The number of observations concerning the test with Tobin's Q are somewhat lower, due to a lower amount of available values. The robust standard errors (t-statistics) are stated in parentheses and *** indicates a significance level below 0.01, ** a significance level below 0.05 and * a significance level below 0.1.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**ROE**	**ROE**	**ROA**	**ROA**	**Q**	**Q**
PIndFem	-0.696		-0.0269		-0.344	
	(1.404)		(0.0293)		(0.237)	
DIndFem1		-0.287		-0.00149		-0.0149
		(0.346)		(0.00393)		(0.0424)
LogTA	0.144	0.160	0.0238***	0.0231***	-0.545***	-0.555***
	(0.122)	(0.129)	(0.00502)	(0.00504)	(0.0616)	(0.0612)
LogTD	-0.00328	0.0986	-0.0162	-0.0157	-0.398***	-0.393***
	(0.326)	(0.232)	(0.0118)	(0.0113)	(0.120)	(0.118)
Busyness	0.985	0.996	0.00705	0.00703	-0.289	-0.290
	(0.760)	(0.769)	(0.0244)	(0.0244)	(0.204)	(0.204)
Constant	-1.045	-1.281	-0.114**	-0.111**	6.495***	6.539***
	(0.775)	(0.878)	(0.0462)	(0.0468)	(0.653)	(0.650)
Observations	21,142	21,142	21,142	21,142	20,087	20,087
R-squared	0.000	0.000	0.006	0.006	0.051	0.050
Number of companies	2,883	2,883	2,883	2,883	2,860	2,860
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Clustered by firm	YES	YES	YES	YES	YES	YES

6. DISCUSSION

This research is limited in the sense that it only focuses on U.S. listed firms. As the SOX has also its implications on the rest of the world it is interesting to see whether its rules have different influences on a firm's profitability in other countries. Next to that, it is limited to only two factors of board composition: independence and gender diversity. Future research could examine more factors and their correlation with each other and their relation to firm performance. Such as different types of diversity: ethnicity, age and professional backgrounds. Lastly, future research could control for more director characteristics, such as their compensation.

Moreover, an alternative explanation to the findings of this research could be examined in future research. It could be that an endogenous relation exists between board composition and firm performance. For instance, highly valued firms can allure smart board members, as stated by Arhen and Dittmar (2012). Also, a firm which hires more independent directors could be more likely to hire female directors and the other way around. This means that firms that like mixed boards not only diversify in gender but also in outside/inside directors and in other diversity types.

What is interesting to investigate is what the impact of male directors is on the firm value. Firms can choose themselves which amount of women they hire for their board of directors, as no law exists in the United States on a minimum or maximum of females on a board. This implicates that firms are likely to choose a certain amount of female directors that has a positive impact on firm performance. Just as stated in the paper of Ahren and Dittmar (2012), in which they say that firms choose the amount of female directors which is for them the most optimal level. However the results of this paper show that no relation exists between a firm's profitability and the proportion of female directors. It could imply that other factors are relevant here. For instance, the retained male directors could perform worse after the appointment of new female directors, due to the differences in preferences of the new women and the retained male directors. It is likely that another explanation is involved as one would expect that the appointment of new female directors and the proportion of female directors would increase the firm's value. The reason for this expectation lies in the fact that women in top positions have to work hard and be very capable to make it to the board of directors, due to the "glass ceiling effect" (Li and

Wearing, 2004). It would be interesting for future research to investigate the role of male directors on firm value, before and after the appointment of new women on the board.

Another interesting point to examine is whether the "glass ceiling effect" has relatively decreased in impact. As section 4.3 of this paper shows that the proportion of female directors has increased over time. It could implicate that it has become relatively easier for females to enter the board. Another reason could be that the United States has become less conservative and that the number of working females has increased.

This research shows that it is relevant for a firm and its profitability to choose its own board composition. It means that laws such as the Sarbanes-Oxley Act have negative consequences for a firm and that in the future people should compare these negative aspects of the law with its positive aspects and see whether or not it should still be obligated. Also, it is very likely that when the United States would introduce a law similar like the quota set on female directors in certain countries in Europe, it would have negative implications on firm value and profitability.

7. CONCLUSION

The objective of this paper is to analyze what effect board composition has on firm value. This paper focused on gender diversity and board independence and investigated the unique relation between independent female directors and firm performance with the use of a panel regression model with fixed effects. The questions were tested in a database consisting of 2883 companies and 197,720 directors. The directors all served one or more years at a U.S. company in the period 1 January 1998 to 31 December 2014.

The first sub-question I tested is the relation between gender diversity and firm performance. What the results show is that no significant relation exists between the two. The implication of this finding is that the presence of a female in the board and the relative amount of female directors has no influence on firm value.

Furthermore, the results show that board independence and firm performance are changed from positively related to negatively related after the introduction of the SOX. This is as expected, as firms could no longer choose their own optimal level of independent directors. When this relation is linked to the time-series analysis of this research, it shows that the Sarbanes-Oxley Act and its regulations concerning board independence, have a negative impact on firm performance. This finding has clear implications for a firm's stakeholders and its managers as their benefits are influenced by the legislations of the SOX.

The third sub-question investigates the relation between gender diversity and board independence. The results show that the proportion of female directors is positively related to the independency of the board. This means that firms with more diverse boards are likely to be more independent, which is as expected and in line with Carter, Simkins & Simpson (2003) and Fondas (2000).

The combination of the two factors of board composition, board independence and gender diversity has no implications on firm value.

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8. APPENDIX

Table I – Summary previous literature on gender diversity

This table provides a summary of the literature stated in section 2.2.1. It elaborates on the firm performance measures used in previous literature and the gender diversity measures used. Moreover, it shows whether a relation is found and whether that relation is positive or negative.

Authors	Performance measure	Gender diversity Measures	
		Percentage of female directors	Presence of females on board
Campbell & Minguez-Vera, 2008	Tobin's Q	+	No relation found
Carter, Simkins and Simpson, 2003	Tobin's Q	+	
Farrell and Hersch, 2005	ROA		No relation found
Ahern & Dittmar, 2012	Tobin's Q	-	

Table II – Summary previous literature on board independence

This table provides a summary of the literature stated in section 2.2.2. It elaborates on the firm performance measures used in previous literature and the board independence measures used. Moreover, it shows whether a relation is found and whether that relation is positive or negative.

Authors	Performance measure	Board indepedence Measures	
		Percentage of independent directors	Proportion of independent directors minus proportion of inside directors
Core, Holthausen and Larcker, 1999	ROA, annual stock market return on the common stock	-	
Yermack, 1996	Tobin's Q	-	
Fich and Shivdasani, 2006	ROA, sales/assets, ROS	-	
Bhagat and Black, 1999	Tobin's Q, ROA, sales/assets		-

Table III – Variable definitions

This table contains the variables I use for this paper. It explains what the variable names stand for. The accounting data are collected from Compustat and the data related to the board of directors is collected from the ISS database over the period 1998 – 2014.

Variable name	Definition
	Accounting Data
ROE	Return on Equity
ROA	Return on Assets
Q	Tobin's Q
NI	Net Income (loss)
TA	Total Assets
Equity	Shareholders' Equity
TD	Total directors of each company within each year
LogTA	Natural logarithm of Total Assets of each company
LogTD	Natural logarithm of Total Directors of each company
	Board of directors Data
Busyness	The percentage directors that within a board of a certain company that serve on more than one board at the same time
DFemale	Dummy where value = 1 when Female Director
DIndependent	Dummy where value = 1 when Independent Director
PFemale	Percentage Female Directors within each company
PIndependent	Percentage Independent Directors within each company
PIndFemale	Percentage Independent Females within each company
DFem1	Dummy where value = 1 when at least 1 director in the board is female
DIndFem1	Dummy variable representing 1 if at least one director is independent and female