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**Women being a better asset to a company than men?**

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# Executive summary

Within this thesis the research question, “To what extend do women on board of directors affect the financial performance of a company when looking at the United States of America”. Therefore will the development of women within the board of directors and their influence on firm performance be discussed within North America, and not only will the years 2002 and 2012 will be taken into account but also the different industries in which women work in are accounted for.

Within the past ten years there has been no research performed on the influence of women within board of directors on firm performance within the United States, though until ten years ago this subject was of great importance. Europe has taken over this perspective and is performing a lot of research on this subject nowadays. Though for the North of America the importance of this subject faded away ten years ago and for this reason there has been no study performed on this influence of women ever since. Therefore this study will investigate whether there is a relationship between women within board of directors and their influence on firm performance within the United States; in order to be able to see whether a change has occurred since the last time research has been performed.

Within previous studies a lot of different methods and variables are used in order to get an answer on this question. This is the cause for very different outcomes for the previous studies performed. For this reason this study will combine these previous studies to get a concrete and clear answer on this question. Therefore 4 dependent variables are used: ROA, ROE, Tobin’s Q and market value, 3 independent variables: percentage of women, dummy for women and board size. Thereby a dummy is taken for each industry separately as also the industries women work in will be accounted for according to their SIC-code. Also some control variables are taken into account as they have a lot of influence on whether a male or female is chosen to become a new director. These controlling variables are firm size, average age of directors and leverage.

The results leading from the study performed within this thesis shows that women within boards of directors do have influence on the firm performance within North America for most of the firm performance measures, though it is hard to establish a concrete and clear answer on whether this influence is positive or negative.

When comparing the models of 2002 and 2012 it can be said that women within board of directors do have influence on the firm performance of companies for the ROA, Tobin’s Q and market value for 2002 and 2012, with and without taking into account the different industries in which women work. And in 2002 when taking into account the different industries this can also be implied for the ROE. But no influence of women can be found on the ROE when looking at 2002 and 2012 without the distinction of the different industries and for 2012 with the distinction for the different industries in which women work.

Whereby the models for the ROA and ROE were better in 2002, implying having a greater explanatory power of women having influence on firm performance than for 2012. For 2012 the Tobin’s Q and the market value were better models implying having a greater explanatory power of women having influence on firm performance than for 2002. When taking into account the different industries it can be said that the models for the ROA, ROE and market value were better in 2002, meaning that women had more influence on firm performance in 2002 than they do for 2002 as the explanatory power of the model was larger. In 2012 the Tobin’s Q was the better model implying that there is a larger explanatory power, which means that women had more influence on the firm performance than in 2002.

Though limitations for this research exist the S&P 1500 companies are used, but these companies had to exist in 2002 and still in 2012. Therefore a lot of companies had to be dropped from the sample, which makes it difficult to generalize the outcome. Thereby S&P 1500 companies are mostly large companies, which make it hard to generalize these outcomes for smaller companies. Another limitation is the fact that in this research some control variables are taken, though it cannot be ruled out all of the important control variables are taken into account. And even another limitation is that it is hard to establish whether the influence of women is positive or negative and whether the results of 2012 were better than 2002. For these reasons it could therefore be interesting to perform some more research.

In summary; the answer on the research question, “*To what extend do women on board of directors affect the financial performance of a company when looking at the United States of America*” can be concluded with the fact that it can be said that the models taking into account the ROA, Tobin’s Q and market value are influenced by women within board of directors, while women have no influence on the ROE. Whereby women had more influence on the ROA ten years ago, thus in 2002 than in 2012. The influence of women has become larger within the last ten years when looking at the Tobin’s Q and market value.

But when the different industries are also taken into account the influence of women shifts. Women had more influence in 2002 than in 2012 when looking at the ROA and market value, though when looking at the Tobin’s Q women had more influence in 2012 than they had in 2002.

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# Introduction

## Background

Corporate governance has become more important after the big scandals in the last couple of years like Enron and Lehman Brothers. Before these scandals interlocking directorships were possible e.g. appointing friends on the board of your company although they were not being critical enough to really add something to the company. After the scandals the corporate boards were being scrutinized. There had to be something changed in order to prevent such scandals from happening again. Therefore the board of directors was discussed extensively by the public but also by the regulators; rules were defined in order to prevent such co-optation. The agency theory is the derivative hereby; this is about the information asymmetry, which often exists between the managers and the stakeholders. The board of directors has to resolve these agency problems and should thus take care of information symmetry (Carter, Simkins, & Simpson, 2003). As the principals want more information, which has to be guarded by the board of directors, they have to be the ones that have to resolve the agency problems.

Because of the scandals a lot of discussion had started about how the boards should be composed and in what way they should perform (Nordberg, 2011). The size, shape, performance, selection and independency of board of directors were being questioned and changes had to be implemented.

A big issue still exists about the selection and shape of the corporate board; in what way diversity should be implemented, whether it should be implemented at all and more important whether this diversity should be regulated.

Diversity within boards of directors is said to improve the performance of companies, therefore it could be interesting to investigate this relationship a bit further and to look for objective evidence. Companies are advantaged by diversity and therefore diversity should exist according to Watson et al. and Carter et al. as diversity leads to more knowledge, innovation and creativity. (Watson, Kumar, & Michaelsen, 1993) (Carter, Simkins, & Simpson, 2003). Thereby with a divers board the quality of decisions being made is higher as the members are more independent and as different people have different perspectives, values and experiences (Luckerath-Rovers, 2011) (Selby, 2000). Moreover as it is the 21st century in which a world exists of modern techniques, globalization etc. why should boards still be structured in the old-fashion way?

Diversity includes gender, ethnicity, race, culture and age, of which all are observable aspects. Non-observable aspects also exist e.g. education, perceptions, personal characteristics and values (Erhardt, Werbel, & Shrader, 2003).

When the discussion about the composition of the board started it was mostly about inside vs. outside directors and what kind of influence they had on firm performance. Only recently the impact of gender diversity on firm performance is being discussed. The discussion about emancipation within companies erupted, as women experienced a glass ceiling, which prevented them from moving up the corporate ladder.

At the moment there are a lot of discussions going on about women quota in order to reduce the glass ceiling; whether it should be mandatory for companies to have a more equally divided percentage of men and women on the payroll. Women still experience (invisible) borders which make it impossible for them to reach the higher management levels within companies. It is being discussed whether a quota should be implemented or not. In some countries like Norway this is already the case, they were the first country that required a quota of 40% (Schwartz-Ziv, 2013). The reason why Norway was the first country introducing a quota goes back to the early days of the 20th century. In 1913, Norway was among the first countries in which women had the right to vote and in 1980 an Act of Equal Opportunity was established in order to promote women. Norway is a country that finds equality between genders of high importance from the early days on (Sweigart, 2012). Therefore it is obvious that they were the first to introduce a mandatory quota for women in board of directors in 2003, and as can be seen now the quota did work out mathematically. Nowadays men and women are more equally divided at all levels within companies in Norway.

In 2011 the total number of inhabitants in the United States was recorded at 311.591.917 of which 158.301.098 were women. This means that 50,8% were women at that time (United Nations, 2013). Although women are half of the population, it is mostly (white) men who are taking seats in the board of directors within companies (Rhode & Packel, 2010).

Though these days’ women are gaining ground, significant advances are being made by women in all kind of fields like education, politics and economies. Take for example women like Hillary Clinton and Condoleezza Rice, both former US Secretary of State. And Angela Merkel as chancellor of Germany and Christine Lagarde as head of the International Monetary Fund (IMF). These are just four of the most influencing women nowadays in the world.

## Motivation

When looking at my own experiences I prefer working with women when making assignments, as they are better prepared, more dedicated and want to get more out of it. In my opinion women may therefore have better capacities to lead a company. Thereby a lot of discussion is going on in the news about promoting women within companies by the United Nations, as they believe that an equal men-women ratio is important within the world today (Sharma, 2012). When looking around during the lectures at the School of Economics at the Erasmus University Rotterdam, male and female students are almost equally divided. But when reading papers and watching television a lot of information is given about men predominating the business environment. Some recent statistics however indicate that women are better educated than men (Nations) (Schaffnit-Chatterjee, 2010) (Lisowska, 2012). For these reasons I became interested to investigate what the influence of women is in companies.

When reading about gender diversity and the effect on firm performance a lot of information can be found about research done within the Netherlands and the rest of Europe, though I personally would have expected to find more research about this subject relating to the United States. The last research performed in the United States on this subject was done by Adams and Ferreira and by Miller and del Carmen Triana (Ferreira & Adams, 2009) (Triana & del Carmen, 2009). Thereby they only investigated a short period of time; Adams et al. investigated 1939 US companies for eight years from 1996 – 2003 and Miller et al. performed research in 326 US firms for only one year, being 2003.

The discussion in the United States about gender diversity has already taken place ten to twenty years ago and for this reason not a lot of research has been done in the recent years (Kemna, 2013). Therefore the diversity within board of directors will be investigated within this thesis whether it has improved in the last ten years within the United States. Thereby keeping in mind that as in these last ten years there was only little attention for gender diversity we could conclude that companies themselves also find it important to have gender diversity within boards, they have better board diversities created then ten years ago when there was still a severe discussion about gender diversity in the United States. The result could be that more women have a place in the board of directors of companies, maybe even have reached the critical mass of having a minimum of three women in the board of directors (Joecks, Pull, & Vetter, 2012). This could mean that their influence is larger as they are with more and thus having more persuasive power.

This research could thus be important for European countries as the United States is already ahead in the process, almost ten to twenty years. For the outcome of my study three scenarios are possible:

* The results of this research indicate that women do have a positive influence on firm performance of companies as would then be proven by American companies. As a consequence European companies could be encouraged to speed up the process of developing and improving the gender diversity within their boards of directors. The role Europe Union will than change as they will have to do less to encourage the countries and companies within Europe itself, as they will see the success American companies have because of the gender diversity.
* In case there is no measurable effect on firm performance this could mean that Europe is spending time and money on improving and developing the gender diversity within boards while this will not be beneficial. This would mean that Europe could save a lot of money, and especially in these times that would be a nice extra advantage.
* If it points out that there is a negative effect, the same goes for the no effect scenario. It will not be beneficial for Europe to spend more money on investigation of gender diversity, as it will not be worth it to have a more gender diverse distribution.

Thus in all cases, whether there is going to be a positive, no effect or even a negative effect, the outcomes could have a decisive impact on what European countries should do in the future about the gender diversity within boards of directors.

Within the last couple of years a lot of discussion within Europe was concentrated about gender diversity in board of directors. This research work was done primarily for short periods of time and was focused mainly within Europe and specific countries within Europe. Different methodologies were used for each research and for this reason different outcomes were established. Therefore this thesis will also look at the different methodologies and variables used in previous studies and will combine these data to establish in a more clear and concrete outcome.

The problem which will be investigated within this thesis will therefore be focused on the United States and the development of gender diversity within boards of directors for the last couple of years, thereby combining the different variables used in previous studies in order to establish a clear and concrete outcome. As this is another drawback of previous studies.

## Research question

First of all it is important to have a good balance of people within a board of directors to get the best performance out of a company (Schwartz-Ziv, 2013). As you have diversity you will have different opinions, experiences and values as stated before, but also the marketplace will be better represented and thus understood; creativity and innovation will be increased and thus overall quality of directors will be higher (Campbell & Minguez-Vera, 2008). Thereby when looking at the competencies of men and women, women could certainly contribute to decision-making within companies e.g. they are doing better at an education level, and probably thus have better knowledge than men. Another point of interest is the fact that men are more overconfident than women and that women are less focused on power (Elsaid & Ursel, 2011) (Adams & Funk, Beyond the glass ceiling: Does gender matter?, 2012).

Overall, women are seen as the ones being more risk averse which would mean that in certain types of industries it could be better to have a woman leading the company but in other types of industries it could be an advantage to have a man leading the company. Recent research however does not always agree with this statement of women being more risk averse. In the physical health and safety field the relation between female and risk aversion is confirmed but for the financial environment and the associated risk decision-making the relation between the two is less clear. Some researches confirm the relation others do not. (Maxfield, Shapiro, Gupta, & Hass, 2010) (Sapienza, Zingales, & Maestripieri, 2009) (Eckel & Grossmann, 2008) (Jianakoplos & Bernasek, 1998) (Cho, 2011). But overall it is assumed that women are more risk averse than men.

Having more women within board of directors would not always have to be an advantage for a company. If more women are on the board of directors the time to take decisions will presumably take longer. Therefore the quality of the decision would probably be better but the time it will take to get to this decision will take (too) long for companies working in competitive markets. It could also thus be an disadvantage to have more women on the boards of directors (Campbell & Minguez-Vera, 2008).

Nowadays the code of corporate governance of companies are concentrated around having a more equally divided workforce and more importantly the drive to promote women to participate in the board of directors (Campbell & Minguez-Vera, 2008). Therefore this thesis will focus on the gender diversity within the board of directors. The focus will lay on the influence of women on the financial performance of a company. The financial performance of a company is highly important for third parties; based on these numbers they often base their opinion about whether a company is performing well. And thus whether they would (or would not) invest in that specific company. Financial performance can thus be seen as one of the most important indicators for a business.

The entire market is being divided by the US security and exchange commission into ten different sectors; ‘*agriculture, forestry and fishing*’, ‘*mining*’, ‘*construction*’, ‘*manufacturing*’, ‘*transportation, communications, electric, gas and sanitary services*’, ‘*wholesale trade*’, ‘*retail trade*’, ‘*finance, insurance and real estate*’, ‘*services*’ and ‘*public administration*’ (Labor, 2013). All these sectors will be investigated and compared within this thesis.

The research question will therefore be:

*‘To what extend do women on board of directors affect the financial performance of a company when looking at the United States of America’*

Whereby the sub questions, which will be used to get to the research question, are:

* *In what way do men and women differ from each other? How come there are so few women within the higher levels of companies, like the board of directors?*
* *How come women are subordinated to men, when did this start?*
* *What is a board of directors, what functions do they have, do differences exists between countries and their systems and how should boards be composed?*
* *Why is financial firm performance important and how can it be measured?*
* *What previous research has been performed on this subject?*

## Contribution to previous research

As mentioned before, the research for the most recent results as published in the United States in 2009 by Triana & del Carmen (Triana & del Carmen, 2009) were performed in 2003. While for Europe there has been done a lot of research for the last ten years. This because the discussion has started in the United States ten to twenty years ago and has passed on to Europe.

When looking at all the research done in the world about gender diversity on firm performance a lot of different outcomes are noticeable. Some had a positive link, others had a negative link and some even did not find a link. Researchers that found a positive link are for example Mahedo et al, Erhardt et al, Smith et al (Mahadeo, Soobaroyen, & Hanuman, 2012) (Erhardt, Werbel, & Shrader, 2003) (Smith, Smith, & Verner, 2006). Some researchers that found a negative link are Wellalage & Locke, Ahern & Dittmar, Bohren & Strom and Adams & Ferreira (Wellalage & Locke, 2012) (Ahern & Dittmar, 2012) (Bohren & Strom, 2010) (Adams & Ferreira, Women in the boardroom and their impact on governance and performance, 2009). Researchers that found no or not a strong link are Fanto et sl., Solan & Darley, Rose, Randoy et al. (Fanto, Solan, & Darley, 2011) (Rose, 2007) (Randoy, Oxelheim, & Thomsen, 2006).

The differences between these outcomes could possibly occur because of the different variables, which were taken into account within the different researches, but another possibility could be because of the differences between countries e.g. differences in composition of board of directors. For this reason it becomes harder to compare the outcomes for these countries. Another reason for the differences could be the different time periods and different estimation models, which were used within the researches. But overall the main fact from past researches is that they are controversial.

## Thesis structure

The literature review is separated into 5 chapters, being chapter 2 until chapter 7.

Chapter two will discuss the major differences between men and women by taking a closer look at the competencies and characteristics of both genders and to find reasons for the fact that women are not equally represented as men within the higher levels of companies, which is known as the glass ceiling.

The third chapter will capture the question why women are subordinated to men; this will be researched by looking at the different waves of emancipation the women have encountered during the last century.

The fourth chapter will explain the functions of the board of directors, the differences between the systems of boards of directors within different countries and how these boards should be composed with respect to diversity. Within this chapter the emphasis will be put on gender diversity.

Chapter five captures two different financial performance indicators, namely accounting-based measures and market-based measures, as tools to measure differences in performance.

The sixth chapter will capture previous studies, which were performed on the subject of the influence of women within companies. As will be seen, a lot of different outcomes exist for the same sort of studies. This will be the last chapter covering literature review.

Chapter seven summarizes the results of the literature overview and gives the outline of the hypotheses.

Chapter eight will capture the research methodology; the dependent, independent and control variables and the research design to be used.

In chapter nine the results will be discussed and chapter ten will capture the discussion and conclusions for which the final conclusion will be provided but also limitations for the study performed.

Within chapter 11 the appendix is included for which all the evidence for the statistics part is provided.

# Men are from Mars, women are from Venus

## Introduction

Men and women are two separated entities, who both act in a different way. The assumption is made that men do not understand women and women do not understand men. Also known as *‘men are from Mars, women are from Venus’* (Gray, 1992). This could be a reason why the ‘old-boys’ network remains, as men are the ones that are leading the companies from the early days. It could therefore be hard for women to get to the higher positions within companies because of these differences between men and women. Therefore the differences between men and women will be named within this chapter, after which the competencies of both men and women will be elaborated on. Also the glass ceiling and women quota will be discussed in this chapter, whereby the glass ceiling is said to be (invisible) boundaries for women to get to the higher position within the hierarchy and whereby a quota could be introduced in order overcome this problem.

## Differences between men and women

Previous research shows that differences exist between men and women. Differences in the way men and women act; differences in behavior, involvement, motivation, stress and attitude towards managers (Powell & Graves, Women and men in management, 2002). When taking a closer look at stress for example it can be seen that women experience different stress factors than men. Not only do women have stress about the same factors as men, like time pressure or responsibility, but they also experience stress about spending enough time with the family and getting her work done in time.

According to Chater and Gaster the differences between men and women can be reduced back to the different values men and women have. The male tend to have different values compared to women. Men find the following factors important according to Chater and Gaster “*power, money, freedom, prestige, advantages, authority, success, wealth, safety, performance, task-oriented and independency*” . While women find the following factors more important in life according to Chater and Gaster “*harmony, service, loyalty, joy, friendship, involvement, family, love, receptivity, responsibility, caring and helping and relations*” (Chater & Gaster, 1997) .

This is probably also the reason why women are believed to be more risk averse, while men are assumed to be more risk seeking. When looking at different industries it is seen that women are performing jobs in the less risky industries, while men are operating in the more risky industries. Less risky industries can be defined as industries in which a low growth of earnings is assumed and which have a low displacement risk (Dan, 2010).

This could also be seen in the different committees in which men and women are taking place. Women directors are more often seen in committees that deal with monitoring tasks and tasks, which are engaged with corporate governance. Men however are more likely to be engaged with business-oriented tasks. A self-selection could thus be made by women and men themselves in which jobs they prefer to work in (Schwartz-Ziv, 2013).

## Competencies of men and women

Charter and Gaster also described specific characteristics, which can be appointed to either men or women. According to Charter and Gaster men tend to have the following characteristics “*logical thinking, strong, non-emotional, combative, self-assertive, decisively, leaders, independent, scientific, rational, performance-minded and impartial*”. While women have other characteristics according to Charter and Gaster “*intuition, weak/timid, emotional, caring, humble, undecided, followers, dependent, humanly, irrational, teamwork-minded, sensitive*” (Chater & Gaster, 1997). Based on these characteristics women tend to be softer than men which is in accordance with the risk averse behaviour of women and the risk seeking behaviour of men mentioned above.

## Glass ceiling

From the 1970s on, research has been done on the performance of women in companies. Significant numbers of women became managers from the mid 1970s on, since then research regarding women has been increased drastically (Powell & Butterfield, Investigating the "glass ceiling"phenomenon: an emperical study of actual promotions to top management, 1994).

In 1986 an article was published in the Wall Street Journal which used the term ‘glass ceiling’, from then on the term was broadly used. The glass ceiling referred to the (invisible) barriers, which women experienced back in those days (Paul & Sahni, 2010)

It is in the conclusion of these researches that women in the middle-management levels have lesser chance to end up in the top-level management than men. Within companies it is often seen that a certain hierarchy is in place, whereby relatively speaking far more men end up in higher positions than women. This is said to be caused by (invisible) barriers. These barriers are known as the glass ceiling for women. The glass ceiling is thus about inequality between groups of people (minorities) and which becomes worse when getting higher within the hierarchy. Women will therefore not encounter these problems in the beginning of their careers, only later when they (want to) achieve higher positions within a company (Bass & Avolio, 1994) (Cotter, Hermsen, Ovadia, & Vanneman, 2001) (Powell & Butterfield, Investigating the "glass ceiling"phenomenon: an emperical study of actual promotions to top management, 1994) (Lyness & Thompson, 1997).

The glass ceiling not only deals with gender inequality but also with other disadvantages like race inequality and it is mainly about minorities. In this thesis the term glass ceiling refers to the definition of barriers which women experience when getting further in their career and for which the disadvantages become larger (Cotter, Hermsen, Ovadia, & Vanneman, 2001).

Because of this glass ceiling the gender gap only becomes larger and the ‘old boys network’ stays for what it is; (white) males denominating the higher positions within companies.

The invisible barriers which women experience could be for example that women have too less experience, the pipeline of women is too short and women and men differ in their points of interest of things they find important, and in the way they act to different things. As said earlier women are more risk averse than men. Thereby the business environment is made by men for men, therefore not a lot of space for women is left. (Ragins, Townsend, & Mattis, 1998) (Adams & Funk, Beyond the glass ceiling: Does gender matter?, 2012) (Meyerson & Fletcher, 2000)

In order to get rid of these barriers, it is important for companies and especially the CEO’s to understand the invisible barriers women face within companies. To get this information to their attention and to let the barriers vanish different methods can be used (Ragins, Townsend, & Mattis, 1998) (Benschop, 2005).

One of the most important methods which is used to get more information and knowledge about women is by researching the performance of women. Catalyst is one of the most important providers of these researches within the world. Catalyst Inc. is a non-profit organization that was founded by Felice N. Schwartz in 1962 (Catalyst). Each year catalyst reports on their findings on the development of women within companies. Because of this annual reports companies know more about women and their developments within companies.

Another method, which can be used for women, is mentoring. If high ranked, influential males are mentoring women it is proven that they will be more successful; they will get more promotions and they will accelerate their careers. The mentors have prestige, know the important people, which they can introduce their protégés to and they have inside information. These are only a couple of the advantages of mentoring. All this factors will help women breaking through the glass ceiling (Ragins, Townsend, & Mattis, 1998) (Meyerson & Fletcher, 2000) (Paul & Sahni, 2010).

Superior performance and adapting to the male culture by women can also be distinguished as a method of breaking the glass ceiling. Women are not seen as the credible ones, like the males are seen, therefore they have to prove themselves time after time and in each new situation. Thereby they have to adapt to the male-culture within the company; women have to act more masculine (Ragins, Townsend, & Mattis, 1998) (Adams & Funk, Beyond the glass ceiling: Does gender matter?, 2012).

## Women quota

Norway was the first country introducing a women quota in 2003. At least 40 percent of women have to be accounted for in the board of directors of stock listed companies. Other countries followed Norway and introduced a quota as well e.g. France, Belgium, Iceland, Spain and Italy (Wang & Kelan, 2012) (Storvik, 2011).

Quota’s are used to improve the development of women within companies at high-level positions, as those women are the minority nowadays. This minority of women are not able through self-regulation to increase the amount of women within the hierarchy fast enough, therefore a women quota could help to accelerate this increase in numbers of women. (Corkery & Taylor, 2012)

Because of the glass ceiling it is harder for women than for men to attain better positions within the hierarchy in companies. Therefore a target is set to mandate companies to help women getting into the better positions. This obligation forces companies to change their internal approach; making them more women minded.

A lot of assumptions are made about women, which causes certain stereotypes and prejudices, which affects the behavior of women. It could therefore be a good reason to introduce a women quota to deduct these assumptions and prejudices about women (Elstad & Ladegard).

Quota’s both have advantages and disadvantages as mentioned within different researches. Some advantages are that the representation of men and women are more equal and a more diverse workplace increases the quality of information, thereby women and men have different experiences that could complement each other and with women in the board of director decision-making becomes more effective. Disadvantages could be that not the most suitable person will be chosen for the job, but that the preference will be given to a women in order to obtain the required target of women, it is therefore discriminatory (Pande & Ford, 2011) (Mizzi, 2011) (Elstad & Ladegard).

Also within Europe it is still questioned whether this quota for women should be introduced or not. As for example Vivian Reding as Eurocommisioner is a proponent for this quota, she states that a mandatory quota should be introduced, whereby 40% of women should fulfill jobs within the higher levels of management within a couple of years (NRC Handelsblad, 2013).

Apart from the discussion about gender quota whether a quota is a good or bad thing there is also a discussion about the percentage. For instance it is questioned whether 40% is a good rate, some people find it too high, they question whether there are enough capable women to fulfill these positions. Other people find a women quota a part of a strategy that should make people more aware of the gender issues and women’s leadership. And even other people say it is assaulting to women as it is then assumed that they cannot make it on their own and need special treatment (Ladegard) (Orr, Daphne, & Horton, 2011).

Though a lot of discussions are still going on about women quota, previous researches show that using quota’s is effective to increase the number of women within the high-level of companies (Corkery & Taylor, 2012).

## Conclusion

Men and women differ from each other, differences exist in behavior, involvement, motivation, stress and attitude towards managers. This because men and women tend to have different values. Thereby men and women have different characteristics which causes women to be softer than men overall. For this reason women tend to be more risk averse and men tend to be more risk seeking. Thereby a self-selection is being made by men and women in which sectors they prefer to work in. Men thus differ from women in several ways.

The glass ceiling is about inequalities of different parties, which prevents them from reaching their goals. In order to get rid of these (invisible) barriers companies and especially the CEOs should understand these (invisible) barriers which minorities face. Different methods can be distinguished in order to break this glass ceiling: researching performance of women, mentoring women, and superior performance and adapting to the male culture by women. Putting a women quota in place could enhance the development of women as well.

But not only the differences between men and women could cause the distinction between men and women within the higher levels of companies. Another explanation could also be the differences between men and women from the early days on, how the tasks were divided in history. Therefore the history of the roles of men and women will be captured in the next chapter.

# Short historical overview of the rise of women

## Introduction

When looking at the population of the world men and women are almost equally divided (United Nations, 2013). Although when looking at statistics of companies women are underrepresented in the higher levels of the hierarchy within businesses (Young E. &.).

From the early days on the allocation of responsibilities of men and women were clear; men were responsible for the (financial) support of the family, women were taking care of the children and the household at home. But for the past decades women are gaining ground as can be seen at educational level, women are higher educated on average, and more women are enrolling more and more within the business environment. Women are becoming more independent nowadays and that is what we call emancipation.

## Background of women

A lot has changed for women within the last couple of decades. Before women were not allowed to work, now they are allowed and are even challenged to climb up the corporate ladder. This chapter will therefore focus on this evolution of women, and how they gained ground, as this information could explain why there are so few women within boards of directors. But it also gives the reason why the number of female board members has increased the last couple of decades. It should not be forgotten that still in the beginning of the last century there was a clear scission of the tasks of men and women therefore a quick change has occurred for women in a large part of the world as they are now able to take part in the better positions within companies as equality between men and women became an important focus within the world. Moreover the government also stimulates this equality as can be seen by the emphasis of this subject within the different governments by the rules and laws they state. Take for example the quotas some governments put in place whereby a certain percentage of women are appointed. Take for example Norway, Denmark and Spain for which regulations are made that at least 40 percentage of women within top-functions have to be appointed to women. A large percentage difference can thus be made for the numbers of women working in the higher levels of the company compared to decades ago. It could therefore not be strange that there are still not a lot of women taking places within board of directors. This could thus be an explanation for the subordination of women in the higher levels of the corporate ladder.

The next paragraph will therefore focus on the different waves women encountered for within the past decades, as this could be an important explanation for the different numbers of men and women within companies.

## Different waves

In the past women were subordinated compared to men. Men were seen as the person who had to support the family (financially), the women were there to raise the children and run the household. Women were depending on their men, but this relationship changed in the past centuries, especially in the last century, women wanted more. They wanted the same rights, opportunities and prestige as men; they wanted equality. Nowadays the dissimilarity between men and women is a lot smaller than the past. But the women had to fight for it (Lisowska, 2012) and in some countries still have.

When describing the rise of women, it is often spoken of as the feministic waves that occurred in the past decades. This way there are three feministic waves to distinguish, which will be captured in this chapter (Teugels, 2006).

The first wave that can be distinguished took place from the end of the 19th century until the beginning of the 20st century. Women were able to work in this period, but they were paid less than men and were exploited. Mostly the women of the lower class of the population were working. In the end this situation could not go on any longer and the women revolted. Women wanted to be equally treated as men, publicly and politically; they wanted voting rights for example. In 1920 the women were appointed voting rights by the law; the Nineteenth Amendment within the United States was a fact. Men and women had to be treated the same from now on, the sex could not be the base for voting rights anymore (rights) (Teugels, 2006).

The second wave occurred from the 1960s until 1985. An important reason for this wave can be found in the Second World War and just after. During the Second World War a lot of women were taking over the men’s roles in business as the men were fighting in the war. Not only the women from the lower level population were working now, but also the middle class women. When the men returned from the front a number of them wanted to take over the role of the women again, but women did not accept this. Women encountered disparities between men and women, they were undermined by the men, and when the economy became deteriorated women were the first who became fired. Women became conscious of the differences that still existed between men and women within this wave, and they started to change this. Women wanted to be equal to men, with no disparities between them within family, rights, sexuality and workplace (Hammer & Kellner) (Teugels, 2006).

The third wave occurred since the 1960s. This was a different kind of feministic wave than the previous two waves. It was more about the individuality of the women. Within this wave there are different movements included like cyber feminism and eco-feminism. Cyber feminism is about the use of Internet and new media by women to distribute their ideas. Eco-feminism is about the relation between ecological movements and women. But overall this was a totally other kind of wave than the previous two waves, this wave was more about rebelling by women, which attracted so far less women than the first and second wave (Hammer & Kellner) (Teugels, 2006) (Rosa).

In order to be able to define why there are so few women in the higher levels of companies, like the board of directors, it is important to go back to the early days, when there was still a dissimilarity between what was expected from men and women. Nowadays the expectations of men and women have changed due to the importance of equality between men and women within the world. And still the expectations are changing; some families for example have shifted the traditional roles from back in the days; the women is working now and the dad is staying at home taking care of the children and the household. This is something you would not have seen back in the early days. The history of men and women can thus be an explanation for the differences in numbers of men and women within companies, and for the increase in the percentage of women in the last couple of decades, as governments throughout the world find it important and stimulates this equality.

## Conclusion

The different waves give a summary of the rise of women. The first wave was about the equalities between men and women legally seen, the second wave was more about equality in a more wide range from family, rights and workplace. The third wave was a special wave that was about the individuality of women.

As the explanations for the differences between men and women are now known; men and women have different values and men and women have a different history with respect to their roles within the family, a closer look is taken at the board of directors. As women are underrepresented in the board of directors compared to men. The role of the board, the differences between different countries and the diversity within board of directors is being explained in the next chapter.

# Board of directors

## Introduction

The board of directors within a company is important in order to be able to handle the day-to-day operations, as well as the monitoring and controlling of management. Furthermore their main responsibilities also include defining strategies for the organization. Without a proper board of directors, and good governance, a company is not worth much as investors will not invest in those companies.

This chapter will cover the corporate governance of companies. The differences between a one and two-tier system, the composition of a board and its diversity. Thereby the focus will lie at the gender diversity and the problem of the glass ceiling that could be encountered for by women. Thereby the women quota will also be discussed.

## Corporate governance

The board of directors performs corporate governance; it is about controlling and directing the company for which the opinion of board of directors, about the business culture and business ethics, is very important. It divides the rights and responsibilities of the people within the company.

The responsibility of a board of directors consists of different elements. They are responsible for the performance of the company, they have to make the decisions about which course to go, they are responsible for the financial results and they are responsible for the strategy the company wants to maintain. By taking these responsibilities they try to create value for the company, as the shareholders like to see it.

Thereby the boards of directors are the one who appoint new employees, fire employees and monitor and control managers within the companies. The latter is important to prevent agency problems from occurring (Baysinger & Butler, 1985).

The agency theory is an extension of the risk sharing theory. In the 1960’s and the beginning of the 1970’s the risk sharing problem was discussed; different parties have different risk preferences. In the 1970’s the agency problem was raised, the principal and the agent have different objectives and have different risk preferences. The stakeholders exist out of different groups of people like the shareholders, the employees, the public, the creditors and the customers. They all have a certain relationship with the company, which causes that they all have a specific claim on the company (Hill & Jones, 1992) (Eisenhardt, 1989).

The agent acts on behalf of the principal, a separation of ownership and control is thus applicable here which causes the agency problem. For this reason moral hazard could occur because the agent is not directly held liable for the risks he takes. It could therefore be possible that he acts in self-interest, instead of acting for the public, the stakeholders. Because of this, information asymmetry could occur between the agent (the manager) and the principal (the stakeholders). This information asymmetry is the main problem within the agency theory as stakeholders do not get all the information available from the managers and it could therefore be possible that they cannot make proper decisions solely based on this information provided by the managers. For example the managers will not act in their best way to maximize the returns, as the stakeholders prefer to see (Hill & Jones, 1992) (Eisenhardt, 1989) (Johnson, Hoskisson, & Hitt, 1993).

The board of directors is responsible for resolving the agency problem. The agency problem is much more discussed nowadays because of the big scandals of the last couple of years like Enron. The boards of directors therefore have to take more responsibility in resolving this agency problem.

When rewarding the board of directors with a compensation plan based on returns they will share the same interest as the stakeholders. In that way it is ensured that the board of directors will truly monitor and control the agents, to let them act in their best way. In order to get control of the agents it is possible to put an incentive system in place for the agents. In that way they are being triggered to maximize returns, they will then also have the same interest as the stakeholders (and board of directors). In that way the agency problem can be resolved (Donaldson & Davis, 1991).

It is thereby important that the chairman of the board of directors and the chief executive officer are not one person. These roles have to be separated in order to be able to act in the stakeholders’ interest. Otherwise the role of management will be too large, and could influence the decisions being made, which will not be in the best interest of the shareholders. Two downsides could then occur: agency loss and managerial opportunistic behavior (Donaldson & Davis, 1991).

It is important for companies to be well governed. As a study of McKinsey and Co shows investors are willing to pay more if a company is well governed, even up to 28% of the original price (McKinsey&Company, 2010). If the market is not efficient, which is often the case, regulations and laws are developed. Though these regulations and laws are often not presented in time, for this reason companies often impose codes of conduct themselves. This way they take care of good corporate governance themselves (Nordberg, 2011).

The board of directors is a legally composed body, often integrated within the business, in which a group of people performs collectively. Decisions within the board of directors are usually made with the majority rule; the alternative with the majority will be selected (Baysinger & Butler, 1985).

The size of the board of directors differs significantly within different companies. Some only have 4 persons within their board, others have 20 people within their board or directors. A large board can have advantages like more people have more knowledge, but if the board is too large it could also be a disadvantage as it becomes harder to really talk through all the different options. But a too small board of directors could easily be influenced by the chief executive officer. As previous research shows, the most optimal amount of people within a board of directors is fewer than ten (Nordberg, 2011) (Lipton & Lorsch, 1992).

## One- versus two-tier system

Differences are made between the tier systems countries use. Anglo-Saxon countries, like the United Kingdom, Spain, Italy and the United States use a one-tier system. This means that they use a unitary board within their public companies, the size of the company is hereby not important, neither whether they are listed or not. The board is divided into executive/inside directors and non-executive/outside directors, the management board and the supervisory board are thus combined, instead of having two separated boards.

A distinction is made between executive directors and non-executive directors. Though they are all responsible for management and for the supervisory role. They thus have to perform both functions instead of either one of them. They have to manage the daily operations and have to monitor and overlook the performed duties. The non-executive directors are often recruited from the outside, and preferably have different backgrounds and knowledge than the executive directors. Thereby they have other connections that could be used to open new doors. In the one-tier model the same person combines the function of CEO, as well as chairman of the board, this could endanger the independency. They are all involved for the operational performance of the organization (Maassen & Bosch, 1999) (Baysinger & Butler, 1985) (Nordberg, 2011) (Hopt & Leyens, 2004) (Koophandel).

Another system used is called the two-tier system, Continental-European countries use this system, which means that there are two separated boards; a management board and a supervisory board, in which the latter controls the management board. This system is mandatory in countries like Germany and Austria. A big advantage hereby is the independence of both the boards, in contrast with the one-tier system, for which people say that the board is not independent enough (Maassen & Bosch, 1999) (Dehaene, Vuyst, & Ooghe, 2001).

The management board within the two-tier system can be compared with the executives in the one-tier system, and the supervisory board within the two-tier system can be compared with the non-executive directors within the one-tier system. Within the two-tier system the supervisory board has to advise the management board, thereby they have to control and monitor them and they are also capable of taking action against the management board if needed. But overall and most important the supervisory board and management board have to cooperate well (Hopt & Leyens, 2004).

In some countries, like France, the shareholders can choose either of those systems mentioned above. As long as they follow up what they originally chose (Nordberg, 2011).

## Diversity within board of directors

The composition of a board can widely differ. The diversity within a board of directors is important but difficult to accomplish according to Plessis, Saenger and Foster (Plessis, Saenger, & Foster):

*“A good, well-motivated and considered board composition will achieve the best results, but achieving the right balance is challenging”*

When talking about diversity within boards of directors there were almost no regulations about how the boards of directors should be composed in 1985. It is said to be a laissez-faire attitude of the regulators back then. Because of this reason not much diversity occurred within boards of directors (Baysinger & Butler, 1985). Only since recent years rules are made by the regulators in order to develop the quality of the board. Again, hereby it is important to mention that the regulation became much more important after the big scandals of the recent years, in order to further resolve the agency problem. Because of these regulation the diversity within board of directors is now (much) more controlled.

A difference is being made between homogeneous groups and heterogeneous groups (Schwartz-Ziv, 2013) (Lazear, 1999) (Hamilton, Barton, Nickerson, & Owan, 2004) (Johnson, Hoskisson, & Hitt, 1993). Heterogeneous groups are groups which have a lot of diversity, it is not only about different genders but mainly about different ethnicities, ages, cultures, quality of people and educational background for example. It is about the diversity within these groups, and for this reason heterogeneous groups are more balanced. Homogeneous groups consist of groups that have (almost) no diversity, and thus exist of the same people. For example the people within a board of directors are often defined as older, white males with a fairly good educational background.

Diversity can be divided into different characteristics of board members whereby the different characteristics can be distinguished, some of these are: age, ethnicity and tenure, education, director type, independency/dependency of directors, occupation of directors and gender diversity which will be more extensively discussed in this paragraph. The main focus within this thesis will be at the latter; gender diversity.

### Age

Within the board of directors the age of the members can differ, though you often see older members taking seats in the board of directors as they have a lot of experience and knowledge. Some companies have age limits for members of the board of directors which means that when they turn for example 72, they will be asked to leave the board to go with (a mandatory) retirement, 72 was the average mandatory retirement age in 2011 in the United States (Larcker, 2011)

### Ethnicity

Different people within the board of directors with different backgrounds have knowledge of different cultures. When expanding throughout the world it can therefore even be a bigger advantage to have different ethnicities within the board of directors, as the knowledge is present of what those people in different countries want. It is therefore possible to react and respond on what they want (Triana & del Carmen, 2009).

### Tenure

The tenure of members within the board of directors can also differ; on average the members on the board of directors have tenure of seven years (Larcker, 2011). Directors can resign whenever they want to. It is not possible for non-executive directors to be send away by the executives nor by the shareholders.

### Education

Based on a person’s education it is possible to deduct their base of knowledge and skills that influences their decisions (Johnson, Hoskisson, & Hitt, 1993). Therefore a distinction can be made between higher educated and lower educated people and their decision-making. People with a higher educational background are better able to deal with more complex situations.

### Director type

Another diversity type that is applicable to the board of directors is the type of directors; there are inside and outside directors. The inside directors come from within the company, the outside directors are recruited from outside the company as mentioned before.

The right amount of insiders and outsiders within a board of directors is arguable. Some say that there exists a positive relationship between more insiders and firm performance (Klein, 1998), others say that there is a positive relationship between more outsiders and firm performance (Baysinger & Butler, 1985). The diversity of inside and outside directors is applicable.

### Independent versus dependent directors

Another difference that is made between directors is whether they are independent or dependent directors. Until recently it was not uncommon that the CEO of a company would ask individuals which he had personal ties with, to take part in the board of directors. The consequence was that friends of the CEO represented the board, for which there was no independency anymore. This is also known as interlocking effects, which is seen as a disadvantage and something that should be avoided. Nowadays laws are implemented which prohibits these interlocking effects (Nordberg, 2011).

### Occupation of directors

Directors’ occupation is another element of diversity within board of directors. The question hereby is what kind of persons is elected for the job of becoming a board member. Research shows that people with business experiences are preferred, as they know how a company works (Kesner, 1988).

### Gender

When there are three or more women in a board of directors corporate governance will be enhanced as stated by L. Fairfax, it is said to be a critical mass. The two most important people who have founded the critical mass theory are Rosabeth Moss Kanter and Drude Dahlerup. Kanter has published two articles in 1977 and Dahlerup published one article in 1988 (Childs & Krook, 2008) (Broome, Conley, & Krawiec, 2011) (Kanter, Some effects of proportions on group life, 1977a) (Kanter, Men and women of the corporation, 1977b) (Dahlerup, 1988).

In the 1970’s Kanter investigated an American corporation, she took a closer look at the experience and status of female within this corporation and concluded that minority groups only become persuasive, as individuals, if the amount of people within the minority increased. Kanter was the only researcher who remained gender neutral. Dahlerup later extended the theory of Kanter for which the most important extensions where: she named it critical mass theory and she identified 30 percent as the relevant point of which individuals within minorities start to have influence and thus persuasive power (Broome, Conley, & Krawiec, 2011) (Dahlerup, 1988) (Kanter, Men and women of the corporation, 1977b) (Kanter, Some effects of proportions on group life, 1977a).

When only one woman is taking place in the board of directors it is said that she will not have a lot of persuasive power between all the men in the board of directors. She will then be the minority group and therefore having less influence on decisions being made. This is also known as a tokenism (Torchia, Calabro, & Huse, 2011).

Another possibility is that two women are taking seats within the board of directors; the women can perform more influence now. But is still not always causing significant changes to be made within decision-making compared to the previous situation with only one woman in the board of directors (Kramer, Konrad, Erkut, & Hooper, 2007).

In order to have persuasive power women need to be with three or more women. A critical mass is applicable when three or more women are taking place within a board of directors. They are assumed to have persuasive power when they are represented with three women within a board of directors and thus have more impact on the decision-making (Campbell & Minguez-Vera, 2008) (Torchia, Calabro, & Huse, 2011).

A citation from Rosener gives a good summary of the previous: “*One female board-member is often dismissed as a token. Two females are not enough to be taken seriously. But three gives the board a critical mass and the benefit of the women’s talents*” (Rosener, 1995)

A limitation is however, that a lot of studies about critical mass are based on interviews that only capture a limited amount of interviews (Schwartz-Ziv, 2013).

When a critical mass of three women is enhanced in the board of directors several advancements could be made. The first thing to be improved is that women raise difficult issues which men would most of the time ignore. The second enhancement will be that women have different perspectives than men, which will lead to different discussions. Women will bring the last chance, as they will alter the dynamics, which exists in a boardroom. Women tend to be more open and collaborative, in contrast to men (Fairfax) (Corkery & Taylor, 2012).

## Conclusion

Corporate governance of a company is being performed by the board of directors. Hereby it is especially important that the board of directors prevent the agency problem from occurring. The main problem, which should be avoided, is that no information asymmetry occurs between the manager and the stakeholders.

There exist two main types of board of directors, namely the one-tier system and the two-tier system. The first system, the one-tier system, is well known in the Anglo-Saxon countries. In this board type the management board en supervisory board are combined, and there is one person appointed as CEO and as chairman. While the latter, the two-tier system, is well-known in the Continental-European countries and hereby the management board and supervisory board are two independent boards.

Diversity should exist in board of directors, as it will enhance the results. Diversity can be distinguished in age, ethnicity, tenure, educational level of members, director type, independent/dependent director, occupation of directors and gender diversity. For which the latter is extensively discussed as this has the main focus within this thesis. It is hereby important to distinguish women as a tokenism and number of women within the board of directors with a critical mass of three or more women, and thus having persuasive power within the board of directors. A critical mass is needed to really make a change.

In order to be able to mention or measure whether a board of directors is performing good or poorly it is important to know which firm performance measures exists, whereby a distinction is being made between accounting-based measures and market-based measures. Therefore the next chapter will cover the different types of performance measures, which can be used.

# Firm performance

## Introduction

The firm performance of companies can be measured in several ways; this thesis will focus on the financial measurement of firm performance, rather than on the non-financial measures like product quality or customer satisfaction. Within the financial measurement indicators two different measure indicators can be distinguished namely the accounting-based measurement and the market-based measurement (Marinova, Plantenga, & Remery, 2010) (Ecker, Francis, Olssen, & Schipper, 2009) (Haslam, Ryan, Kulich, Trojanowski, & Atkins, 2010).

## Financial measurement indicators

Financial measurement indicators are more objective indicators than non-financial measurement indicators as they are based on quantitative information instead of qualitative information. Through financial measurement indicators the efficiency and effectiveness can be measured of a company’s economic goals using financial ratios within. For instance credit ratios, which are indicators whether a company can continue his business in the short or long run like quick ratio and current ratio, but also profitability ratios, whether a company is performing well or poorly, like gross margin and net profit margin. The advantage of ratios is that comparison between different factors is possible. For example companies can be compared due to ratios though when doing so one have to keep in mind that different countries can use different accounting methods, which could erupt the comparison. Therefore people have to be careful when comparing ratios between companies. The same applies for the different industries in which different interlards are used which could influence the ratios within different industries (Gentry & Shen, 2010).

When taking a closer look at the distinction that is being made within this sector according to value-based management, the accounting-based and market-based measures can be distinguished. In the early days of management research, accounting based measures were used. Though from the mid 1980s people also started using market-based measurements as shareholders became more active and more important to companies. From then on market-based measurements were used as a benchmark for executive compensations within most companies nowadays and still is valid (Gentry & Shen, 2010) (Young & O'Byrne, 2000).

Although a distinction is made between these two financial performance measures there is an ongoing discussion about these two different performance measures. This discussion will be elaborated in the last part of this chapter.

### Accounting-based measures

Accounting based measures are based on historical values; these measures are based on the operating environment of the company. Examples of accounting-based measures, which are commonly used, are return on sales (ROS), return on equity (ROE), return on assets (ROA) and return on investments (ROI), and of which are all said to be objective variables (Leung) (Gentry & Shen, 2010). Where the ROS can be measured by dividing the net income by the sales, the ROE can be measured by dividing the net income by the shareholders equity, the ROA can be measured by dividing the net income by the total assets and the latter, the ROI, can be measured by first subtracting the costs of the gains of the investments, after which is should be divided by the cost of investments.

The different measures all take a closer look at different aspects of a company. The ROS can be used to see whether the operations of a company are efficient. The ROE and the ROA both can be used to see whether a company is profitable or not, though the first one will be checked by comparing it to the shareholders equity, while the latter compares net income against the total assets. The ROI can be used in order to see whether an investment is efficient or not.

Within this thesis two of these types of performance indicators of accounting based measures will be used, namely the ROE and the ROA as these are the two most common variables used within previous studies which investigated gender diversity and firm performance (J.Joecks, Pull, & Vetter, 2012) (Schwartz-Ziv, 2013) (Erhardt, Werbel, & Shrader, 2003) (Marinova, Plantenga, & Remery, 2010) (Mahadeo, Soobaroyen, & Hanuman, 2012) (Luckerath-Rovers, 2011). And as this study will be a combination of previous studies, the ROE and ROA will be used. Both of these indicators can be measured in several ways, but the most commonly used ways of measuring these are stated below.

The ROE is believed to be one of the most important ratios for companies, and as stated before, can be measured by dividing the net income by the shareholders equity. It is used to measure how profitable a company is and whether the company is using their equity profitably. The ROE is assumed to be an average ratio when the ROE fluctuates around 10% to 12%. Everything above the 12% is said to be a good and desirable ratio. Most companies within the United States have a ROE between 10% and 12%.

The ROA is the percentage of profit compared to the total assets; it measures a company’s capital intensity. The ROA can be measured by dividing the net income by the book value of the total assets. When one wants to compare the results of the ROA of a company, one should compare it with previous outcomes of the ROA of the same company or with the ROA of companies within the same industry. If one would compare it with different companies of another industry it could lead to wrong conclusions as the results of different companies differ widely.

### Market-based measures

Market-based measures are based on future performances; these measures are based on information about the trading environment of companies. Examples of market-based measures are earnings per share (EPS) and portfolio returns (Leung). Whereby earnings per share can be calculated by subtracting the dividends of the preferred stocks from the net income, which should then be divided by the average of the outstanding shares. When measuring the EPS the profitability of a company can be established. Portfolio return is about the financial return when having several investments; in order to invest one will want to see or expect profit.

Within this thesis the two stock-based measure indicators which will be used are the Tobin’s Q and the market value. The Tobin’s Q will be used as it is a commonly used variable within previous studies on this subject (Wellalage & Locke, 2012) (Carter, Simkins, & Simpson, 2003) (Nguyen, Locke, & Reddy, 2012) (Marinova, Plantenga, & Remery, 2010). Thereby Tobin’s Q is a good measure as it is not affected by reporting distortions as it is related with tax regulations whereas other measures are affected by reporting distortions. Thereby Tobin’s Q also does take into account risk, unlike the other performance measures (Campbell & Minguez-Vera, 2008).

Tobin’s Q has been developed by Tobin in 1969. Nowadays the Tobin’s Q performance measure indicator is often used for corporate governance studies, as it is a measure, which can be interpreted quite easily. It explains differences in diversification and investment decisions. It compares the market value with the replacement value of assets of a company (Marinova, Plantenga, & Remery, 2010) (Haslam, Ryan, Kulich, Trojanowski, & Atkins, 2010) (Chung & Pruitt, 1994).

Tobin’s Q can be measured, according to previous research, by taking the market value of equity plus the book value of debt which should then be divided by the book value of debt plus the book value of equity. Tobin’s Q is said to be an effective ratio as firm performance measurement if the ratio is greater than 1. It is believed that more value can then be created by using available resources. Ratios lower than 1 means that the available resources are poorly used and thus no or little value is created (Campbell & Minguez-Vera, 2008) (Wellalage & Locke, 2012).

Next to the Tobin’s Q variable, the market value will also be used as an dependent variable as it is believed to be a good measure for company performance, as the market value of a company is set by the market participants. The market value is also known as the market price of a company. It is therefore an important indicator of a company’s performance and for this reason market value will be taken into account as another dependent variable within this study. The market value can be measured by taking the number of outstanding volume of shares multiplied by the price of shares for a certain year-end.

Contrary to the two variables of the accounting based measure, market based measures are rather subjective; it is more about the perception of investors. The latter are more heavily influenced by stock market reactions (Haslam, Ryan, Kulich, Trojanowski, & Atkins, 2010).

## Debate between accounting-based and market-based measures

For the past years there is a fierce discussion going on about the accounting-based and market-based measures. As mentioned above the accounting-based measurement is normally seen as the one that has a short term performance focus based on the past, while the market-based measurement is seen as the one having a long term performance focus based on the future. Though there is no agreement on this relationship. Thereby it is questioned to what extend these two measures are related with each other. Some researchers believe there is a positive relationship between the two, like McGuire and Matta (McGuire & Matta, 2003), others though believe that a negative relationship exists between the two measures like Nelson (Nelson, 2003), and even others believe there is no relationship like Hillman (Hillman, 2005).

Though both are seen as valid measurements and both are still often used for research.

## Conclusion

Two types of performance measurements for financial firm performance are being discussed; accounting-based measures and market-based measures. Return on equity and return on assets are used as measures for accounting-based indicators. Tobin’s Q and stock market value will be used as indicators for market-based measures. The market-based indicators are more subjective than the accounting-based measures.

The next chapter will discuss the previous research performed on gender diversity and firm performance within board of directors. The different variables used within previous studies are also discussed in the next chapter.

# Previous research

## Introduction

The relation between gender diversity in board of directors and firm performance has started in the United States ten to twenty years ago. Since ten years this discussion has shifted to Europe, where it is a well-discussed topic nowadays. A lot of research has been performed on this topic for the last decades within the United States and Europe, but also within other continents, which will be defined as the rest of the world. Three different parties can thus be distinguished: the United States, Europe and the rest of the world whereby the United States and Europe are the leading parties within this discussion.

A lot of research has been performed within the United States until about ten years ago, from then on the research shifted to Europe. Thereby a lot of controversial outcomes appeared for the same studies due to the fact that the different researches used different variables and different methodologies within their researches.

## Previous research

The last research performed in the United States about gender diversity within board of directors and firm performance was in 2003 by Triana & del Carmen; they published their results in 2009. They concentrated on innovation and firm reputation in order to look for the relationship between gender diversity and performance within the United States. They found a positive relation between innovation and gender diversity in board of directors. They could not establish a relationship between reputation and gender diversity, this because companies are expanding their businesses worldwide because of the globalization. Therefore ethnical diversity is ranked higher than gender diversity nowadays, as the local environments in the different countries are understood better with an ethnical diversity within a board of directors which is important when expanding in different countries (Triana & del Carmen, 2009).

Different studies have been performed worldwide, striking is that these studies have a lot of different outcomes.

Some studies that found a positive link between gender diversity and firm performance are for example Mahedo, Soobaroyen & Hanuman, Smith, Smith & Verner, Erhardt, Werbel & Shrader and Luckerath-Rovers. Mahedo et al. found a positive link between gender diversity in board of directors and firm performance in Mauritius. They studied 42 listed companies within Mauritius in 2007 (Mahadeo, Soobaroyen, & Hanuman, 2012). Smith et al found a positive link with gender diversity in board of directors and firm performance for Danish firms from 1994 until 2003. They focused in their study not only on the boards of directors but also on the top CEO, top 5 CEO and top 15% CEOs (Smith, Smith, & Verner, 2006). The third study that found a positive relation between gender diversity in board of directors and firm performance is Erhardt et al. They investigated 127 US companies for the years 1993 and 1998. They not only focused on gender diversity but also on ethnical diversity within board of directors (Erhardt, Werbel, & Shrader, 2003). Luckerath-Rovers also found a positive link; she investigated 116 Dutch listed companies for 2005 until 2007 (Luckerath-Rovers, 2011).

Some studies that did not find a relationship or did not find a strong relationship are Rose and Randoy, Oxelheim & Thomsen. Rose investigated all listed Danish companies during 1998 and 2001 (Rose, 2007). Randoy et al. also did not find a relationship between gender diversity in board of directors and firm performance. They investigated the 500 largest companies in Sweden, Norway and Denmark (Randoy, Oxelheim, & Thomsen, 2006).

The following studies found a negative link between gender diversity in board of directors and firm performance; Wellalage & Locke, Ahern & Dittmar, Bohren & Strom and Adams & Ferreira. Wellalage et al. investigated all listed companies in Sri Lanka for the period of 2006 until 2010 (Wellalage & Locke, 2012). Ahern et al. took into account 248 companies in Norway from 2001 until 2009 (Ahern & Dittmar, 2012). Bohren et al. also investigated companies within Norway, but for the period of 1989 until 2002. They investigated 203 listed Norwegian companies (Bohren & Strom, 2010). Adams et al. studied 1939 companies within the United States from 1996 until 2003 (Adams & Ferreira, Women in the boardroom and their impact on governance and performance, 2009).

As presented above there are all different outcomes for the relationship between gender diversity in board of directors and firm performance. This is possible because all the researches use different variables, some use overlapping variables but use different control variables and other researches use totally different dependent and independent variables.

Another possibility for the different outcomes could be that the studies are performed in different countries. It is therefore more difficult to compare these results as they have different (cultural) backgrounds. For example some countries have a one-tier system and others have a two-tier system for the board of directors, this could have influence on the results. In addition results could differ because of the different time periods used and the different estimation models used by the researchers.

As could be seen the results on this topic vary widely and thereby a lot of research has been performed in Europe for the past ten years. Before the focus changed to Europe the relation of gender diversity in board of directors and firm performance was investigated extensively in the United States. As it is not a well discussed topic anymore within the United States, it is interesting to see whether and how this relationship of gender diversity in board of directors and firm performance has developed within these last ten years, as the last research performed derives from almost ten years ago. Therefore this thesis will focus on gender diversity in board of directors and financial firm performance within the United States within the last ten years, whereby two points in time will be compared, namely 2002 and 2012. As well as for 2002 as for 2012 data will be. The data for 2002 will not be taken from previous research, as this study will combine the previous studies, it is therefore not possible to extract this information from previous studies.

Not only the results of the entire market will be taken into account for these two years, but the entire market will also be divided into the different industries by their SIC-codes in order to be able to compare the different industries with the results of the entire market. It can then be deducted which industries have a lot of gender diversity within the companies and which do not have a lot of gender diversity within their companies. This way this study can focus on the industries for which the change of gender diversity is the largest compared to ten years ago.

## Conclusion

Ten to twenty years ago the discussion of gender diversity in board of directors and the effect of firm performance had started in the United States. Nowadays the focus of this discussion has been shifted to Europe. For this reason the focus on the United States is left behind. It could therefore be interesting to see whether and how this relationship has developed within the United States. As Europe, which is lacking behind, could learn lessons from this development.

Though a lot of different outcomes can be distinguished within the different researches due to the fact that different countries use different systems thereby different time periods are used, but also due to the different estimation models which are used.

Therefore the focus of this thesis is on the development of the relationship of gender diversity in board of directors and firm performance within the United States, for the last ten years. Comparing two time periods namely 2002 and 2012 will do this.

Thereby a closer look will be taken at the different industries distinguished by the U.S. Securities and Exchange Commission. This way the different industries can be compared with the results of the entire market. Whether a relation can be found between certain industries and women performing in those industries.

The next chapter will give a short overview of all the literature provided within the previous chapters.

# Hypotheses

## Introduction

This chapter will give a summary of the previous literature provided. It will cover the most important information of these last chapters.

The last part of this chapter will provide an overview of what will be investigated in this thesis, why this study is different than other studies and why it is relevant for other parties. The hypotheses needed for this will be given here as well.

## Summary of literature

Chapter two covers the differences between men and women as men and women differ from each other. Men and women tend to have different values and different characteristics. Women are for this reason softer than men and they tend to be more risk averse, while men are tougher and more risk seeking.

When talking about the differences of men and women, it is said that women face a glass ceiling. This glass ceiling is about inequalities of different parties, which prevents them from reaching positions in higher and top management levels. In order to get rid of these (invisible) barriers within companies especially the CEOs should understand these (invisible) barriers which minorities face. Different methods can be distinguished in order to break this glass ceiling of which putting a quota in place is one option.

But not only the differences between men and women as a person could cause the distinction in presence between men and women within the higher levels of companies. Another explanation could also be the differences between men and women from the early days on, how the tasks were divided in history, whereby different waves can be distinguished of the rise of women. This point of view on the difference between men and women is being captured in chapter three.

In the early days there was dissimilarity between what was expected form men and women. Men were expected to support the family financially and women were expected to stay home and taking care of the children and the household. Nowadays the expectations of men and women have changed due to the importance of equality between men and women within the world. And still the expectations are changing, some families for example have shifted the traditional roles from back in the days; the women is working now and the dad is staying at home taking care of the children and the household.

The history of men and women can thus be another explanation for the differences in numbers of men and women within companies, and for the increase in the percentage of women in the last couple of decades, as governments throughout the world find it important and stimulates this equality.

Men and women have different values and characteristics and men and women have a different history with respect to their (traditional) roles within the family, a closer look is taken at the board of directors in chapter four.

The board of directors is performing corporate governance of a company. Hereby it is especially important that the board of directors prevent the agency problem from occurring. The main problem hereby which should be avoided is that no information asymmetry occurs between the manager and the stakeholders.

There exist two main types of board of directors, namely the one-tier system and the two-tier system. The first system, the one-tier system, is well known in the Anglo-Saxon countries. In this board type the management board en supervisory board are combined, and there is one person appointed as CEO and as chairman. While the latter, the two-tier system, is well-known in the Continental-European countries and hereby the management board and supervisory board are two independent boards.

Diversity should exist in boards of directors, as it will enhance the results. Diversity can be distinguished for example in age, ethnicity, tenure, educational level of members, director type, independent/dependent director, occupation of directors and gender diversity. For which the latter is extensively discussed as this has the main focus within this thesis. It is hereby important to distinguish women as a tokenism and number of women within board of directors with a critical mass of three or more women, and thus having persuasive power within the board of directors. A critical mass is needed to really make a change.

In order to be able to mention or measure whether a board of directors is performing good or poorly it is important to know which firm performance measures exists, whereby a distinction is being made between accounting-based measures and market-based measures. The firm performance of a company is being covered in chapter five.

Return on equity and return on assets are used, as measures for accounting-based indicators, both are indicators of how profitable a company is. Though the ROE is focused on the shareholders equity, by dividing the net income by shareholders equity, and the latter, the ROA, is focused on the total assets of a company, by dividing the net income by the total assets. Tobin’s Q and market value will be used as indicators for market-based measures, whereby the Tobin’s Q compares the market value with the replacement value of the assets of a company. And of which is an often-used variable in previous research. The market value is taken into account, as it is believed to be a good measure for a company performance.

The market-based indicators are more subjective than the accounting-based measures.

At the moment there is still a fierce discussion going on about the relation between accounting-based and market-based measurements, whether it exists or not and whether they are thus interchangeable or not. Though both measurement indicators are seen as valid measurements.

Within chapter six the previous studies are more extensively discussed. Ten to twenty years ago the discussion of gender diversity in board of directors and the effect of firm performance had started in the United States. Nowadays the focus of this discussion has been shifted to Europe. For this reason the focus on the United States is left behind. It could therefore be interesting to see whether and how this relationship has developed within the United States for these last ten years. As Europe, which is lacking behind, could learn lessons from this development.

Though a lot of different outcomes can be distinguished within the different researches performed due to the fact that different countries use different systems thereby different time periods are used, but also due to fact that different estimation models and different variables are used in previous research. No clear and concrete answer can thus be given for previous studies.

Therefore the focus of this thesis will lay on the development of the relationship of gender diversity in board of directors and firm performance within the United States, for the last ten years. Comparing two time periods namely 2002 and 2012 will do this.

Thereby a closer look will be taken at the different industries distinguished by the U.S. Securities and Exchange Commission. This way the different industries can be compared with the results of the entire market. Whether a relation can be found between certain industries and women performing at top levels in those industries.

## Hypotheses

Compared to previous research this study will be different compared to other studies because of the focus on North America for the last ten years, as North America has not been studied for in the last ten years. As well this study will be different due to the fact that this study will not only investigate two time periods and the change within this time period for an entire market but this study will also extensively concentrate on the different industries within the North American market. Thereby, more importantly, the different variables used in previous studies will be combined within this thesis in order to get more straight and clear answers.

The latter is mostly important because this is a drawback in previous studies. As can be seen in previous research a lot of different outcomes appear due to the fact that almost every study is different from each other. Some studies take for example only Tobin’s Q as dependent variable, while others take the ROE as dependent variable, while still others combine the ROE and ROA in order to draw conclusions on gender diversity and firm performance. This way no real and clear conclusions can be drawn. Therefore this study will combine these different studies for which the different variables are taken.

By taking all the used variables of previous research together in one study, real and concrete conclusions can be drawn. In order to combine these previous studies the following alternative hypotheses can be distinguished:

**Hypothesis 1a:** *There exists a positive relationship between gender diversity and firm performance measured through return on assets within North America for 2002.*

**Hypothesis 1b*:*** *There exists a positive relationship between gender diversity and firm performance measured through return on assets within North America for 2012.*

**Hypothesis 2a:** *There exists a positive relationship between gender diversity and firm performance measured through return on equity within North America for 2002.*

**Hypothesis 2b:** *There exists a positive relationship between gender diversity and firm performance measured through return on equity within North America for 2012.*

**Hypothesis 3a:** *There exists a positive relationship between gender diversity and firm performance measured through Tobin’s Q within North America for 2002.*

**Hypothesis 3b:** *There exists a positive relationship between gender diversity and firm performance measured through Tobin’s Q within North America for 2012.*

**Hypothesis 4a:** *There exists a positive relationship between gender diversity and firm performance measured through market value within North America for 2002.*

**Hypothesis 4b*:*** *There exists a positive relationship between gender diversity and firm performance measured through market value within North America for 2012.*

Not only will be tested for the different performance measures for 2002 and 2012, but also the different industries will be discussed, for which the next hypotheses are used:

**Hypothesis 5a:** *There exists a positive relationship between gender diversity and firm performance measured through return on assets for the different industries in North America for 2002.*

**Hypothesis 5b:** *There exists a positive relationship between gender diversity and firm performance measured through return on assets for the different industries in North America for 2012.*

**Hypothesis 6a:** *There exists a positive relationship between gender diversity and firm performance measured through return on equity for the different industries in North America for 2002.*

**Hypothesis 6b:** *There exists a positive relationship between gender diversity and firm performance measured through return on equity for the different industries in North America for 2012.*

**Hypothesis 7a:** *There exists a positive relationship between gender diversity and firm performance measured through Tobin’s Q for the different industries in North America for 2002.*

**Hypothesis 7b:** *There exists a positive relationship between gender diversity and firm performance measured through Tobin’s Q for the different industries in North America for 2012.*

**Hypothesis 8a:** *There exists a positive relationship between gender diversity and firm performance measured through market value for the different industries in North America for 2002.*

**Hypothesis 8b:** *There exists a positive relationship between gender diversity and firm performance measured through market value for the different industries in North America for 2012.*

## Conclusion

Within this chapter an overview is captured of the provided literature. Thereby it is explained why this study is making a difference compared to previous studies. This study will combine all previous studies to get one clear and straight answer, as previous research knows a lot of different outcomes. It will therefore combine all the different variables used within these previous studies. For this eight different hypotheses are designed.

The next chapter will cover the methodology for this study.

# Research methodology

## Introduction

Within this chapter the research methodology will be captured. First the standard industrial classification will be explained, after which the data collection will be explained; which databases are used and whether companies are excluded or not. As a third point the different variables for the models will be elaborated and fourthly the research design will be illustrated. The last paragraph will capture the statistical hypotheses that will be used.

## Standard industrial classification

In order to compare different companies within certain industries, systems are developed in which different industries are classified. One famous classification method is known as the SIC-classification system; the standard industrial classification, which was established in 1937 in the United States, since then it has been altered each couple of years.

Within the SIC-system the entire market is divided into sectors, each different industry has its own sector. The codes exist of a 4-digit code, but also two and three digits codes are used. Not only the United States is making use of this system but also other countries like England (Library) (UK).

The U.S. Securities and Exchange Commission is still using this SIC-classification although a new system is developed in 1997 which was meant to replace the SIC-system, namely the NAICS code which stands for North American Industry Classification System. The NAICS was established by the US Economic Classification Policy Committee, the Statistics department of Canada and Instituto Nacional de Estadistica y Geografia from Mexico and is developed for use in North America, Canada and Mexico (Commerce) (Canada).

The major difference between the two systems is the difference in the industry classification, the SIC systems uses broader classification groups of industries.

These classifications make it possible to collect statistical data for each industry. Thus this data can be analyzed and used for other purposes. For example it is now possible to compare companies within industries, which is an advantage (Commerce). This classification system will be used within this study for the distinction of industries within the market.

SIC-codes sectors given by the United States exists of ten sectors, as stated by the United States department of Labor (Labor, 2013):

“Sector A: Agriculture, forestry and fishing”

“Sector B: Mining”

“Sector C: Construction”

“Sector D: Manufacturing”

“Sector E: Transportation, communications, electric, gas and sanitary services”

“Sector F: Wholesale trade”

“Sector G: Retail trade”

“Sector H: Finance, insurance and real estate”

“Sector I: Services”

“Sector J: Public administration”

## Data collection

Two time periods will be investigated for the S&P 1500 companies, namely 2002 and 2012, in order to investigate whether a change has occurred for gender diversity in board of directors within the United States. In order to be able to investigate these time periods the database of Wharton Research Data Service (WRDS) will be used to get all the information needed. Within WRDS more databases can be accessed, for this study ExecuCom and Compustat are used but also the database of the Center for Research in Security Prices (CRSP).

Only those companies that were active in 2002 and 2012 are taken into account, as this is the only way to compare these companies. Another possibility would be to use all S&P 1500 companies which existed in 2002 and to use all companies that existed in 2012 which would have given two records of time, though within this study the first option is chosen as is believed that the influence of women can be better compared when looking at the same companies for two time periods. For this reason the sample originally existed out of 721 companies of the S&P1500 companies. Though after removing the outliers there were 627 companies left for the year 2002 and 657 companies for the year 2012.

## Variables

The variables used within this study are shown in table 1. The next three paragraphs will describe the dependent, independent and control variables why they are taken into account and how they are derived from the databases.

Table 1: Overview of variables

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DEPENDENT VARIABLS: |  | INDEPENDENT VARIABLES: |  | CONTROL VARIABLES: |
|  |  |  |  |  |
| ROA |  | Percentage of women |  | Firm size |
|  |  |  |  |  |
| ROE |  | Dummy for women |  | Average age of members |
|  |  |  |  |  |
| Tobin’s Q |  | Board size |  | Leverage |
|  |  |  |  |  |
| Market value |  | Dummy for industry sector (SIC-code) |  |  |

### Dependent variables

Four different variables will be used as dependent variables namely return on assets (ROA), return on equity (ROE), Tobin’s Q (TOBIN) and the market value (MARKET) as is mentioned within chapter five.

The ROA, ROE and Tobin’s Q variables can be conducted from the database Compustat the market value can be conducted from CRSP. Each of them has to be calculated separately as the information for these variables cannot be directly withdrawn.

ROA can be measured by dividing net income by the book value of assets. In Compustat the net income is known as NI and the total assets as AT.

The ROE can be measured by dividing net income by shareholders equity whereby net income is known in Compustat as NI and shareholders’ equity as SEQ (stockholders equity).

Tobin’s Q can be measured, according to previous research, by taking the market value of equity plus the book value of debt which should then be divided by the book value of debt plus the book value of equity. Within CRSP the market value can be deduced, the other variables can be deduced from Compustat. The market value can be conducted as SHROUT times PRC (number of shares outstanding times the price of shares). The book value of debt is the total of short term and long-term debt; DLC and DLTTT (debt in current liabilities and long-term debt total) and the last part of the formula equity is known as CEQ (common/ordinary equity). In order to control for a normal distribution for this variable the log has been taken.

The market value can be measured in CRSP by taking the number of outstanding volume times the price of shares for 2002 and 2012. To control for a normal distribution the log is taken for this variable.

Table 2: Dependent variables overview

|  |  |  |  |
| --- | --- | --- | --- |
| Dependent variables | Description | Source of data | Calculation according to the database(s) used |
|  |  |  |  |
| ROA | Net income divided by book value of assets | WRDS, Compustat | NI / AT |
|  |  |  |  |
| ROE | Net income divided by shareholders equity | WRDS, Compustat | NI / SEQ |
|  |  |  |  |
| Tobin’s Q (log is taken) | Market value of equity plus book value of debt, divided by the book value of debt plus the book value of equity | WRDS, Compustat and WRDS, CRSP | (SHROUT\*PRC + DLC + DLTT) / (DLC + DLTT + CEQ) |
|  |  |  |  |
| Market value (log is taken) | Number of outstanding volume times the price of shares | WRDS, CRSP | SHROUT \* PRC |

### Independent variables

As independent variables four different variables are distinguished. Percentage of women (WOMPERC), dummy for women (WOMDUM), board size (BSIZE) and as last the dummy for the industry sector (SICDUM).

The percentage of women can be calculated as the number of women within a board of directors divided by the total number of directors in the board of directors. This information can be extracted from Execucomp, which is part of Compustat. The dummy for women will be used, whereby one will be taken if one or more women are directors of the board of directors, and zero if no women are represented in the board of directors. These two variables are especially important for measuring the gender diversity within board of directors for this reason these two variables are taken into account.

The board size variable stands for the total members of the board of directors. Also this variable can be extracted from Execucomp. Though it is not possible to conduct this information right away. In order to get the information there should be looked at the CUSIP-code of the companies. When there are eight of the same CUSIP-codes for the same year, this means that there are eight directors in the board of directors. This should be done for all the companies. A large board of directors has advantages but also disadvantages, there is more knowledge and experience within the board though it takes longer to reach an agreement. It is therefore an important variable to take into consideration when looking at firm performance.

The last variable is the dummy for the industry sector, which will be used to extensively elaborate on the results for the different industries. Whereby ten industries can be distinguished according to the 4-digit SIC-codes as mentioned at the beginning of this chapter. Though the first sector, sector A agriculture, forestry and fishing does not appear within the results of S&P1500 companies. Therefore this sector is not taking into account.

For the other sectors a dummy has been allocated: sector 0 mining, sector 1 construction, sector 2 manufacturing, sector 3 transportation, communications, electric, gas and sanitary services, sector 4 wholesale trade, sector 5 retail trade, sector 6 finance, insurance and real estate, sector 7 is public services and the last sector is sector 8 public administration. For which a 4-digit code is used, for which the precise codes are mentioned in the last column in the overview table below.

Table 3: Independent variables overview

|  |  |  |  |
| --- | --- | --- | --- |
| Variables | Description | Source of data | Calculation according to the database(s) used |
|  |  |  |  |
| Percentage of women | Percentage of women within board of directors | WRDS, Compustat, Execucomp | Total number of women within board of directors / total number of directors |
|  |  |  |  |
| Dummy for gender | 1 for women within board of directors or 0 for no women within board of directors | WRDS, Compustat, Execucomp | 0 = Male  1 = Female |
|  |  |  |  |
| Board size | Total size of the board of directors | WRDS, Compustat, Execucomp | Total number of directors within board of directors |
|  |  |  |  |
| Dummy for industry | Dummies for the different sic-codes and thus for the different industries which will run from 0 to 8 | WRDS, Compustat | 0 = 1011-1499  1 = 1521-1799  2 = 2011-3999  3 = 4011-4971  4 = 5012-5199  5 = 5211-5999  6 = 6011-6799  7 = 7011-8999  8 = 9111-9999 |

### Control variables

Three control variables are taken into account namely firm size (FSIZE), average age of directors (AVERAGE) and leverage (LEV).

The firm size can be conducted out of Compustat it stands for the total assets of a company, which is known as AT in Compustat. It is important to take firm size into account as a control variable because if a firm is larger it experiences more social pressure, which could lead to more board diversity. In order to control for a normal distribution, the log of this variable is taken.

The average age of directors is taken into account as a control variable as the influence of directors is large in nominating and appointing new directors. Younger directors are assumed to have fewer connections with the ‘old boys’ network’. The chance for women to be appointed to the board of directors is then larger. It is therefore an important control variable to take into consideration. The average age of directors can be conducted from Execucomp by taking the present age of the directors. The total number of directors is already known from Compustat. Therefore the average age can be calculated as taking all the ages of the directors and then dividing it by the total number of directors.

The leverage can be reached by dividing the total debt by the total assets. This one can be conducted from Compustat again. Taking the total debt (DLTT+DLC) and dividing it by the total assets (AT). This control variable is taken into account as companies with higher leverages have more debt compared to own money. It can therefore be assumed that those companies experience more risk and which could mean that more men than women are working in those companies as women are more risk averse and men are more risk seeking. It is therefore used as a control variable.

Table 4: Control variables overview

|  |  |  |  |
| --- | --- | --- | --- |
| Control variables | Description | Source of data | Calculation according to the database(s) used |
|  |  |  |  |
| Firm size (log is taken) | The total of assets a company earns | WRDS, Compustat | AT |
|  |  |  |  |
| Average age of directors | The average age of board members within a company | WRDS, Compustat and WRDS, Execucomp | Total of ages of directors / number of directors |
|  |  |  |  |
| Leverage | The total debt divided by the total assets | WRDS, Compustat | (DLTT+DLT) / AT |

## Research design

This study will compare two different points in time, namely 2002 and 2012. This way it will be possible to see whether the gender diversity in companies within North America have changed over the past ten years and whether the influence of women on firm performance have changed. The focus is not only on the overall changes within the past ten years for the entire market, but also each industry separately will be compared with the overall results for the market. This will be done by taking into account the SIC-codes for each different industry.

It can be assumed that we are dealing with a parametrical test as interval and/or ratio variables are being used. Thereby a multiple regression model is used as this test concentrates on the influence of the independent variables on the dependent variables, it is about the effect or influence of the X’s on the Y.

Assumptions have to be met in order to be able to use a parametrical test for example whether the data is normally distributed. Making histograms in SPSS will check whether the data is normally distributed. If a variable is not normally distributed it will be controlled for by taking the log of the variable. If it is normally distributed the variable will be used as it is. Some variables, which will be used within this study, like firm age and board size, are sensitive to be not normally distributed. Therefore all variables will be extensively looked at and if needed they will be adjusted.

Another way of controlling for normal distribution is by performing a Kolmogorov-Smirnov test or a Shapiro-Wilk test which, though for large amounts of sample sizes these tests could cause significant results while only small deviations occur. This way the significant results do not necessarily have to mean that a bias occurred. For this reason we will not only use a Kolmogorov-Smirnov test or a Shapiro-Wilk test but also the former method of just making histograms.

Another assumption that should be met in order to use a parametrical test is homogeneity of variance. Whereby it is important that the variances have to be the same for all variables. Using the Levene’s test this can be checked for.

The Pearson correlation will next be performed to check for correlation between the variables. If a correlation is found the ordinary least square regression (OLS) will be used or the two-stage least square regression (2SLS). These tests will be used as the direction of this correlation is not clear, nothing can thus be said about the causality. It could thus be possible that higher firm performances causes more women to work in a company but also the other way around that more gender diversity leads to higher firm performance. This problem is also known as endogeneity. In order to know which test to use, either the OLS or the 2SLS, the Durbin-Watson test should be performed. This test tests for independent errors and is one of the assumptions of regressions.

In order to be able to see the overall fit of the model, the goodness of fit model will be performed. This way it can be seen whether a good model is used.

In order to use a kind of regression several assumptions have to be met. In this study we will extensively discuss four of these assumptions: non-zero variance, no or little multicollinearity, independent errors and normal distributed errors.

Non-zero variances mean that the variances of the predictors vary around zero. This can be checked by looking at the variances of the predictors.

There will be checked for multicollinearity in order to be sure that no perfect linear relationship exists between the predictors. The predictor variables must show no or a low correlation; normally it is seen that there is almost always at least a small correlation but as long as it is small it is not to worry about. This test will be done by using the variance inflation vector (VIF) and the corresponding tolerance. When the largest VIF is greater than 10 and/or the average VIF is greater than 1 it is cause for concern and a closer look should be taken as the regression could then be biased. If the Tolerance of VIF is less than 0,1 this could mean that a serious problem exists, a Tolerance below 0,1 could mean that a potential problem has arisen.

To check for normal distribution of the errors the residuals have to be normally distributed, which means that the means of the residuals are around zero.

The last assumption which will be extensively discusses is to look for the independent errors. This can be done by performing the Durbin-Watson, the outcome of this test will also decide whether to use the OLS or the 2SLS as it checks for autocorrelation between the error terms and the different independent and dependent variables. The outcome of the Durbin-Watson test lays between the zero and four, if it is near to zero it means that the error terms are positively related with each other. If the outcome lies near two this means that there is no autocorrelation between the error terms. An outcome close to four means that there exists a negative correlation of the error terms. If the outcome of the Durbin-Watson is around two the OLS regression will be used and if the outcome is around zero the 2SLS will be used.

All these tests will be performed in SPSS.

## Hypotheses

Different alternative hypotheses will be used to answer the research question:

**Hypothesis 1a:** *Return on assets 2002  = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4* *firm size* + *β5 average age of directors* + *β6* *leverage + ε*

**Hypothesis 1b:** *Return on assets 2012 = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4* *firm size* + *β5 average age of directors* + *β6* *leverage + ε*

**Hypothesis 2a:** *Return on equity 2002 = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4* *firm size* + *β5 average age of directors* + *β6* *leverage + ε*

**Hypothesis 2b:** *Return on equity 2012 = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4* *firm size* + *β5 average age of directors* + *β6* *leverage + ε*

**Hypothesis 3a:** *Tobin’s Q 2002  = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4* *firm size* + *β5 average age of directors* + *β6* *leverage + ε*

**Hypothesis 3b:** *Tobin’s Q 2012  = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4* *firm size* + *β5 average age of directors* + *β6* *leverage + ε*

**Hypothesis 4a:** *Market value 2002  = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4* *firm size* + *β5 average age of directors* + *β6* *leverage + ε*

**Hypothesis 4b:** *Market value 2012  = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4* *firm size* + *β5 average age of directors* + *β6* *leverage + ε*

When taking into account again the different industries the following hypotheses can be distinguished:

**Hypothesis 5a:** *Return on assets 2002 = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4 dummy for industry + β5* *firm size* + *β6 average age of directors* + *β7* *leverage + ε*

**Hypothesis 5b:** *Return on assets 2012  = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4 dummy for industry + β5* *firm size* + *β6 average age of directors* + *β7* *leverage + ε*

**Hypothesis 6a:** *Return on equity 2002 = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4 dummy for industry + β5* *firm size* + *β6 average age of directors* + *β7* *leverage + ε*

**Hypothesis 6b:** *Return on equity 2012  = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4 dummy for industry + β5* *firm size* + *β6 average age of directors* + *β7* *leverage + ε*

**Hypothesis 7a:** *Tobin’s Q 2002 = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4 dummy for industry + β5* *firm size* + *β6 average age of directors* + *β7* *leverage + ε*

**Hypothesis 7b:** *Tobin’s Q 2012 = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4 dummy for industry + β5* *firm size* + *β6 average age of directors* + *β7* *leverage + ε*

**Hypothesis 8a:** *Market value 2002 = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4 dummy for industry + β5* *firm size* + *β6 average age of directors* + *β7* *leverage + ε*

**Hypothesis 8b:** *Market value 2012 = β0 + β1 percentage of women + β2 dummy for gender + β3 board size + β4 dummy for industry + β5* *firm size* + *β6 average age of directors* + *β7* *leverage + ε*

## Conclusion

Within this chapter the data, which will be used is covered. The variables are explained and thereby an explanation is given of the different tests, which will be performed. The last paragraph captures the statistical hypotheses, which will be used in SPSS in order to get answers.

The next chapter will focus on the tests, which are explained in this chapter, which will be performed in SPSS.

# Results

## Introduction

This chapter will capture the results of the different tests performed. First a summary is given of the descriptive statistic of the variables used, than a closer look is taken at the Pearson correlation. An explanation is given why a parametrical test is used and what the assumptions are for the OLS regression, which is derived from the parametrical test. The OLS regression is than performed and the outcomes will be extensively discussed. At last a goodness of fit test will be performed for which the models will be further examined.

## Descriptive statistics

In table 5 & 6 the descriptive statistics are shown for 2002 and 2012. In 2002 29% of the companies had one or more women within their board of directors for the S&P1500 companies, in 2012 this amount increased up till 33% of the S&P 1500 companies. When looking at the percentage of women within board of directors in companies the amount of women in 2002 was 5,74% and in 2012 7,47%. Also an increase in the amount of women within board of directors has taken place within the last ten years.

Table 5: Descriptive statistics 2002

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2002 | Observations | Mean | Standard deviation | Minimum | Maximum |
| ROA | 627 | 0,043089 | 0,0513226 | -0,1258 | 0,2313 |
| ROE | 627 | 0,099880 | 0,1048775 | -0,2327 | 0,4105 |
| Log Tobin’s Q | 627 | -0,5369 | 0,24924 | -1,55 | 0,06 |
| Log Market value | 627 | 6,3070 | 0,60010 | 4,85 | 8,05 |
| Percentage of women | 627 | 0,0574 | 0,10058 | 0,00 | 0,43 |
| Dummy for female | 627 | 0,29 | 0,452 | 0,00 | 1,00 |
| Different industries | 627 | 3,42 | 2,013 | 0,00 | 8,00 |
| Board size | 627 | 6,32 | 1,308 | 3,00 | 12,00 |
| Log Firm size | 627 | 7,4092 | 0,69930 | 5,89 | 9,88 |
| Average age of directors | 627 | 58,5045 | 4,26149 | 43,75 | 76,60 |
| Leverage | 627 | 0,0456 | 0,07775 | 0,00 | 0,54 |

Also when looking at the descriptive statistics of the regression models two variables stand out namely the average age of directors and the leverage. In 2002 the average age of directors was 58,5 years though when looking at 2012 the average age of directors has declined to 50,9 years. Which means a total decrease of 7,6 years. This is quite a large change that has occurred in the past ten years. When taking a closer look at the leverage the leverage in 2002 was 4,56%, while in 2012 this is 21,16%. Which means that companies use more debt to keep their business going, or it could mean that companies use less assets to keep their business going. In both cases a company is more at risk with a higher leverage.

Table 6: Descriptive statistics 2012

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2012 | Observations | Mean | Standard deviation | Minimum | Maximum |
| ROA | 657 | 0,053170 | 0,0495897 | -0,1183 | 0,2370 |
| ROE | 657 | 0,127059 | 0,1067384 | -0,2130 | 0,4880 |
| Log Tobin’s Q | 657 | -0,3438 | 0,20649 | -1,08 | 0,02 |
| Log Market value | 657 | 6,6387 | 0,64187 | 5,10 | 8,70 |
| Percentage of women | 657 | 0,0747 | 0,11764 | 0,00 | 0,80 |
| Dummy for female | 657 | 0,33 | 0,471 | 0,00 | 1,00 |
| Different industries | 657 | 3,41 | 2,005 | 0,00 | 8,00 |
| Board size | 657 | 5,35 | 0,830 | 2,00 | 10,00 |
| Log Firm size | 657 | 7,7700 | 0,73192 | 6,01 | 10,37 |
| Average age of directors | 657 | 50,8951 | 3,52123 | 37,67 | 70,80 |
| Leverage | 657 | 0,2116 | 0,14981 | 0,00 | 0,95 |

## Pearson correlation

## Firm performances for 2002 and 2012

When looking at the correlation for 2002 and 2012 (table 7 & 8), the Pearson correlation has been used. In 2002 there was no significant correlation between dummy for women and one of the firm performance variables, which does not support the hypotheses used within this study. When looking at the percentage of women there is also no significant correlation shown between the variable and the firm performance variables. Even a negative correlation is found for percentage of women and the log of the market value.

For 2002 the control variables are mostly positively significant correlated with the variables of percentage of women and dummy for women. Only the log of the firm size is not significant correlated with these two variables, it is even negatively correlated with percentage of women.

In 2012 there are also no significant correlations for dummy for women and percentage of women in relation with the firm performance variables. It is not only not significant, but the correlations are even negative, which do not support the hypotheses used within this thesis at all.

Most of the control variables are not significantly correlated with the variables of percentage of women and dummy for women. Only board size is significantly positive correlated.

Comparing the two matrixes of table 7 & 8, 2002 show much more significant correlations between the variables than 2012.

Table 7: Pearson correlation matrix 2002

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | 2002 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 | ROA | 1 |  |  |  |  |  |  |  |  |  |
| 2 | ROE | ,813\*\* | 1 |  |  |  |  |  |  |  |  |
| 3 | Log of Tobin’s Q | ,291\*\* | ,419\*\* | 1 |  |  |  |  |  |  |  |
| 4 | Log of market value | ,080\* | ,210\* | ,462\*\* | 1 |  |  |  |  |  |  |
| 5 | Percentage of women | ,063 | ,059 | ,056 | -  ,006 | 1 |  |  |  |  |  |
| 6 | Dummy for gender | ,017 | ,042 | ,067 | ,027 | ,904\*\* | 1 |  |  |  |  |
| 7 | Board size | -,155\*\* | -,100\* | ,094\* | ,220\*\* | ,115\*\* | ,183\*\* | 1 |  |  |  |
| 8 | Log of firm size | -,264\*\* | ,006 | ,251\*\* | ,861\*\* | -,006 | ,041 | ,278\*\* | 1 |  |  |
| 9 | Average age of directors | -  ,060 | -  ,012 | -  ,025 | ,081\* | -,119\*\* | -,098\* | -,025 | ,131\*\* | 1 |  |
| 10 | Leverage | -,153\*\* | ,022 | ,503\*\* | ,162\*\* | ,024 | ,016 | ,058 | ,320\*\* | ,031 | 1 |
|  |  |  |  |  |  |  |  |  |  |  |  |

Table 8: Pearson correlation matrix 2012

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | 2012 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 | ROA | 1 |  |  |  |  |  |  |  |  |  |
| 2 | ROE | ,805  \*\* | 1 |  |  |  |  |  |  |  |  |
| 3 | Log of Tobin’s Q | ,096  \* | ,356  \* | 1 |  |  |  |  |  |  |  |
| 4 | Log of market value | ,227  \*\* | ,298  \*\* | ,378  \*\* | 1 |  |  |  |  |  |  |
| 5 | Percentage of women | -,070 | -  ,024 | ,034 | -,041 | 1 |  |  |  |  |  |
| 6 | Dummy for gender | -,064 | -  ,007 | ,053 | -,031 | ,868  \*\* | 1 |  |  |  |  |
| 7 | Board size | -,104\*\* | -,059 | ,078\* | ,098\* | ,113\*\* | ,185\*\* | 1 |  |  |  |
| 8 | Log of firm size | -,157\*\* | ,032 | ,331\*\* | ,839\*\* | ,013 | ,004 | ,117\*\* | 1 |  |  |
| 9 | Average age of directors | ,013 | ,022 | -,031 | ,085\* | -,009 | -,007 | -,023 | ,112\*\* | 1 |  |
| 10 | Leverage | -,183\*\* | ,089\* | ,717\*\* | ,162\*\* | ,042 | ,056 | ,046 | ,208\*\* | -,080\* |  |

## Distinction for different industries included for 2002 and 2012

When looking at the different industries in 2002 significant correlations can be found for all of the firm performances with industries. But especially the finance industry shows a significant positive correlation with the firm performance measures. Thereby the manufacturing industry shows a significant negative relation with either percentage of women and dummy for women. While the retail trade sectors shows a significant positive relation for percentage of women and dummy for gender. Which means that especially in this sector women can be found working in, which is also a logical outcome as women are said to be risk averse.

Table 9: Pearson correlation matrix 2002

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | 2002 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | | 15 | 16 | 17 | 18 | | 19 | |
| 1 | ROA | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  | |
| 2 | ROE | ,813\*\* | 1 |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  | |
| 3 | Log of Tobin’s Q | ,291\*\* | ,419\*\* | 1 |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  | |
| 4 | Log of market value | ,080\* | ,210\* | ,462\*\* | 1 |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  | |
| 5 | Percentage of women | ,063 | ,059 | ,056 | -  ,006 | 1 |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  | |
| 6 | Dummy for gender | ,017 | ,042 | ,067 | ,027 | ,904\*\* | 1 |  |  |  |  |  |  |  |  | |  |  |  |  | |  | |
| 7 | Board size | -,155\*\* | -,100\* | ,094\* | ,220\*\* | ,115\*\* | ,183\*\* | 1 |  |  |  |  |  |  |  | |  |  |  |  | |  | |
| 8 | Log of firm size | -,264\*\* | ,006 | ,251\*\* | ,861\*\* | -,006 | ,041 | ,278\*\* | 1 |  |  |  |  |  |  | |  |  |  |  | |  | |
| 9 | Average age of directors | -  ,060 | -  ,012 | -  ,025 | ,081\* | -,119\*\* | -,098\* | -,025 | ,131\*\* | 1 |  |  |  |  |  | |  |  |  |  | |  | |
| 10 | Leverage | -,153\*\* | ,022 | ,503\*\* | ,162\*\* | ,024 | ,016 | ,058 | ,320\*\* | ,031 | 1 |  |  |  |  | |  |  |  |  | |  | |
| 11 | Mining | -  ,054 | -  ,077 | -,121\*\* | ,015 | -,063\* | -,068 | -,029 | ,008 | ,037 | -,019 | 1 |  |  | |  |  |  |  | |  | |  |
| 12 | Construction | ,078 | ,110\*\* | -  ,040 | -,040 | -,021 | -0,018 | -,079\* | -,009 | ,076 | ,020 | -,031 | 1 |  | |  |  |  |  | |  | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  | |  | |  |
| 14 | Transportation | -  ,075 | -  ,030 | ,026 | ,016 | ,045 | ,046 | ,094\* | ,149\*\* | -,011 | ,142\*\* | -,086\* | -,058 | -,352\*\* | | 1 |  |  |  | |  | |  |
| 15 | Wholesale trade | -  ,009 | -  ,012 | -,092\* | -,079\* | -  ,013 | -,034 | ,011 | -,067 | -,041 | -,040 | -,039 | -,026 | -,160\*\* | | -,072 | 1 |  |  | |  | |  |
| 16 | Retail trade | ,246\*\* | ,147\*\* | ,006 | ,042 | ,167\*\* | ,121\*\* | -,001 | -,063 | -,046 | -0,086  \* | -,066 | -,045 | -,271\*\* | | -,122\*\* | -,056 | 1 |  | |  | |  |
| 17 | Finance | -,132\*\* | ,122\*\* | ,134\*\* | ,183\*\* | -  ,007 | ,015 | ,037 | ,434\*\* | ,030 | ,162\*\* | -,086\* | -,058 | -,352\*\* | | -,159\*\* | -,072 | -,122\*\* | 1 | |  | |  |
| 18 | Public services | ,102\* | ,027 | ,017 | -,081\* | ,018 | ,024 | ,011 | -,197\*\* | -,046 | -,154\*\* | -,072 | -,049 | ,295\*\* | | -,133\*\* | -,061 | -,103\* | -,133\*\* | | 1 | |  |
| 19 | Public administration | -  ,016 | -  ,025 | ,004 | -,013 | ,085\* | ,089\* | ,029 | -,030 | -,037 | -,019 | -,012 | -,008 | -,050 | | -,023 | -,010 | -,017 | -,023 | | -,019 | | 1 |

Note: \*significant at level 0,01

\*\* significant at level 0,05

Table 10-1: Pearson correlation matrix 2012

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | 2012 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 1 | ROA | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 | ROE | ,805  \*\* | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 | Log of Tobin’s Q | ,096  \* | ,356  \* | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 | Log of market value | ,227  \*\* | ,298  \*\* | ,378  \*\* | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 | Percentage of women | -,070 | -  ,024 | ,034 | -,041 | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 | Dummy for gender | -,064 | -  ,007 | ,053 | -,031 | ,868  \*\* | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7 | Board size | -,104\*\* | -,059 | ,078\* | ,098\* | ,113\*\* | ,185\*\* | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 | Log of firm size | -,157\*\* | ,032 | ,331\*\* | ,839\*\* | ,013 | ,004 | ,117\*\* | 1 |  |  |  |  |  |  |  |  |  |  |  |
| 9 | Average age of directors | ,013 | ,022 | -,031 | ,085\* | -,009 | -,007 | -,023 | ,112\*\* | 1 |  |  |  |  |  |  |  |  |  |  |
| 10 | Leverage | -,183\*\* | ,089\* | ,717\*\* | ,162\*\* | ,042 | ,056 | ,046 | ,208\*\* | -,080\* | 1 |  |  |  |  |  |  |  |  |  |
| 11 | Mining | -,035 | -,045 | -,023 | -,002 | ,003 | -,005 | -,053 | ,028 | -,019 | -,007 | 1 |  |  |  |  |  |  |  |  |
| 12 | Construction | ,051 | ,077\* | ,048 | ,020 | ,087\* | -,075 | ,039 | -,017 | -,025 | ,049 | -,031 | 1 |  |  |  |  |  |  |  |
| 14 | Transportation | ,006 | ,027 | ,009 | ,009 | ,033 | ,039 | ,018 | ,018 | -,007 | -,004 | -,084\* | -,059 | -,353\*\* | 1 |  |  |  |  |  |
| 15 | Wholesale trade | -,028 | -,016 | ,041 | ,055 | -,026 | ,001 | ,005 | ,075 | ,024 | ,051 | -,044 | -,031 | -,183\*\* | -,082\* | 1 |  |  |  |  |
| 16 | Retail trade | -,003 | -,016 | -,039 | -,021 | -,015 | ,013 | -,047 | -,021 | ,058 | -,032 | -,063 | -,044 | -,265\*\* | -,119\*\* | -,062 | 1 |  |  |  |
| 17 | Finance | ,017 | 0,000 | ,012 | ,036 | -,029 | -,037 | ,058 | ,026 | -,059 | -,014 | -,081\* | -,056 | -,339\*\* | -,153\*\* | -0,079\* | -,115\*\* | 1 |  |  |
| 18 | Public services | -,053 | -0,080\* | -,005 | -,020 | ,021 | ,033 | ,052 | -,032 | -,062 | 0,000 | -,072 | -,051 | -,304\*\* | -,136\*\* | -,071 | -,103\*\* | -,131\*\* | 1 |  |
| 19 | Public administration | ,008 | -,015 | -,021 | -,028 | ,012 | ,020 | ,010 | -,040 | ,009 | -,011 | -,012 | -,008 | -,049 | -,022 | -,011 | -,017 | -,021 | -,019 | 1 |

Note: \*significant at level 0,01

\*\* significant at level 0,05

When looking at the different industries for 2012 there are only two significant relations left for different industry and firm performance, namely the relation between the ROE and construction, which shows a significant positive relation. The other significant result is a negative one for public services and the ROE. When looking at the relations between the different industries and percentage of women and dummy for women only one significant relation is left, which is a positive one. The relation of percentage of women and construction, which is quite different than one would expect as construction is believed to be a real men’s world.

Comparing the two matrixes of table 9 & 10, 2002 show much more significant correlations between the variables than 2012.

## Parametrical test

In order to be able to use a parametrical test some assumptions had to be tested. The variables were not all normally distributed therefore the log was taken for market value and the Tobin’s Q, for which the variables were than normally distributed. The variables ROE and ROE were normally distributed, therefore they were not transformed. The histograms of these variables are included in the appendix within chapter 11,1.

When checking for normal distribution another method can also be used namely Kolmogorov-Smirnov and Shapiro-Wilk test. As mentioned before it is possible that these tests do not give significant values as it is a large sample. When testing thus for normal distribution it appeared that all the dependent variables were not normally distributed as shown in chapter 11,2. As it is a large sample and the histograms do give a normal distribution, it can be said that the dependent variables are normally distributed.

When testing for homogeneity of variance significant outcomes appear, when using a Levene’s test. Which means that the variances are significant and homogeneity can thus be assumed. The variances do not differ significantly.

The assumptions for parametrical test are thus assumed to be correct. For this reason a linear regression can be performed.

## Assumptions of regression

Four assumptions of regression are extensively discussed within this part namely the non-zero variances, no or little multicollinearity, independent errors and normal distributed errors.

First to check for non-zero variances a closer look should be taken at the variances. The variances of the variables are included in the appendix chapter 11, 3. The variances of the predictors are not zero thus there is some variance. The assumption of non-zero variance is thus met.

Secondly no or little multicollinearity is checked for. This is done by using collinearity diagnostics for every dependent variable separately. It can then be seen that the Tolerance of the variables lay around below 1 for all variables in 2002 and 2012 and the VIF lays around 1 for most of the variables for 2002 and 2012. Only for the variables percentage of women and dummy female the VIF lays around 5 for 2002 and around 4 for 2012. These scores are no motive for concern; therefore this assumption of no or little multicollinearity is also met.

Thirdly the assumption of normal distribution of the errors is being discussed. This can be checked for by looking at the mean of the residuals whether they lay around zero, this can be done by making histograms. As can be seen in the appendix, chapter 11,4 they are normally distributed therefore this assumption of normal distribution of the errors is also met.

At last there is checked for independent errors, using the Durbin-Watson test can do this. For each dependent variable the Durbin-Watson test is performed. And each time the score of Durbin-Watson lays around two; this means that the assumption is met as there is no autocorrelation between the error terms. Next to this we now also know, that as the score lays around two, we should use an OLS regression.

## OLS-regression

The results of the OLS regression can be found in tables 9 until 14. In tables 9, 10 and 11 the outcomes are given for the years 2002 and 2012 in relation with the firm performances without dummies for industries and which will be further elaborated in paragraph 9,6,1. Table 12, 13 and 14 include the outcomes of 2002 and 2012 with the distinction for industries and which will be further elaborated in paragraph 9,6,2. A distinction is thus made between the outcomes for 2002 and 2012 for the firm performances which covers the first four hypotheses (paragraph 9,6,1) and for the outcomes for the years 2002 and 2012 but than with taking into account the different industries, which covers the last four hypotheses (paragraph 9,6,2).

Whereby the significant levels are marked with \* for a significance level of 5% and \*\* for a significance level of 1%.

## Firm performances for 2002 and 2012

When taking a closer look at table 11 the OLS regression is performed for the year 2002. As can be seen the ROA, log of Tobin’s Q and log of market value have significant values, while the outcome for the ROE is not significant. This means that hypothesis 10, 30 and 40 should be rejected for the year 2002 as they have a significant effect. The influence of women within board of directors thus has an influence on the firm performance when looking at the ROA, Tobin’s Q and market value. Hypothesis 20 should be accepted for the year 2002, as there is no significant effect. There is thus no effect of women within board of directors on firm performance when looking at the ROE in 2002.

As it is known now that there is an influence the question remains whether this influence is negative or positive. When looking at the percentage of women a positive beta can be found for the ROA, ROE and the market value, which means that the variable percentage of women has a positive influence on the model. For the ROA this influence is even significant, while for the ROE and market value it is not. For the Tobin’s Q a negative beta is found which means that a negative influence exists of this variable on the model, but again this influence is not significant. Overall this means that the percentage of women has a positive influence on the firm performances when looking at ROA, ROE and market value, while percentage of women has a negative influence on Tobin’s Q.

The variable dummy for gender shows a negative influence for the ROA, Tobin’s Q and market value, though all of them are not significant. But the dummy for gender thus shows that women within board of directors have a negative influence on the firm performances ROA, Tobin’s Q and market value, but an important note is the values are not significant.

Table 11: OLS regression 2002

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2002 | ROA | ROE | Log of Tobin’s Q | Log of Market value |
| Intercept | 0,193 | 0,130 | -0,736 | 1,138 |
|  | (0,000)\*\* | (0,067) | (0,000)\*\* | (0,000)\*\* |
| Percentage of women | 0,097  (0,036)\* | 0,093  (0,343) | -0,075  (0,710) | 0,207  (0,520) |
| Dummy for gender | -0,015  (0,150) | -0,005  (0,834) | 0,040  (0,373) | -0,051  (0,480) |
| Board size | -0,004 | -0,010 | 0,006 | -0,005 |
|  | (0,024)\* | (0,005)\*\* | (0,425) | (0,645) |
| Log of firm size | -0,015  (0,000)\*\* | 0,006  (0,399) | 0,034  (0,013)\* | 0,738  (0,000)\*\* |
| Average age of directors | 0,000  (0,553) | 0,000  (0,774) | -0,003  (0,172) | -0,004  (0,235) |
| Leverage | -0,056 | 0,021 | 1,514 | -0,865 |
|  | (0,036)\* | (0,717) | (0,000)\*\* | (0,000)\*\* |
|  |  |  |  |  |
| F-statistic | 10,424 | 1,795 | 37,994 | 217,628 |
| p-value | 0,000\*\* | 0,098 | 0,000\*\* | 0,000\*\* |
| Adjusted R^2 | 0,083 | 0,008 | 0,262 | 0,675 |

Table 12: OLS regression 2012

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2012 | ROA | ROE | Log of Tobin’s Q | Log of Market value |
| Intercept | 0,143 | 0,100 | -0,990 | 1,012 |
|  | (0,000)\*\* | (0,182) | (0,000)\*\* | (0,000)\*\* |
| Percentage of women | -0,031  (0,347) | -0,074  (0,301) | -0,052  (0,578) | -0,470  (0,045)\* |
| Dummy for gender | 0,002  (0,773) | 0,016  (0,370) | 0,016  (0,508) | 0,055  (0,356) |
| Board size | -0,005 | -0,009 | 0,005 | 0,001 |
|  | (0,044)\* | (0,086) | (0,430) | (0,935) |
| Log of firm size | -0,008  (0,003)\*\* | 0,003  (0,630) | 0,053  (0,000)\*\* | 0,740  (0,000)\*\* |
| Average age of directors | 0,000  (0,759) | 0,001  (0,522) | 0,000  (0,935) | -0,002  (0,617) |
| Leverage | -0,051 | 0,064 | 0,932 | -0,057 |
|  | (0,000)\*\* | (0,026)\* | (0,000)\*\* | (0,547) |
|  |  |  |  |  |
| F-statistic | 6,707 | 1,615 | 132,210 | 261,433 |
| p-value | 0,000\*\* | 0,140 | 0,000\*\* | 0,000\*\* |
| Adjusted R^2 | 0,050 | 0,006 | 0,545 | 0,704 |

When looking at table 12, the outcome of the OLS for 2012, it can be seen that the variables ROA, log of Tobin’s Q and log of market value are again significant, therefore the hypotheses 10, 30 and 40, of having no effect, can be rejected for the year 2012, as there is a significant effect. The ROE has a p-value of 0,140 that leads to accepting the hypothesis 20 for the year 2012, as there is no significant effect.

Again there is an influence of women within board of directors noticeable when looking at the firm performance variables ROA, Tobin’s Q and market value. There is no influence of women within board of directors noticeable when looking at the firm performance measure Tobin’s Q for 2012.

When taking a closer look at table 10 it can be seen that for percentage of women a negative value can be found for all firm performance measures. This means that the percentage of women has a negative influence on firm performance, though only for market value a significant value can be found.

Though for dummy for gender only positive influences can be found, but for which none of them are significant. This means that having dummy for gender has a positive influence on the firm performance measures ROA, ROE, Tobin’s Q and market value.

In summary the next conclusion can be drawn for hypotheses one until four for 2002 and 2012:

Table 13: Overview of hypotheses 1 until 4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | ROA | ROE | Log of Tobin’s Q | Log of Market value |
| 2002 | Reject H10 | Accept H20 | Reject H30 | Reject H40 |
|  | Influence present | No influence present | Influence present | Influence present |
| 2012 | Reject H10  Influence present | Accept H20  No influence present | Reject H30  Influence present | Reject H40  Influence present |

As conclusions are drawn for the first four hypotheses, the last four hypotheses should still be investigated. Therefore the next four hypotheses will be discussed next.

## Distinction for different industries for 2002 and 2012

Looking at table 14 the OLS is given for the year 2002, within this OLS regression the different industries are taken into account. A dummy is taken for each industry separately.

When looking at the total p-values for the OLS regressions for 2002, the p-values are significant. This means that the hypothesis 50, 60, 70 and 80 should be rejected for 2002. Women within a board of directors do have influence on the performance of a company when looking at the ROA, ROE, Tobin’s Q and market value.

Table 14: OLS regression 2002 incl. different industries

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2002 | ROA | ROE | Log of Tobin’s Q | Log of Market value |
| Intercept | 0,178 | 0,170 | -0,811 | 0,450 |
|  | (0,000)\*\* | (0,019)\* | (0,000)\*\* | (0,038)\* |
| Percentage of women | 0,064  (0,162) | 0,046  (0,638) | -0,079  (0,694) | 0,139  (0,634) |
| Dummy for gender | -0,012  (0,248) | -0,001  (0,955) | 0,033  (0,463) | -0,042  (0,521) |
| Dummy for mining | -0,007  (0,446) | -0,018  (0,379) | -0,132  (0,002)\*\* | -0,080  (0,187) |
| Dummy for construction | 0,031  (0,022)\* | 0,093  (0,001)\*\* | -0,081  (0,177) | -0,216  (0,014)\* |
| Dummy for transportation | 0,002  (0,779) | 0,013  (0,300) | -0,048  (0,072) | -0,273  (0,000)\*\* |
| Dummy for wholesale trade | -0,001  (0,900) | 0,012  (0,602) | -0,096  (0,049)\* | -0,149  (0,037)\* |
| Dummy for retail trade | 0,042  (0,000)\*\* | 0,067  (0,000)\*\* | 0,035  (0,272) | 0,094  (0,043)\* |
| Dummy for finance | 0,001  (0,873) | 0,055  (0,000)\*\* | -0,006  (0,827) | -0,448  (0,000)\*\* |
| Dummy for public services | 0,014  (0,035)\* | 0,027  (0,059) | 0,078  (0,010)\* | 0,090  (0,039)\* |
| Dummy for public administration | -0,014  (0,679) | -0,028  (0,696) | 0,046  (0,760) | 0,086  (0,694) |
| Board size | -0,004 | -0,008 | 0,004 | -0,015 |
|  | (0,023)\* | (0,016)\* | (0,534) | (0,133) |
| Log of firm size | -0,014  (0,000)\*\* | -0,004  (0,575) | 0,044  (0,004)\*\* | 0,859  (0,000)\*\* |
| Average age of directors | 0,000  (0,547) | 0,000  (0,839) | -0,002  (0,217) | -0,005  (0,098) |
| Leverage | -0,041 | 0,034 | 1,568 | -0,633 |
|  | (0,120) | (0,543) | (0,000)\*\* | (0,000)\*\* |
|  |  |  |  |  |
| F-statistic | 7,852 | 3,741 | 18,987 | 128,528 |
| p-value | 0,000\*\* | 0,000\*\* | 0,000\*\* | 0,000\*\* |
| Adjusted R^2 | 0,133 | 0,058 | 0,287 | 0,740 |

The variable percentage of women does have a positive influence on firm performance when looking at the ROA, ROE and market value, though when looking at the Tobin’s Q it has a negative effect. But for all of the firm measures the variable percentage of women does not have significant values.

When looking at the variable dummy for gender a negative influence on firm performance can be found for ROA, ROE and market value. A positive influence can be found for Tobin’s Q, but again all of these values are not significant.

The dummy for construction, retail trade and public services stand out compared to the other dummies for industries as they give for three firm performance measures significant values. The dummy for construction gives significant positive values for the ROA and ROE, while it gives a significant negative value for market value. The dummy retail trade gives significant positive values for the ROE, ROA and market value, whereby very significant positive values are given for the ROA and ROE. Thereby the dummy for public services also gives significant positive values for the ROA, Tobin’s Q and market value. This thus means that women who work in these sectors have more influence on the dependent variables as the values are significant.

Though the dummies for transportation and finance give very significant values. The dummy for transportation gives a p-value of 0,000 for market value and the dummy for finance gives p-values of 0,000 for the ROE and market value. This means that women within these two industries have a high influence on these dependent variables compared to the other industries. But that does not necessarily mean that is a positive influence as for transportation it is a negative influence when looking at the market value and for finance as well. Though for the ROE women within the finance industry have a highly positive influence.

Next, table 15 will be discussed which are the outcomes for the hypotheses five until eight for the year 2012.

Table 15 provides the outcomes of the OLS regression for the year 2012 taking into account the different industries. When looking at the p-values the ROA, Tobin’s Q and market value model all have significant values; the ROE does not have a significant value with a p-value of 0,124.

Therefore it can be said that the hypotheses 50, 70 and 80 can be rejected, though hypothesis 60 cannot be rejected, as the value is not significant. It is said that women within board of directors do not have an influence on the firm performance measure ROE, while when looking at the ROA, Tobin’s Q and market value, they do have an influence.

The variable percentage of women only shows negative influences on the firm performance measures, though only for the measure market value a significant value can be found. Thus percentage of women has a negative influence on firm performance.

The dummy for gender only shows positive influences for all the firm performance measures, but for which none are significant. But dummy for gender does have positive influence on firm performance.

Table 15: OLS regression 2012 incl. different industries

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2012 | ROA | ROE | Log of Tobin’s Q | Log of Market value |
| Intercept | 0,145 | 0,109 | -0,992 | 0,995 |
|  | (0,000)\*\* | (0,149) | (0,000)\*\* | (0,000)\*\* |
| Percentage of women | -0,035  (0,282) | -0,088  (0,222) | -0,059  (0,531) | -0,497  (0,036)\* |
| Dummy for gender | 0,003  (0,698) | 0,019  (0,303) | 0,017  (0,473) | 0,058  (0,332) |
| Dummy for mining | -0,010  (0,318) | -0,029  (0,169) | -0,022  (0,434) | -0,077  (0,267) |
| Dummy for construction | 0,021  (0,118) | 0,052  (0,076) | 0,024  (0,532) | 0,177  (0,066) |
| Dummy for transportation | 0,000  (0.972) | 0,002  (0,847) | 0,004  (0,812) | -0,005  (0,910) |
| Dummy for wholesale trade | -0,004  (0,665) | -0,018  (0,408) | -0,008  (0,777) | -0,027  (0,701) |
| Dummy for retail trade | -0,004  (0,598) | -0,012  (0,437) | -0,010  (0,640) | -0,009  (0,856) |
| Dummy for finance | 0,002  (0,760) | -0,003  (0,802) | 0,009  (0,632) | 0,024  (0,585) |
| Dummy for public services | -0,008  (0,199) | -0,028  (0,048)\* | 0,000  (0,996) | 0,016  (0,728) |
| Dummy for public administration | 0,002  (0,959) | -0,031  (0,678) | -0,026  (0,796) | 0,074  0,767) |
| Board size | -0,005 | -0,009 | 0,004 | -0,002 |
|  | (0,037)\* | (0,075) | (0,511) | (0,912) |
| Log of firm size | -0,008  (0,004)\*\* | 0,003  (0,576) | 0,053  (0,000)\*\* | 0,742  (0,000)\*\* |
| Average age of directors | 0,000  (0,776) | 0,001  (0,573) | 0,000  (0,888) | -0,002  (0,670) |
| Leverage | -0,052 | 0,061 | 0,931 | -0,064 |
|  | (0,000)\*\* | (0,034)\* | (0,000)\*\* | (0,494) |
|  |  |  |  |  |
| F-statistic | 3,300 | 1,452 | 56,258 | 112,048 |
| p-value | 0,000\*\* | 0,124 | 0,000\*\* | 0,000\*\* |
| Adjusted R^2 | 0,047 | 0,010 | 0,541 | 0,703 |

When taking a closer look at the dummies for industries only a significant value can be found for the dummy public services, which has a negative influence on the ROE. Whereby the dummies for mining, wholesale trade and retail trade only give negative values for the firm performances, which means that a negative influence exists on firm performance for these sectors. This means that women within these sectors have a negative influence on the firm performances.

As conclusions are now drawn for hypotheses five until eight, a short summary is given underneath in table 16.

Table 16: Overview of hypotheses 5 until 8

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | ROA | ROE | Log of Tobin’s Q | Log of Market value |
| 2002 | Reject H50 | Reject H60 | Reject H70 | Reject H80 |
|  | Influence present | Influence present | Influence present | Influence present |
| 2012 | Reject H50  Influence present | Accept H60  No influence present | Reject H70  Influence present | Reject H80  Influence present |

Overall it can thus be said that women do have influence on the firm performance of a company most of the times, though the question remain in what way this influence is directed. In order to get an answer on this question the next paragraph will take a closer look on the model summaries of the regressions.

## Goodness of fit test

In order to be able to mutually compare these models and hypotheses a closer look is taken at the model summaries of the regressions, which are included in the tables 17 until 20. Within table 17 and 18 summaries are given for 2002 and 2012 without the distinction for different industries, while in table 19 and 20 this distinction is included.

When comparing the models for 2002 and 2012 it can be seen that the models correlate better with the dependent variables ROA and ROE in the year 2002, while for 2012 the models correlate better with the dependent variables Tobin’s Q and market value.

This same conclusion can be drawn when looking at the R square and thus when looking at the explanatory factor of the model for the dependent variables. It can be seen that the model explains more in 2002 for the ROA and ROE, than for 2012. While in 2012 the models explain more for the Tobin’s Q and market value. It can thus be said that the models are better in 2002 when looking at the ROA and ROE, and when looking at 2012 the models are better for the Tobin’s Q and the market value.

The conclusion which can be drawn from this is the fact that the influence of women on the firm performances ROA and ROE was higher in 2002, compared to 2012, while the influence of women on the firm performances Tobin’s Q and market value was higher in 2012 compared to 2002. An improvement over time has thus occurred when looking at the influence of women and the Tobin’s Q and the market value.

Table 17: Model summary of the regressions for 2002

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2002 | ROA | ROE | Tobin’s Q | Market value |
| R | 0,303 | 0,131 | 0,518 | 0,823 |
| R square | 0,092 | 0,017 | 0,269 | 0,678 |
| Adjusted R square | 0,083 | 0,008 | 0,262 | 0,675 |

Table 18: Model summary of the regressions for 2012

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2012 | ROA | ROE | Tobin’s Q | Market value |
| R | 0,241 | 0,121 | 0,741 | 0,841 |
| R square | 0,058 | 0,015 | 0,550 | 0,707 |
| Adjusted R square | 0,050 | 0,006 | 0,545 | 0,704 |

When comparing the models for 2002 and 2012 it can be seen that the models again correlate better with the dependent variables ROA and ROE in 2002 than in 2012. But in 2012 the models correlate better than 2002 for the dependent variables Tobin’s Q and market value.

When looking at the R square, and thus whether how well the model explains the dependent variable it can be seen that the model was better in 2002 for the dependent variables ROA, ROE and market value, while the model was better for the Tobin’s Q in 2012.

The conclusion which can be drawn here is the fact that women had more influence on the firm performances ROA, ROE and market value in 2002 compared to 2012, while in 2012 women have more influence on the Tobin’s Q compared to 2002. An improvement over time has thus occurred when looking at the Tobin’s Q and the influence of women.

Table 19: Model summary of the regressions for 2002 including the different industries

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2002 | ROA | ROE | Tobin’s Q | Market value |
| R | 0,390 | 0,281 | 0,550 | 0,864 |
| R square | 0,152 | 0,079 | 0,303 | 0,746 |
| Adjusted R square | 0,133 | 0,058 | 0,287 | 0,740 |

Table 20: Model summary of the regressions for 2012 including the different industries

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2012 | ROA | ROE | Tobin’s Q | Market value |
| R | 0,259 | 0,175 | 0,742 | 0,842 |
| R square | 0,067 | 0,031 | 0,551 | 0,710 |
| Adjusted R square | 0,047 | 0,010 | 0,541 | 0,703 |

## Conclusion

For 2002 the hypothesis 10, 30 and 40 can be rejected, an influence thus exists of women within board of directors on firm performance measures ROA, Tobin’s Q and market value. Only for percentage of women a significant positive influence by women can be found when looking at the ROA. Dummy for gender mostly gives a negative influence on the firm performances, though these values are not significant. The second hypothesis cannot be rejected, as there is no significant value, which means that women within board of directors have no influence on firm performance when looking at the ROE.

For 2012 the hypothesis 10, 30 and 40 can be rejected again, just like for 2002. For percentage of women only negative values can be found, though only for market value a significant negative influence can be found. When looking at dummy for gender only positive influences can be found, but for which none of them are significant. The second hypothesis cannot be rejected, as there is no significant value, which means that women within board of directors have no influence on firm performance when looking at the ROE.

For 2002, when taking into account the distinction for the different industries, the hypotheses 50, 60, 70 and 80 can be rejected. Women within board of directors do have influence on the firm performance. Though no significant values can be found for dummy for gender and percentage of women, but it can be seen that percentage of women has a positive influence for most of the dependent variables, and dummy for gender has mostly a negative influence. When looking at the distinction of the different industries some dummies stand out namely dummy for construction, dummy for retail trade and dummy for public services as they give significant values. Women in these industries thus have a positive influence on the firm performances. Also when looking at the transportation and finance industry very significant values arise, which means that women within the transportation industry have a very negative effect on the market value, and women within the finance sector have a very positive effect on the ROE and a very negative influence on the market value.

For 2012, when taking into account the distinction for the different industries, the hypotheses 50, 70 and 80 can be rejected. Which means that women within board of directors have an influence on the firm performance of a company. The hypothesis 60 cannot be rejected which means that women within board of directors do not have influence on the firm performance. Only a significant negative value can be found for the public service industry, which means that women within this industry have a negative effect on the ROE.

There thus exists a difference on the outcome of the influence of women on firm performance when taking the different industries into account when looking at the ROE. But overall the influence of women on firm performance stays the same when taking the different industries into account.

When looking at the goodness of fit test it can be seen that in 2002 the model explained more for the ROA and ROE and thus being a better model, while in 2012 the model explained more for the Tobin’s Q and the market value for which they were the better models as the explanatory factor is higher. But when taking into account the different industries in which women work in and thus having influence in those industries, the models in 2002 explained more for the ROA, ROE and market value than they did for 2012. In 2012 the model explained only more for the Tobin’s Q, for which the model has a larger explanatory power for the Tobin’s Q making it a better model than that of 2002.

The next chapter will capture the discussion and limitations of this study.

# Discussion and conclusions

## Discussion and limitations

This thesis investigates the influence of women within the board of directors on different kinds of firm performance measures for 2002 and 2012 and mutually, it is thus a combination of previous studies, which takes into account different measures of firm performances. As can be concluded women do have influence on the firm performance of a company most of the times but it depends on which firm performance measure one takes whether this influence is positive or negative.

Within previous research a lot of different outcomes occurred, for example some found a positive link (Erhardt, Werbel, & Shrader, 2003), others found no or a small relation (Rose, 2007) and even others found a negative relation between women in board of directors and firm performance (Wellalage & Locke, 2012). This information of these previous researches corresponds with the study within this thesis. As can be seen the influence of women within board of directors is established, positively and negatively. But also no influence of women has occurred for example for the ROE. This study thus reproduces the same outcomes as previous studies.

Within this study the S&P 1500 companies are used for the sample, but as these companies had to exist in 2002 and 2012 a lot of companies within this sample had to be dropped from the sample. It is therefore hard to establish a conclusion, which can be generalized for all the companies within North America. Thereby the S&P 1500 companies are mostly large companies it is therefore hard to generalize the outcomes for smaller companies.

Another limitation for this test is that it is hard to establish whether women within board of directors have more influence in 2012 compared to 2002. This thesis used different regressions, but in order to compare regression not a lot of extensively methods can be used, therefore the use of the goodness of fit test was used. But this test only gives information about whether the model is a good fit for what one wants to test. Therefore it is only possible to say whether the model fits better for a certain year compared to another year.

Another point of interest is the fact that it can be said that an improvement on the influence of women within board of directors on firm performance has occurred when comparing 2002 and 2012, but is hard to establish a concrete answer whether this influence is negative or positive. Because when the variable percentage of women shows a negative effect on the firm performance, the variable dummy for gender shows the opposite effect; having a positive effect and vice versa. So a recommendation for further research could be to take a closer look at this direction. Thereby significant outcomes arise for the totals of the models which leads to the adoption of the alternative hypothesis but when looking at the direction of this influence almost no concrete answers can be given as the values of the independent and controlling factors are mostly not significant.

Within this study some control variables are already included, though it is hard to determine whether all variables are included which should be included. If a closer look is taken at the goodness of fit test the model for ROE only explains a small amount. Therefore it could be questionable whether the model for the ROE is a good model to look at when looking at women and their influence on the ROE.

Thereby women may or may not have an influence on the firm performance but they could have an influence within other areas of a company, which are important for example how well people are working together, and the atmosphere within a company. But this is also not taken into account within this study. Therefore a recommendation could be to examine the influence of women in other fields’ then firm performance, which are also important for companies and for which the company could benefit.

## Conclusion

This study looked for whether a relationship occurred between women in board of directors and the firm performance measures ROA, ROE, Tobin’s Q and market value. Hereby independent and controlling variables were used. For the study itself a sample of the S&P 1500 companies were used for which the companies had to exist in 2002 and in 2012, which led to 721 companies for this sample.

When looking at the limitations one could say that it is not a good study though this study does contribute to previous studies. As can be learned from this study, which combined previous studies, is the fact that to see whether a relationship exists between the influence of women within board of directors and firm performance it depends, for which firm performance measure one takes into account. Different outcomes arise when taking different firm performance measures into account when using the same independent and controlling variables. Thereby it is still hard to get a straight answer on this direction of this effect because if the percentage of women has a negative effect, the dummy for gender shows the opposite effect and vice versa. It is therefore hard to get a concrete answer on whether this influence is negative or positive, as there is a contradiction between these two variables.

But overall it can be said that women within board of directors do have influence on the firm performance of companies for the ROA, Tobin’s Q and market value for 2002 and 2012, with and without taking into account the different industries in which women work. And in 2002 when taking into account the different industries this can also be implied for the ROE. But no influence of women can be found on the ROE when looking at 2002 and 2012 without the distinction of the different industries and for 2012 with the distinction for the different industries in which women work.

Whereby the models for the ROA and ROE were better in 2002, implying having a greater explanatory power of women having influence on firm performance than for 2012. For 2012 the Tobin’s Q and the market value were better models implying having a greater explanatory power of women having influence on firm performance than for 2002. When taking into account the different industries it can be said that the models for the ROA, ROE and market value were better in 2002, meaning that women had more influence on firm performance in 2002 than they do for 2002 as the explanatory power of the model was larger. In 2012 the Tobin’s Q was the better model implying that there is a larger explanatory power, which means that women had more influence on the firm performance than in 2002.

In summary; the answer on the research question, “*To what extend do women on board of directors affect the financial performance of a company when looking at the United States of America*” can be concluded with the fact that it can be said that the models taking into account the ROA, Tobin’s Q and market value are influenced by women within board of directors, while women have no influence on the ROE. Whereby women had more influence on the ROA ten years ago, thus in 2002 than in 2012. The influence of women has become larger within the last ten years when looking at the Tobin’s Q and market value.

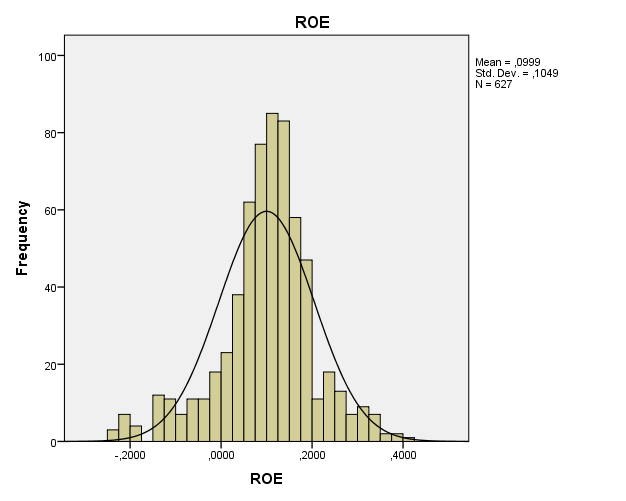
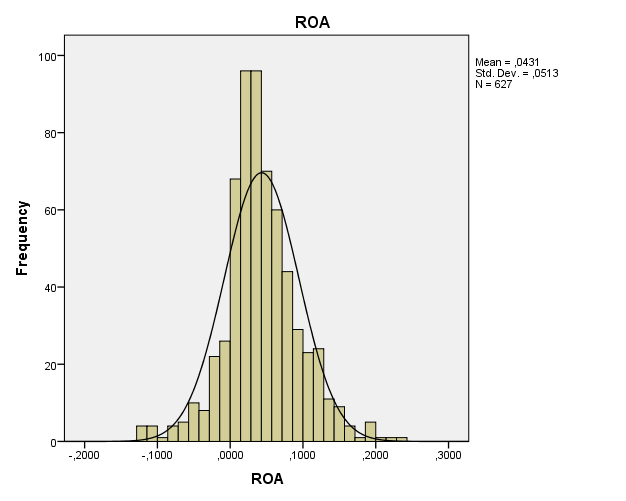
But when the different industries are also taken into account the influence of women shifts. Women had more influence in 2002 than in 2012 when looking at the ROA and market value, though when looking at the Tobin’s Q women had more influence in 2012 than they had in 2002.

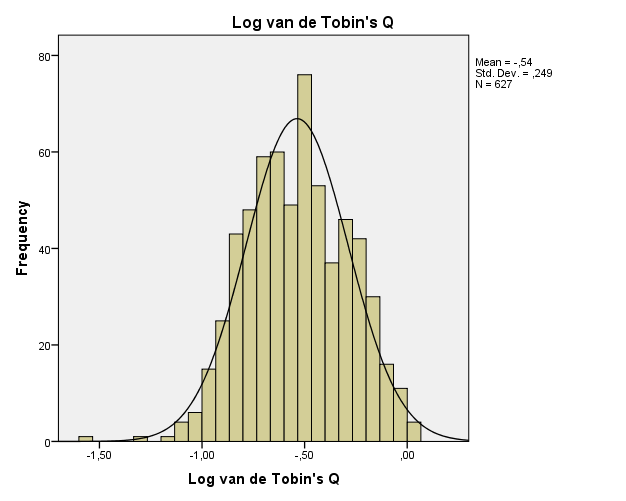
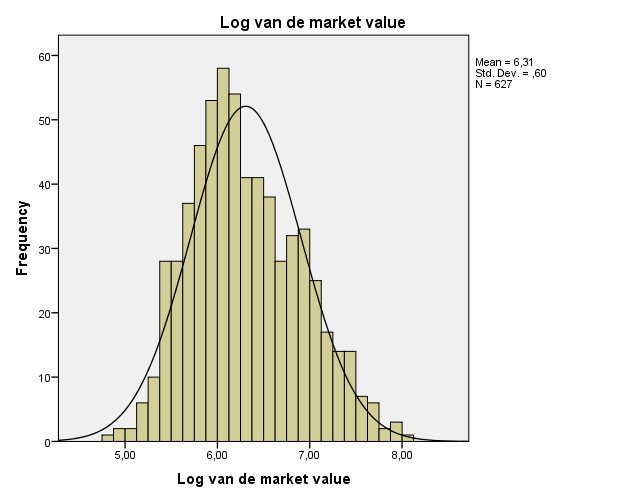
Though when looking at the history of men and women and especially the emancipation of women it can be seen that women do have influence on firm performance, though these influences are not significant as can be seen. This means that women are not yet represented well enough. This conclusion stresses the importance of the government to define policies. As more women are needed to fulfill these vacancies within boards of directors.

# Appendix

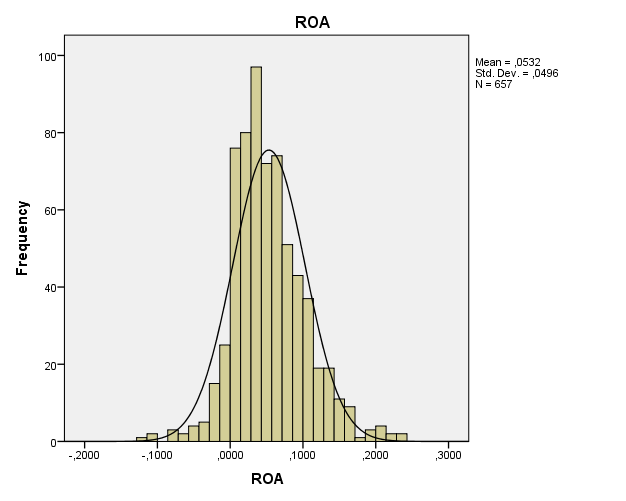
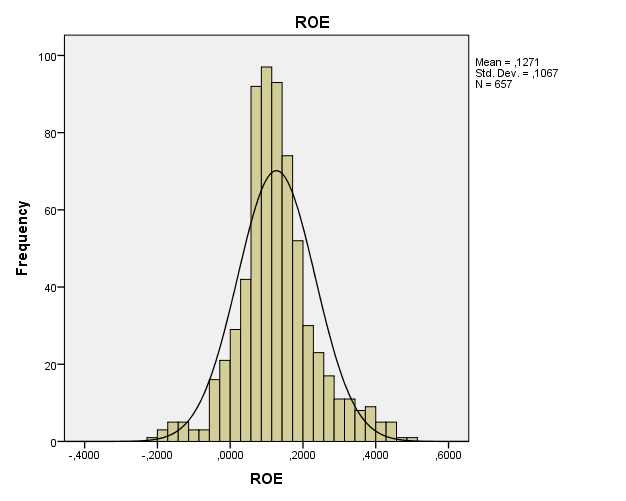
## Histograms normal distribution

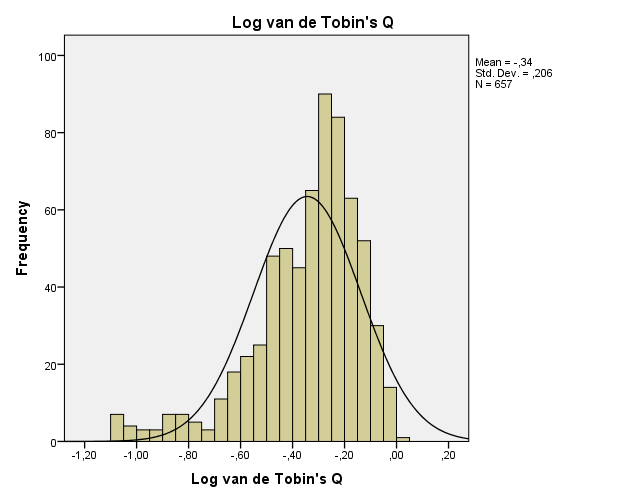
### 2002

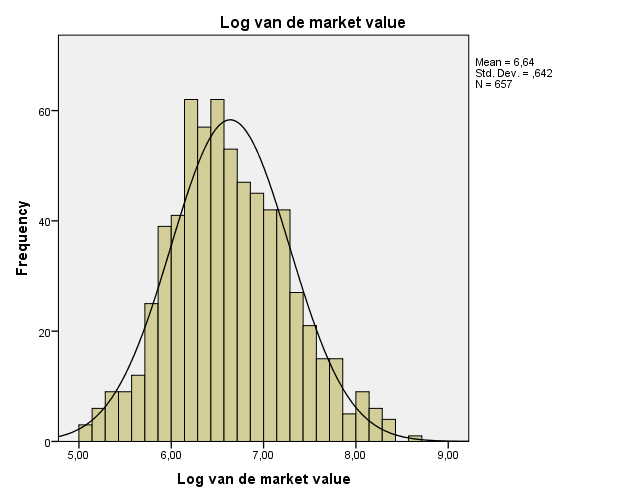
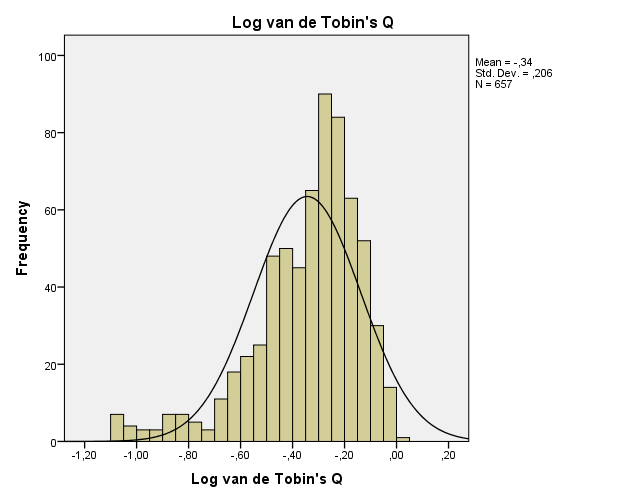




### 2012







## Kolmogorov-Smirnov & Shapiro-Wilk

### Results for 2002

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Tests of Normality** | | | | | | |
|  | Kolmogorov-Smirnova | | | Shapiro-Wilk | | |
| Statistic | df | Sig. | Statistic | df | Sig. |
| ROA | ,074 | 627 | ,000 | ,975 | 627 | ,000 |
| ROE | ,090 | 627 | ,000 | ,962 | 627 | ,000 |
| Log van de Tobin's Q | ,034 | 627 | ,086 | ,992 | 627 | ,002 |
| Log van de market value | ,060 | 627 | ,000 | ,985 | 627 | ,000 |
| a. Lilliefors Significance Correction | | | | | | |

### Results for 2012

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Tests of Normality** | | | | | | |
|  | Kolmogorov-Smirnova | | | Shapiro-Wilk | | |
| Statistic | df | Sig. | Statistic | df | Sig. |
| ROA | ,069 | 657 | ,000 | ,971 | 657 | ,000 |
| ROE | ,082 | 657 | ,000 | ,967 | 657 | ,000 |
| Log van de Tobin's Q | ,098 | 657 | ,000 | ,919 | 657 | ,000 |
| Log van de market value | ,044 | 657 | ,005 | ,992 | 657 | ,002 |
| a. Lilliefors Significance Correction | | | | | | |

## Non-zero variance

### Results for 2002

Non-zero variances overview 2002

|  |  |
| --- | --- |
| 2002 | Variance |
| ROA | 0,003 |
| ROE | 0,011 |
| Log Tobin’s Q | 0,062 |
| Log Market value | 0,360 |
| Percentage of women | 0,010 |
| Dummy for female | 0,204 |
| Different industries | 4,052 |
| Board size | 1,710 |
| Log Firm size | 0,489 |
| Average age of directors | 18,160 |
| Leverage | 0,006 |

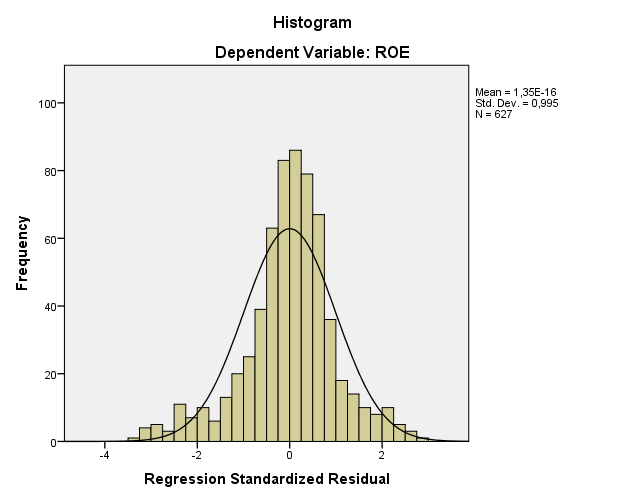
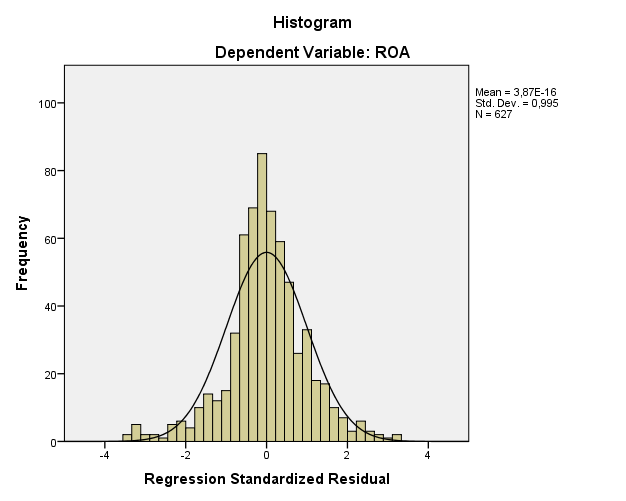
### Results for 2012

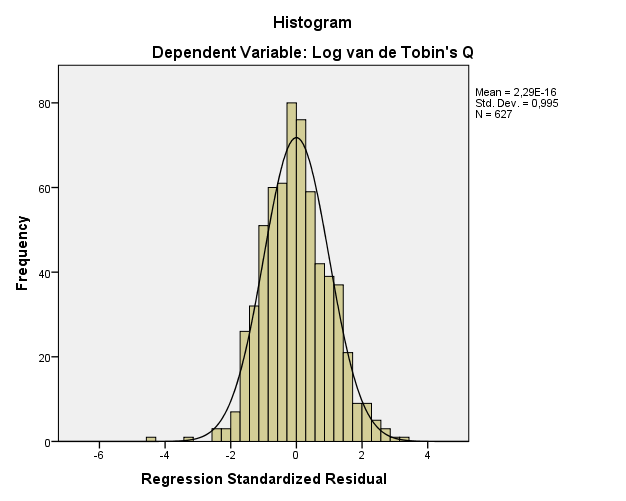
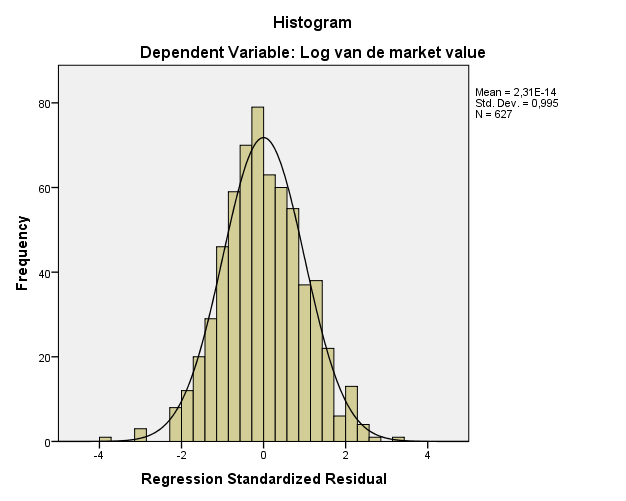
Non-zero variances overview 2012

|  |  |
| --- | --- |
| 2002 | Variance |
| ROA | 0,002 |
| ROE | 0,011 |
| Log Tobin’s Q | 0,043 |
| Log Market value | 0,412 |
| Percentage of women | 0,014 |
| Dummy for female | 0,222 |
| Different industries | 4,020 |
| Board size | 0,689 |
| Log Firm size | 0,536 |
| Average age of directors | 12,399 |
| Leverage | 0,022 |

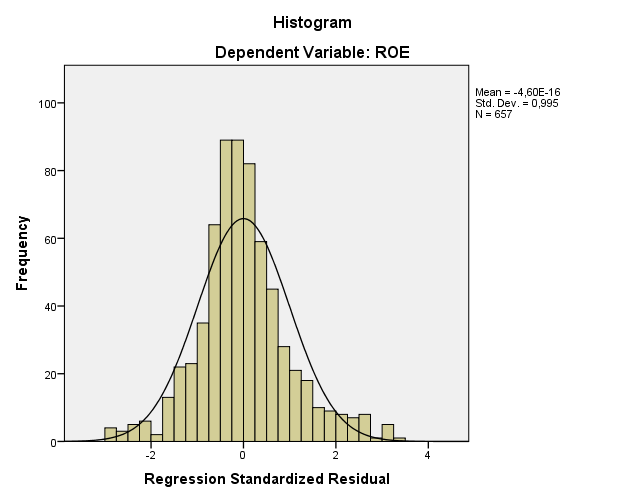
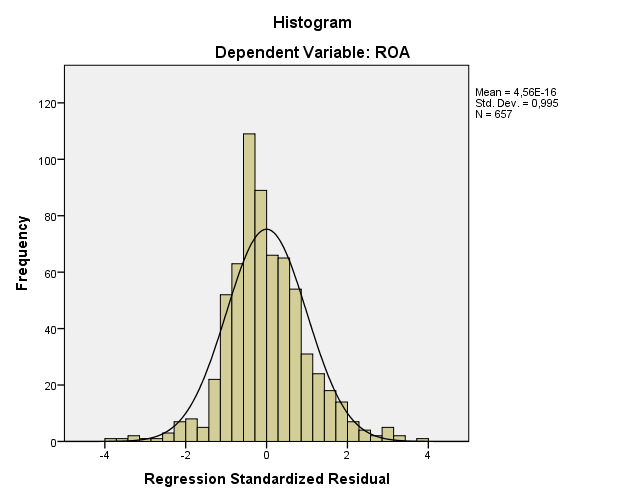
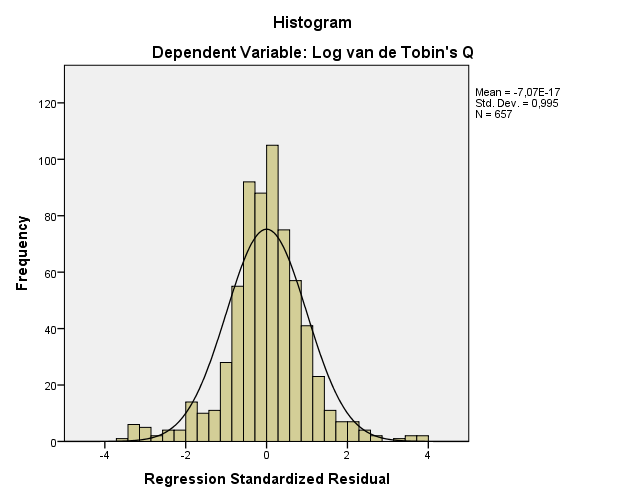
## Normal distribution of the errors

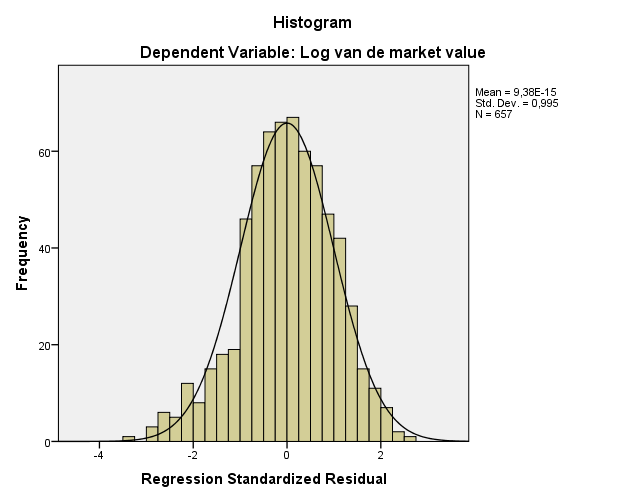
### Results for 2002





### Results for 2012





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