How do women in top management affect firms’ performance?

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Abstract:

This study investigates how women in top management affect firms' financial performance. Particularly, the study focuses on the effect of women in executive management on firm performance in Finnish listed firms based on data for 2013. Women are still underrepresented in top management positions, even if they have long since been equally educated and represented in working life compared with men. Promoting executive managers only among men may result in large losses for firms, since half of the talent distributed between both genders is lost. Promoting the best resources to top management is important for creating firm value.

The hypothesis of this study is that gender diversity in top management will have a positive effect on firm performance. This hypothesis is based on previous research showing that gender diversity in top management enhances corporate governance and firm performance. The research approach of the study is quantitative. Regression analysis is used to investigate the relationship between the presence of female executive managers and firm performance when controlling for a number of other factors affecting firm performance. The findings of the study suggest that increased presence of women in top management has a stronger impact in cases when a company has low female representation.

Keywords: Gender diversity, executive management, corporate governance, non-linear correlation
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1 INTRODUCTION

Gender inequality is not only a moral and a social issue but also a critical economic challenge. If women do not reach their full potential in working life, the global economy will underperform, since women account for half of the world’s working-age population. According to a recent report by McKinsey Global Institute, $28 trillion (or 26 per cent) could be added to global annual GDP by year 2025, if both genders were to have an equal role in labour markets, compared to a “business as usual” development. The increase in global GDP that could be achieved by identical roles of women and men in economy by year 2025 equals approximately the size of the Chinese and US economies today. (Dobbs et al. 2015)

In Finland family friendly policies have over the past decades ensured that women can enter the labour market. Moreover, women currently account for the majority of university students in the country (Tilastokeskus 2014). Despite these facts, women are still underrepresented in leadership positions in Finland. A huge economic loss occurs, when only a few women enter management positions, according to the study by McKinsey Global Institute (Dobbs et al. 2015). Gender diversity in management can also affect corporate governance, which in turn affects financial performance. Gender diversity and diversity in general are beneficial for the management of companies, since people with diverse backgrounds, experiences and points of view can consider more alternatives and create new ideas (Peni 2012).

However, according to research it is not self-evident that gender diversity enhances firm performance in all circumstances. According to Richard et al. (2004) a management team that is either homogeneous or highly heterogeneous improves firm performance, while a moderately heterogeneous management team does not improve performance. Richard et al. (2004) point out that there needs to be a certain degree of diversity within a group before the diversity results in positive outcomes. (Richard et al, 2004) Having women represented by only one or two members of a team can make them feel like outsiders. They can also be victims of stereotyping and be seen as representing all women which could lead to them spending more time on convincing other team members of their opinions (Kramer et al. 2007).

Much has been studied about the effects of female board members on firm performance. However, the effects of female executive directors on firm performance,
has not been researched as broadly. Historically, women being promoted to executive management teams have been rare occurrences, and the number of women in top management has not increased until recent years. Therefore, I will focus my research question on women in executive management. Executive directors have an even stronger impact on firm performance than the board of directors, since the management is involved in daily operations, whereas the board mainly focuses on advising and monitoring. From a corporate governance perspective, research in this field can add to a better understanding of how companies create shareholder value.

1.1. Purpose

The purpose of this study is to investigate the impact of the proportion of women in executive management on firm performance. Gender diversity in top management can be both positive and negative, which makes it interesting to learn what view is supported by data. From a practical point of view, the number of female executive directors has increased in recent years, but the development is slow and women are still underrepresented in many business fields. If female executive directors enhance firm performance, more women are needed in top management.

1.2. Problem background and scope

Gradually, the number of women promoted to management positions has been growing. However, women still face many difficulties in their career advancement. For example women promoted to executive management teams are often responsible for support functions, such as human resources, marketing as well as communication tasks, compared to men taking care of business operations (Smith et al. 2013). Barriers in women's career advancement, the so called “glass ceiling”, have become a widely discussed topic.

Several theories and arguments are presented to explain the effects of gender diversity in management. Smith et al. (2006) argue that companies should aim at a more diverse management because if only men are potential candidates for management, the selection of executive members will take place from only this selected distribution of qualifications. This means on average a lower quality compared to if the executive members are promoted among the best distribution of both men and women. (Smith et al. 2006)
Although previous researchers have been studying women in top management, there is not a simple answer to the question how gender diversity affects companies’ financial performance. Both a linear correlation as well as a non-linear correlation has been found in previous studies, which will be discussed in the following chapter describing previous research. In the empirical part of the study both possibilities will be investigated. Since a perfectly gender diverse management would mean 50 % women and 50 % men, a non-linear correlation appears to be a valid estimate. By combining previous studies in the field with empirical evidence from Finnish listed firms, this study aims to answer the following research question:

How do women in executive management affect firms’ financial performance in Finnish listed firms?

1.3. Delimitations

A few delimitations are made in order to clarify the scope of the study. The study focuses only on listed firms, therefore, it does not give a picture of all firms in Finland. The findings of the study may differ when investigating only big listed companies compared to investigating smaller firms. Furthermore, the data sample of the study is relatively small with 119 observations, which is determined by the number of listed firms in Finland in 2013.

The study is a cross-sectional study focusing on the companies’ financial performance. Thus, it does not take into account a longer time perspective of the companies’ financial performance. In essence, the study examines the relationship for a given year between women in management and companies’ financial performance, not a long-term development between these two. Due to the cross-sectional data, causality between female executive directors and firm performance is not studied. In other words, if a correlation between the studied factors is found, causal effects cannot be explained.

1.4. Structure

The introduction is followed by a discussion about previous research. The chapter about previous research is divided into two main parts: the first part presents theories of the effects of gender diversity in top management and the second part focuses on previous research. In particular, the second part of this chapter focuses on a linear versus a non-linear correlation between women in management and firm performance.
The discussion about previous research is followed by a chapter about the current situation in Finland concerning gender diversity in top management, before moving on to the methodology. The methodology part of the study begins with a presentation of the hypothesis of the study. This is followed by a description of the research method, including an explanation of the variables used in the regression analysis and the dataset of the study. The chapter is followed by the empirical part, which focuses on analysing the correlation between women in executive management and firm performance. Lastly, the findings are discussed and the final conclusions are drawn at the end of the study. It is shown that the relationship between female executive directors and firm performance is non-linear.
2 PREVIOUS RESEARCH

Theories for both positive and negative effects of gender diversity are presented in the first part of this chapter. The second part focuses on previous research, which has shown both a linear and a non-linear correlation between women in top management and firm performance. A table summarizing previous literature discussed in this chapter is presented at the end of the chapter.

2.1. Theories about the effects of gender diversity

Smith et al. (2006) studied management diversity in the 2500 largest Danish firms during 1993-2001 and found that the proportion of female top managers (CEOs, vice-CEOs and board members) has a positive impact on firm performance (ROA among other indicators). The findings also showed that the positive effects of women strongly depend on the education of the female top managers. The research by Smith et al. (2006) is based on an assumption of equal distribution of management talent among men and women. If the potential candidates for the executive director positions are only men, the selection of executive directors’ qualifications will be restricted. The result will be lower average qualification than if the directors were appointed according to qualification, regardless of gender. Equal distribution of talent between genders means that the small number of women promoted to top management positions have higher qualifications on average compared to the larger number of men promoted to similar positions. Therefore, these few women affect firm performance positively. (Smith et al 2006)

Another theory for why management diversity matters is that a more diverse management is capable of evaluating more alternatives when making decisions compared to a more homogenous management. Women may have different experiences both from working and non-working life compared to men. They may also have a better understanding of certain market segments of the firm. This may enhance the creativity and quality of the decision-making of the management group. (Singh & Vinnicombe 2004) Dezso et al. (2012) found in their study that the more a firm’s strategy is focused on innovation, the more female representation in top management improves firm performance (Dezso et al. 2012).
The study by Dwyer et al. (2003) focuses on gender diversity in two different contexts. The research hypothesizes that more growth oriented and culturally diverse organisations benefit from a more diverse workforce, which means that a certain supportive organisational environment may be needed before the benefits of gender diversity can be fully in place. Dwyer et al. (2003) argue that a growth oriented and culturally diverse organisation benefits from flexible employees that are able to adapt to changes within the organisation. Women at different managerial levels can bring cultural insight, understanding and sensitivity that are needed when entering new markets or acquiring firms in new markets. On the other hand, if a firm has a downsizing strategy, it needs operational efficiency and in this case heterogeneous groups can lead to disadvantages in the form of additional costs. (Dwyer et al. 2003)

Deszo et al. (2012) argue that female representation in top management affects not only the top management task performance but also middle management performance. Female top managers are recognised to focus more on the development and mentoring of their subordinates, which increases the commitment and motivation amongst middle management. Further, mentoring can be especially important for female middle managers in their career development. This may increase firm productivity indirectly by creating a larger pool of potential candidates for top positions in the firm (Smith et al. 2006). Female top managers also encourage the adoption of gender-related norms, such as behaviour associated with a feminine management style. In top management, women increase performance through social and informational diversity. Each of these effects improves both individual and group task performance throughout the firm. (Deszo et al. 2012)

However, there are also theories against gender diversity in management. A more diverse executive management team can have more conflicts and be more time-consuming in its decision-making processes because of more opinions and critical questions. The company might need to respond quickly to market changes in a highly competitive surrounding and in these circumstances the positive effects of a diverse management might not balance out the negative effects. (Hambrick et al. 1996) Thus, based on these theories, the effect of gender diversity in management on firm performance remains undetermined a priori. This effect will be investigated in Finnish listed firms in the empirical part of the study.
2.2. Previous research on a linear versus a non-linear correlation

Previous literature has studied the relationship between gender diversity and firm performance showing various results. Firstly, previous research based on a linear relationship will be presented and, secondly, previous research based on a non-linear relationship.

Shrader et al. (1997) performed a study about the relationship between women on all management levels and firm financial performance measured in return on sales (ROS), return on assets (ROA), return on investment (ROI) and return on equity (ROE) with data from 1992 to 1993. They motivate their study with the resource-based theory according to which human capital resources are a firm’s strongest assets when it comes to developing competitive advantages. In addition, they point out that women are more oriented toward supporting and maintaining relationships than men and also strong in idea generation. With the help of these characteristics women can improve organizational learning and performance as well as the organizational climate according to the researchers. (Shrader et al. 1997)

However, Shrader et al. (1997) could not find any strong support for the idea that firms recruiting more women would perform better financially. Female middle managers were found to have some positive effects on firm performance, female top managers were insignificant and female board members had negative effects on firm performance. (Shrader et al. 1997) The used data is over 20 years old meaning that the number of women in leadership positions was smaller compared to current numbers and may have affected the results of the study by Shrader et al. (1997).

Furthermore, the results of Shrader et al. (1997) may have been affected by too few control variables included in the study. The researchers only controlled for the total amount of members in management, top management and the board of directors. For example, firms of different size can affect the results if not controlled for in the analysis. Firm size can affect firm performance and also correlate with the percentage of women in management. Therefore, important factors influencing firm performance need to be included in the research model. The control variables used in this study will be discussed in detail in the following chapter.
A more recent study, within the topic of gender diversity in top management is made by Jalbert et al. (2013). They motivate their research focus with the fact that the amount of female CEOs has increased in US publicly traded firms. The increase has reached such a level that it makes it relevant to compare the performances of firms led by CEOs of different genders. Jalbert et al. (2013) used several measures to identify differences in female and male CEOs and a time period covering years from 1997 to 2006 with 6305 annual firm observations. To capture the differences in performance between genders, they examined ROA, ROE and ROI. Further, different managerial effects were measured with dividend pay out ratio of the firm and debt to assets ratio. The study also included measures to identify shareholder perceptions. These included variables for institutional ownership, inside ownership, price to book ratio and price to earnings ratio. Moreover, several control variables, such as demographical variables related to the CEO were considered in the study. (Jalbert et al. 2013)

Firstly, Jalbert et al. (2013) made simple regressions with several dependent variables and only gender as an independent variable without any control variables. The gender variable showed significant explanatory power for four out of fourteen dependent variables considered; price to earnings, ROI, debt to assets and a variable for industry. The result for price to earnings ratio indicated that investors are willing to pay a higher price to acquire firms managed by a female, whereas the debt ratio suggested that female CEO’s finance their firms differently. Moreover, the industry variable explained the higher representation of female CEOs in some industries than others. (Jalbert et al. 2013)

Secondly, Jalbert et al. (2013) built up multiple regressions including a series of control variables together with gender as an explanatory variable. When controlling for the effects of a number of control variables, the multiple regressions showed a significant positive correlation with gender and five dependent variables; price to earnings, ROI, ROA, sales growth and institutional ownership. Lastly, regressions for these five dependent variables were made including only the control variables that were significant for each of the dependent variables. The results indicated that female CEOs produce higher sales growth and have higher institutional ownership. Furthermore, the results suggested that companies managed by female CEOs provide higher ROI and ROA as well as being valued higher on the market compared to firms managed by male CEOs. (Jalbert et al. 2013)
The study by Jalbert et al. (2013) does not take into consideration the direction of causality. If well-performing firms decide to recruit female CEOs, the correlation between female leaders and firm performance tends to be positive. If this is the case, the causality is the reverse of the results presented by Jalbert et al. (2013). Therefore, the question remains whether or not female CEOs really affect the studied firm characteristics positively or whether better performing firms are more likely to employ women? Controlling for the direction of causality in this study is restricted by the cross-sectional data. As noted in the delimitations, this study cannot explain causality, in the case that a correlation is found between female executive directors and firm performance.

Most studies within the topic have been made with data from the US, including the studies by Shrader et al. (1997) and Jalbert et al. (2013) presented above. A research by Kotiranta et al. (2007) with data from Finland is an interesting comparison for this study similarly focusing on Finnish data. Kotiranta et al. (2007) studied a large sample consisting of over 10,000 Finnish, both listed and non-listed, companies with at least 10 employees in the year 2003. They investigated the impact of female CEOs, chairpersons and board members on ROA, ROI and ROS when controlling for several other effects on firm performance. The conclusion was that female led companies are on average about 10% more profitable compared to male led companies. In 2003 less than a tenth of Finnish firms’ CEOs and chairpersons were women and less than a fourth of Finnish firms’ board members were women. (Kotiranta et al. 2007)

Kotiranta et al. (2007) analysed possible explanations for their empirical results and distinguished four possible reasons. Firstly, the authors present an interpretation that women are better managers overall compared to men. However, this is not a conclusion that can be drawn from the regression results. Secondly, the authors suggest that women being promoted to top management positions can be a more selected group than corresponding men being promoted. Therefore, women promoted are more qualified for top management positions. (Kotiranta et al. 2007) This explanation is in line with the theory presented by Smith et al. (2006), which is accordingly the underlying theory for this empirical research.

Thirdly, Kotiranta et al. (2007) discuss the direction of causality as an explanation. Women might be selected on average to better performing companies or women might on purpose seek to apply to firms that are performing better. The last possible
The explanation presented by the authors is that both female leadership and firm profitability are related to a third parameter that was not possible to control for in the study. (Kotiranta et al. 2007) The research point out some of the difficulties for mapping out the effects of women in top management on company financial performance. The correlation can be studied from multiple perspectives, and thus the research approach selected for this study is examined in the methodology chapter.

Previous research that has estimated a linear relationship between gender diversity and firm performance has showed a positive, negative or no relation at all. Some differences in results within the topic of gender diversity and firm performance can be due to differences in data, for example from different countries. Differences can also be due to different performance measures and estimation methods. Joecks et al. (2013) argue that the differing results between studies measuring the correlation between gender diversity and firm performance depend on the relationship not being linear, but shaped as a U-curve (Joecks et al. 2013).

Joecks et al. (2013) point out that the average ratio of female top managers in the dataset has an impact on the results. The researchers argue that studies with data consisting of low female representation on average find a negative linear correlation with firm performance. On the contrary, studies with data of high female representation on average show a positive linear correlation with firm performance. This is because the negative and positive linear correlations show only one part of the actual relationship, which is formed as a U-curve according to Joecks et al. (2013). The negative correlation is the downward-going slope in the curve and the positive correlation is the upward-going slope in the curve. (Joecks et al. 2013)

Joecks et al. (2013) describe the impact of gender diversity on firm performance with the help of four groups with different levels of diversity. The group types originally presented by Kanter (1977) are uniform groups, skewed groups, tilted groups and balanced groups. In a uniform group, all members share the same characteristics. On the other hand, in a skewed group there are a few members that do not belong to a dominant member type controlling the group. Unlike in skewed groups, the minority members in a tilted group have a possibility to influence, since they already represent a subgroup. The last group, called balanced group has no majorities or minorities but all individuals stand with their own skills and abilities. (Kanter 1977)
Kanter (1977) describes the skewed groups with approximately 20% women to be the most problematic, since in these groups the few “tokens” not belonging to the dominant member type are either overlooked or stereotyped. Female tokens can react in different ways, but typical reactions according to Kanter (1977) are to pretend that differences between women and men do not exist or they conceal their individual features behind stereotypes. The problems with skewed groups can also imply that uniform groups in which all members are of the same gender are more efficient than skewed groups. (Kanter 1977) Based on this argument Joecks et al. (2013) show that the relationship between firm performance and gender diversity is formed as a U-curve, were the bottom of the curve is characterized by skewed groups. (Joecks et al. 2013)

An alternative explanation to a curvilinear relationship is presented by Richard et al. (2004). The assumption of the study by Richard et al. (2004) is that homogenous groups have no cultural barriers and form positive social contacts within the group, which results in better firm performance in homogenous groups. In contrast, moderately heterogeneous groups are characterized by relationship conflict, communication problems and low identification of members within a work group, which in turn leads to low performance. However, high levels of heterogeneity are not disturbed by different social identities, have many contacts outside the group and can benefit from the diverse pool of knowledge and experience. (Richard et al. 2004)

The hypotheses formulated by Richard et al. (2004) were studied on a sample of 153 banks in 1998. They focused on two characteristics of the banks: innovativeness and risk-taking. The study showed that banks with innovative strategies correlate with higher productivity in banks with both heterogeneous and homogeneous management. On the other hand, banks also focusing on innovative strategies but with a moderately heterogeneous management, showed lower productivity. Interestingly, the results were the opposite for banks characterized by high levels of risk-taking. These banks had the best productivity with moderate heterogeneous management and lowest productivity in banks with heterogeneous and homogeneous management. (Richard et al. 2004)

The research discussed in this chapter shows that there are various results concerning the correlation between gender diversity and firm performance. Besides the differing theoretical predictions, the diverse empirical evidence may be due to different estimation approaches. Further, there may be a number of variables, which affect firm
performance but are not included in the estimation model and remain unobserved by the researcher. In table 1 below the previous researches discussed are summarized.

When comparing previous research results that show a linear relationship with results showing a non-linear relationship, the non-linear correlation appears to be a more logical approach. If either gender is represented at higher than 50 %, the other gender is a minority. Therefore, ideal gender diversity would be 50 % women and 50 % men in executive management. The possibility of non-linearity is important to take into account in the empirical part of the study. The methodology of this study will be elaborated in chapter 4. Before moving on to the methodology part, a general background of the current situation in Finland regarding gender diversity in top management is discussed in the following chapter.
<table>
<thead>
<tr>
<th>Authors (year)</th>
<th>Linear relationship</th>
<th>Non-linear relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shrader et al. (1997)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jalbert et al. (2013)</td>
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<td></td>
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<tr>
<td>Kotiranta et al. (2007)</td>
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<td>Joecks et al. (2013)</td>
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<tr>
<td>Richard et al. (2004)</td>
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<table>
<thead>
<tr>
<th>Management level</th>
<th>Linear relationship</th>
<th>Non-linear relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle and senior management levels, board of directors</td>
<td>CEO</td>
<td>Board of directors, Executive management</td>
</tr>
<tr>
<td>CEO, chairperson, board of directors</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Measurement for gender diversity (explanatory variable)</th>
<th>Linear relationship</th>
<th>Non-linear relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women’s ratio</td>
<td>Dummy</td>
<td>Dummy (4 categories for different percentages of women in the board), Blau’s index</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measurement for firm performance (dependent variable)</th>
<th>Linear relationship</th>
<th>Non-linear relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROS, ROA, ROI, ROE</td>
<td>Various measures, e.g. ROA, dividend pay out, debt to assets ratio</td>
<td>ROA, ROI, ROS</td>
</tr>
<tr>
<td></td>
<td>Blau’s index</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Dataset (N, country, years)</th>
<th>Linear relationship</th>
<th>Non-linear relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>6305 firms from Forbes Compensation List, US, years 1997-2006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 738 listed and non-listed firms, Finland, year 2003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>151 listed firms, Germany, years 2000-2005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>153 banks, US, year 1998</td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>Main result</th>
<th>Linear relationship</th>
<th>Non-linear relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>No strong evidence for better performance in firms employing higher percentages of women.</td>
<td>Female CEO’s correlate positively with sales growth, institutional ownership, ROI, ROA and price to earnings ratio.</td>
<td>Relationship follows a U-shape; at least 30% females define a &quot;critical mass&quot; affecting firm performance positively.</td>
</tr>
<tr>
<td></td>
<td>Female led companies are on average about 10% more profitable.</td>
<td>Banks focusing on innovations have higher productivity with homogeneous and highly heterogeneous managements.</td>
</tr>
</tbody>
</table>

Table 1 Summary of previous research
3 GENDER DIVERSITY IN FINLAND

Equality between genders has been an important issue in Finland for decades, but still relatively few women reach executive management level in Finnish listed firms today. This chapter gives a general background for the study by introducing statistics about gender diversity in top management in Finland compared to other European Union countries. Also problems in Finnish women’s career advancement are discussed and whether upcoming generations will solve the problem of few women promoted to leadership positions.

Finland is a good example of how a relatively high degree of gender diversity compared to other European Union countries can be reached without quotas. Many European countries have applied Finnish listed companies’ corporate governance codes regarding gender diversity into their own recommendations for corporate governance practices. (Linnainmaa & Turunen 2014) However, Finland is not “best in class” compared to other European Union countries, despite a large proportion of women having a high degree of education and the majority of university students being women (Tilastokeskus 2014).

Figure 1 Gender diversity in top management in EU 2013 (source: European Commission – Directorate-General for Justice 2013)
Figure 1 above shows the share of women of both non-executive directors and senior executives of large listed companies in the European Union in April 2013. The countries in the figure are ranked by the share of women in the executive management teams and non-executive boards combined, so that the countries are in the same order in both the upper and lower part of the chart. As can be seen from the figure, Finland is ranked within EU as the fourth country with the number of women in leadership positions combined. Regarding the percentage of women in non-executive boards, Finland is ranking in the top with 30.2% in 2013. However, female executive directors are just above average in Finland with 12%. (European Commission – Directorate-General for Justice 2013)

The statistics in figure 1 are based only on large cap companies in EU countries. There are relatively few large cap companies in Finland. According to Linnainmaa and Turunen (2014) the number of female executive directors in Finnish listed companies, including small and mid cap companies have been slowly increasing during the past few years. Interestingly, the growth of female executive directors has been the fastest in small cap companies compared to a more stable development in mid and large cap companies. If not accounting for the CEO, the percentage of women in executive management was 18.5% in 2012, 19.2% in 2013 and 20.7% in 2014. (Linnainmaa & Turunen 2014)

A problem in women’s career advancement is that many of the positions women occupy within executive management are vice-president positions in support functions, such as human resources, research and development as well as marketing and communication tasks. Research has shown that this can hinder women’s advancement to CEO positions (Smith et al. 2013). This is because CEO’s more often have experience of vice-president tasks within business operations, such as sales and production areas rather than support functions. (Smith et al, 2013) In Finnish listed firms only one female held a CEO position in the year 2013 (Linnainmaa & Turunen 2013). The gender distribution between different functions in executive management in Finnish listed firms in 2013 is shown in figure 2. From the figure it can be seen that female executive directors were mostly leading human resources, whereas male executive directors were mostly leading business operations, sales and financials. (Linnainmaa & Turunen 2013)
Niederle and Vesterlund (2007) present commonly perceived reasons for differences in the number of promoted women versus men. These are among other reasons that women are less self-confident in their abilities and are not interested in responsible positions to the same degree as men. (Niederle & Vesterlund 2007) According to Klaile (2013) these reasons do not stand for Finnish female managers, since in her study 90 % of the questioned women show confidence in their abilities and skills for career advancement to senior level positions or higher. (Klaile 2013)

According to Klaile (2013) women are not sending as many signals about their skills and their will to be promoted compared to men. Therefore, women seem to have lower career ambitions, even if they believe they have the required skills for leadership roles. Signalling of the right abilities is often needed, if a person desires a top management position. When having children women are away from the labour market for long periods of time, which limits their signalling frequency. During that time women cannot use their full potential, while men will have an advantage in their career ambitions. Returning to the labour market after childbirth can also mean difficulties in signalling due to loss in human capital or less time that is allocated to work compared to the time before having children. Due to women’s lower signalling frequency, it will take longer for women to be promoted to vice-president positions and even longer to
CEO positions. It also needs to be considered that there is a limited amount of years to a human’s working life. (Klaile 2013)

A common understanding is that the long traditions of a workforce dominated by men is hindering women’s promotion to management positions, but that there is a change happening now that more women have a higher education. In a report on female leadership in Finland, Linnainmaa and Turunen (2014) present new evidence of the fact that there is a change happening among younger generations in Finnish listed firms. As can be seen from figure 3, in 2013 women accounted for 17% of all executive managers between 36 and 40 years and 25% of all executive managers below 35 years. The corresponding numbers in 2014 were 24% women of all executive managers between 36 and 40 years and 44% women of all executive managers below 35 years. However, it needs to be kept in mind that the total number of executive managers between 36 and 40 years is only 10% of all executive managers, whereas executive managers below 35 years is only 1% of all executive managers in Finnish listed firms. (Linnainmaa & Turunen 2014)

![Figure 3](image)

**Figure 3** Women in executive management by different age groups in Finnish listed firms 2013-2014 (source: Linnainmaa & Turunen 2014)

As mentioned, women promoted to executive management often end up leading support functions, rather than leading business operations. However, a change can be seen when examining younger women being promoted. Younger women are according
to Linnainmaa and Turunen (2014), receiving more responsibility within executive management in Finnish listed firms. In the age group of 51-60 year old women in executive management, 88 % manage support functions, whereas only 17 % manage business operations. The number of women leading business operations doubles when looking at women under the age of 50. In addition, already 37 % of women under the age of 40 have a leading role in a business operation. A similar pattern is not seen when studying men between different age groups. On the contrary, men are more frequently occupying leadership roles in business operations at older ages. In the light of Linnainmaa’s and Turunen’s observations, you can ask whether upcoming generations will solve the problem of few women promoted to leadership positions in business operations. (Linnainmaa & Turunen 2014)
4 METHODOLOGY

This chapter discusses the methods applied to address the research question. The hypothesis of the study is also stated. Moreover, the chapter describes the sources of data and the selection of data used in the study. The main focus of the study is to investigate whether the presence of women in top management has positive effects on firm outcomes. Other explanatory variables are included in the regression model to control for other possible effects on firm performance besides gender diversity.

4.1. Hypothesis

The hypothesis of the empirical study is based on previous research presented earlier in this study. Assuming equal distribution of management talent between genders, implies that the smaller number of women promoted to top management positions on average have higher qualifications than the larger number of men promoted to the same positions (Smith et al. 2006). Therefore, women promoted to top management can have positive effects on firm performance. Other reasons for why gender diversity matters in top management is that a more diverse management can consider more alternatives when making decisions as well as have a broader range of experiences and understanding for different market segments (e.g. Singh & Vinnicombe 2004).

The hypothesis, which is stated to address the research question, is formulated to estimate the validity of the arguments presented about the effects on gender diversity with empirical data. The hypotheses are drawn as an alternative hypothesis and a null hypothesis. The hypotheses are formulated as follows:

\[ H_1: \text{Women in executive management teams in Finnish listed firms correlate positively with firm performance.} \]

\[ H_0: \text{Women in executive management teams in Finnish listed firms do not correlate with firm performance.} \]

The alternative hypothesis \( (H_1) \) states that women in executive management have a positive impact on firm performance when controlling for firm specific characteristics, whereas the null hypothesis \( (H_0) \) implies that firm performance is indifferent to the level of women in the executive management team when controlling for firm specific characteristics. The firm specific characteristics will be described in detail later in the
chapter. Women in executive management are measured by the percentage of women in the management team and firm performance is measured by return on assets.

If the null hypothesis can be rejected, it states that women have a positive effect on firm performance. On the other hand, failure to reject the null hypothesis implies that there is no correlation between gender diversity in top management and firm performance in the dataset. Further, failure to reject the null hypothesis can also imply that the correlation between women in executive management and firm performance is better explained by a non-linear correlation. This will be discussed in the later parts of the study.

4.2. Research method

The research approach is based on previous research on the correlation between gender diversity and firm performance. For example, Kotiranta et al. (2007) found that in the year 2003 female managers had a positive influence on Finnish firms’ financial performance. Smith et al. (2006) also present evidence of gender diversity having a positive correlation with firm value in Danish firms. The description of the research method will include a presentation of the variables, collection of data and data processing.

4.2.1. Variables

Commonly used variables for gender diversity in previous research are the percentage of women or an index measuring gender diversity (e.g. Blau’s index), whereas often used measurements for firm performance are return on assets (ROA), return on equity (ROE), return on sales (ROS) and return on investment (ROI) (e.g. Kotiranta et al. 2007; Jalbert et al. 2013). Control variables that have commonly been used to control for other effects on firm performance are total assets of the firm and sales growth to identify firm size effects. Further, price to book ratio and price to earnings ratio have commonly been used to control shareholder perceptions, as well as industry dummies to control industry differences (e.g. Jalbert et al. 2013).

The variables used in this research are presented below. The dependent variable used for measuring firm performance is return on assets. Female representation in top management teams is measured by the percentage of women and a dummy for having at least one female on the executive management team. The rest of the variables
presented will be used as control variables in the regression: executive management team size, firm size, debt to assets, price to book and a dummy variable for high technology firms. The variables are summarized in table 3 later on in this section.

**Dependent variable**

In this research return on assets (ROA) is used as a measurement for firm performance, which is the dependent variable in the regression model. The higher the ROA is, the more the company is earning on less investment. In other words, ROA illustrates how efficiently management is using the company's assets, regardless of size. ROA is calculated as net income divided by total assets. In previous literature, ROA has frequently been used as a measurement for firm performance when studying the impact of gender diversity (e.g. Kotiranta et al. 2007; Smith et al. 2006).

A few previous researchers have also used ROE (return on equity) as a performance indicator (e.g. Shrader et al. 1997). The difference between ROA and ROE depends on the debt ratio. In the case that two firms have the same ROA that exceeds the loan interest rate, the more indebted firm will have a higher ROE. Better performance produced by higher leverage is not of interest when evaluating management performance; therefore, ROA is better suited for this analysis.

**Independent variables**

The main focus of the study is the variable for female executive directors measured by the percentage of women. Moreover, a dummy variable for female representation in the executive team is created, which takes the value 1 if at least one female is represented in the executive management and 0 otherwise. The expected signs for the variables measuring female representation on executive management are positive in relation to firm performance according to the hypothesis.

The percentage of women as the independent variable is used to estimate whether or not companies with more women on the executive management have higher ROA. Further, the dummy as the independent variable is used to estimate if women per se can enhance performance. If the results would show a negative or insignificant dummy but a positive variable for the percentage of women, it would imply that gender diversity is needed to improve firm performance, while only the appearance of women on the management team does not improve performance. The opposite finding would be a positive dummy but a negative or insignificant percentage of women, which would
suggest that it is enough with at least one female on the executive team in order to improve firm performance.

**Control variables**

Another executive management team characteristic included in the regression is the size of the executive management team, which is used as a control variable. Previous studies within the field have similarly used management team size as a control variable, for example Dezso et al. (2012) among others. The size of the executive management team is likely to be related to the size of the company. Multicollinearity will be examined between the independent variables in the following chapter.

Different firm characteristics are also used as control variables in the regression. Firstly, it is important to include a control variable for firm size, since this is assumed to have an impact on firm performance. The variable for firm size is measured as the logarithm of total assets. Larger firms can take advantage of economies of scale effects or market dominance positions (Smirlock et al. 1984). Therefore, the size of a firm is estimated to positively correlate with firm performance. For example, Dwyer et al. (2003) found a positive correlation between firm size and firm performance (measured in employee productivity and return on equity).

Furthermore, a variable for debt to assets is included in the regression and measured as total debt divided by total assets. The ratio shows the proportion of a company’s assets that are financed through debt, in other words the leverage of the company. A debt to assets ratio less than 0.5 means that most of the firm’s assets are financed through equity, whereas a ratio greater than 0.5 means that most of the firm’s assets are financed through debt. There is a trade-off between the effects of too much leverage versus too little leverage on the value of a firm. Too much leverage is associated with financial distress costs. If a company is financing its operations with debt to an excessive extent, it can create a solvency risk. On the other hand, too little leverage is associated with agency costs, due to lack of creditors monitoring the management. (Berk & DeMarzo 2014) Dezso et al. (2012) also included debt to assets as a control variable when studying the correlation between gender diversity and firm performance. They found a negative correlation between this control variable and firm performance (measured in Tobin’s q). (Dezso et al. 2012)
In order to include a measure for how shareholders perceive the firm value, the ratio of price to book value is included in the model. The price to book value is measured as the closing price of stock at the end of the year divided by the book value of equity. The higher the price to book value is, the higher shareholders value the firm. For example Jalbert et al. (2013) used the price to book value as a control variable when measuring the effect of gender diversity on several firm performance indicators. They found a positive relation between the control variable and firm performance. (Jalbert et al. 2013)

Lastly, it is important to pay attention to differences between industries, since this can have an effect on return on assets. For example Smith et al. (2006) have controlled for the effects of different industries on firm performance in their study about female top managers. Controlling for all different industries represented in the Finnish listed firms is not applicable in this study, because only a few companies represent certain industries and thus, cannot give a reliable estimate of these industries. Instead, the effect of firms within a high technology industry is controlled for in this study. The industry is controlled by a dummy variable for high technology firms. The dummy is measured as 1 if the company belongs to a high technology industry and 0 otherwise.

In table 2 below, all variables used in the regression estimating the relation between female executive managers and firm performance are summarized. The table explains how the variables are measured as well as the variable name used in the regression model.
<table>
<thead>
<tr>
<th>Variables used in the regression estimating the relation between female executive managers and firm performance</th>
<th>Variable measurement</th>
<th>Variable name in the regression equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on assets</td>
<td>Net income divided by total assets.</td>
<td>ROA</td>
</tr>
<tr>
<td>Percentage of women executive directors</td>
<td>Number of female executive directors divided by total number of directors in the executive management team.</td>
<td>PWOMEN</td>
</tr>
<tr>
<td>Dummy variable for female executive directors</td>
<td>The dummy variable takes the value 1 if at least one female is represented on the executive management team and 0 otherwise.</td>
<td>DWOMEN</td>
</tr>
<tr>
<td>The size of the executive management team</td>
<td>Total number of directors in the executive management team.</td>
<td>Management size</td>
</tr>
<tr>
<td>Total assets</td>
<td>The natural logarithm of total assets in thousand euros.</td>
<td>Firm size</td>
</tr>
<tr>
<td>Ratio of debt to assets value</td>
<td>Total debt divided by total assets.</td>
<td>Debt to assets</td>
</tr>
<tr>
<td>Ratio of price to book value</td>
<td>The closing value of stock divided by the book value of equity at the year-end.</td>
<td>Price to book</td>
</tr>
<tr>
<td>Dummy variable for firms within a high technology industry</td>
<td>The dummy variable takes the value 1 if the company is within a high technology industry and 0 otherwise.</td>
<td>High tech</td>
</tr>
</tbody>
</table>

Table 3  Variables used in the regression model
4.2.2. Data collection

In the following section the sources for the data as well as the sample size are presented. The Finnish Chamber of Commerce have conducted statistical studies about gender issues in Finland and collected similar data that was needed for the empirical research in this study.

Sources of empirical data

The Finnish Chamber of Commerce has published several studies about female business leaders in Finland based on collected data from the websites of Finnish listed companies. The studies present statistical analysis of the composition of gender diversity in Finnish listed firms. Their data consisting of information about executive management teams in Finland was given for this research. The data was completed with financial data from the database Orbis as well as companies' annual reports.

The data given by the Finnish Chamber of Commerce consists of the number of executive management members, the number of female executive managers, the size of the company categorized into small, mid and large cap companies and the industry of the company for all Finnish listed firms in 2013. The dataset on the proportions of women and men was completed with financial data collected from Orbis’ database. The numbers that the database was lacking were collected from the annual reports of the specific companies in order to get a dataset as complete as possible.

Sample size and selection

The sample of the empirical study consists of all Finnish listed firms in the year 2013, which add up to 119 firms. However, three of the companies could not be included because they were delisted during 2013. These three companies were GeoSentric Oyj, Stonesoft Oyj and Tiimari Oyj (Nasdaq GlobeNewswire 2013a; Nasdaq GlobeNewswire 2013b; Nasdaq GlobeNewswire 2013c). Extreme values were also excluded from the regression model, since they were seen as outliers in the regression estimate. The process of excluding these extreme values will be described in more detail in the following chapter.

Finland has relatively large numbers of women in boards of directors compared to other EU countries. However, the percentage of women is still relatively low in executive management. The data used for female executive managers consists of the
whole executive management team in which the chief executive officer is seen as a member of the team. The percentage of women including the CEO in the executive management team was 16.7% in the year 2013. If evidence can be found that women enhance firm performance, this gives a reason as to why gender diversity should be improved even in executive management teams. This motivates a study focusing on management teams, rather than boards of directors in Finland. Furthermore, executive management has a central role in the daily operations of a company, whereas the board of directors has roles of controlling and advising. Thus, executive management can have an even larger effect on firm financial performance compared to the board of directors.

4.2.3. Data processing

The main analysis method in the study will be multiple regression analysis, which will be used for testing the significance of the whole model (F-test) and the significance of individual parameters (t-test). The ordinary least square (OLS) method is used to estimate a linear slope between the dependent and independent variables. The regression equation is:

\[ y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n + \epsilon \]

The independent variables in the regression equation above are \( x_1, x_2, \ldots, x_n \) and the dependent variable is \( y \). The parameter \( \beta_0 \) stands for the intercept, which is the value of the dependent variable when all independent variables are zero. Epsilon (\( \epsilon \)) represents the error term in the model, or in other words those effects that are not explained by any of the independent variables. The parameters \( \beta_i - \beta_n \) indicate a predicted value for the effect each independent variable has on \( y \). The parameters also referred to as regression coefficients measure the impact when all other parameters are unchanged (ceteris paribus). For example a unit change in \( x_i \) is associated with a change in \( y \) by \( \beta_i \), ceteris paribus. In this study \( y \) stands for firm performance, whereas \( x \)-values are variables for the percentage of women in executive management and a number of firm specific control variables. (Freund 2006)

The first step of the regression analysis is to test a simple regression model with female managers as the only explanatory variable for firm performance. The next step is to include the control variables in the model. The F-test is used to determine whether or not a significant correlation exists between the dependent variable and the set of all
independent variables. Whereas, t-test is used to determine whether or not each of the individual independent variables are significant (Anderson et al. 2014).

According to previous research there are also results indicating that the relationship between gender diversity and firm performance is non-linear. This possibility will also be estimated in this research. A squared term of the variable for percentage of women is used to estimate non-linearity. To account for a non-linear relationship, the regression equation is formed as:

\[ y = \beta_0 + \beta_1 x_1 + \beta_2 x_1^2 + \beta_3 x_2 + \ldots + \beta_n x_n + \varepsilon \]

where \( x_1 \) is the variable for the percentage of women in executive management and \( x_1^2 \) is the square of the variable. The variables \( x_2 - x_n \) stand for the same control variables as used in the regression equation estimating a linear relationship and \( y \) stands for return on assets. If the estimated regression equation shows a negative value for the coefficient \( \beta_2 \) and a positive value for the coefficient \( \beta_1 \), the estimation indicates that the curve is formed as a reverse U-curve with a maximum point. On the other hand, if the estimated regression equation shows a positive value for the coefficient \( \beta_2 \) and a negative value for the coefficient \( \beta_1 \), the estimation indicates that the curve is formed as a U-curve with a minimum point.

**Multicollinearity**

In this section multicollinearity as a statistical problem is described, since it will be taken into consideration in the data processing. Multicollinearity appears when many of the explanatory variables correlate with each other. If there is multicollinearity in the regression model, it cannot estimate which of the independent variables has an effect on the dependent variable. A typical result of high multicollinearity occurs when none or few parameters are significant, whereas the coefficient of determination, R-squared, is high. (Koop 2008) Calculating the variance inflation factor (VIF) for each independent variable in the model is a way of detecting multicollinearity. The variance inflation factor is defined as:

\[ \text{VIF} (x_j) = \frac{1}{1 - R_j^2} \]

where \( R_j^2 \) is the coefficient of determination found when each independent variable (\( x_j \)) is regressed on all remaining independent variables in the model. If \( x_j \) is not correlated
with other predictors, $R_j^2$ is close to 0 and VIF is close to 1. According to Anderson et al. (2009) VIF values of ten or more are considered as problematic. (Anderson et al. 2009)
5 EMPIRICAL FINDINGS

The aim of this chapter is to describe the empirical results found when investigating the research question of the study. Before analysing the regression model, descriptive statistics for the dataset are presented. The first regression model estimated is a simple regression between firm performance and female executive directors, before all other control variables are included in the regression and analysed by the ordinary least square method. Non-linearity will be estimated after considering the results of the linear estimation.

5.1. Descriptive statistics

In table 4 descriptive statistics of the variables used in the regression model are presented. Firstly, this section focuses on the independent variable measuring the percentage of women (PWOMEN) and the dependent variable measuring return on assets (ROA). Secondly, the control variables are discussed.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Average</th>
<th>Max</th>
<th>Min</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWOMEN</td>
<td>116</td>
<td>16,960</td>
<td>66,667</td>
<td>0</td>
<td>13,740</td>
</tr>
<tr>
<td>DWOMEN</td>
<td>116</td>
<td>0,750</td>
<td>1</td>
<td>0</td>
<td>0,435</td>
</tr>
<tr>
<td>ROA (%)</td>
<td>116</td>
<td>0,553</td>
<td>21,440</td>
<td>-53,510</td>
<td>11,588</td>
</tr>
<tr>
<td>Management size</td>
<td>116</td>
<td>7,267</td>
<td>17</td>
<td>1</td>
<td>2,860</td>
</tr>
<tr>
<td>Total assets (th EUR)</td>
<td>116</td>
<td>2 305 846,9</td>
<td>43 720 000</td>
<td>6 448</td>
<td>6 207 607,9</td>
</tr>
<tr>
<td>Log total assets</td>
<td>116</td>
<td>12,697</td>
<td>17,593</td>
<td>8,772</td>
<td>2,051</td>
</tr>
<tr>
<td>Debt to assets</td>
<td>116</td>
<td>0,579</td>
<td>1,265</td>
<td>0,051</td>
<td>0,186</td>
</tr>
<tr>
<td>Price to book</td>
<td>116</td>
<td>2,053</td>
<td>17,270</td>
<td>-10,900</td>
<td>2,650</td>
</tr>
<tr>
<td>High tech dummy</td>
<td>116</td>
<td>0,147</td>
<td>1</td>
<td>0</td>
<td>0,355</td>
</tr>
</tbody>
</table>

Table 4 Descriptive statistics
PWOMEN stands for the percentage of women, while DWOMEN represents the dummy variable for women in executive management. The average percentage of women in executive management in 2013 is approximately 17%. It is observed that one company has an executive management with over 50% women (the maximum value of 67% women is observed in the company Marimekko Oyj). The descriptive statistics of the dummy variable in table 4 shows that 75% of the companies have at least one female in executive management.

In figure 4 a bar chart for the data of female executive managers in all listed firms is presented. A small proportion of the companies have over 30% women, whereas a large proportion of companies in the data have 0% women in executive management. These proportions make the diagram skewed right. Usually, skewed data can be transformed with the help of taking the logarithm of the values, but this is not possible for zero values. However, it is important to understand the effects of the independent variable on the dependent variable. Later in this chapter, the effect of the coefficient for women in executive management on return on assets will be interpreted.

![Bar chart for female executive managers of 116 Finnish listed firms 2013](image)

When comparing the average value with the maximum and minimum values of ROA in the descriptive statistics, some extreme values can be observed for the variable. The maximum value is 21.4% and minimum value is -53.5% compared to an average value of 0.553%. Four companies have extreme negative values of ROA, which can also be seen in figure 6. Figure 5 shows a bar chart of ROA for all listed firms and figure 6 a scatter plot of ROA and female executive managers. The companies with extreme
negative ROA are Cencorp Oyj (ROA -37.89%), Incap Oyj (ROA -53.51%), Ixonos Oyj (ROA -48.41%) and Takoma Oyj (ROA -48.46%). These outliers are excluded in the regression model presented in this chapter, but results including the outliers are found in appendices 1 and 2. As can be compared later in this chapter, the outliers influence the significance of the variable for women in executive management.

Figure 5  Bar chart for return on assets of 116 Finnish listed firms 2013

Figure 6  Scatter diagram for ROA (%) and female executive managers (%) of 116 Finnish listed firms 2013
In the scatter diagram in figure 6 there is no clear relationship between ROA and women in executive management. Still, another outlier can be seen in the diagram. The observation of 67% women in executive management is also excluded from the regression model in this chapter, but included as well in the regression results presented in appendix 3. This observation was considered to influence the results as an outlier when looking at the residuals of the estimated regression. The residuals will be discussed more in detail later in the chapter.

When looking at the control variables presented in the descriptive statistics certain characteristics can be seen for the data. The average number of executive management team members is 7 in Finnish listed firms in 2013. The observed companies have at the most 17 team members and at the least only 1. Moreover, close to 15% of the Finnish listed firms are among high technology industries as can be concluded from the average value for the high tech dummy. The dummy takes the value 1 if the company is within a high technology industry and 0 otherwise.

Further, from the descriptive statistics it can be seen that the difference between the total assets in the largest companies and smallest companies is large, which can be determined from the large standard deviation for total assets. The natural logarithm is taken for the values of total assets (log total assets) in order to make the variable normally distributed. Firm size is expected to correlate positively with firm performance, since larger firms can be expected to have more market power.

According to the average value for debt to assets, most companies’ debt size is a little more than half the size of their assets. The larger the size of debt, the larger the value for debt to assets gets. A financial structure consisting of excessive debt can be risky for a firm confronting difficulties in its business. According to previous research in the field finding a negative correlation between debt to assets and firm performance, indicates that the expected sign for the control variable in the regression is negative (e.g. Dezso et al. 2012).

The variable for price to book is defined as the closing price of the company’s share price at the year-end compared to its’ book value of equity. If the price to book value is high, it means shareholders are valuing the company’s future business opportunities positively. Previous researchers have found a positive correlation between this control variable and firm performance (e.g. Jalbert et al. 2013). In correspondence with
previous research, the expected sign of the variable for price to book in the regression is positive.

5.2. Multicollinearity

A statistical problem in regression analysis is multicollinearity between some of the explanatory variables. Multicollinearity occurs when two of the independent variables are highly correlated. In table 5 below, the correlations between all independent variables are presented.

The variable for the percentage of women does not correlate highly with any of the other explanatory variables except for the dummy variable for women. This is not a problem, since these two variables are not included in the same regression model. However, the dummy variable for women does correlate with management size (0.3198), which means that larger teams are more likely to include at least one female. The variable for firm size also correlates highly with management size (0.5372), which indicates that larger firms in terms of total assets also are more likely to have larger executive management teams.

<table>
<thead>
<tr>
<th>PWOMEN</th>
<th>DWOMEN</th>
<th>Firm size</th>
<th>Debt to assets</th>
<th>Price to book</th>
<th>Management size</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWOMEN</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DWOMEN</td>
<td>0.7158</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm size</td>
<td>-0.0353</td>
<td>0.2350</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt to assets</td>
<td>-0.0101</td>
<td>0.1181</td>
<td>0.1788</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Price to book</td>
<td>0.0721</td>
<td>0.0190</td>
<td>-0.0777</td>
<td>0.0180</td>
<td>1.0000</td>
</tr>
<tr>
<td>Management size</td>
<td>-0.0216</td>
<td>0.3198</td>
<td>0.5372</td>
<td>0.0730</td>
<td>0.0529</td>
</tr>
</tbody>
</table>

Table 5  Correlation matrix

In order to identify possible multicollinearity the variance inflation factor (VIF) is calculated for each independent variable. The VIF is defined in the methodology part (see section 3.2.3). The calculations indicate that VIF is below 2 for all independent variables. Therefore, it can be concluded that there is not a problem of multicollinearity in the regression model.
5.3. Linear correlation analysis

A simple regression model is conducted for both the percentage of women in executive management against ROA and for the dummy variable of female executive managers against ROA. The simple regression is made to find out, if women in executive management can explain ROA without any control variables included.

The regression equations for the simple regressions are as follows:

\[ ROA = \beta_0 + \beta_1 (PWOMEN) + \varepsilon \]

\[ ROA = \beta_0 + \beta_1 (DWOMEN) + \varepsilon \]

<table>
<thead>
<tr>
<th>ROA</th>
<th>ROA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>Constant</td>
</tr>
<tr>
<td>1,163</td>
<td>2,980***</td>
</tr>
<tr>
<td>DWOMEN</td>
<td>PWOMEN</td>
</tr>
<tr>
<td>1,501</td>
<td>-0,042</td>
</tr>
<tr>
<td>N = 111</td>
<td>N = 111</td>
</tr>
<tr>
<td>F statistic</td>
<td>F statistic</td>
</tr>
<tr>
<td>0,889</td>
<td>0,600</td>
</tr>
</tbody>
</table>

* p<0,10 ** p<0,05 *** p<0,01

Table 6 Simple regression results

No correlation between female executive managers and ROA can be seen in either one of the simple regression results presented in table 6. The F-statistics indicate that both models are insignificant. The simple regression results show that many other factors than simply women in executive management impact a firm’s return on assets. Therefore, the influence of other variables is important to include in the model.

Other firm specific characteristics that might affect the level of ROA are included in the regression equations below. In order to account for firm size effects the logarithm of total assets is included in the regressions. A control for management size is also included. Further, debt to assets ratio gives a measure for the leverage of the firm, whereas price to book ratio gives an estimate of how shareholders perceive the firm. Finally, the dummy variable for high technology industries is included in the models in order to control for the effects of this industry on firm performance.
The following regression equations are estimated:

\[ ROA = \beta_0 + \beta_1 \text{(PWOMEN)} + \beta_2 \text{(firm size)} + \beta_3 \text{(management size)} + \beta_4 \text{(price to book)} + \beta_5 \text{(debt to assets)} + \beta_6 \text{(high tech)} + \varepsilon \]

\[ ROA = \beta_0 + \beta_1 \text{(DWOMEN)} + \beta_2 \text{(firm size)} + \beta_3 \text{(management size)} + \beta_4 \text{(price to book)} + \beta_5 \text{(debt to assets)} + \beta_6 \text{(high tech)} + \varepsilon \]

<table>
<thead>
<tr>
<th>Variable</th>
<th>ROA</th>
<th>ROA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-6,405</td>
<td>-6,761</td>
</tr>
<tr>
<td>Firm size</td>
<td>1,274***</td>
<td>1,210***</td>
</tr>
<tr>
<td>Management size</td>
<td>-0,158</td>
<td>-0,185</td>
</tr>
<tr>
<td>Price to book</td>
<td>1,310***</td>
<td>1,320***</td>
</tr>
<tr>
<td>Debt to assets</td>
<td>-15,027***</td>
<td>-15,211***</td>
</tr>
<tr>
<td>High tech</td>
<td>0,366</td>
<td>-0,222</td>
</tr>
<tr>
<td>PWOMEN</td>
<td>-0,039</td>
<td></td>
</tr>
<tr>
<td>DWOMEN</td>
<td></td>
<td>1,194</td>
</tr>
<tr>
<td>F statistic</td>
<td>7,231***</td>
<td>7,212***</td>
</tr>
<tr>
<td>R-squared (adj. R²)</td>
<td>0,294 (0,254)</td>
<td>0,294 (0,253)</td>
</tr>
</tbody>
</table>

| N = 111        | N = 111      |

* p<0,10  ** p<0,05  *** p<0,01

Table 7  Multiple regression results

The results of the OLS estimates for both regression equations are shown in table 7. The results for the regression equation with the variable for percentage of women included are found on the left hand side, and the results for the regression equation with the dummy for women included are found on the right hand side. All other control variables, except for management size and high technology, show significant results on a 1% significance level in both the regression measuring the percentage of women and the dummy variable for women. This means that the variables for firm size, debt to assets and price to book have a significant effect on firm performance. Firm size and
price to book correlate positively with ROA, whereas debt to assets correlates negatively with ROA. The correlations for the control variables are in accordance with the expected signs for the correlations.

Both the variable for the percentage of women and the dummy for women are insignificant in the regression results shown in table 7. It can be observed that the variable for the percentage of women has a negative sign, whereas the dummy has a positive sign. This indicates that firms with at least one female in their executive management show a better result in terms of return on assets compared to firms with no women in their executive management. Yet no evidence can be given that women per se have a positive effect on firm performance. Neither can evidence be given that higher percentages of women in executive management would enhance firm performance based on the linear regression results. Regression results with outliers included are shown in appendix 1. The results are similar to the results in table 7 showing no explanatory power for either PWOMEN or DWOMEN.

5.4. Non-linear correlation analysis

It can be questioned whether there is an optimal point for gender diversity in executive management. Arguably, an optimal point would occur at 50 % women and 50 % men, since in other cases either gender is in majority/minority. According to Richard et al. (2004) and Joecks el al. (2013) among others the relationship between gender diversity and firm performance is non-linear.

On the contrary, Kotiranta et al. (2007) conclude their study by stating a positive linear effect of women in top management on firm performance. However, Kotiranta et al. (2007) also argue that a non-linear relationship can be studied with the same dataset. They found that the effect of female top managers on firm performance is at its strongest with a percentage of around 50 % women in top management. Still, the linear results of Kotiranta et al. (2007) remain valid within the confidence interval of the non-linear results. (Kotiranta et al. 2007)

Based on the non-linear results shown by previous research, the possibility of non-linearity will be estimated for this study as well. The non-linear relationship will be estimated by including a squared term of the variable for percentage of women SQ(PWOMEN) in the model. A negative squared term and a positive non-squared term
indicate that there is a maximum point of the curve, whereas a positive squared term and a negative non-squared term indicate a curve with a minimum point.

The regression equation for the non-linear estimation is as follows:

\[
ROA = \beta_0 + \beta_1(PWOMEN) + \beta_2SQ(PWOMEN) + \beta_3(firm\ size) + \beta_4(management\ size) + \beta_5(price\ to\ book) + \beta_6(debt\ to\ assets) + \beta_7(high\ tech) + \epsilon
\]

In table 8 the results of the non-linear estimation are presented. Both the variable for the percentage of women as well as the squared term of the variable are significant. The squared term is significant on a 1 % significance level, whereas the non-squared term is significant on a 5 % significance level. The same control variables are significant as in the estimation for linear correlation. Based on the regression result it can be interpreted that the relationship between female executive directors and firm performance is non-linear.

The squared term is significant and negative, implying a relation of a reverse U-curve. Interestingly, these results are the opposite of those presented by Joecks et al. (2013). The researchers showed a U-curve between ROE and female representation on boards of directors in Germany. The different directions of the curves estimating the relation between firm performance and gender diversity can be explained by the different measurements for gender diversity used in the studies. Joecks et al. (2013) used Blau’s index to measure gender diversity, whereas this study used the percentage of women.

Results with outliers included in the non-linear regression analysis are presented in appendix 2. It can be seen that the outliers influence the regression results, since the variables for percentage of women and the squared term of percentage of women are insignificant when including the outliers. Four outliers have extreme negative values of ROA and one outlier has exceptionally high percentage of women, as could be concluded based on figure 6.
Table 8  Regression results for non-linear estimation

<table>
<thead>
<tr>
<th></th>
<th>ROA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-3.050</td>
</tr>
<tr>
<td>Firm size</td>
<td>0.975***</td>
</tr>
<tr>
<td>Management size</td>
<td>-0.310</td>
</tr>
<tr>
<td>Price to book</td>
<td>1.337***</td>
</tr>
<tr>
<td>Debt to assets</td>
<td>-15.632***</td>
</tr>
<tr>
<td>High tech</td>
<td>-0.589</td>
</tr>
<tr>
<td>PWOMEN</td>
<td>0.332**</td>
</tr>
<tr>
<td>SQ(PWOMEN)</td>
<td>-0.009***</td>
</tr>
<tr>
<td>F statistic</td>
<td>8.066***</td>
</tr>
<tr>
<td>R-squared (adj. R²)</td>
<td>0.354 (0.310)</td>
</tr>
<tr>
<td>N</td>
<td>111</td>
</tr>
</tbody>
</table>

* p<0.10  ** p<0.05  *** p<0.01

5.5. Residuals

Residual analysis is a tool for investigating if the assumed regression model is appropriate. A residual is the difference between the observed value of the dependent variable and the predicted value of the dependent variable. (Anderson el al. 2014) In figure 7 below, a residual plot against the variable for the percentage of women is presented. The values for the percentage of women are represented by the horizontal axis and the corresponding residuals are represented by the vertical axis. The residual plot shows a random distribution of residuals, which indicate that the regression model stays valid.

As mentioned previously, a company with very high female executive manager representation compared with the average of other companies in the dataset, has been excluded. The company with high female representation can be observed as an outlier in the residual plot presented in appendix 3. Moreover, the outlier influenced the...
significance level of the estimated coefficient for the percentage of women and squared term of the variable. When the outlier with high female representation was included, the significance level was 10 % for PWOMEN and 5 % for SQ(PWOMEN). These regression results are also included in appendix 3.

Figure 7  Residuals against the variable for female representation in executive management

5.6. Maximum effect

The non-linear regression results indicate that there is a level at which the percentage of women has a maximum effect on ROA, since the curve is formed as a reverse U-curve. The maximum percentage of women on the curve can be calculated with help of the estimated regression equation, which will be discussed later in this section. Before this, the effect of women on executive management on ROA is estimated with the help of four dummy categories.

A regression is built with the variable for percentage of women divided into four dummy variables. The reference dummy is defined as 0 % women in the executive management team against which three other groups of dummies are estimated. The
second group consists of executive management teams with up to 20 % women, whereas the third group consists of the management teams with at least 20 % and up to 40 % women. Lastly, the fourth group consists of the management teams consisting of at least 40 % women.

The following regression equation is estimated:

\[ ROA = \beta_0 + \beta_1 (0 \% \text{ women}) + \beta_2 (<20 \% \text{ women}) + \beta_3 (20-40 \% \text{ women}) + \beta_4 (>40 \% \text{ women}) + \beta_5 (\text{firm size}) + \beta_6 (\text{management size}) + \beta_7 (\text{price to book}) + \beta_8 (\text{debt to assets}) + \beta_9 (\text{high tech}) + \epsilon \]

<table>
<thead>
<tr>
<th>ROA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constant</strong></td>
<td>-2,758</td>
</tr>
<tr>
<td><strong>Firm size</strong></td>
<td>0,948**</td>
</tr>
<tr>
<td><strong>Management size</strong></td>
<td>-0,327</td>
</tr>
<tr>
<td><strong>Price to book</strong></td>
<td>1,396***</td>
</tr>
<tr>
<td><strong>Debt to assets</strong></td>
<td>-15,560***</td>
</tr>
<tr>
<td><strong>High tech</strong></td>
<td>-1,006</td>
</tr>
<tr>
<td>&lt;20% women</td>
<td>3,061*</td>
</tr>
<tr>
<td>20-40% women</td>
<td>2,363</td>
</tr>
<tr>
<td>&gt;40% women</td>
<td>-6,275**</td>
</tr>
<tr>
<td><strong>F statistic</strong></td>
<td>7,520***</td>
</tr>
<tr>
<td><strong>R-squared (adj. R²)</strong></td>
<td>0,371 (0,322)</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>111</td>
</tr>
</tbody>
</table>

* p<0,10 ** p<0,05 *** p<0,01

Table 9  Regression results for the effect of female representation on ROA when female representation is categorized in dummy variables

The regression results in table 9 show that the effect of having a percentage of lower than 20 % women in executive management is a ROA that is approximately 3 % higher compared to having 0 % female representation. This can be seen in the table from the
dummy for <20 % women in management being significantly positive towards the reference dummy for 0 % female representation. The dummy for 20-40 % women is positive in relation to 0 % female representation, but the variable does not show any significance. On the other hand, the coefficient of the dummy for >40 % women in executive management indicates a significant and negative effect on ROA compared to the reference dummy for 0 % female representation on the management team.

Interestingly, the coefficient of the dummy for 20-40 % women is lower than the coefficient of the dummy for <20 % women. This would imply, in case the coefficient would be significant, that the effect on ROA is greater when having <20 % female representation compared to 20-40 % female representation. Still, the insignificant dummy can refer to that there are too few companies represented by this category in the dataset of Finnish listed firms.

The percentage of women with the optimal effect on ROA can be calculated based on the estimated regression coefficients of the non-linear correlation presented in table 8. Calculations show that a percentage of 18,44 % women in executive management has the optimal effect on ROA (see appendix 4). The coefficients of the variable for percentage of women and the squared term of the variable can be further interpreted. Based on the coefficients it can be estimated how an increase in the percentage of women in executive management affects ROA when all other control variables are constant.

Table 10 shows examples of how changes in the percentage of women in executive management affect ROA. It can be estimated, based on the regression coefficients that an increase in the percentage of female executive managers of 10 %, results in an increase in ROA of 2,42 %. Further, if female representation increases by 15 %, ROA will increase by 2,96 %. This can be interpreted as the upward going slope in the reverse U-curve. On the contrary, if female representation increases by 40 %, ROA will decrease by -1,12 %. Moreover, an increase in female representation by 50 % results in a decrease in ROA by -5,90 %. Larger differences in the percentage of women than 18,44 % results in a worse effect on ROA, which can be interpreted as the downward going slope of the curve.
The empirical research showed that the relationship between female executive managers in Finnish listed firms and firm financial performance is non-linear. The correlation is formed as a reverse U-curve with 18.44% female representation having the maximum effect on ROA. This means that an increase in the proportion of women in executive management has stronger impacts on ROA when a company has below 18.44% female representation. The empirical results presented will be discussed in the following chapter. Both the linear and non-linear regression results will be considered in a larger context and in relation to previous research. Lastly, the results of the research are concluded and a suggestion for future research is given at the end of the chapter.

### Table 10: The effect of female executive directors on ROA (ceteris paribus) based on estimated regression coefficients

<table>
<thead>
<tr>
<th>Difference in the percentage of women in executive management</th>
<th>Difference in return on assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>2.42%</td>
</tr>
<tr>
<td>15%</td>
<td>2.96%</td>
</tr>
<tr>
<td>18.44%</td>
<td>3.06%</td>
</tr>
<tr>
<td>40%</td>
<td>-1.12%</td>
</tr>
<tr>
<td>50%</td>
<td>-5.90%</td>
</tr>
</tbody>
</table>

The empirical research showed that the relationship between female executive managers in Finnish listed firms and firm financial performance is non-linear. The correlation is formed as a reverse U-curve with 18.44% female representation having the maximum effect on ROA. This means that an increase in the proportion of women in executive management has stronger impacts on ROA when a company has below 18.44% female representation. The empirical results presented will be discussed in the following chapter. Both the linear and non-linear regression results will be considered in a larger context and in relation to previous research. Lastly, the results of the research are concluded and a suggestion for future research is given at the end of the chapter.
6 DISCUSSION AND CONCLUSIONS

The purpose of this study is to answer the research question of how women in executive management affect firm performance in Finnish listed firms. The hypothesis formulated in the methodology part was that the presence of women in executive management affects firm performance positively. However, the results suggest not a linear but a non-linear relationship between women in executive management and firm performance. The maximum impact of gender diversity on return on assets is found when the percentage of women in the executive management team is at approximately 20%. This chapter will discuss the empirical results in more detail as well as present conclusions and a suggestion for future research.

6.1. Insignificant linear correlation

The linear regression result showed in the empirical part (see table 7) did not support the hypothesis of the presence of female managers enhancing firm performance in Finnish listed companies. The dummy variable for women on executive management estimated whether women per se could have a positive effect on firm performance, whereas the percentage of women estimated whether or not higher percentages of women in executive management could enhance firm performance. Neither the variable for percentage of women nor the dummy variable for women showed any explanatory power against ROA in the regression model.

As described in the theory part, a study by Kotiranta et al. (2007), which is based on Finnish data on women in top management showed a positive linear correlation between female top managers and firm performance. The main differences between the study by Kotiranta et al. (2007) and this study are the focus and scope of the data sample. Kotiranta et al. (2007) used a dataset with both listed and non-listed companies, whereas this study focused only on listed companies in Finland. This can be interpreted as the positive effects of women being more evident in non-listed firms compared to listed firms.

There are other differences as well between this study and the study by Kotiranta et al. (2007). Kotiranta et al. (2007) studied women in CEO and chairperson positions as well as women represented in the board of directors. On the other hand, this study solely focused on the effects of women in executive management. It can be argued that women in executive management are more important when studying the effects on a
firm’s financial performance. Therefore, more research needs to be carried out on gender diversity on executive management instead of board of directors.

Even if Kotiranta et al. (2007) suggest a positive linear effect of female CEOs and board of directors on firm performance, they also argue that a non-linear relationship can be estimated for the dataset used in their study. Still, the linear results of Kotiranta et al. (2007) remain valid within the confidence interval of the non-linear results. (Kotiranta et al. 2007) The insignificant linear results of this study are explained by including a squared term of the percentage of women in the regression model, which shows that the relationship is non-linear. This is also the main finding of this study and is discussed in more detail below.

### 6.2. Significant non-linear correlation

When analysing the results of this study it is essential to consider the dataset. There are still relatively few listed companies in Finland with more than 30 % women represented on the executive management team. Moreover, a large proportion of the dataset consists of companies with 0 % female representation on executive management. The dummy for 20-40 % women in executive management, which was insignificant in the regression analysis (see table 9), may have been affected by the small ratio of companies in the dataset represented by this dummy variable. However, the dummy for <20 % women and >40 % women showed significant positive, respectively negative, correlations towards ROA indicating a non-linear relation. This finding is in line with the significant squared term of the variable for percentage of women suggesting a non-linear correlation.

The descriptive statistics showed a skewed data for the variable for female executive directors in Finnish listed firms. Therefore, certain cautiousness should be applied when interpreting the results. However, the result for the percentage of women in the non-linear estimation suggests a reasonable estimation for return on assets. If a company has very low representation of female executive managers, a small increase in diversity is likely to have a positive effect on ROA. This is seen at the end of the empirical part where for example an increase in female representation by 10 % is estimated to result in an increase in ROA by 2.42 %. On the other hand, large increases in female representation on executive management were shown to have a negative effect on ROA.
In relation to previous literature, the level of gender diversity with an optimal effect on firm performance suggests an interesting finding. Kanter (1977) argues that so called skewed groups with approximately 20% women are the most problematic, since too few women represented in the top management have no influencing power over the large majority of men. Kanter (1977) claims that these “tokens” are either overlooked or stereotyped. Nevertheless, according to the results in this empirical research, the companies with approximately 20% females appear to have the most positive effects on return on assets. This indicates that already a relatively small percentage of women in the executive management team has positive effects on firm performance compared with no representation of women at all in the team.

The result showing that female representation at approximately 20% has the optimal effect on ROA can be interpreted according to the theory of Smith et al. (2006). According to Smith et al. (2006) managerial talent is equally distributed among genders. Since there are fewer women represented in executive management, these are a more selected group of managerial talent compared to the larger number of male managers represented. This theory implies that a few female managers can have a positive effect on firm performance due to being a more selected group of managerial talents. The small number of women represented in executive management teams in Finnish listed firms represents a selected group of the most qualified female managers.

Listed Finnish companies with high percentages of female representation in executive management are still exceptional cases. Only a few companies in the dataset had an equal representation of genders with 50% women and 50% men in executive management. Linnainmaa and Turunen (2015) claim, in their newest report on gender issues in top management in Finland, that younger women are being promoted to executive management teams to a larger extent. It will be interesting to see the effects of gender diversity in future research as women occupy more positions in executive management.

### 6.1. Possible underlying factors affecting the correlation

It is important to discuss the differences in appointments of men and women to executive director positions, when studying the effects of female executive directors on Finnish listed firms’ financial performance. According to Haslam and Ryan (2005) women are often appointed to management positions under circumstances that differ
from those of male managers. They argue that women are more often appointed to leadership roles in companies being under financial pressure. The phenomenon is referred to as the “glass cliff” by the authors. (Haslam & Ryan 2005) If the glass cliff phenomenon could be observed in Finnish listed companies, it would have an impact on the correlation between gender diversity and firm performance.

Further, Linnainmaa and Turunen (2014) point out that female executive managers in Finnish listed firms more often hold roles of leading support functions, such as human resources or marketing. From this it can be derived that men mainly hold positions within business operations. (Linnainmaa & Turunen 2014) For example, only 2 large cap companies had a female chief financial officer (CFO) in Finnish listed firms in 2013 (Linnainmaa & Turunen 2013). Female executive managers are more often seen in service sectors (e.g. retailing) than in industrial sectors (e.g. manufacturing and information technology) (Singh & Vinnicombe 2004). These differences between female and male appointments to executive management teams have an impact on the effects of female managers on firm performance. These matters may have also influenced the results of the proportion of women with the optimal impact on ROA. However, these factors were not possible to control for in the empirical study.

There may in addition to the underlying factors presented above, be other factors impacting the relation between gender diversity and firm performance that could not be identified. In other words, there might still be a third parameter affecting both firm performance as well as gender diversity that could not be included in the regression model.

6.2. Conclusions

Based on existing research there is plenty of evidence of the positive effects of gender diversity. In addition, a number of previous studies argue that the relationship between gender diversity in top management and firm performance is non-linear. The same result can be concluded from this empirical research. Gender diversity in top management would be ideal, at least from an equality perspective, at 50% women and 50% men. However, the results showed that a smaller percentage of women than that had positive effects on firm performance in Finnish listed companies in 2013.

The main contribution of this study to existing literature is the finding of a non-linear correlation between female executive directors and firm performance. The optimal
effect on ROA was found when 18.44% of the executive management team consisted of women. However, the optimal share of female representation is dependent on the applied dataset. Likely, the optimal level will show a different result for another dataset. This result also underlines the importance of further research within the field. Current research has not been able to fully explain the relationship between gender diversity and financial performance, yet the main findings in this study have shown the existing relationship between these two.

The non-linear results can be interpreted as illustrating that a female representation of 20% in executive management is a viable and grounded alternative for Finnish listed companies. In this sense gender diversity is better compared to having no women represented in the executive management. A large number of Finnish listed firms have already appointed at least one female in their executive management. However, as can be concluded from the dummy variable for women in the descriptive statistics, 25% of the companies still have no women represented in executive management. In other words, a fourth of stock listed companies still have room for improvement. This can make a big difference for the Finnish economy. According to the study by McKinsey Global Institute, there are huge economic benefits that can be gained globally if women are able to achieve equal positions to men in working life (Dobbs et al. 2015). This also means that financial losses will occur if only a small number of women reach management levels.

The research question about how female executive managers affect firm performance is a subject that has both ethical and financial implications. The research question poses a challenge because it is difficult to measure. On one hand, firm financial performance can be assessed with multiple indicators, on the other hand gender diversity can be based on underlying factors influencing the effects of diversity as discussed above. Yet, gender diversity in the economy is an important issue, since women account for half of the working population. Therefore, more research needs to be focused on the question of gender diversity and its impacts on the economy. This study has contributed to existing research by examining Finnish listed companies, in which a non-linear relation was found between female executive directors and firm performance.

6.2.1. Future research

This study has shown that even a relatively small percentage of women can enhance firm performance. Further research is still needed on the topic; since more women are
gradually being promoted, new data will be available to study the relationship between female top managers and firm performance. The positions of women in executive management are suggested to be included in further research, since women are more often represented in support functions, which can have an impact on the effects of gender diversity. It would be interesting to investigate whether there is a difference in the effect of gender diversity in companies having a larger proportion of women leading business operations versus support functions.

So far, gender diversity has been an actively discussed topic by researchers, but it can be argued that other forms of diversity in executive management can have similar effects too. For example, different educational backgrounds as well as age differences between members in executive management can also be argued to enhance firm performance. Therefore, another suggestion for future research is to include factors for other types of diversity in management, such as differences in age and education.
REFERENCES


Koop, G. (2008) “Introduction to econometrics”, *Chichester; Wiley*


Websites


**APPENDIX 1**

The results of the regression models estimating linear correlation between ROA and PWOMEN as well as ROA and DWOMEN with the extreme values included are shown below.

<table>
<thead>
<tr>
<th></th>
<th>ROA</th>
<th>ROA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-10,154</td>
<td>-10,728*</td>
</tr>
<tr>
<td>Firm size</td>
<td>2,384***</td>
<td>2,360***</td>
</tr>
<tr>
<td>Management size</td>
<td>-0,162</td>
<td>-0,080</td>
</tr>
<tr>
<td>Price to book</td>
<td>0,233</td>
<td>0,221</td>
</tr>
<tr>
<td>Debt to assets</td>
<td>-32,813***</td>
<td>-32,922***</td>
</tr>
<tr>
<td>High tech</td>
<td>1,107</td>
<td>0,790</td>
</tr>
<tr>
<td>PWOMEN</td>
<td>-0,040</td>
<td></td>
</tr>
<tr>
<td>DWOMEN</td>
<td></td>
<td>0,538</td>
</tr>
<tr>
<td><strong>F statistic</strong></td>
<td>10,882***</td>
<td>10,797***</td>
</tr>
<tr>
<td><strong>R-squared (adj. R²)</strong></td>
<td>0,375 (0,340)</td>
<td>0,373 (0,338)</td>
</tr>
</tbody>
</table>

* p<0,10  ** p<0,05  *** p<0,01
APPENDIX 2

The result of the regression model estimating non-linear correlation between ROA and PWOMEN with the extreme values included is shown below.

<table>
<thead>
<tr>
<th></th>
<th>ROA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-8,504</td>
</tr>
<tr>
<td>Firm size</td>
<td>2,238***</td>
</tr>
<tr>
<td>Management size</td>
<td>-0,126</td>
</tr>
<tr>
<td>Price to book</td>
<td>0,249</td>
</tr>
<tr>
<td>Debt to assets</td>
<td>-33,473***</td>
</tr>
<tr>
<td>High tech</td>
<td>0,496</td>
</tr>
<tr>
<td>PWOMEN</td>
<td>0,130</td>
</tr>
<tr>
<td>SQ(PWOMEN)</td>
<td>-0,004</td>
</tr>
<tr>
<td>F statistic</td>
<td>9,520***</td>
</tr>
<tr>
<td>R-squared (adj. R²)</td>
<td>0,382 (0,341)</td>
</tr>
<tr>
<td>N</td>
<td>116</td>
</tr>
</tbody>
</table>

* p<0,10  ** p<0,05  *** p<0,01
APPENDIX 3

The result of the regression model estimating non-linear correlation between ROA and PWOMEN with the outlier observation of high female representation on the executive management team included is shown below.

<table>
<thead>
<tr>
<th></th>
<th>ROA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-3,912</td>
</tr>
<tr>
<td>Firm size</td>
<td>1,037***</td>
</tr>
<tr>
<td>Management size</td>
<td>-0,245</td>
</tr>
<tr>
<td>Price to book</td>
<td>1,354***</td>
</tr>
<tr>
<td>Debt to assets</td>
<td>-15,594****</td>
</tr>
<tr>
<td>High tech</td>
<td>-0,529</td>
</tr>
<tr>
<td>PWOMEN</td>
<td>0,218*</td>
</tr>
<tr>
<td>SQ(PWOMEN)</td>
<td>-0,006**</td>
</tr>
<tr>
<td><strong>F statistic</strong></td>
<td>7,588***</td>
</tr>
<tr>
<td>R-squared (adj. R²)</td>
<td>0,338 (0,294)</td>
</tr>
<tr>
<td>N</td>
<td>112</td>
</tr>
</tbody>
</table>

*p<0,10  **p<0,05  ***p<0,01
Residual plot against the variable PWOMEN with the outlier observation of high female representation on the executive management team included is shown below.
APPENDIX 4

Estimated regression equation for PWOMEN, SQ(WOMEN) and control variables towards ROA:

\[
ROA = -3,050 + 0,332 (PWOMEN) - 0,009 SQ(PWOMEN) + 0,975 (firm size) - 0,310 (management size) + 1,337 (price to book) - 15,632 (debt to assets) - 0,589 (high tech) + \epsilon
\]

Maximum PWOMEN on the reverse U-curve (ceteris paribus):
\[
dy/dx = 0
\]
\[
o = 0,332 - 0,018 (PWOMEN)
\]
\[
PWOMEN = 0,332/0,018
\]
\[
PWOMEN = 18,44 \%
\]

If PWOMEN increases with 18,44 %, ROA increases with (ceteris paribus):
\[
ROA = 0,332 (18,44\%) - 0,009 (18,44\%)^2
\]
\[
ROA = 3,06 \%
\]