Gender composition on the board of directors and firm performance

- Would a mandatory gender quota affect firm performance of Swedish public firms?

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Abstract

The purpose of this thesis is to examine if it exists a relationship between gender diversity on the board of directors and firm performance and to answer if a legislated gender quota for corporate boards would affect the performance of Swedish public firms.

The approach in this study is quantitative and conducted on 48 large cap companies listed on Nasdaq OMX Stockholm, during the time period 2007-2016. The authors use panel data regression models. Firm fixed effects and period fixed effects is used in order to account for the endogeneity problem between female board members and firm performance. The authors examine two different measures of firm performance; ROA and Tobin's Q as well as two measures of female board representation; the share of female directors and a female dummy variable that takes on the value of 1 if at least one women is represented and zero otherwise. The percentage of female directors has a positive effect on the natural logarithm of Tobin's Q, the relationship is significant at the 10% significance level. This indicates that grater gender diversity may add value to the shareholders. Gender diversity on corporate boards does not have a significant impact on ROA. The presence of at least one women has no effect regardless of performance measure.

It is clear that different results occur depending on how firm performance is measured. It should be emphasized that this study shows no significant negative relationship between gender-diverse corporate boards and firm performance. The results suggest that Swedish public firms should not worry about destroying shareholder value nor worse performance when adding females to their corporate boards.

Keywords: Board of directors, Gender diversity, Gender quota, Corporate governance, Firm value, Financial performance, Board composition

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1. Introduction

Boards outshine management groups

"The corporate boards are far from equal, but compared to the management groups they appear like role models. After the annual meetings of 2017, the boards[1] have 33 per cent women. Most common are companies with two women in the board. They constitute one third of all companies"

The AllBright Report, AllBright.se, September 2017

The field of gender diversity on the board of directors is of great relevance with an increasing number of countries having introduced gender quotas to increase diversity on corporate boards[2]. The underlying factors of such actions are that females have been and still are underrepresented on corporate boards. In 2012, the European Union proposed a gender quota; at least 40 % of each gender should be represented on the board of directors by 2020 (EC, 2011).

Additionally, the Swedish government published a memorandum including a law proposal in 2016, stating that publicly traded Swedish firms must have a certain percentage of each gender on the corporate board. The proposal suggests different quotas depending on the board size, with at least 40 % of each gender represented on corporate boards consisting of more than 10 members (Government Offices of Sweden, 2016). Moreover, Norway legislated a gender quota back in 2006, requiring all publicly traded Norwegian firms to have at least 40 % of each gender on their boards within two years (EC, 2011; Matsa & Miller, 2013).

If firms increase the amount of females on their corporate boards, it can potentially impact firm performance, provided that female directors behave and act differently than male directors. In other words, there has to be a discrepancy between the behaviour of men and women in order to find a significant difference caused by gender diversity.

[1] The boards of Swedish listed firms (AllBright, 2017)
[2] The authors use the expressions board of directors, corporate boards, boardrooms and boards interchangeably.

During the recent years, the topic of gender composition on boards have been widely researched, along with the differences in financial and investment behaviour between male and females. (Adams & Ferreira, 2009; Campbell & Minguez-Vera, 2008; Adams, 2016; Wang & Kelan, 2013; Ahren & Dittmar, 2012). Adams and Ferreira (2009) study how gender diversity on boards affect firm performance and inputs such as director attendance and committee assignments. The researchers find that female directors have a significant impact on both firm performance as well as board inputs. Campbell and Minguez-Vera (2008) also research gender diversity on boards and firm performance, like Adams and Ferreira (2009), they find a significant relationship between gender-diverse boards and firm performance.

However, the results differ among the researchers regarding the effect on firm performance. Adams and Ferreira (2009) state that a diverse corporate board could decrease firm performance. They find that gender diversity in the boardroom have a positive impact on performance in firms that otherwise have weak governance. However, in firms with already strong governance, a mandatory gender quota in the boardroom could decrease the value for shareholders. Campbell and Minguez-Vera (2008) argue that a more diverse corporate board increase firm performance. Their findings demonstrate that the presence of women on the board of directors does not in itself, affect firm value. However, they find that the diversity of the board has a positive impact on firm value.

It is possible to conclude that the impact of gender diversity cannot be determined a priori and even the empirical evidence is inconclusive. In addition, previous research is mostly based on U.S. data.

Gender quotas

An increasing number of countries are introducing gender quotas, including Norway, Iceland, France, Italy, The Netherlands, Belgium and Spain (Ahren & Dittmar, 2012; EC, 2017). The majority of corporate board members in European firms are still male, even though a lot of firms are trying to increase the female proportion of board members (Tienari et al., 2009). At the time when Norway legislated the gender quota in 2006, women represented 18 % of the board directors. Thus, the quota increased female representation by over 20 percentage points at the typical affected firm (Matsa & Miller, 2013).

Arguments for greater female boardroom representation can be split into two categories; ethical and economic. The former is related to society and that it is immoral to exclude women from corporate boards because of their gender. The latter is based on the proposition that firms which fail to select the most able candidates for the board of directors damage their financial performance, also known as the "business case" for female participation on boards (Campbell and Minguez-Vera, 2008).

When countries are introducing gender quotas and discussing the gender issue, common arguments are related to the ethical category as the government of many countries want to achieve a greater gender balance on corporate boards. The main argument and aim with the gender quota proposed in 2012 by the European Commission (EC) was in fact to "break the glass ceiling" and to promote equal opportunities for men and women to make it to senior positions in the European Union's largest firms (EC, 2011). However, when gender diversity is discussed in academic literature, the focus is the "business case" for female participation on boards, thus how it affects the firm from an economic point of view.

At this point, there is no legislated gender quota on corporate boards in Sweden, only a memorandum. The aim with the memorandum in Sweden is to break the male dominance in the Swedish business world as well as to promote and take advantage of the competence that women possess. After the annual meetings of 2017, the corporate boards of Swedish public firms have 33 per cent women (AllBright, 2017), thus if the quota become legislated, Swedish public firms would have to increase the share of female board members in the future. Interesting areas that could be affected by these quotas are corporate governance and firm performance, provided that female and male directors behave differently.

Differences between men and women

In order to further the discussion of gender diversity on board of directors, one important aspect to look at is the differences between female and male leaders. In general, research find females to be somewhat younger, and more likely to be independent or foreign directors compared to male directors. Additionally, females tend to be higher educated than males in similar roles, and hold a higher number of multi-directorships, thus being more experienced with serving on boards (Wang & Kelan, 2012).

Other differences between female and male directors include the attendance records. Studies have shown that female directors have a better record of attendance at board meetings than male directors. Adams & Ferreira (2009), simultaneously discovered that female members on the board spiked an increase in male members' attendance record as well. This suggest that a diverse board may lead to greater monitoring and activity on the boards.

In addition, there are also more behavioural differences as many studies over the years have suggested that females are more risk-averse than males (Jianakoplos & Bernasek, 1998; Post & Byron, 2015; Croson & Gneezy, 2009; Byrnes et al., 1999). This can influence the board of directors' approach to risk as a whole if personal preferences are influenced when making decisions for the firm and its stakeholders. These differences between the genders is of great interest for this study, since the aim is to investigate if a legislated gender quota would have an impact on the financial performance of Swedish public firms.

The purpose of this study is to answer if a mandatory gender quota would have an impact on firm performance, as a consequence, the authors[3] conducted the following research question:

- *Does the gender diversity on the board of directors affect firm performance?*

The market that will be examined in this study is Stockholm Stock Exchange's main list, Nasdaq OMX Stockholm. The time period that will be examined is 2007-2016. Previous research has primarily been conducted on the US Stock exchanges. Swedish public firms are limited to domestic regulations and therefore the theories from research that has been conducted outside of Sweden may not be fully applicable to the Swedish stock market.

Return on assets (ROA) and Tobin's Q will be used as proxies for firm performance. These measures of performance are by far the most common in this field, and were chosen to maximise this study's comparability with previous research.

[3] In this study, the term "the authors", always refers to the authors of this thesis; Jonna Tillenius and Marianne Lango.

Moving forward, the study is organized as follows: Chapter 2 contains the literature review with the background of gender composition on the board of directors and previous research that are relevant to this study's research question. In chapter 3, the authors present the methodology, data and the empirical approach. Chapter 4 provides the results and analysis of this study. Chapter 5 contains a discussion of the results and in chapter 6 the authors present the conclusions. Finally, in chapter 7, the authors discuss the limitations of the study and present suggestions for further research.

2. Literature Review

2.1 Theoretical framework

In this section, the authors will present two theories that can be linked to the relationship between the board of directors and the financial performance of a firm.

2.1.1 Agency theory

The monitoring function of boards, refers to the responsibility of directors to monitor managers on behalf of shareholders (Hillman & Dalziel, 2003). The agency theory concerns the separation of ownership and control in organizations. According to the principal-agent theory, agents that own a small part of the firm spend less effort working and monitoring on behalf of the principals (Ljungqvist and Wilhelm, 2003). Asymmetric information between the agents and the principals can create high agency costs, however, a well-functioning corporate governance can diminish agency costs (Reguera-Alvarado et al., 2014). In this way, corporate governance structure and the board of directors is linked to the financial performance of a firm.

Hillman and Dalziel (2003), state that the board of directors is the basis of the corporate governance and the corporate board is working to decrease agency costs and to reconcile the interest of agents and principals. The structure of the board has an impact over the actions of both the corporate board and the management, which has an influence over the financial performance (Kim et al., 2009). Fama and Jensen (1983) argue that the board monitors and keeps the management of the firm from acting selfish and opportunistic, stating that the board of directors is in fact the most important mechanism for the internal control of the firm. According to Carter et al. (2010), the agency theory does not imply that diversity on the board of directors is directly advantageous for the firm. Yet, a more diverse board might enhance the board independence (Mace 1979; Carter et al., 2010), while in return diminish agency problems where the CEO is very dominant (Mace, 1979).

2.1.2 The stakeholder theory

The concept of the stakeholder is "any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 1984). According to this theory the organization should be thought of as a grouping of stakeholders and the purpose of the organization is to manage the interests and viewpoints of the stakeholders.

The composition of both management and the board of directors are important to the authors of this paper for several reasons. As touched upon previously, distinct differences are seen between females and males. One of which are the level of risk, with many researchers having over the years suggested that females are more risk-averse than males (Jianakoplos & Bernasek, 1998; Post & Byron, 2015; Croson & Gneezy, 2009; Byrnes et al., 1999). If stakeholders of a firm want high risk, the theory states that it is in management and the boards' interest to maintain such expectations. Additionally, a more gender diverse board represents the various stakeholders in a better way compared to a more homogenous board (Cornell & Shapiro, 1987).

2.2 Results from previous research

The theoretical argumentation for a more diverse corporate board and firm performance can be split into two steps; firstly, will a more diversified board make the board work more efficient? Secondly, will a more efficient board work affect firm performance? As mentioned previously, a more gender diverse board can be seen from an ethical and economic perspective. However, the premise for this literature review is based on the economic perspective. In the following paragraphs, the authors will present the results from a few researchers that study the field of gender diverse corporate boards and its link to financial performance.

Positive link

The impact of gender diversity cannot be determined a priori and the empirical evidence is inconclusive, however many papers conclude that there is a positive link between gender

diversity in the boardroom and firm performance. In a recent study, Gordini and Rancati (2017) study the relationship between gender diversity in the boardroom and financial performance, and find a significant result. In addition, Campbell and Minguez-Vera (2008) who examined Spanish firms, obtained similar results. Both research pairs find that the presence of women on the board of directors in itself, does not have a positive impact on firm value whereas an equal division of genders has. Gordini and Rancati (2017) and Campbell and Minguez-Vera (2008), used Tobin's Q as a proxy for firm value.

Carter et al. (2010) findings indicate a positive relation between the proportion of females on the corporate boards of the S&P 500 firms and its return on investment (ROA). In accordance with Carter et al. (2010), Mahadeo et al. (2011) find a positive link between a gender diverse corporate board and ROA, compared to a corporate board with no female directors. Erhardt et al., (2003) also find a significant relationship between the share of female board directors and ROA as well as ROI when examining U.S firms.

Negative link

On the other hand, Bøhren and Strøm (2005), find a significant negative relationship between the share of females on corporate boards in Norway and firm value, measured as Tobin's Q. Ahren and Dittmar (2012), survey the Norwegian market and obtain a significant negative link between gender diversity on corporate boards with firm value and performance, measured as Tobin's Q and ROE respectively. Ahren and Dittmar (2012) suggest that the introduction of legislated gender quotas has led to younger and less experienced boards, which may have affected the performance of the firm. These empirical results are interesting for this study since Norway was one of the first countries to introduce a legislated gender quota. As mentioned previously, Adams and Ferreira (2009) find that a diverse corporate board have a negative impact on firm performance, when accounting for the endogeneity problem between gender diversity and firm performance. This is especially true for firms that already have a strong corporate governance. Their results suggest that gender-diverse boards spend more effort on monitoring compared to less diverse boards. Thus, in firms with an already strong governance, a greater gender diversity can lead to over-monitoring which in turn might affect shareholder value negative.

No link

Two studies conducted on the Danish market find no link between gender diversity in the boardroom and financial performance (Smith et al., 2006; Rose, 2007). Smith et al. (2006) investigate accounting measures whereas Rose (2007) use Tobin's Q as a proxy for firm value. Also Randøy (2006), find insignificant results of the relationship between gender diversity and ROA on a study including the 500 largest firms in Scandinavia. These results are also in accordance with the findings of Du Rietz and Henrekson (2000), as they observe the Swedish market and fail to find any significant relationship. This is of great interest for this paper since the authors will study the Swedish market and previous research conducted in Scandinavia seem to find a negative link or no link between gender diversity and firm performance.

Previous empirical results are ambiguous and inconclusive, which can be explained by several factors. Firstly, it is important to notice the differences between the estimation methods used by various researchers. The previous studies also relate to different time periods and different countries which may lead to inappropriate comparisons. Secondly, the presence of an endogeneity problem may also mislead the conclusions when a positive link is found. One important question to keep in mind is this; is it that female directors affect firm performance, or is it the other way around, that females choose the largest and most profitable firms? In this paper, the authors will use panel data to account for this possible endogeneity problem[4].

[4] Section 3.3.1 explains how the authors of this study will account for the endogeneity problem.

2.3 Differences between the behaviour of men and women

Several theories exist regarding why the board would be affected by the gender composition. We will discuss and present these arguments in the following paragraphs, from an unbiased standpoint.

Risk aversion

A topic heavily researched is the difference between men and women regarding risk aversion. It is commonly argued that women are more risk averse than men, however, the research is inconclusive concerning the gender discrepancies, and the various methods to measure risk also differ to a large extent between the studies. Some studies demonstrates that females are more risk averse than males (Jianakoplos & Bernasek, 1998; Post & Byron, 2015; Croson & Gneezy, 2009; Byrnes et al., 1999), yet there are also research results that indicate that men in fact are more risk averse than women (Adams & Funk, 2012; Evgeniou & Vermalen, 2016).

Adams and Funk (2012) research if female board directors are different from men by examining public firms on the Swedish market and find significant results. They conclude that women are less tradition and security-oriented than their male counterparts and that female directors actually are slightly more risk-loving than male directors. Men, on the other hand value power and achievement more than women, and universalism and benevolence less (Adams and Funk, 2012). Women also care more about a high stimulation than men do and they argue that women who make it to the board of publicly traded firms have a low need for security, thus, it is no wonder in that respect that women appear less risk averse than men.

In contradiction to the findings of Adams and Funk (2012), Jianakoplos & Bernasek (1998) find in their observations that women are more risk averse than men. They examine private investments made by single female and male households and by married couples. In their study, they define risk as the ratio of risky assets in relation to wealth. For all three household types, Jianakoplos & Bernasek (1998) conclude that relative risk aversion decreases with wealth. However for single male households, relative risk aversion decreases more with an

increasing wealth compared to single female households. The results suggest that women are more risk averse than men.

Corporate governance

Adams and Ferreira (2009) study how board inputs such as attendance and committee assignments are affected by the presence of female directors. Turns out, that female board directors have better attendance records than male directors and that a higher share of female directors has a positive impact on the attendance of male directors.

The results of Adams and Ferreira (2009), also indicate that gender-diverse boards allocate more time and effort to monitoring. Tougher monitoring and greater participation in board meetings and decision making could both have a negative and positive influence over firm value. However, the literature in the field generally argues that stronger governance should increase the value for shareholders since corporate boards are seen as essential to overcome the well-known agency problem between agents and principals (Hermalin & Weisbach, 2001; Adams & Ferreira, 2009). There are also other relevant papers that argue that too much monitoring actually have a negative impact on corporate performance (Almazan & Suarez, 2003).

Campbell and Minguez-Vera (2008), argue that greater diversity fosters a better understanding of the marketplace and that the diversity of the board should reflect the diversity of the firm's customers and increase the firm's ability to penetrate markets. They also argue that diversity can improve problem-solving as the variety of perspectives that emerges from a more diverse board leads to more alternatives evaluated. This is in accordance with Carter et al., (2003) findings, that the presence of female directors enhance the independence of the board since females are more likely to ask questions that their male counterpart would not ask, thus creating a broader perspective.

2.4 Gender diversity on corporate boards

The gender composition on the board of directors can affect the quality of the monitoring role that the board has. According to Kim et al. (2009), the structure of the board has an impact over the actions of both the board and management, which in turn affect the performance of the firm. Fama and Jensen (1983) argue that the board monitors and keeps the management of the firm from acting selfish and opportunistic. With that argument they state that the board of directors is in fact the most important mechanism for the internal control of the firm.

The diversity on the board of directors can be measured in several dimensions including gender, age, nationality, educational background, ethnicity and industrial experience (Campbell & Minguez-Vera, 2008). In this thesis, the authors will only focus on gender diversity on the board of directors and other dimensions of diversity will be excluded. According to Campbell and Minguez-Vera (2008), gender diversity is by far the most explored field in terms of diversity, both for board diversity as well as in the business world and society in general.

2.4.2 Gender diversity on corporate boards of Swedish firms

According to the European Commission (2016), one solution to increase female directors on corporate boards is to legislate gender quotas. In the Swedish parliament, there are still mixed opinions regarding a legislated gender quota and the parliament voted down the proposal for a legislated gender quota as they believed it was depreciatory on the Swedish Companies Act (The Swedish Parliament, 2017).

After the annual meetings of 2017, the share of females on the board of directors of Swedish listed firms was 33% with only 6% of the corporate boards having a female chairman. There is a great difference between small cap, mid cap and large cap firms in Sweden regarding gender diversity. Large cap firms are more equal than the average, as they have 37% female directors on their corporate boards. While mid cap firms have 33% and small cap only 25% females on their corporate boards.

3. Methodology

3.1 Data

This section will provide the background for the chosen market as well as the origin of the collected data. The authors will also provide the selection criteria that is used.

3.1.1 Primary and secondary data

The authors are primarily working with secondary data, i.e. data that has been obtained and processed by others. The advantage of secondary data is access to international and cross-historical data and that it is less resource intensive to collect compared to primary data. Secondary data is also considered to have a higher reliability (Lewis et al., 2010). The authors have collected data from well known financial resources and databases, such as Capital IQ and Nasdaq OMX Nordic. The data regarding corporate boards have been manually collected by the authors from each firm's annual reports, however, since public firms have external requirements from authorities, the data is considered to be objective.

3.1.2 Selection criteria and omitted firms

Table 1
Selection criteria for public firms

Notes: Table 1 presents the selection criteria and how the final sample was determined.

Selection Criteria		
Criteria	**Less (excluding)**	**Firms**
1. Stocks listed on Large Cap Nasdaq OMX Stockholm 2007-2016		123
2. Financial firms, banks, insurance companies, real estate, investment banks	42	81
3. Complete information regarding annual reports and financial data	33	48
Complete and final sample		**48**

There are observable differences between large cap, mid cap and small cap firms in Sweden regarding the gender diversity on the boards as well as firm and other board characteristics. To ensure a consistent results, the decision to only include large cap firms was made. Additionally, financial firms and insurance companies have been omitted from the sample in accordance with previous research (Campbell and Minguez-Vera, 2008; Matsa & Miller, 2013; Wang & Kelan, 2013). The reason behind is that the financial measurements examined would be incorrect if financial firms were compared to non-financial firms since the capital structure to a large extent differ. These criterias left the authors with a final sample of 48 firms.

3.1.3 Data collection and time frame

In total, 48 listed companies are examined in this study and the sample consists of 479 complete firm-year observations from 2007 to 2016. This length of time will provide insight as to whether a greater gender-diverse board has a positive effect on a firm's performance. The chosen time period is also of interest as it provides insight to the reactions from the external environment on the increasing focus of gender diversity on boards. The ten year period will show evidence as to whether or not there has been structural challenges for firms due to the push for diversity, and if the results have been positive or negative following this.

3.2 Empirical approach

The authors will collect and analyze different panel data regressions. Regressions will therefore be utilized with Tobin's Q and ROA as the measure of firm value and performance to determine if the independent gender variables have a significant effect on firm performance and firm value.

3.3 Panel data

Panel data is a tool used to analyze data comprised of both time series and cross-sectional elements, and will provide information across both time and space. Data with variation both

over time and cross-sectionally is more generalizable and informative compared to time-series data for one entity or cross-sectional data at just one point in time, as there is more observations, more degrees of freedom and higher efficiency (Brooks, 2014). In this study, the same sample of firms are measured over several time periods. The authors will conduct the panel data regression in several steps, including and excluding the different variables with the aim to find the regression model with the highest adjusted R^2. The results will then be analysed and compared to previous research.

3.3.1 Endogeneity problem

Benefits of panel data include controlling for individual heterogeneity and time-specificity (Brooks, 2014), which is of utmost importance in this study. The authors are faced with an endogeneity problem as it is hard to determine cause and effect. On the one hand, female directors might affect firm performance positively, and on the other hand, it may be that females choose to be board members in the largest and most profitable firms, i.e. that past performance influence board diversity. Firm fixed effects is used in the panel data regression analysis to account for endogeneity, however, compared to the issue with omitted variables, it is not possible to perfectly control for this type of endogeneity.

Another issue is the presence of unobserved heterogeneity due to omitted variables in the regression model. Unobserved heterogeneity is more of a rule than exception in most of the social sciences (Brooks, 2014), that is, in this context, any type of unobserved business characteristic that affects both independent and dependent variables. If there is a variable that have an impact on the dependent variable but at the same time is unobservable, all the variation in the dependent variable that is not explained by the the independent and control variables ends up in the error term. If the unobserved variable is correlated with with any of the other independent and control variables, the error term will also be correlated with these. If this is not accounted for, the regression will be estimated with an endogeneity bias. However, it is possible to isolate the influence of firm specific characteristics when observing the same firms repeatedly over time, that is, the authors can perfectly control for omitted

variables with firm fixed effects. With fixed effects dummies, the intercepts vary across each firm, yet are the same across time (Brooks, 2014).

Since the same firms are measured over several years, it is important to isolate the effect of time-specific occurrences that impact the firms in a similar way. There is a time trend that the amount of female directors increase over time, as many firms are trying to be more equal. However, if there are other factors that also increase over time and this is not accounted for, the authors could end up with a spurious regression. One common approach to isolate the effect of time-specific occurrences, is to use period fixed effects. With period fixed effects dummies, the intercepts vary over time but are the same across firms at each given point in time (Brooks, 2014).

In this study, the authors are faced with both individual heterogeneity and time-specificity and therefore the decision to use panel data and fixed effects and period fixed effects was made. This is in line with previous research in the field, especially research conducted during the last 10 years (Adams & Ferreira, 2009; Adams & Funk, 2011; Campbell & Minguez-Vera, 2008; Ahren & Dittmar, 2012; Wang & Kelan, 2013). Adams and Ferreira (2009) account for the endogeneity problem and find a negative link between gender diversity and firm performance. When the endogeneity problem is not accounted for, the researchers find a positive link. Thus, this example demonstrates the importance of accounting for endogeneity. To obtain a robust result, the authors of this study follows the same approach.

3.3.2 Key assumptions for the linear regression model

The interpretation of a panel data model is as any other linear regression model. There are several assumptions that must be satisfied for a linear regression model to hold. The authors must test for normality, linearity, heteroscedasticity and multicollinearity (Brooks, 2014).

All the variables in the panel regression model were tested with reference to linearity and normality and a conclusion was made to log the dependent variable Tobin's Q and the control variable firm size, measured as the book value of total assets. Natural logarithms are used to

mitigate the problem with excess kurtosis and skewness, making the regression model linear and the variables to follow a more normal distribution (Brooks, 2014). Presence of heteroscedasticity may cause misleading conclusions concerning the results if the problem is not mitigated. To be able to test if heteroskedasticity is present the authors will conduct White's test, in which the null hypothesis states the presence of homoscedasticity.

Lastly, in order to obtain a reliable result from the panel data regression analysis the authors must address the potential problem with multicollinearity. Multicollinearity appears when it exists a high correlation between two or more control variables (Newbold et al., 2013). In order to examine if multicollinearity is present, a correlation matrix was conducted and analysed.

3.3.3 Dependent variable

In this paper, the authors examine two dependent variables in different panel data regressions. The dependent variables are return on assets (ROA) and Tobin's Q, measuring firm performance and firm value respectively.

ROA

Return on assets (ROA) is an accounting based performance measure. The authors of this paper think an advantage with using ROA is that it is an indicator of how profitable a firm is in relation to its total assets. Thus it gives an idea of how efficient management is when it comes to generating earnings by using its assets. Hence, it might also reflect if the corporate governance is well-functioning and how well the board is monitoring. Potential drawbacks of using ROA as a performance measure is that it does not account for risk. It may also vary significantly from year to year due to changes in goodwill and because of the fact that firms write off items (Campbell & Minguez-Vera, 2008).

To calculate return on assets (ROA), the authors did the following equation:

$$\textbf{ROA} = \textit{Return on assets } (ROA) \quad = \quad \frac{Net\ Income}{Total\ Assets}$$

Tobin's Q

Tobin's Q reflects the market's expectations for future earnings and is considered to be a good proxy for a company's competitive advantage (Montgomery & Wernerfeldt, 1988). Compared to ROA, Tobin's Q is a valuation measure and it accounts for risk and focuses more on future performance (Campbell & Minguez-Vera (2008).

To calculate Tobin's Q, the authors use an approximation of Tobin's Q, which is in accordance with how Campbell & Minguez-Vera (2008) calculated Tobin's Q in their study. The authors did the following equation for Tobin's Q:

$$\textbf{TQ} = Tobin's\ Q = \frac{Total\ market\ capitalization}{Total\ Assets}$$

3.3.4 Independent variable

Gender diversity

The gender variables focus on the board of directors, which is also in line with the proposed gender quota that only considers the female share on the board of directors (Government Offices of Sweden, 2016) as well as previous research. Two gender variables will be used in this paper; percentage of female directors and a binary variable that takes on the value 1 if at least one women is represented among the board of directors and 0 otherwise.

Share of females on the board of directors

$$\textbf{PFemales} = \frac{Female\ directors}{Total\ number\ of\ directors}$$

Female "dummy"

DFemale = Female "Dummy"

1 if the at least one female is represented among the board of directors

0 otherwise

3.3.5 Control variables

The authors of this paper have chosen to include the following control variables; firm size, leverage, board size and CEO gender. These variables are recurring in several papers in the field of gender diverse board and its impact on firm performance (Adams & Ferreira, 2009; Campbell & Minguez-Vera, 2008; Adams, 2016; Ahren & Dittmar, 2012; Adams & Funk, 2011). The chosen variables are empirically documented to actually influence firm performance and shareholder value.

Firm Size

Firm size is known to affect firm performance and is an important corporate governance measure to include when analysing firm performance (Campbell & Minguez-Vera, 2008). Some studies have shown that the size of a firm has a positive impact on firm performance, as economies of scale implies that it is a crucial factor in firm performance (Olawale et al., 2017)

Firm size = LN(Total Assets)

Leverage

Leverage is also known to affect firm performance and is indeed an important variable to include when analysing firm performance (Campbell & Minguez-Vera, 2008; Adams & Ferreira, 2009). Leverage can have a positive impact on firm performance if debt is an efficient factor to control for the agency conflict within the firm, however it indirectly also increases the cost of bankruptcy (Campbell & Minguez-Vera, 2008). The leverage of a firm will be calculated as total debt divided by total assets.

Leverage = LN(Total Debt ÷ Total Assets)

Board size

According to Fama and Jensen (1983), the size of the board may influence the monitoring and advising of the board. Firms which have women represented on their board of directors have larger corporate boards than firms with no female board directors, according to the findings of Adams and Ferreira (2009). Furthermore, Ahren and Dittmar (2012) study the impact of the legislated gender quota in Norway and find that the board size did not change

as the female share increased in the boardroom. Suggesting that firms on average simply did not just add females to their corporate boards but in fact replaced existing male directors with female directors, which is in contradiction to Adams and Ferreira (2009) findings. The ambiguous previous stated effects makes it an an important control variable to include in the panel data analysis.

Board size = LN(Total board members)

CEO (female/male)

In accordance with previous research regarding the differences between the behaviour of men and women, the authors of this paper will also include the gender of the CEO to control for a potential correlation with firm performance.

CEO 'Dummy' =

1 if the CEO is female

0 otherwise

3.3.6 The panel data regression model

The authors use the following four initial panel data regression models:

Model I

$$ROA_{it} = \alpha + \beta_1(PFEMALES)_{it} + \beta_2 (LN\ FIRM\ SIZE)_{it} + \beta_3 (LEVERAGE)_{it} + \beta_4(BOARD\ SIZE)_{it} + \beta_5(CEO\ Dummy)_{it} + \varepsilon_{it}$$

Model II

$$ROA_{it} = \alpha + \beta_1(DFEMALES)_{it} + \beta_2 (LN\ FIRM\ SIZE)_{it} + \beta_3 (LEVERAGE)_{it} + \beta_4(LN\ BOARD\ SIZE)_{it} + \beta_5(CEO\ Dummy)_{it} + \varepsilon_{it}$$

Model I has ROA as dependent variable and the measure of gender diversity is PFEMALES, which is simply the percentage of female directors on one particular board. Model II also has ROA as dependent variable but the measure of gender diversity is DFEMALE, which is the gender dummy variable that takes on the value 1 if at least one female is represented among the board of directors and zero otherwise.

Model III

$$TQ_{it} = \alpha + \beta_1(PFEMALES)_{it} + \beta_2 (LN\ FIRM\ SIZE)_{it} + \beta_3 (LEVERAGE)_{it} + \beta_4(BOARD\ SIZE)_{it} + \beta_5(CEO\ Dummy)_{it} + \varepsilon_{it}$$

Model IV

$$TQ_{it} = \alpha + \beta_1(DFEMALES)_{it} + \beta_2 (LN\ FIRM\ SIZE)_{it} + \beta_3 (LEVERAGE)_{it} + \beta_4(BOARD\ SIZE)_{it} + \beta_5(CEO\ Dummy)_{it} + \varepsilon_{it}$$

Model III has the natural logarithm of Tobin's Q as dependent variable and PFEMALE as the measure of gender diversity. Finally, model IV also has the natural logarithm of Tobin's Q as dependent variable but the measure of gender diversity is the gender dummy variable DFEMALE.

4. Analysis and result

4.1 Descriptive statistics

Model assumptions

Table 2

Correlation Matrix

Notes: The correlation matrix outlines the correlation between the dependent, independent and control variables. The pairwise correlation coefficients lie in the range of -1 and 1.

Correlation Matrix								
	ROA	PFEMALES	DFEMALE	LEVERAGE	BOARD SIZE	CEO DUMMY	LN FIRM SIZE	LN TQ
ROA	1							
PFEMALES	0.0304	1						
DFEMALE	0.0436	0.4861	1					
LEVERAGE	-0.0976	0.2031	0.2407	1				
BOARD SIZE	-0.1426	0.0046	0.1601	0.1333	1			
CEO DUMMY	-0.0193	0.0709	0.0173	-0.0165	-0.0237	1		
LN FIRM SIZE	-0.1870	0.1812	0.2336	0.3885	0.5265	0.0231	1	
LN TQ	0.3924	0.1265	-0.0827	-0.4058	-0.4390	-0.0099	-0.6136	1

According to Gujarati and Porter (2008), if a pairwise correlation coefficient exceeds |0.8|[5], there is a severe presence of multicollinearity. If multicollinearity is present in a regression analysis, the standard error for the regressions' coefficients will increase. This may lead to a misleading adjusted R^2, since the adjusted R^2 will show a high value yet the variables are not significant (Brooks, 2014). As shown from table 2, none of the variables have a pairwise correlation coefficients that exceeds |0.8| and the authors can conclude that no severe multicollinearity problem exists.

Although panel data is one way to get around the potential problem with heteroscedasticity, the authors use robust standard errors in the panel data regression analysis to account for heteroscedasticity. Robust standard errors make the regression model more homoscedastic (Brooks, 2014).

[5] +/- 0.8.

Furthermore, histograms for all variables, except the dummy variables are presented in Appendix 1. After testing for normality, the decision to log Tobin's Q and firm size was made. Natural logarithms are used to mitigate the problem with excess kurtosis and skewness, making the regression model more linear and the variables to follow a somewhat normal distribution (Brooks, 2014).

Table 3

Descriptive board statistics

Notes: Table 3 presents a statistical summary of the corporate boards in the sample. Each row is presented as the actual number of directors with one row representing the size of the board and the other row representing the number of female directors

Descriptive statistics for board of directors						
Variable	**Minimum**	**Maximum**	**Mean**	**Standard dev.**	**Sum**	**N**
Board size	3	14	8.138	1.755	3906	480
Female directors	0	5	1.991	1.134	954	480

Total number of observed directors is 3906, with a total of 954 female directors. Needless to say, women are clearly underrepresented among the board of directors. The average corporate board consists of 8.14 members, with only 1.99 female board members on average.

Table 4

Descriptive statistics for all variables included in the panel data regression analysis

Notes: Table 4 shows the minimum, maximum, standard deviation and mean for all the variables included in the panel data regression, except for the female and CEO dummy variables. ROA is calculated as net income over total assets, Tobin's Q is calculated as total market capitalization over total assets, Firm size is measured as total assets and Leverage is calculated as total liabilities over total assets.

Descriptive statistics for the panel data regression variables					
Variable	**Minimum**	**Maximum**	**Mean**	**Standard dev.**	**N**
ROA	-0.243	0.990	0.076	0.085	480
Tobin's Q	0.071	19.001	1.816	2.573	479
LN(Tobin's Q)	-2.650	2.944	0.082	0.960	479
Percentage females	0.000	0.667	0.245	0.135	480
LN (Firm size)	4.234	13.252	9.945	1.697	480
Leverage	0.050	1.143	0.568	0.158	480
Board size	3	14	8.138	1.755	480

This study's sample consists of 48 firms[6] from the large cap list on Nasdaq OMX Stockholm during the time period 2007-2016. The maximum share of females on the boards amounts to 66.7 percent. However, the average share of female directors is 24.5 percent, that is, a long way to go to reach the 40 percent as suggested by the memorandum. The average firm size is 9.95 and is calculated as the natural logarithm of total assets.

The average value of Tobin's Q for the whole sample is 1.82 and the interpretation of Tobin's is as follows; a low value between 0 and 1, means that the cost to replace a firm's assets is greater than the value of its stock and implies that the stock is undervalued. Vice versa, a value greater than 1, implies that a firm's stock is more expensive than the replacement cost of its assets, implying that the stock is overvalued. However, in the panel data regression analysis, the natural logarithm of Tobin's Q is used and the obtained mean value is 0.08.

The average value of ROA for this study's sample is 7.6 percent, which is a higher average compared to values observed in previous research within the field, especially when observing firms included in the index S&P 500 (Adams & Ferreira, 2009; Campbell & Minguez-Vera, 2008). The value of 7.6 percent gives an idea of how efficient management is when it comes to generate earnings by using its assets.

[6] According to the selection criteria presented in section 3.2.3

4.2 Female directors and the effect on firm performance

4.2.1 ROA

Table 5

Panel data regression output with ROA as dependent variable

Notes: Table 5 contains 480 observations during the years 2007-2016. The beta coefficient is presented first for each variable, followed by (robust standard error) and [p-value]. In model I the dependent variable is ROA, the independent variable is PFEMALES and all the control variables are included and the adjusted R^2 is 2.29%. In model II the key independent variable is DFEMALE and the adjusted R^2 is 2.10%, when including all observations. Both regressions use Firm Fixed Effects and Period Fixed effects, i.e. year dummies. The variables that are significant at the 1% significance level are marked with ***, 5% level with ** and 10% with *.

Regression specifics	Model I	Model II
Key Independent variable		
PFEMALES	0.0928	
	(0.0647)	
	[0.158]	
DFEMALE		0.0395
		(0.0299)
		[0.195]
Control variables		
LEVERAGE	0.0080	-0.0104
	(0.0449)	(0.0406)
	[0.859]	[0.798]
BOARDSIZE	0.0022	0.0016
	(0.0043)	(0.0038)
	[0.610]	[0.676]
CEODUMMY	0.0054	0.0102
	(0.0166)	(0.0190)
	[0.747]	[0.594]
LN FIRMSIZE	0.0412	0.0381
	(0.0446)	(0.0428)
	[0.360]	[0.378]
Intercept	-0.3501	-0.3205
	(0.4810)	(0.4646
	[0.470]	[0.494]
Adjusted R^2	0.0229	0.0210
Fixed Effects	Yes	Yes
Period Fixed Effects	Yes	Yes
Number of obs	480	480

Table 5 presents the panel data regression output for model I and II, with model I having PFEMALES as independent variable and model II DFEMALE as independent variable. The regression analysis could not prove that neither the share of female directors nor the presence of at least one female director has a significant effect on return on assets (ROA), at neither the 1%, 5% nor the 10% significance level. Additionally, the explanatory power for model I and II is very low, with an adjusted R^2 of 2.29 and 2.10 percent respectively, indicating that model I and II is nowhere near to be considered well-defined models.

All variables have p-values larger than 10%, and the authors can conclude that no significant relationship exists between ROA and the share of female directors, and ROA and the presence of at least one female director in these models. Model I and II are not able to explain nor answer the research question concerning if gender diversity on the board of directors would have an effect on firm performance. In other words, the answer would be that an effect could not be confirmed nor rejected since no significant relationship is found.

The obtained result is in accordance with the findings of Randøy et al. (2006) who failed to find a significant relationship between the gender diversity effect and ROA when they analysed the 500 largest firms from three Scandinavian countries; Denmark, Norway and Sweden. Also other researchers who study the Scandinavian markets fail to find a significant relationship between a gender diverse board and accounting based performance measures (Smith et al. 2006; Rose, 2007; Du Rietz and Henrekson, 2000).

4.2.2 Tobin's Q

Table 6

Panel data regression output with LN(Tobin's Q) as dependent variable

Notes: Table 6 contains 480 observations during the years 2007-2016. The beta coefficient is presented first for each variable, followed by (robust standard error) and [p-value]. In model III the dependent variable is LN(Tobin's Q), the independent variable is PFEMALES, all the control variables are included and the adjusted R^2 is 49.73%. In model IV the key independent variable is DFEMALE and the adjusted R^2 is 46.72%, when including all observations. Finally, in model V the key independent variable is DFEMALE and the adjusted R^2 is 51.15%%, excluding board size as a control variable. All three regressions use Firm Fixed Effects and Period Fixed effects, i.e. year dummies. The variables that are significant at the 1% significance level are marked with ***, 5% level with ** and 10% with *.

Regression specifics	**Model III**	**Model IV**	**Model V**
Key Independent variable			
PFEMALES	0.7499*		0.7531*
	(0.3770)		(0.3813)
	[0.053]		[0.054]
DFEMALE		0.1083	
		(0.1131)	
		[0.343]	
Control variables			
LEVERAGE	-1.1889**	-1.2850***	-1.1688**
	(0.4810)	(0.4406)	(0.4873)
	[0.017]	[0.005]	[0.020]
BOARDSIZE	0.0238	0.0226	
	(0.0298)	(0.0315)	
	[0.429]	[0.477]	
CEODUMMY	-0.3252**	-0.2936**	-0.3416**
	(0.1365)	(0.1321)	(0.1494)
	[0.021]	[0.031]	[0.027]
LN FIRMSIZE	-0.2870	-0.3009	-0.2764
	(0.2072)	(0.2156)	(0.2033)
	(0.172]	[0.169]	[0.180]
Intercept	3.2437*	3.4871*	3.3171*
	(1.8925)	(1.9696)	(1.9466)
	[0.093]	[0.083]	[0.095]
Adjusted R^2	0.4973	0.4672	0.5115
Firm Fixed Effects	Yes	Yes	Yes
Period Fixed Effects	Yes	Yes	Yes
Number of obs	480	480	480

Table 6 presents the panel data regression output with the natural logarithm of Tobin's Q as dependent variable. The panel data model could prove that the key independent variable PFEMALES had a significant effect on firm value measured as the natural logarithm of Tobin's Q at the 10% significance level.

However, when the key independent variable is the female dummy (DFEMALE), no significant relationship is obtained. Noteworthy, despite the lack of a significant relationship between DFEMALE and LN(Tobin's Q) is that the effect the female dummy had on firm value was expected. It shows a positive relationship, and with that has the same effect that the share of female directors has on firm value. The non-significant relationship between the presence of at least one women and firm performance is supported by Gordini and Rancati (2017), as they argued that is is not reasonable that the presence of one female director alone could have an impact on the performance of a company.

Moving forward, the authors included and excluded the different control variables with the aim to find the highest adjusted R^2 , which resulted in model V. Model V includes the key independent variable PFEMALES and the control variables leverage, CEO dummy and LN(Firm size) and shows the highest adjusted R^2 of 51.15 %. The reason to exclude board size as a control variable is based on the fact that it has the highest p-value among all variables included in model III.

The positive significant relationship indicates that a higher share of female directors has a positive effect on firm value measured as the natural logarithm of Tobin's Q. The results are in accordance with Campbell and Minguez-Vera (2008), who find a positive link between the natural logarithm of Tobin's Q and the share of female directors and concluded that any negative aspects of a gender-diverse board is outweighed by the positive effects. These findings are also supported by Gordini and Rancati (2017), who suggested that the presence of female directors cannot destroy shareholder value.

4.2.3 Control variables

In this section, the authors will focus on the control variables and more specifically, the output from Model III, IV and V. Hence, an analysis of the output from model I and II will not be conducted, due to the low explanatory power and the overall insignificant results when the dependent variable is ROA.

Moving forward, *leverage* shows a significant relationship at the 1% and 5% significance levels and has a negative effect on the dependent variable. According to Campbell & Minguez-Vera (2008), debt has a positive impact on performance in cases where debt is an efficient factor to control for the agency conflict within the firm. At the same time, debt increases the bankruptcy cost too, and can negatively impact firm value. This may be the case, since Tobin's Q accounts for risk. *Board size* has a positive slope, indicating that a large board has a positive effect on Tobin's Q. The effect of board size is not significant at the 1%, 5% nor the 10% significance level.

The variable *CEO dummy* is significant and has a negative slope, indicating that a female CEO has a negative effect on Tobin's Q. However, important to notice is that out of the 480 observations, only 2 observations have a female CEO, making it impossible to draw any conclusion about the population since the sample is too little and the effect is most probably driven by other factors, although the authors use firm fixed effects to account for omitted variables. *Firm size* with a negative slope indicates that larger companies have a lower value of Tobin's Q. The authors expect firm size and board size to have the same slope, since they often go hand in hand and the pairwise correlation coefficient between the two was greater than 0.5. Nevertheless, both board size and firms size have p-values larger than 10 percent, thus, due to the insignificance these variables will not be emphasized further.

5. Discussion

In retrospect, when the study and empirical analysis had been performed the authors concluded that the following aspects were the most interesting to highlight and further discuss. Overall, the results from this study indicate that a higher share of female directors will not harm or destroy shareholder value or firm performance. This is in line with the findings of Campbell and Minguez-Vera (2008), as they conclude that increased gender diversity can be achieved without destroying value for the shareholders. The results from this study can also be linked to the agency theory and the findings of Carter et al. (2010) who suggest that a more gender diverse board may improve the indepence of the board. Thus, a more independent board can be more efficient when dealing with high agency costs due to asymmetric information between shareholders and management compared to a less independent board. However, in this study the authors did not control for board characteristics other than gender, making it impossible to draw any conclusion regarding independence, yet is an interesting aspect to further research.

The stakeholder theory suggests that the value of a company relates to how well the company fulfills the contracts with its stakeholders. A gender diverse board represent the diverse stakeholders in a better way than a board dominated by just one gender and it is in the board of directors' interest to maintain the expectations from the stakeholders. A more gender diverse board may also represent the needs of the various stakeholders in a better way and when a company fulfills the contracts with its stakeholders well, this should be reflected in the company value. Tobin's Q reflects the market's expectations and valuations, and since a positive link exists between Tobin's Q and the share of female directors, it is likely that the diversity of the board in fact is an important factor and that it affects firm value. In addition, since no negative link is found, the authors of this study suggest that there are good reasons to assume that, at a minimum, stakeholders of Swedish public firms are not against the presence of female directors.

The insignificant relationship between both gender variables and ROA could be explained by the fact the that the differences in behavior between men and women as discussed in the first

two chapters, in fact are to small to make a difference. That is, for gender diversity to have an impact on ROA, the effect has to emerge from completely within the firm. In addition, it might be that changes in ROA from year to year is more related to operational decisions taken by the management of a firm, thus, not by the board. For long-term strategic decisions affected by the board, it probably takes a longer time to see the effect it has on profitability than from one year to another.

Topics that have been widely researched are behavioural differences such as risk aversion and board inputs such as attendance and committee assignments. In this study, we suggest that either the differences are to small to even make an impact on an internal performance measure, or the previous discussed theories are not applicable to a typical Swedish female board member. In addition, it is also unclear what the impact of these behavioural differences might have on the board work and how that in turn would affect the valuation and profitability of a firm. Speaking of risk aversion, what is the expected effect from a more risk averse board on the performance of a firm? In the short term, the typical risk averse firm perhaps faces a more stable growth and profitability for not taking on too much risk. However, in the long run, the very same firm may have trouble keeping up with industry trends, digital changes and customer demands if the firm does not dare to invest in new projects and innovations. Additionally, a risk averse board does not necessarily imply that the management of the firm is risk averse, that is, it might be that a risk averse board has little or no effect on these types of decisions.

In common for all panel data regression models are that the presence of at least one women, i.e. the female dummy variable (DFEMALE) does not have a significant effect, yet the sign is positive throughout the regressions. This is in accordance with the findings of Gordini and Rancati (2017), who state that the presence of one women alone could not have a significant impact on the financial performance of a firm. In addition to this argumentation, Joecks et al. (2013) suggest that a positive link between gender-diverse corporate boards and firm performance can only be found when the share of females directors is at least 30 percent.

Returning to the initial question if a mandatory gender quota would have an impact on firm performance, the authors of this study can not confirm or reject that a quota would have a

significant effect on the performance of a firm. The authors suggest that a greater gender diversity will not harm firm performance, measured as ROA, and firm value measured as Tobin's Q. Regarding the effect on the value of a firm, the results indicate that the share of females directors have a positive effect on Tobin's Q, the effect is significant at the 10% significance level. With this study's sample, the authors can confirm that a quota will have a positive effect on Tobin's Q. Overall, the effect of adding more females to the corporate boards of Swedish firms may be more related to shareholder value than purely firm performance.

To account for the possible problem with endogeneity, firm fixed effects and period fixed effects is used in the panel data regressions. Fixed effects control for heterogeneity and omitted variables bias, noteworthy, fixed effects does not account for reverse causality. Even though the authors account for the possible endogeneity problem with this approach, it is still difficult to prove the causality in these types of studies as past performance may influence board diversity. That is, the endogeneity problem can not be completely solved.

In conclusion, Swedish public firms can add females without destroying value or the performance of its firm and the results indicate that increased gender diversity in fact have a positive effect on shareholder value measured as Tobin's Q. In addition, firms can also add females to their corporate boards for ethical reasons. One important question is; if it does not harm performance, should a quota take place for ethical reasons to ensure gender equality? If that is the case, how can firms make sure that the best qualified individuals are given board roles regardless of gender?

6. Conclusion

The purpose of this study is to answer if a legislated gender quota would affect firm performance of Swedish public firms. Moreover, the authors wanted to contribute with an up to date knowledge regarding the gender diversity on corporate boards and to examine if a more gender-diverse corporate board have a positive effect on firm performance. In order to meet the purpose, a panel data set over 10 years was analysed with 48 firms from the large cap list of Nasdaq OMX Stockholm. The authors examine two different measures of firm performance; ROA and Tobin's Q. ROA is an accounting based measure and a proxy for profitability whereas Tobin's Q reflects the market's expectation and is a proxy for firm value. In common for all panel data regression models are that the presence of at least one female director has no effect regardless of performance measure.

The results from this study shows that the share of female directors on corporate boards have a positive significant effect on firm value, measured as the natural logarithm of Tobin's Q. The positive effect is significant at the 10% significance level. The results from this study can be linked to the "business case" for female participation on corporate boards, i.e. that there is an economic argument for greater female participation. According to Campbell and Minguez-Vera (2008), companies which fail to select the most competent directors damage their financial performance. Thus, if women are excluded from corporate boards simply because of their gender, is is possible to argue that it is an unjustified argument not only from an ethical point of view, but also from an economic point of view.

To measure profitability the authors used the accounting based measure ROA, the results from the study showed that there is no significant relationship between the share of female directors and ROA and the presence of at least one female director and ROA. The explanatory power when ROA is used as key independent variable is very low; less than 2 percent. Additionally, all variables have p-values larger than 10 percent and the authors conclude that model I and II are not well-defined models and that no significant relationship exists.

The results are a little ambiguous, it is clear that different results occur depending on how firm performance is measured. It should be emphasized that this study shows no significant negative relationship between gender-diverse corporate boards and firm performance. Moving forward, in this sample the average share of female directors is 24.5 percent. If the proposed gender quota of at least 40 percent of each gender becomes legislated, listed firms should not worry about destroying shareholder value nor worse performance when adding females to their corporate boards.

7. Limitations of the study

The authors want to address certain limitations of this study. First, the sample size used in this study is limited to 479 complete firm-year observations. This was due to the time constraint of having to manually collect the data for each individual company over all years observed. In general a larger sample provide a more accurate representation of the topic at hand. However, the authors find that the obtained results provide an accurate depiction of the market trends as a whole. Industry effects have also not been accounted for in this study, as fixed effects models were used.

Another limitation is the focus of the characteristics of the board, and the difference between male and female directors. It might be that the differences when it comes to behavioural aspects are not noticeable, but rather that factors such as age, experience, independence as well as if they are foreign or domestic and if they have multi-directorships have a greater impact on the board work. No characteristics such as these have been included in the study, thus making it impossible to conclude anything about why it might have a positive effect or no effect. As a suggestion for further research, the authors of this study propose that the previously mentioned characteristics should be emphasized. It would be of great interest to establish the underlying factors that drives the effects that have been found in several studies.

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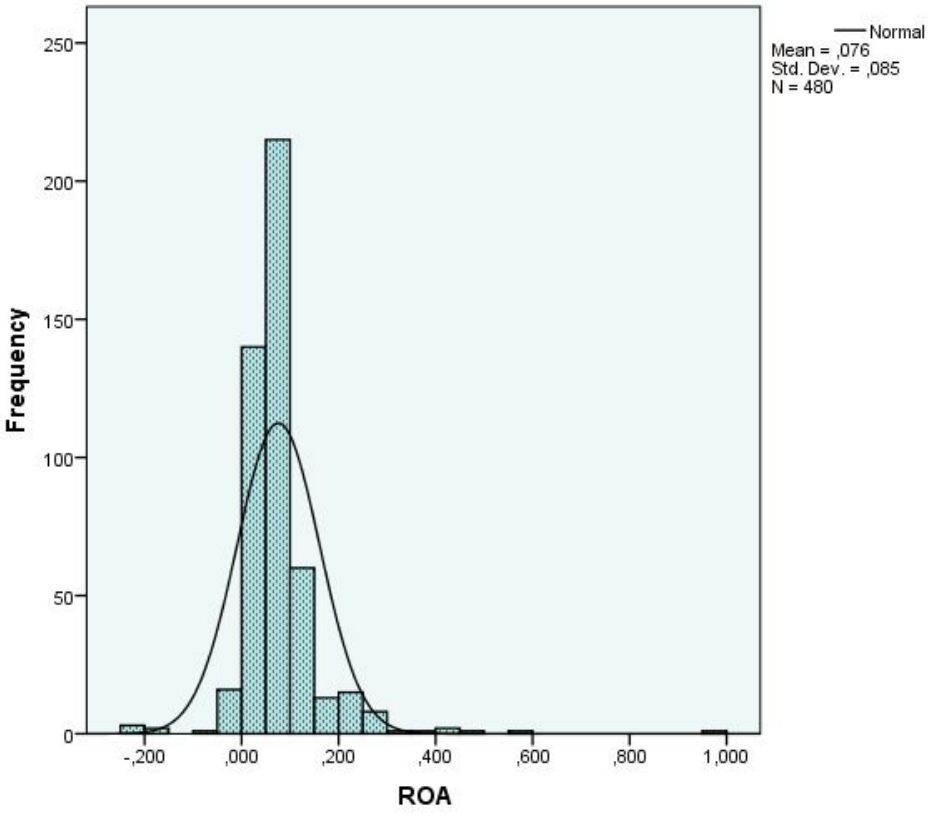
Appendices

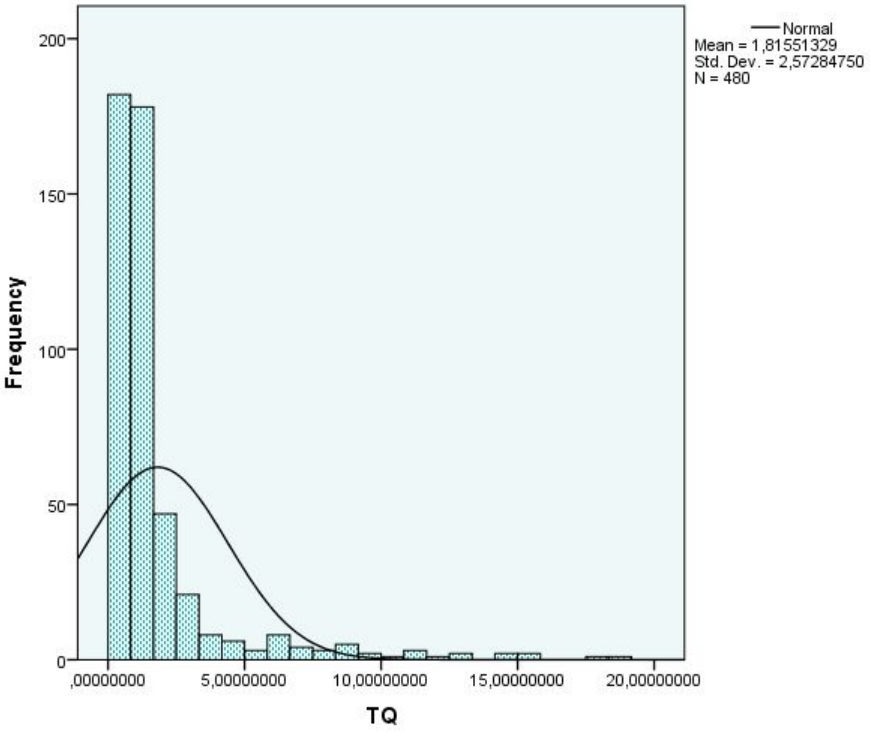
Appendix 1 - Histogram

Notes: Appendix 1 presents the histograms for all variables included in the panel data regression (except the dummy variables). The histograms illustrate the distribution of the sample for a given variable. When analysing if a variable follows a normal distribution, the mean and the standard deviation features are used as determinants (Newbold et al., 2013).

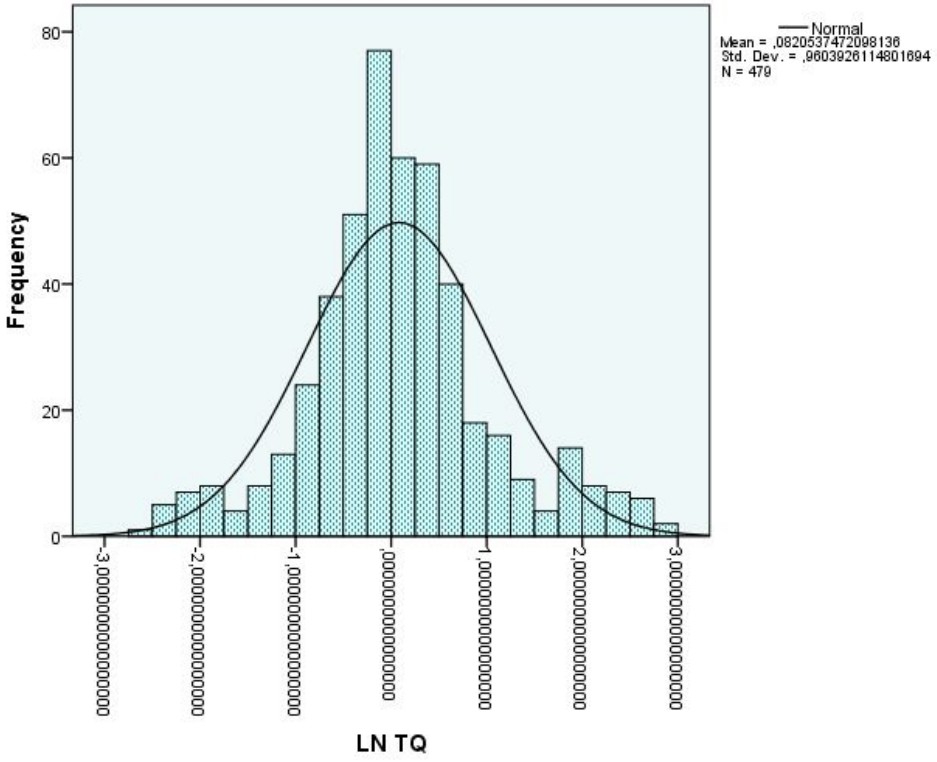
Histogram for ROA



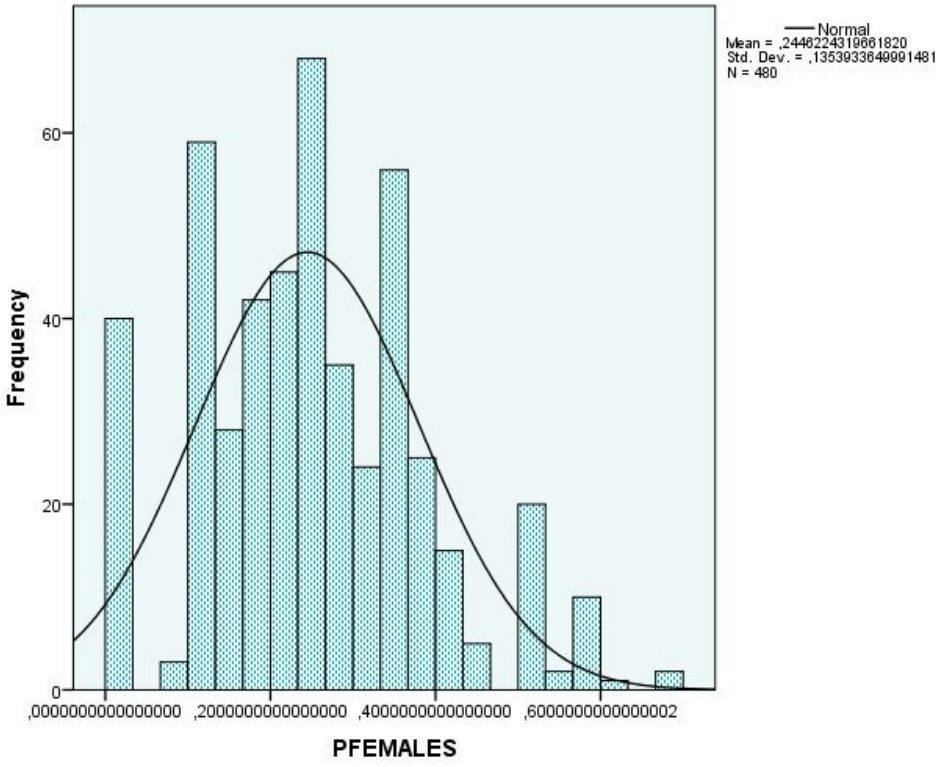
Histogram for Tobin's Q



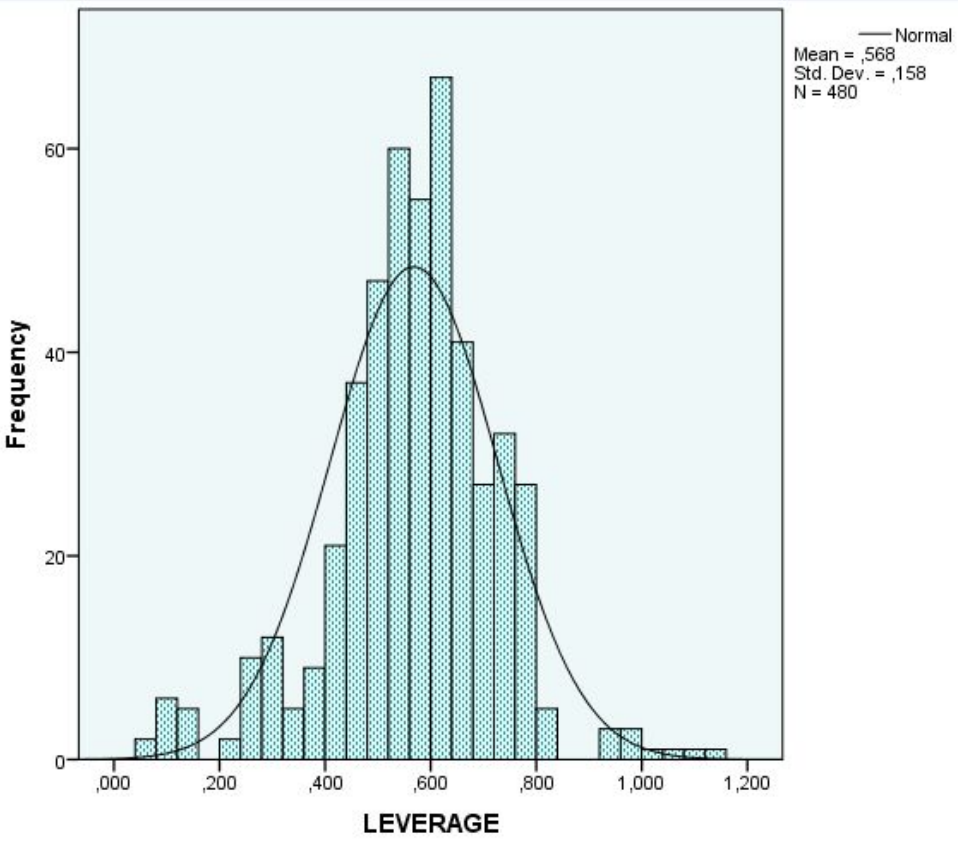
Histogram for LN(Tobin's Q)



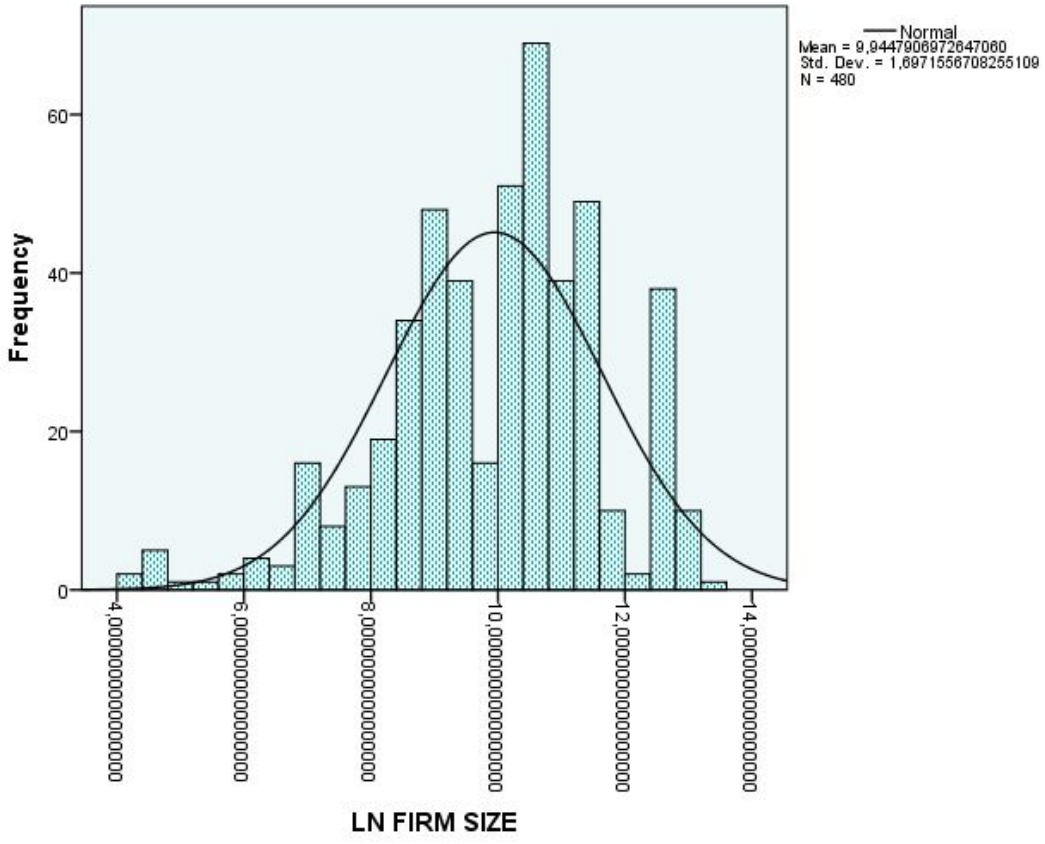
Histogram for PFEMALES



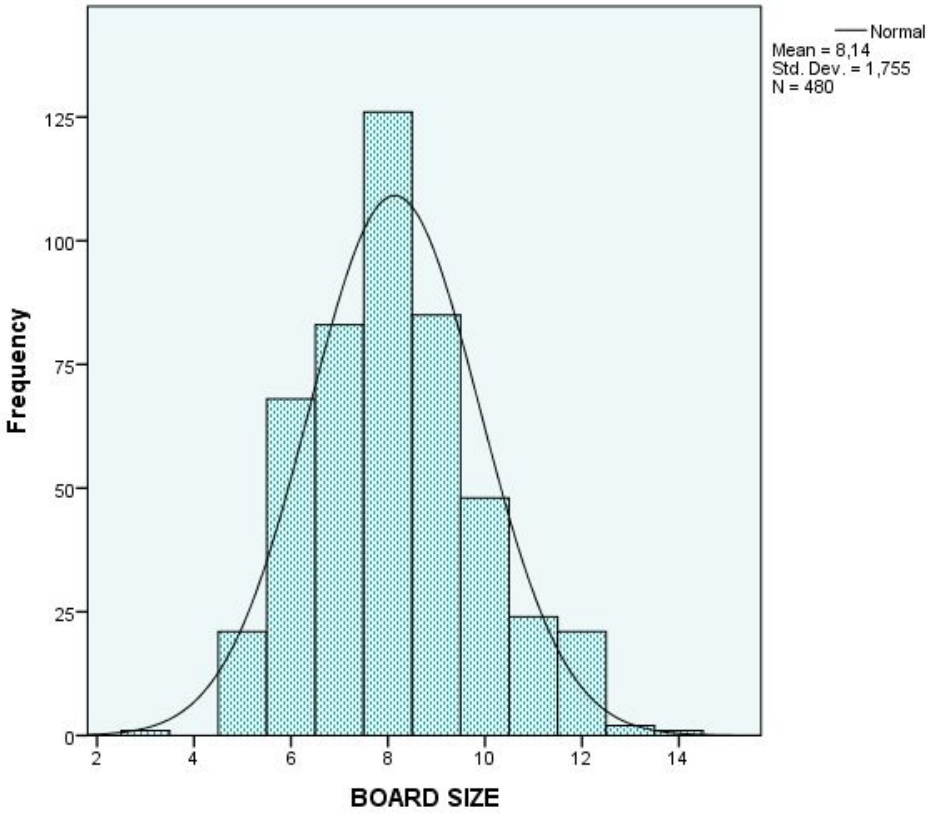
Histogram for LEVERAGE



Histogram for LN(FIRM SIZE)



Histogram for BOARD SIZE



Appendix 2 - List of public firms included in the sample

Company	Company
AAK	Kindred Group
ABB	Loomis
ÅF	Millicom Int. Cellular
Ahlström - Munksjö	Modern Times Group
Alfa Laval	NCC
ASSA ABLOY AB	NetEnt
Astro Zeneca	NIBE Industrier
Atlas Copco	Nobia
Autoliv	Peab
Axfood	Saab
Axis	Sandvik
Betsson	SCA
Billerud Korsnäs	Securitas
Boliden	Skanska
Electrolux	SKF
Ericcson	SSAB
Fingerprints Cards	Sweco
Getinge	Swedish Match
H&M	Swedish Orphan Biovitrum
Hexagon	Tele 2
Holmen	Telia Company
Husqvarna	Tieto Oyj
ICA Gruppen	Trelleborg
Indutrade	Volvo