MSc thesis in Business Administration – Financial Management

The Effect of Gender Diversity on the Financial Performance of Swedish Listed Firms

Ramon Lappas

University of Twente

Author Note

Master Business Administration – Financial Management

Supervisors:

Prof. E. Svetlova

Dr. L. Shen

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Abstract

The purpose of this research is to examine the effect that gender diversity has on performance and therefore seeks to answer the research question to what extent board gender diversity may have an impact on financial performance of a firm. Previous studies investigating this relationship provide mixed results. In outline, the agency theory suggests that a higher degree of board gender diversity does not have a positive nor negative effect on the financial performance of a firm. Moreover, the stakeholder theory predicts a higher degree of female to be fruitful for the financial performance of a firm. Therefore, the objective of this thesis is to examine the diversity in the form of participation of women on the board of Swedish listed firms at the Nasdaq Stockholm stock exchange with the financial performance of those firms since the literature considers Sweden to be a pioneer. The topic is currently under political debate surrounding the women quote on corporate boards, which makes this study relevant. In this field of research, scientific publications with Swedish listed firms as the unit of analysis appear to be scarce, emphasizing the relevancy of this thesis even further. This thesis has conducted a study based on panel data for 309 complete observations of Swedish listed firms at the Nasdaq Stockholm stock exchange over the years 2018-2020. The analysis involves a descriptive analysis using Excel and EViews 12. The multiple regression analysis includes Pooled OLS & Breusch-Pagan Test, Fixed Effects & Wald Test, Random Effects & Hausman Test, and Interaction Test followed by examining the test using R, Panel EGLS & Hadri-Z Test and lastly a Granger Causality Test for causality testing. The results show no significant indication for the relationship between gender diversity and performance of a firm, where performance is measured by Tobin's Q.

Keywords: Gender diversity, Financial performance, Swedish listed firms, Nasdaq Stockholm, Multiple regression analysis

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Introduction

The discipline of corporate governance is not one from the last decade or two. Berle & Means (1932) published a pioneering study on the topic of Corporate Governance (CG). According to these authors, initial research in the field of CG is mainly concerned with the segregation of ownership and control with an eye on managerial opportunism and is in essence an attempt to identify governance mechanisms aimed at addressing this issue. This research yielded rich empirical evidence in the form of both internal and external governance mechanisms designed to align the interests of those with ownership with those in control, also referred to as managerial agency. A few decades later, Meckling & Jensen (1976) shift the focus of managerial opportunism to a broader view involving other stakeholders in the equation. This is a result of scientific literature showcasing increasing importance of other stakeholders besides shareholders. Amongst others, the composition as well as the structure of the board of directors were identified as corporate mechanisms by Kumar & Zattoni (2014). More recently, there has been a rapid increase in governance studies and according to Kumar & Zattoni (2019) the research field of corporate governance is moving towards a maturation phase at the current time. Additionally, these academics emphasize that governance scholars still have plenty of room to go beyond current research practices and that new theories and methods are yet to be explored (Kumar & Zattoni, 2015).

Gender board diversity recently started gaining more attention in the field of corporate governance research as well as in the world of business (see for example Herring, 2009). In 2003, Norway had introduced a binding women quota and Nordic countries such as Sweden, Denmark, Finland, and Iceland followed shortly after (Matland, 2005). Additionally, the Netherlands have implemented a target figure women quota in 2013 and is currently under heavy political debate since many of the

firms still have not reached the target figure[1]. The Socio-Economic Council (SER) has recently vouched for improvement of this law since it is currently merely a target figure and is it not being enforced[2]. Moreover, the gender pay gap closely linked to this discussion showcases this need (see for example Rubery *et al*., 2005). Initially, the idea was to investigate the current situation with regards to board gender diversity in the Netherlands. Fellow scholars however readily investigate the effect of board gender diversity of Dutch firms on firm performance (see for example Overveld, 2012; ten Dam, 2018; Mutlu, 2020). As a result, the unit of analysis in this study are Swedish firms. The main reason for the unit of analysis being Swedish listed firms at Nasdaq Stockholm is due to the consensus in the literature that Sweden is one of the pioneers in promoting board gender diversity. According to Matland (2005), Sweden is, alongside with Denmark and Norway, amongst the top of the world when it comes to opportunities for women to climb the corporate ladder. What stands out is that when Norway implemented binding women quotas to corporate boards in 2003 to promote women even further in business, Sweden did not (Heidenreich, 2012). Heidenreich (2012) argues that this is most likely since business owners in Norway were small and widely dispersed at that time whilst Swedish businesses were a lot more autonomous, and the gender quotas were therefore deemed both better implementable as well as enforceable for Norway than for Sweden. Randøy *et al*. (2006) state that Sweden filed a proposition for a similar law, but due to a change of government this proposal was withdrawn. More recently in the years 2012 through 2014, however, Sweden has also introduced gender quotas in its legislation in the form of party quotas for elected bodies and governance codes for corporate bodies. Like the Netherlands, target

[1] Referral to Article 166 and Article 276 of the Dutch Civil Code. This law can be found (in Dutch) at the following URL: https://wetten.overheid.nl/BWBR0003045/2015-01-01.
[2] The report of advice from SER can be found at the following URL (text in Dutch): https://www.ser.nl/-/media/ser/downloads/adviezen/2019/diversiteit-in-de-top-publieksversie.pdf

figures for women in top positions of a firm were not met by many Swedish firms leading to this introduction of legislation (Freidenvall, 2015). As a result of these events, it may be interesting to investigate Swedish listed firms since Sweden is a frontier in the discussion surrounding gender diversity by the readily discussed publications and thus provide a cornerstone in the on-going political debate surrounding this topic. To gain a better overall understanding of gender diversity and its impact on the financial performance of a firm, multiple theories will be used to achieve this. Amongst others, several corporate governance theories will be introduced in the next chapter. In essence, the agency theory suggests that a higher degree of female board members does not have a positive nor negative effect on the financial performance of a firm and the effect is thus to be considered neutral. The stakeholder theory predicts the contrary; in outline, a higher degree of female participation on the board to be fruitful for the financial performance of a firm (Francoeur *et al*., 2008).

This research will form a worthy contribution to the controversy surrounding women on the board of listed firms. Currently, there are often no unequivocal conclusions and various results are often of contradictory nature, showing both positive as well as negative relationships but some studies have also failed to find a relationship at all. The contribution of this study can be roughly split into two parts. At the time of writing there is an on-going political debate surrounding the women's quota, also referred to as gender quota and in addition the measures that are in place to promote this. This quota implies that at least a certain percentage of the people on the board should be of female gender. A similar quota of 30% is maintained on a European scale, although not every nation within the European Union has progressed as far as others when it comes to surpassing the set targets. Initially this target figure (incorporated by law) was to be reached or surpassed by the 1st of January in 2016 but this has been delayed to the 1st of January 2020. Performing this study

may provide a building block for future research that could be used to compare the situation as of right now (where '*soft*' legislation is in place) with the situation in the future (where it is likely that '*hard*' legislation with enforcement will be in place, although this is determined by the direction of the political agenda). Ultimately, this may be speculation but following the trend the government as well as the European Union have taken in the past decade in addition to the development of the scientific literature in this field of research, it does not appear to be unlikely to happen in the foreseeable future.

This thesis is structured as follows. Chapter 2 provides a thorough literature review to grasp an understanding with regards to the developments in the field of gender diversity on boards alongside some empirical results from previous studies. Additionally, several findings on the board gender diversity-performance relationship will be reported. Furthermore, several useful concepts are briefly set out in this chapter. Thereafter, the underlying research methodology of this study alongside with the motivation behind several design choices are to be found in Chapter 3 Research design. Subsequently, Chapter 4 Data analysis and results will provide an overview of the process with regards to the data analysis and provide the results from this analysis. Conclusions, limitations, and recommendations are reported and discussed in Chapter 5. Lastly, this thesis concludes with a discussion of the results, the appendices and the bibliography used in writing this thesis.

Literature review

In this section a thorough literature review is provided to get a better understanding of the corporate governance discipline. Thereafter, I take a closer look at board gender diversity. A few phenomena with regards to gender diversity will be set out such as the glass ceiling phenomenon. Additionally, several concepts are discussed that provide preliminary ideas and insights. Finally, this section concludes with a brief overview of empirical evidence from previous studies.

2.1. Corporate governance and diversity of the board

As has been stated in the introduction, Kumar & Zattoni (2014) emphasize the importance of both the structure and composition of the board. Board diversity is a part of this and is deemed as important since multiple studies have pointed out that diversity on boards have a positive impact on the performance of the firm (Carter *et al*., 2003; Erhardt *et al*., 2003; Darmadi, 2011).

Carter *et al*. (2003) reports a policy statement on corporate governance with regards to the composition of the corporate board. In essence, the composition of the board should exist out of "qualified individuals who reflect diversity of experience, gender, race, and age" (TIAA-CREF, 1997). The underlying thought is that the diversity of the board will make it less likely for the board to act solely in best interest of those managing the firm.

In the United States, the National Association of Corporate Directors (1994) report that diversity that comes in the form of gender, race, age, and nationality should be taken into consideration when selecting individuals and determining the appropriateness of these individuals in their function to-be being directors.

Oremus (2020) extends this initial figure and has includes culture, ethnicity, educational background, and expertise. Depicted below in Figure 1 are the multiple aspects of board diversity. On the left-hand side the aspects reported by the National Association of Corporate Directors

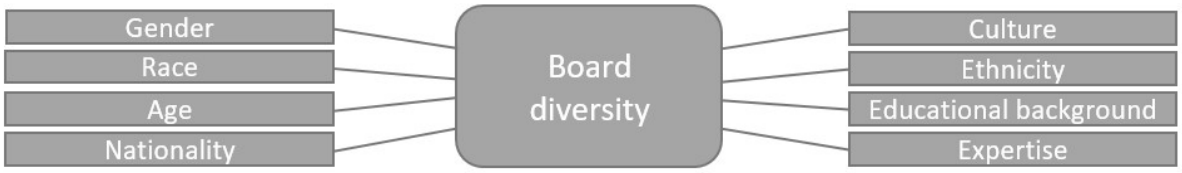

Figure 1. Diversity on the board consists of multiple aspects (National Association of Corporate Directors, 1994; Oremus, 2020).

(1994) are to be found. On the other side the elements recently added by Oremus (2020) are to be found. Note that these traits of diversity are not fully distinguishable from one another. For instance, educational background and expertise intertwine to a certain extent as educational background is often preceding the expertise for instance and the latter is often in the direction of the educational background, albeit that these both statements do not necessarily have to be the case. On the other hand, race, nationality, culture, and ethnicity all have some extent of common ground with one another. Raised often are the relationships between race and culture and similarly ethnicity and culture as the first is generally said to have quite a moderating impact on the latter. This is even the case for nationality and culture, admitting that this impact is of much lesser strength. Note that these are only a small portion of the relationships that have been identified between the diversity traits and the reason of statement is rather to raise awareness. The relationships between diversity traits will not be discussed further in this thesis due to the scoping of this research being gender diversity. For further in-depth discussion on this topic, the reader is referred to Carter *et al*. (2003), Erhardt *et al*. (2003) and Darmadi (2011). Concluding, Carter *et al*. (2003) along with fellow scholars such as Kumar & Zattoni (2014) and Oremus (2020) state that it is rather a mix of diversity traits that ultimately result in a positive impact on the financial performance of a firm. In the

instance of the pioneering study conducted by Carter *et al*. (2003), which have Fortune 1000 firms in scope, the relationship between board diversity and the value of the firm is examined. In this study, board diversity is essentially looking into two traits: gender diversity (in the form of percentage of women on boards) and ethnicity (respective percentage of individuals with African Americans, Asian and Hispanics ethnicity on the board of these firms). After controlling for firm size, firm industry and additional corporate governance incorporated measures, this study finds significant positive relationships between the two traits as specified above and the value of the firm. In the same year, Erhardt *et al*. (2003) publishes a study of similar nature with its scope on 127 large US-based firms. These scholars examine the same traits (gender diversity and ethnicity) as fellow scholars Carter *et al*. (2003) but instead have performed regression and correlation analyses on the relationship between these traits and the financial performance of firms in the form of return on assets (RoA) and return on investments (RoI). The results of this study are like the results obtained by Carter *et al*. (2003). They find a positive association between board diversity and the financial performance of the firm. These studies have provided tangible results and showcase the impact that board diversity may have on performance.

Even though the scope of this thesis is the impact of gender diversity on the financial performance of a firm, studies of comparable nature may still provide beneficial insights into the discipline of corporate governance and board diversity more specifically. There is a myriad of studies available (Dobbin & Jung, 2010; Carter *et al*., 2010; Adams & Ferreira, 2009; and more) that are of comparable nature and to provide a general idea, a brief outline is provided in the section below.
Dobbin & Jung (2010) publish their research on the relationship between gender diversity on corporate boards and the performance of stocks. This study summarizes as well as showcases various results. When it comes to cross-sectional studies, the impact that board diversity may have

on firm performance is deemed spurious. On the one hand side, Carter *et al*. (2010) showcases the positive impact of this relationship by using a singular or at most two moments in time. On the other hand, studies such as the study conducted by Adams & Ferreira (2009), identify a negative relationship between gender diversity on boards and performance. Additionally, Gul *et al*. (2011) conduct a study towards the question whether board gender diversity improves the informativeness of stock prices. They showcase that, after controlling for multiple variables, firm-specific information is better reflected in stock prices as boards become more gender-diverse. Moreover, Boulouta (2013) conducts a study that validates the link between gender diversity on the board and the corporate social performance (CSP) of a firm, however, concludes with the notion that the strength of this link largely varies with the CSP metric that is under investigation. Furthermore, Liao *et al*. (2015) conduct a study towards the impact of board characteristics on the voluntary disclosure of greenhouse gas emissions and find that there is a significant positive association between gender diversity and the propensity to disclose greenhouse gas emissions alongside the extensiveness of this disclosure and therefore more gender-diverse boards show a higher tendency of ecological transparency. Lastly, firm risk in the mode of equity risk. Sila *et al*. (2016) investigate the relationship of gender diversity on the board and firm risk. Notably, the authors find no evidence that female boardroom representation influences equity risk. On the counterpart, findings that may potentially indicate a negative relationship are deemed spurious and the authors conclude that these findings are supported by unobserved intercompany factors of a heterogeneous nature. Concluding, board diversity and in particular gender diversity in the boardroom is examined quite extensively in the past. Hereby, numerous relationships have been identified and a substantial amount of empirical evidence is presented.

2.2. Gender diversity

In the more recent years, board gender diversity receives more attention and numerous publications appear in the past two decades, partially because of on-going political debate. The conclusions of these publications appear to not always be univocal (see for example: Campbell & Minguez-Vera, 2008; Francoeur *et al*., 2008; Gul *et al*., 2011). Francoeur *et al*. (2008) find a high degree of female officers in firms working in complicated business environments to yield positive and significant abnormal returns. These academics apply the valuation framework initially introduced by Fama and French (1992) to take firm risk levels into consideration when drawing conclusions regarding the performance of firms. More women officers in top management prove positive results; significant monthly abnormal returns of 0.17%, i.e., on average 6% over a longer period of 3 years. The rationale behind this finding may potentially be explained by women officers often being appointed to positions associated with a greater risk of failure and are generally better able to manage these circumstances by outperforming their male counterpart, however, the authors refrain from this conclusion as evidence and emphasize the need for further research to support this notion. The authors also state that the degree of female participation on the board did not seem to make a significant difference, at least not for financial performance. Additionally, the authors argue that it is possible that female directors do perform better than male directors in general. This notion is built upon the works of Ryan and Haslam (2005). Their empirical data shows that, in contrast to "the glass ceiling effect", that a "glass cliff" also exists. In addition to the world of business, these phenomena are identified to exist in (higher) education (Jackson & O'Callaghan, 2009; Davis & Maldonado, 2015). The glass cliff is the designation of the phenomenon where women working in senior positions in a firm generally receive job tasks that are deemed riskier than their male counterpart. Not unimportant to the subject of gender diversity is the theory often referred to as

the glass ceiling effect as initially introduced by Cotter *et al*. (2001). In the past two decades, multiple studies conduct research towards this effect. The glass ceiling effect essentially implies that it is deemed more difficult for women to climb the corporate ladder as they face tacit barriers as they get higher up the corporate ladder (Cotter *et al*., 2001). Arfken *et al*. (2004) recognise the board of a firm to be the preeminent barrier for women to face. For this research this effect will not be taken into consideration, but it may however be appealing for future research. These findings altogether tend to be of supportive nature when it comes to the on-going debate with regards to the growth of women in business at large. The findings of Doidge *et al*. (2007) showcase that different countries often yield different empirical results due to discrepancies in country characteristics. Therefore, it is essential to take country characteristics into consideration and investigation on a particular country on its own may provide fruitful contributions towards the readily existing literature in this field of research, especially due to the various readily available conclusions. When it comes to gender diversity in top management and the board, two corporate governance theories seem to stand out since gender diversity has readily been incorporated by these theories, albeit to a certain extent. The well-known and perhaps utmost related to corporate governance agency theory and in addition to that, the stakeholder theory also takes notice of gender diversity. The next section will touch upon the research gap and include more focus on the unit of interest. Carter *et al*. (2010) emphasizes that the diversity-performance relationship cannot be fully elaborated upon using an individual theory.

2.3. The research gap

One of the main reasons that corporate governance is becoming a more widely discussed topic is that the demographics of corporate boards become more advanced whilst ultimately corporate governance is directly influenced by corporate boards. Carter *et al*. (2010) finds that management

as well as the boardrooms of large corporate firms have not adapted properly to this development. As a result, multiple countries spread over the world now use quotes in the attempt to compel with this development. In addition, scholars find a considerable increase in the incorporation of voluntary quotes in the corporate governance code of firms (Rhode & Packel, 2014). Alm & Winberg (2016) state that legislation surrounding a women's quote for Sweden is not yet in place at the time of publication however the issue at hand is receiving an increasing amount of attention and in addition political pressure where Norway is set as an example. Bøhren & Strøm (2010) report that Norway has been one of the first to act by passing a law in 2003 that requires firms to attain 40 per cent of women participation in the composition of boards by 2008. Lindén (2014), in hindsight, emphasize the necessity for legal actions. Anders Borg, a former Swedish minister of Finance, states that the participation of women is at 24 per cent (Alm & Winberg, 2016). Andersson (2013) report that Sweden is moving in the direction of legally binding quotes. This is largely due to the point of view that some business leaders of Swedish listed firms maintain towards a diversity-performance relationship of a firm, which is often more focused on the creation of value for the shareholders rather than social engineering (See for example: Hafsi & Turgut, 2013).

Adams & Ferreira (2009) present several arguments in favour of gender diversity. Amongst others, women are deemed equally adept to men but often receive less opportunity. In addition, boards are reported to benefit from improved effectiveness because of female participation on the board as women tend to offer a unique set of skills alongside a divergent way of thinking. Reguera-Alvarado *et al*. (2017) find evidence of supporting nature for these arguments and argue that women tend to be more risk-averse than their male counterpart and in addition propose both more sustainable as well as less assertive investment strategies. Carter *et al*. (2010) however state to have found the

contrary. More gender diversity results in a larger diversity in notions which are in turn deemed to prolong decision-making processes and make these processes less effective overall (Carter *et al*., 2010). By conducting this study, an establishment is made in the ongoing political debate surrounding the Swedish board gender quotes with more recent data.

To conclude this chapter, the various conclusions in the form of empirical evidence that have been reported by fellow scholars on the diversity-performance relationship are explored. As has readily been mentioned, empirical evidence has not always yielded consistent results. Scholars have reported both positive and negative relationships between the participation of women on corporate boards and the financial performance of a firm for a study conducted on firms in the US (Adams & Ferreira, 2009). The moderating factor appears to be the strength of the governance mechanisms in place. For firms with relative weak governance, the gender diversity-performance relationship is positive whereas firms with a relative strong governance were found to have negative diversity-performance relationships. The authors conclude with the notion that there is no clear evidence encouraging legally binding quotes. Carter *et al*. (2010) performs a similar study on US firms and find no clear link between gender diversity and the financial performance of a firm. However, these authors come to the same conclusion that there is no motivation promoting legally binding quotes. Francoeur *et al*. (2008) perform a slightly extended study where risk has been incorporated in the diversity-performance relationship. Interestingly, various results were found on the diversity-performance relationship, largely varying based on the level of risk a firm experience as well as external influences such as industry pressure. For firms experiencing a higher level of risk, a positive relationship is reported. Furthermore, the authors report that firms with a higher participation rate of women on the board generally do not result in excess returns. All in all, the conclusion is that it is not clear whether gender diversity has a positive impact on financial

performance provided that empirical results have been of various nature. Granted that inconclusive results were found and that several measures have been implemented in Sweden, it may be captivating to reconstruct and investigate the gender diversity and financial performance relationship for Swedish listed firms. Therefore, the research question for this study is:

RQ1*:* "*To what extent does gender diversity on corporate boards of Swedish listed firms have an impact on the financial performance of these firms?*"

To tackle this research question, an analysis will be performed which includes the Swedish firms listed at the Nasdaq Stockholm stock exchange.

2.3.1. Hypothesis development

Concluding on this chapter, a hypothesis has been developed for **RQ1** as depicted below.

H0: *Gender diversity on the corporate board has no impact on the financial performance of a firm.*

H1: *Gender diversity on the corporate board has a positive impact on the financial performance of a firm.*

Research design

In this section the underlying research methodology of this study is set out alongside with some of the advantages and disadvantages that come with it. In addition, the motivation behind some choices that are made during the design of this study will be mentioned to include and partially reflect the thought process of the author. The model in this study alongside with the definitions of the variables that are used are clarified including the respective methods of measurement. Lastly, the sample is discussed in the final section of this chapter.

3.1. Previous literature

Various methods are used in determining the relationship between board characteristics and firm performance. Amongst others, methods that have been widely used are the two-stage least squares (2SLS) regression, pooled ordinary least squares regression (OLS), generalized method of moments regression (GMM), fixed effects regression, random effects regression and many other techniques (see for example Campbell and Mínguez-Vera, 2008; Adams and Ferreira, 2009; Dezsö and Ross, 2012; Matsa and Miller, 2013). The most frequently used method with regards to quantitative studies in this field of research appears to be the OLS regression technique. For studies of qualitative nature publications appear to be rather scarce, especially in contrast to the number of quantitative studies and even more so when specifically looking into the diversity-performance relationship. A recent study by Pandey *et al*. (2022), however, finds through the theoretical framework of complexity theory that gender diversity on the board stand-alone does not necessarily influence firm performance, but rather a blend with board and firm characteristics. Nonetheless, even then results appear to be inconclusive as both combinations resulting in stronger firm performance and combinations resulting in weaker firm performance have been identified, ultimately pointing in the direction of the need for further research. Kaczmarek & Nyuur (2021)

find similar results, again emphasizing the need for future research. This has been taken into consideration in the approach of this study. The next subsections will provide a brief outline of the various regression analysis techniques that have been used in conducting this research.

3.1.1. OLS regression

Ordinary least squares regression is a method that can be used to determine estimates in a linear model. Valuable scientific contributions to the relationship between gender diversity and the performance of the firm with the aid of this method are for example Adams and Ferreira (2009), Dezsö and Ross (2012) and Carter *et al*. (2010). In the analysis, it makes use of least squares. Least squares imply the minimization of the sum of the squares of the differences between the dependent variables in the dataset and the estimates that this method provides. This technique is widely used due to its fair simplicity in use and sees applications across a large variation of fields of research, however, this does not come without pitfalls (Stimson, 1985). A considerable example being that the method does not account for endogeneity, where the explanatory variable is correlated with the error term. If that is the case, instrumental variables, also referred to as IVs, should be introduced within the model. In the examples, Adams and Ferreira (2009) have introduced industry effects as well as year fixed effects whereas Dezsö and Ross (2012) have introduced fixed effects as well as using the Arellano-Bond estimator in their models, respectively. The latter will not be discussed in this thesis since it is not deemed relevant for this study. Industry effects as well as year fixed effects, however, are relevant. The next two sections provide a general outline on these effects.

3.1.2. Fixed effects regression

The fixed effects regression model is also widely used in this field of research. In essence, this model either sets fixed parameters or takes a particular difference out of the estimating equation (Allison, 2009). Adams and Ferreira (2009) apply fixed effects for firms and report that these

findings significantly impact their results. In addition, Carter *et al*. (2010) and Oremus (2020) apply various fixed effects, such as firm, annual economy, and industry fixed effects. Lastly, Allison (2009) states that for fixed effects methods to work, it is essential for the variables to change over time. The author provides examples that would render the method useless, such as race and gender, because these do not change over time and would thus not yield any estimates. Additionally, the author concludes with the statement that this method should not be used when the variation over time on an individual scale is little, since that causes the method to become inaccurate.

3.1.3. Random effects regression

Opposed to the fixed effects regression, the random effects model does not set fixed but random parameters, usually following a specified probability distribution. This method is applicable under the assumption that unobserved variables are uncorrelated with the observed variables in the model. This contrasts with the fixed effects regression, which allow the unobserved variables to have correlations with the observed variables. This method is only appropriate when it is expected that differences between individuals are substantial and have an impact on the dependent variables, otherwise the method is considered counterproductive (Allison, 2009).

3.2. The design

The first step in conducting this study is the preparation of the data set. Subsequently, I briefly look at the development of gender diversity on corporate boards over the years 2018-2020. Thereafter, quantitative data analysis in the form of multiple types of regression analysis are performed, paired with corresponding testing to investigate the diversity-performance relationship. The methods and the variables are set out in the next sections. This study seeks to provide results

for RQ1 and the corresponding hypotheses. A step-by-step overview of the design including all methods and techniques is found below in Figure 2.

Step	What	Methodology	Technique
1.	Generation of the data set	Data gathering	Refinitiv Eikon, Excel
2.	Examining gender diversity developments	Descriptive analysis	Excel: Bar Charts
3.	Outlier analysis	Quantitative analysis	Excel: Data Winsorization
4.	Pooled OLS Regression	Quantitative analysis	EViews: OLS Regression
5.	Test for heteroscedasticity	Quantitative analysis	EViews: Breusch-Pagan Test
6.	Fixed Effects Regression analysis	Quantitative analysis	EViews: Fixed Industry Effects
7.	Test for Fixed Effects	Quantitative analysis	EViews: Wald Test
8.	Fixed Effects Regression analysis cont.	Quantitative analysis	EViews: Time Fixed Effects
9.	Fixed Effects Regression analysis cont.	Quantitative analysis	EViews: Combined Fixed Effects
10.	Test Interaction Effects	Quantitative analysis	EViews: Wald Test
11.	Plot Interaction Effects	Diagnostic analysis	R: Interaction Plot
12.	Random Effects Regression analysis	Quantitative analysis	EViews: Random Cross-section Effects
13.	Test for FEM vs REM	Quantitative analysis	EViews: Hausman Test
14.	Weighting the Observations	Quantitative analysis	EViews: Panel EGLS
15.	Test for Unit Root	Quantitative analysis	EViews: Hadri-Z Test
16.	Causality Testing	Quantitative analysis	EViews: Granger Causality Tests

Figure 2. The step-by-step research design used in conducting this study including the techniques used.

3.3. Model development

Based on the previous literature, it may prove fruitful to make use of similar research methodology to allow for comparison between countries to be made. Note that all the discussed methodology has been carefully considered for the purpose of this research. Notwithstanding the previously found empirical evidence, taking into consideration the relative ease of use and the allowance of future comparison to be made, the equation model will be adopted from Carter *et al*. (2010). This model is as follows:

$$\text{Firm performance (Carter } et\ al.\text{, 2010)} = \alpha + \beta_1 \text{ Diversity} + \beta_2 \text{ Previous Perform} + \beta_3 \text{ Firm Size} + \beta_4 \text{ Governance} + \beta_5 \text{ Firm} + \beta_6 \text{ Time Period} + \varepsilon$$

The model has been modified accordingly to fit this study and the model then is:

$$\text{Firm performance (Y)} = \beta_0 + \beta_1 \text{ Gender Diversity} + \beta_2 \text{ Firm Size} + \beta_3 \text{ Industry} + \varepsilon$$

3.3.1. Variables

The next section is dedicated to the outset of the definitions maintained and the measurement of the various variables in our model.

3.3.2. Firm performance

For the vast majority of the recently discussed papers, the metric that is used in representing firm performance is Tobin's Q. There is one other alternative that is being used in a minority of readily reviewed research, which is return of assets (ROA). The latter is less appealing for this study for a few reasons. Since the data set of this study contains multiple industry groups, Tobin's Q is the preferred metric since it is likely that various industries have varying asset structures as well as profit margins, which entails that using ROA as a metric may impose limitations. Furthermore, ROA is more susceptible to accounting practices than Tobin's Q which must not be ignored. Therefore, the measurement of firm performance that is maintained is Tobin's Q. Most comparable studies investigating the diversity-performance relationship that are discussed thus far throughout this thesis also use Tobin's Q as a measurement tool for the financial performance of a firm which allows for collation. Tobin's Q has however proven to not always be a suitable metric with some reports of unreliable results where perhaps a different metric would have yielded better results.

3.3.3. Gender diversity

The variable that this thesis is particularly interested in is the gender diversity on the board of a firm. Gender diversity for the purpose of this study can be measured in two ways. The first method being the absolute number of female directors on the corporate board of a firm. The second method of measuring gender diversity on the corporate board is dividing the number of female directors on a particular board by the total number of directors of that board. Gender diversity for the purpose of this study is measured by the percentage of directors of the female gender on the board, which

is in line with Adams & Ferreira (2009) and others. In addition, it is consistent with most other publications referred to in this thesis that are also investigating the gender diversity-performance relationship, which will have the main benefit of allowing for direct comparison. The main reason for this is that ratios can be compared with each other whilst comparing the absolute values for this variable does not nearly provide as much value nor insights. Ultimately, investigating the ratio provides the best fit with RQ1 and the hypotheses drafted, respectively.

3.3.4. Year, industry effects and the error term

Previous comparable studies (Adams & Ferreira, 2009; Liu *et al*., 2014; Low *et al*., 2015) report to be controlling for both year and industry effects. The first, year fixed effects, must be controlled for due to the influence that the general economy has on firm performance. This is accounted for with the use of dummy variables. The latter, industry effects, must be controlled for the potential influence that the industry a firm is operating in may have on the financial performance of a firm. Larger industries are reported to have a potential impact on performance. To control for this effect, dummy variables are used. Lastly, a portion of the uncertainty is accounted for with the use of the error term, ε.

3.3.5. Firm size

A substantial majority of the analyses that have been readily discussed have included firm size in their research when investigating the gender diversity – performance relationship. This variable is generally introduced to further enhance comparability by accounting for '*scale'* effects and to address heterogeneity (See for instance Carter *et al*., 2010; Campbell & Mínguez-Vera, 2008).

Data analysis and results

The following chapter sets out how the data set used in conducting this study is created. In addition, the data analysis is set out alongside with the results of the analysis.

4.1. Generation of the data set

For this study, I have created a data set. This data set is drafted based on a company sheet provided by Nasdaq Stockholm with public access and is used as the starting point for this data set. Initially, without having performed any subsequent procedures, the initial sample equals sample size N = 409. An attempt was made to retrieve data from SIS Ägarservice, a Swedish entity that holds information on Swedish listed firms. Unfortunately, access was not granted for the purpose of this research. Thereafter, data related to these firms is gathered by hand. Gathering data with regards to the stock prices throughout the period under investigation generates incomplete data for 35 entities listed on the sheet, for instance due to the IPO being after the start of the period under investigation, leaving a sample of N = 374. Subsequently, a total of 44 entities are found to be listed in duplicate, e.g., the entity having both A and B stocks. After filtering for these duplicates, sample size equals N = 330. Lastly, the financial data is retrieved for the remaining sample through the Refinitiv Eikon database provided by Thomson Reuters. A total of 11 entities yielded incomplete financial data due to for instance the creation of the entity during or after the years that are in scope and were subtracted from the sample. In addition, for a total of 6 other companies the financial data is unavailable in Refinitiv Eikon and are deducted from the sample. Finally, 4 entities are found to have either unavailable data with regards to the board of the firm or are delisted and therefore no longer available on Refinitiv Eikon. After processing all the steps, a sample size of N = 309 remains. For an overview of the generation of the data set, refer to **Table 1** below.

Table 1. Generation of the data set	N
Obtained a list of the listed firms at Nasdaq Stockholm	409
Retrieved information related to the stock prices of these listed firms	374
Data set filtered for firms with multiple stocks	330
Removed the firms with incomplete financial data during investigation period	319
Filtered data set for the firms with unavailable financial information	313
Discard firms that have been delisted or have unavailable board data	**309**

As previously mentioned, the data set involves 309 firms listed at Nasdaq Stockholm OMX between the years 2018 up to and including 2020. The final sample composes a total of 12.305 director years. The next sub-section provides a more detailed overview of the dispersion of the board over the years.

4.2. Gender diversity on corporate boards

Figure 3 depicted below shows the percentage males and females on corporate boards throughout the years 2018 and 2020. Most of the board members in the period under scope are male, with 71 / 70 / 69 per cent over the years, respectively.

Figure 3. Gender diversity on Swedish corporate boards over the years 2018 through 2020.

It must be noted that there has been an overall growth in the number of directors throughout the period under analysis. What stands out is that, even though there has been an overall growth, the relative growth of female participation on the boards is higher than that of their male counterpart. Depicted below in Figure 4 is the growth of the corporate boards throughout the years in scope in absolute numbers, separated based on the gender male and female. Notable is that, provided that the male portion of directors is ranging from 225-247 per cent of that of female directors over the years, the absolute growth in the number of female directors in effect surpassed that of the male directors in the year 2019 – 2020. The growth as represented by this sample is in line with the expectation of the literature review.

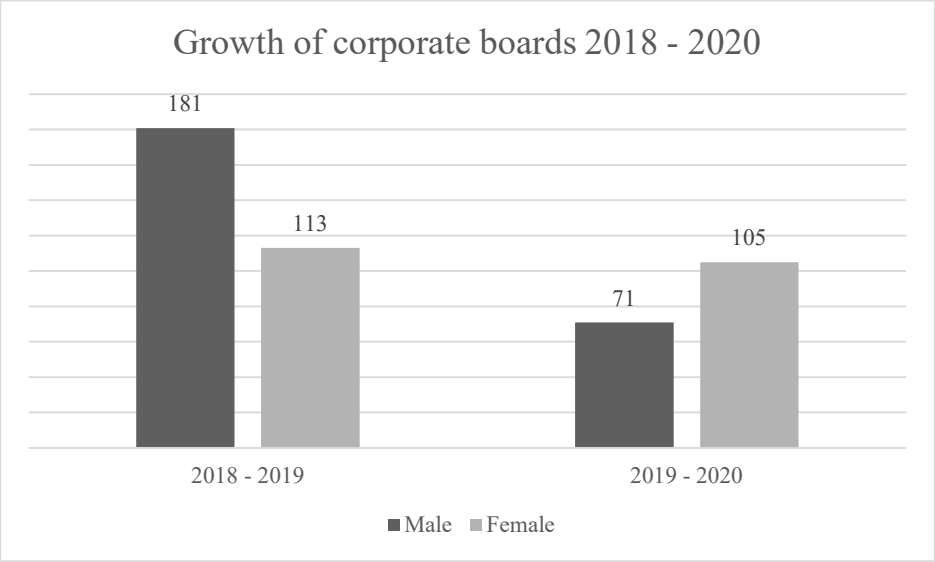

Figure 4. The growth of corporate boards through the years 2018 – 2020, categorized by gender.

4.3. Elaboration on variables

Ultimately, the gender variable is calculated as the female portion of directors divided by the total number of directors on the board of a firm which is in line with methodology used in previous research such as Adams & Ferreira (2009) and Gul *et al*. (2011). Furthermore, to address potential reverse causality and endogeneity issues, the variable is lagged for up to and including one year

since the performance of previous year may affect the performance of this year and in addition it may also affect the structure of the board (Carter *et al*. 2010). Carter *et al*. (2010) and Gul *et al*. (2011) use natural log of total assets as a proxy for firm size, which is also used in conducting this study.

4.4. Winsorization of the data

At first glance of the data set, several extreme outliers are identified. After running the initial few steps of the data analysis, these outliers appear to exert quite some influence on the regression results. Initially, these outliers were to be trimmed from the data set. However, this would result into quite a loss of data, the choice was made to look for alternatives. According to Ghosh & Vogt (2012), there are two options for treating these outliers. The first being to treat them as any other data point or second, to winsorize them. This has resulted into applying a 99% Winsorization to the data set to address the issue of outliers but not over tune the effects of doing so. The method entails to set all outliers equal to a specified percentile, both at the top and at the bottom of the data set. The bottom 0,5 per cent has been set equal to the 0,5 percentile whereas the top 0,5 per cent has been set equal to the percentile 99,5.

4.5. Regression analysis

The following subsections showcase a walkthrough of the regression analysis that is performed for conducting this study, including the corresponding tests and hypothesis development.

4.5.1. Pooled OLS Regression

First, I perform the pooled OLS regression where firm specific and period specific characteristics are captured in the error term, also known as endogeneity. The results of the pooled OLS regression can be found below in **Table 2**.

Table 2. Results of the Pooled OLS Regression

Constant	13,88
	(1,01)
Female directors	1,25
	(0,82)
Size	-0,55***
	(0,05)
R-squared	0,13
No. observations	927

Standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

To determine whether the Pooled OLS regression is considered stable and thus fitting for this regression analysis, it is paired with a Breusch-Pagan test for heteroscedasticity. This test is designed to assess the presence of heteroscedasticity in regression. The result of the Breusch-Pagan test is depicted below in **Table 3.** Subsequently, the development of the corresponding hypotheses to this test are set out. For interpretation of the Breusch-Pagan test results, the following hypothesis are drafted:

H0: *Homoscedasticity is present (and thus the pooled OLS regression is stable).*

H1: *Heteroscedasticity is present (and thus a fixed/random effects model is a better fit).*

As the p-value of the Breusch-Pagan test for cross-section and time element is both < 0,05, the null hypothesis that the pooled OLS regression model is considered stable is rejected. In short, this entails that the pooled OLS regression results are not a good fit. Therefore, I examine the usage of a fixed effects model or random effects model in this regression.

Table 3. Results of the Breusch-Pagan test for heteroscedasticity

	Cross-section	Time	Both
Breusch-Pagan	447,25***	11,00***	458,25***

*, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

4.5.2. Industry Fixed Effects Model (FEM)

As a result of the Breusch-Pagan test, industry fixed effects are introduced to the model, see **Table 4**. Provided that there are 11 different industries present in the data set, this yields the creation of dummy variables *IND2* up to and including *IND11*, for a total of 10 dummy variables. Each of these variables are coded to pair with one unique industry category.

Table 4. Fixed Industry Effects added to the model

Constant	7,79
	(1,23)
Female directors	-0,40
	(0,83)
Size	-0,30***
	(0,05)
Industry group 2	0,93
	(0,68)
Industry group 3	0,49
	(0,45)
Industry group 4	-0,11
	(0,71)
Industry group 5	0,23
	(0,49)
Industry group 6	3,09***
	(0,46)
Industry group 7	0,31
	(0,42)
Industry group 8	-0,10
	(0,49)
Industry group 9	1,61***
	-0,48
Industry group 10	0,66
	-0,65
Industry group 11	-0,80
	(1,65)
R-squared	0,23
No. observations	927

Standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

Subsequently, before interpreting the results of the fixed effects model, I perform a Wald test to determine whether the fixed industry effects are present in our regression or whether the created dummy variables *IND2* through *IND11* are all sharing the same constant. For the interpretation of the Wald test, I draft the following hypotheses:

H0: *All the industry dummy variables' constants are equal to zero, C(4) throughout C(13)=0 (and as a result, pooled OLS regression is considered stable).*

H1: *All the industry dummy variables' constants are different (and thus the fixed effects model is considered a better fit).*

Table 5. Wald Test for the Fixed Industry Effects

	Value	df
F-statistic	11,52***	(10, 914)
Chi-square	115,15***	10

*, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

As depicted in **Table 5**, the p-value is less than 0,05 and therefore the null hypothesis is rejected. This means that the dummy variables *INDUS2* through *INDUS11* do exist and have different constants. In other words, the fixed industry effects as introduced exist. This provides an indication that the fixed effects model is better than pooled OLS.

4.5.3. Time Fixed Effects Model (FEM)

Consequently, in a similar way I test for time specific characteristics. Provided that the years in scope are 2018 throughout 2020, two dummy variables for year are created, being 2019 and 2020. The year 2018 is captured in the intercept. As depicted in **Table 6**, only the dummy variable *YEAR 2020* comes back as statistically significant with a p-value of < 0,01. What stands out is that variable *SIZE* again returns a statistically significant coefficient.

Table 6. Time Period Effects in the model

Constant	13,63
	(1,01)
Female directors	1,10
	(0,82)
Size	-0,56***
	(0,05)
Year 2019	0,42*
	(0,24)
Year 2020	0,79***
	(0,24)
R-squared	0,15
No. observations	927

Standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

4.5.4. Combined Fixed Effects Model (FEM)

When comparing the results from the industry fixed effects with the time fixed effects, both results contain some statistically significant p-values for the created dummy variables. The comparison of the Schwarz criterion of both output show that the difference is negligible and therefore not indicating one fixed effects model as a substantially better fit to the model opposed to the other fixed effects model. As a result, I now combine the two fixed effects into one model as depicted below in **Table 7**. Also note that with regards to multicollinearity, an analysis is performed which is found in **Appendix 1**. In short, two variables that are perfectly correlated with each other return a value of 1. Two independent variables that return a high correlation with each other are considered detrimental to statistical inferences and should be reconsidered or they may impose a threat to the reliability of the model. The covariance analysis indicates no issues for this study.

Table 7. Combined Time and Industry Effects in the model

Constant	7,59
	(1,23)
Female directors	-0,55
	(0,82)
Size	-0,30***
	(0,05)
Industry group 2	0,95
	(0,68)
Industry group 3	0,50
	(0,44)
Industry group 4	-0,13
	(0,71)
Industry group 5	0,25
	(0,49)
Industry group 6	3,09***
	(0,45)
Industry group 7	0,31
	(0,41)
Industry group 8	-0,07
	(-0,49)
Industry group 9	1,60***
	(0,48)
Industry group 10	0,66
	(0,65)
Industry group 11	-0,82
	(1,64)
Year 2019	0,40*
	(0,22)
Year 2020	0,76***
	(0,22)
R-squared	0,24
No. observations	927

Standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

Like the industry fixed effects (**Table 4)** and time fixed effects (**Table 6)**, the same variables return with statistically significant p-values. In addition, the variable *SIZE* again returns statistically

significant after combining effects. However, before drawing any further conclusions, the interaction effects between the independent variables in our model are inspected.

4.5.5. Interaction Effects

The next section presents the interaction effects *IND2*FDIR, IND2*SIZE* through *IND10*FDIR, IND10*SIZE*. By doing so, I investigate for indications of potential omitted variable bias and moreover a further enhanced understanding of the relationship in scope may be gained. Note that *IND11*FDIR* and *IND11*SIZE* are dropped from **Table 8** down below on due to a *near singular matrix* issue caused by the small n of group 11 (3 observations in total).

Table 8. Interaction Effects between Industry Dummy Variables, FDIR and SIZE

Constant	2,44
	(5,13)
Female directors	1,26
	(3,36)
Size	-0,08
	(0,24)
Industry group 2	-8,79
	(13,70)
Industry group 3	6,71
	(6,17)
Industry group 4	3,68
	(11,31)
Industry group 5	0,02
	(5,80)
Industry group 6	20,87***
	(5,64)
Industry group 7	2,08
	(5,60)
Industry group 8	-2,61
	(8,29)
Industry group 9	7,19
	(6,64)
Industry group 10	3,65
	(7,14)
Industry group 11	-0,29

	(1,66)
Industry 2 * Female directors	-11,30
	(8,80)
Industry 2 * Size	0,55
	(0,62)
Industry 3 * Female directors	-2,15
	(3,85)
Industry 3 * Size	-0,25
	(0,28)
Industry 4 * Female directors	-0,22
	(8,31)
Industry 4 * Size	-0,16
	(0,49)
Industry 5 * Female directors	-1,70
	(4,37)
Industry 5 * Size	0,01
	(0,27)
Industry 6 * Female directors	-3,76
	(3,81)
Industry 6 * Size	-0,79***
	(0,26)
Industry 7 * Female directors	-1,71
	(3,78)
Industry 7 * Size	-0,05
	(0,26)
Industry 8 * Female directors	-1,71
	(4,45)
Industry 8 * Size	0,12
	(0,37)
Industry 9 * Female directors	2,31
	(4,12)
Industry 9 * Size	-0,28
	(0,31)
Industry 10 * Female directors	-8,54
	(6,77)
Industry 10 * Size	-0,04
	(0,34)
R-squared	0,27
No. observations	927

Standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

Apart from *IND6* and *IND6*SIZE* all variables return as statistically insignificant. In addition, one could argue that this many variables into an estimation may lead to multicollinearity. Various literature suggests that it may be interesting to investigate the interaction effects' slope of *IND6* to be able to interpret the effects and understand the relationship between the variables. To allow for this plot, *IND6FDIR* is categorized into 5 categories being very low, low, medium, high, and very high. These categories are coded based on the corresponding percentiles in the data set, e.g., the very low category consists of the bottom 20 per cent of the variable *IND6FDIR* whereas the category low consists out of the subsequent 20 per cent, the 20-40 per cent portion. Subsequently, the plot is created using R (https://www.r-project.org/). The results of the interaction plot in R are in Figure 5 below. The plot provides an indication for the relationship under scope is best described as 'some interaction'. With this conclusion, the models of 'moderate reversal' and 'full reversal' are ruled out.

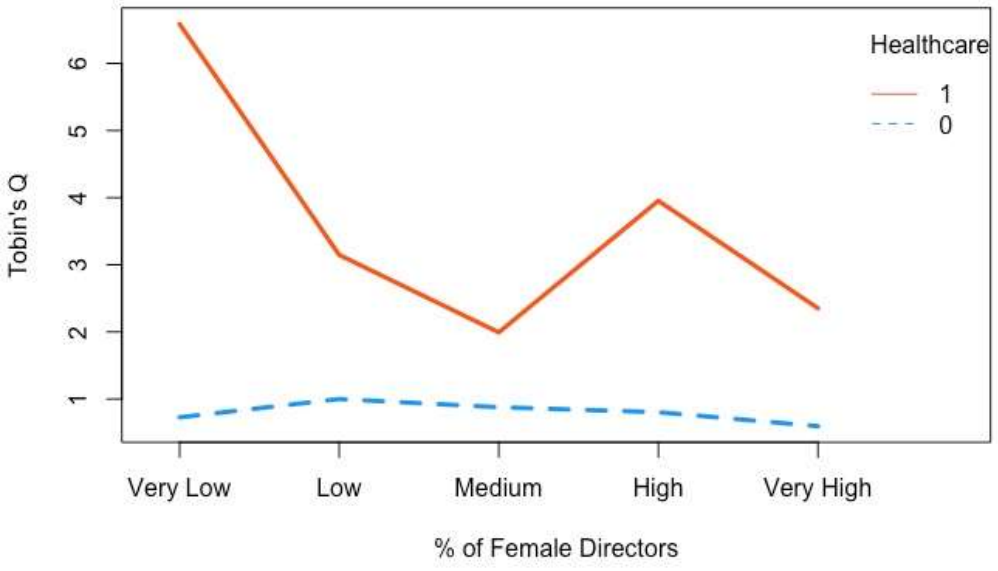

*Figure 5. The Interaction Effects SIZE*FDIR plotted with R for variable IND6.*

4.5.6. Random Effects Model (REM)

Additionally, I estimate the same model with random effects as opposed to fixed effects to test the assumption that the variables *IND2 – IND11* are fixed. As illustrated below in **Table 9**, the estimation drops in power in contrast to the fixed effects model (**Table 4)**.

Table 9. Random Cross-section Effects

Constant	9,60
	(1,80)
Female directors	0,80
	(0,88)
Size	-0,39***
	(0,08)
Industry group 2	0,88
	(1,04)
Industry group 3	0,34
	(0,68)
Industry group 4	-0,05
	(1,09)
Industry group 5	0,23
	(0,75)
Industry group 6	2,76***
	(0,69)
Industry group 7	0,19
	(0,64)
Industry group 8	-0,18
	(0,75)
Industry group 9	1,38*
	(0,74)
Industry group 10	0,63
	(1,00)
Industry group 11	-0,85
	(2,54)
Weighted R-squared	0,12
Unweighted R-squared	0,23
No. observations	927

Standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

4.5.7. FEM or REM?

To conclude on whether the fixed effects model is in fact a better approach in estimating the model as opposed to the random effects model, I perform a Hausman test. Therefore, the following hypothesis is drafted:

H0: *The Random Effects Model is considered appropriate.*

H1: *The Fixed Effects Model is considered appropriate.*

Table 10. Hausman Test

	Value	df
Cross-section random	13,07***	2
	Fixed	Random
Female directors	2,00*	0,80*
Size	-1,06***	-0,39***

*, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

As the p-value of the test returns as < 0,05, the null hypothesis is rejected and thus the fixed effects model is considered appropriate. The p-value for the cross-section random effects test comparisons return as statistically significant for the size variable with a p-value of < 0,01. Paired with the assumption that the cross-sectional units in the sample are not random since there is no such thing as drawing from a larger sample, and that the final and cleaned data set entails a large portion of the Swedish listed firms, provides a strong indication that FEM is more appropriate. In addition, variables *IND2* through *IND11* included results in estimated covariance matrix of reduced rank. Henceforth, the next sections report additional estimates.

4.5.8. Weighting the Observations

To enhance the efficiency and reliability of the parameter estimates, it may provide fruitful for this regression analysis to introduce weighting to the observations in the panel data (For example, see Solon *et al*. 2015). By doing so, the heteroscedasticity in the panel data is partially omitted due to more importance being allocated to observations with relatively less variance whereas there is less importance given to observations with relatively large variance. In a similar fashion, the impact of outliers on the estimates is addressed. Lastly, it could be utilized as a robustness check. Consequently, I perform some tests using generalized least squares (GLS). Provided that the number of cross-sections N is larger than the number of time periods T, it is most appropriate to first apply the period weights. Henceforth, below in **Table 11** is the estimation of weighting the observations using period seemingly unrelated regression weights (Period SUR).

Table 11. Weighting the Observations using Period SUR Weights

Constant	9,07
	(1,63)
Female directors	1,06
	(0,79)
Size	-0,37***
	(0,07)
Industry group 2	0,75
	(0,94)
Industry group 3	0,19
	(0,61)
Industry group 4	-0,05
	(0,99)
Industry group 5	0,15
	(0,67)
Industry group 6	2,35***
	(0,62)
Industry group 7	-0,00
	(0,57)
Industry group 8	-0,22
	(0,67)

Industry group 9	0,95
	(0,67)
Industry group 10	0,58
	(0,90)
Industry group 11	-0,94
	(2,28)
Weighted R-squared	0,13
Unweighted R-squared	0,22
No. observations	927

Standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

At first glance, some parameters return as statistically significant. When considering the power of the test however, the weighted statistics of this test showcase that the power of this test is rather low. Consequently, I perform the test using period weights. In **Table 12** below, the estimate of the GLS approach is shown with period weights.

Table 12. Weighting the Observations using Period Weights

Constant	7,45
	(1,17)
Female directors	-0,13
	(0,78)
Size	-0,29***
	(0,05)
Industry group 2	0,89
	(0,65)
Industry group 3	0,44
	(0,43)
Industry group 4	-0,10
	(0,68)
Industry group 5	0,19
	(0,47)
Industry group 6	2,97***
	(0,43)
Industry group 7	0,25
	(0,40)
Industry group 8	-0,13

	(0,47)
Industry group 9	1,47***
	(0,46)
Industry group 10	0,64
	(0,62)
Industry group 11	-0,80
	(1,57)
Weighted R-squared	0,24
Unweighted R-squared	0,23
No. observations	927

Standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

Like the previous results, some parameters do return statistically significant. However, when inspecting the power of the test results, the weighted statistics and the unweighted statistics resemble practically the same power, thus indicating that applying the period weights merely provides a negligible increase in power of the estimates. This may be largely determined by the period in scope, T = 3. Subsequently, I test using cross-section weights, results in **Table 13** below.

Table 13. Weighting the Observations using Cross-Section Weights

Constant	5,00
	(0,23)
Female directors	-0,37***
	(0,14)
Size	-0,18***
	(0,01)
Industry group 2	0,91***
	(0,09)
Industry group 3	0,32***
	(0,05)
Industry group 4	-0,21**
	(0,09)
Industry group 5	-0,04
	(0,05)
Industry group 6	2,55***
	(0,17)

Industry group 7	0,21***
	(0,05)
Industry group 8	-0,09*
	(0,05)
Industry group 9	1,40***
	(0,12)
Industry group 10	0,43***
	(0,05)
Industry group 11	-0,51***
	(0,15)
Weighted R-squared	0,58
Unweighted R-squared	0,20
No. observations	927

Standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

Overall, except for variables *IND5* and *IND8,* this test returns statistically significant parameters whilst controlling for other variables as well as the weighting scheme. Moreover, when examining the test statistics, the weighted R-squared value of 0.5836 suggests that the model explains a significant proportion of the variance in the dependent variable when adjusting for cross-section weights over the unweighted model (R-squared of 0.20). These findings are however subject to the regression assumptions as well as the limitations in our regression model and although the use of cross-section weights may account for the heterogeneity in the data set to a certain extent, the causality in the relationship cannot be inferred from these results alone. Therefore, I explore additional factors that may validate the robustness of these findings.

4.5.9. Panel Unit Root Test

To further aid the strength of the model, I perform a panel unit root tests provided that their power is significantly greater compared to the tests performed above, although it must be noted that the time frame of this panel data series is rather small in relation to the recommended minimum

interval. In pursuance of the model with the best fit and power, the following hypotheses are drafted for conducting the panel unit root test.

H0: *The Panel data does not have unit root (stationarity).*

H1: *The Panel data has unit root (non-stationarity).*

Table 14. Hadri Z-stat test for stationarity

	Statistic
Hadri Z-stat	20,67***

*, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

Provided that the p-value for the Hadri Z-stat is < 0,05, the null hypothesis is rejected which entails that the test provides an indication that the panel data has statistical properties that do in fact change over time, the panel data has unit root. However, given the rather limited time frame under investigation in this study T=3, Dickey & Fuller (1981) suggests that the validity of the panel unit root test is under pressure and that the power of the test results on this data set is rather low and should be interpreted appropriately. As a result, the panel cointegration test, VAR model or similar tests designed for analysing panel data will not be performed simply on account of the time frame of the data set and is brought up as recommendation for future research.

4.5.10. Causality Testing

In furtherance of gaining a deeper understanding of the relation that is in the data, I perform testing for causality which is appropriate in analysing panel data. This will allow to understand whether one variable can predict or cause change in another variable which is crucial in gaining an understanding of the dynamics between the variables in the panel data set. Henceforth, the Granger causality is opted for which specifically assesses the direction of causality (Lopez & Weber, 2017). Also, panel data often suffers from cross-sectional dependence where there is correlation between

the entities as well as heterogeneity. The Dumitrescu-Hurlin test is designed to combat these issues by applying panel-specific corrections which facilitates in drawing more appropriate conclusions. Moreover, in comparison to standard Granger causality testing, the Dumitrescu-Hurlin test is considered robust in panel data with a small number of cross-sections and a limited time frame, which is the case for this study, therefore being the preferred test to perform. Provided the limited number of variables introduced into the model however, it is considered inferior for the purpose of this study. Depicted below in **Table 15** are the results of the Granger causality test with a lag of one. For this test, I draft the following hypotheses (X and Y in this instance resemble the various variables from our model):

H0: ***X*** *does not homogenously cause* ***Y***.

H1: ***X*** *does homogenously cause* ***Y***.

Table 15. Granger Causality test

	Statistic
Size does not Granger Cause Y	11,00***
Y does not Granger Cause Size	67,57***
No. observations	618
Female directors do not Granger Cause Y	3,14*
Y does not Granger Cause Female directors	0,39
No. observations	618
Female directors do not Granger Cause Size	2,06
Size does not Granger Cause Female directors	1,61
No. observations	618

Standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

For ‘SIZE does not Granger Cause Y’ as well as ‘Y does not Granger Cause SIZE’ the test returns statistically significant which implies that normally the null hypothesis is rejected which entails that homogeneous causality exists across the panel data. However, there are more alternatives that need to be taken into consideration. The first being bi-directional causality which essentially means

that both variables exert a certain influence on each other and are also statistically significant where a change in the one variable predicts a certain change in the other variable and vice versa. The latter being that the power of this test is rather low, and it does not detect the effect of potential confounding variables that influence both variables. If this were to be the case, the test may return statistical significance even though there is no direct causal relationship between X and Y. For this study, multiple variances in lag have been tested for this test specifically but do not yield any further insights in the relationship that is under scope. In addition, further increasing the period that is in scope of this study would allow for more appropriate options for instance in the form of sensitivity analysis.

Conclusion and recommendations

The aim of this study is to investigate whether gender diversity on corporate boards of Swedish listed firms at Nasdaq Stockholm influence the financial performance of these firms. In addition, the influence of the size of the firm is taken into consideration, measured by the natural logarithm of the total assets of a firm. Moreover, industry groups are taken into consideration in the analysis as indicated by Nasdaq Stockholm. Furthermore, the variable for year has been considered. Overall, most of the regressions return quite a low level of significance. When looking at the primary variable of interest, gender diversity, the variable returns insignificant. These results suggest that the gender diversity of corporate boards-financial performance relationship has no effect on the financial performance of a firm. Subsequently, I fail to reject the hypothesis drafted for RQ1 that gender diversity has no impact on financial firm performance. As set out in the previous chapter however, there have been indications of factors that may further influence these findings.

Some statistically significant results are found that may be of interest for financial performance. Primarily, the size of a firm is found to have a negative relationship with Tobin's Q. Also, certain industry groups were found to have a statistically significant positive influence on financial performance. These findings suggest that when investigating the diversity-performance relationship, it may bring forth further insights to include for instance multiple methods to measure performance or firm characteristics. The findings are in line with the expectations based on previous research which has readily shown a wide range of results. To reflect on the first two chapters of this thesis, the results do not provide support for the enforcement of gender quotas on Swedish corporate boards listed at Nasdaq Stockholm specifically. Ultimately, the results encourage investigating the relationship in scope even further by implementing more variables and thus recommendations for future research include but are not limited to digging deeper into the

data analysis by for example further including variables such as ownership (as in for example the gender of the CEO or investigating further on directors with share ownership), the distribution of independent versus dependent directors, CEO/director compensation in SEK (Refinitiv Eikon did have data on this variable to a certain extent but generally it was not complete and therefore not included in this study). In addition, investigating other diversity traits such as demographics or other variations are likely to provide new insights into this topic. Furthermore, the time frame for the performed analysis is relatively small and the years that are in fact in scope have not been the most 'normal' years when it comes to the state of the world economy. In addition, extending this data set would also allow for more valid panel unit root testing, cointegration testing and the estimation of other models such as panel VAR models, ultimately resulting in more reliable results. Regardless, the sample size in director-firm-year observations is mostly equal or slightly larger than most comparable studies. Consequently, future research could investigate more in the direction of financial performance of a firm. Finally, it is feasible for the results of this study to control for more variables such as for instance compensation as previously mentioned (Adams and Ferreira, 2009 have controlled for CEO compensation using natural logarithm since it is believed that compensation increases effort and thus affects the financial performance of a firm) but also the age of directors where for example Carter at al. (2010) have controlled for the average age of the board. Undertaking several of these steps in conjunction with the analysis as it is performed is expected to further improve the power of the results and most importantly provide even better insights into the relationship between diversity and performance. The next chapter will provide a literature-backed discussion to get a greater grasp of the findings of this study.

Literature-based discussion for the findings

As mentioned in the last chapter, the main purpose of this study is to investigate whether gender diversity on corporate boards of Swedish listed firms have an impact on the financial performance of these firms. The results of this study showcase that gender diversity has no significant impact on the financial performance of a firm. These findings are in line with multiple other studies such as by Campbell & Mínguez-Vera (2007), Carter *et al*. (2010), and Alm & Winberg (2016) who also fail to reject the null hypothesis that gender diversity influences financial performance. According to the latter, a potential reason for this result may be that board members with different gender tend to pick up the behaviour and customs of existing board members (in this case that of their male counterpart), therefore more or less nullifying the impact of board gender diversity on performance which may explain the outcome of this study. This finding also interweaves with Sila *et al*. (2016) that report a higher proportion of female directors does not show more risk-averse or risk-taking behaviour opposed to a board with all male directors. For Sweden in particular, Boschini *et al*. (2019) find no evidence for a gender gap in risk preferences which may also partially clarify the findings of this study. However, publications in this field of research in economic setting appear to be limited. Nevertheless, other studies report that for firms facing more risk and external pressure female directors frequently outperform male directors, although these findings could not be extrapolated significantly across the entire population (Francoeur *et al*., 2007). Dezsö & Ross (2012) state that gender diversity has a positive impact on firm performance, albeit only to the extent that innovation is part of the organizational strategy of a firm. This may account for the results of this study with regards to Industry group 6 and Industry group 9 notwithstanding the need for further research to find scientific support for this notion.

On the contrary, Adams & Ferreira (2009) have found the effect of gender diversity on firm performance to be negative. A study that has come to a similar conclusion is that of Dobbin & Jung (2010). They have, however, provided an interesting theory as to why this is the case. The authors argue that their research suggests it is not per definition the proportion of female directors that negatively impacts performance but more so investor bias leading to a decrease in stock prices and thus negatively impacting firm performance. For Swedish listed firms in particular, this theory is not receiving support currently. According to the Hofstede (2011) framework, the culture in Sweden is more towards femininity than masculinity and could thus impose a first argument against the theory indicating the need for further study. One argument that may explain the difference in findings in contrast to this study is that of the sample used in conducting the study. Adams & Ferreira (2009) conduct a study based on a Standard & Poor's data set whilst Dobbin & Jung (2010) use the U.S. Fortune 500 and in addition a few industry-specific lists as sample. Another claim could be the sample periods. The first study investigates the period 1996-2003 whilst the second study considers the years 1997-2006. Ultimately, the U.S. cultural foundation and economic frameworks differ in contrast to Sweden which may collectively determine the difference in results even though the methodologies applied are virtually the same.

Opposed to the findings of this study, Arfken *et al*. (2004) are a strong advocate of gender diversity having a positive influence on performance. Ultimately, the key takeaway for their study is that more diversity results in a larger variety of viewpoints and ideas which then lead to better decision-making capabilities across the board. Another study of similar nature is conducted by Lückerath-Rovers (2011). The main results of this study have also been positive where female directors on corporate boards were achieving higher return on equity opposed to boards with no female director

participants. The authors suggest that companies that have female directors included on the board may have a better overall relationship with relevant stakeholders at all organizational levels which in turn enhances the perceived image of the respective company and thus results in a positive impact on performance. For both studies, however, the difference in results with this study could be related to the divergence in methodologies that were applied since these studies are mostly of a descriptive nature. Liu *et al*. (2014) adds to the discussion by including the critical mass theory, where a board with 3 or more female directors outperforms a board with 2 female directors or less. These findings were significant for most of the firms, however proved to be insignificant for state-owned companies. Reiteratively, the methodology used in conducting this study is similar. The sample, however, concerns a data set of Chinese listed firms at the Shanghai and Shenzhen stock exchanges. All in all, the board gender diversity–financial performance relationship has proven to be complicated, involving a large web of interrelated elements. While this study yields statistically insignificant results and fails to provide valuable new insights into the diversity–performance relationship directly, it calls for further research to delve deeper into these elements for a greater understanding and new insights that further advance the grasp of the network of relationships that comprise the diversity-performance relationship. For instance, by including different variables as readily explained in the previous section but also by introducing a multivariate analysis taking into consideration other elements. Examples of these elements could be to introduce the critical mass theory in the analysis, adopting more than one metric for performance, or by redirecting the scope slightly and approach the research from a different angle such as for example the stakeholder theory.

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Appendices

Appendix 1. Covariance analysis.

Covariance Analysis: Ordinary
Date: 10/24/23 Time: 12:17
Sample: 2018 2020
Included observations: 927

Correlation	Y	FRATIO	IND2	IND3	IND4
Y	1.000000				
FRATIO	-0.017367	1.000000			
IND2	-0.017410	0.006795	1.000000		
IND3	-0.061944	0.037543	-0.067308	1.000000	
IND4	-0.055171	-0.172833	-0.024820	-0.062856	1.000000
IND5	-0.127000	0.068684	-0.050445	-0.127750	-0.047109
IND6	0.398519	0.116647	-0.077535	-0.196355	-0.072407
IND7	-0.115820	-0.078534	-0.094733	-0.239908	-0.088468
IND8	-0.147765	0.169550	-0.050445	-0.127750	-0.047109
IND9	0.114375	-0.069369	-0.054440	-0.137868	-0.050840
IND10	-0.027407	-0.053164	-0.028237	-0.071510	-0.026370
IND11	-0.025249	-0.069819	-0.009289	-0.023525	-0.008675
SIZE	-0.363983	0.174330	0.086756	0.017340	0.036733

IND5	IND6	IND7	IND8	IND9	IND10	IND11
1.000000						
-0.147162	1.000000					
-0.179804	-0.276362	1.000000				
-0.095745	-0.147162	-0.179804	1.000000			
-0.103327	-0.158816	-0.194044	-0.103327	1.000000		
-0.053594	-0.082375	-0.100647	-0.053594	-0.057839	1.000000	
-0.017631	-0.027100	-0.033111	-0.017631	-0.019028	-0.009869	1.000000
0.285485	-0.371974	0.012396	0.221193	-0.205418	0.066239	-0.024686