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The influence of board gender diversity on the effectiveness of ESG-based executive payment.

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PREFACE AND ACKNOWLEDGEMENTS

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The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.

ABSTRACT

In this thesis, I studied the effects of Board Gender Diversity on the relation between ESG-based executive payment and ESG ratings. Multivariate regressions and difference-in-differences models were used to test for the moderating effect of Board Gender Diversity and to attempt to establish causality. Contrary to the initial expectations, I found that there is a negative moderating effect of Board Gender Diversity on the effectiveness of ESG-based executive payment. Unfortunately, the difference-in-differences effect could not establish the significant causality of the effect of Board Gender Diversity, however some partially promising evidence was found for causality. My results have implications for lawmakers and firms, who need to critically evaluate if a combination of the usage of ESG pay and aiming for gender equality in their boards will lead to desirable results in terms of ESG ratings.

Keywords: ESG, executive payment, board gender diversity, gender quotas

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CHAPTER 1 Introduction

Environmental, Social and Governmental (ESG) ratings are measures with which an assessment can be made of a country's or firm's efforts in areas of sustainability, ethical relations and responsible management. In recent years, more and more focus is directed towards incentivizing firm boards to employ ESG-positive measures. Cohen et al. (2023) find that, in a global cross-section of executive compensation, the percentage of firms adopting compensation plans based on ESG performance has risen from around 1 percent in 2011 to 38 percent in 2021. The logic behind these kinds of ESG pay structures is intuitive: if executives are rewarded according to their efforts on ESG, they will have a direct monetary motivation for increasing their firms' ratings. Logically, this should lead to improved firm ESG ratings and outcomes. With an ever-increasing sense of urgency towards attempting to halt global-warming and create a better world for the whole population, the potential and need for ESG to contribute to these goals is obvious. However, there is still a lack of widespread evidence towards what actually drives positive ESG outcomes.

Within recent years, there has been an increase of academic attention towards ESG, relating its drivers and outcomes. In a global study of public firms between 2011 and 2020, evidence is found for some positive effects of ESG pay on the yearly changes in firm ESG outcomes (Cohen et al., 2023). However, the effects found by the authors vary in significance between different ratings providers, and the study's statistical models show limited explanatory power. Cohen et al. explain that the mechanism behind their findings is likely related to "efficient incentive contracting". This comes from the idea that ESG pay creates more aligned interests of higher management with regards to long-term ESG goals. The authors add that this alignment effect is stronger if ESG related goals are seen as potential future risks for the firm. In another study, Velte (2016a) analyzes a sample of publicly listed German firms between 2010 and 2014, from which the author is able to observe a significant positive effect of ESG pay on ESG ratings. The author's measure entails a coefficient, which is the amount of ESG-related executive compensation criteria, relative to the financial criteria in the executives' pay. However, the author does admit that the short sample period and analysis based on solely one country calls for more extensive research, in order to draw more generalizable conclusions on the effects of ESG pay.

Outside of ESG pay, research has also focused on other determinants of ESG ratings. One study of Italian listed firms finds a significant positive effect of the number of women in executive boards on the firms' ESG performance (Romano et al., 2020). The authors manage to link this positive effect to increased dialogue within the board of directors, which then contributes to an increase in the quality of decision-making. Moreover, the authors observe that the improved dialogue leads to increased innovation and more competitive strategies, which also pertains to ESG policy. Another study hypothesizes that one of the effects of more women on corporate boards is a greater range of perspectives and an increased facility

for creativity within groups (Hillman et al., 2007). These examples of the benefits of board gender diversity relate to the decision-making ability and creativity of boards. It is therefore not unthinkable that the number of women on firm boards does influence the level of impact that ESG-based executive compensation has on the boards themselves. It could for example be the case that the relatively less gender diverse boards experience more difficulty in the implementation of ESG-positive changes, since on average these boards are less creative, are involved in worse decision-making, and have a less broad range of perspectives (Hillman et al., 2007; Romano et al., 2020). From this line of reasoning, the expectation rises that board gender diversity has a positive moderating effect on the influence of ESG pay on firm ESG ratings. Therefore, the research question answered in this paper is:

“How does board gender diversity impact the relationship between ESG-based executive compensation and firm ESG ratings?”

This study uses multivariate regression analysis on panel data, combined with a difference-in-differences technique, to estimate the effects and causality of board gender diversity as a moderating variable. The panel data used for the analysis is based on observations between 2008 and 2022 from publicly listed firms within the European Union. The difference-in-differences design is used to establish causality of the moderating effect of board gender diversity. This research strategy consists of a treatment group with firms from EU-countries that have implemented mandatory board gender diversity quotas. This group is opposite to the control group, which contains firms from countries with no mandatory gender quotas within the sample period.

The dependent variable in this study is ESG ratings, whilst the independent variables of interest are the number of women within firms' boards (board gender diversity) and whether the firms use ESG pay or not. An interaction between board gender diversity and ESG pay is used as an interaction within the model. Observations on firms' ESG ratings and control variables are collected from the LSEG Datastream Database. ESG ratings are operationalized with a score between 0 and 100 and contain a one-year lag to account for delayed effects of ESG pay incentives. Board characteristics and information on executive compensation are obtained from BoardEx and Datastream. Board gender diversity is operationalized as a proportion of women directors within the board. For usage of ESG pay by firms, a dummy variable is created that takes the value 1 if the firm employs ESG pay. Furthermore, the multivariate analysis includes country fixed effects to account for country-level differences that are harder to observe directly, such as cultural norms and political environment. With regards to the operationalization of the difference-in-difference method, a dummy variable is created to indicate whether an observation is part of the control group or the treatment group. Indicator variables take the value 1 for observations within the treatment group if a certain time period is before or after the implementation of a board gender. This

operationalization provides evidence on both the significance and sign of the moderating effect, as well as the causality of the relation.

In this study, it was expected to find that the number of women on corporate boards significantly influences the impact of ESG pay on ESG outcomes, with the moderating variable increasing the strength of the effect of ESG executive compensation. The significance of the moderating effect was expected to be noticeable within the multivariate regression results, and its causality confirmed by the difference-in-difference effect on ESG ratings. These combined results could then provide increased insights into the conditions under which ESG-based executive compensation are the most effective in improving ESG results.

However, contrary to the expectations, it was found that the moderating effects of Board Gender Diversity on the relation between ESG-based executive compensation and ESG ratings to be negative. I argued that these results could be caused by Tokenism, or they might be due to impaired decision-making by firm boards. Furthermore, it was hypothesized that the choice of operationalization for the ESG pay variable could have large impacts on the magnitude, sign and significance of the moderating effect. Next, the difference-in-differences designs showed evidence in favor of the causal effect of Board Gender Diversity on ESG Ratings. However, due to a likely violation of the parallel trends assumption, interpretation of the effect with certainty unfortunately was not possible.

The rest of this thesis is structured as follows: Chapter 2 provides the theoretical framework on which the research is based, next to introducing the hypotheses that are tested. Chapter 3 presents the data and introduces the variables. Chapter 4 explains the methodologies used in the research. Chapter 5 shows the results, which are discussed and compared to the theoretical framework in Chapter 6. Lastly, Chapter 7 presents the conclusion of this study, in which the research question is answered.

CHAPTER 2 Theoretical Framework

2.1 ESG

For a solid understanding of the scope of this study, it is crucial to clearly define what encompasses ESG. After this introduction, hypotheses will be introduced regarding the effects of multiple variables on ESG outcomes.

Li et al. (2021) state that ESG is a factor system which finds its origins in the principles of responsible investing. Within these principles, the authors argue that ESG can be used by investors to assess how firms act with regards to environmental, social and governmental issues. These issues for example are carbon emissions (environmental), human rights adherence (social) and board composition (governmental). Furthermore, the authors link ESG factors to positive or negative effects on firm financial performance. This makes a sensible case for ESG-based investing being used, not only in light of responsible investing, but also to achieve superior future returns on investments. Li et al. (2021) therefore state that ESG can be seen as a type of investment philosophy which aims for long-term value, whilst also keeping into account possible benefits or harms to the firm's performance based on how responsibly the firm acts.

ESG has not been in the eye of the public for a very long time. In 2004, a joint effort between the UN Global Impact and several large financial institutions from different countries resulted in the first mainstream formal ESG publication (United Nations, 2004). The publication entailed recommendations on how to better combine ESG issues with certain financial services, such as analysis and investments. The publication argued that it was in the best interest of the financial sector to take ESG into account within their activities, since more attention to it would contribute to increased shareholder value, while at the same time contributing to sustainable development of the countries in which financial firms operate. Within recent years, ESG has seen its importance in finance rise massively. Edmans (2023) observes that in 2020, the amount of funds under professional management in the United States invested in ESG type strategies was 25 times as high as in 1995. The author argues that next to the idea that ESG investing creates better returns relative to other investments, an important driver of this trend is a willingness to improve the externalities of companies' behavior. According to the author, investors could for example apply pressure by threatening to exit firms that are lacking in ESG policies or use their voting power to change the firms' policies.

Furthermore, ESG is partly related to Corporate Social Responsibility (CSR), which has seen a large rise in academic publications during the last fifteen years. According to Gillian et al. (2021), the definitions of ESG and CSR relate to each other as follows: "ESG refers to how corporations and investors integrate environmental, social and governance concerns into their business models. CSR traditionally has referred

to corporations' activities with regards to being more socially responsible, to being a better corporate citizen. One difference between the two terms is that ESG includes governance explicitly and CSR includes governance issues indirectly as they relate to environmental and social considerations." The authors therefore argue that ESG is broader than CSR, although the terminologies are intertwined and likely have overlapping focus, results and effects.

2.1.1 ESG ratings and determinants

Where ESG is the framework for evaluating the ethical and sustainable practices of businesses or countries, ESG ratings are the benchmarks using which these entities can be compared to each other (Pagano et al., 2018). ESG ratings are the result of a process, in which ESG rating agencies compile, research and rank firms in how well they perform on ESG matters. Within this market, there has been a large consolidation trend in the last two decades, which was largely driven by supply-push and demand-pull factors, according to Pagano et al. (2018).

Unsurprisingly, firms' own fundamental characteristics have large impacts on their ESG ratings. Within these characteristics, Dremptic et al. (2020) find that several metrics that can proxy for firm size (market capitalization, employees, revenue, total assets) have a significant positive effect on firms' ESG ratings. Simultaneously, the authors also find that proxies for financial success do not directly impact ESG ratings, which indicates that the profitability of a firm does not appear to be of great importance in ESG. Furthermore, Dremptic et al. (2020) hypothesize that the importance of size proxies in determining ESG ratings can be explained by a sort of signaling effect. They argue that larger firms feel more pressure from society to perform well in ESG areas, which causes the firms to place more importance on their ESG outcomes.

Next to firm size, there also is significant evidence relating the impacts of where a firm operates to the firm's ESG ratings. Ioannou and Serafeim (2012) find that, in a seven-year study of firms from 42 countries, countries business systems have highly significant effects on ESG ratings. These systems for example are the political, labor, education and cultural systems, from which the political system by far is the most important. However interestingly, the authors find relatively much less significance of the financial system. Ioannou and Serafeim (2012) manage to link the importance of different business systems to ESG by stating that there is a level of integration between firms and institutions, which put pressure on the behavior of firms, therefore influencing their behavior.

Additionally, another study also finds positive effects of fundamental characteristics on ESG scores, with in this case the engagement in M&A deals as the variable of interest. Barros et al. (2022) report over a sample period from 2002 until 2022 within 41 countries and 12 economic sectors, that firms engaging in at least one acquisition on average performed almost 0.7 points higher in the year on their combined ESG

score, relative to firms that did not engage in a merger in the sample period. The authors manage to link this significant positive effect of mergers to increased efficiency and more sustainable resources. Furthermore, it is argued that the acquiring firm will undergo more scrutiny by the public as well as the government, increasing pressure on the firm to perform well in ESG areas.

Alternatively, firms' efforts with regards to CSR seem to have logical effects on the outcomes of ESG scores. Baraibar-Diez and Odriozola (2019a) study the effects of dedicated CSR committees on ESG performance in a panel of EU-based firms. In their sample of listed firms between 2005 and 2015, they find significant positive effects of the existence of a CSR committee within the firms on environmental, social and governmental scores. The authors argue that a CSR committee helps allocate experts in CSR matters towards the recognition, management and evaluation of CSR issues. This allocation and the subsequent handling of CSR issues logically also have effects on ESG matters, since there is overlap between the two.

2.2 ESG-based executive compensation

ESG-based executive compensation is the practice of linking the amount of compensation or payment an executive receives to certain ESG-based performance indicators. This is very similar to how certain financial metrics (e.g. stock price or revenue targets) can be used to determine the bonus salaries of executives, however in this case non-financial indicators are used.

Within the last decade, the use of ESG-based executive compensation has increased dramatically. In an international study of 10,061 firms between 2011 and 2021, Cohen et al. (2023) find that the percentage of firms in their sample making use of ESG-based pay increased from around 1 percent in 2011 to 38 percent in 2021. This implies that in 2021, around 38 percent of the international sample made use of at least one performance metric based on ESG in the payment of their executive management. Next, the authors examine the effects of this finding on outcomes on the firm level. The authors find here that the use of ESG pay does not lead to a significant difference in firms' return on assets, but it does lead to significantly lower stock returns, as opposed to firms who do not employ a single pay measure based on ESG performance. Furthermore, Cohen et al. (2023) find that the usage of ESG pay is correlated to more trading by institutional investors. The authors also conclude that their results are in line with theories relating efficient contracting, stakeholder preference alignment and signaling commitment to ESG pay.

Next, in a study of S&P500 firms between 2004 and 2013, Flammer et al. (2019) find that CSR contracting, or executive compensation based on CSR targets, leads to an increase in long-term orientation of management. Moreover, the authors find that effects are increased firm value, social and environmental initiatives, fewer emissions, and increases in green innovations, as opposed to not engaging CSR contracting. The authors argue that these effects form evidence in favor of CSR-based

executive pay being used to guide the interests of management to long-term financially beneficial goals, which are prone to receiving less interest since they usually do not reflect short-term increases in share value. Therefore, CSR contracting can be more effective in achieving CSR-related goals than more general stock options.

In another case showing evidence for efficient contracting, Cavaco et al. (2020) study large firms from OECD countries over the period 2004 until 2018. In their study, the authors find that executive compensation schemes including CSR-based pay have negative effects on the financial performance of firms. The authors do however find a large positive effect of CSR contracting on extra-financial performance, such as the relationship with suppliers and customers, and the firm's involvement within its community. The authors claim that this effect is mostly caused by better alignment of management interests with regards to CSR, combined with a better engagement with the firms' stakeholders.

Additionally, a 2002 to 2004 study of 256 non-financial UK firms by Haque (2017) detects a positive association between ESG-related executive compensation and carbon reduction initiatives. The author, however, does not find significant effects on the actual greenhouse gas emissions of firms. This signals that ESG-based pay could also be used to curb criticism about perceived excessive executive pay, instead of as a tool to achieve better ESG results. Haque (2017) mentions that the reason behind this might be the lack of long-term measurable targets in environmental matters, since only 16 percent of the author's sample firms uses long-term sustainability targets in their executive payment schemes.

Firm innovation is another outcome variable that is possibly correlated to ESG/CSR linked pay. To study this relationship, Tsang et al. (2021) employ a large sample from 30 countries and find that innovation output tends to be positively correlated to the inclusion of CSR in executive compensation. Disentangling the possible channels from which the increased innovation stems, the authors find significant positive effects of CSR contracting on employee well-being and employee productivity. Moreover, the authors observe increased managerial risk-taking and greater R&D sensitivity to the investment opportunity set, which Tsang et al. (2021) interpret as more efficient allocation of R&D capital.

Lastly, a study of shareholder welfare in relation to ESG pay in Swedish CFOs finds that there is no effect on firm profitability in its sample (Homroy et al., 2023). The authors also find that in their sample, ESG-linked pay is 5 percent more likely to be employed in well-governed firms. These two findings together form evidence of ESG incentives being used by firms to satisfy the needs of shareholders, who seem to care greatly about ESG issues and their investments being ESG responsible.

2.2.1 ESG pay effects on ESG ratings

It would seem logical that improving firms' ESG ratings is one of the main reasons for using executive payment that is partially based on the ESG performance of the firms. Within this expectation, research has been done to establish the effectiveness of ESG payment schemes on the ESG ratings achieved by firms.

One study on a narrow sample focusing on the banking sector finds evidence in favor of the positive effects of ESG pay on banks' ESG ratings. D'apollito et al. (2019) study prominent European banks between 2013 and 2017, in which they employ panel data with fixed effects to estimate the effects of ESG pay. The authors operationalize the usage of ESG remuneration with a model, in which points are granted based on whether the firm for example uses non-financial performance criteria, and if so, how many non-financial criteria they employ. Their results show that relatively more usage of ESG pay is significantly and positively correlated with higher ESG ratings in the banks in their sample. The authors consider multiple explanations for the effect, among which the likely effect of ESG pay in prolonging the managers' horizon focus towards more long-term focused decisions. Based on these findings, it is hypothesized that the use of ESG-based executive compensation leads to higher ESG ratings (hypothesis H1).

Moreover, the effects of ESG-based compensation are also evident in a much broader sample of publicly listed firms from Spain, France, Germany and the United Kingdom. In their study of the period between 2005 and 2015, Baraibar-Diez et al. (2019b) find significant effects of ESG-based compensation policies on the environmental, social and governmental scores of the firms. Based on these findings, it is hypothesized that the use of ESG-based executive compensation leads to higher environmental scores (hypothesis H2), higher social scores (hypothesis H3), and higher governmental scores (hypothesis H4). The study operationalizes the use of ESG-based executive payment in a dummy variable, which is also done for the existence of a CSR committee within the firms. The authors also find significant negative effects of CEO duality, and whether the CEO is chairman of the board on firms' ESG performance. Moreover, the inclusion of the CSR committee dummy and its interaction effect with the use of ESG-based compensation proves crucial to the research, as only then the ESG pay coefficients become significant. Furthermore, the highly negative interaction term between ESG pay and CSR committee shows that the positive standalone effects of ESG pay and a CSR committee on ESG scores become greatly reduced if both measures are active within the same firm. Baraibar-Diez et al. (2019b) argue that this is consistent with the principal-agent problem and proves the importance of monitoring the managerial decision-making process.

In another internationally focused study, Cohen et al. (2023) find that ESG-based metrics in executive compensation schemes do lead to year-on-year improvements in firm ESG scores, but not to better

financial outcomes. The authors use a binary measure to indicate whether firms use at least one ESG criterium in their executive payment schemes in that year. Moreover, the authors find a more pronounced effect of ESG pay in Europe, relative to other sample regions such as North America, the United Kingdom and Australia. This effect is stated to be due to higher regulatory and social pressure in Europe, to perform well in ESG areas. Cohen et al. (2023) state that their research is in accordance with the idea that ESG pay is largely due to shareholders having preferences in favor of ESG, who are willing to accept lower returns in exchange for better ESG performance. Within this idea, ESG pay also shows a credible commitment of firms towards shareholders in improving their ESG outcomes, which makes ESG pay a way of signaling dedication. These findings further support hypothesis H1, stating that the use of ESG-based executive compensation leads to higher ESG ratings.

There has also been research linking CSR-based executive payment and the presence of a CSR committee to CSR performance. In this study of 164 Canadian firms in the period 2012-2018, Radu and Smaili (2021) use a binary variable to indicate whether firms use CSR-based pay for their executives. The authors' results show that the use of CSR in remuneration policies leads to significant positive effects on both the environmental and social performance within the sample firms. These findings support hypothesis H2 and H3, which state that the use of ESG-based executive compensation leads to higher environmental and social scores. The authors also find standalone positive significant effects of having a CSR committee on environmental, but not social performance, however the effect is shown to be moderated by CSR-linked executive payments. Radu and Smaili (2021) argue that this is evidence supporting the improved alignment of management interests towards CSR objectives.

Lastly, in a study of German listed firms between 2010 and 2014, Velte (2016a) finds a highly significant positive effect of ESG pay on the ESG performance of firms. In this article, the use of ESG pay is operationalized by a ratio of non-financial to financial indicators within the management compensation schemes. Moreover, the author performs a robustness test, in which the usage of at least one non-financial metric leads to a dummy variable that equals 1. Once again, Velte (2016a) finds a significant positive effect, which together with the first coefficient forms evidence in favor of the positive effects of ESG pay on ESG ratings. These findings further support hypothesis H1, which states that the use of ESG-based executive compensation leads to higher ESG ratings. The author does however realize that the short sample period window and research focus on just one country pose questions for the external validity of the study.

The previously reviewed literature shows support for the effects of ESG-based executive compensation on firms' ESG ratings. More specifically, ESG pay directs managerial decision-making horizon towards long-term decisions, and it aligns managers' interests towards CSR and ESG goals. Furthermore, ESG pay has a monitoring effect on the board and shows a credible commitment of the firm towards improving

their actions in ESG matters. From these effects, the expectation is that ESG pay has significant positive effects on firms' ESG ratings. The findings by D'apollito et al. (2019), Cohen et al. (2023), and Velte (2016a) lead to the following hypothesis:

H1. The use of ESG-based executive compensation leads to higher ESG ratings.

Next, based on the above literature, findings by Baraibar-Diez et al. (2019b) and Radu and Smaili (2021) lead to the following hypothesis:

H2. The use of ESG-based executive compensation leads to higher environmental scores.

Furthermore, results found by Baraibar-Diez et al. (2019b) and Radu and Smaili (2021) lead to the following hypothesis:

H3. The use of ESG-based executive compensation leads to higher social scores.

Lastly, the study performed by Baraibar-Diez et al. (2019b) leads to the following hypothesis:

H4. The use of ESG-based executive compensation leads to higher governmental scores.

The next subsection presents the literature regarding board gender diversity effects on ESG ratings, after which the expectations for the moderating effects of board gender diversity on the relation between ESG pay and ESG ratings will be explained.

2.3 Board gender diversity as a moderator

The moderating effect in this study is board gender diversity, which amounts to the number of female executive board members within firms. In 2003, Norway implemented a quota entailing that both male and female members of the board of directors had to represent at least 40 percent of the total board.

Firstly, Reddy and Jadhav (2019) compose a literature review of board gender diversity, to amongst others study the effects of board gender quotas. Within this review, the authors find large evidence demonstrating a systemic gender bias against women in corporate boards. The authors also list and evaluate countries that have implemented gender quotas to promote more equal representation of women on firm boards. Consequently, the authors review multiple studies which analyze the effects of quotas on outcomes, such as firm value and profitability. Within multiple different countries, varying effects on these outcome variables are found, since both negative and positive effects of board gender diversity quotas are found.

In a more focused study, Velte (2016b) studies the relation between board gender diversity and ESG scores amongst a sample of Austrian and German listed firms. In the study on the period between 2010 and 2014, board gender diversity is operationalized as the percentage of female management board members reported by the firms. The author finds a highly significant positive effect of board gender diversity on ESG performance, even when controlling for a multitude of other relevant variables. Moreover, the results found are consistent with multiple robustness checks. From the findings, Velte (2016b) observes evidence against the critical mass theory, which entails the theory that women on management boards have very limited impact until a certain “critical mass” of for example 3 female directors is achieved.

Secondly, Shakil et al. (2021) also study the effects of the number of women on management boards on firms ESG performance in a focused context, but their sample is more sector-based. Within their sample of U.S.-based banks in the period 2013-2017, the authors find significant positive effects of board gender diversity on the ESG performance of these firms. From the findings, the authors state that their study shows evidence in favor of the resource dependence theory, which states that businesses are partially dependent on resources from their external environment. Shakil et al. (2021) elaborate that more board gender diversity increases the relationship to external resources in that communication and decision-making within firms, resulting in more attention towards ESG matters.

Among a more geographically broad sample of listed U.S. and Europe based banks between 2011 and 2016, Birindelli et al. (2018) find an inverted U-shape relationship between the number of female board directors and how banks performed in ESG matters. The authors argue that this is evidence in favor of gender-balanced boards’ significant positive effect on corporate social and environmental responsibility. Some effects of board gender diversity, according to Birindelli et al. (2018), are that “gender-balanced boards facilitate information flow within the board and debate on a broader range of alternatives and novel solutions.” Within this argument, the information flow and broader debate leads to improved long-term decision-making, relative to less gender-balanced boards. Furthermore, Birindelli et al. (2018) also find significant positive effects of board size on ESG scores. The authors argue that this is likely explained by more different skills and attitudes (including attitudes more in favor of sustainability) in larger boards, compared to smaller boards. Interestingly, a negative effect is found between board independence and ESG outcomes. Here, it is argued that an overly large number of independent directors decreased expertise and experience by insiders, which is deemed crucial for increasing ESG outcomes.

Next, studies have researched board gender diversity in Italy and its effects on both the financial and non-financial sector. Firstly, Romano et al. (2020) find significant positive effects of the presence of female board members on firm ESG ratings in a sample of Italian non-financial firms in 2017 and 2018. In this case, the authors operationalize board gender diversity using the Blau index, which measures the diversity

within a group, which in this case is the diversity within the firms' boards. However, the small sample size and period of this study do raise questions about its general external validity. Secondly, Menicucci and Paolucci (2022) research the Italian banking sector between 2017 and 2021, in which they study the effects of different board characteristics on the ESG performance of 105 Italian banks. The authors find that board size, independence, and the presence of a CSR committee have significant positive effects on the ESG performance of the firms in their sample. Furthermore, the authors find significant effects of female board directors on ESG performance, but they do find this relationship to be non-linear. This implies evidence against the critical mass theory, since in this study Menicucci and Paolucci (2022) find the effects of female directors to significantly drop beyond a certain threshold level of women directors already on the board.

Finally, a broad sample of public non-financial firms from 11 European countries show promising results of board gender diversity on ESG. In the sample period between 2013 and 2019, Gaio and Gonçalves (2022) find that women on the firms' management boards significantly and positively impact firms' ESG scores. Moreover, the authors find similar results for the number of female managers in firms on their ESG ratings. The authors state that these findings show evidence against "gender-washing" (firms' exaggeration of claiming equality within for example management gender), since the positive results create an incentive for firms to pursue equality of genders in both board roles and general management roles throughout the firm. Moreover, Gaio and Gonçalves (2022) note that their results can be interpreted as evidence in favor of gender quotas on boards.

The above articles create expectations of positive effects of board gender diversity on ESG outcomes, along with some possible channels through which gender diversity could affect ESG. These channels are along the lines of improving the decision-making process, enhancing communication with the board and increasing boards' attention towards issues that do not directly provide short-term value, such as ESG matters. Since these channels regard the effects of board gender diversity on the conduct and operations of boards and their decision-making, these channel effects of board gender diversity are expected to influence the effectiveness of remuneration based on ESG. My view from the previous literature is that the channel effects create a board that is more open to broad discussions and more aligned to long-term incentives, that don't create immediate value. Therefore, my expectation is that ESG pay becomes relatively more effective in its effects on ESG ratings, when more female directors are present. In other words, I hypothesize that board gender diversity has a positive and increasing moderating effect on the effect of ESG pay on ESG ratings. These theories lead to the following hypothesis:

H5: The positive effects of ESG-based executive compensation on ESG ratings are stronger in firms with more board gender diversity.

2.3.1 Board gender diversity quotas and ESG

Recently, academic literature has also focused on the effects of gender diversity quotas in firm boards on corporate governance and ESG outcomes.

Firstly, Schoonjans (2024) studied board gender quotas in Europe and analyzed the effects on ESG ratings. Using a staggered difference-in-differences design with 7 European countries that have implemented Board Gender Diversity quotas, the author examined a sample of 1917 firms between 2002 and 2020. From this research, it was found that environmental and social ratings increase subsequent to the implementation of these quotas. Moreover, Schoonjans (2024) found the effects on ratings to be driven by an increase of ESG committees, improved innovation and resource use, along with more focus towards human rights. The author therefore concludes the existence of positive spillover effects of gender diversity quotas on ESG outcomes.

Within the context of French firms and the 2011 implementation of a board gender diversity quota, Ginglinger and Raskopf (2023) used the quota as a natural experiment. Against the control group of US-based firms, the authors found that the quota implementation led to improved environmental and social scores. The effects of the quota were also observed in more environmental and social committees being employed. Moreover, the authors noticed that in their sample female board directors had more environmental and social experience. The implementation of the gender quota caused firms to employ more female board members, which resulted in the positive effects on environmental and social ratings.

The above findings lead to an expectation of positive board gender diversity quotas on ESG ratings. The hypothesis that follows from this expectation is the following:

H6: The implementation of board gender diversity quotas leads to a significant increase in firms' ESG ratings.

In the next chapter it is explained which data will be operationalized to answer the above hypotheses, next to how the variables will be formed from the data.

CHAPTER 3 Data

3.1 Sample and data collection

This study uses a sample of 523 public firms from 24 European countries. The sample period ranges from 2008 until 2022, to include a large time period with greatly varying macroeconomic conditions, policy changes and economic cycles. Using such a long sample period also allows for the inclusion of certain trends over time within ESG, board gender diversity and ESG pay. The data is collected through the databases Refinitiv Eikon and Compustat, which are merged and matched to form the unbalanced panel dataset. After excluding financial firms, observations with missing variables and firms with less than 10 years of data, the final sample size consists of 6576 firm-year observations. Within the sample, the number of observations show an increasing trend towards the end of the sample period. The year 2008 forms around 4 percent of the sample, while 2022 is close to 7 percent of the total sample observations. Within this sample, the largest industry represented is by far the manufacturing industry, which makes up 48 percent of the sample. It is followed at a distance by the transport, communications, electricity, gas and sanitary industry, which makes up 18 percent of the sample. The third largest industry is the services sector, which represents 11 percent of the sample.

3.2 Variables

Based on the theoretical framework section and the studies reviewed in it, the following sections will provide an overview of the variables used in this study.

3.2.1 Dependent variables

ESG Rating is the main dependent variable in this study, which measures how well a certain firm performed in a year on the combined scores of environmental, social and governmental measures (Pagano et al., 2018). These ratings are provided by the Refinitiv Eikon ASSET4 database and are a weighted average of 10 underlying category scores across all three categories. The 10 underlying category scores are based on ranks between firms, with 186 underlying metrics used to determine the ranks for these categories. For all variables, 6576 observations are included within the final sample. The data shows a constant rise in the average ESG ratings of the sample firms, since the mean combined ESG score in 2008 is 48, compared to a mean of 69 in 2022. This observation is coherent with increased importance of and attention towards ESG over time.

In this study, ESG ratings will also be split into the three pillars to test effects individually on dependent variables **Environmental Rating**, **Social Rating** and **Governance Rating**. These ratings are the weighted average of the individual score categories within each pillar. Logically, the same increasing trend can be observed in the individual pillars that is also observed in the combined ESG scores. Within these pillars, the largest increase in mean scores over the years is observed in the social scores (from 46 to

73), followed relatively closely by the environmental scores (from 45 to 66). Interestingly, the governmental scores show much less improvement over time than the other two pillars, since the mean governmental score increases from 51 in 2008 to 65 in 2022.

3.2.2 Independent variables

The main independent variable of interest is **Board Gender Diversity**. In line with the findings in the covered literature (Velte, 2016b; Gaio & Gonçalves, 2022), this variable is operationalized as the percentage of women on firms' board of directors, relative to all members of the board of directors. Therefore, Board gender diversity is a measure of the following:

$$\text{Board Gender Diversity} = \frac{\text{Number of female directors}}{\text{Number of total directors}}$$

Board Gender Diversity is operationalized with a one-year lag, meaning that its effects on ESG ratings are observed in the subsequent year, allowing for an analysis of the one-year delayed effect. The one-year lag is in line with previous studies, and information for this variable was collected from the Refinitiv Eikon ASSET4 database. The sample shows a large increase of board gender diversity over time. In 2008, on average 9 percent of all board directors were female, but the mean increased fourfold to 36 percent in 2022. Whilst this is evidence of a large disbalance that is still the case in board genders, it does show large improvement towards more equality in genders on boards.

The next important independent variable is **ESG Pay**, which is a binary variable that measures whether firms used at least one metric based on ESG key performance indicators in their executive payment schemes within a certain year. This operationalization is in line with the used methodology of previously examined literature (Baraibar-Diez et al., 2019; Cohen et al., 2023; Velte, 2016a). The variable is also operationalized with a one-year lag, meaning that the effects of ESG pay are compared to the ESG ratings of the subsequent year, in order to allow for a delay in the relation. Furthermore, data on ESG pay is also collected from the Refinitiv Eikon ASSET4 database. The sample data shows a large increase of the use of ESG pay over time. In 2008 only 16 percent of firms used at least one measure of ESG pay in their executive payments, whilst in 2022 more than 80 percent of firms employed ESG based executive compensation.

3.2.3 Control variables

From the theoretical framework section, it is known that several control variables have significant effects on the ESG ratings of firms. Firstly, a number of variables are used regarding the firms' board of directors.

Board Size measures the total number of members on the board of directors, which is found to influence ESG scores positively (Birindelli et al., 2018; Romano et al., 2020). This variable is collected from the Refinitiv Eikon ASSET4 database. Interestingly, in this sample board size does not seem to fluctuate much over time. The average board consisted of 10.1 members in 2008, and this only marginally increased to 10.6 board members in 2022.

Board Independence is a measure of the percentage of board of directors members that are independent of the firm, which refers to the independent directors not having a material relationship to the firm. This means that the executives, for example, are not employees of the firm and do not have financial ties to the firm, apart from the financial compensation received for their contribution as a board member. Within the earlier studies literature, board independence was found to significantly influence firms' ESG ratings (Birindelli et al., 2018; Romano et al., 2020). Board independence is measured as:

$$\text{Board independence} = \frac{\text{Number of independent directors}}{\text{Number of total directors}}$$

Once again, this variable is collected from the Refinitiv Eikon ASSET4 database. The data show a slight increasing trend in board independence over time, since on average, 56 percent of the board members were independent in 2008, compared to 61 percent in 2022.

Next, **CEO Duality** is a binary measure of whether the firms' CEO is also chairman of the board of directors. Baraibar-Diez et al. (2019b) found CEO duality to have significant negative effects on firms' ESG ratings. Data on this variable is also collected from the Refinitiv Eikon ASSET4 database. An interesting trend can be observed in CEO duality, since the number of CEOs that are chairman of the board decreased from 75 percent in 2008 to 64 percent in 2022.

Furthermore, several more firm-specific rather than board-specific variables are used. Firstly, **CSR Committee** is a binary variable indicating whether a firm had an active CSR committee in a certain year, which was found to have significant positive effects on ESG ratings (Baraibar-Diez & Odriozola, 2019a; Radu and Smaili, 2021). This variable is collected from the Refinitiv Eikon ASSET4 database. The number of firms employing a CSR committee has risen sharply over the years. In this sample an increase from 47 percent in 2008 to 93 percent of firms employing a CSR committee in 2022 is observed.

Firm Size is a measure of the scale of the firm, which Drempetic et al. (2020) and Baraibar-Diez et al. (2019b) found to be influential on firms' ESG ratings. It is operationalized as the total assets of the firm in a certain year, logarithmically transformed and created with first differences, to account for observed unit root. Afterwards, Firm Size results from:

$$Firm\ Size = \ln (Total\ assets)$$

Data on the total assets of firms to create this variable was collected from the Compustat Fundamentals database. Once again, the sample shows a highly noticeable trend, since the average firm size increased by 70 percent over the sample period. However, it must be noted that this increase in average size includes the effects of inflation, likely causing an overestimated growth to be observed.

Firm Return on Assets (ROA) measures how well firms manage to convert their assets into profits. In this case, it is operationalized by the following:

$$Firm\ return\ on\ assets = \frac{Earnings\ before\ interest\ and\ taxes}{Total\ assets}$$

By using earnings before interest and taxes (EBIT), this measure of ROA compares how firms use their assets to create operational profit, whilst excluding the effects of interest and tax expenses. This is included for its effects on ESG ratings, as studied by Baraibar-Diez et al. (2019b). ROA is winsorized at the 1 and 99 percent levels, to account for extreme outliers far from the normal distribution. Data on firms' EBIT and total assets is collected from the Compustat Fundamentals database. Within the sample, ROA fluctuates largely from 2008 until 2022. From an average firm ROA of 10.4 percent in 2008, firms' ROA mostly revolve around the total sample period mean of 8.4 percent. However, in 2020 ROA dropped to a mere 5.5 percent, afterwards rising again towards 8 and 8.5 percent in 2021 and 2022.

Finally, **Leverage** is a measure of how much debt firms have outstanding in a certain year, which is operationalized by a ratio of total liabilities to total assets. It is included in the regressions for its perceived effects on ESG ratings, as per Baraibar-Diez et al. (2019b). Firm leverage is the variable that results from this calculation:

$$Leverage = \frac{Total\ liabilities}{Total\ assets}$$

Data on firms' total liabilities and total assets is collected from the Compustat Fundamentals database. Leverage is winsorized at the 1 and 99 percent levels, to account for extreme outliers far from the normal

distribution. The sample mean firm leverage stays relatively constant throughout the period, with an average leverage of 62.5 percent in 2008 decreasing to an average of 60.4 percent in 2022, with a total sample mean of 59.6 percent leverage.

3.3 Summary statistics

The following table shows the mean, standard deviation, minimum and maximum for every variable:

Table 1
Summary statistics

Variable	Mean	Standard deviation	Minimum	Maximum
ESG Rating	59.01	19.21	1	96
Environmental Rating	57.14	24.90	0	99
Social Rating	61.49	23.36	0	98
Governance Rating	56.64	21.58	2	99
Board Gender Diversity	22.91	14.70	0	75
ESG Pay	0.46	0.50	0	1
Board Size	10.75	3.70	2	27
Board Independence	55.80	23.81	0	100
CEO Duality	0.68	0.47	0	1
CSR Committee	0.76	0.43	0	1
Firm Size	8.89	1.84	1	17
ROA	8.43	7.32	-14	36
Leverage	59.58	19.28	11	123
Observations	6576			

Note. This table provides the summary statistics for ESG Rating and all independent variables.

3.3.1 Dependent variables

If we observe the statistics for the ESG ratings and the individual pillar ratings, we can observe a sizable spread of ratings between observations. This can be seen by comparing the standard deviations of ratings, which are relatively high, to the rating means. This spread can also be seen in the ratings minima and maxima, since the minima are zero or close to zero, whilst the maxima are around the 99 ratings mark.

3.3.2 Independent variables

Furthermore, on average close to 23 percent of the board members in our sample were female. However, there is a large spread within board gender diversity, and there are also boards with no female members or a large majority (75 percent) of women on their boards. Next, ESG pay shows that in our sample, in 46 percent of the observations at least one metric of ESG-based executive compensation was used.

3.3.3 Control variables

For Board Size, there seems to be quite some variability in this sample. The average board size is 10.75, however the standard deviation is relatively high, and the number of board members ranges from 2 to 27. Board Independence also shows large variability, with on average close to 56 percent of independent board members, however this is once again with a sizable standard deviation. Furthermore, in the sample there are boards which have no independent board members and there are boards in which every member is independent. With regards to CEO duality, this sample shows that in 68 percent of the observations the CEO is also the chairman of the board.

Lastly, the firm-based control variables show that in 76 percent of the firm-year observations, the firm employed a CSR committee. The variables also show that firm size is moderately spread out, since its standard deviation is not extremely high compared to its mean. However, for ROA the opposite can be observed since its mean of 8 percent ROA within the sample is combined with a standard deviation of 7 percent. The variability for leverage is also quite large, with a mean of 59.58 percent, compared to a minimum of 11 percent and a maximum total liabilities of 123 percent of total assets.

3.4 Correlation matrix

Table 2 shows the correlation matrix for ESG Rating and all independent variables, where the asterisk shows significance at the 99% level.

Firstly, we can observe the correlations between ESG Rating and the main independent variables of interest, which are Board Gender Diversity and ESG Pay. Table 2 shows that there is a significant correlation between ESG Rating and both Board Gender Diversity and ESG Pay. Furthermore, since the table shows a significant positive correlation between ESG Rating and Board Gender Diversity, there is some positive evidence for the regression relating to hypothesis H1, which covers ESG Ratings.

Secondly, Table 2 shows multiple significant correlations between the control variables and ESG Rating. Interestingly, in this sample Firm Size does not seem to be significantly correlated to ESG Rating.

Table 2*Correlation matrix*

	1	2	3	4	5	6	7	8	9	10
1. ESG Rating	1									
2. Board Gender Diversity	.42*	1								
3. ESG Pay	.36*	.30*	1							
4. CSR Committee	.54*	.28*	.28*	1						
5. Board Size	.30*	.09*	.06*	.19*	1					
6. Board Independence	.26*	.25*	.17*	.16*	-.24*	1				
7. CEO Duality	-.08*	-.10*	.06*	.03	.05*	-.13*	1			
8. Firm Size	.00	-.03*	-.01	.01	.01	-.02	.01	1		
9. ROA	-.04*	-.04*	-.07*	-.03	-.11*	.05*	.02	.14*	1	
10. Leverage	.16*	.07*	.08*	.09*	.17*	-.00	.06*	-.05*	-.17	1

Note. This table shows the correlation matrix for ESG Rating and all independent variables.

* $p < 0.01$

CHAPTER 4 Method

4.1 Panel data multivariate regressions

To study the collected data, multivariate regressions with country-fixed, firm-fixed and year-fixed effects on panel data are used. Panel data are observations of variables for which the same entities are observed over multiple years, which in this case amounts to 523 firms with data over multiple years. The panel structure is unbalanced, since a minimum of ten years of data is required for every firm, but this does not have to be from consequent and the same years.

Panel data structure allows controlling for heterogeneity between different entities, therefore allowing the existence of entity-specific effects that might influence ESG ratings. Its' usage provides benefits relative to the use of time series, since multiple entities can be observed. Moreover, compared to for example cross-sectional data, panel data allows for the observation of dynamics over time within multiple firms. In line with the earlier discussed literature by Baraibar-Diez et al. (2019b), country-fixed, firm-fixed and year-fixed effects are used. The Hausman test is used to check whether there is a systematic correlation between the individual-specific error terms and independent variables. Using the Hausman specification test showed that, for each model, the implementation of fixed effects was more suitable than the usage of random effects. The use of country-fixed effects incorporates the influence of unobserved, time-invariant characteristics such as cultural norms or legal systems, whilst the firm-fixed effects result in the control for unobserved, time-invariant characteristics of individual firms, such as firm culture, management style and firm industry. Furthermore, the use of year-fixed effects controls for unobserved, time-variant factors affecting all firms, such as macroeconomic conditions or external shocks. Lastly, to account for heteroskedasticity and autocorrelation, standard errors are clustered on the firm and year levels. This type of standard error clustering takes care of correlation within firms and over time of standard errors.

After filtering the observations to exclude data based on previously mentioned characteristics, panel data is created by combining the observations for a certain years and certain firms, thus forming a combination of time series and cross-sectional data. Next, the panel regressions with fixed effects can be estimated for the data. These regressions consist of the multiple fixed effects, Board Gender Diversity and ESG Pay, the interaction term between these two (as shown relevant by Baraibar-Diez et al., 2019b), a multitude of control variables and the error term. Therefore, the panel regressions estimated in this study are:

$$ESG Rating_{i,t} = \beta_0 + \gamma_c + \alpha_i + \delta_t + \beta_1 Board\ Gender\ Diversity_{i,t-1} + \beta_2 ESG\ Pay_{i,t-1} \\ + \beta_3 Board\ Gender\ Diversity_{i,t-1} * ESG\ Pay_{i,t-1} + \beta_4 \mathbf{Control\ variables}_{i,t} + \epsilon_{i,t}$$

*Environmental Rating*_{*i,t*}

$$= \beta_0 + \gamma_c + \alpha_i + \delta_t + \beta_1 \text{Board Gender Diversity}_{i,t-1} + \beta_2 \text{ESG Pay}_{i,t-1} \\ + \beta_3 \text{Board Gender Diversity}_{i,t-1} * \text{ESG Pay}_{i,t-1} + \beta_4 \text{Control variables}_{i,t} + \epsilon_{i,t}$$

*Social Rating*_{*i,t*}

$$= \beta_0 + \gamma_c + \alpha_i + \delta_t + \beta_1 \text{Board Gender Diversity}_{i,t-1} + \beta_2 \text{ESG Pay}_{i,t-1} \\ + \beta_3 \text{Board Gender Diversity}_{i,t-1} * \text{ESG Pay}_{i,t-1} + \beta_4 \text{Control variables}_{i,t} + \epsilon_{i,t}$$

*Governmental Rating*_{*i,t*}

$$= \beta_0 + \gamma_c + \alpha_i + \delta_t + \beta_1 \text{Board Gender Diversity}_{i,t-1} + \beta_2 \text{ESG Pay}_{i,t-1} \\ + \beta_3 \text{Board Gender Diversity}_{i,t-1} * \text{ESG Pay}_{i,t-1} + \beta_4 \text{Control variables}_{i,t} + \epsilon_{i,t}$$

In these equations the ratings are the ESG, Environmental, Social or Governmental Ratings for the individual firm *i* at year *t*. The country-fixed, firm-fixed and year-fixed effects are represented by γ_c , α_i and δ_t , respectively. Similarly, *i* and *t* denote the firm and year for the independent and control variables, along with the error term for the firm and year. For Board Gender Diversity, ESG Pay and their interactions, the value of the previous year is compared to the ratings of the subsequent year, to allow for lagged or delayed effects.

4.2 Difference-in-differences estimations

To test the causality of the effect of board gender diversity on ESG Ratings, a difference-in-differences (d.i.d.) analysis is performed. In this analysis, countries that have not implemented board gender diversity quotas (the control group) will be compared to countries which have (the treatment group), to test for structural differences in ESG ratings that can clearly be attributed to the gender quotas. The crucial assumption difference-in-differences analysis requires is that of parallel trends between the groups, as then it can be assumed that the different groups would have followed similar trends, if the treatment had not happened. In this case, the treatment is the implementation of board gender diversity quotas, which is compared to the ESG Rating of the following years, to allow for delayed effects of the quota implementations. Furthermore, in the difference-in-differences estimations, firm-fixed and year-fixed effects are employed to control for time-invariant and unobserved characteristics.

Of the 24 countries in the sample, 9 countries have implemented board gender diversity quotas that became active between 2008 and 2023. Since the d.i.d. estimation analyzes the years following an implementation of board gender diversity quotas, the country and quota that became active in 2023 is omitted from the estimation. This results in 8 countries in the treatment group, versus 15 in the control group. The regression that is estimated for the difference-in-differences effects is as follows:

$$ESG\ Rating_{i,t} = \beta_0 + \gamma_c + \alpha_i + \beta_1 Quota_i + \beta_2 Post_{i,t} + \beta_3 Quota_i * Post_{i,t} + \beta_4 ESG\ Pay_{i,t} + \beta_5 \mathbf{Control\ variables}_{i,t} + \epsilon_{i,t}$$

In this equation, the variable ESG Rating are the ESG ratings for the individual firm i at year t . The country- and firm-fixed effects are represented by γ_c and α_i . Quota is the variable indicating whether the observation belongs to the treatment group of countries implementing a board gender quota in the sample period. Post is the variable that indicates whether a treatment group observation is before or after the implementation of a board gender quota, and has the value 0 for control group observations. The interaction term between Quota and Post is the difference-in-differences effect estimator, which shows the treatment effect attributable to board gender diversity quotas. Lastly, i and t denote the firm and year for the independent and control variables, along with the error term for the firm and year.

CHAPTER 5 Results

5.1 Panel data multivariate regressions

In this chapter, the results of the earlier mentioned methods are presented. The panel data multivariate regression models are estimated using country-fixed, firm-fixed and time-fixed effects. The continuous variables in these models, except for the Firm Size control variable, are measured without any adjustments to the data. Therefore, the effects of these continuous independent variables can be interpreted as a one-unit increase in variable X on average leads to a Z unit increase or decrease in Y, all else equal. For the natural logarithm of Firm Size, its effects can be interpreted as a 1% change in total assets on average leads to a change in Y of 1% multiplied by the size variable coefficient. The standalone effects of the binary variables can be interpreted as the change in Y when the binary variable takes the value 1 as opposed to value 0, all else equal. The interaction term between Board Gender Diversity and ESG Pay can be interpreted as the change in Y attributed to Board Gender Diversity, conditional on the firm using ESG Pay.

Table 3 shows the results of the regressions, using the different outcome variables.

Table 3*Multivariate regressions*

	(1)	(2)	(3)	(4)
	ESG Rating	Environmental Rating	Social Rating	Governmental Rating
Board Gender Diversity	0.16*** (0.03)	0.15*** (0.04)	0.14*** (0.03)	0.19*** (0.04)
ESG Pay	4.38*** (0.88)	4.97*** (1.11)	4.74*** (1.30)	2.96** (1.25)
ESG Pay * Board Gender Diversity	-0.13*** (0.03)	-0.17*** (0.04)	-0.16*** (0.04)	-0.04 (0.04)
CSR Committee	7.43*** (0.88)	10.56*** (1.27)	7.64*** (1.03)	4.84*** (0.93)
Board Size	0.14 (0.16)	0.34* (0.17)	0.34 (0.19)	-0.43* (0.21)
Board Independence	0.08*** (0.02)	0.04** (0.02)	0.02 (0.02)	0.23*** (0.03)
CEO Duality	-1.81 (1.09)	-0.89 (1.08)	-1.38 (1.34)	-3.18* (1.74)
Firm Size	-0.97* (0.46)	-0.89 (0.64)	-0.68 (0.77)	-1.37 (0.81)
ROA	-1.06 (3.67)	-7.14 (5.04)	4.90 (4.84)	-1.39 (5.29)
Leverage	-0.12 (1.92)	-1.05 (2.76)	-1.48 (2.81)	2.62 (2.61)
Constant	45.53*** (2.72)	42.22*** (3.04)	50.20*** (3.38)	41.02*** (3.69)
Country-fixed effects	Yes	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes
R^2	0.862	0.850	0.832	0.704
Adjusted R^2	0.849	0.836	0.816	0.676
Within R^2	0.117	0.100	0.062	0.078
Observations	6576	6576	6576	6576

Note. This table shows the multivariate regressions on ESG, Environmental, Social and Governmental ratings. The two-way clustered standard errors are provided in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5.1.1 ESG Rating

From Table 3, we can observe Column (1), which contains the regression model run with ESG Ratings as the dependent variable. Firstly, it can be noted that the R-squared and adjusted R-squared values of the model seem quite high, since these values translate to around 85 percent of the variance in ESG Ratings being explained by the model and its independent variables. However, these R-squared values are inflated because of the inclusion of the country-, firm- and year-fixed effects. More informative is the within R-squared value of 11.7 percent, since it states the amount of variance in ESG Ratings explained by the independent variables, after accounting for and removing the influence of the multiple fixed effects. From these numbers, it can then be concluded that on average 11.7 of the variation in ESG Ratings is explained by the independent variables, whilst a much larger part of the variance is explained by unobserved country-, firm- and time-specific effects. The large influence of these unobserved characteristics means that the model in itself, without including fixed effects, has relatively low explanatory power.

Next, the effects of the main variables of interest can be observed. Table 3 shows that in this sample, one year lagged Board Gender Diversity on average has a positive standalone effect on firms' ESG Ratings, since its coefficient is 0.16 and highly significant. The positive significant coefficient can therefore be interpreted as that for each one unit increase in Board Gender Diversity, the firm's ESG Rating in the following year on average increases by 0.16 units, all else equal. This implies that in this sample higher gender diversity in the board is associated with improved ESG Ratings.

The next independent variable of interest is ESG Pay, of which the coefficient is also positive and highly significant. Table 3 shows the coefficient of 4.38, which implies that firms which use ESG-based executive compensation in any form on average achieve ESG Ratings, exceeding those of firms which do not use ESG Pay, by 4.38 units in the subsequent year. This means that the use of ESG Pay is associated with better ESG Ratings in this sample.

The last and most important variable of interest in this model is the interaction between Board Gender Diversity and ESG Pay. Whilst both Board Gender Diversity and ESG Pay produce significant positive standalone effects, the interaction term coefficient is -0.13, which is also highly significant. This signals that the positive effect of ESG Pay on ESG Ratings on average is 0.13 units lower for every one unit increase in Board Gender Diversity. This implies a negative moderating effect of Board Gender Diversity on the influence of ESG Pay on ESG Ratings.

To further explore this negative moderating effect, the Stata 'margins' command can be used to observe the varying average marginal effects of ESG Pay at different levels of Board Gender Diversity. This marginal effect is the difference in ESG Ratings at varying levels of Board Gender Diversity between

firms that use ESG Pay, and firms that do not use it. The usage of this command in this case resulted in the interesting observation that the difference in ESG Ratings is significant and positive at low levels of Board Gender Diversity, implying that at these levels firms using ESG Pay on average achieve higher ESG Ratings than firms that do not. However, the difference decreases between 0 and 25 percent Board Gender Diversity, where the difference in ESG Ratings drops from 4.83 to 1.16. At around 45 percent Board Gender Diversity the difference starts to become significantly negative, at an average marginal effect of -1.40. This implies that for this level of Board Gender Diversity, firms using ESG Pay on average achieve 1.40 units lower ESG Ratings than firms that do not use ESG Pay. From the 45 percent diversity level, the average marginal effect remains significant and negative, dropping to -4.62 at the maximum of 75 percent Board Gender Diversity. These observations clearly show the negative moderating effect between ESG Pay and Board Gender Diversity on ESG Ratings, with increasing levels of Board Gender Diversity.

Based on the above interpretation of the regression output table and the model with ESG Ratings as the dependent variable, there is enough evidence to reject one hypothesis related to ESG Ratings. Hypothesis H1 stated that the use of ESG-based executive compensation leads to higher ESG Ratings. From the above table and the significance of the ESG Pay coefficient, we can confirm the positive standalone effects of ESG Pay on ESG Ratings. Therefore, there is not enough evidence to reject hypothesis H1. However, hypothesis H5 stated that the positive effects of ESG-based executive compensation on ESG Ratings are stronger in firms with more Board Gender Diversity. Earlier interpretation of the interaction effect and the usage of the margins command showed that there is in fact a significant negative moderating effect of Board Gender Diversity on the relationship between ESG Pay and ESG Ratings. More specifically, Board Gender Diversity seems to have negative moderating effects on the relation between ESG Pay and ESG Ratings. Therefore, we have enough evidence to reject hypothesis H5.

Next to the main independent variables of interest, the effects of numerous control variables are observed within the regression table. Interestingly, only the control variables for CSR Committee and Board Independence have highly significant positive effects on ESG Ratings, whilst Firm Size only has weakly significant negative effects on ESG Ratings. Within the sample, all other control variables do not have statistically significant effects on ESG Ratings. Lastly, the highly significant positive constant likely signals that there are more variables with effects on ESG Ratings than currently included in the model.

5.1.2 Environmental Ratings

Next, Table 3 shows the multivariate regression model with Environmental Ratings as the dependent variable in Column (2). Here, we observe similar R-squared and adjusted R-squared values to the ESG Ratings model, with values again close to 85 percent. However, there is a small drop in the within R-

squared value compared to Model 1. The within R-squared score of Column (2) implies that around 10 percent of the variation in Environmental Ratings can be explained by independent variables, excluding the country-, firm- and year-fixed effects. Therefore, there is less explanatory power compared to the first model.

Moreover, the main independent variables show interesting effects on firms' Environmental Ratings. Once again, the highly significant coefficients of Board Gender Diversity and ESG Pay, 0.15 and 4.97 respectively, show results alike those of the model in Column (1). These coefficients imply that on average, a one unit increase in Board Gender Diversity leads to an increase in Environmental Ratings of 0.15 units. Furthermore, firms which use ESG-based executive compensation in any form on average achieve Environmental Ratings which exceed those of firms which do not use ESG Pay by 4.97 units in the subsequent year. These results imply that both Board Gender Diversity and the use of ESG Pay are associated with firms achieving higher Environmental Ratings in the following year.

Even more interesting are the coefficient and the significance of the interaction term. The coefficient takes the value -0.17, meaning that the positive effects of Board Gender Diversity on Environmental Ratings (with positive coefficient 0.15) are fully diminished by the interaction effect. The significant coefficient shows that, in firms using ESG Pay, Environmental Ratings on average are 0.17 units lower for every one unit increase in Board Gender Diversity, which is a decrease even beyond the initial positive standalone effects of Board Gender Diversity on Environmental Ratings. This implies a negative moderating effect of Board Gender Diversity on the influence of ESG Pay on Environmental Ratings.

Once again, the margins command can be used to disassemble the moderating effects at different levels of Board Gender Diversity. Similar observations to the first model can be made, since the margins command shows that between 0 and 20 percent Board Gender Diversity, the average marginal effect of ESG Pay is significantly positive. However, the difference between ESG Pay using firms and non-using firms again drops, in this case from 4.97 to 1.59. Moreover, for increasing levels of Board Gender Diversity the average marginal effects of ESG Pay on Environmental Ratings become increasingly negative, and the negative effects become significant from around 45 percent Board Gender Diversity. Furthermore, the effects become increasingly negative, dropping from -2.64 at 45 percent diversity, to -7.71 at 75 percent gender diversity. This implies that for this level of Board Gender Diversity, firms using ESG Pay on average achieve 7.71 units lower Environmental Ratings than firms that do not use ESG Pay. Therefore, these observations show the negative moderating effect between ESG Pay and Board Gender Diversity on Environmental Ratings with increasing levels of Board Gender Diversity.

The above interpretation of the variables of interest in the model with Environmental Ratings as the dependent variable give conclusive evidence that allows for an answer to hypothesis H2. Hypothesis H2

stated that the use of ESG-based executive compensation leads to higher environmental scores. From the significance of the positive coefficient measuring the effect of ESG Pay on Environmental Ratings, we find no evidence favoring the rejection of hypothesis H2.

Lastly, the control variables in this model show similar results to the regression model on ESG Ratings. Here, the significant positive effect of having a CSR Committee on Environmental Ratings is even greater than in the model with ESG ratings. Furthermore, Board Independence still has significant positive effects on Environmental ratings, whilst Board Size now also shows weakly significant positive effects on Environmental Ratings. However, the effects of Firm Size are not significant anymore. Moreover, the significance and magnitude of the Constant once again show that there is still a large portion of variance in Environmental Ratings unexplained by the existing independent variables.

5.1.3 Social Ratings

The model in Column (3) shows the regression model with Social Ratings as its dependent variable. This model shows another drop in explanatory power, since the R-squared and adjusted R-squared values drop to around 82 percent, whilst the within R-squared value drops to 6.2 percent. This means that in this model, only 6.2 percent of the variation in Social Ratings can be explained by the independent variables included in the model.

The independent variables of interest show similar results to the findings in the Environmental Ratings model. Namely, the highly significant coefficients of Board Gender Diversity and ESG Pay on Social Ratings are 0.14 and 4.74, respectively. This means that on average, every one unit increase in Board Gender Diversity leads to an increase in the Social Ratings of the firm by 0.14 units in the following year, all else equal. Furthermore, the ESG Pay coefficient implies that the use of ESG Pay on average leads to a 4.74 higher Social Ratings for firms in the subsequent year, as opposed to not using ESG Pay.

For the interaction term between Board Gender Diversity and ESG Pay, the same interesting effect as in Column (2) can be observed. The coefficient is negative and highly significant, with a coefficient value of -0.16. This value implies that ESG Pay using firms experience Social Ratings which on average are 0.16 units lower for every one unit increase in Board Gender Diversity. This is a decrease even beyond the initial positive standalone effects of Board Gender Diversity on Social Ratings, which implies a negative moderating effect of Board Gender Diversity on the influence of ESG Pay on Social Ratings.

If the margins command is used to explore the average marginal effects of ESG Pay on Social Ratings for varying levels of Board Gender Diversity, results are found that are similar to those for ESG Ratings and Environmental Ratings. The margins command once more shows increasingly negative and significant

average marginal effects between 0 and 20 percent Board Gender Diversity, followed by increasingly negative effects that become negative in sign and gain significance around the 45 percent Board Gender Diversity mark. From this point, the average marginal effect of ESG Pay on Social Ratings decreases from -2.29 to -6.20 at the 75 percent Board Gender Diversity level. This implies that for this level of Board Gender Diversity, firms using ESG Pay on average achieve 6.20 units lower Social Ratings than firms that do not use ESG Pay. These observations reaffirm the negative interaction effect between ESG Pay and Board Gender Diversity on Social Ratings.

The above results on Social Ratings have implications for Hypothesis H3. Hypothesis H3 stated that the use of ESG-based executive compensation leads to higher social scores. Since the coefficient for ESG Pay in this model is highly significant and has the positive value 4.74, we have insufficient evidence to reject hypothesis H3.

The loss of explanatory power of this model can also be observed within the control variables. In the Social Ratings model, only CSR Committee has significant positive effects on firms' Social Ratings. All the other control variables are insignificant. Finally, the constant of this again reveals that there likely are many variables explaining the variance in Social Ratings, which have not been included in this model.

5.1.4 Governmental Ratings

Lastly, Column (4) of Table 3 shows the effects of the numerous independent variables on firms' Governmental Ratings. The overall explanatory power of this model shows a decent drop, with an R-squared and adjusted R-squared value of around 69 percent. However, the within R-squared shows a minor improvement relative to the previous model, with the model on Governmental Ratings achieving a within R-squared value of 7.8 percent. This means that 7.8 percent of the variation in Governmental Ratings can be explained by the independent variables included in the model.

The independent variables of interest show significant differences with the main independent variables of the models on ESG, Environmental and Social Ratings. The coefficient of Board Gender Diversity is 0.19 and is highly significant, which makes Board Gender Diversity by far the most influential within Governmental Ratings. The coefficient implies that for every one unit increase in Board Gender Diversity, firms' Governmental Ratings will on average increase by 0.19 in the following year. Next, the positive ESG Pay coefficient of 2.96 loses some significance and decreases in magnitude relative to the previously discussed models. The coefficient of 2.96 (significant at the 5 percent level) implies that on average, firms using ESG Pay receive a 2.96 higher Environmental Ratings in the subsequent year. Therefore, this model shows the smallest effect of ESG Pay on a rating in terms of magnitude.

Another very interesting observation can be made about the interaction term, which completely loses its significance in the model on Governmental Ratings. Since the coefficient is highly insignificant, there is insufficient evidence to conclude on the moderating effect of Board Gender Diversity on the relationship between ESG Pay and Governmental Ratings.

The above findings show evidence in favor of Hypothesis H4. This hypothesis stated that the use of ESG-based executive compensation leads to higher governmental scores. From the significant positive coefficient of ESG Pay with the value 2.96, we can confirm that there is not enough evidence to reject hypothesis H4. However, the loss of significance and magnitude relative to the other models implies that ESG Pay might be of less effect on Governmental Ratings than it is on other ratings.

Furthermore, the control variables show remarkable changes relative to the previous models. Within the model on Governmental Ratings, CSR Committee has a highly significant positive effect on Governmental Ratings, however its magnitude is much smaller than the previous models. Moreover, Board Size has a weakly significant negative effect on Governmental Ratings, whilst Board Independence entails a highly significant and large coefficient. This implies a large importance of Board Independence in the determination of Governmental Ratings. Lastly, the Constant is once again highly significant, implying the need for more independent variables in explaining the variation in Governmental Ratings within the model. However, the magnitude of the constant is the smallest of all models.

5.2 Difference-in-differences regressions

In this section, the results of the difference-in-differences regressions will be presented, which help identify the causality of Board Gender Diversity effects on ESG Ratings. Table 4 shows the difference-in-differences regressions output.

Table 4*Difference-in-differences models*

	(1)	(2)	(3)	(4)
	ESG Rating	Environmental Rating	Social Rating	Governmental Rating
T=-5	-3.50 (2.40)	-2.91 (2.63)	-6.95** (2.89)	1.91 (3.23)
T=-4	-1.7 (1.11)	-2.43 (1.66)	-2.92* (1.52)	1.11 (2.07)
T=-3	0.09 (1.20)	-1.08 (0.98)	0.22 (2.15)	1.82 (1.53)
T=-2	-1.07** (0.47)	-1.47** (0.59)	-1.36 (0.79)	0.16 (0.69)
T=0	0.38 (0.45)	0.62 (0.41)	1.40* (0.74)	-0.73 (1.13)
T=+1	1.11** (0.46)	2.26** (0.76)	2.62** (1.14)	-1.35 (1.31)
T=+2	1.97** (0.71)	3.22*** (0.83)	4.20*** (1.37)	-1.64 (1.13)
T=+3	2.72*** (0.86)	3.05*** (0.90)	5.36*** (1.12)	-0.49 (1.13)
T=+4	4.26*** (0.87)	4.15*** (1.10)	8.11*** (0.95)	-0.37 (1.77)
T=+5	5.24*** (0.90)	4.18*** (1.16)	9.73*** (1.20)	0.70 (2.09)
T=+6	5.06*** (1.35)	4.47** (1.89)	10.47*** (1.86)	-1.05 (1.50)
T=+7	7.05*** (2.00)	4.95** (2.06)	11.61*** (2.60)	3.54* (1.83)
T=+8	8.07*** (1.46)	6.64*** (1.53)	12.90*** (1.84)	3.43* (1.82)
T=+9	8.59*** (1.56)	7.16*** (1.67)	13.10*** (2.07)	4.67* (2.56)
T=+10	9.88*** (1.51)	7.68*** (1.77)	15.33*** (1.92)	5.14*** (1.60)
Constant	39.80*** (3.44)	37.94*** (3.54)	41.8*** (4.41)	37.20*** (3.87)
Country-fixed effects	Yes	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes

R-squared	0.826	0.837	0.785	0.689
Adjusted R-squared	0.810	0.822	0.765	0.660
Within R-squared	0.341	0.221	0.270	0.193
Observations	6,511	6,511	6,511	6,511

Note. This table shows the outputs of difference-in-differences regressions on ESG, Environmental, Social and Governmental ratings across different periods relative to the implementations of quotas. The coefficients show the difference in outcome variable between the treatment and control groups, regression equations with the following form: $Rating_{i,t} = \beta_0 + \gamma_c + \alpha_i + \beta_1 Quota_i + \beta_2 Post_{i,t} + \beta_3 Quota_i * Post_{i,t} + \beta_4 ESG Pay_{i,t} + \beta_5 Control\ variables_{i,t} + \epsilon_{i,t}$, in which the bold part of the equation represents the coefficients that are shown in the table above. For example, “T=+3” in Column (1) shows the difference in ESG Rating between the control and treatment groups, three years after the implementation of a quota. Lastly, two-way clustered standard errors are provided in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In the table, the results for difference-in-difference models with varying dependent variables are shown. Column (1) shows the overall model with the variable of interest being ESG Ratings, whilst Column (2), (3) and (4) show Board Gender Diversity quota effects on Environmental, Social and Governmental Ratings. It is important to note the evidence of the parallel trends assumption’s validity, before drawing conclusions from the model outputs. In the difference-in-differences outputs with ESG, Environmental and Social Ratings as the dependent variables, all models show significant coefficients in periods ranging from T=-5 (five years before a quota), until T=-2 (two years before a quota). These significant coefficients show evidence that there likely already was a difference in trends before the treatment effect, therefore drawing cause of concern to the parallel trends assumption. This concern will be touched upon more below.

The model in Column (1) regards the quota effects on combined ESG Ratings. The model has R-squared, adjusted R-squared and within R-squared values of 82.6, 81 and 34.1 percent, of which the within R-squared value is especially higher than the multivariate regression on ESG Ratings. However, since the difference-in-differences model does not contain year-fixed effects, it is likely that this exclusion is the cause for an increase in the within R-squared value. This signals that the year-fixed effects accounted for a sizable part of the variation within ESG Ratings. Next, the time periods from T=-5 until T=+10 show the coefficients and significance of treatment effects in the period starting 5 years before treatment and ending 10 years after treatment. Furthermore, period T=-1 is omitted from the table, since it is the baseline or starting period for the difference-in-differences design. Period T=-1 is chosen for this baseline, as it is the last full period in which there was no influence of the implementation of Board Gender Diversity quotas. Therefore, it provides the starting point or status quo from which possible effects of the quotas can be observed the best.

The pre-quota coefficients and their significance mostly show that there are no significant differences in ESG Ratings before the quota was implemented. The only exception is the $T=-2$ period, in which the difference-in-differences coefficient is highly significant, and its sign is negative. This could be a sign of anticipatory effects in the two years leading up to the quota being introduced, which provides evidence against the parallel trends assumption. Therefore, interpretation of the difference-in-differences coefficients should be done with caution, since the assumption is crucial for the interpretation of any difference-in-differences effects.

Around the implementation of Board Gender Diversity quotas, there do not appear to be any significant immediate effects in the $T=0$ period. However, the years following implementations of quotas show significant positive effects of quotas on ESG Ratings, which increase in magnitude and significance over time. The effects range from an average 1.11 unit increase in ESG Ratings in the year following quota legislation, to an average 9.88 increase in ESG Ratings ten years after the quotas. From these coefficients, we can tell that the implementations of Board Gender Diversity quotas do have prolonged positive effects on ESG Ratings. This finding is very similar to the results in the multivariate regressions, in which a highly significant positive effect of Board Gender Diversity on ESG Ratings was found. Since the multivariate regression results seem to hold for the difference-in-differences model, it provides some evidence in support of the multivariate regression, regarding the effects of Board Gender Diversity on ESG Ratings. Furthermore, this affirming evidence makes it seem highly likely that there is a causal effect of Board Gender Diversity on ESG Ratings. The presumption appears even more likely, when considering that the treatment coefficients increase in magnitude and significance over time. However, the difference-in-differences model as a robustness test unfortunately does not solidify or reject the results relating to the negative moderating effect of Board Gender Diversity on the relationship between ESG Pay and ESG Ratings. Moreover, since previously concern was raised about the validity of the parallel trends assumption, we cannot be entirely certain that the above interpretation is statistically significant.

The next step is to answer hypothesis H6, which stated that the implementation of board gender diversity quotas leads to a significant increase in firms' ESG ratings. Although the difference-in-differences model on ESG Rating shows promising evidence for a causal positive effect of Board Gender Diversity, the possible violation of the parallel trends assumption prevents interpretation of the model with certainty. Therefore, hypothesis H6 should not be rejected, however it cannot be fully accepted either. Unfortunately, this means that there is no absolute certainty for the causal effect of Board Gender Diversity on ESG Ratings.

The models in Column (2), (3) and (4) provide a closer look at the possible mechanics involved gender quota effects on ESG Ratings and the individual pillar ratings. The models of Column (2) and (3), which show the difference-in-differences results using Environmental Ratings and Social Ratings as the

dependent variables, find similar results to the quotas model on ESG Ratings. However, five years before a quota is passed, the model in Column (3) finds highly significant negative effects on Social Ratings. This once again warns for the likely violation of the parallel trends assumption, since there already was a significant difference between the control and treatment groups before the implementation of any treatment. Therefore, we should be cautious in the interpretation of the rest of the model. The model in Column (2), runs into similar problems with Environmental Ratings as the dependent variable, since it shows a highly significant coefficient two years before the treatment period.

Finally, the model in Column (4) shows the influence of Board Gender Diversity quotas on Governmental Ratings. Interestingly, the results in this model are completely opposite to those of the other models, since this model only shows weakly significant effects from 7 years onwards after quotas. Moreover, the only strong significance is found 10 years after the treatment. The model also does not run into the same parallel trends assumption problems, which the other models did encounter. This is observable in the fact that there are no significant coefficients in the pre-treatment period, which shows support in favor of the assumption holding. Furthermore, the lack of significance in this model until 7 years post-treatment is not in line with the findings of the multivariate regression, which showed highly significant positive effects of Board Gender Diversity on Governmental Ratings.

CHAPTER 6 Discussion

After observing and analyzing the obtained results, these results can be compared to previously examined literature.

The first results that should be discussed are the standalone effects of Board Gender Diversity and ESG Pay. From the multivariate regressions, it was found that in this study Board Gender Diversity has significant positive standalone effects on ESG Ratings. This finding is in line with the findings of Velte (2016b), Shakil et al. (2021), Birindelli et al. (2018), Menicucci and Paolucci (2022), Romano et al. (2020) and Gaio and Gonçalves (2022), and partially with the findings of Reddy and Jadhav (2019), which authors studied various contexts with the goal of observing board gender effects on ESG Ratings. However, a major difference between the existing studies and this study is that, excluding the literature review by Reddy and Jadhav (2019), my study is much less focused in terms of geography, industry or time period than the other samples. Therefore, it is interesting to observe that the positive effect of Board Gender Diversity seems to hold in broad contexts as well.

Next, the standalone effects of ESG Pay can be compared to the related existing literature. My study finds highly significant positive effects of ESG Pay on ESG Ratings. This finding is directly in line with D'apolito et al. (2019), Baraibar-Diez et al. (2019b), Cohen et al. (2023), Velte (2016a), who find significant positive effects of ESG Pay on ESG Ratings in studies varying in geography, firm types, industries and time periods. Furthermore, my findings are similar to those of Radu and Smaili (2021), who found significant positive effects of CSR-linked executive payment on CSR performance. Once again, the positive results of ESG Pay also seem to hold for broader contexts than earlier studies.

However, when paired with firms that use ESG Pay, the significant positive effects of Board Gender Diversity in this sample turn into a significant negative interaction effect. My study therefore finds negative moderating effects of Board Gender Diversity on the relationship between ESG Pay and ESG Ratings. Interestingly, the negative effect is completely the opposite of what I expected based on the studied literature, since the literature showed proof for positive standalone effects of both Board Gender Diversity and ESG Pay on ESG Ratings. Admittedly, because I did not find previous academic literature that had studied the same moderating effect of Board Gender Diversity, my expectations were not fully based on existing literature. These expectations were therefore raised, based on the idea of the two positive standalone effects (Board Gender Diversity and ESG Pay) reinforcing and magnifying their individual positive effects.

Apart from the possibilities of methodological errors, there are some other possibilities for what could be driving the negative moderating effects. One possibility relates to potential forms of 'Tokenism'. In the

case of Tokenism, Board Gender Diversity could be used merely as a way of improving firms' reputations in the eye of the public, instead of using the increased diversity for legitimate purposes, like broader views or a wider range of skills within the board. If there is in fact Tokenism present within a board, it is also likely that the influence of the female board members on decision making is limited or restricted. Through the lack of influence, this could cause the positive standalone effects of Board Gender Diversity to diminish, or even disappear altogether. Interestingly, the above argument is counterintuitive relative to the studies of Velte (2016b), Menicucci and Paolucci (2022) and Gaio and Gonçalves (2022), who found evidence against gender-washing (which is similar to Tokenism) and the critical mass theory, which implies that female board members only gain significant influence after a certain number of female directors are active.

Another reason for the unexpected negative results could lie in the methodological design of this study. To operationalize the use of ESG-based executive payment, I chose to create a binary variable with value 1, if at least one ESG-based metric was used in the payment of management. This choice was made in line with previous literature, with Baraibar-Diez et al. (2019b), Cohen et al. (2023), Radu and Smaili (2021), and Velte (2016a) using the same method of operationalization. However, creating this binary variable, instead of for example creating a continuous variable for the ratio of ESG-based metrics to the total metrics in executive payment schemes, has its drawbacks. Relative to a continuous variable, the binary variable simplifies the model greatly and leads to less opportunities to examine the impacts of varying levels of ESG-based executive compensation. Therefore, it is likely that the methodology choice has large effects on the sign, magnitude and significance of the interaction term. If another study on the moderating effect was performed with the continuous ESG Pay variant, it could very well find completely different results, or even no significant results at all.

Another possible cause for the negative moderating effect could be presented in the difference-in-differences models, which showed that only from 7 years onwards after the treatment, positive effects on Governmental Ratings start to show. Since Governmental Ratings are based on a series of corporate governance metrics, they provide some insight into how firms are run. The 7-year delay in positive effects could therefore signal that boards are slow to improve certain governance processes, which in part also relate to the decision-making process of the board. If the decision-making process is impaired or less efficient after increases in Board Gender Diversity, this might be one of the causes of the significant negative moderating effects found in the multivariate regressions.

CHAPTER 7 Conclusion

In this thesis, I have studied the effects of Board Gender Diversity on the relationship between ESG-based executive payment and ESG Ratings. Previous studies found positive standalone effects of both Board Gender Diversity and ESG-based executive payment on ESG Ratings, however limited research had been done within a broad context, in terms of geography, industry and time period. Moreover, no publicly available study had been performed on the interaction effects between the two variables. Since there is more and more focus on improving gender equality within firm boards, this study meant to explore what this improving focus could mean for firms and ESG outcomes. Therefore, the research question studied in this thesis was: “How does board gender diversity impact the relationship between ESG-based executive compensation and firm ESG ratings?”

To answer this research question, multivariate regressions were employed on panel data from EU-based firms in the period 2008-2022. Alongside the multivariate regressions, a difference-in-differences design was used to establish possible causality and attempt to explore mechanics behind the moderating effect of Board Gender Diversity. Contrary to expectations, the multivariate regressions revealed significant negative effects of Board Gender Diversity on the relation between ESG-based executive payment and ESG ratings. Furthermore, the difference-in-differences regressions showed some support for the causality of the Board Gender Diversity effect on ESG Ratings. However, due to a likely violation of the parallel trends assumption, no certain interpretation of the difference-in-differences models was possible. Furthermore, the negative moderating effects of Board Gender Diversity amongst others were considered to possibly be caused by Tokenism or a decrease in the efficiency of decision making.

Therefore, this study concludes that although both Board Gender Diversity and ESG Pay alone have positive effects on ESG Ratings, the combination of ESG Pay and increased Board Gender Diversity leads to negative effects. These negative effects are strong enough to diminish, or even completely counteract the positive standalone effects of gender diversity and ESG-based executive payment. However, the encountered effects could vary greatly with different contexts, partly depending on the operationalization chosen for ESG-based executive payment.

The results found in this study could be of interest to lawmakers looking to improve the way firms approach and handle ESG-related matters. Although more research is required to confirm the negative combined effects of Board Gender Diversity and ESG-based executive payment, governmental organizations should be critical and wary of possible unintentional harmful effects of gender diversity on ESG outcomes.

Moreover, firms could similarly share interests with lawmakers, if for example these firms aim to achieve the highest ESG Ratings possible in the most efficient way. If the combination of gender diversity within the board and ESG-executive managerial payment leads to a loss of efficiency in achieving high ESG Ratings, firms might wish to re-evaluate their policy and might want to choose either gender diversity or ESG-based executive compensation to use.

7.1 Limitations

For further research, there are some ways in which this study can be improved or augmented. In this study, the use of ESG-based executive payment was operationalized as a binary variable, taking either value 0 or 1. However, this method is flawed in that it results in less possibilities to observe the effects of varied levels of ESG pay use by firms. For example, it could prove interesting and change the results of this study to compare firms, for which only 10% percent of executive payment is based on ESG ratings, with firms that relatively use ESG pay a lot more.

Furthermore, the regression models showed that large portions of the variance in ratings was still unexplained by the model. Therefore, more research into what drives ESG ratings could prove useful and results in more informative models. More explanatory power could also result in a change of the moderating effect.

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