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# **Female board participation and CSR performance: The moderating role of CEO duality.**

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## Abstract

The purpose of this study is to examine the influence of female board participation and CEO duality on CSR performance. Specifically, it investigates whether the presence of a CEO on the board of directors influences the relationship between the number of women on the board of directors and a company's CSR performance. Based on the balanced panel data sample of 1151 multi-industry American firms during the period 2016-2021, the study employs a pooled Ordinary Least Squares regression model to explore this relationship. Robustness is ensured by performing the analysis with an additional control variable and with an alternative measurement of female board participation. The findings from this analysis suggest that the amount of women on the board of directors is indeed related to more responsible business conduct from both the social and environmental perspectives. Contrary to initial assumptions, no evidence is found for decreased CSR performance in companies where the CEO is simultaneously a board member. The moderating effect of CEO duality on the relationship between female board participation and CSR performance returns insignificant results. This research contributes to the literature on corporate governance and could be of value to firms, its stakeholders, and policy makers by shedding light on how CSR performance could be enhanced.

**Keywords:** CSR performance, CEO duality, female board participation, board of directors, triple bottom line, stakeholder theory, social role theory, agency theory.

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# 1 Introduction

Corporate social responsibility (CSR) has gained significant importance for companies during the 21<sup>st</sup> century. CSR is a voluntary concept aimed at balancing environmental, social and economic goals. This balance is often referred to as the triple bottom line perspective (Berber et al., 2018). Various stakeholders have heightened expectations for corporate behaviour and accountability. Increased external demand is placed on companies to mitigate the negative impact that their operations have on the environment and society. CSR performance has become an essential factor for firms seeking to meet these evolving expectations in an increasingly interconnected world (Eliwa et al., 2023; Gull et al., 2022; Harjoto et al., 2015). However, prioritizing CSR initiatives is not exclusively important to the company because of a moral obligation to contribute to sustainable economic growth. Other benefits can be derived from superior CSR performance such as customer retention and loyalty, increased employee engagement, positive brand imaging and even improving the financial performance of the firm (Alhouti & D'Souza, 2018). These numerous benefits resulting from advanced CSR performance increase the importance of understanding factors that contribute to its realization.

Corporate governance is a concept that is closely intertwined with CSR performance. The critical importance of this relationship has been acknowledged in the literature (Aras and Crowther, 2009; Unerman and Bennett, 2004). CSR is described as the development of appropriate governance (Harjoto and Jo, 2011; Jo and Harjoto, 2012), in which firms with superior governance are often more socially responsible (Ntim and Soobaroyen, 2013). Therefore, corporate governance can be identified as the driving force behind CSR performance. Because corporate governance is an important determinant of CSR performance, this research takes a corporate governance perspective to approach CSR performance. It does so by trying to identify corporate governance factors that contribute to improved CSR performance. The board of directors is the core element of corporate governance since they carry the responsibility of achieving and monitoring the CSR objectives (Eccles et al., 2011). The prominent role of the board of directors in corporate governance mechanisms is why board characteristics are the factors of interest in this research. More specifically, the characteristics CEO duality and the amount of female board participants. CEO duality refers to a situation in which the position of the Chief Executive officer

(CEO) and the position of board member are simultaneously held by the same person (Mallin & Michelon, 2011). Female board participation refers to the percentage of board members that is female.

Both CEO duality and female board participation have been discussed in relation to CSR performance in prior literature (Cormier et al., 2022; Katmon et al., 2019; Khan et al., 2021; Mallin & Michelon, 2011; Naciti, 2019). However, literature on a potential moderating effect that exist when investigating these two characteristics simultaneously has remained very scarce. As mentioned, the numerous company benefits resulting from improved CSR performance combined with growing environmental pressure to operate more responsible create an importance to understand which factors influence CSR performance. Since recently a shift towards more women in leadership positions has been visible, and due to its novelty a lot is still to be discovered, it is important to understand how companies can most effectively reap the potential benefits of female board members on CSR performance. This includes an understanding of factors that might influence the relationship between female board members and CSR performance. Therefore, the question that this study tries to answer is whether CEO duality moderates the association between female board participation and CSR performance. Moderation occurs when the relationship between variables, in this case the relationship between female board participation and CSR performance, depends on a third variable, in this case CEO duality. To test whether this moderating effect is present, this study assesses whether CEO duality affects the strength of the relationship between female board participation and CSR performance by performing a quantitative analysis. For this research, archival data from various databases is used.

CEO duality is an important characteristic of the board of directors (Duru et al., 2016). Empirical research on the link between CEO duality and CSR performance suggests a negative association (Mallin & Michelon, 2011; Naciti, 2019). This negative effect that CEO duality has on CSR performance is supported by the agency theory. According to the agency theory, the agent, in this situation the CEO with a dual role, is a self-interest optimiser. This CEO who is an executive manager and simultaneously a chairperson can use its powerful position to optimise personal wealth at the expense of firm performance, including CSR performance (Khan et al., 2013). A CEO

with a dual role is able to do this because he or she is assigned greater power than a regular CEO. A CEO who is on the board of directors has the executive power to make decisions and is also responsible for representing the shareholders in evaluating these same decisions (Elsayed, 2007). According to the agency theory, CEO duality can thus lead to reduced CSR initiatives if an overpowered CEO takes advantage of his or her position to prioritize personal wealth (Khan et al., 2013).

Another important board characteristic is female board participation. In recent years, the importance of women on boards of directors has gained recognition. Researchers have paid extensive attention to the role that female board members play in value-creation processes. The positive effect of female board members on CSR performance is confirmed by empirical evidence (Cormier et al., 2022; Katmon et al., 2019; Khan et al., 17 2021). This resulted in the widespread acknowledgment of the importance of female directors for CSR performance (Cormier et al., 2022; Katmon et al., 2019; Khan et al., 17 2021). Since the increase of women in leadership positions is relatively new and expected to increase, it is important to investigate factors that might influence the effect of female board members on firm CSR performance. CEO duality is a board characteristic that potentially moderates the effect that female board members have on CSR performance.

Despite the extensive literature on the separate effects of female board members and CEO duality on CSR performance, research on the moderating effect of CEO duality on the link between the amount of female board members and CSR performance has been very scarce. Female directors on a board are more likely to influence firms to consider socially and environmentally responsible practices (Khan et al., 2019). However, the decisions of these female directors might potentially be impacted by a CEO who simultaneously is a chairperson. If the overpowered CEO neglects the interest of stakeholders, female directors might be less likely to advocate for CSR involvement to avoid confrontation with this powerful board member (Cabeza-García et al., 2018). This study investigates whether such a moderating effect of CEO duality on female director's influence exists because despite the importance of understanding this potentially moderating relationship, it had never been addressed in the literature until recently.

The limited research on this topic is comprised of an investigation in the context of listed companies in Pakistan (Zhu et al., 2022) and the Italian equity market (Romano et al., 2020). The article by Zhu et al. (2022) concludes that in the context of Pakistani listed companies, CEO duality does not moderate the relationship between the relative amount of female board members and sustainability performance. Research conducted by Romano et al. (2020) discovered opposite results for this relationship. In the context of the Italian equity market, CEO duality negatively moderates the relationship between the amount of female board members and ESG performance. These opposing results indicate that further research on this topic is required to increase our understanding of the link between corporate governance and CSR performance.

The urgent need for increased sustainability performance by companies as a consequence of pressing environmental issues creates the importance of understanding this link. Especially since the shift towards more women in leadership positions has been visible recently, it is important to understand how we can best reap the benefits that this shift can have on CSR performance. This research tries to reduce the lack of overall clarity on this subject as a consequence of inconsistency in the limited previous studies. This study addresses this gap in the literature by examining whether CEO duality has a moderating effect on the association between the amount of women on the board of directors and CSR performance. The method of statistical analysis Ordinary Least Squares is used to test whether a significant interaction effect is present. This study comprises of quantitative research aimed to answer the following research question: Does CEO duality moderate the association between the amount of female board members and CSR performance?

## **2 Theoretical framework & hypotheses**

### **2.1 The triple bottom line**

The relationship between CSR performance and corporate governance is the focus of this study. The rise of globalization and international trade resulted in complex businesses and therefore an increasing desire for transparency (Jamali, 2006). The model of firms operating in isolation has become outdated (Mendes et al., 2021). In recent years, organizations have increasingly shifted

their focus towards a broader basis for performance evaluation. Companies tend to be more inclined to focus on long-term sustainable business operations and shift away from the short-term financial focus (Hardjono and van Marrewijk, 2001). This shift towards a more long-term perspective gave rise to the conception of corporate responsibility to include social impacts and environmental conservation (Jamali, 2006). These two dimension are considered to be equally important as the traditional economic function under the triple bottom line perspective (Berber et al., 2018). Adhering to the triple bottom line perspective involves balancing the interests of a broad selection of stakeholders, including customers, employees, shareholders and potentially environmental activists (Naciti, V., 2019). Because corporate social responsibility is a concept that is comprised of three separate yet intertwined perspectives, this multidimensional concept should be assessed including all three dimensions of firm performance.

The environmental dimension comprises of a company's impact on natural systems like ecosystems, water, air and land. Operating environmentally responsible involves a comprehensive approach including entire business processes (Hourneaux et al., 2018). It is about increasing efficiency of resources, eliminating waste and emissions and minimizing practices that potentially negatively affect the ability of future generations to use the planet's resources (Jamali, 2006). Therefore, the environmental dimension goes beyond solely complying to applicable laws and regulations.

The social dimension focusses on the impact that companies have on the social system in which they operate. Both internal and external stakeholders are considered when it comes to the expectations that these diverse groups have. The social dimension in the triple bottom line perspective incorporates 'issues of public health, community issues, public controversies, skills and education, social justice, workplace safety, working conditions, human rights, equal opportunity, and labor rights' (Jamali, 2006).

The economic dimension refers to the financial performance of firms. It is comprised of concepts such as profitability, competitiveness, and market creation (Jamali, 2006). So therefore, following the triple bottom line perspective, the economic dimension, which is not a component of the ESG concept, is still of importance. However, the economic dimensions is just one pillar in a framework with the two ESG dimensions. The growing awareness of the social and

environmental dimensions has shifted to focus within the economic dimension to the importance of generating added value in a wider sense (Hourneaux et al., 2018). Value creation that goes beyond the conventional financial accounting. Within the economic dimension an increasing recognition of the importance of systematic resource management to reduce operating cost is visible. The awareness of the potential to attract new business through integrity policies is another concept that is becoming more popular within the economic dimension (Hourneaux et al., 2018).

## **2.2 Corporate governance**

Corporate governance can be described as the adoption of policies by firms to meet the expectation of its stakeholders while ensuring accountability towards society (Alam & Akhter, 2017). It is a vehicle used by companies to attain its objectives and vision, among which those related to CSR performance. Appropriate corporate governance thus will ensure effective CSR practices by companies (Ntim and Soobaroyen, 2013). This relationship between CSR and corporate governance can be explained by referring to stakeholder theory (Hill and Jones, 1992). Stakeholder theory stresses the importance of a company's relationship with stakeholders. The relationships with various stakeholder groups inside and outside of the company affect firm performance, making the effective managing of these stakeholder relationships essential to long-term firm survival (Stuebs & Sun, 2015). Effective stakeholders relationships revolve around trust. Trust is created by ensuring that companies continually meet or exceed the expectations that stakeholders have regarding a firm's responsibilities (Alam & Akhter, 2017). The corporate governance structure serves as an important mechanism to manage these stakeholder relationships by assuring that the company lives up to its responsibilities (Stuebs & Sun, 2015).

The responsibility of achieving the CSR related objectives lies with the board of directors, making them a core force in the corporate governance mechanism. Because of the significant influence that the board of directors, through corporate governance mechanisms, has on CSR performance, board characteristics are the topic of interest. The board characteristics female board participation and CEO duality are investigated in relation to CSR performance. They are discussed in more detail in the following section.

## 2.3 Hypotheses development

### 2.3.1 The effect of female board participation on CSR performance

Female board participation refers to the number of females on the board of directors. In recent years we have witnessed a rising awareness of the benefits that could potentially come with female leadership. A prominent example that demonstrates this increased acknowledgment is the adoption of an EU law by the European Parliament on gender balance in corporate boards that mandates firms operating within the European Union to strive for improved representation of the underrepresented sex among board members. Under the provision of this law, companies are mandated to ensure that at least 40 percent of non-executive board members are of the underrepresented sex. Alternatively, compliance with this law can be achieved by having a minimum of 33 percent of total directors on the board originating from the underrepresented sex. These requirements come into effect by June 30, 2026 (Christian et al., 2024). This law indicates that this shift towards more women in leadership positions is relatively new and is expected to increase in the upcoming years. This trend of more women in leadership position has increasingly become the topic of research in the literature in recent years. A study done by Ren et al. (2024) investigated if the presence of female directors affects CSR focus. The results of the study show a strong positive correlation between improved CSR and female directors. Another study by Awwad et al. (2022) about the relationship between women's presence on board of directors and a company's CSR disclosure found that the presence of women on the board of directors positively affects disclosure of CSR performance. These results are confirmed by a study performed by Oino en Liu (2022) which also confirms that the number of females in the board of directors is positively associated with CSR. This growing body of research thus suggests that an increased amount of females on the board leads to better CSR. Much of this work views the CSR enhancing effect of females in leadership positions as driven largely by women's moral orientations.

The effect of the amount of females on the board of directors on CSR performance is explained by referring to stakeholder theory and social role theory (Ren et al., 2024). First, stakeholder theory stresses the interconnected relationship between a firm and its stakeholders. The theory highlights the importance of creating value for all stakeholders, thus

not limiting the strategic focus to shareholders. According to stakeholder theory, effectively responding to and managing all stakeholder relationships is crucial to long-term survival (Stuebs, 2015). Therefore, stakeholder theory supports corporate social responsibility. Female participation within a board of directors increases stakeholder representation by providing different perspectives and multiple insights for decision-making (McGuinness et al., 2017). Because the decision-making power is delegated to a more diverse group of directors, the decisions that are made are more likely to be in line with a more diverse group of stakeholders. Because leadership positions tend to be predominantly male-dominated, it is assumed that a higher amount of females increases diversity as male directors are in abundance (Eliwa et al., 2023). A more diverse board in terms of gender increases the dialogue within the board of directors possibly resulting in more innovative and competitive business CSR business strategies (Adams et al., 2012). Overall, the appointment of female board members contributes to better addressing the expectations of stakeholders (Zhang et al., 2013).

Second, the literature on social role theory indicates that women and men have different environmental attitudes. Social role theory suggests that females are more cooperative, selfless, and empathetic while males tend to be more dominant and competitive (Eagly, 2009). Women show greatest sensitivity towards environmental topics (Eagly, 2009). Therefore, females aspire to moral principles to a higher extent than men do. Because they are more empathetic they tend to be more willing to change (Hillman et al., 2007). These traits make female directors more suitable for making ethical judgments (Eagly, 2009). Research performed by Cabeza-García et al. (2018) has shown that female directors tend to be more concerned about a firm's ethical behaviour and less about a firm's financial needs. Therefore, the amount of female directors on a board is likely to influence the commitment of a firm to CSR operations. This is confirmed by García Martín & Herrero (2020) and Dienes & Velte (2016) who argue that an increased amount of female board members strengthens a firm's corporate social responsibility. Furthermore, Hollindale et al. (2017) and Frias-Aceituno et al. (2013) conclude that female board members are more likely to implement strategies aimed at minimizing environmental risk. Female directors increase a company's societal conscience and therefore enhance the overall welfare of stakeholders (Arayssi et al., 2016). Thus, in line with the results in previous literature (Ren et al.,

2024; Oino en Liu., 2022; Awwad et al., 2022; Cormier et al., 2022; Katmon et al., 2019; Khan et al., 2021), the following hypothesis is proposed:

*H1: Female board participation is positively associated with CSR performance.*

### 2.3.2 The effect of CEO duality on CSR performance

CEO duality refers to a situation in which the position of the Chief Executive officer (CEO) and the position of board member are simultaneously held by the same person (Mallin & Michelon, 2011). The relationship between CEO duality and CSR performance has been discussed in previous literature. A study by Alabdullah et al. (2019) examined the impact of CEO duality on CSR reporting. The findings of this study indicate a negative relationship between CEO duality and CSR disclosure. Another study by Voinea et al. (2022) investigated the same relationship. This study confirms the results found in Alabdullah et al. (2019) by depicting a negative relationship between CEO duality and CSR disclosure. In a study conducted by Rashid et al. (2020) the similar relationship was found that CEO power is negatively associated with the degree of CSR disclosure.

The relationship between CEO duality and CSR performance can be explained by referring to agency theory. Agency theory suggests that the board of directors should be primarily comprised of directors who do not fulfil managerial functions in the organisation because independent directors are likely to mitigate managerial opportunism (Naciti, 2019). CEO duality is an important factor in the leadership structure within a corporate governance mechanism that significantly influences the running of the company (Ahmad et al., 2017). CEO duality reduces board independence as it delegates substantial power to a single individual who may choose to pursue personal goals that are not in line with the interest of external stakeholders. A CEO might have little interest in promoting CSR as it leads to additional costs and may lead to loss of individual wealth (Ahmad et al., 2017b). The concentration of power allows a board member with a dual role to resist change related to sustainability initiatives because a CEO with a dual role can control information flows and set agendas (Ahmad et al., 2017). This self-utility maximizing behaviour may reduce the undertaking of social and environmental activities by the

company and can therefore be detrimental to CSR performance. This dual leadership structure reduces accountability as it reduces checks and balance (Ahmad et al., 2017b)

Effective corporate governance mechanisms encourage a firm to engage in CSR practices (Shaukat et al., 2016; Zhang et al., 2013). In a situation of CEO duality, the board of directors as the representatives of shareholders lose effectiveness in its governance role because of a reduction in accountability and monitoring. Since corporate governance mechanisms in companies with lower amounts of CEO duality are more effective, the decision-making process regarding engagement in CSR practices is improved. Thus, in line with the results from previous literature (Mallin & Michelon, 2011; Naciti, 2019; Alabdullah et al, 2019; Rashid et al, 2020; Voinea et al, 2022), the following hypothesis is developed:

*H2: CEO duality is negatively associated with CSR performance*

### 2.3.3 The moderating effect of CEO duality in the relationship between female board participation and CSR performance

The separate effects of CEO duality and female board participation on CSR performance have been the topic of research more frequently in previous literature. However, there is a lot to be discovered about the moderating effect that CEO duality potentially has on the association between an increased amount of female board members and CSR performance. Therefore, this is where this study becomes more innovative. The moderating role in this relationship can be explained by referring to agency theory. According to agency theory a CEO that has a dual role has increased power over the board, thus hindering the independence between management and the board of directors (Duru et al., 2016).

The concentration of power limits the control function of other directors. This includes the control function of female directors who tend to advocate in favour of CSR activities (Cabeza-García et al., 2018). The undivided authority of a board member who simultaneously is a CEO potentially weakens the role of female directors in preventing opportunistic behaviours that increase CEO wealth instead of satisfying stakeholder needs (Benjamin & Biswas, 2019). According to prior research, women tend to have a higher commitment to conducting socially responsible business operations (Arayssi et al., 2016). Thus, a CEO with a dual role who

simultaneously is a chairperson can potentially overpower these female directors that would otherwise strive for improved CSR performance. Company decisions are therefore less likely to be geared towards increasing CSR performance. It becomes more challenging for female board members to direct attention to CSR practices when they are under significant peer pressure to get along with this overpowered board member (Benjamin & Biswas, 2019). Thus, in view of this agency problem, the ability of female board members to advocate for CSR activities could be undermined by the presence of CEO duality. The proactive role of female board members in considering environmental risk and developing sustainability practices could potentially be mitigated by a powerful CEO who serves as a chairman on the board. Therefore, the following hypothesis is proposed:

*H3: CEO duality moderates the association between female board participation and CSR performance.*

### **3 Methodology**

#### **3.1 Data and sample**

To test the hypotheses defined in the previous section, data is gathered from the LSEG database. The research includes financial data used to control for firm-level characteristics, data on board composition, and data on CSR performance. The sample for this study contains large publicly listed companies located in the United States. A significant percentage of US companies publish comprehensive CSR reports (Harvard Business School, 2021). This availability of data enhances the robustness of the empirical study. Large companies are selected because they are more likely to have sophisticated corporate governance mechanisms which is a fundamental principle for this study. In addition, data for publicly listed companies is available to a higher extent which helps to create a large sample to run the regression analysis. The data that is retrieved from the data sources covers a time interval from 2016 to 2021. The data collection starts at the year 2016 because ESG data covering earlier years is scarce. The data collection ends

at the year 2021 because from later years not all accounting information is available yet. A total sample of 1151 companies is included in this research.

## **3.2 Variables**

### **3.2.1 Dependent variable: CSR performance**

The dependent variable in this research is CSR performance (ESGscore). The ESG scores from the LSEG database are used to measure sustainability performance. The scores are designed to measure a company's relative ESG performance, commitment and effectiveness in a transparent and objective manner (LSEG, 2023). The scores are also discounted for significant ESG controversies related to the company. These ESG scores are measured as the weighted sum of three dimensions. These three dimensions include the environmental dimension, the social dimension, and the governance dimension. The environmental dimension includes the categories: resource use, emissions, and innovation. The social dimension includes the categories workforce: human rights, community, and product responsibility. The governance dimension includes the categories: management, shareholders, and CSR strategy.

The scores provide a comprehensive scoring of the organizational ESG performance. They reflect organizational effectiveness and commitment regarding corporate social responsibility based on publicly-reported information (LSEG, 2023). The final ESG scores consist of the relative sum of category weights which vary per industry. Using the sum of the items averaged by their relative weight takes into account differences in for example policies and regulations. A final score is calculated that can be ranked on a scale from 0 to 100. Scores between 0 and 25 indicate companies with poor relative ESG performance and an insufficient degree of transparency in reporting material ESG data publicly. Scores within the range 25 to 50 indicate companies with a satisfactory relative ESG performance and a moderate degree of transparency in reporting material ESG data publicly. Scores between 50 and 75 indicate companies with good relative ESG performance and an above average degree of transparency in reporting material ESG data publicly. The range between 75 and 100 indicate companies with excellent relative ESG performance and a high degree of transparency in reporting material ESG data publicly. Table 1 gives a more elaborate overview of the scores.

TABLE 1, ESG SCORE RANGE

Score range	Grade	Description
0.00 <= score <= 0.08	D-	'D' score indicates poor relative ESG performance and insufficient degree of transparency in reporting material ESG data publicly
0.08 < score <= 0.16	D	
0.16 < score <= 0.25	D+	
0.25 < score <= 0.33	C-	'C' score indicates satisfactory relative ESG performance and moderate degree of transparency in reporting material ESG data publicly
0.33 < score <= 0.41	C	
0.41 < score <= 0.50	C+	
0.50 < score <= 0.58	B-	'B' score indicates good relative ESG performance and above- average degree of transparency in reporting material ESG data publicly.
0.58 < score <= 0.66	B	
0.66 < score <= 0.75	B+	
0.75 < score <= 0.83	A-	'A' score indicates excellent relative ESG performance and high degree of transparency in reporting material ESG data publicly.
0.83 < score <= 0.91	A	
0.91 < score <= 1	A+	

(LSEG, 2023)

### 3.2.2 Independent variables: female board participation & CEO duality

The independent variables in this study are female board participation (Fembaord) and CEO duality (CEOduality). The variables are obtained from the LSEG database. Female board participation is measured as a percentage of the number of female directors to the total number of directors. The variable CEO duality is measured as a dummy variable which takes the value 1 if the CEO and chairperson position is held by the same person, and the value 0 otherwise.

### 3.2.3 Control variables

This study incorporates multiple control variables to account for the potential influences they might have on the relationship between CSR performance, female board participation, and CEO duality. The control variables includes are retrieved from the LSEG database. The selection of control variables used in this study is based on empirical research performed by Macchioni et al. (2022) on the moderating role of CEO duality in the relationship between the amount of female board members and carbon emissions. Although carbon emissions are only a part of ESG

performance and therefore the dependent variable in the research by Macchioni et al. (2022) does not perfectly correspond with the dependent variable in this research, the same control variables are likely still relevant. Therefore, the same control variables are applied. CSR performance might be captured by firm characteristics including firm risk, firm size, profitability and industry. To test the influence of the established independent variables, these firm-level characteristics must be controlled for.

Firm risk refers to a firm's leverage because high leverage is associated with higher risk-seeking behaviour (Cornett et al., 2009). Research shows that high leveraged companies tend to reduce CSR-related activities and that firms with weaker financial positions minimize spending financial resources on these activities (Mishra & Modi, 2013). Firm risk (Risk) is calculated as the ratio of total debts/total assets.

Firm size is expected to positively be associated with CSR performance. This is the result of greater visibility to external stakeholders which results in a company's desire to create a positive company image (Tashman et al., 2018). Firm size (Size) is measured as the total assets of a company.

Previous research indicates that there is a relationship between return on assets and CSR performance. This relationship can be negative, for example in the manufacturing sector where firms with a high return on assets tend to have reduces CSR performance (Hidayat, 2017). Controversly, research has also indicated that companies with superior CSR performance tend to report higher return on assets (Sulbahri & Fuadah, 2022). Profitability is calculated as the ratio of operating income and total assets (ROA).

Industry (Industr) is included as a control variable because some industries experience increased attention and pressure from various stakeholder groups due to their significant impact on society and the environment (Hafsi & Turgut, 2013). According to Hussain et al. (2018) the most environmentally sensitive industries include the oil and gas producers and chemical and pharmaceutical industries. To account for the industry that the firm operates in a value of 1 is assigned if the firm belongs to one of these environmentally sensitive industries and 0 otherwise.

Finally, to control for time specific effects, year dummies are added to the model as additional control variables. Table 2 gives an overview of the operationalisation of the variables included in this research.

TABLE 2, RESEARCH VARIABLES OPERATIONALISATION

Variable	Abbreviation	Description	Expected sign
<b>CSR performance</b>	ESGscore	The overall company score based on reported information on environmental, social and corporate governance pillars with an ESG controversies overlay	n.a.
<b>Female board participation</b>	Femboard	The percentage of female board members	+
<b>CEO duality</b>	CEOduality	A dummy variable taking value 1 if the CEO is simultaneously a board member and 0 otherwise	-
<b>Firm risk</b>	Risk	The ratio of total debt on total assets at the reporting date	+
<b>Firm size</b>	Size	The total assets at the reporting date	+
<b>Profitability</b>	ROA	The return on assets at the reporting date	+/-
<b>Year</b>	Year	A vector of year dummies	n.a.
<b>Industry</b>	Industr	A dummy variable taking value 1 if a firm belongs to the environmentally sensitive industries (oil and gas, chemical, pharmaceutical) and 0 otherwise	-

### 3.3 Empirical methodology

Data from the databases LSEG is retrieved with the use of unique identifiers it is ensured that the retrieved variable are matched to the corresponding companies. Quantitative research is conducted using the statistical program R-studio. This study comprises a panel data analyses because a large number of economic entities is analysed over multiple moments in time. The first

model measures the effect of the separate variables board gender diversity and CEO duality on CSR performance:

$$\begin{aligned} & ESGscore \\ & = \beta_0 + \beta_1 Femboard + \beta_2 CEOduality + \beta_3 Risk + \beta_4 Size + \beta_5 ROA + \beta_6 Industr \\ & + \beta_7 Year + \varepsilon \end{aligned}$$

In the second model, the interaction effect between female board participation and CEO duality is added:

$$\begin{aligned} & ESGscore \\ & = \beta_0 + \beta_1 Femboard + \beta_2 CEOduality + \beta_3 Boarddiv * CEOduality + \beta_4 Risk \\ & + \beta_5 Size + \beta_6 ROA + \beta_7 Industr + \beta_8 Year \varepsilon \end{aligned}$$

## 4 Results

### 4.1 Descriptive statistics

Table 3 provides the summary statistics of the dependent, independent and control variables. The sample contains 1150 companies for which observations are made over a period of 6 years resulting in a total amount of 6900 observations. Since all companies in the dataset have observations for every time period, the database is characterized as a balanced panel data set. There are no missing observations for any unit across the time periods. The ESGscore variable shows that firms have an average CSR performance of 47.26. This score corresponds with the 'C' score assigned by the LSEG database which indicates a satisfactory relative ESG performance and a moderate degree of transparency in reporting material ESG data publicly. The percentage of female board members is 21.97% with the highest observed percentage of females on the board being 80.00%. CEO duality is present in 98% of the firms. This indicates that the presence of a CEO who simultaneously is a board member is a very common practice among the firms in the sample.

TABLE 3 DESCRIPTIVE STATISTICS

<b>Variables</b>	<b>Observations</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>ESGscore</b>	6900	47.26	19.51	0.1	93.53
<b>Femboard</b>	6900	21.97	11.37	0.00	80.00
<b>CEOduality</b>	6900	0.98	0.13	0.00	1.00
<b>Risk</b>	6900	31.88	23.81	0.00	364.99
<b>Size</b>	6900	33,804,477.32	158,154,679.35	22,271.00	3,743,567,000.00
<b>ROA</b>	6900	4.84	12.20	-308.96	154.73
<b>Industr</b>	6900	0.80	0.40	0.00	1.00

The standard deviations of firm size indicates a considerable dispersion in the data. This suggests that the observations are not closely clustered around the mean. This issue is addressed by transforming the variable firm size using the natural logarithm. Table 4 shows the updated summary statistics, the standard deviation of firm size is now considerable lower making the estimation of the coefficients more precise and reliable. The natural logarithm of total assets will throughout the following statistical analyses be used to measure firm size (Logsize). The transformation to the natural logarithm helps to improve the normal distribution of the variable firm size. This can be observed in Appendix A.

TABLE 4 UPDATED DESCRIPTIVE STATISTICS

<b>Variables</b>	<b>Observations</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>ESGscore</b>	6900	47.26	19.51	0.91	93.53
<b>Femboard</b>	6900	21.97	11.37	0.00	80.00
<b>CEOduality</b>	6900	0.98	0.13	0.00	1.00
<b>Risk</b>	6900	31.88	23.81	0.00	364.99
<b>Logsize</b>	6900	15.61	1.68	10.01	22.04
<b>ROA</b>	6900	4.84	12.20	-308.96	154.73
<b>Industr</b>	6900	0.80	0.40	0.00	1.00

## 4.2 Assumptions test

Table 5 provides an overview of the correlation matrix of the variables included in the research. A correlation value of 0.8 or higher between two variables is considered problematic according to Rönkkö and Cho (2022) because high correlation between two variables in the same model raises concerns about multicollinearity. In case of multicollinearity at least two predictors variables in a multiple regression model such as this one, are highly correlated. This strong linear relationship between two predictor variables can cause problems in the analysis and the interpretation of the regression results. Considering the highest correlation score in table 5 is 0.43 which is the correlation between female board participation and ESG score, there is no need to assume that problematic amounts of multicollinearity are present in the model. To further confirm the absence of multicollinearity in the model, the variance inflation factor for the independent variables in the model was calculated. The results are shown in table 6. Since the VIF-values of all independent variables are close to 1, this indicates that there is no significant multicollinearity present in the model.

TABLE 5 CORRELATION MATRIX

	<b>Femboard</b>	<b>ESGscore</b>	<b>Risk</b>	<b>Logsize</b>	<b>ROA</b>	<b>CEODuality</b>	<b>Industry</b>
<b>Femboard</b>	1.00	-	-	-	-	-	-
<b>ESGscore</b>	0.43	1.00	-	-	-	-	-
<b>Risk</b>	0.04	0.06	1.00	-	-	-	-
<b>Logsize</b>	0.10	0.18	-0.02	1.00	-	-	-
<b>ROA</b>	0.06	0.11	0.09	-0.02	1.00	-	-
<b>CEODuality</b>	0.03	0.05	-0.03	0.01	0.02	1.00	-
<b>Industry</b>	0.03	0.09	0.11	-0.20	0.08	-0.02	1.00

TABLE 6, VARIANCE INFLATION FACTORS

<b>Variable</b>	<b>Variance inflation factor</b>
<b>Femboard</b>	1.00
<b>LEV</b>	1.00
<b>Logsize</b>	1.00
<b>ROA</b>	1.00
<b>CEOduality</b>	1.00
<b>Industrydummy</b>	1.00
<b>Year2016</b>	1.67
<b>Year2017</b>	1.67
<b>Year2018</b>	1.67
<b>Year2019</b>	1.67
<b>Year2020</b>	1.67

A problem that is common in studies that involve social, financial and economic variables is heteroskedasticity (Wooldridge, 2019). Heteroscedasticity refers to a situation in which the variability of the residuals across all levels of the independent variables is not constant. This violates a key assumption of ordinary least squares regression which assumes a constant variance of residuals. In order to assess potential heteroscedasticity in the model, a Breusch-Pagan test is conducted. The Breusch-Pagan test shows a p value of  $<2.2 \times 10^{-16}$  and therefore the results are significant which indicates the presence of heteroscedasticity in the model. To address the issue of heteroscedasticity that is common in pooled regression models, the standard errors in the analysis are clustered at the firm level. Adding these clustered standard errors controls for the effect of heteroscedasticity.

### 4.3 Separate effect regression results (H1 & H2)

The first model considers CEO duality and female board participation separately, in the context of CSR performance. Therefore, hypothesis one and two are tested which state that, when considered separately, more women on the board of directors increases CSR performance and CEO duality decreases CSR performance. Table 7 reports pooled OLS regression coefficients estimated based on clustered standard errors at the firm level.

TABEL 7, POOLED OLS REGRESSION RESULTS

Variable	Coefficient	Std. Error	t-value	p-value	Significance
<b>(Intercept)</b>	-70.30	4.82	-14.57	< 2.2e-16	***
<b>Femboard</b>	0.44	0.04	9.94	< 2.2e-16	***
<b>CEOduality</b>	6.70	2.22	3.02	0.00	**
<b>Risk</b>	0.00	0.02	0.03	0.9724	
<b>Logsize</b>	6.05	0.27	22.40	< 2.2e-16	***
<b>ROA</b>	0.06	0.03	1.78	0.07	
<b>Industrydummy</b>	10.90	1.09	9.96	< 2.2e-16	***
<b>Year2016</b>	-4.89	0.61	-8.07	< 2.2e-16	***
<b>Year2017</b>	-3.562	0.54	-6.57	5.272e-11	***
<b>Year2018</b>	-3.21	0.45	-7.17	8.025e-13	***
<b>Year2019</b>	-1.87	0.34	-5.54	3.162e-08	***
<b>Year2020</b>	-0.29	0.26	-1.12	0.26	
<b>Total Sum of Squares</b>	2625800				
<b>Residual Sum of Squares</b>	1480100				
<b>R-Squared</b>	0.44				
<b>Adj. R-Squared</b>	0.44				
<b>F-statistic</b>	236.77				

\*Significance at 10% level, \*\* significance at 5% level and \*\*\* significance at 1% level.

The evaluation of the model visualized in table 7 is based on a p-value of 0.05. The results in table 7 indicate that female board participation and CEO duality are both significantly correlated with CSR performance. They both have positive coefficients. Thus, an increase in the amount of women on the board of directors is associated with an increase in CSR performance. Therefore, hypothesis one which predicted a positive effect of female board participation on CSR performance is accepted. For CEO duality the results indicate that the presence of a CEO with a dual role on the board of directors is associated with an increased CSR performance. Therefore, hypothesis two which predicted a negative effect of CEO duality on CSR performance, is rejected. The adjusted R-squared, which is adjusted for the number of predictors, returns a value of 0.44. Therefore, the model explains a reasonable portion of the variance in CSR performance. The variables in the model collectively have a substantial impact on company CSR performance. This is confirmed by the F-statistic of 236.77. The F-statistic with a very low p-value indicates that the overall model is highly significant.

#### **4.4 Interaction effect regression results (H3)**

The second model constructed in this study measures the moderating effect of CEO duality on the relationship between female board participation and CSR performance, it therefore tests hypothesis three. Hypothesis three states that CEO duality moderates the association between female board participation and CSR performance. To investigate whether CEO duality and female board participation may produce any synergy effects, an interaction between the two is computed and added to the second OLS model for an explorative analysis. This pooled OLS regression analysis again estimates the coefficients based on firm-level clustered standard errors.

TABLE 8, POOLED OLS REGRESSION RESULTS INCLUDING INTERACTION EFFECT

Variable	Coefficient	Std. Error	t-value	p-value	Significance
(Intercept)	-71.09	5.70	-12.47	< 2.2e-16	***
Fembaord	0.48	0.19	2.46	0.01	*
CEOduality	7.53	3.71	2.03	0.04	*
Fembaord:CEOduality	-0.04	0.20	-0.21	0.83	
Risk	0.00	0.02	0.04	0.97	
Logsize	6.05	0.27	22.39	< 2.2e-16	***
ROA	0.06	0.03	1.78	0.07	
Industrydummy	10.89	1.09	9.95	< 2.2e-16	***
Year2016	-4.89	0.61	-8.05	9.42e-16	***
Year2017	-3.56	0.54	-6.56	5.70e-11	***
Year2018	-3.21	0.45	-7.16	8.79e-13	***
Year2019	-1.88	0.34	-5.52	3.47e-08	***
Year2020	-0.29	0.26	-1.13	0.26	
Total Sum of Squares	2625800				
Residual Sum of Squares	1480100				
R-Squared	0.44				
Adjusted R-Squared	0.44				
F-statistic	216.68 < 2.22e-16				

\*Significance at 10% level, \*\* significance at 5% level and \*\*\* significance at 1% level.

The results from running the pooled OLS regression again while including the interaction effect between female board participation and CEO duality are summarized in table 8. From these results it becomes clear that the interaction term between female board participation and CEO duality is not significant. Therefore, hypothesis three which predicted that the presence of CEO duality would moderate the relationship between female board participation and CSR

performance, is rejected. No evidence is found that the combined effect of female board participation and CEO duality is different from their individual effects. Female board participation and CEO duality, measured separately, are in this model significant at the 10% level. In this model, the interaction term needs to be considered to interpret their full effect. Similar to the model in table 6 that does not include the interaction term, this model explains a reasonable portion of the variance in CSR performance with an adjusted R-squared of 0.44.

#### **4.5 Alternative variable measurement robustness check: Critical mass dummy**

Conducting a robustness check is necessary for validating the consistency and reliability of the regression results. To ensure the robustness of the study results, additional data analyses have been conducted. First, the pooled OLS regression is re-run with an alternative measure of female board participation. According to multiple studies (e.g., Post et al., 2011), the amount of women on a board of directors needs to first reach some 'critical mass' to be able to have an impact on a company's performance. Without this critical mass, referring to a certain minimal amount of female board members, more specifically two, social pressures may urge female directors to conform to the opinion of the majority (Post et al, 2011) and therefore they might conform to the masculine behavior patterns of their male colleagues (Nadeem et al., 2020). Ideas and opinions of female directors are sometimes disregarded in a situation of low level female representation (Martin and Herrero, 2020). To account for this potential effect a dummy variable labeled (Criticalmassdummy) that is equal to 1 if a firm has more than two women (Post et al, 2011) on the board of directors and 0 otherwise has been used as an alternative measure for board gender diversity.

Table 9 contains the results of running the same pooled OLS regression, including the robust standard errors, but with the alternative measure female board participation. Changing the measurement of female board participation in the model confirms the positive impact on CSR performance. In this model, both female board participation and CEO duality have significant positive effects on CSR performance. Similar to the original model, the interaction between them is not significant which indicates that there is no combined effect. The results of this additional analysis confirm the robustness of the original findings.

TABLE 9, POOLED OLS REGRESSION RESULTS WITH ALTERNATIVE MEASUREMENT OF FEMALE BOARD PARTICIPATION

Variable	Estimate	Std. Error	t-value	Pr(> t )	Significance
(Intercept)	-61.24	5.20	-11.77	< 2.2e-16	***
Criticalmassdummy	12.73	5.83	2.18	0.03	*
CEOduality	7.94	2.28	3.49	0.00	***
Criticalmassdummy: CEOduality	-4.50	5.85	-0.77	0.44	
Risk	0.01	0.02	0.55	0.58	
Logsize	5.84	0.28	20.96	< 2.2e-16	***
ROA	0.07	0.03	2.20	0.03	*
Industrydummy	11.15	1.13	9.87	< 2.2e-16	***
year2016	-6.90	0.49	-13.95	< 2.2e-16	***
year2017	-5.27	0.44	-11.87	< 2.2e-16	***
year2018	-4.35	0.38	-11.36	< 2.2e-16	***
year2019	-2.50	0.31	-8.06	8.81e-16	***
year2020	-0.57	0.25	-2.32	0.02	*
Total Sum of Squares:	2625800				
Residual Sum of Squares:	1533000				
R-Squared:	0.42				
Adj. R-Squared:	0.42				
F-statistic:	197.863 < 2.22e-16				

\*Significance at 10% level, \*\* significance at 5% level and \*\*\* significance at 1% level.

#### 4.6 Additional control variable robustness check: Board size

For the second robustness check, the pooled OLS regression is re-run with an additional control variable to check if the results are sensitive to omitted variable bias. The additional control variable that is included is board size (Boardsize). The results of this analysis are visible in table 10. The results of this regression analysis lead to the same conclusion as the original model in that the interaction effect of female board participation and CEO duality does not significantly influence CSR performance. The robustness of results is therefore again confirmed.

TABLE 10, POOLED OLS REGRESSION WITH ADDITIONAL CONTROL VARIABLE

Variable	Estimate	Std. Error	t-value	p-value	Significance
(Intercept)	-70.72	5.77	-12.27	< 2.2e-16	***
Femboard	0.48	0.20	2.44	0.01	*
CEOduality	7.41	3.77	1.97	0.05	*
Femboard:CEOduality	-0.04	0.20	-0.22	0.83	
Risk	0.00	0.02	0.12	0.90	
Logsize	5.94	0.30	19.93	< 2.2e-16	***
ROA	0.06	0.03	1.81	0.07	
Industrydummy	10.92	1.10	9.91	< 2.2e-16	***
Boardsize	0.14	0.17	0.81	0.42	
Year2016	-4.89	0.61	-8.08	7.84e-16	***
Year2017	-3.56	0.54	-6.59	5.12e-11	***
Year2018	-3.21	0.45	-7.17	8.10e-13	***
Year2019	-1.87	0.34	-5.52	3.49e-08	***
Year2020	-0.28	0.26	-1.09	0.28	
Total Sum of Squares	2625800				
Residual Sum of Squares	1479400				
R-squared	0.44				
Adj. R-squared	0.44				
F-statistic	200.544 < 2.22e-16				

*\*Significance at 10% level, \*\* significance at 5% level and \*\*\* significance at 1% level.*

## 5 Discussion and conclusion

This study examined the role of CEO duality in the relationship between female board participation and CSR performance. This was done by trying to answer the research question ‘Does CEO duality moderate the association between female board participation and CSR performance?’. To examine this relationship, a pooled regression based on robust standard errors was performed.

The first hypothesis predicts that female board participation has a positive effect on CSR performance, in line with stakeholder theory and social role theory. The results for this hypothesis are significant and thus confirm that firms with higher amounts of female board members tend to exhibit improved CSR performance. Hypothesis two, which predicts the existence of a negative effect of CEO duality on CSR performance, is rejected because the results of the regression analysis return a significant positive coefficient. This indicates that, for this sample, companies for which the CEO is a board member tend to perform better when it comes to CSR practices. The unexpected positive influence of CEO duality on CSR performance challenges the traditional agency theory view that separating the executive role from the monitoring role leads to better performance. A possible explanation for this unexpected result is that when these roles are fulfilled by a single individual, it might streamline decision-making processes and lead to more alignment of CSR strategies. Another possible explanation for this result could be that the model does not distinguish male CEO's with a dual role from female CEO's with a dual role. Perhaps agency theory predicting self-servicing behaviour by people that have both a monitoring and executive role is less applicable when this person with a dual role is a female. Potentially, women with a dual role are less inclined to prioritize company decision that maximize their own utility over responsible business practices that would satisfy stakeholder needs due to their inherent desire to aspire to moral principles.

The third hypothesis predicts that CEO duality moderates the association between female board participation and CSR performance. This hypothesis is rejected because the empirical analysis for the interaction effects did not return significant results. This thus answers the research question by concluding that this study was not able to find evidence to confirm that CEO duality influences the effect that female board members have on CSR performance. A possible explanation for this result is that companies that have a higher amount of female board participants, and therefore prioritize gender diversity, might also have stronger ethical values when it comes to good CSR performance. Such values of promoting females in leadership positions and CSR performance might be embedded in the organizational culture. Therefore CEO duality might not alter these deep-rooted values. It could also be that when CSR is a strategic priority, it transcends individual roles within the board of directors. The strategic commitment to

CSR might be sufficiently strong that it is driven by the entire board, including the CEO, regardless of duality. In this case the effect of female board representation and CSR performance remains strong irrespective of the dual role of the CEO.

This research contributes to the literature on corporate governance mechanisms. The study adds to the very limited empirical research that is done on the moderating effect of CEO duality on the relationship between female board participation and CSR performance. Despite the growing number of studies on the implications of board structures of companies, the moderating effect of CEO duality remains largely untouched in existing research. Especially because the only research performed on this topic contradicts each other, this research provides a necessary addition. The results of this research suggest several practical implications for stakeholders. Considering that the subject of female leadership positions is becoming increasingly important in legislation and policy development, this research can serve as a recommendation for policymakers. The concluded positive impact of female board members on CSR performance provides input for regulators to assist in their efforts to continuously improve CSR practices by firms. Current and prospective board members can use this study to get a better understanding of the implications of board composition. This study provides insights into how they can enhance CSR performance through an increased amount of female board members. Potential investors interested in ethical and sustainable investing could use this study to increase their understanding of factors that influence CSR performance. Being aware of the positive effect that female board representation can have on CSR performance might guide them in making ethical investment decisions.

Some limitations must be acknowledged that might provide new avenues for future research on the topic. The first limitation stems from potential selection bias because the sample consist of companies incorporated in the United States. American companies may not completely capture the diversity of corporate governance mechanisms across different cultural and regulatory environments. Future studies should consider including companies from various regions when replicating this research to enhance the generalizability of the findings. The second limitation is related to the quantification of the CSR performance scores. Although the LSEG database is widely used by academics to quantify a companies' CSR performance, the robustness

of the research would be increased if an alternative measure of the CSR performance variable would be added. Future researchers might reproduce this study by using an alternative measurement of corporate CSR performance. Due to time limitations an analysis in which it is taken into account whether the CEO with a dual role is male or female is not part of this study. Future researchers could perform an analysis that takes this into consideration to see whether the effects of CEO duality are different when it concerns female CEO's compared to male CEO's. As mentioned earlier, such an analysis could potentially reveal why CEO duality has a positive effect on CSR performance instead of the hypothesised negative effect. The last limitation refers to the nature of the analysis. The quantitative analysis cannot capture all relevant aspects and underlying relationships that might explain the partially unexpected results. By incorporating qualitative data like interviews with board members, deeper insights into the underlying motivations regarding CSR initiatives might be uncovered.

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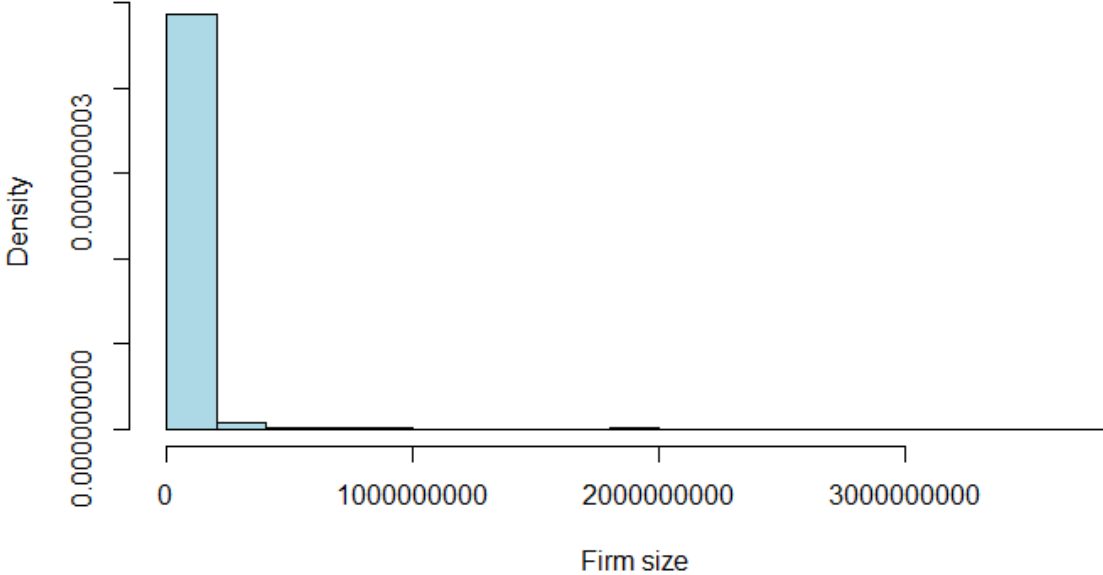
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Appendix A

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