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Do gender quotas work? A study into the role of the Dutch gender diversity quota on firm performance

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Abstract

This paper examines the relationship between the new Dutch gender quota, introduced in 2022, and firm performance. Whilst previous studies have shown conflicting results regarding gender quotas and firm performance, many do agree that gender diversity helps improve firm performance. Thus, by focusing on a gender quota which on average has improved the gender diversity of the supervisory board for Dutch publicly listed firms, this paper predicts that there will be a positive association between the gender quota and the firm performance measures, return on assets and return on equity.

Using an OLS regression and difference-in-difference analysis, and the data of 56 publicly listed and 198 unlisted Dutch firms, this paper findings a small but significant negative association between the Dutch gender diversity quota and the firm's return on assets, however the three other results show no significant relationships between the Dutch gender quota and the return on assets and the return on equity. However, due to certain inconsistencies regarding the empirical analyses, this paper suggests that there is no significant relationship between firm performance and gender quota. Thus, underscoring the idea that gender quotas can be implemented to help promote gender diversity without directly harming firm performance.

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1. Introductions

Over the past decades, female participation in the labour market has greatly increased. According to the International Labour Organization, roughly 50% of working-age women are part of the labour market worldwide. However, this growth is not reflected at the corporate leadership level. Globally, 63.8% of companies are reported to have less than 30% of women making up their corporate boards (International Labour Organization, 2019).

To combat the problem of gender inequality at the corporate level, gender quotas are often implemented. These are policies mandating a minimum percentage of positions should be appointed to women, with the aim of improving female representation in the workforce, female financial independence, and the professional development of women (Ministerie van Algemene Zaken, 2022). Although recently there has been an increase in the implementation of gender quotas, there are still conflicting theories and empirical evidence regarding the effects of gender quotas on firm performance. For instance, the study from Comi et al. (2019) shows, in France, gender quotas seem to negatively impact firm performance, whilst in Italy a positive effect on firm performance is reported. With the researchers underscoring that these results may also be impacted by the effectiveness of the gender quotas. This raises the question of whether gender quotas can both effectively impact gender equality in corporate leadership and also have a positive effect on a firm's performance.

This thesis aims to investigate the effects of gender diversity on firm performance. Specifically taking a look at the effects of gender quotas, which increase gender diversity in the corporate leadership of firms, and whether this also leads to performance improvements. This will be done by investigating the diversity quota implemented by the Dutch government on the 1st of January 2022. This quota states that all publicly listed Dutch firms should have a supervisory board which consists of one-third women (Ministerie van Justitie en Veiligheid, 2021). To analyse this gender quota, this paper will be using data obtained from the Orbis database, regarding Dutch publicly listed and unlisted firms from 2020 to 2023, to conduct an Ordinary Least Squares regression and a difference-in-difference analysis to investigate the association between the return on assets and return on equity for firms affected and firms which are not affected by the Dutch gender quota.

This thesis will provide insights into the effects of gender quotas on firm performance, using a quota which has already been shown to be successful in increasing gender diversity as analysed by the Netherlands Bureau for Economic Policy Analysis (Zulkarnain et al., 2024). Thereby, it contributes to earlier literature on gender diversity and firm performance, which has yielded inconsistent results so far.

This thesis is also socially relevant as its findings will add insights into the effectiveness of diversity in corporate leadership. Thus, it can help firms make better decisions when it comes to diversity practices, whilst also shedding light on the possible performance gains of having a diverse board of directors.

Main research question:

'To what extent has the Dutch diversity quota from 2022 impacted firm performance of Dutch publicly listed firms?'

2. Theoretical framework

2.1 Theoretical perspectives of gender diversity across the Supervisory Board:

Corporate governance can be defined as "the system by which companies are directed and controlled" (Cadbury Report, 1992). The supervisory board, also known as the board of directors, is one of the main corporate governance systems regarding the alignment of the interests of controlling shareholders, minor stakeholders, and others (Campbell & Mínguez-Vera, 2007). The supervisory board can prevent individual opportunistic behaviours by upper management, such as the CEO or managers, through monitoring and advising the executive board and upper management. (Peij et al., 2012). The effectiveness of the supervisory board has been criticised, stating that the supervisory board members suffer from information asymmetries. These stem from lacking information about day-to-day operations (Almulhim, 2023; Eisenhardt, 1989) or struggles with managing interpersonal relationships (Westphall, 1999).

It is important to consider the influence of the board's composition to overcome such problems and ensure that the supervisory board can add value to its firm, with many of these discussions revolving around gender. Researchers have investigated the role of gender diversity on the effectiveness of the supervisory board, resulting in several economic theories and ideas highlighting the benefits of gender diversity on the effectiveness of the supervisory board. One economic theory often referenced when trying to explain the relationship between gender diversity in the supervisory board and board performance is the agency theory. This theory outlines the common principal-agent problem, where the interests of the principal; shareholders and stakeholders, do not align with the interests of the agent; managers (Eisenhardt, 1989). This problem arises as without proper monitoring the agents can indulge in individualist behaviours which solely benefit them, as long as the costs of these actions are smaller than the benefits obtained by the agent (Fama & Jensen, 1983). As mentioned before, a supervisory board is often appointed by the firm to oversee and control the behaviours of agents. According to Isah and Iliya (2018), a gender-diverse board can help improve board performance by mitigating these principal-agent problems. This is due to the presence of different perspectives from female board members. Female board members can increase the board with monitoring and controlling qualities, due to their different perspectives and ability to ask different questions than their male colleagues.

Zhang (2019) also builds on the idea that the different perspectives of female board members can help increase firm performance, identifying gender diversity as a valuable human resource. Zhang's (2019) reasoning is that the increase in different perspectives on the board also increases the creative capacity of the supervisory board. This can be helpful when facing firm-related problems and interpersonal board issues. Furthermore, the paper of Campbell & Mínguez-Vera (2007) indicates that an increase in gender diversity helps the supervisory board gain a better understanding of the market the firm serves. Explaining that the diverse board reflects the diversity of the actors in the market, such as the consumers

and employees. By reflecting the diversity of the market, the board is able to have better knowledge of the potential wants and needs of those actors and can use this when trying to enter or dominate markets.

This idea is further discussed by Isah and Iliya (2018) and (Carter et al., 2010), who state that gender diversity can help combat the problems of resource dependency. The resource dependency theory encapsulates the idea that a firm's survival is influenced by the external environment and resources (Pfeffer & Salancik, 1978). The theory of Pfeffer & Salancik (1978), proposes that firms can benefit from external factors through four different ways; provision of resources and information, communications with market actors, support from other organisations, and enhancing firm legitimacy. The research of Carter et al. (2010) suggests that the resource dependency theory can provide a potential explanation for the benefits of a gender-diverse board in terms of firm performance, through the aforementioned benefits. A board comprised of different genders is more likely to possess a wider range of information due to the different perspectives and experiences of the board members. Similar to the research of Campbell and Mínguez-Vera, (2007), Isah and Iliya (2018) theorize that these differences also help when it comes to understanding its customers and the market. This is because female board members are likely to have better communication with the female labour market and female consumers. Furthermore, Carter et al. (2010), research suggests that a diverse board positively affects the board's problem-solving capabilities, particularly in terms of the decision-making by the management. Affirming the research of Isah and Iliya (2018), which indicates that gender diversity among boards can lead to higher levels of managerial control. This could be due to the higher levels of preparation demonstrated by female board members, according to the study of Huse and Solberg (2006). By improving the preparation before board meetings, the reliance on information necessary to make critical decisions is not solely on the information presented by upper management. This in part helps improve the board's independence and decision-making. Lastly, Isah and Iliya (2018) suggest that gender diversity across the board helps with improvements in the legitimacy of firms. As it helps demonstrate the acceptance of social and societal norms to internal and external individuals and corporations. However, Carter et al. (2010) indicates that for countries with greater ethnic heterogeneity, solely increasing gender diversity but not ethnic diversity may not fully improve the understanding of the market nor signal improved legitimacy.

Despite the various economic theories and ideas regarding the benefits of gender diversity and firm and board performance, researchers have also highlighted the potential harm of increased gender diversity among the supervisory board. The paper of Earley & Mosakowski (2000), highlights that homogenous, groups of the same gender, supervisory boards are more likely effective and more frequent communications. This is because they are likely to share the same ideas and opinions. Moreover, Tajfel and Turner (2004) suggest that boards with members of the same gender are less likely to have conflicts due to those shared ideas. By increasing communications and decreasing conflicts, homogenous boards are more likely to make quicker complex decisions, which can often be required for firms (Campbell &

Mínguez-Vera, 2007). Additionally, the papers of Jianakoplos and Bernasek (1998) and Cox & Blake (1991). highlight negative traits of female board members for firm performance, stating that they are on average more risk-averse and can have higher turnovers and absentee rates than their male counterparts.

2.2 Empirical overview of gender diversity and firm performance:

The relationship between gender diversity and firm performance has also been empirically tested. The paper of Moreno-Gómez et al. (2018) focuses on the impact of gender diversity in the boardroom on firm performance, in Columbia. Highlighting that gender diversity has a significant positive effect on firm performance particularly when it comes to the return on equity, as gender diversity helps bring different perspectives to the supervisory board compared to only having a male or female-dominated board. The findings of Brahma et al. (2020) also suggest that gender diversity leads to improved firm performance. Underscoring that firms should reach critical mass, having at least 30% of women on boards, to see significant positive benefits regarding firm performance.

However, there are also findings suggesting that the relationship between gender diversity and firm performance is not significant. For instance, the findings of Marinova et al. (2015), show that increased gender diversity in corporate boards in Dutch and Danish firms are not significantly correlated with the improvements in firm performance. However, Marinova et al. (2015) also indicates that variables besides Tobin's Q, return on assets, and return on investments should be used to gain a better understanding of the relationship between gender diversity and firm performance.

Thus, there are several findings that increasing female representation in corporate boards helps increase firm performance. For example, through increasing the value of human capital, mitigating principal-agency problems and resource dependency, and positive effects on return on equity.

2.3 Gender quotas and firm performance:

Gender quotas are a policy measure which either encourages or mandates firms to increase the amount of female representation on their boards. Norway was the first country to introduce this in 2003 (von Meyerinck, 2019), however in recent years many countries, like the Netherlands, have also started to implement such policies. This has also sparked the interest of research, specifically regarding the effects of such gender quotas on firm performance.

The paper of Comi et al. (2019) analyses the effects of gender quotas on firm performance in Italy, France, and Spain. The findings demonstrated the complex relationship between gender diversity in corporate boards, as the results for Italy showed a positive impact, the results for France showed a negative impact on the productivity and profitability of firms, and the results for Spanish firms showed no effects. Comi et al. (2019) research shows how factors such as the enforcement of the gender quotas can affect the relationship between gender diversity in boards and firm performance, as the quota was

not strongly enforced which could have led to insignificant results. Furthermore, the paper highlights how the availability and selection of qualified women board members can positively impact firm performance as seen by the results in Italy (Comi et al., 2019). The study of Dale-Olsen et al. (2013), also underscores the negligible effect of the Norwegian gender quota on the return on assets, theorizing that the influence of the supervisory board on firm performance is not visible in the short run.

The paper of Von Meyerinck et al. (2018) underscores the negative impact of the non-binding gender quota in California on firm performance. Highlighting the difficulty for firms to find and appoint qualified female directors in a timely manner to comply with the quota. Additionally, underscores that the gender quota may have resulted in greater principal-agent problems due to the lack of experience from the appointed female directors. Soare et al. (2021) also investigates the effects of a mandatory gender quota on firm performance. The findings indicate that this quota had significant negative effects on 10 financial indicators, underscoring that although the gender quota improves gender diversity it has a harmful effect on firm performance.

Even though we see that there are positive effects of gender diversity on firm performance, when trying to implement this through artificial means, i.e. gender quotas the findings remain inconclusive or lean towards a negative association, however, this is dependent on the country and context of the gender quota.

2.4 Institutional context: The Dutch gender quota:

The Netherlands has struggled with the issue of gender diversity in its labour force. Before the 1980s, the Netherlands was considered a country with an extremely low female labour participation rate, with this rate being only 32%. However, Dutch female labour force participation has seen significant improvement, with its current rates belonging to some of the highest in the Western world (Nientker & Alessie, 2019). Although female labour force participation has increased, the issue of gender diversity is still prevalent in the Netherlands. The Dutch government have even commented on gender diversity challenges such as female financial dependency and the underrepresentation of female workers in leadership positions (Ministerie van Algemene Zaken, 2022).

To combat the issues of gender diversity the Dutch government have implemented a diversity quota in 2022, specifically targeting gender inequality among supervisory boards. The diversity quota mandates that publicly listed firms should strive to have a supervisory board consisting of at least one-third female members and one-third male members. Furthermore, new appointments to the supervisory board should follow this pattern or otherwise be rejected (Ministerie van Justitie en Veiligheid, 2021). With the introduction of this quota, the Dutch government aims to move towards equal gender representation in senior roles (Ministerie van Algemene Zaken, 2022).

The effectiveness of the Dutch diversity quota has also been empirically analysed by the CPB Netherlands Bureau for Economic Policy Analysis (CPB). Using a difference-in-difference analysis the CPB investigated the short-term changes in the gender composition of the supervisory board for publicly listed and unlisted firms due to the diversity quota. The findings demonstrate that the gender quota was effective. The number of Dutch-listed firms with a supervisory board comprising of one-third women increased after introducing the diversity quota (Zulkarnain et al. 2024).

2.5 Hypothesis formation:

This study aims to investigate the relationship between the Dutch gender quota and firm performance and is guided by two hypotheses.

The first hypothesis aims to uncover a positive relationship between the Dutch gender quota and the firm performance measure return on assets. Previous studies regarding the effect of gender quotas on firm performance have shown mixed results. The study of Comi et al. (2019) for example, demonstrates that gender quotas had a positive effect on firm performance in Italy, but negative effects in France. However, a positive relationship is anticipated because the Dutch gender quota has successfully increased gender diversity in the supervisory of Dutch firms (Zulkarnain et al. 2024), and when analysing the effects of gender diversity, the theories of Eisenhardt (1989) and Pfeffer & Salancik (1978) suggest that gender diversity helps improve firm performance. The study of Brahma (2020) and Moreno-Gómez et al. (2018), also empirically demonstrates that increases in gender diversity help boost a firm's return on assets.

Hypothesis 1: Firms affected by the Dutch gender quota will experience higher return on assets.

Similarly, using the theoretical information about gender diversity and firm performance, such as the reduced information asymmetries, and improvements in decision-making and firm legitimacy (Isah and Iliya,2018), and the study of Moreno-Gómez et al. (2018), demonstrates that gender diversity improves the return of equity, the following hypothesis was formulated:

Hypothesis 2: Firms affected by the Dutch gender quota will experience higher return on equity.

3. Data

3.1 Data collection:

The introduction of the Dutch diversity quota in 2022 has had a significant impact on the gender composition of the supervisory board of Dutch firms (Zulkarnain et al. 2024). To further investigate this gender quota, and its specific implications on firm performance, this paper will analyse active Dutch firms during the period 2020 to 2023. This time period was chosen to include data both pre and post the introduction of the gender quota in 2022. The data for this study was obtained from Orbis. Orbis is a global database of the Bureau van Dijk containing business and financial information for 105 Dutch publicly listed firms – which were affected by the gender quota – and 91,423 Dutch unlisted firms – which were not affected by the gender quota – with available accounts in the years 2020, 2021, 2022, and 2023. Firms with missing values for any of the board, firm specific, and performance variables were dropped. This resulted in a sample of 254 Dutch firms, of which 56 are firms which are listed on the Euronext Amsterdam stock exchange and 198 are unlisted firms, meaning that they are not publicly traded (Orbis, n.d.).

3.2 Independent variable:

In this study, the status of firms; listed and unlisted, is used as the independent variable. This distinction is specifically used as the Dutch diversity quota is aimed at listed firms. This gender quota requires listed firms to have at least one-third of female and male supervisory board members. Thus, to analyse the effects of this gender quota, this study differentiates between the publicly listed and unlisted Dutch firms. This data was collected from Orbis and shows if the firm is listed through a dummy variable which has a value of 1 or 0 if the firm is unlisted.

Zulkarnain et al. (2024) show that the gender quota has significantly increased the number of listed firms which have at least one-third of female supervisory board members. Specifically, since the introduction of the gender quota, there has been a 47 percent increase in the number of listed firms with at least a third of female supervisory board members. However, a similar increase was not seen for unlisted firms, as expected, where in 2022 almost 60% of the unlisted firms did not have at least one-third of female members on the supervisory board. This study only focuses on data from 2017-2022, therefore not showing whether the increase of females in the supervisory board is also seen in 2023.

To ensure that this trend was present in 2023, I first compare the percentage of female supervisory board members in listed and unlisted firms. This data was obtained from Orbis, by summing all the female supervisory board members and dividing this by the total number of supervisory board members. The descriptive statistics in Table 1 show that listed firms still do have a higher percentage of female supervisory board members in 2023. The data shows that the average percentage of female board

members is 33.75, thus on average fulfilling the gender quota requirement. This is also 16.85 percentage points higher than the share of female supervisory board members in unlisted firms.

Table 1: Percentage of females in the supervisory board of Dutch listed and unlisted firms in 2023.

	Number of Observations	Mean	Standard deviation	Min	Max
Listed firms	56	0.3375	0.1279	0	0.6667
Unlisted firms	198	0.1690	0.2006	0	0.6667

Note: The data was obtained from the Orbis database.

3.3 Dependent variables:

This study will link the divergence in the share of female board members via the Dutch gender diversity quota to two firm performance measures; return on assets (ROA) and return on equity (ROE). Many previous studies have used ROA and ROE as measures for firm performance (Comi et al., 2019; Moreno-Gómez et al, 2018). ROA indicates a firm's operating profitability, demonstrating the managerial efficiency of a firm. Specifically, it indicates how effectively firms use their assets to generate earnings, a higher ROA meaning a more efficient use of assets. ROA is calculated as net income divided by average total assets. ROE is also a performance indicator; however, this variable gives insight into the financial performance of firms, showing how firms generate earnings from their shareholder's equity. Similar to ROA, a higher ROE indicates a more efficient use of equity. ROE is calculated as net income divided by average total equity (Garcia-Blandon et al. 2022).

3.4 Control variables:

To improve the accuracy of the statistical analyses conducted in this paper several control variables are introduced. Control variables help remove potential omitted variable bias caused by the differences between the treatment group, listed firms, and the control group, unlisted firms. By controlling for the variables; total assets, number of employees, firm age and industry effects, this study aims to get a more accurate image of the relationship between the independent variable and the dependent variable, or the coefficient estimate of interest.

The control variables total assets and number of employees were added as proxy variables for firm size. It is important to control for firm size, as it is expected to affect firm performance. According to Solakoglu and Demir (2016), larger firms are expected to have higher performance levels. However, it should also be noted that increases in firm size are associated with inflexibility, thus also reducing firm performance. Moreover, the firm size is affected by the independent variable as the listed firms, or the firms affected by the gender quota are more likely to be larger compared to the unlisted firms. Similar to the study of Comi et al. (2019), total assets will be used as a measure of firm size because the total assets generally measure the total resources the firm possesses (Dang et al., 2013). Additionally, the number of employees will be used as a second measure of firm size. Although this is not the most

common method, it is recommended as other measures such as market capitalisation cannot be used for this study due to the mix of publicly listed and unlisted firms (Dang et al., 2013).

The firm age will also be used as a control variable and was obtained by subtracting the year of the data point from the year of incorporation. This control variable was added because of its inverse U-shape relationship with firm performance. Younger firms are likely to be at the start of their product cycle, whereas older firms may enter a stage of the product cycle with lower earnings (Smith et al., 2006). This control variable is also affected by the independent variable, as the listed firms are on average older than the unlisted firms, thus helping remove any potential bias.

Lastly, industry effects were added as a time-invariant controlled variable, meaning the variable's value will not change over time. This control variable was added because the industry in which firms operate can impact the profitability and performance of those firms (Caloghirou et al., 2004; Comi et al., 2019). The industry effects variables are added through dummy variables with a value of 1 if the firm is a part of that specific sector and a 0 if this is not the case.

4. Methodology

To empirically study the effects of the Dutch gender quota on firms' performance, I will be using two different statistical tests: the OLS regression model and the Difference-in-Difference approach (Comi et al., 2019).

4.1 Ordinary Least Squares (OLS) regression:

An OLS regression was conducted to estimate the relationship between the presence of gender quotas for supervisory boards in the Netherlands and two performance measures; ROA, and ROE. This regression used data from the period 2022 to 2023, as it aimed to investigate the effects of the gender quota after it was introduced.

To estimate the difference in firm performance between firms affected by the gender quota and firms not affected by the gender quota, this study used listed firms as the treatment group and unlisted firms as the control group. To assess comparability between these two groups (no significant differences between the two groups prior to the gender quota) a balance test was conducted. A balance test is a statistical test which compares the characteristics of the treatment and control group. Table 2 demonstrates that the listed and unlisted firms do have significant differences in characteristics. Regarding the firm characteristics, listed firms have a higher number of employees and are on average older. Additionally, the balance test shows that listed firms have on average significantly more firms in Biotechnology and Life Sciences, Chemicals, Petroleum, Rubber & Plastic, Industrial, Electric & Electronic Machinery, Property Services, and the Retail sector. But fewer firms in the Banking, Insurance & Financial Services, Business Services, Computer Software, Printing & Publishing, and Wholesale sector. As there are significant differences between the listed (treatment group) and the unlisted (control group), these variables should be controlled for. These significant differences also indicate that there is a high likelihood that the treatment and control group differ in unobservable characteristics. The differences in the performance measures return on assets and return on equity for listed and unlisted firms, estimated by the regression, are highly caused, or biased by these unobserved characteristics which the model does not control for.

Table 2: Balance test of Listed and Unlisted firm characteristics from 2020 to 2021

	Listed firms		**Unlisted firms**		***t*-test**
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	
Total assets	8,023,519	19,000,000	6,591,122	78,100,000	-1,432,397
Number of employees	23195.21	70912.36	1894.53	7418.239	-21300.68**
Firm age	54.2857	53.35204	32.85859	25.831	-21.4271***

Agriculture	0.0357	0.1864	0.0152	0.1226	-0.0205
Banking	0.0179	0.1330	0.0660	0.2486	0.0481**
Biotechnology	0.0536	0.2262	0.0051	0.0712	-0.0485*
Business Services	0.0714	0.2587	0.4365	0.4966	0.3651***
Chemicals	0.1071	0.3107	0.0152	0.1226	-0.0919**
Communications	0.0357	0.1864	0.0051	0.0712	-0.0306
Computer Software	0	0	0.0102	0.1004	0.0102*
Construction	0.0357	0.1864	0.0660	0.2486	0.0303
Food & Tobacco Manu.	0.0536	0.2262	0.0254	0.1575	-0.0282
Industrial	0.1786	0.3847	0.0102	0.1004	-0.1684***
Leather, Stone, Clay & Glass products	0.0357	0.1864	0.0051	0.0712	-0.0306
Media & Broadcasting	0.0357	0.1864	0.0051	0.0712	-0.0306
Metals & Metal products	0.0357	0.1864	0.0152	0.1226	-0.0205
Mining & Extraction	0.0179	0.1330	0.0051	0.0712	-0.0128
Printing & Publishing	0	0	0.0102	0.1004	0.0102*
Property Services	0.0714	0.2587	0.0203	0.1412	-0.0511*
Public Administration	0.0179	0.1330	0.0457	0.2091	0.0278
Retail	0.0536	0.2262	0	0	-0.05357*
Textiles & clothing	0	0	0.0051	0.0712	0.0051
Transport, Freight	0.0357	.1864109	0.0558	0.2299	0.0201
Transport Manu	0.0179	.1330273	0.0102	0.1004	-0.0077
Travel	0.0357	0.1864109	0.0508	0.2198	0.0150
Utilities	0.0179	0.1330273	0	0	-0.0179
Waste Management	0	0	0.0051	0.0712	0.0051
Wholesale	0.0357	0.1864	0.1066	0.3090	0.0709**
Wood	0	0	0.0051	.07116	0.0051
Number of observations	112		396		508

Note: Balance test of all control variables of listed and unlisted firms, *p-value <0.1, **p-value <0.05, ***p-value <0.01.

These variables were added to the OLS regression model as control variables, to remove potential biases which may influence the relationship between the gender quota and the firm performance measures, resulting in the following regression equation for the performance measure return on assets:

$$ROA_{i,t} = \beta_0 + \beta_1 \cdot Listed_{i,t} + \beta_2 \cdot Total\ assets_{i,t} + \beta_3 \cdot Number\ of\ employees_{i,t} + \beta_4 \cdot Firm\ age_{i,t} + \sigma_j \cdot \text{Industry}_j + \epsilon_{i,t}$$

In this equation, *i* indicates the firm id, and *t* indicates the year. Furthermore $ROA_{i,t}$ is the return on assets, $Listed_{i,t}$ is the dummy variable indicating whether a firm is publicly listed or unlisted. The controlled variables total assets, number of employees, firm age and industry effects were also added to the regression equation. Lastly $\epsilon_{i,t}$ indicates the error term.

The same equation was replicated for the analysis of gender quotas on return on equity.

$$ROE_{i,t} = \beta_0 + \beta_1 \cdot Listed_{i,t} + \beta_2 \cdot Total\ assets_{i,t} + \beta_3 \cdot Number\ of\ employees_{i,t} + \beta_4 \cdot Firm\ age_{i,t} + \sigma_j \cdot \text{Industry}_j + \epsilon_{i,t}$$

Although control variables were added to this OLS regression, the results of this analysis may not identify causal estimates because of the presence of unobservable differences between listed and unlisted firms. In addition, firm-specific effects may also affect the firm performance measures. For example, firms with better management quality may have higher returns on assets, however, as this variable is not controlled for, it will bias the estimation of the effect of the gender quota on the ROA.

4.2 Difference-in-Difference (DiD) regression:

To further investigate the relationship between the Dutch gender quota and firm performance, a Difference-in-Difference analysis is also conducted. Similar to the study of Comi et al. (2019), a DiD analysis is conducted as it allows for a comparison between the changes in firm performance pre- and post-introduction of the gender quota. In addition, this methodology is able to control for time-invariant and firm-specific characteristics, even if they are not observable. This analysis will focus on the effects of gender quotas on firm performance, by comparing the changes in firm performance (ROA, and ROE) of Dutch publicly listed firms which have been affected by a gender quota, and Dutch privately traded companies that have not been affected by gender quotas, during the period 2020-2023.

Before the analysis, the parallel assumption must be investigated, since the effect of the gender quota on firm performance can only be isolated if, in the absence of the gender quota, the differences between listed and unlisted firms would have remained constant over time. The parallel trends assumption test was conducted using a graphical method. By plotting the average value of the dependent variable for both listed firms and unlisted firms during the time period 2020-2023, I observed if the differences in ROA and ROE were constant prior to the gender quota's introduction.

Figure 1 shows that the differences in ROA for listed and unlisted firms were parallel before the gender quota was introduced. This indicates that the parallel assumption likely holds, and the difference-in-difference analysis can produce significant results. This is not the case for the parallel assumption trend test for ROE. Figure 2 demonstrates that the trends in ROE, prior to the introduction of the gender quota, differ as the ROE in the listed firms experienced a greater decline in 2021 compared to the ROE for unlisted firms. However, it is important to note the pre-gender quota time period is only two years,

meaning that it is difficult to see if the trends in ROA and ROE for listed and unlisted firms are truly parallel.

Figure 1: Parallel trends assumption test for the return on assets of listed and unlisted firms

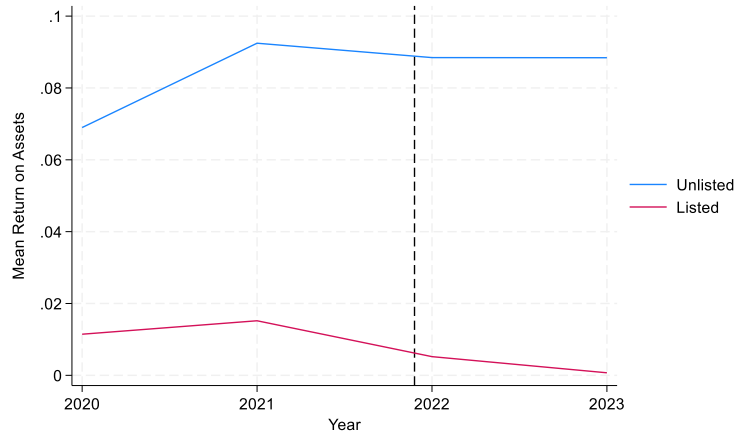
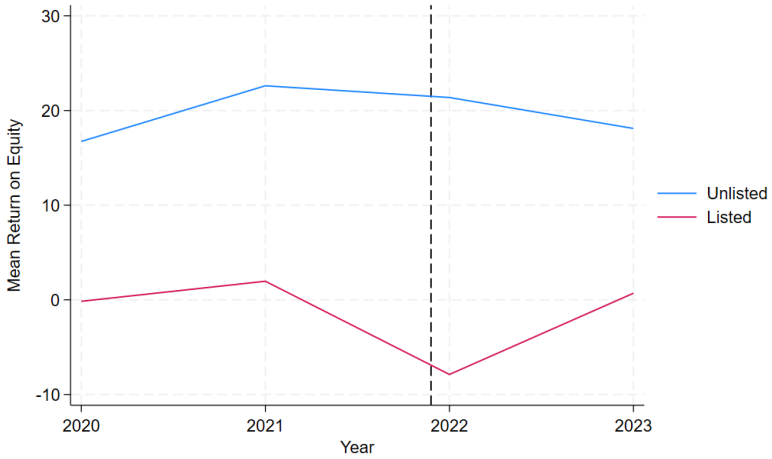


Figure 2: Parallel trends assumption test for the return on equity of listed and unlisted firms



To conduct the DiD analysis, ROA and ROE will be the dependent variables and the performance measures. However, this analysis will also require an interaction term between the Listed variable (dummy variable indicating that the firm is affected by the gender quota) and the Post variable (dummy variable indicating if the time period is pre- and post-introduction of the gender quota for listed firms). Resulting in the following equations for ROA and ROE respectively:

$$ROA_{i,t} = \beta_0 + \beta_1 \cdot Listed_{i,t} + \beta_2 \cdot Post_t + \beta_3 (Listed_{i,t} \times Post_t) + \beta_4 \cdot Total\ assets_{i,t} + \beta_5 \cdot Number\ of\ employees_{i,t} + \beta_6 \cdot Firm\ age_{i,t} + \epsilon_{i,t}$$

$$ROE_{i,t} = \beta_0 + \beta_1 \cdot Listed_{i,t} + \beta_2 \cdot Post_t + \beta_3 (Listed_{i,t} \times Post_t) + \beta_4 \cdot Total\ assets_{i,t} + \beta_5 \cdot Number\ of\ employees_{i,t} + \beta_6 \cdot Firm\ age_{i,t} + \epsilon_{i,t}$$

For this analysis, the coefficient estimate of interest is the interaction term between the Listed and the Post variable. This coefficient estimates the change effect of the gender quota on the dependent variable, return on assets or return on equity, for the listed firms after the gender quota is introduced in comparison to the changes in the dependent variable for unlisted firms.

The industry dummy variables were not added to this model, as these are time-invariant variables, for which this model already accounts.

5. Results

5.1. OLS regression results:

Column (1) of Table 3 demonstrates an OLS regression analysing the association between the gender quota introduced in 2022 spanning through to 2023 on the return of assets. The results show that among listed firms, who are subject to the gender quota, the return on assets is on average 0.0816 lower, ceteris paribus, indicating a negative relationship between gender quota and return on assets. This result is statistically significant at a 1% significant level. This contrasts the first hypothesis of a positive association, as the results suggest that the presence of gender quotas reduces firm performance in terms of returns on assets in 2022 and 2023.

The control variables total assets, number of employees and firm age, do not seem to have a significant effect on return on assets. Appendix A shows that there is heterogeneity in return on assets among various industries, as expected. Particularly sectors Banking, Insurance & Financial Services, Business Services, Leather, Stone, Clay & Glass products, Metals & Metal Products, Property Services, and Transport Manufacturing have relatively high returns on assets.

Column (2) of Table 3 demonstrates the OLS regression results which analyse the effects of the gender quota, in 2022 and 2023, on the return of equity. The results show a negative coefficient with a value of -19.2416 for gender quotas. However, this coefficient is not statistically significant as the p-value is greater than 0.1. Therefore, the coefficient cannot be interpreted, as there is no statistical indication of a significant relationship between gender quotas and return of equity. Therefore, the null hypothesis stating that there is no significant relationship between the presence of gender quotas and return on equity cannot be rejected. The estimated coefficients on the control variables are similar to those in column (1).

Table 3: OLS regression results: Dutch gender quota on the return on assets and the return on equity

	(1)	**(2)**
	ROA	**ROE**
Listed firms	-0.0816***	-19.2416
	(0.020)	(16.714)
Total assets	-0.0000	0.0000
	(0.000)	(0.000)
Number of employees	0.0000	0.0000
	(0.000)	(0.000)
Firm age	0.0001	0.0358
	(0.000)	(0.052)
Constant	0.0539***	4.2417

	(0.015)	(8.510)
Industry controls added	YES	YES
Number of Observations	506	506
Adjusted R^2	0.2599	0.0891

Note: Table shows the results of the OLS regression analysis with return on assets and return on equity as dependent variables and Listed firms as the independent variable. The industry effects results were omitted from this results table but can be found in appendix A, robust standard errors in parentheses, *p-value <0.1, **p-value <0.05, ***p-value <0.01.

5.2 Difference-in-Difference analysis results:

The results of the difference-in-difference analyses are documented in Table 4. Column (1) reports the results of the analysis regarding the firm performance measure return on assets. The coefficient of the Listed variable is equal to -0.0789, significant at a one percent significance level. This means that the null hypothesis stating that the average return on assets is equal for listed and unlisted firms before the introduction of the gender quota, can be rejected. The coefficient demonstrates that listed firms in this sample experience lower returns on assets by 0.07869 before the implementation of the gender quota, ceteris paribus.

Furthermore, the coefficient of the Post gender quota variables measures the difference in return on assets for the unlisted firms after the introduction of the gender quota. The coefficient is equal to 0.0071 but is not statistically significant. This suggests there is no statistical association between the gender quota and the return on assets for unlisted firms.

The coefficient of the interaction term is equal to -0.0181, indicating that the firms affected by the gender quota on average experienced a greater decline in return on assets compared to the unlisted firms after the introduction of the gender quota, ceteris paribus. However, this coefficient is not statistically significant as the p-value is greater than 0.1. Meaning that the null hypothesis, no difference in the changes in return on assets for listed and unlisted firms after the introduction of the gender quota, cannot be rejected.

Lastly, the control variables in column 1, total assets, number of employees and firm age, do not seem to have an effect on the return on assets. This is because the results were either insignificant or the value of the coefficient was almost equal to zero.

The results in Table 4 column (2) analyse the effect of gender quota on the performance measure return on equity. The coefficient of the Listed variable demonstrated that listed firms experience lower returns on equity compared to unlisted firms. Although this coefficient is significant by the one percent significance level, the results cannot be interpreted as the parallel trends assumption does not hold. This indicates that unobserved factors could have influenced the coefficient estimate.

Additionally, the coefficient of the Post gender quota is equal to 0.0029, however, this coefficient is not statistically significant and accurate due to the valuation of the parallel trend assumption.

The coefficient for the interaction term in column (2) is equal to -4.6588. Demonstrating that listed firms experience a lower return on equity compared to unlisted firms after the introduction of the gender quota. But this result is not significant as the p value is greater than 0.1. Moreover, the coefficient is likely not accurate due to the violation of the parallel assumption.

Table 4: Difference-in-Difference analysis: Introduction of Dutch gender quota on the return on assets and the return on equity of Listed and Unlisted firms

	(1)	**(2)**
	ROA	**ROE**
Listed	-0.07869***	-21.6872***
	(0.021)	(8.323)
Post gender quota	0.0071	0.0029
	(0.006)	(3.669)
Listed · Post gender quota	-0.0181	-4.6588
	(0.019)	(10.816)
Total assets	-0.0000***	-0.0000
	(0.000)	(0.000)
Number of employees	0.0000**	0.0000**
	(0.000)	(0.000)
Firm age	0.0003	0.0422
	(0.000)	(0.060)
Constant	0.0710	18.1276
	(0.011)	(4.339)
Number of Observations	1,016	1,016
Adjusted R^2	0.0625	0.0247

Note: Table shows the difference-in-difference analysis with return on assets and return on equity as dependent variable, and listed time post-gender quota as the interaction term. Robust standard errors in parentheses, *p-value <0.1, **p-value <0.05, ***p-value <0.01.

6. Discussion and Conclusions:

This thesis aimed to investigate the impact of the Dutch gender quota, introduced in 2022, on the performance of Dutch publicly listed firms. Specifically focusing on the effects of gender quotas on the performance metrics; return on assets and return on equity. Various researchers like Isah and Iliya (2018), have highlighted the beneficial effects of gender diversity on firm performance. Stating that gender diversity in the supervisory board helps boost their problem-solving skills and reduce information asymmetries. However, when looking at the effects of gender quotas on firm performance across international datasets, the results are more inconsistent, as evidenced by the study of Dale-Olsen et al. (2013) and Soare et al. (2021).

The first hypothesis suggests that gender quota would lead to increased return on assets, based on the studies Moreno-Gómez et al. (2018), Comi et al. (2019), and Zhang, (2019) examining the effect of gender diversity on the return of assets. Moreover, this hypothesis was conducted based on the agency and research dependency theory which suggests that gender diversity helps reduce principle-agent problems, due to their different perspectives, and behaviours, as this allows the supervisory board to have a better understanding of the market they serve (Campbell & Mínguez-Vera, 2007). The different perspectives and behaviours also help increase the creative capacity of the supervisory board, further improving their decision-making and problem-solving (Zhang, 2019).

This hypothesis was tested using an OLS regression, which analysed the impact of the gender quota on the return of assets, and a difference-in-difference analysis, which examined how the introduction of the gender quota had affected the return on assets of firms impacted by the gender quota compared to firms which were not impacted by the gender quota. The results from the OLS regression indicate a significant negative correlation between the listed firms and return on assets. This contradicts my first hypothesis but is consistent with the research of Von Meyerinck et al. (2018) which highlights that the pressures of hiring female supervisory board members because of gender quotas lead to underqualified board members. Moreover, the negative association between gender quotas and return on assets may be due to omitted variable bias and the unobserved differences between listed and unlisted firms.

The results of difference-in-difference regression show no significant changes in the return of assets for listed firms compared to unlisted firms, this is also inconsistent with hypothesis 1. Although, these results are insignificant the positive effects of gender diversity outlined by agency and resource dependency theory may still apply, as it could be an issue of the chosen performance measures (Marinova et al., 2015). Moreover, the insignificant results may be due to the difference in the institutional contexts of the listed firms, as the acceptance of and presence of diversity, both gender and racial, may be necessary to exploit the information benefits of a gender-diverse supervisory board (Zhang, 2019; Carter et al., 2010).

Subsequently, hypothesis 2 states that the Dutch gender quota would increase the return on equity of firms. This hypothesis was based on the research of Moreno-Gómez et al. (2018) which underscores the positive effect of gender diversity on the return on equity for Columbia firms. This hypothesis was again assessed using an OLS regression and a difference-in-difference analysis. The results of the OLS regression demonstrated that the Dutch gender quota had no significant effect on the return on equity, which is not consistent with the second hypothesis. These insignificant results may have been caused by the omitted variable bias present in this OLS regression, or due to short-term analysis of the gender quota (Dale-Olsen et al., 2013). The results of the difference-in-difference analysis for the return on equity also demonstrated insignificant results, however, the coefficients of this analysis are not interpretable because the parallel trend assumption is not met.

As mentioned, a likely contributing factor to my non-significant/conflicting results could be attributed to omitted variable bias. For both the OLS regression and the difference-in-difference analysis of the return on equity, it is likely that the treatment and control group had unobserved characteristics which likely affected the coefficient estimates. For the OLS regression, this is due to the fact that the conditional independence assumption was likely violated, whereas for the difference-in-difference analysis of the return on equity was due to the violation of the parallel trends assumption. According to Akguc et al. (2015), unlisted firms are more likely to outperformance public firms, as they have higher managerial flexibility and controlling ownership which allows them to be more efficient and have lower agency costs. Further empirically demonstrating that the return on assets and the return on equity are higher in unlisted firms compared to listed firms. The managerial flexibility, reduced agency costs, and operational efficiency can be factors which may have led to a downward bias in the coefficient estimates for my statistical models. The magnitude of this bias may be big enough that the effects of the gender quota cannot be observed by coefficient estimators.

Expanding on this, other limitations of my analyses include the brief time frame of my data and the conditions of the Dutch gender quota. This paper analyses solely uses data from 2020 to 2023. This is problematic for the difference-in-difference analysis as is difficult to fully assess the parallel trends assumption in such a short time period. Moreover, the gender quota was only introduced in 2022, meaning that the effects of the gender quota were only analysed for 2 years, which might also partially explain the insignificant results, as the positive effects of gender diversity in the supervisory board, such as a new perspective and increased problem-solving skills, may only take effect in the long run. This could be because, in the short term, the influence of the supervisory board is not visible in performance measures like return on assets (Dale-Olsen et al., 2013). Secondly, the introduction of the Dutch gender quota does not mean that all the listed firms immediately have a supervisory board of at least one-third female members. Listed firms with heavily male-dominated supervisory boards may have impacted the regression coefficient, thus not fully capturing the effect of the gender quota and gender diversity on firm performance. Additionally, the majority of the data used for my analysis falls within the time frame

of the COVID-19 crisis, 2020 to 2023. Due to the Covid pandemic business and economic activity did not commence normally, as many business operations were disrupted. This could have led to firms altering their main priorities such as enhancing firm performance, therefore, the data and analysis may not fully reflect the association between firm performance and the Dutch gender diversity quota.

This research solely looked at the effect of the Dutch gender quota on the performance of Dutch publicly listed firms. This gender quota was only implemented in 2022, this meant that only the short-term changes in firm performance could be investigated. For future research, it would be interesting to analyse the long-term changes in firm performance for firms that must adhere to a gender quota, and whether this aligns with the positive firm performance effects observed by increasing gender diversity. It would also be interesting to explore the effects of gender quotas in the field of personnel economics. Specifically, looking at the effects it could have on labour/management productivity and satisfaction, and whether this also, in turn, enhances firm performance.

To conclude this study investigated the research question; *'To what extent has the Dutch diversity quota from 2022 impacted firm performance of Dutch publicly listed firms?'.* An OLS regression and the difference-in-difference analysis were carried out on the data, obtained from the Orbis database, of 254 Dutch firms, to uncover the associations between the Dutch gender quota and the firm performance measures, return on assets and return on equity. The findings of the OLS regression demonstrate a negative association between the Dutch gender quota and the return on assets but an insignificant association between the Dutch gender quota and the return on equity. The results of difference-in-difference analyses show that there is an insignificant association between the Dutch gender quota and the performance measures, return on assets and return on equity.

Most researchers agree that there is a positive relationship between gender diversity and firm performance, however, when it comes to gender quotas and firm performance the findings are less consistent. Therefore, this paper adds ongoing academic debate regarding the effects of gender diversity and gender quotas on firm performance but views it from the Dutch perspective. Furthermore, it also contributes to the social and academic understanding of gender quotas, showing that a gender quota which seems effective in increasing gender diversity, has limited to no consequences on firm performance.

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8. Appendices

8.1 Appendix A:

Table X: Full OLS regression results

	(1) ROA	(2) ROE
Listed firms	-0.0816***	-19.2416
	(0.020)	(16.714)
Total assets	-0.0000	0.0000
	(0.000)	(0.000)
Number of employees	0.0000	0.0000
	(0.000)	(0.000)
Firm age	0.0001	0.0358
	(0.000)	(0.052)
Banking, Insurance & Financial Services	0.0994**	26.5745**
	(0.046)	(12.207)
Biotechnology and Life Sciences	-0.3167***	-49.0434**
	(0.122)	(21.325)
Business Services	0.0486***	21.4845**
	(0.017)	(8.524)
Chemicals, Petroleum, Rubber & Plastic	0.0531*	13.8986
	(0.028)	(9.385)
Communications	0.0326	17.1939
	(0.037)	(12.944)
Computer Software	-0.0618**	-4.7348
	(0.026)	(10.979)
Construction	0.0128	10.0906
	(0.029)	(11.831)
Food & Tobacco Manufacturing	0.0239	9.7153
	(0.022)	(6.853)
Industrial, Electric & Electronic Machinery	0.1287***	5.0645
	(0.028)	(34.799)
Leather, Stone, Clay & Glass products	0.0467**	15.2252*
	(0.024)	(8.876)
Media & Broadcasting	-0.2274***	-27.3473**
	(0.064)	(11.791)
Metals & Metal Products	0.0689***	22.5693***
	(0.022)	(6.932)
Mining & Extraction	0.0195	23.3698***
	(0.027)	(6.636)
Printing & Publishing	0.0120	8.6308
	(0.031)	(12.396)
Property Services	0.0776***	21.0929***
	(0.020)	(7.384)
Public Administration, Education, Health Social Services	-0.0429	-10.3256
	(0.029)	(14.785)

Retail	0.0608	29.8994
	(0.046)	(35.311)
Textiles & Clothing Manufacturing	0.0535**	10.5986
	(0.026)	(9.309)
Transport Manufacturing	0.1028**	31.7320***
	(0.042)	(10.593)
Transport, Freight & Storage	0.0190	-15.0419
	(0.033)	(32.402)
Travel, Personal & Leisure	-0.0236	8.4337
	(0.024)	(8.009)
Utilities	0.0514	10.2237
	(0. 037)	(16.737)
Waste Management & Treatment	0.0289	9.7739
	(0.034)	(10.304)
Wholesale	0.0136	14.3045
	(0.023)	(9.432)
Wood, Furniture & Paper Manufacturing	0.0498	9.1881
	(0.061)	(12.314)
Constant	0.0539***	4.2417
	(0.015)	(8.510)
Number of Observations	506	506
Adjusted R^2	0.2599	0.0891

Note: Table shows the results of the OLS regression analysis with return on assets and return on equity as dependent variables and Listed firms as the independent variable, including the industry effects results, robust standard errors in parentheses, *p-value <0.1, **p-value <0.05, ***p-value <0.01.