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Gender Quota Policy in Denmark: Placebo or Progress?

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Abstract

Despite facing controversy in business realms, gender equality initiatives are gaining traction on a global scale. In this thesis, we study the impact of Denmark's 2013 boardroom gender quota policy. Employing the synthetic control method, our study compares the boardroom female ratio of major listed companies in Denmark with that of 16 control countries over a decade before and after the policy's implementation. Our research indicates that although there is a rise in female representation on Danish company boards following implementation, the policy acts more as a placebo. Nevertheless, it does contribute to enhancing investors' market expectations. Further analysis reveals a positive correlation between the firm valuation and board diversity. However, while gender diversity is valued, its impact on firms' actual performance remains questionable.

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Contents

List of Figures

List of Tables

1 Introduction

Top leadership roles in politics and business still lack adequate female representation. One notable legislative intervention to address this problem in this domain is the implementation of gender quotas for corporate boardrooms, a pioneering move initiated by Norway (Wang and Kelan, 2013). These quotas, designed to increase the representation of women, serve the dual purpose of mitigating gender-based income disparities and fostering greater female participation in corporate environments (Bertrand et al., 2019). Despite the adoption of gender quotas, substantial gender disparities persist, particularly evident in corporate recruitment practices where women encounter systemic discrimination. This ongoing challenge highlights the need for continuous initiatives to promote gender equality in the business sector.

The increasing recognition of gender quotas as a mechanism for enhancing gender equality has catalyzed their widespread adoption. While initially established in political arenas—such as party representation and parliamentary composition—gender quotas are increasingly gaining traction within corporate settings. Alongside the process of development of gender quotas and policies related, skeptical voices have also been present. Carrasco et al. (2015) points out the different tolerance levels under different cultures regarding gender inequality, while Terjesen and Sealy (2016) deep dive into the ethical tensions through four overarching theoretical perspectives: institutional, stakeholder, social identity, and social capital.

However, an expanding number of countries are still exploring or advocating for gender quotas within corporate boards, reflecting a global trend towards proactive measures to address gender imbalances in corporate governance structures. Among the research in recent years, more scholars are trying to find a more long-term effect of gender quotas in the boardrooms (Mazza et al., 2024), including negative effects of gender quota for boardrooms of a company (Eckbo et al., 2022), and the relationship between board gender quota to female management ratio (Halrynjo and Teigen, 2024).

The motivation behind this study stems from the observed variations in gender gap levels and cultural norms across nations, particularly regarding tolerance of gender inequality and division of labor based on gender. These differences extend to the scope and objectives of gender quota implementations, exemplified by the contrasting approaches of countries such as Norway and Italy. For instance, Norway exhibits higher female workforce participation rates and enacted a gender quota of 40%, while Italy progressively aims for one-third representation. Consequently, there is a need for a nuanced examination of the impacts associated with different styles or rigor levels of gender quotas. Despite the legislative enactment of gender quotas in Denmark in 2013, literature on this subject remains scarce compared to the culturally akin context of Norway's adoption of a 40% gender quota in 2003, highlighting Denmark's comparatively lenient approach, albeit ten years later. Thus, our study seeks to elucidate whether such policy divergences yield disparate outcomes. The significance of this research lies in advancing understanding of the varied effects resulting from different degrees of stringency in gender quota policies, with potential implications for informing future initiatives, including the impending gender quota set by the EU in 2030 (Castro Núñez et al., 2020).

The objective of this study is to examine the repercussions of gender quotas enforced in the boardrooms of Danish publicly listed companies, addressing inquiries including: how the representation of women in the boards of directors of listed companies evolved subsequent to the implementation of gender quotas in Denmark; has there been a discernible alteration in company performance subsequent to the enactment of gender quotas and whether it is favorable or adverse. We believe this research carries significance in furnishing fresh insights into the ramifications of gender quota policies, thus contributing to the advancement of scholarly discourse and offering practical guidance. By scrutinizing the outcomes of gender quota implementation in Denmark, this study endeavors to offer a deeper understanding of the efficacy of such policies and their implications for corporate governance and decision-making. Moreover, the findings of this research endeavor to inform future policy formulations and strategic initiatives aimed at fostering gender parity and diversity within corporate environments.

To be more specific, with the inspiration from the previous research on the effect of gender quota policy in other countries as contexts, we gained curiosity about the Danish position in the practice of boardroom's gender quota since it is also landed in a Scandinavian country, thus shares a similar gender attitude with Norway, but 10 years later than Norway and without a harsh punishment. In preparation for the examination of boardroom gender quotas in Denmark, we endeavored to explore various sources of data and empirical models, aiming to reconcile divergent viewpoints and provide comprehensive support for our study. Here are some delineations of the three primary hypotheses around which our study revolves.

Firstly, we noticed that the Danish gender quota policy, initiated in late 2012 and enforced on April 1, 2013, aims to improve female representation on company boards. Compared to the other two Scandinavian countries, Sweden and Norway, the stringency of Denmark's policies appears to lie somewhere in between. On the one hand, Denmark, akin to Norway, enacts boardroom gender quota policies through legal mandates, differing from Sweden where no such legislation exists. On the other hand, Denmark's pertinent policies lag behind Norway by a decade, and lack stringent punitive measures for non-compliant companies, representing a considerably more lenient stance in comparison.

Furthermore, Norway's pioneering introduction of boardroom gender quota policies in 2002 prompted subsequent enactments in various nations such as Spain, the Netherlands, Germany, France, Italy, and others, preceding Denmark's implementation. These initiatives have consistently shown a positive correlation with augmenting the representation of women in corporate boards. Nevertheless, disparities persist in the stringency of policy measures across nations, coupled with variances in gender cultural norms. Notably, existing scholarly literature often lacks comprehensive cross-national comparisons. Thus, in refocusing our research on Denmark, our principal objectives encompass two key facets: firstly, to evaluate the efficacy of legislative gender quotas in augmenting female board membership; secondly, to compare our findings with those of nations yet to adopt gender quota legislation, thereby assessing for potential placebo effects. Based on the analysis above, we raise our first hypothesis as:

Hypothesis 1: *The policy effectively increases female representation on boards.* Our

conclusion is that despite increased female representation, the policy itself is likely a placebo, which might be perceived as effective but is not actually driving the growth in female representation on boards.

Secondly, we extrapolate that this policy not only influences board elections and turnover within companies, but also serves as a public policy discourse in the external market. According to the Efficient Market Hypothesis (Malkiel, 1989), stock prices are determined by the market's expectations (i.e., the price reflects what investors believe it is worth). Therefore, we hypothesize that the dissemination of news regarding the adoption of the policy would change the market expectations.

Hypothesis 2: *The policy approval elevates investor expectations, believing gender-diverse boards enhance company performance and stock prices.* Analyzing abnormal return on stocks as an event study method, we find evidence showing that following the announcement, OMX-Copenhagen stocks experienced a significant sustained increasing cumulative abnormal return within a period of 30 transaction days, compared to the overall Nordic stocks. This suggests that the market perceives the policy approval as favorable news, indicating investors' common belief that companies with greater gender diversity will command higher prices.

Thirdly, in our early-stage search for gender quotas as a policy, we have noted a long-standing debate within academia regarding the motivation behind gender quotas. Various theoretical perspectives and political ideologies often argue from the standpoints of utility and justice to support their positions. In the subsequent literature review section, we will delve into these theories and debates in detail. Furthermore, we will incorporate utility into our research framework, aiming to explore the potential correlation between the extent of gender diversity on corporate boards and company performance. From this, we propose our final hypothesis.

Hypothesis 3: *Increased female representation on board improves company performance itself.* To examine the hypothesis, we employ an empirical approach investigating the relationship between the proportion of female board members and corporate accounting performance, with industry and time controlled as fixed effects. The model results suggest that the increase in the proportion of female board members has a significant positive impact on valuation but does not lead to an improvement in the company's operational performance.

This thesis makes several contributions to the existing literature. Firstly, while most studies assessing the effectiveness of gender quotas have relied on the difference-in-difference method (DID), our thesis enriches the empirical methodology by employing the synthetic control method. Furthermore, it looks into the impact of boardroom gender representation on both internal corporate dynamics and external investor valuation of firms.

The thesis structure unfolds as follows: Section 2 offers a comprehensive review of the literature concerning gender quotas, with a particular focus on their implications within corporate realms. Section 3 outlines the data sources and methodologies employed in this study. In Section 4 we present a detailed analysis of the empirical findings aligned

with the three hypotheses posited. Finally, Section 5 encapsulates the key insights and avenues for future research.

2 Literature Review

In this section, we systematically construct the framework of our literature study from both the supply and demand sides. Therefore, concerning the supply of female labor, we commence our examination by delving into the domain of female labor force participation to gain insights into the prevailing gender disparities within the broader macroeconomic labor landscape. Specifically, we delve into the legislative and policy frameworks across various nations aimed at promoting female employment. Subsequently, we explore the implementation of gender quotas, with a particular focus on the controversial discussions within academia regarding gender quotas. We then proceed to examine the application of gender quotas in two primary domains: political representation and corporate board membership. Proceeding further, we narrow our focus to the Danish context to delineate the pertinent legal considerations.

2.1 Female labor force participation (FLFP)

Female labor force participation is both an important driver and an outcome of growth and development, as is disclosed by Verick (2014) by using developing countries as a research context. As Lechman and Kaur (2015) explored in 162 countries, the relationship between female labour force participation and economic development has a U-shaped characteristic in most countries, except for low-income countries where the hypothesis could not be verified directly. In the context of the United States, Blau and Kahn (2013) points out the rank of female labor participation rate had fallen compared to other OECD countries but the ratio of women who have full-time jobs and work as managers or professionals from 1990 to 2010 maintained a high position due to the less application of "family-friendly" policies including parental leave and part-time work entitlements. As for Nordic countries, the booming of female labor force participation happened even earlier. Gustafsson and Jacobsson (1985) shows labor force participation of married women increased from 49.1% to 83.5% from 1965 to 1985, in which the increases in own wage have been by far the most important explanatory factor.

As we can see, with a trend of generally increasing female labor force participation, more specific groups of women are involved in the research field and more research is conducted to combine women's family roles and working behaviors. Fernández (2013) shows the dramatic increase in married women's labor force participation over the last century and investigates the role of culture in the gigantic change by tracing the long-term effects of holding different beliefs. However, against our intuition of the trade-off relationship between family role and working payback, it is shown by Vikat (2004) that a woman's economic activity and income were positively correlated with the birth of their first child by using the entire female population of reproductive age in Finland in 1988-2000, which can be seen as a common pattern in the Nordic countries. As a supplementary finding, "Nordic fertility regime" by Andersson et al. (2009) describes the similar trends of Nordic countries in terms of the resurgence of fertility at advanced childbearing ages and the relatively modest correlation between educational achievement and ultimate fertility.

For policymakers, policies are focused on easing women's caregiving by providing low-cost childcare, maternity leave, and so on, rather than directly encouraging women to enter the workforce and pursue higher career goals, when they see that women in

general are becoming less inclined to have children or are more cautious about taking on family responsibilities as a result of increased education levels. However, the result of such policies would in certain scenarios boost or inhibit female labor participation. As for paid parental leave, Thévenon and Solaz (2013) shows that paid leave leads to a slight increase, on average, in women's share of paid employment. Moreover, childcare services for children at a very young age can be a crucial element in helping women get back to work after maternity leave. However, under different welfare systems, the cost of young-age child care can vary a lot, which determines whether it is a burden or a relief. Thévenon (2013) points out that the Nordics are among the biggest providers of such young-age childcare services, Denmark and Sweden, especially, are the two countries spending by far the most per child on childcare services since the early 1990s. De Henau et al. (2010) in their study shows a key insight that public childcare provision has the strongest impact when it comes to securing equal labor-market access and conditions for mothers of young children and non-mothers.

2.2 Gender quotas

After the overview of the supply side of female labor participation, we shall move on to the demand side. Gender quotas have evolved from being experimented with by only a few countries in the 1970s to becoming a widely recognized and adopted solution aimed at addressing the global issue of women's under-representation. The initial application was in politics, as is disclosed by Krook et al. (2009), the majority of countries have explicit policies requiring the selection of female candidates for political office.

Gender quotas typically mandate a specific percentage or absolute number of men and women to be represented within an organization or its candidate list, particularly in governmental bodies and parliaments, aimed at enhancing women's representation and influence in the political sphere.

Dahlerup (2005) divides gender quotas into two main categories, candidate quotas and reserved seats. While candidate quotas refer to the practice of setting a minimum percentage of female candidates for election and no limitation for the election results; reserved seats, on the other hand, directly set aside a certain number of seats for women and may omit or simplify the electoral process, which mains aims to have a more diversified representatives for the organization. Contemporary quota systems aim to ensure women's representation reaches a 'critical minority' threshold, often 30 or 40 percent, or seeks a 'gender balance' per international agreements. These measures are temporary until barriers to women's political participation are removed. Hughes et al. (2019) In essence, mandatory gender quotas are perceived to elevate the representation of women, yet they remain a subject of controversy and sustained scholarly inquiry over the years. As Dahlerup (2008) points out, controversial opinions were raised towards quotas after the introduction of quotas. we need research into the question of why male-dominated parliaments all over the world introduce gender quotas. Continuous debates and deliberations persist regarding gender quotas, particularly within corporate boardrooms. Terjesen and Sealy (2016) has curated discussions on conflicting tensions concerning board quotas, delving into the motivations behind quota implementation, as well as exploring ethical and meritocratic considerations. We will elaborate our discussion more on the gender quota on the two main topics: (1)motivation and (2)meritocratic concern.

In considering the motivations behind gender quotas, it becomes apparent that drawing consistent conclusions on each motive poses a challenge. While the objective of gender quota implementation ostensibly aims to reduce the gender gap and achieve greater gender equality and justice, proponents and opponents alike argue for "better justice" in their respective stances. For instance, Holst (2018) contends that gender quotas, whether in politics or corporate boards, foster equality and uphold justice. Conversely, opponents argue that quotas disrupt the original selection mechanism and competitive landscape, thereby compromising justice, as the most qualified candidates may not be selected for board positions (Sheridan et al., 2014).

Meritocracy has long been a focal point of discussion, with Son Hing et al. (2002) asserting that true merit is only attainable in a society devoid of biases. However, contemporary society still grapples with merit being defined by a specific group of individuals. Uhlmann and Cohen (2005) highlights how discrimination can arise from the definition of criteria in the hiring process, often concealed and challenging to eliminate. Regarding gender quotas, while they imply an increased proportion of women on corporate boards, it is noteworthy that these rules are formulated by the ruling class. Consequently, the selection of women for board positions may be influenced by antiquated assessment methods, potentially resulting in appointments that do not necessarily inspire more women to assume key corporate roles but rather maintain the status quo. Nonetheless, gender imbalances are increasingly unacceptable in many countries (Dahlerup, 2008). As discussed by Scherer and Palazzo (2007), the legitimacy of a process hinges on the genuine engagement of decision-makers with equitable influence.

In the political realm, the Swedish zipper quota, which mandates alternating men and women in local parties, provides an intriguing case study. Besley et al. (2017) finds that the introduction of the zipper quota, leading to the resignation of mediocre male leaders, increases female representation without compromising meritocracy. In Africa, where both candidate quotas and reserved seats are common in parliament, Bauer (2008) emphasizes the necessity of a democratic dispensation for electoral gender quotas to be meaningful. Mansbridge (2005) underscores the significant role of quotas in augmenting female representation in parliaments, reshaping societal conceptions of political leadership and women's roles.

While gender quotas in politics have been widely accepted to enhance female representation, their introduction to the business world was revolutionary. Norway pioneered boardroom gender quotas in 2002, requiring a 40% gender quota for boards of publicly traded firms and state-owned enterprises. Subsequent policies expanded to the corporate governance context, with a law mandating 40% representation of men and women on the boards of public limited liability companies introduced in 2003 and implemented in 2005. The policy's main goals in the Norwegian context were to boost female executives in companies and narrow the gender gap within the sector. Despite facing initial opposition, all Norwegian listed companies achieved 40% female representation by mid-2008 (Bergstø, 2013).

From the study of Bertrand et al. (2019), while the former goal lacks discernible evidence to support it, indicating that affected companies do not experience a notable increase in female employees; concerning the latter, evidence suggests that implemen-

tation of policies within corporate boards significantly diminishes the gender pay gap. The most conspicuous change was, by the year 2005, the proportion of women serving on boards of directors within ASA firms stood at a mere 17%; however, by 2009, this figure had surged to 40%. Thus, it shows the implementation of such a policy takes a gradual process to be done. Post-policy implementation, while the quality of female employees in affected companies remains relatively unchanged, women appointed to corporate boards exhibit enhanced qualifications, including educational attainment and professional competency. One step further, as for the impact on the enterprise valuation of the companies affected by the policy in Norway, Eckbo et al. (2022) use the short-run event study and come to a conclusion that the supply of qualified female director candidates was high enough to avoid the negative effect on the firm value at the time of the Norwegian quota.

After the practice of Norway, more European countries started to involve gender quotas on board of directors. Below is our compilation of gender quota-related policies in several European countries.

(1) France: In 2008, the modification of Article 1 of the French Constitution states "the law shall promote equal access of women and men to electoral mandates and elective offices as well as professional and social responsibilities." Subsequently, in 2011 the legislator introduced legal requirements for gender representation on boards of directors within medium and large companies, through the Copé-Zimmermann Act. This law set a quota of 40% for the underrepresented gender on boards of directors, to be reached within five years, with an intermediate threshold of 20% within three years. In December 2021, France added a further legal layer by enacting the Rixain Act, which will impose quotas for all corporate management bodies of at least 30% from the underrepresented gender by 2027 and eventually reach 40% by 2030.

(2) Germany: In 2016, German law mandates a minimum 30 percent representation of each gender on supervisory boards of large private corporations that are both listed and subject to full co-determination.

(3) Italy: In 2011, Italy introduced board gender quotas, law 120/2011, also known as the "Golfo-Mosca" law, mandates that publicly listed companies should have a minimum target of either gender on their boards of directors and statutory auditors. The quota is implemented gradually: at the first board election, the required target is 1/5 and becomes 1/3 for the following two elections

(4) Spain: Spain is the second country, right after Norway, that enacted a gender quota law in 2007, mandating a 40% gender diversity target on boards by 2015. Despite this mandate, attainment fell short, with women's representation on boards of listed companies hovering around 20% by 2016, mainly due to there being no punishment for the non-compliance companies.

(5) Netherlands: In 2013, the Netherlands applied gender balance rules based on a comply-or-explain principle, which is also known as the statutory target regulation of Article 2:166/267 Dutch Civil Code for large public limited companies and private limited companies, expired on January 1, 2020. In 2021, the Act on Gender Balance on

Management and Supervisory Boards passed the parliament's senate that supervisory boards of listed companies will have to comprise at least one-third male and one-third female members, and any new board appointment that does not achieve gender balance will be null and void (however, the validity of any board decisions are unaffected).

Beyond the EU, Quebec's *Bill 53* (Canada) established a 50% quota in 2006. India implemented a policy in 2012 requiring at least one woman on the board of directors, followed by the United Arab Emirates in 2013 with a similar mandate. Greenland (Denmark) also imposed a 50% quota in 2013. Malaysia had imposed a 30% quota in 2011 for women to participate in senior management, and in 2017, the 30% quota was extended to the corporate boards of publicly listed "large companies" (Mastura et al., 2021).

2.3 The Danish model

As we discussed previously, gender quota policy is a measure, either legislatively mandated or voluntarily adopted by institutions, to ensure a certain level of gender representation in decision-making positions, aiming to promote gender equality and diversity. The Nordics are hailed as the leaders of gender equality (OECD, 2021). As early as 1981, legislation was passed to enforce gender quotas, initially targeting government-appointed boards, councils, and committees. Over time, this gender quota system gradually gained acceptance in the business sector as well.

Unlike Norway, Denmark has not imposed strict quotas that have to be satisfied. However, Denmark is the only Nordic country to require its largest companies to design policies on how they will attain executive management-level gender diversity. The recent evolution of gender quota frameworks within the Danish business sector can be delineated as a progression from voluntary measures to a more structured and legally binding approach.

Although Denmark has had many voluntary equality initiatives urging more women on board for quite some time, since last century, there has been a growing resistance to gender parity, especially to gender quota, coming from both women and men in liberal, conservative, and populist parties based upon strong beliefs in the liberal principles of individual citizens' free choice. This ideology has directly resulted in the failure of voluntary measures, by not achieving a significant increase in gender-balanced company board compositions. Yet it's still remarkable that despite social resistance to this notion of "parity in outcomes", historical data shows that compared to other nations, Denmark has better achieved "substantive equality in practice".

For instance, in 2007, the liberal conservatives introduced the *"Charter for Women in Management"*, a soft law initiative aimed at Danish companies and organizations. It encouraged voluntary adoption of the Charter, requiring them to prepare reports, outline their commitment to fulfilling their obligations, and finally enhance women's management position through explicit strategies. It operated on a voluntary basis without any sanctions or significant effects. In October 2011, under the influence of the Norwegian experience and EU-level debates, a Government Platform document, *"A Denmark that stands together"*, was proposed. The proposals included a section about equality and diversity in relation to quotas within company boards (however

later withdrawn). Similar initiatives also include the launch of *"Operation Chain Reaction: Recommendations for more Women on Boards"*, which encouraged companies to increase the representation of women on their boards through ambassador appointment, focused recruitment, and voluntary gender quotas.

In general, prior to 2012, Danish policies and legislation typically prioritized flexibility for companies, avoiding binding obligations such as fixed targets and instead emphasizing self-management, allowing companies to set their own goals. However, the anticipated effects of these soft law initiatives failed to materialize. Kromann Reumert, the vice chairman of the Danish Corporate Governance Committee, remarked that all of these initiatives were "soft law", distinct from legislative measures.

Changes were enacted in 2012. According to the *Act modifying the Gender Equality Act (No.1288 of 19/12/2012)*, the largest private companies in Denmark, determined by economic size and staff numbers, are mandated to report on their efforts to increase the representation of women in top management and executive boards. Approximately 1,100 companies are subject to these new obligations. Additionally, the *Act modifying the Companies Act, Financial Statements Act(No.1383 of 23/12/2012)*, and other legislation extend similar requirements to all national public companies and institutions.

The landmark moment came on April 1, 2013, when the new legal framework came into force requiring at least 40% representation of the underrepresented gender at board and managerial levels in approximately 1,100 of the largest Danish private companies and all public organizations. This law applied to various entities, including listed companies, large enterprises, foundations, financial undertakings, state-owned public limited companies, and other public organizations. Large enterprises were defined as those surpassing two of the following criteria in two consecutive financial years: a balance sheet total of DKK 143 million (EUR 19.16M), revenue of DKK 286 million (EUR 38.32M), or an average number of employees totaling 250.

Under this law, failure to achieve the 40% gender representation ratio mandates the establishment of clear gender ratio targets and implementation policies within a specified timeframe. While failure to set targets or report may result in fines, not meeting the set targets is not penalized. Specific targets can vary across boards and management levels, allowing flexibility within the framework.

The 2013 Danish gender quota policy represents a significant shift towards a more structured and legally binding approach to gender diversity in corporate leadership positions. This pivotal shift motivates our research as we endeavor to evaluate the policy's impact.

In conclusion, governments worldwide are enacting measures to ensure that underrepresented voices are heard. Although the efforts of Denmark and many other countries are aligned, the unique characteristic of higher female representation without strict quotas adds value to our research.

3 Data and empirical strategies

As previously introduced, the Danish gender quota policy, initiated in late 2012 and enforced on April 1, 2013, aims to improve female representation on company boards. Building upon this foundation, an empirical framework is devised to assess the validity of the three following hypotheses.

Hypothesis 1: The policy effectively increases female representation on boards.

Hypothesis 2: The policy approval heightens investor expectations, as diverse boards are seen to boost stock prices.

Hypothesis 3: Increased female board representation improves company performance itself.

3.1 Synthetic control method

It is mainstream that policy researchers would use the Difference-in-Differences (DID) method to see how the policy affects the treatment group compared to the control group. The estimation of the boardroom female participation ratio, often referred to as the "treatment" effect, is accomplished by comparing the change in the outcome variable before and after the implementation of the treatment, both for the treated unit and the control group. The attractiveness of the DID estimator for comparative studies lies in its ability to mitigate the influence of unobserved covariates that may affect the outcome variable. This is achieved by considering time differences and assuming that the effects on the outcome variable remain constant over time. Additionally, the DID estimator assumes that any macroeconomic shocks or other time effects affect both the treated unit and the control group uniformly. These assumptions collectively constitute the "parallel trends assumption," implying that, absent a gender quota for directors on company boards, the trajectories of board female ratios in affected and unaffected Danish companies evolve in parallel.

However, a significant drawback of the DID method is the challenge of verifying the parallel trends assumption. While it may be possible to assess pre-treatment trends in the outcome variable, post-treatment verification is inherently constrained by the nature of counterfactual analysis. If the treated and control groups fail to exhibit a common trend, the DID estimator becomes biased.

When parallelism assumptions are not met, the synthetic control method offers an alternative approach(Abadie and Gardeazabal, 2003). Unlike the DID method, which assumes consistent effects of unobserved confounders over time, the synthetic control method allows for variations in these effects by weighting the control group. This weighting process ensures that, prior to treatment, the control group closely resembles Denmark in terms of key predictors of board female participation and exhibits similar emission levels and trajectories. Thus, by relaxing the parallel trends assumption, the synthetic control method enhances the accuracy of our estimates compared to the DID estimator.The specific steps to build a synthetic model are as follows.

Let $N+1$ be the number of all the selected comparable countries in our sample, indexed

by n. We note $n = 1$ as Denmark, i.e. the "treated unit". For the rest countries we note them as $n = 2, 3, \ldots, N, N + 1$. For them, we would apply a vector of weights W. The observation period is noted as $t = 1, 2, \ldots, T$. We exercise caution in selecting an adequate timeframe for our research endeavors to ensure the generation of a comprehensive representation of Denmark. We choose the vector of weights W so that the difference between Denmark and the control units on the number of key predictors of the outcome variable and the outcome variable itself is minimized in the pre-treatment period, subject to the convexity constraints.

Hypothesis 1*: The policy effectively increases female representation on boards.*

In our specific context, the companies impacted by the boardroom gender quota policy include publicly traded entities and 1,100 large private firms meeting the specified criteria. Given the nature of the affected group, it is unrealistic to expect similar effects from external events compared to the unaffected group. Moreover, tracking the boardroom female ratio of private firms over an extended period is challenging. Conversely, data on boardroom female ratios for large public companies are more readily available. Therefore, we opted for the synthetic control method, which relaxes the parallel trends assumption, making it suitable for comparative case studies. To employ an empirical approach analyzing the effect of the board gender quota law enacted in 2013 on board gender ratios, we first tried to utilize annual panel data for the years from 2003 to 2022 for 32 OECD countries, including Denmark.

Our study takes female representation on boards as the dependent variable, and we acquired the data of those largest and publicly listed firms from the European Institute for Gender Equality Database (EIGE). The EIGE database compiles data from dozens of companies representing blue-chip stocks known for their robust business operations and significant profitability across various countries. This dataset covers most of the relevant firms.

To augment data from additional OECD countries not covered in the EIGE database, we utilized the Refinitiv Eikon Database. Within our model, we introduced additional countries such as Japan, South Korea, Australia, Switzerland, and New Zealand, which exhibit comparable economic and cultural characteristics to Denmark.

Subsequently, we conducted data collection at the corporate level for selected OECD countries' listed companies. Our approach to delineating the scope of the study involved collecting data from the primary indices of each country/market, ensuring a roughly equivalent representation of companies across nations, and maximizing the temporal coverage. For instance, in Denmark, the key index is the OMX-Copenhagen 25 (OMXC 25), and data availability spans from 2003 to 2022, encompassing the decade preceding and following the policy enactment.

From the 32 countries, we partially excluded the ones characterized by significant cultural differences and data deficiencies. Among these countries, we conducted further screening to select the most suitable candidate countries for synthesizing Denmark. For instance, Thailand lacked any corporate disclosures regarding the gender composition of boards before 2009. Subsequently, a comparative assessment of political and cultural

contexts across nations led to the exclusion of Middle Eastern countries (e.g., Saudi Arabia and Iran). Ultimately, a cohort of 17 countries was delineated for further examination, including Denmark.

In our research, we have our approach based on these indices in each of the 17 selected countries as the following Table 1 shows.

	Blue-chips	No. of constituents	No. of companies covered
Estonia	OMX Tallinn_GI	18	18
Finland	OMX Helsinki 25	25	23
Czechia	PX-GLOB 19	19	13
Australia	ATX 20	20	20
Greece	FTSE/ATHEX Large Cap	25	21
Japan	TOPX100	100	99
Korea	KOSPI50	50	50
Latvia	OMX Riga_GI	8	8
Lithuania	OMX Vilnius_GI	21	21
New Zealand	NZX50	50	50
Poland	WIG20	20	18
Slovak Republic	SAX	7	7
Slovenia	SBITOP	18	18
Sweden	OMX Stockholm 30	30	26
United Kingdom	FTSE 100	100	50
Denmark	OMX Copenhagen 25	25	24
Switzerland	SSMI	20	20

Table 1: Sample companies and countries.

In our study, the control variables encompass socioeconomic indicators, sourced from the World Bank Database. Specifically, we include Sav_Edu denoting savings to education expenditure, which serves as a proxy for investment in human capital development. Additionally, we incorporate $CO2$ representing carbon dioxide emissions per capita, serving as a proxy for environmental impact. Furthermore, we consider Fe_unem, female unemployment, as a percentage of the female labor force, capturing gender-specific labor market dynamics and labor force participation rates. By incorporating these control variables, we mitigate the confounding effects of extraneous factors and enhance the precision of our empirical analysis.

Figure 1 shows the female representation trends on blue-chips' boards in 17 countries including Denmark. Most of them present a volatile upward trend.

Figure 1: Female representation on boards graphed by country.

3.2 Event study

Hypothesis 2: *The policy approval elevates investor expectations, believing gender-diverse boards enhance company performance and stock prices.*

In this section, we focus on hypothesis 2 and analyze how investors reacted to the Danish stock market when they anticipated changes in market expectations following the release of the new legal framework. In other words, we check whether the gender quota policy was seen as good news or bad news for investors.

Our research methodology starts with the identification of a particular event, namely, the release of the new law. We analyze the responsiveness of stock prices both preceding and following the event's unfolding, aiming to discern the investors' sentiment on this event. However, this short-term event study logic is grounded in very fundamental assumptions.

*Assumption*1 : The Efficient Market Hypothesis (EMH) posits that prices reflect all information, including public and private information. The EMH suggests that even insider information would not give an investor an advantage, as it is already reflected in asset prices. Investors in the efficient market are rational in their responses to new information.

*Assumption*2 : Events occur or information is disclosed suddenly or unexpectedly. This assumption suggests that market participants were not aware of the relevant information before the event, enabling us to attribute stock price movements to the event's impact rather than existing market expectations.

*Assumption*3 : During the event window, there should exist no confounding effects from other events. By isolating the effects of the event itself on stock prices, we can assess its impact with greater clarity.

A standard model for assessing the so-called announcement effect of a particular event, introduced by MacKinlay (1997), is to measure the abnormal returns (AR) on the announcement date and for a period thereafter. By deducting the expected normal returns, which are estimated under the assumption that a specific event did not take place, from the actual returns of sample stocks, AR can be derived. AR function as an indicator of the extent to which stock prices demonstrate unusual responses to the event's unfolding or the revelation of information. These AR observations are then aggregated through time, resulting in a cumulative abnormal return (CAR).

It is foreseeable in the short term, that if there were no unexpected event occurrence, or if such an event did not affect investors' sentiment, the CAR curve would fluctuate around the expected value, which is zero. Oppositely, if the event alters investors' expectations, the CAR curve will persistently deviate from zero following the event occurrence.

Inspired by the spirit of the Market Model described in the article by MacKinlay (1997), we measure the announcement effect as follows. We assume that there is a linear relationship between the return on OMX-Copenhagen 20 and the return on the

Nasdaq Nordic 120. The Nordic 120 index perfectly covers the companies within OMX-Copenhagen 20.

Even though the new legal framework took effect on April 1, 2013, it was introduced by the *Act modifying the Gender Equality Act (No. 1288 of 19/12/2012)*. For the purposes of analysis, we consider December 19, 2012, as the date of announcement (t=0).

We obtained historical price data for OMXC20 and Nasdaq Nordic 120. To estimate the linear relationship and avoid estimates being contaminated by anticipation effects, we determine the 30 transaction days preceding December 19, 2012, as the pre-event object of observation ($-30 \leq t < 0$). Also, we test the 30 transaction days' abnormal return following the policy approval ($0 \leq t \leq 30$).

To be noticed, unlike the synthetic control section, where the OMXC25 index was referenced, here we utilized the OMX20 index. This choice was made because the OMXC20 served as the precursor to the OMXC25, with historical price data labeled under OMXC20 for the period spanning 2002 to 2003.

$$R.OMXC_t = \alpha + \beta R.Nordic_t + \epsilon_t$$

$$-30 \leq t < 0, \quad E(\epsilon_t) = 0, \quad VAR(\epsilon_t) = \sigma^2.$$

The term ϵ_t, which represents zero disturbance, serves to capture abnormal returns observed in Danish stocks. With the historical data predating the publication of the news ($-30 \leq t < 0$), we determine the intercepts and coefficients utilizing Ordinary Least Squares (OLS) regression.

$$AR_t = R.OMXC_t - R.\hat{OMXC}_t = R.OMXC_t - (\alpha + \beta R.Nordic_t), \quad 0 \leq t \leq 30$$

We utilize the $-30 \leq t < 0$ data to construct an estimation equation above, which is subsequently employed to forecast the stock returns for the period of $0 \leq t \leq 30$. The difference between actual returns and predicted values constitutes what we refer to as Abnormal residual (AR). Finally, we accumulate AR to be CAR.

$$CAR_t = \sum_{k=0}^{t} AR_k, \quad 0 \leq t \leq 30$$

3.3 Impact of increased women on boards on firm performance

***Hypothesis 3**: Increased female representation on board improves company performance itself.*

In order to examine hypothesis 3, we designed the model as follows, controlling for both industry and time fixed effects.

$$Y_{i,j,t} = \beta_0 + \beta_1 Fe\_on\_boards_{i,j,t} + \beta Control\_vars + \alpha_j + \lambda_t + u_{i,j,t}$$

	VarName	Notes
Potential Y	PB	Market value to book value
	ROA	Return on asset
	ROIC	Return on invested capital
Core regressor	Fe_on_boards	Share of women on board of directors
Control_vars	Capex	Capital expenditure to total asset
	Cf_sales	Operating cashflow to net sales
	LDE	Long-term debt to common equity
	Asset	Total asset
	Ifcph	If headquartered in Copenhagen
	GDP	Real GDP growth rate in Denmark
	Govbond	Government bond yield in Denmark per annum
	α_j	Industry fixed effects
	λ_t	Time fixed effects

Table 2: Variables in the fixed effects model.

To build the model, we gathered financial data publicly disclosed by Danish listed companies from 2009 to 2023 via the Infinitiv Eikon database. For missing values, we referred to financial statements and ESG reports on each company's official website, making manual efforts to fill gaps. After integration, we ultimately obtained 535 valid records, originating from 71 companies. The panel is relatively unbalanced with gaps in time variables.

Allowing for the limited panel length and the sample size, we did not include individual fixed effects in the model. Specifically, the dataset encompasses 535 valid observations drawn from 71 companies spanning 22 diverse industries. The number of individuals is much greater than the number of industries. Controlling for individual firm fixed effects would lead to a considerable decrease in observations actually used for regression, with statistical effectiveness diminished.

Therefore, for the modeling purpose, instead of including individual firm fixed effects, we opt to control for industry fixed effects. We acknowledge the unobserved heterogeneity among the 22 industries, irrespective of the heterogeneity among individual firms within the industries, which of course exists though, in reality.

The unobserved heterogeneity among industries refers to factors that inherently persist within each industry (Wooldridge, 2019), such as distinctive commercial models, im-

plicit norms, and vulnerability to economic cycles. For example, while the food industry typically exhibits more resilience to economic fluctuations, the steel industry follows a cyclical pattern. By controlling for industry fixed effects, we mitigate disparities among sectors.

To better capture the time trends, we also control for time fixed effects, simultaneously introducing variables reflective of macroeconomic conditions, such as real GDP growth rate and annualized government bond yields. This approach was adopted to address factors that persist throughout a specific year, such as macroeconomic fluctuations, which may influence the overall period but are independent of individual entities and industries.

4 Results and analysis

4.1 Denmark v.s. synthetic Denmark

Using the synthetic control method, we utilize data from the additional 16 countries and construct a synthetic counterpart to Denmark. This synthetic Denmark functions as a counterfactual control group, faithfully emulating the dynamics of female board representation in actual Denmark from 2003 to 2012. Table 3 outlines the model fitting process during the pre-treatment periods, while Table 4 projects the hypothetical plot of female board representation, illustrating how it would have developed had the gender quota policy not been implemented in Denmark.

Co-variate	Treated value	Synthetic value	Country, no.	U.weight
Sav_Edu	7.4949	5.5455	New Zealand, 10	0.3480
CO2	8.2099	7.5590	Finland, 2	0.2580
Fe_unem	6.3838	7.3157	Switzerland, 17	0.2300
Fe_on_boards(2004)	11.3000	11.3115	Slovak Republic, 12	0.1650
Fe_on_boards(2008)	16.9000	16.0881	Other countries	0
Fe_on_boards(2012)	20.8000	19.8372		

Table 3: Co-variate balance and optimal unit weights.

Time	Actual Outcome	Synthetic Outcome	Treatment Effect
2013	22.9000	22.9044	-0.0044
2014	24.0000	23.2352	0.7648
2015	25.8000	21.3184	4.4816
2016	27.1000	23.0042	4.0958
2017	30.3000	24.9717	5.3283
2018	27.1000	28.0755	-0.9755
2019	30.0000	29.8355	0.1645
2020	33.6000	31.3819	2.2181
2021	34.9000	31.2925	3.6075
2022	40.8000	33.6041	7.1959
Mean	29.6500	26.9623	2.6877

Table 4: Prediction results in the posttreatment periods.

Figure 2 shows the trajectory of women representation in Danish companies and the average of the other 16 countries during the sample period. Overall, before 2013, the synthetic line closely tracks the Denmark line, and women on boards seem to follow a very similar trend, although the lack of pre-period data may impair the fit.

After the policy was enacted in 2013, Figure 2 vividly illustrates a notable increase in the presence of women on boards in Denmark compared to the synthetic Denmark. However, a significant drop occurs between 2017 and 2018. By looking into the board compositions of OMXC25 companies, we find this cliff-like decline can be entirely attributed to the simultaneous resignation of female directors from various companies. This may not be a coincidence and is likely more than a result of macro factors. A study found that the impact of the board quotas may also have yielded unintended side effects, that the introduction of targets had paved the way for family driven hiring (University of Copenhagen, 2021). Women with family connections to current directors and CEOs were more than twice as likely to secure positions in boardrooms. This reliance on family networks for board appointments rather than merit-based selection,

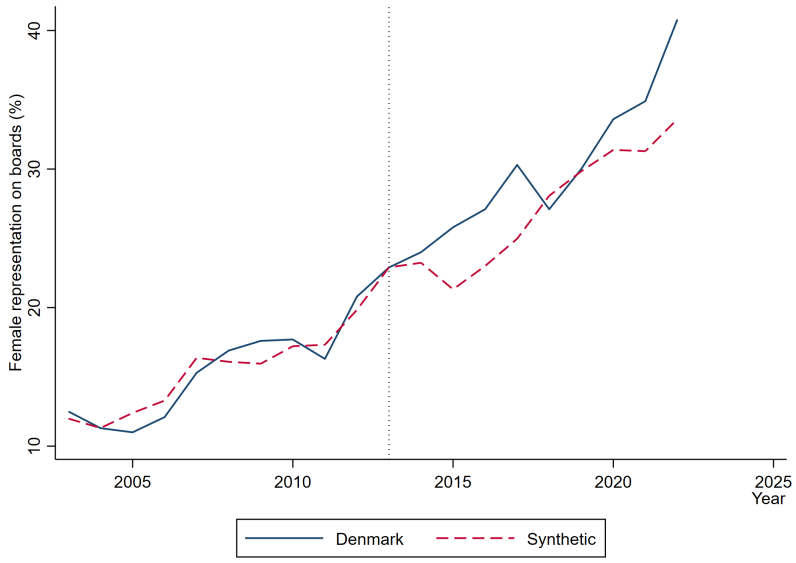

Figure 2: Path plot for female representation on boards in Denmark v.s. synthetic Denmark.

created tensions and dissatisfaction among highly qualified women without such connections. These factors combined to create an environment where many capable women felt marginalized or bypassed, prompting some to resign from the boards in frustration with the system and its outcomes. Upon closer examination of a larger dataset including 169 public companies incorporated in Denmark, we see the abrupt drop is toned down by a larger sample size but still existent. Besides, it is evident that OMXC25 recognized as a blue-chip stock in Denmark, showed in Figure 3, outperforms other ordinary public Danish companies regarding gender diversity on boards.

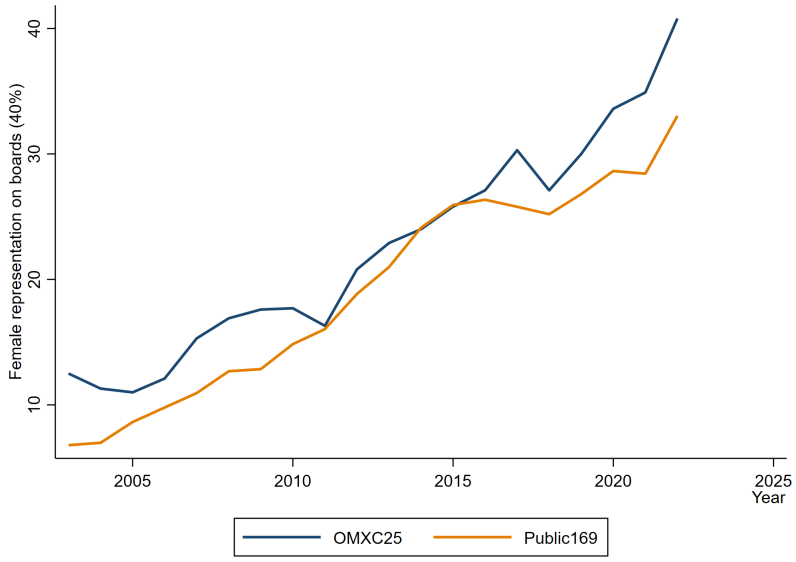

Figure 3: Female representation in different datasets.

4.2 Placebo or progress?

We want to find out if the policy effect estimated using the synthetic control method is just a result of chance. In simpler terms, we check if we get similar results, when we pick a country randomly (not Denmark) from the donor pool, and use it for synthetic control estimation.

A commonly used method, namely the in-space placebo test, is the sorting test proposed by Abadie et al. (2012). This method is similar to a rank test in statistics and is used to determine the likelihood of other regions experiencing the same situation as the treatment. The idea behind this test is to assume that all control group countries began implementing laws in 2013. Using the synthetic control method, corresponding synthetic control units are constructed for each country, and the policy effect is estimated under this assumption. Then, the actual policy effect generated in Denmark is compared with the hypothetical policy effect generated in the control group states. If the difference between the two policy effects is significant enough, then we have reason to believe that the policy effect of the Danish law is significant.

This in-space placebo test requires that the synthetic control units for each country before the policy implementation have a good fit. If a country's fit before 2013 is not ideal, indicated by the large values of mean squared prediction error (MSPE) or root mean squared prediction error (RMSPE), the observed differences in predicted variables after policy implementation may not accurately reflect the policy's effect. Therefore, we exclude countries with poorly fitting synthetic control units before policy implementation. In other words, the reason for doing this is that if the synthetic control units fail to fit the predicted variable values before the 2013 law implementation, the resulting large difference in predicted variables may be due to poor fit and may not be related to the law enactment.

In their study, Abadie et al. (2012) excluded states with MSPE values before 1989 exceeding California's MSPE values by 20 times, 5 times, and 2 times, respectively. Here, we take the exclusion of countries exceeding 10 times for illustration.

Using all control units, the probability of obtaining a post/pretreatment MSPE ratio as large as Denmark's is 0.4118. Excluding control units with pretreatment MSPE 10 times larger than the treated unit, the probability of obtaining a post/pretreatment MSPE ratio as large as Denmark's is 0.5000. There are in total 3 countries with pretreatment MSPE 10 times larger than Denmark, including the Slovak Republic, Slovenia, and Sweden.

Unit	Pre MSPE	Post MSPE	Post/Pre	Pre_Fake / Pre_Treated
16	1.0386	13.8986	13.3817	1.0000
1	4.7515	54.4286	11.4550	4.5748
10	2.3934	7.5088	3.1373	2.3043
11	0.6322	16.0342	25.3623	0.6087
12	18.5684	53.0235	2.8556	17.8778
13	17.0453	7.2367	0.4246	16.4114
14	18.3056	13.2537	0.7240	17.6248
15	1.3950	85.4905	61.2815	1.3432
17	1.0202	31.0346	30.4214	0.9822
2	4.6550	11.2045	2.4070	4.4819
3	3.0980	86.7567	28.0040	2.9828
4	1.8597	78.8060	42.3754	1.7905
5	1.4712	14.6296	9.9443	1.4164
6	0.5159	1.9295	3.7399	0.4967
7	3.0415	20.2653	6.6629	2.9284
8	10.0774	47.5741	4.7209	9.7026
9	3.7933	120.3836	31.7358	3.6522

Table 5: In-space placebo test results using fake treatment units.

Figure 4, 5, 6 show results of the in-space placebo test after sequentially excluding the countries with MSPE more than 10x, 5x, and 2x. As we can see in the figures, the red lines represent Denmark's treatment effect, i.e., the difference between Denmark and synthetic Denmark's female representation on boards, while the gray lines represent the placebo effects of the donor countries with MSPE value lower than 10x, 5x, and 2x that of Denmark (i.e., the difference in female representation on boards between these countries and their respective synthetic countries). From a graph perspective, the treatment effect in Denmark does not stand out among the many placebo effects, which indicates that Danish policy is itself a placebo.

Figure 4: Placebo effects excl. 10x MSPE

Figure 5: Placebo effects excl. 5x MSPE

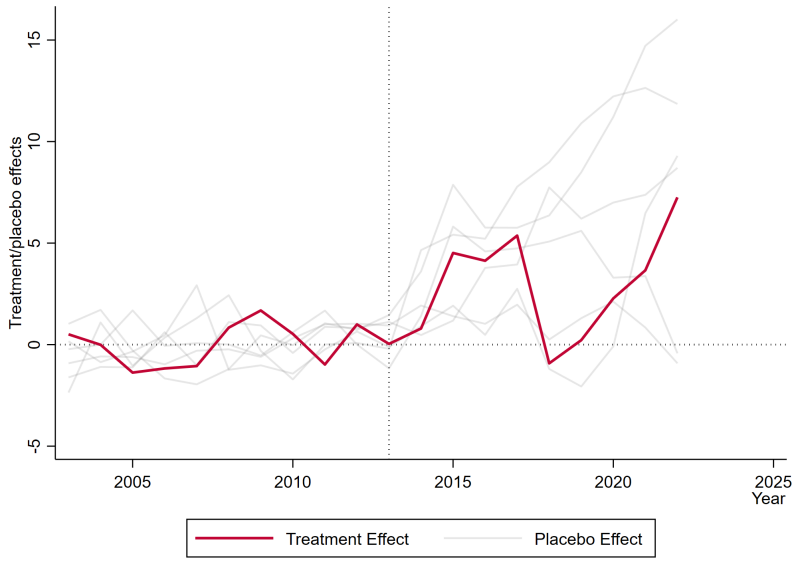

Figure 6: Placebo effects excl. 2x MSPE

year	excl. 2x MSPE	excl. 5x MSPE	excl. 10x MSPE
2013	0.5714	0.4615	0.5000
2014	0.8571	0.5385	0.5714
2015	0.5714	0.3077	0.2857
2016	0.5714	0.3077	0.2857
2017	0.4286	0.2308	0.2143
2018	0.8571	0.6154	0.5714
2019	0.8571	0.5385	0.5000
2020	0.7143	0.5385	0.5000
2021	0.7143	0.5385	0.5000
2022	0.7143	0.4615	0.4286

Table 6: In-space placebo test and p-values.

From a more statistical perspective, the p-value is applied for measuring the fraction of countries with results larger than or as large as the one obtained for the treated unit(Abadie et al., 2012; Andersson, 2019).

Table 6 presents the right-sided p-values of the treatment effect for year from 2013 to 2022, which is defined as the frequency that the placebo effects are greater than or equal to the treatment effect. We conclude that the Danish gender quota policy likely functions as a placebo.

4.3 Good news for investors

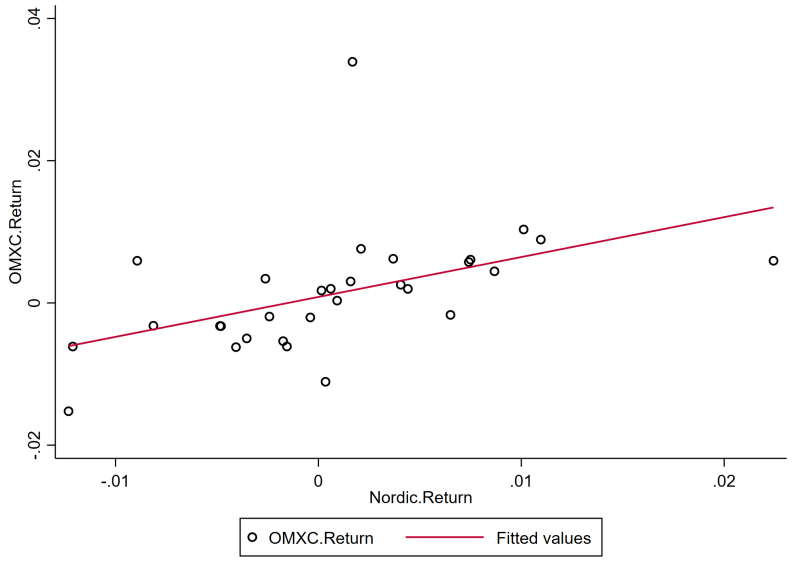

Figure 7: Scatter and OLS estimates.

	(1)
	R.OMXC
R.Nordic	0.5611***
	(2.85)
_cons	0.0008
	(0.59)
N	30

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Regress OMXReturn NordicReturn before announcement.

As presented by Figure 7 and Table 7, the Ordinary Least Squares (OLS) model successfully passes the t-test, indicating a consistent linear relationship between R.OMXC and R.Nordic. This suggests that the expected return of OMXC20 is primarily influenced by systemic risk alone, in line with the spirit of the Capital Asset Pricing Model (CAPM). Consequently, we infer that our analysis effectively mitigated the impact of extraneous events during the pre-treatment period.

During the 30 trading days following the announcement, in Figure 8, the actual daily returns of OMXC20 exhibited a clear and sustained abnormal increase relative to the Nordic 120. We believe this policy has brought about improved expectations for investors, indicating that investors perceive an increase in the representation of underrepresented groups in the boardroom as potentially enhancing the value of the companies. The growth in stock returns appears to be primarily driven by the confidence and faith investors have in the company, and the trust likely originated from the acknowledgment of the varied viewpoints that different genders contribute to decision-making and corporate dynamics. Additionally, there might be an anticipation for innovation and

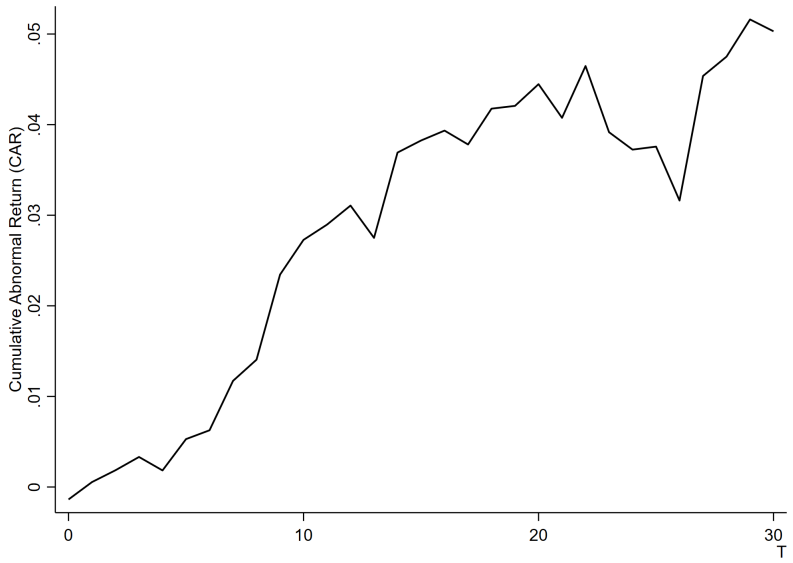

Figure 8: 30-day cumulative abnormal return after announcement

enhanced market understanding resulting from this diversity (Ruiz-Jiménez and del Mar Fuentes-Fuentes, 2016). While the actual realization of this value growth hinges on various factors, the inherent trust itself can significantly benefit the company.

4.4 Diverse boards, valued stocks

In our previous research, we found that (1) the proportion of women on corporate boards in Denmark has been increasing following the policy enactment, although the policy is merely a placebo, and (2) the policy enactment, as a public sentiment, has contributed to an upward trend in the stock price performance of Danish companies. In this section, we investigate whether the proportion of women on boards has an impact on the accounting/operational performance of companies.

$$Y_{i,j,t} = \beta_0 + \beta_1 Fe\_on\_boards_{i,j,t} + \beta Control\_vars + \alpha_j + \lambda_t + u_{i,j,t}$$

Controlling for both industry and time fixed effects, we performed a regression analysis examining how the share of women on boards affects corporate valuation (P/B ratio) and corporate performance (ROA, ROIC). As the model result presented in Table 8, our findings indicate a significant enhancement in firms' valuations (P/B ratio) with an increase in female directors on listed company boards. However, there is no robust or discernible improvement in operational management capabilities within the firms.

	(1) PB	(2) ROA	(3) ROIC
Fe_on_boards	0.0317*	0.0799	0.186
	(2.04)	(1.25)	(1.79)
capex	0.0818**	0.0974	0.163
	(2.70)	(0.66)	(0.87)
Asset	8.00e-10	3.55e-09	3.84e-09
	(1.41)	(1.54)	(1.18)
Cf_to_sale	0.00152***	0.0199***	0.0240***
	(3.70)	(4.81)	(4.77)
LDE	-0.000491	-0.00925**	-0.0137***
	(-0.75)	(-3.27)	(-3.64)
Ifcph	-0.835	-2.383	-6.600**
	(-1.91)	(-1.61)	(-2.77)
GDP	0.322*	-0.282	-0.639
	(2.39)	(-0.58)	(-0.92)
Govbond	3.142	1.008	2.278
	(1.62)	(0.17)	(0.27)
_cons	-8.217	-6.561	-10.70
	(-1.24)	(-0.33)	(-0.38)
N	521	524	522

t statistics in parentheses using robust std. error

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8: Fixed effects model result with different explained variables.

The valuation rise might be attributed to several potential mechanisms.

Firstly, the idea of equal rights and opportunities for different genders has become synonymous with Scandinavia (Langvasbråten, 2008), and in Denmark, the concept of gender equality had already permeated deeply into the social conscious base long before mandatory measures were implemented. Firms that proactively comply with such regulations or voluntarily adopt diversity initiatives may demonstrate good governance practices and a commitment to social consciousness that investors identify with. Besides, compliance with regulatory standards can mitigate legal and reputational risks, which may also positively influence investor perceptions and valuations.

Secondly, a gender-diverse board may tend to mitigate risk and increase transparency. Research suggests that gender-diverse boards are associated with better risk management practices. Korphaibool et al. (2023) find evidence from textual analysis and conclude that female directors impact the decision-making processes of corporate boards, steering them towards risk-neutrality, by lowering innovation investments while maintaining the firm profitability. Furthermore, a company's financial statements more faithfully reflect its financial position when it takes relatively conservative business strategies. Credible financial reporting enhances the trustworthiness of a company among investors, creditors, and other stakeholders, without resorting to overly optimistic projections or aggressive accounting practices. For instance, stock prices of firms with gender-diverse boards reflect more firm-specific information (Gul et al., 2011); the number of women sitting on boards is associated with increased transparency and ethical behavior of the boards (Larkin et al., 2013).

In summary, the heightened valuation of companies with a higher representation of women on their boards may not necessarily be attributed to an improvement in performance driven by gender diversity. Instead, it is probable that investors perceive a more diversified board as indicative of a forward-thinking, adaptable, and responsible company, thus inflating its valuation. This suggests that while gender diversity is valued, its impact on firms' actual performance warrants further investigation.

5 Conclusions

In this study, applying the synthetic control method and linear regression models, we assess the policy impact of the gender quota law in Denmark from three perspectives: the direct consequence, investors' response, and the benefits to companies, which correspond to hypothesis 1, 2, 3, respectively.

Through the comparison between real Denmark and synthetic Denmark, we find that despite the progress that female representation in Danish listed company boards is increasing after the policy implementation in 2003, the policy itself is most probably a placebo. Instead, it suggests that other factors may be at play, and the policy might not have had a significant impact in driving the change. The policy might be perceived as effective but is not actually causing the observed outcome.

Investors in the stock market have a similar optimistic perception as mentioned above. Through event study, we observe the OMX Copenhagen 20 index prices within 30 transaction days before and after the date on which the gender quota policy is approved by the authority. We find that policy approval improves investors' market expectations, indicated by the growing cumulative abnormal returns on the stocks. An intuitive explanation is, that a more gender-diverse board is believed to create more value for their company. While the realization of this value enhancement depends on myriad factors and specific circumstances, the mere existence of this trust may itself cast a positive influence on the stocks.

Further evidence from a fixed effects model also confirms the existence of such a positive correlation. With both industry and time fixed effects controlled, the regression suggests that higher female representation on boards leads to a higher ratio of market value to the firm's book value. However, when we replace the explained variable with indicators such as return on assets, return on invested capital, reflective of the firm's management and operating ability, this relationship becomes not robust or even existent any longer. To some extent, it is implicated that gender quotas do not improve the performance of firms themselves. In terms of talent selection, the essence of gender quotas seeks to achieve equality, inevitably and inherently challenging the principle of meritocracy in the pursuit of efficiency. However, to advance efficiency while maintaining a steadfast commitment to equal rights, we believe, requires strengthening complementary policies, such as better-established education and property rights systems. These measures are not only deemed essential but also offer promising avenues for further exploration in the realm of promoting gender equality.

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