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Master Thesis Accounting and Finance

The impact of mandatory gender quotas for board of directors on firm value

Evidence from French firms

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Abstract

The objective of this study is to assess the effect on firm value of a required gender quota on boards of directors implemented in France in 2011. In 2003, Norway was the first country to introduce a mandatory quota of 40% female directors. In subsequent years, multiple European countries have introduced gender quotas on corporate boards. At the same time, existing academic literature is divided on the effect of such regulations on firm value, and most studies have focused on the Norwegian setting. This paper aims to provide further clarity on this matter. The results of this study indicates that gender quotas for boards of directors have a neutral effect on firm value, both on the short and long term. At the same time, mandatory gender quotas are an effective tool to raise female presence on executive boards, which have been previously dominated by men.

Key words: Corporate governance, gender quota, gender diversity, firm value, female directors, France

Contents

1. Introduction

The relation between gender diversity and firm value has been studied extensively in academia, with both positive and negative arguments pertaining the presence of female executives. Increased gender diversity on corporate boards of directors has been promoted in a number of nations worldwide, as they have been vastly dominated by men. In 2003, Norway took a proactive approach in gender balancing the board composition by introducing a mandatory quota of minimum 40% female directors. In the upcoming years many countries followed suit and introduced similar laws aiming at raising female representation on executive positions.

Following the introduction of gender quotas by several governments, a number of studies emerged that aimed to analyse the effects of such laws on the value of firms. Studies such as those of Ahern and Dittmar (2012), Matsa and Miller (2013) and Greene et al. (2020) advocate that gender quotas are detrimental to firm value, as value-maximizing boards are replaced with less experienced and subpar boards. On the other hand, other studies hold the opposite opinion and demonstrate that raising female representation on boards through mandated quotas has a neutral effect on firm value (Eckbo et al., 2019), and that gender disparity is a demand-drive problem, as a large pool of experienced female talent is still untapped.

Given the effect of mandated gender quotas on firm value is still unclear and that most studies are focused on the Norwegian setting, this study aims to provide further input by analysing a similar quota introduced in France in 2011. The quota mandated a 40% female representation by 2017 year end, and prescribed sanctions for non-compliant firms. The study is pertinent for governments, law makers, as well as, shareholders and company managers to understand the consequences of introducing a mandatory gender quota for board of directors, particularly on firm value. Moreover, countries which have not implemented such a quota until now could review the effects which took place in France. Lastly, companies which are not subject to the law, can decide if such a quota would be beneficial, if implemented at company level.

Therefore, the central research question of is study has been formulated as follows:

How does the implementation of gender quota for boards of directors affects the value of French firms?

This thesis aims to answer the research question by following the methodological approach designed by Ahern and Dittmar (2012) and further used by Eckbo et al. (2019), as well. In more depth, the study takes two distinct approaches at quantifying the effect of the gender quota. Firstly, an event study will be conducted for three key event dates which led to the implementation of the quota. This approach evaluates the short-term market reaction and initial investors' perception of the quota. Secondly, an instrumental variable analysis will be deployed to determine the long-term effect of the quota on firm value, proxied by Tobin's Q. Although the gender quota is an exogenous shock that restraints a firm's selection of directors, the timing of compliance may not be, as corporations vary in their capacity to recruit suitable female directors. Therefore, companies that comply early may find compliance to be less costly, in terms of Q, than late comers. To address this endogeneity issue, I use the instrumental variable analysis designed by Ahern and Dittmar and also used by Eckbo et al. (2019). The IV analysis utilizes the pre-quota variance in female board representation across companies as an instrument for exogenous change in boards required by the quota.

The results of this paper indicates that the mandated gender quota had a neutral effect on firm value. In particular, the event study found no abnormal market returns encompassing the announcement and promulgation of the quota. This can be interpreted as investors foresaw the quota as being neither beneficial, nor harmful to future firm value. Secondly, the IV analysis concluded the same results. The shortfall of female directors is unrelated to Tobin's Q, where shortfall being the percentage of additional female directors necessary to meet the quota requirement for a certain board size. One probable explanation for why French businesses did not experience a value decline following the introduction of mandatory gender quota is that France has a large pool of skilled women who can occupy board seats. This argument is also supported by literature (Allemand & Brullebaut, 2014; Zenou et al., 2017).

The results of this paper contribute to the literature as it challenges the prevailing narrative that increased female presence and mandated gender quotas are detrimental to firm value, as sedimented by the highly popular paper of Ahern and Dittmar (2012). The findings suggest that both investors and companies saw compulsory gender parity as a low-cost restraint on board elections. This narrative could also explain why numerous other western European nations have since followed suit and implemented their own forms of female quotas on corporate boards. This paper is relevant to show that, for a nation like France, a mandated

gender quota is an uncostly regulation that eventually concentrates on promoting policies that are gender neutral.

In terms of external validity, the results of this paper could be generalizable for other Western countries that benefit from a deep pool of qualified female candidates, similar to France. In addition, firms that are able to attract experienced female talent are most likely to achieve a value-neutral board gender restructure.

2. Theoretical framework

2.1. Arguments for and against gender quotas for board of directors

Gender diversity on corporate boards has been encouraged in multiple countries across the globe. Within Europe, Norway was the first country to adopt a gender quota law in 2003, followed by Iceland, Spain, Finland, The Netherlands, Italy, Belgium, and others. Comparable laws have been also introduced in Asia-Pacific region, in Australia, India and Pakistan. Within North America, the states of Quebec and California followed suit. With different approaches of implementation, the aforementioned countries aim to bring inclusion of the female gender on executive boards, previously dominated by men. Therefore, it is essential to outline the arguments for and against gender diversity and gender quotas for boards.

Firstly, the ethical argument stands at the core of each mandated quota. Gender quotas are intended to combat the existing imbalance of women's underrepresentation and men's overrepresentation, which is no longer deemed standard. (Meier, 2013). Although Western culture is founded around the philosophy of meritocracy in professions and organisations, the majority of director appointments are not made solely on the basis of talent (Lewis, Simpson & Sealy, 2010). The persistence of gender disparity in the upper echelons is concerning, given that women enrol in more degree programs and attain higher academic success than men (OECD, 2015). As a deep pool of qualified female talent exists, the gender disparity appears to be a demand-driven problem (Gabaldon et al., 2016).

Secondly, there is an extensive body of research that identifies numerous benefits of having an increased presence of women directors on corporate boards. The presence of women, alike external stakeholders, foreigners or ethnic minorities, can bring a new perspective on

complex issues and can help in correcting informational biases in formulating strategies and making decisions (Campbell & Mínguez-Vera, 2008; Francoeur et al., 2008).

Adams & Ferreira (2009) find that female directors have a higher attendance record than male directors, while male directors have less attendance issues because the board is more gender diverse. In addition, women are more likely to serve on monitoring committees. These findings imply that a gender-balanced board devotes more time and attention to supervision.

Furthermore, Torchia et al. (2018) and Chen et al. (2018) find a positive relation between the presence of females on boards and firm innovativeness success. Two underlying mechanisms behind this positive relation emerge. First, female directors' increased oversight improves managers' incentives to innovate, and second, women directors bring new perspectives, by minimizing cognitive biases associated with board decision making, resulting in more innovative decision outcomes.

A plausible drawback of having females on boards is that women may have less risk appetite than men (Barber and Odean, 2001 ; Byrnes et al., 1999), and companies with more gender-balanced boards are more prone to become less competitive due to risk aversion. Nonetheless, Arnaboldi et al. (2021) examined whether gender-balanced bank boards can help deter expensive fraud incidents. They discover that the female representation decreases the incidence of misconduct penalties, resulting in annual savings of $7.48 million, mostly due to the risk aversion, and not necessarily due to increased diversity.

Moreover, there is an extensive body of literature on the relation between gender diversity and firm value, documenting mixed evidence. Many studies find a positive association between female representation on board of directors and firm value, measured by both accounting measures such as return on sales, return on assets, return on equity, and market measures, such as Tobin's Q. Positive findings emerge from different settings as well, such as studies focused on U.S firms (Shrader et al., 1997 ; Carter et al., 2003 ; Conyon and He, 2017), Spanish firms (Campbell and Mínguez-Vera, 2008), French firms (Ahmadi et al., 2018) and Russian firms (Garanina and Muravyev, 2020). On the other hand, there are studies that document a negative relationship between board gender diversity and firm value. Bøhren and Strøm (2010) and Darmadi (2011) find evidence that firms create more value when gender diversity is low and that heterogenous boards are less effective decision makers.

Furthermore, the relation between board gender diversity and firm value appears to be moderated by several firm-specific characteristics and nation-wide characteristics, such as:

conditionally high or low performing firms (Conyon and He, 2017), percentage of women on board (Kanter, 1997), national governance (Nguyen et al., 2021), shareholder protection levels and gender parity (Post and Byron, 2015).

One argument against introducing mandated gender quotas is that boards of directors are appointed in order to enlarge firm value, and such laws replace optimal, value-maximizing boards with younger and less experienced boards, which in turn decreases firm value. This argument is supported by studies of quotas introduced in Norway (Ahern and Dittmar, 2012) and in the state of California (Greene et al., 2020). In addition, the quota introduction in Norway led to a decrease in short-term business profitability due to fewer layoffs and increased labour prices (Matsa and Miller, 2013).

A theory pro-gender quotas is the *captured boards* hypothesis which states that compulsion to appoint female directors diminishes a CEO's control over the board. This in turn reduces agency costs and maximizes firm value. (Bebchuk and Fried, 2005)

Existing literature on gender quotas confirm that hard law quotas, which prescribe penalties for non-compliant firms are more effective at raising female representation than advisory regimes. Examples of European countries which introduced mandatory regimes are France and Italy (Bennouri et al., 2020), while Spain and United Kingdom opted for an advisory implementation (De Cabo et al., 2019 ; Bennouri et al., 2020).

Lastly, to the best of my knowledge, there are currently no studies focused on the French quota introduced in 2011 and its impact on firm value. Only a descriptive study by Zenou et al. (2017) documents the quota as being effective in raising female representation on French corporate boards, due to its mandatory nature.

2.2. The French quota

On January 27, 2011, The French National Assembly and Senate have adopted the law n° 2011-103 which mandates the proportion of directors of each gender may not be less than 40% for publicly traded companies, and for private companies with at least five hundred permanent employees and have a net turnover or balance sheet of at least 50 million euros. Furthermore, the violation of the law results in the suspension of compensation for board members until compliant, and non-conformant appointments are automatically invalid. Within three years after implementation, 20% of a company's board members must be

women, and by 2017, females must account for 40% on a board. As stated in article 1, the composition of board of directors should seek a balanced representation of both women and men (LOI n° 2011-103).

The bill was brought forward by Jean-François Copé and Marie-Jo Zimmermann and firstly discussed by the National Assembly on December 3rd, 2009. Subsequently, the first draft outlining a 40% gender quota was adopted on January 20th, 2010. After a year of discussions and debates within the Senate, the final text was definitively adopted by the National Assembly on January 13th, 2011, and on January 27th, 2011 the law was officially promulgated. Appendix A outlines the key events leading to the implementation of the French quota, which will be used to conduct an event study on the market reaction to the quota. More details on this matter will be discuss in the methodology and data part.

Event number	Date	Event description
1	January 20, 2010	First reading of the law in the National Assembly. The draft text was adopted by the National Assembly, which outlines the 40% gender quota on executive boards.
2	January 13, 2011	Second reading of the law in the National Assembly. Final text was adopted definitively by the National Assembly.
3	January 27, 2011	Law n° 2011-103 was promulgated and published in the Official Journal.

Appendix A: Key events leading to the implementation of the French quota

French firms can operate in one of two modes of corporate governance. An executive board and a supervisory board form the two-tier structure. Alternatively, the one-tier structure consists of a Chief Executive Officer and a board of directors, with the CEO being able to serve as chair, as well. The one-tier system is the most common, with 65% of businesses operate under a one-tier structure (Zenou et al. ,2017).

Preliminary research revealed that France is leading among European countries in terms of gender equality within executive boards. As of 2018, France already exceeded the 40% quota by approximately five percentage points, which denotes a voluntary and proactive approach in gender balancing, ahead of Norway (40%) and the EU28 average (27%). In isolated cases, the board composition was comprised of more than 50% women, while a fashion conglomerate had 60% of board members as women (Toplensky, 2018). This confirms, to a certain extent, that France has a deep pool of qualified females that can fill in the board seats.

As previously mentioned, this paper aims to expand the literature by exploring the effect of the gender quota on firm's value in France. The paper will follow the study approach of Ahern and Dittmar (2012) and Eckbo et al. (2019).

To identify a causal relationship between the gender quota and firm value, two complementary approaches will be used. First, conduct an event study on the stock price reaction around the announcement and passing of the law. This aims to quantify shareholder's short-term perception and reaction to the quota. A negative market reaction would confirm the theory that boards are appointed in order to maximize firm value, and the French quota is detrimental to the firm value. Conversely, a positive reaction would confirm that shareholders perceive female representation as beneficial, and bring added value to a firm through increased oversight, innovativeness and strategic decisions. In addition, a positive market reaction would confirm that female representation lowers agency costs.

Therefore, the first hypothesis is stated as follows:

*Hypothesis 1: There are **no** abnormal market returns encompassing the announcement and passage of the gender quota law.*

Secondly, to provide additional perspective on the effect of the French quota on firm value, I investigate whether the quota affects Tobin's Q. Tobin's Q gives an estimation of the value of a firm's intangible assets, such as goodwill, superior managers, and growth potential, assuming that the value translates into financial performance (Perfect and Wiles, 1994). The market response to the quota news release is an impartial estimation of the valuation impact under market efficiency. This means that future periods should see no significant shifts in market equity valuation or Tobin's Q (Eckbo et al., 2019). The second hypothesis is stated as follows:

*Hypothesis 2: There are **no** changes in Tobin's Q for companies that adhered to the gender* quota.

Similarly, a fall in Tobin's Q reinforces the argument that boards are motivated to optimize firm worth and that placing contractual legal limits on their decision-making would result in firm value declines. On the other hand, an increase in Tobin's Q implies that female representation is favourable to a firm's value, by lowering agency costs, increased oversight and enhanced innovation.

3. Methodology and Data

This section will explain the methodology used to test the two hypotheses, as well as the data sources and data summary. The paper will mostly follow the study approach of Ahern and Dittmar (2012) and Eckbo et al. (2019).

3.1. Methodology

Portfolio estimation of abnormal returns

As previously mentioned, the first hypothesis will be tested by conducting an event study on the stock price reaction around the announcement and passing of the law. Given the French quota was not enacted rapidly and unexpectedly, it is therefore crucial to explore all events which led to its final implementation. This is in line with the remarks of Eckbo et al. (2019) on the seemingly biased results of Ahern and Dittmar (2012), who only studied the law promulgation event, and found economically implausible results of minus 20% in market value. The event study will be focused on the news event dates listed in appendix A, which have progressively increased the probability of a gender quota law. This approach allows for a more comprehensive understanding of the market reaction, as under market efficiency, the investors should react to all new information given by quota related events.

To conduct the event study, I compute a calendar-time equal-weighted portfolio return of all French firms in scope for the quota, and for each of the three events I estimate the portfolio's daily abnormal return, using the following return-generating process:

$$r_t = \alpha + \beta r_{wt} + AR_k d_{kt} + \varepsilon_t \quad (1)$$

In this model, r_t is the average daily stock return of the French listed companies subject to the quota, in excess of the daily 3-month Euribor rate, r_{wt} is the daily market return of the STOXX Europe 600 Index, and d_{kt} is a dummy variable which takes a value of one for each day in the two-day event window and zero otherwise. I use the standard narrow two-day event window, ending with the public announcement date. The event parameter AR_k is the average daily abnormal portfolio return over the two-day events. ε_t is the error term, a random variable with expectation zero and finite variance, uncorrelated to the market return and to the portfolio return. The estimation period starts 252 trading days prior to the first event date and ends one day prior to the first event date. In the estimation period I estimate

the α and β coefficients, as well as the standard deviation of the abnormal returns. A firm must have at least one hundred return observations to be included in the portfolio, and must have return observations for each day in the event windows. The t-statistic for CAR_k(-1,0) is t $= \dfrac{AR_k}{\sigma AR_k}$. Figure 1 illustrates the event study timeline.

Figure 1: Event study timeline of the French quota

The sample is divided into two portfolios, namely *high shortfall* and *low shortfall.* Variable *shortfall* is the difference between the percentage of females directors required by the quota, outlined in appendix B, and the actual percentage of female directors, measured at the end of the year before each event date mentioned in appendix A. High *shortfall* are the French listed companies that have an above sample median *shortfall,* and vice versa for *low shortfall.* Therefore, *high shortfall* firms have a larger quota constraint, and are required to replace more male directors with female candidates. The event study will determine whether the market reaction is significantly different between high and low shortfall firms.

The second hypothesis examines whether the gender quota has an effect on Tobin's Q. Although the gender quota is an exogenous shock that restraints a firm's selection of directors, the timing of compliance may not be, as corporations vary in their capacity to recruit suitable female directors. Therefore, companies that comply early may find compliance to be less costly, in terms of Q, than late comers. For this reason, the endogenous business choices will distort the time series link between board gender changes and company value. To address this endogeneity issue, I use the instrumental variable analysis designed by Ahern and Dittmar and also used by Eckbo et al. (2019). I utilize pre-quota variance in female board representation across businesses as a proxy for exogenous variance in required changes in female board membership over time, further explained below.

Reduced-form Q regression

I begin by estimating Tobin's Q using the below regression in equation (2) over the 2008-2018 period, where θ_i are firm fixed effects, τ_t are year fixed effects, and identify the effect of the quota-constraint using each firm's value of *Shortfall*. Variable *Shortfall* is the percentage of additional female directors necessary to meet the quota requirement for a certain board size. Tobin's Q is defined as (book value of total assets – book value of equity + market value of equity) / (book value of total assets). The equity market value is calculated as the number of shares outstanding times the year-end share price. The coefficient β will determine whether the actual shortfall of female directors is related or not to Q. Based on the second hypothesis stated, I expect β to be insignificant, as the shortfall of female directors induced by the quota to have no impact on firm value. Firm size as measured by total assets was not included as a control variable because it is negatively correlated with variable shortfall and significant. This could be because larger firms are in a better position to attract female candidates, hence the lower shortfall. Ahern and Dittmar (2012) also refrain from including other time-varying controls, as the control variables can be themselves an outcome of the quota change.

$$Q_{it} = \alpha + \beta Shortfall_{it} + \theta_i + \tau_t + \varepsilon_{it} \quad (2)$$

Two-stage IV analysis of Q

The two-stage IV study is intended to reduce the impact of companies' endogenous compliance timings during the six-year period, from 2011 to 2017. In the first stage, the firm's female director shortage, $Shortfall_{it}$ is regressed on its exogenous shortfall in $T_0 = 2008$, interacted with D_t, year dummies, as follows:

$$Shortfall_{it} = \alpha + \beta_t D_t Shortfall_{iT0} + \theta_i + D_t + u_{it} \quad (3)$$

T_0 is chosen two years prior to the first announcement of the quota to ensure the board gender composition of French firms is exogenous to the quota. The predicted value of equation (3), $\widehat{Shortfall}_{it}$ extrapolates the firm's exogenous shortfall in 2008 with the market-wide trend, thus eliminating firm-level endogeneity in the appointment of female directors. In the second stage, Tobin's Q is regressed on the predicted shortfall:

$$Q_{it} = \alpha + \beta \widehat{Shortfall}_{it} + \theta_i + \tau_t + \varepsilon_{it} \quad (4)$$

Similarly, based on the second hypothesis, I expect the β coefficient of predicted shortfall to be insignificant to firm value, measured by Tobin's Q, supporting the value-neutral nature of the quota. Firms fixed effects, θ_i account for any visible or unobserved constant business factors that may impact a firm's Q. Year fixed effects, τ_t are used to account for any aggregate variations in Q, namely recessions or expansions. To instrument for shortfall, I use the firm's shortfall of female directors in 2008, interacted with year dummies. There are three underlying assumptions that must hold true when using IV analysis, namely: relevance assumption, exclusion restriction and exchangeability assumption (Labrecque & Swanson, 2018). Figure 2 illustrates how the IV analysis is applied for this study. Firstly, the relevance assumption states that the instrument has a causal effect on the independent variable. For this study, the female shortfall at $T_0 = 2008$, two years prior to the first quota announcement, will determine the shortfall of female directors after the first quota announcement. Secondly, the exclusion assumption states that the instrumental variable affects the outcome only through the independent variable. Thirdly, the exchangeability assumption states that the instrumental variable has no confounding effect on the dependent variable. For this study, at $T_0 = 2008$ the board composition of French firms is exogenous to the quota, as it is chosen to be two full years prior to the first quota announcement. Figure 3 also confirms to a certain extent this assumption, as the female representation on boards began to raise significantly only after 2010.
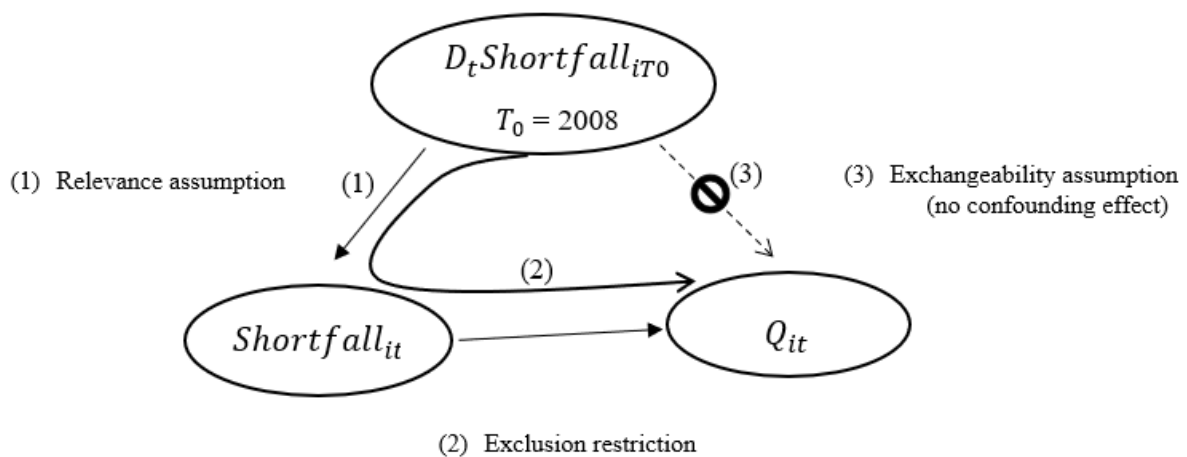

Figure 2:Illustration of instrumental variable assumptions

3.2. Data

For the event study, the daily stock prices of listed French companies are taken from Compustat Global. Companies with less than €50 million in total assets or less than 500 permanent employees are excluded from the sample, as the quota is not applicable for them. In addition, firms with less than a hundred return observations and missing observations in the event window are excluded. Firms will no data available for total assets or employees are also eliminated. This leads to a total sample of 262 firms.

The number of directors and the percentage of female directors is retrieved from BoardEx. One constraint to note is that BoardEx data does not include one and two-tier board classifications.

Variables to calculate Tobin's Q are retrieved from Compustat Global, as well, and the values are winsorized at the 1st and 99th percentile. Figure 3 illustrates the evolution of the percentage of female directors and Q values over the 2006 to 2018 period. Worth mentioning is that board female representation in 2014 was mandated to be no less than 20%, while the actual value is over 27%, implying that French companies took a timely approach at gender balancing their boards. Similarly, the 40% was achieved in 2017 as required, and in 2018 it was exceeded by 1 percentage point, denoting a voluntary and proactive approach.
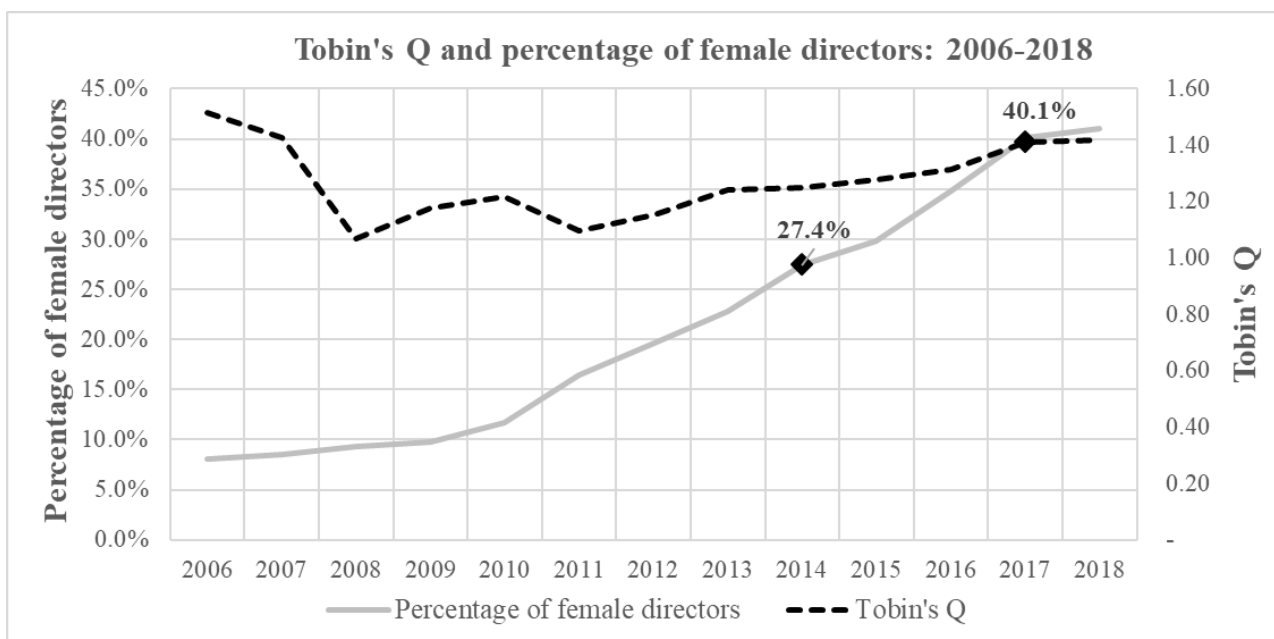

Figure 3: Tobin's Q and percentage of female directors: 2006-2018

Appendix C: Variable averages and firm observations 2006-2018

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Firm observations	183	188	185	186	186	190	191	198	194	209	212	201	185
Percentage of female directors	8.0%	8.5%	9.4%	9.8%	11.7%	16.5%	19.6%	22.8%	27.4%	29.8%	34.8%	40.1%	41.0%
Shortfall of female directors (%)	34.7%	34.4%	33.4%	32.9%	31.3%	26.4%	23.1%	20.1%	15.3%	12.9%	7.5%	2.6%	1.5%
Number of directors	11.30	11.16	11.37	11.30	11.46	11.37	11.24	11.18	11.38	10.99	10.90	11.00	11.09
Number of employees	25,801	25,859	26,160	28,230	31,153	33,629	35,511	32,804	30,812	29,933	26,488	29,946	36,886
Total assets (in million €)	38,512	41,092	45,855	44,447	45,890	46,690	48,208	43,964	48,922	44,775	45,971	46,031	51,933
Tobin's Q	1.51	1.43	1.07	1.18	1.22	1.10	1.15	1.24	1.25	1.28	1.31	1.41	1.24

Notes: This table reports the mean values for each variable used in this study for the period 2006 to 2018.

Appendix D: Summary Statistics

Variable	Mean	Median	SD	Min	P1	P99	Max
Percentage of female directors	0.22	0.20	0.15	0.00	0.00	0.54	0.66
Shortfall of female directors	0.21	0.22	0.15	-0.33	-0.12	0.50	0.50
Number of directors	11.20	11.00	4.01	2.00	4.00	21.00	27.00
Number of employees	30,234.01	3,118	62,441.78	10	10	333,609.11	495,287
Total assets (in million €)	45,572.99	1,898.78	210,424.40	44.69	61.78	1,378,891.50	2,077,759
Tobin's Q	1.26	1.10	0.49	0.62	0.62	3.63	3.64

Notes: This table reports the mean, median, standard deviation, minimum, 1st percentile, 99th percentile and maximum values for each variable used in this study.

Appendix C shows the number of directors remained relatively constant from 2006 to 2018, averaging eleven board seats. This implies, to a certain extent, that firms did not choose to scale down board seats in order to appoint less female directors. On the contrary, a board of 11 directors requires an actual female representation of 45%, or 5 female directors. In addition, appendix D shows the summary statistics.

4. Results

This section elaborates on the results of this study. Firstly, the event study is interpreted and plausible explanations are given. This is followed by discussing the IV analysis outcome and its possible justification.

Table I
Cumulative abnormal returns of quota firms on key event dates

	All firms (1)	High shortfall (2)	Low shortfall (3)	High - Low (4)
(1) January 20, 2010				
$CAR_1(-1,0)$	-0.004	-0.004	-0.004	0
p-value	(0.696)	(0.717)	(0.683)	(0.998)
N	262	112	152	
(2) January 13, 2011				
$CAR_2(-1,0)$	0.005	0.004	0.006	-0.002
p-value	(0.364)	(0.448)	(0.331)	(0.737)
N	262	109	157	
(3) January 27, 2011				
$CAR_3(-1,0)$	0.003	0.003	0.002	0.001
p-value	(0.642)	(0.578)	(0.704)	(0.866)
N	262	109	157	
All events (1)-(3)				
$CAR_{1-3}(-1,0)$	0.009	0.008	0.009	-0.001
p-value	(0.600)	(0.608)	(0.603)	(0.869)
N	262	118	161	

Notes: This table reports the cumulative abnormal returns for the two-day event periods, p-values and number of firms for the three key events leading to the implementation of the French quota. Column 1 reports these values for all firms, column 2 reports only for high shortfall firms, column 3 only for low shortfall firms, as defined in the methodology. Lastly, column 4 reports the difference between high and low shortfall firms. If any, significance levels would be shown as *** for 1%, ** for 5% and * for 10%.

Table I reports the cumulative abnormal returns, $CAR_k(-1,0)$, along with the p-values in brackets across the three event dates studied, for high shortfall and low shortfall firms, as well as the difference between the two. As it can be seen, for none of the three events statistically significant cumulative returns have been found. Furthermore, firms with a high shortfall of female directors do not differ in terms of CARs, compared to firms with a low shortfall of female directors. The results are in line with those of Eckbo et al. (2019) who do not find any significant cumulative abnormal returns, as well.

This can be interpreted as the quota having a neutral effect on the firm value, as the shareholders did not react either positively or negatively to the three events leading to the implementation of the quota. In this regard, the quota is not perceived as a constraint to the value maximization theory of director appointments, nor does it increase firm value through lowering agency costs, according to the captured board theory. The value neutral effect of female participation on boards of directors may be partly explained by their very similar characteristics compared to male directors. Zelechowski & Bilimoria (2004) find that female directors do not differ significantly in terms of experience, qualifications, board tenure and company tenure, compared to male directors. Similarly, Dang et al. (2014) find that male and female directors of French companies do not differ significantly in terms of higher educational qualifications. To conclude, the first hypothesis is accepted, as there are no abnormal market returns encompassing the announcement and passage of the gender quota law. As stated by Gabaldon et al. (2016), the gender disparity appears to be a demand-driven problem, and mandating a quota increases female representation on boards, without deteriorating firm value.

Continuing with the results, table II reports the regression results of equation (2), where Tobin's Q is regressed on the shortfall of female directors over the 2008 to 2018 period. The model yields a negative $\beta = -0.025$ with a p-value of 0.269 which is statistically insignificant. This suggests that the actual shortfall of female directors is not related to Q values, which again supports the idea that the quota has a value neutral effect.

Table II
Reduced-form Q regression

	Standard Error	Standardized Beta Coefficients	t-statistic	Significance
Intercept (α)	0.072		21.654	0.000***
Shortfall (β)	0.001	-0.025	-1.105	0.269
Firm fixed effects (θ)	Yes			
Year fixed effects (τ)	Yes			
R^2	0.521			
Adjusted R^2	0.498			

Notes: This table reports the regression output of regression model (2), as specified in the methodology. The table reports the standard errors, standardized beta coefficients, t-statistics and p-values for the intercept and beta coefficient shortfall. The dependent variable is Tobin's Q for firm i at time t. The regression is run over the 2008 to 2018 period. The regression includes both firm and year fixed effects. Lastly, the table specifies the R-squared and adjusted R-squared. Significance levels are shown as *** for 1%, ** for 5% and * for 10%.

Table III presents the output of the IV regression for Tobin's Q and female director shortfall. The results of first stage of the IV regression are presented in part B, where the firm's female director shortage, $Shortfall_{it}$ is regressed on its exogenous shortfall in $T_0 = 2008$, interacted with D_t, year dummies. As expected, the magnitude of the coefficients $Shortfall_{T0}$ interacted with year dummies are declining over time, which supports the relevance assumption of the IV analysis, where the instrument has a causal effect on the independent variable.

More importantly, the second stage IV regression is presented in part A. Here, the Tobin's Q is regressed on the predicted shortfall. The model yields a coefficient β equal to 0.012 in column (2), which is statistically insignificant. This implies the female director shortfall is unrelated to Tobin's Q. Moreover, the findings support the second hypothesis, as there are no changes in Tobin's Q for companies that adhered to the gender quota. This is in line with the findings of the first hypothesis, as well as with the findings of Eckbo et al. (2019) who do not find any evidence of the quota having an impact on firm value. The market reaction to the quota news announcement is an impartial assessment of the valuation effect when market efficiency is present. This means that in following periods, there should be no systematic changes in market equity or Tobin's Q (Eckbo et al., 2019).

For robustness purposes, the model has been re-estimated using the integer number of missing female directors, $\widehat{Shortfall_{number}}$. Results are presented in table III column (2) and are consistent with the first model, with a statistically insignificant coefficient $\beta = 0.010$.

One plausible explanation to why French firms did not suffer from a decrease in value post the mandated gender quota implementation is that France has a deep pool of qualified women that can fill in board seats. According to Allemand & Brullebaut (2014) the educational and

professional backgrounds of new female directors in French large capitalization companies are comparable to those of male directors. Additionally, there no major disparities in terms of age, education (number of years of study, graduates of elite institutions), and other types of experiences can be seen among the new appointments, such as experience as CEO or international experience. Furthermore, the idea that France benefited from an ample base of qualified female candidates is also reflected by the pace at which firms increased female representation on boards. This aspect has also been mentioned by Zenou et al. (2017), as the intermediary quota of 20% female directors has been achieved one year ahead of the schedule.

To conclude the results part, the French gender quota for board of directors introduced in 2011 successfully raised female representation on boards from under 15% in 2010, to over 40% at the end of 2018. This has been achieved without a detrimental impact on firm value, as demonstrated by short-term abnormal returns and by the long-term effects on Tobin's Q. A plausible explanation to these findings, also supported by literature, is that board experience did not decrease as a result of gender balancing, provided that boards are elected in order to maximize firm value.

Table III
IV regression for Tobin's Q and female director shortfall

	Sample period: 2009-2018	
	$T_0 = 2008$	
	(1)	(2)
A: Second-stage IV regression for Q		
$\widehat{Shortfall}$	0.012	
	(0.798)	
$\widehat{Shortfall}_{number}$		0.010
		(0.665)
Firm fixed effects	Yes	Yes
Year dummies	Yes	Yes
F-statistic	38.430	37.329
N (firm-years)	1573	1573

Notes: This tabulation is the first part of Table III. It reports the second stage of the IV regression on Tobin's Q. Column 1 reports the beta coefficient for predicted shortfall and its p-value in brackets. Column 2 reports the beta coefficient for predicted shortfall expressed as an integer number with its p-value in brackets. The regression is run over the period 2009 to 2018, with T_0 as 2008. Both models include firm fixed effects and year fixed effects. The table reports the F-statistics and number of firm-year observations for both models. The R-squared values for the entire IV analysis are reported at the end of panel B. If any, significance levels would be shown as *** for 1%, ** for 5% and * for 10%.

Table III continued

IV regression for Tobin's Q and female director shortfall

	Sample period: 2009-2018	
	$T_0 = 2008$	
	(1)	(2)
B: First-stage IV regression for *Shortfall*		
$Shortfall_{T0} \times D_{2009}$	0.630***	0.582***
	(0.000)	(0.000)
$Shortfall_{T0} \times D_{2010}$	0.546***	0.471***
	(0.000)	(0.000)
$Shortfall_{T0} \times D_{2011}$	0.320***	0.318***
	(0.000)	(0.000)
$Shortfall_{T0} \times D_{2012}$	0.265***	0.198***
	(0.000)	(0.000)
$Shortfall_{T0} \times D_{2013}$	0.222***	0.169***
	(0.000)	(0.000)
$Shortfall_{T0} \times D_{2014}$	0.143***	0.127***
	(0.003)	(0.001)
$Shortfall_{T0} \times D_{2015}$	0.101**	0.048
	(0.033)	(0.220)
$Shortfall_{T0} \times D_{2016}$	0.011	0.009
	(0.818)	(0.669)
$Shortfall_{T0} \times D_{2017}$	0.005	0.003
	(0.901)	(0.912)
$Shortfall_{T0} \times D_{2018}$	-0.015	-0.023
	(0.757)	(0.550)
Firm fixed effects	Yes	Yes
Year dummies	Yes	Yes
F-statistic	37.373	31.581
R^2	0.625	0.601
Adjusted R^2	0.579	0.569
N (firm-years)	1573	1573

Notes: This tabulation is the second part of Table III. It reports the first stage of the IV regression on Tobin's Q. Namely, this table reports the beta coefficients of the shortfall at T_0 interacted with year dummies over the period 2009 to 2018. Similarly to panel A, column 1 reports the beta coefficients for shortfall expressed as percentage, while column 2 reports the beta coefficients for shortfall expressed as integer numbers. Both models include firm fixed effects and year fixed effects. The table reports the F-statistics, number of firm-year observations, as well as the R^2 and adjusted R^2 for both models.

5. Conclusion

The purpose of this study was to examine the impact of the mandatory French quota of female directors on firm value. The quota has been firstly announced at the beginning of 2010 and prescribed that boards of directors of French companies should seek a gender balanced representation, and mandated an intermediary target of minimum 20% female representation in 2014, and a 40% target by the end of 2017. The quota was inspired by the global trend to increase female presence in executive positions, as pioneered by Norway in 2003 with the first law of this kind.

Following the introduction of gender quotas for bords of directors in multiple countries, many studies have emerged aiming to analyse the impact of such laws on firm value. Most notably, the studies of Ahern and Dittmar (2012), Matsa and Miller (2013) and Eckbo et al. (2019) found contrasting evidence on the effect of gender quotas on Norwegian firms' value. As numerous countries have introduced similar laws and the academic literature documents inconclusive results, this study aims to provide an additional perspective by examining a similar hard law quota in the setting of France. Therefore, the central research question of this paper has been formulated as follows:

How does the implementation of gender quota for boards of directors affects the value of French firms?

To answer the research question, this paper follows the methodological approach used by Ahern and Dittmar (2012) and Eckbo et al. (2019). In more detail, the paper used two distinctive approaches to determine the impact of the gender quota on French firm's value. Firstly, I conducted an event study aimed at quantifying the initial market reaction of investors at the announcement and passage of the law. Secondly, I deployed an instrumental variable analysis to determine the long-term impact of the quota on firm value, as measured by Tobin's Q.

The results of both approaches reconcile and are consistent with the hypotheses that the introduction of the gender quota has a neutral effect on firm value. Specifically, the study found no abnormal market returns during the announcement and passage of the quota and found no significant changes in Tobin's Q during the implementation period.

The research contributes to the literature in a number of ways. Firstly, it sheds more light on the effect of mandatory gender quotas. Given the large scale implementation of the law in

France, more observations are be available to use, compared to Norwegian studies. Secondly, as the law is passed eight years after Norway's law in 2003, the managerial pool of qualified women has likely grown since then. The research could have implications in governments, law makers, as well as, shareholders and company managers. Moreover, countries which have not implemented such a quota until now could review the effects which took place in France. Lastly, companies which are not subject to the law, can decide if such a quota would be beneficial, if implemented at company level.

The results of this paper align with those of Eckbo et al. (2019), and supports the idea that mandated gender quotas do not have any influence on the value of subject companies. Furthermore, this stance is opposed to that of Ahern and Dittmar (2012) and Greene et al., (2020) who advocate that mandated changes in board representation disrupt the value-maximizing election of directors, lowers board experience, and in turn negatively impacts firm value.

There are a number of limitations pertaining to this study. Firstly, the scope of the French quota is much broader than tested in this study. The quota applies to both listed and non-listed French firms, with at least five hundred permanent employees and have a net turnover or balance sheet of at least € 50 million. The study only focuses on the publicly listed companies, as the event study requires stock prices. Moreover, the BoardEx database has data available only for listed companies, as well. Having said that, smaller, non-listed companies might have lower capabilities in attracting competent female directors, or compromise in having less experienced female directors. In that sense, the firms excluded from this study might have different characteristics which could change the outcome of this study. Secondly, the BoardEx database does not differentiate between one-tier and two-tier boards. The corporate structure might play a role in the outcome of this study.

An avenue of future research on this topic could be to analyse multiple countries which implemented a mandatory gender quota and to reconcile the results between jurisdictions. This would determine whether French firms have a particularly favourable access to a deep pool of qualified and experienced female directors, or this is a generalizable characteristic across a continent, such as Europe.

Lastly, additional attention could be focused on the possibility that certain French firms intentionally position themselves below the quota requirements in order to avoid being subject to it.

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7. Appendices

Appendix A: Key events leading to the implementation of the French quota

Event number	Date	Event description
1	January 20, 2010	First reading of the law in the National Assembly. The draft text was adopted by the National Assembly, which outlines the 40% gender quota on executive boards.
2	January 13, 2011	Second reading of the law in the National Assembly. Final text was adopted definitively by the National Assembly.
3	January 27, 2011	Law n° 2011-103 was promulgated and published in the Official Journal.

Appendix B: Required percentage of female directors based on board size

Board size	Required number of female directors	Required percentage of female directors (Shortfall)
2	1	50%
3	1	33%
4	2	50%
5	2	40%
6	3	50%
7	3	43%
8	3	38%
9	4	44%
10	4	40%
11	5	45%
12	5	42%
13	6	46%
14	6	43%
15	6	40%
16	7	44%
17	7	41%
18	8	44%
19	8	42%
20	8	40%
21	9	43%
22	9	41%
23	10	43%
24	10	42%
25	10	40%
26	11	42%
27	12	44%

Notes: This table reports the required number and percentage of female directors for a specific number of total directors,

Appendix C: Variable averages and firm observations 2006-2018

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Firm observations	183	188	185	186	186	190	191	198	194	209	212	201	185
Percentage of female directors	8.0%	8.5%	9.4%	9.8%	11.7%	16.5%	19.6%	22.8%	27.4%	29.8%	34.8%	40.1%	41.0%
Shortfall of female directors (%)	34.7%	34.4%	33.4%	32.9%	31.3%	26.4%	23.1%	20.1%	15.3%	12.9%	7.5%	2.6%	1.5%
Number of directors	11.30	11.16	11.37	11.30	11.46	11.37	11.24	11.18	11.38	10.99	10.90	11.00	11.09
Number of employees	25,801	25,859	26,160	28,230	31,153	33,629	35,511	32,804	30,812	29,933	26,488	29,946	36,886
Total assets (in million €)	38,512	41,092	45,855	44,447	45,890	46,690	48,208	43,964	48,922	44,775	45,971	46,031	51,933
Tobin's Q	1.51	1.43	1.07	1.18	1.22	1.10	1.15	1.24	1.25	1.28	1.31	1.41	1.24

Notes: This table reports the mean values for each variable used in this study for the period 2006 to 2018.

Appendix D: Summary Statistics

Variable	Mean	Median	SD	Min	P1	P99	Max
Percentage of female directors	0.22	0.20	0.15	0.00	0.00	0.54	0.66
Shortfall of female directors	0.21	0.22	0.15	-0.33	-0.12	0.50	0.50
Number of directors	11.20	11.00	4.01	2.00	4.00	21.00	27.00
Number of employees	30,234.01	3,118	62,441.78	10	10	333,609.11	495,287
Total assets (in million €)	45,572.99	1,898.78	210,424.40	44.69	61.78	1,378,891.50	2,077,759
Tobin's Q	1.26	1.10	0.49	0.62	0.62	3.63	3.64

Notes: This table reports the mean, median, standard deviation, minimum, 1st percentile, 99th percentile and maximum values for each variable used in this study.