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Les femmes au pouvoir: Economic effects of mandated female board  
representation

Evidence from the French gender quota

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## Abstract

This thesis finds that the French gender quota has negatively influenced firm value. In both the short-term and long-term analysis, a significant relationship is found between the number of female directors prior to the initiation of the quota in 2009 and firm value after 2009. The French gender quota is significantly associated with lower cash holdings and lower growth in terms of total assets, but no association with capital expenditures, leverage and revenue growth and profitability could be identified. This thesis contributes to the discussion on gender quota, because the empirical results suggest that quotas cause negative economic effects. The discussion is relevant because gender diversity policies are increasingly popular in Europe. This thesis enriches the literature on the price that is paid for mandated gender diversity.

Keywords: Gender diversity, board diversity, gender quota, France, female directors, firm value, corporate policy, profitability

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## I. Introduction

The relationship between diversity and firm value has been a popular research subject for more than two decades. Carter, Simkins and Simpson (2003) were the first to present empirical evidence that board diversity in terms of gender and ethnic minorities is associated with increased firm value. Erhardt, Werbel and Schrader (2003) also find support for their hypothesis that diversity in the executive board of directors is positively associated with return on investments and return on assets. The positive relationship between diversity and firm value can be linked to several reasons. For example, a diverse company better reflects its customers and is therefore better able to understand the market. Next to that, diverse boards appear to adopt a broader perspective, which improves their ability to solve complex business challenges (Robinson and Dechant, 1997).

These findings are clearly in favour for diversity in corporate boards. However, creating equal representation of the sexes in the board room has proven to be difficult. The Social and Economic Council in the Netherlands (SER) recently stated that the liberal target of 30% women in corporate boards, set by the Dutch legislator, has not been effective. The target is not registered in Dutch company law, but in their Code of good Corporate Governance. To speed up the gender diversity, the SER started a campaign for a binding gender quota of 30% (SER, 2019). This campaign has been successful, as a majority of the Dutch parliament agreed on introducing the recommended quota (Kammer and Sterk, 2019).

The Netherlands would not be the first country to require firms to adopt diverse boards by law. Norway acted as a frontrunner by approving a binding quota already in 2003. Many European countries followed, starting from 2010 onwards. The quotas are hard to compare, since they differ on many levels. The thresholds range from 20% to 40%, sometimes with intermediate thresholds in an adjustment period. Secondly, the scope is different across countries. Quotas can be for state-owned enterprises, publicly listed companies, or both. Additionally, within publicly listed companies, companies can be excluded based on number of employees or book assets. Lastly, a distinction can be made between executive and non-executive boards and sanctions range from withholding fees to voiding the appointment (Terjesen, Aguilera and Lorenz, 2015).

A rough distinction can be made between two arguments for pursuing board diversity. One reason is to think boards should be more diverse because it is the right thing to do. Another reason is to think that boards should be more diverse because it improves shareholder value (Carter, Simkins and Simpson, 2003). For the second reason, equal representation is a means to higher goal. For the first reason, equal representation is the goal itself (Brammer, Millington and Pavelin, 2007). A gender quota is an effective measure in pushing up the percentage of women in the board room. Figure I provides an overview of female board representation in countries that adopted a quota. All countries show an increase in female directors. It also becomes apparent that countries which set higher requirements succeed in achieving

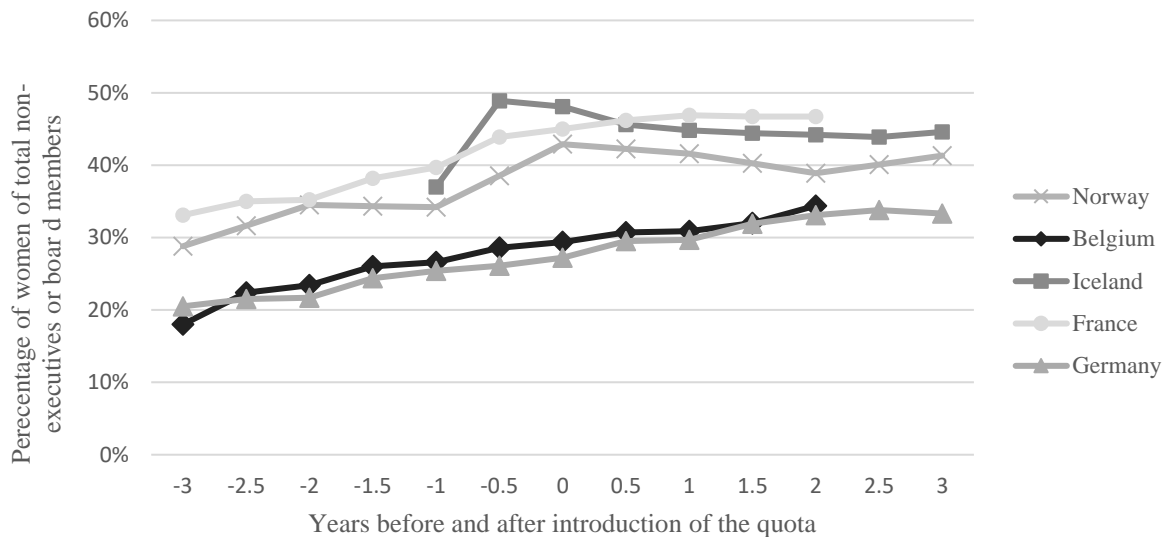


Figure I

Development of female board representation before and after the introduction of a quota

Norway was the first country to officially apply and maintain a quota in 2008. Iceland followed in 2013, Germany in 2016 and Belgium and France in 2017. Norway, Belgium and France require a minimum percentage of all board members, Iceland and Germany from non-executives only. Norway, Iceland and France require a percentage of 40%, Belgium requires 33% and Germany requires 30%. France used an intermediate quota of 20% from 2014 onwards. Data are retrieved from the European Institute for Gender Equality (EIGE). Information about the characteristics of the quota is from Seierstad, Gabaldon, and Mensi-Klarbach (2017).

higher female board representation. Therefore, it can be argued that a gender quota is an appropriate measure considering the ethical motive that women deserve an equal share of the board room.

It is not necessarily true that increased representation of women as a result of a quota also brings along the increased firm performance that Carter, Simkins and Simpson (2003) and Erhardt, Werbel and Schrader (2003) find. A quota, in whatever form, can limit a firm's number of eligible candidates for board positions. This restriction can damage the quality of the board composition, which will likely hurt the value of the firm. In fact, Ahern and Dittmar (2012) find that the Norwegian quota led to a substantial decline in firm value. They find that when the law was announced, firms with no female directors experienced a significantly lower return than firms with at least one female director, suggesting boards are chosen to maximize shareholder value. They also provide evidence that following the years after the introduction of the law, firms suffered from a lower firm value. The Norwegian quota was by far the first binding legislation on female board representation. Despite the negative economic consequences found by Ahern and Dittmar (2012), many other countries have introduced or consider introducing binding gender quota. Because of the novelty of gender quotas, the economic consequences have not been investigated extensively. Therefore, the research question of this thesis is as follows:

*Does increased female representation on corporate boards mandated by a gender quota influence firm value?*

This thesis focuses on the French gender quota, named the Copé Zimmerman law. The was initiated by Jean-Francois Copé and Marie-Jo Zimmermann in December 2009. The French parliament voted for the law in January 2011. The quota requires boards of French firms to consist of at least 40% women by 2017. The law also includes an intermediate step of 20% in 2014. Section III elaborates on the French gender quota in more detail.

This thesis finds a significant negative association between the French gender quota and firm value. Both short-term and long-term regressions suggest that firm value was damaged. The abnormal returns around the announcement of the quota were significantly worse for firms without female directors. Next to that, firms experienced worse Tobin's Q values in the years after the introduction of the quota. Interestingly, no significant effects could be found on any form of profitability.

The rest of this thesis is organised in the following sections. The next section discusses literature about board composition, the relationship between female representation and firm value and the effects of quotas on firm value. Section III reviews the French corporate governance system and its quota and describes the hypotheses. Section IV explains the methodology and data to test the hypotheses. Section VI discusses the empirical results. Lastly, section VI concludes.

## II. Theoretical framework

In this section I elaborate on the rationale for quotas. Arguments for and arguments against quotas can be divided in ethical and economic arguments. First, I discuss the ethical arguments, followed by the economic arguments. Since this thesis investigates gender quotas, I leave out arguments that are only relevant for diversity in terms of race, ethnicity or age. Thereafter, I describe evidence on the relationship between gender diversity and firm value, without quotas being involved. In subsection C, I highlight the existing literature on the economic effects of quotas that are already in place. The section concludes with a summary of the described literature. Appendix A provides an overview of the arguments for and against quotas. Appendix B provides an overview of the evidence on the relationship between diversity and firm value.

### *A. Arguments for and against quotas*

An ethical argument in favour of quotas is that the natural outcome of corporate boards is strongly dominated by males, with few exceptions. A more equal distribution of board positions is fairer and better reflects society (Brammer, Millington, and Pavelin, 2007). This argument is the core of most gender diversity policies. When the Norwegian Minister of Trade and Industry Ansgar Gabrielsen introduced the quota in 2002, he claimed to be sick and tired of the "old boys club", controlling most of the board positions in the Norwegian private sector. The minister criticized the current system in which directors 'do not compare CVs' to appoint people to open board positions. Opponents can argue

that quotas put restrictions to the freedom of appointing the best available candidates to the board. These type of affirmative action policies utilize discrimination in order to fight discrimination (Fullinwider, 1980).

Economic arguments focus on boards dominated by males as suboptimal, rather than immoral. Women may have exceptional abilities that are not being utilized when the decision-making of the firm is performed and monitored by men only. On the other side, opponents argue that any restriction put on board composition can limit a firm to choose their directors that maximize firm value. I discuss both sides of the debate.

Women can bring additional perspective to the board, which improves the ability to monitor the executives in their decision making. A broader view yields evaluation of more alternatives and better understanding of the firm's challenges. (Campbell and Mínguez-Vera, 2008). Besides understanding potential customers and monitoring executives, heterogenous boards are also found to be more creative and innovative (Cox and Blake, 1991). Heterogeneity improves the level of critical analysis and consideration of alternatives in decision making. I also suspect that female talent prefers to work at a gender balanced firm rather than a firm dominated by males. This hypothesis also promotes board diversity, although I did not find empirical evidence for this.

In business-to-customers industries specifically, diverse boards better reflect the diversity that is present at their potential customers. This enables them to better penetrate new markets (Campbell and Mínguez-Vera, 2008). Brammer, Millington, and Pavelin (2007) argue in accordance with this theory that in the United Kingdom, firms in the business-to-customers industries, like retail, banking and media, had significantly more female directors than firms with less exposure to final customers. Next to that, firms with diverse boards have a better corporate image, resulting in improved financial performance (Smith, Smith and Verner, 2006).

On a biological level, there is evidence that women generally have more flexible cognitive structures, yielding a board that has more organizational flexibility. Women are for example better at performing ambiguous tasks and have higher levels of divergent thinking (Cox and Blake, 1991).

There is also literature that claims diversity is not beneficial to companies. People with the same characteristics appear to communicate more frequently, since they often have the same point of view (Earley and Mosakowski, 2008). Homogenous groups would also be more cooperative and are less likely to end up in emotional conflicts (Williams and O'Reilly, 1998). The increased perspective and broader view on firms' problems and criticism on directors also results in less effective decision-making (Bøhren and Strøm, 2007). The decisions may be of better quality, but this advantage does not outweigh the costs of poor timing when the challenges require quick action (Lau and Murnighan, 1998).

There are also biological arguments that gender diversity may come with a price. Andreoni and Vesterlund (2001) find that when the price of giving is low, men are more altruistic, but when the price is high, the opposite is true. Men appear to be more price elastic. Furthermore, women are more risk averse (Jianakoplos and Bersanek, 1998), tend to change jobs more often (Cox and Blake, 1991) and have higher absenteeism rates (Ichino and Moretti, 2006), all leading to higher costs or less productivity.

### *B. Theory on diversity and firm value*

The theories on the value or disvalue of diversity has caused many researches to investigate the subject empirically. The majority finds a positive relationship between gender diversity and firm value. However, some authors have found mixed results or negative relationships. Campbell and Mínguez-Vera (2008) reason that the discrepancy originates from different time periods and different countries. On top of that, there is variety in the used estimation methods, like the use of different control variables. Appendix B provides an overview of the findings by different authors.

Most studies have focused on the United States. Shrader, Blackburn and Iles (1997) did not find a significant relationship between female representation and different profitability measures. Carter, Simkens and Simpson (2003) find positive relationships between gender diversity and firm value. Six years later, Shrader again researched this topic and finds a positive association between profitability and diversity, gender and ethnic diversity combined (Erhardt, Werbel and Shrader, 2003). Farrell and Hersch (2005) investigate the reaction of stock prices to the appointment of female directors. They find no significant results, even when the female director joined a board of males only. In two studies focused on Denmark, no clear relationship was found between firm value and gender diversity. Smith, Smith and Verner (2006) found mixed results, depending on the methodology used. Rose (2007) did not find a significant relationship between Tobin's Q and female board representation.

Contrary to other studies, Bøhren, and Strøm (2007) found a negative association between board diversity and firm performance in Norway, in a period before the introduction of their quota. Board diversity was measured as board size, female directors and employee directors. Randøy, Thomsen and Oxelheim (2006) find that in a sample from Norwegian, Swedish and Danish firms, no significant effect exists between diversity and firm value. Campbell and Mínguez-Vera (2008) find no evidence in Spain for a positive relationship between the presence of at least one female director and firm value. They do find a significant association between the percentage of female directors and firm value. Finally, Terjesen, Couto and Francisco (2015) find that across 47 countries firms with more female directors have a higher Tobin's Q and return on assets, controlled for various corporate governance mechanisms.

### *C. Theory on quotas*

The impact of gender quotas has not been investigated extensively, because most of the quotas have been introduced in the last 10 years. One clear exception is Norway, in which the quota was announced



already in 2002. Norway passed the law in the end of 2003, setting a voluntary target for public limited liability company to have 40% board representation by women by July 2005. Because the voluntary target did not have the desired effect, the quota became mandatory in January 2006. After a transition period of two years, firms who did not comply were to be dissolved. All firms within the scope of the law complied in April 2008.

Ahern and Dittmar (2012) researched the economic effects of the Norwegian quota and categorized three different possible outcomes. The first outcome is that the quota leads to a decline in firm value. The explanation is that boards are chosen to maximize value and any restriction on the appointment of board directors possibly leads to a suboptimal board and a lower valuation (Demsetz and Lehn, 1985). The second outcome is that the quota leads to an increase in firm value. Ahern and Dittmar (2012) link this scenario to either better monitoring because of the forced addition of female directors or the benefits of diversity itself. Lastly, if the quota does not have influence on firm value, it may be a sign of the new appointed directors only window dressing, to comply with the regulation.

Research on the short run effects shows that at the cumulative abnormal return in the five days surrounding the announcement of the law in 2002, was -2.57%, significantly different from zero (Ahern and Dittmar, 2012). The abnormal return was computed by subtracting the average return of firms in the United States from Norwegian firms in the same industry. For firms with no female directors, the abnormal return was -3.55%, compared to -0.02% for firms with at least one female director.

Ahern and Dittmar (2012) also question the effects of quotas on long run firm value. They find that between 2002 and 2009, an increase of 10% in female board representation is associated with a decline in Tobin's Q of 0.19, with a mean of 1.53 across their sample. This result suggests that Norwegian firms suffered from the requirement to appoint women to the board. In a following test they also find evidence that firms with no female directors in 2002 had a significantly worse Tobin's Q in the years 2007 until 2009, compared to firms with at least one female director in 2002. The difference in 2009 in Tobin's Q was 0.25. This result is an indication that the loss in firm value is persistent for a longer time.

The evidence suggests the forced appointment of women led to losses in firm valuation. Investors seem to seem to value firms less when they are obligated to act to fulfil the quota requirements. Firms that were free to appoint any director without restrictions from the quota showed higher Tobin's Q values. This result is in line with the theory that firms choose boards that maximize shareholder value.

Subsequently, Ahern and Dittmar (2012) try to understand what has caused the loss in value. They study decisions about financial and investment policies and find that firms increase their financial risk as a result of the quota: leverage increased and cash holdings declined. Next to that, firms that suffered most from the quota engaged in more acquisitions than firms who suffered less.

Matsa and Miller (2013) also investigate the Norwegian quota, but focus on performance aspects, like operating profit and labour costs. The quota leads to a decline in profitability, by 4.1% of assets. They control for external influences to listed firms or Norwegian firms in general. The decline in profitability was not caused by a significant decline in revenues. The only type of costs that played a significant role was labour costs.

Bøhren and Staubo (2016) find evidence in line with Ahern and Dittmar (2012) and Matsa and Miller (2013). They also find that the Norwegian quota caused a loss in firm value, and link this to the independence of directors. Adams and Ferreira (2007) describe that optimal independence of corporate board is a tradeoff between independent (outside) directors for their role as monitor and dependent (inside) directors for their role as advisor. Newly appointed female directors are more likely to be independent. Bøhren and Staubo (2016) conclude that firms that were forced to appoint women to the corporate board suffered from a lack of advice from dependent directors.

The research of Ahern and Dittmar (2012) and Matsa and Miller (2013) suggest that quotas come at a significant cost. Whether measured as stock return around the announcement date, long run firm valuation captured by Tobin's Q or short run profitability, the limit put on board composition seems to have negative economic consequences. However, there is also literature that could not find the negative impact of the gender policy. Nygaard (2011) focuses on abnormal returns around the date when the quota became binding legislation in December 2005. He finds positive cumulative abnormal returns for firms with few female directors and low information asymmetry and insignificant abnormal returns for firms with few female directors and high information asymmetry. This suggests that the new female directors were able to add value when they were not limited by information asymmetry. Five years later, Nygaard criticizes his own findings because firms that did not fall within the scope of the quota experienced similar abnormal returns, suggesting the returns originate from other reasons than the imposed quota (Eckbo, Nygaard and Thorburn, 2016). They further point out that the event used in Ahern and Dittmar (2012) for short run effects is not appropriate on its own. They test abnormal returns of eleven different events that played a role in the development of the quota and find no evidence of negative effects on the value of firms. In their long run analysis, they also do not find a significant negative relationship between the magnitude of shortfall of female directors and Tobin's Q.

#### *D. Summary*

This section started with a survey of arguments for and against gender quotas. One can argue that gender quotas cause a fairer distribution of board positions, but one can also argue that quotas disturb the free appointment of eligible candidates. Economically there are proponents and opponents as well. There is some theory which states that homogenous groups would perform better, but heterogenous boards would have a better corporate image, would be better able to penetrate new markets and are more creative and innovative. There has been plenty of research to examine these theories empirically. Most

of this research finds a positive relationship between gender diversity and firm value. Despite quotas being introduced mainly because of the ethical argument that it creates a fairer society, it is still interesting and relevant to see whether diversity creates value as well if it is mandated. The current evidence finds that the Norwegian quota has led to a decrease in firm value. Since all evidence until today concerning the effects of quota focuses on the Norway, it is particularly interesting to widen the scope to other countries as well. The next section describes the French quota and its background, followed by the hypotheses of this thesis.

### III. The French quota

This section elaborates on France as the subject of this thesis. I explain corporate governance aspects in France and the quota that has been introduced. Finally, I describe the hypotheses.

In general, governments require firms to have either a one-tier board or a two-tier board structure. A one-tier board consists of a board of directors led by a Chief Executive Officer (CEO). A two-tier board is a dual structure with an executive board and supervisory board. French firms have the freedom to choose either one of the two systems. 65% of the French firms have a one-tier board (Zenou, Allemand and Brullebaut, 2017). The minimum allowed number of directors is 3, the maximum is 18. France is further characterised by the large share of family-owned firms. Even of the listed firms, 70% is family owned (Sraer and Thesmar, 2007). The French state is known to have much power on firms through participations. Although several privatization waves since 1986 have shifted control towards the market, some governmental influence is still present today (Berne & Pogorel, 2004). Directors are appointed by the general meeting of shareholders. Boards may have a nominating committee who propose directors to be appointed by the general meeting of shareholders. Share ownership in France is relatively concentrated, probably because of the large involvement of families who retain their stakes in the firm for more generations (Millet-Reyes and Zhao, 2010).

Like many other countries, France also has a code on good corporate governance. The first principles were set out in the Viénot I report in 1995. Multiple updated versions followed, but it was only in 2010 that a recommendation about gender board diversity was included. The clause states that ‘Each board should consider what would be the desirable balance within its membership (...), in particular as regards the representation of men and women (...). The clause further sets the objective that each board shall achieve a percentage at least 20% women within three years and at least 40% within six years (AFEP-MEDEF, 2010).

The first law on gender equality was the Roudy law in 1983. The equality rights were improved by the law Génisson. Equality in terms of labour conditions were established, but there was no regulation yet on the composition of corporate boards. On the 4<sup>th</sup> of December 2009, parliamentarians and members

of the UMP group Marie-Jo Zimmerman and Jean-François Copé initiated a law that required firms to have boards consisting for at least 50% of women, in five years. The law passed the parliament after modification on the 13<sup>th</sup> of January 2011, requiring a minimum of 40% in 2017 and 20% in 2014, similar to the code. The Copé Zimmerman law applies to listed or non-listed firms with total assets or revenues greater than 50 million euros, or firms with more than 500 employees for three successive years. In a one-tier board structure, the law applies to all directors. In a two-tier board structure, only the supervisory board must comply. If a firm violates the law, all unlawful appointed directors are nullified and director fees are not allowed to be paid. Firms with more than 5000 employees in France or 10.000 employees worldwide have to appoint two board members who represent the employees, or one if the board consists of 12 members or less. These board members are not taken into account for calculating the required female ratio of 40% (Zenou, Allemand and Brullebaut, 2017).

The research question is whether increased female representation on corporate boards, mandated by a gender quota, influences firm performance. This thesis focuses on the French quota, as it is one of the quotas that is in full operation. Firms with few female directors will be affected most by the quota. These firms will have to act to reach the intermediate level of 20% and final level of 40% of female directors. The scenario that these firms perform better after the adoption of the quota would be an indication that the quota has a positive influence on firm value. Consequently, if these firms perform worse, it suggests that the quota has a negative influence on firm value.

The current evidence on the economic effects of the Norwegian quota suggests that mandated female board representation damages firm value. Therefore, I predict that the French quota also leads to negative economic impact.

The short-term effects are tested by comparing the abnormal returns of firms with different board gender ratios around December 4<sup>th</sup> 2009, when the Copé Zimmermann law was initiated and the January 13<sup>th</sup> 2011, when the law was adopted. The long-term effects are measured by comparing firms' development of Tobin's Q values after the initiation of the quota.

*Hypothesis 1: The French gender quota negatively influences firm value*

The first hypothesis is tested in multiple ways. The first tests are event studies on the cumulative abnormal returns around two critical dates in the legislative process. A subsequent test measures the impact in the long run by examining the impact of the quota on Tobin's Q.

If the first hypothesis turns out to be accepted, it is interesting to explore the cause of this effect. The gender quota may have driven several changes in corporate policy that impact firm value. I test if the quota has caused changes in the corporate policy of firms, by measuring levels of leverage, capital expenditures, cash holdings, assets growth and revenue growth. Asset and revenue growth are defined as the level of total assets and sales relative to the previous year. As firm value is expected to decrease

as a result of the quota, the corporate policy measures are also expected to be worse. This means higher leverage and lower capital expenditures, cash holdings, asset growth and revenue growth. This relationship is in line with the results of Ahern and Dittmar (2012).

*Hypothesis 2a: The French gender quota causes an increase in the level of leverage*

*Hypothesis 2b: The French gender quota causes a decrease in capital expenditures*

*Hypothesis 2c: The French gender quota causes a decrease in cash holdings*

*Hypothesis 2d: The French gender quota causes a decrease in asset growth*

*Hypothesis 2e: The French gender quota causes a decrease in sales growth*

Lastly, I test whether the quota has influenced the profitability of firms. A significant drop in profitability as a result of the quota would be an indication of direct impact associated with the quota.

*Hypothesis 3: The French gender quota causes a decrease in profitability*

This section discussed some characteristics of corporate governance in France, the adopted gender quota from 2011 and the hypotheses. The next section, the Methodology and Data, explains how the hypotheses are tested. Furthermore, the data gathering is described and a summary of the data is provided.

## IV. Methodology and Data

In this section I discuss the used methodology to test the hypotheses and the sources and characteristics of the data. The methodology is for most part based on that of Ahern and Dittmar (2012). Appendix C provides an overview of variable definitions.

### A. Methodology

To estimate the short-term effects of the quota, I compute cumulative abnormal returns (CARs) on two critical events in the legislative process. The first event is the 4<sup>th</sup> of December 2009, the day that the first version of the law was initiated. The announcement was probably quite unanticipated, as the initiation of new regulation requires caution and proper preparation. However, a law initiated by only one political party is far from being passed by the government. Therefore, I also examine the 13<sup>th</sup> of January 2011, the day the law was adopted by the French parliament. On this day it became certain that the quota was to become official legislation. Firms then knew for sure that they had to work towards the ratio of 40% in 2018. To calculate the short-term effects, I look at the cumulative stock returns five days surrounding the event. The interval of five days is chosen to be sure that the full effect of the event is captured. From the cumulative return I subtract five times the firm's average daily return from the

past 250 trading days. This way I correct for the expected return of the firm, which leaves the abnormal return caused by unexpected events on the selected day.

First, I compare the CARs of firms with zero female directors to firms with at least one female director. Firms with zero or few female directors are affected more than their competitors with more female directors. Firms with few female directors experiencing worse returns than competitors with more female directors is an indication that investors consider the quota as bad news.

Thereafter, I regress the CARs on female board presence, measured as either a dummy for whether a firm has at least one woman in its board or the percentage of female directors. Dummies for firm size quartiles, levels of leverage and profitability are added in the regression as control variables. Profitability is measured as the return on sales. I also report the regressions without these control variables.

$$(1) \text{ CARs} = \alpha + \beta_1 * \text{female} + \beta_2 * \text{firm size quartile} + \beta_3 * \text{leverage} + \beta_4 * \text{return on sales} + \varepsilon$$

The second part of the firm value analysis focuses on the long term. I use the period between 2005 and 2018. The first important event was the initiation of the gender quota in December 2009. I obtain data from 2005 until 2009 to get a balanced sample with enough observations prior to initiation. After the event I obtain data until 2018, the most recent year for annual reports.

The dependent variable is Tobin's Q. Tobin's Q is the capital market value of the firm divided by the replacement value of its assets (Montgomery and Wernerfelt, 1988). Tobin's Q takes into account the investor's expectations of future earnings and is therefore an appropriate variable to measure long-term value. Appendix B shows that Tobin's Q is widely used in similar economic literature. Tobin's Q is computed as total book assets minus ordinary equity, plus market equity, divided by total book assets. Market equity is equal to the share price multiplied by the total shares outstanding. Many studies use only one share price that counts for the entire year. This is risky, as share prices can fluctuate wildly. Therefore, I take the average market value of every last day of the month to obtain a balanced market value for one firm-year observation.

The goal of the regressions on firm value is to analyse whether firms with low female representation underperformed compared to firms with more females in their board. Equation 2 is a simple regression that estimates the effect of the number of female directors on Tobin's Q, not considering the effects of the gender quota. Equation 3 adds a dummy to the regression that equals one if the observation is after the initiation of the quota, to measure its effect. Equation 4 estimates the effect of the quota by regressing an interaction term of the female director variable times year dummies. This regression estimates the effect of pre-quota female presence on each year separately.

The variable for female presence in equation 3 and 4 is a dummy for whether the firm contained a female director in 2005. An alternative I use is a variable that takes the average of 4 dummies for whether the firm contains at least one female director in 2005 until 2008. For example, if a firm has female directors since 2007, the variable yields a value of 0.5. In equation 3 and 4, the female director variable is time invariant. This means that the female director dummy is 1 if the firm contained at least one female director in 2005, regardless of in which year the observation is.

The variation in female board members prior to the quota is used as a proxy for the effort that was needed to comply with the intermediate requirement in 2014 and full quota in 2018. A negative relationship between female board representation prior to the quota and firm performance after adoption of the quota suggests that the quota had negative impact on firm performance. The sample is divided into four quartiles based on total assets to control for size. Other control variables are leverage, board size and return on sales as a proxy for profitability. All long-term regressions include firms fixed effects ( $\gamma$ ) and time fixed effects ( $\delta$ ). The following equations are tested, where  $i$  indicates firms and  $t$  indicates years.

$$(2) \text{ Tobin's } Q_{i,t} = \alpha + \beta_1 * \text{female}_{i,t} + \beta_2 * \text{control variables}_{i,t} + \gamma_i + \delta_t + e_{i,t}$$

$$(3) \text{ Tobin's } Q_{i,t} = \alpha + \beta_1 * \text{female}_i * \text{post initiation dummy}_t + \beta_2 * \text{control variables}_{i,t} + \gamma_i + \delta_t + e_{i,t}$$

$$(4) \text{ Tobin's } Q_{i,t} = \alpha + \beta_1 * \text{female}_i * \text{year dummy}_t + \beta_2 * \text{control variables}_{i,t} + \gamma_i + \delta_t + e_{i,t}$$

The first four equations attempt to provide insight into whether the French quota has influenced firm value. The next step is to investigate whether these results can be linked to changes in corporate policy and profitability. The same methodology is used as in the long-term analysis. Equation 5 and 6 summarize the tests on corporate policy and profitability. Equation 5 tests the effects caused by the quota on leverage, capital expenditures, cash holdings, asset growth and revenue growth. Equation 6 tests the effects caused by the quota on return on assets, return on equity and return on sales.

$$(5) \text{ Corporate policy}_{i,t} = \alpha + \beta_1 * \text{female director dummy 2005}_i * \text{post initiation dummy}_t + \beta_2 * \text{control variables}_{i,t} + \gamma_i + \delta_t + e_{i,t}$$

$$(6) \text{ Profitability}_{i,t} = \alpha + \beta_1 * \text{female director dummy 2005}_i * \text{post initiation dummy}_t + \beta_2 * \text{control variables}_{i,t} + \gamma_i + \delta_t + e_{i,t}$$

## *B. Data*

In this subsection I describe data used in this thesis. The data on board characteristics is retrieved from the BoardEx database. French stock price data to calculate the announcement returns for the short-term analysis and market equity values are collected from Compustat Global.

Firms that do not fall within the scope of the quota are deleted from the sample. Firms are restricted by the quota if they have assets worth over €50 million or more than 500 employees for at least three consecutive years. Because the first relevant year is 2005, I extract data from 2003 and create lagged variables to see if a firm-year observation is restricted by the quota. The data has some missing values for the employees variable. This is a problem when total assets are less than €50 million, because then the number of employees is essential to whether the firm falls within the scope of the quota. Observations with total assets worth less than €50 million have more than 500 employees in only 2% of the sample. That is why I assume that if total assets are less than €50 million and the number of employees is missing, the observation does not fall within the scope of the quota.

To compute the event return of the initiation of the law I select the five days surrounding the event date. That means I compute the cumulative returns of December 2<sup>nd</sup> until December 8<sup>th</sup> 2009 for the initiation of the law and of January 11<sup>th</sup> until January 17<sup>th</sup> 2011 for the adoption of the law.

Observations with leverage values of higher than 1 are winsorized. Return on assets and return on equity are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentile. Tobin's Q values have been winsorized at different percentiles to see if the results change, which they did not. Table I provides summary statistics of all relevant variables. Appendix C provides definitions of all the used variables.

Figure II presents the development of female board representation of the data sample. The average representation almost hits the threshold of 40% in 2018. However, this number only an average. The female board representation is not concentrated among firms, as the share of firms reaching the threshold of 40% is only 61%, despite the steep increase in the years before the quota became mandatory.



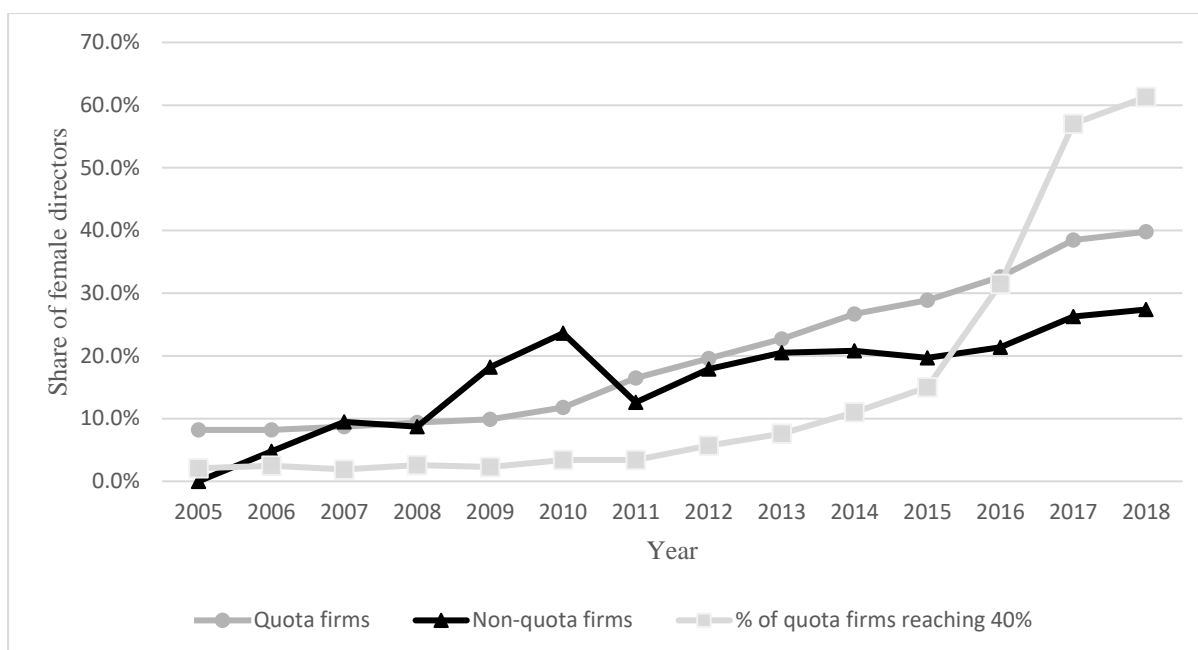


Figure II  
Development of female board representation in France

Table I  
Summary Statistics

Variable	Mean	Median	SD	Min	P1	P99	Max	Observations
<i>Short term (2009)</i>								
CARs	-0.01	-0.01	0.04	-0.38	-0.09	0.07	0.09	256
<i>Short term (2011)</i>								
CARs	0.02	0.01	0.04	-0.10	-0.06	0.14	0.18	288
<i>Long term</i>								
Employees	27807	3752	58925	1	6	320653	495,287	3284
Female director dummy	0.83	1	0.37	0	0	1	1	4207
Female director %	0.22	0.20	0.16	0	0	0.58	0.8	4207
Board size	10.33	10	4.13	1	3	21	27	4207
Firm size - ln(total assets)	7.35	6.96	2.11	3.30	4.04	13.70	14.55	4206
Firm size - total assets (€M)	29629	1057	166539	27	57	892783	2,077,759	4206
Leverage	0.59	0.60	0.19	0	0.08	0.96	0.96	4206
Tobin's Q	1.35	1.16	0.68	0.35	0.70	4.01	10.43	4195
Cash / assets	0.11	0.08	0.12	0	0	0.61	1.00	4192
Capex / assets	0.39	0.03	0.04	0	0	0.20	0.52	3503
Asset growth	0.06	0.04	0.21	-1.42	-0.39	0.74	3.78	3301
Revenue growth	-0.24	-0.11	0.81	-12.36	-3.26	1.04	1.79	3301
Return on assets	0.09	0.08	0.07	-0.22	-0.22	0.30	0.30	4197
Return on equity	0.07	0.09	0.19	-1.05	-1.05	0.60	0.60	4181
Return on sales	0.07	0.11	0.51	-4.41	-4.41	0.62	0.62	3510

## V. Results

This section discusses the results of the empirical analysis. First, I discuss the short-term and long-term firm value analysis to be able to examine the first hypothesis. Thereafter, I describe the results regarding corporate policy and profitability respectively.

### A. *Effects on firm value*

The firm value analysis is tested in both the short term and the long term. The short-term results are presented in Table II. Panel A and B describe the analysis on the initiation of the law on the 4<sup>th</sup> of December 2009. Between the 2<sup>nd</sup> and 8<sup>th</sup> of December this sample experienced an average cumulative return of 0.88%. Of the 256 firms, 98 had no female director in their board. Model 2-4 show that firms with no female directors experienced significantly worse returns around the 4<sup>th</sup> of December. Firms without female directors realized CARs of 1.1% lower than firms in the sample with at least one female director. This result indicates that investors interpreted the quota as a threat to firms without female directors, as they have put in most effort to satisfy the quota.

Panel B presents four different regressions on the CARs in December 2009. The models differ in the use of either a dummy or the percentage of female directors as a proxy for female representation and the use of different control variables. All the coefficients of female presence are positive and significant. The positive coefficients illustrate that firms with few female directors suffer more from the quota. Model 2 suggests that firms with no female directors have CARs of 0.9% lower on average compared to firms with at least one director, controlled for size, profitability and leverage. Model 4 suggests that firms with boards consisting for 10% of females experience CARs of 0.4% lower than firms with 20% females in their board.

Panel C and D follow the same methodology as panel A and B, but investigate returns around the adoption of the law in the French parliament on the 13<sup>th</sup> of January. The overall return around the adoption of the law is significantly positive, in contrast to the initiation of the law. Firms with no female directors experience worse CARs than firms with at least one female director, similar to Panel A. However, the coefficient in Panel C is not significant. In all but model 4 the coefficients for female presence are positive. The effect of the quota is less visible in this event study, since none of the variables are significant.

Table II shows that around the initiation of the quota in December 2009, French firms experienced negative returns of -0.9% on average. The negative return is even stronger for firms with zero females on board. These firms experience a return of 1.1% lower compared to firms with at least one female director, which differs significantly. This result suggests investors see the gender quota as a measure that damages the value of the firms, especially the ones that are far from reaching the threshold of 40%. The results are not clear around the adoption of the law in January 2011. This is why in the subsequent

analyses, the initiation of the quota in December 2009 is chosen as the main event that triggered the market. The insignificant coefficients in the analysis on the adoption of the quota might suggest that the quota was already priced in the firms' stocks at that time. Perhaps, investors valued firms with no or few female directors already lower than firms with more female directors, with the chance of a quota being imposed in the back of their minds. Concluding, the cumulative abnormal returns in December 2009 suggest that the French gender quota has negatively impacted firm value in the short run.

Table II  
Short-term firm value analysis

Panel A. CARs (%) of quota-firms between the 2nd and 8th of December 2009				
	All firms	No female directors	One or more female directors	Difference
	1	2	3	2-3
Mean	-0.880*** (0.240)	-1.536*** (0.484)	-0.472* (0.243)	-1.064** (0.490)
Observations	256	98	158	

Panel B. Regression on CARs (%) between the 2nd and 8th of December 2009				
	1	2	3	4
Female director dummy ( $\beta_1$ )	1.1064** (0.541)	0.936* (0.560)		
Female director % ( $\beta_1$ )			3.747* (2.095)	4.046* (2.269)
Firm size quartile 2 ( $\beta_2$ )		1.120 (0.927)		1.334 (0.947)
Firm size quartile 3 ( $\beta_2$ )		1.761* (0.912)		1.974** (0.955)
Firm size quartile 4 ( $\beta_2$ )		2.080** (0.912)		2.436** (0.986)
Leverage ( $\beta_3$ )		-2.986 (1.837)		-2.843 (1.824)
Return on sales ( $\beta_4$ )		-0.094*** (0.025)		-0.097*** (0.025)
Constant ( $\alpha$ )	-1.536*** (0.483)	-0.723 (0.831)	-1.252*** (0.359)	-0.813 (0.838)
Observations	256	216	256	216
R-squared	0.02	0.07	0.01	0.07

Panel C. CARs (%) of quota-firms between the 11th and 17th of January 2011				
	All firms	No female directors	One or more female directors	Difference
	1	2	3	2-3
Mean	1.701*** (0.226)	1.342* (0.662)	1.746*** (0.241)	-0.404 (0.720)
Observations	287	32	255	

Table II  
(continued)  
Short-term firm value analysis

Panel D. Regression on CARs (%) between the 11th and 17th of January 2011				
	1	2	3	4
Female director dummy ( $\beta_1$ )	0.404 (0.697)	0.181 (0.799)		
Female director % ( $\beta_1$ )			0.088 (1.963)	-2.238 (1.989)
Firm size quartile 2 ( $\beta_2$ )		0.425 (0.719)		-0.498 (0.722)
Firm size quartile 3 ( $\beta_2$ )		-0.904 (0.691)		-0.935 (0.687)
Firm size quartile 4 ( $\beta_2$ )		0.066 (0.686)		0.163 (0.653)
Leverage ( $\beta_3$ )		1.836 (1.971)		1.740 (1.976)
Return on sales ( $\beta_4$ )		-0.050 (0.146)		-0.036 (0.148)
Constant ( $\alpha$ )	1.342* (0.654)	0.314 (1.351)	1.686*** (0.399)	0.862 (1.247)
Observations	287	242	287	242
R-squared	0.00	0.02	0.00	0.03

Notes: The announcement returns are cumulative returns of the two days before the event until two days after the event. The first number is the regression coefficient, the number in parentheses is the standard error. The coefficient of the firm size quartile variables is the difference of that quartile relative to the quartile of the smallest firms. \* Indicates significance at 10%, \*\* at 5% and \*\*\* at 1%.

Before looking into the effects on firm value in the long run, Appendix E provides insight in the development of female presence in each year relative to the initial percentage of women in the firm's board, prior to the quota. The coefficients are year dummies and year dummies interacted with the firm's original percentage of female directors. Female presence is measured with the same two variables as in the long-term analysis. The constant in the model imply that the average of the share of female directors is 8.2% in 2005. The models yield two interesting insights. The year dummies are significantly positive and increasing in both models after 2009, when the quota was initiated. The share of female directors increases with every year, in line with Figure II. Secondly, the interaction coefficients are significantly negative and decreasing from 2011 onwards. This implies that firms with few female directors initially grow faster than other firms with more female directors in the years after the initiation of the quota.

Table III provides results on the long-term firm value analysis. Panel A displays the outcomes of equation 3 and 4. The regression estimates the relationship between firm value and female board representation, without taking the introduction of the quota into account. No clear effect can be observed. Model 4 yields a negative significant result, albeit fairly small. This model implies that firms

with at least one female director have Tobin's Q values of 0.039 lower compared to firms without female directors. The first three models have opposite signs and are insignificant.

Panel A does not show an association between firm value and female board representation, but does not include effects caused by the quota. Panel B uses firms' female board representation prior to the quota to measure its effects. The interaction term indicates the effect for when the observation is after the initiation of the quota and has at least one female director.

In line with the short-term analysis, Panel B also suggests that the quota has caused significant damage to firm value. The positive coefficients imply that firms with at least one female director in 2005 experience higher Tobin's Q values in the years after the introduction of the quota. Firms that had to take more effort to comply with the quota experienced a lower firm value. Model 2 and 4 control for effects of firm size, leverage, profitability and board size. Appendix F displays an identical regression, with the only difference that the dependent variable is the Tobin's Q of one year later. This regression takes a more long-term approach as it analyses the firm value of one year later. Appendix F produces similar results to Table III, as three of the four models yield positive significant coefficients as well. Panel C provides coefficients on a yearly basis. The coefficients are all positive and increasing over the years, which is in line with the other models, but the observations after the initiation of the quota are not significant.

The first hypothesis is: the French gender quota negatively influences firm value. The hypothesis is accepted because the results suggest that the quota has caused damage to firm value in both the short term and the long term. The abnormal returns around the initiation of the quota indicate that investors fear the quota as a threat to firm value. Figure III shows a graphical view of the difference in Tobin's Q values over the years. Similar to the regressions, Figure III uses the presence of female directors in 2005 as a time invariant variable as a proxy for which firms are influenced more by the quota. It becomes clear that the Tobin's Q values of firms with and without female directors are indistinguishable until the introduction of the quota, but diverge after 2009. The difference increases up to 14% in 2018. Appendix G provides the same figure, except it uses 2006 until 2009 as proxies for female presence before the quota. The similar pattern is visible after the introduction of the quota, but the gap seems to diminish as the observations are closer to the present. This could imply that the damage of the quota being partly undone.

Table III  
Long-term firm value analysis

Panel A: Regression of female presence on Tobin's Q				
	1	2	3	4
Female director % ( $\beta_1$ )	0.042 (0.073)	0.055 (0.083)		
Female director dummy ( $\beta_1$ )			-0.033 (0.020)	-0.039* (0.023)
Firm size quartile 2 ( $\beta_2$ )		-0.028 (0.036)		-0.029 (0.036)
Firm size quartile 3 ( $\beta_2$ )		-0.015 (0.053)		-0.014 (0.053)
Firm size quartile 4 ( $\beta_2$ )		-0.134* (0.072)		-0.127* (0.072)
Leverage ( $\beta_2$ )		0.153* (0.089)		0.155* (0.089)
Return on sales ( $\beta_2$ )		0.151*** (0.032)		0.153*** (0.032)
Number of directors ( $\beta_2$ )		0.015*** (0.004)		0.016*** (0.004)
Constant ( $\alpha$ )	1.337*** (0.017)	1.178*** (0.076)	1.373*** (0.017)	1.214*** (0.074)
Observations	4172	3478	4172	2933
Firm fixed effects ( $\gamma$ )	Yes	Yes	Yes	Yes
Time fixed effects ( $\delta$ )	Yes	Yes	Yes	Yes
Adjusted R-squared	0.77	0.76	0.77	0.76

Panel B: Regression of female directors dummy interacted with event dummy on Tobin's Q				
	1	2	3	4
Female director 2005 dummy x post initiation dummy ( $\beta_1$ )	0.067** (0.027)	0.073** (0.030)		
Female director 2005-2008 x post initiation dummy ( $\beta_1$ )			0.056** (0.027)	0.054* (0.031)
Firm size quartile 2 ( $\beta_2$ )		-0.066 (0.050)		-0.047 (0.041)
Firm size quartile 3 ( $\beta_2$ )		-0.165** (0.065)		-0.034 (0.058)
Firm size quartile 4 ( $\beta_2$ )		-0.226*** (0.870)		-0.129* (0.077)
Leverage ( $\beta_2$ )		0.152 (0.108)		0.047 (0.102)
Return on sales ( $\beta_2$ )		0.280*** (0.048)		0.216*** (0.038)
Number of directors ( $\beta_2$ )		0.021*** (0.005)		0.019*** (0.004)
Constant ( $\alpha$ )	1.327*** (0.011)	1.146*** (0.098)	1.317*** (0.011)	1.177*** (0.088)
Observations	2732	2374	3325	2832

Firm fixed effects ( $\gamma$ )	Yes	Yes	Yes	Yes
Time fixed effects ( $\delta$ )	Yes	Yes	Yes	Yes
Adjusted R-squared	0.75	0.75	0.74	0.73

Panel C: Regression of pre-quota female directors dum on Tobin's Q

	1		2
Female director dummy 2005	0.039	Female director 2005-2008	0.034
x 2006 dummy ( $\beta_1$ )	(0.069)	x 2006 dummy ( $\beta_1$ )	(0.077)
Female director dummy 2005	0.037	Female director 2005-2008	0.025
x 2007 dummy ( $\beta_1$ )	(0.070)	x 2007 dummy ( $\beta_1$ )	(0.077)
Female director dummy 2005	0.027	Female director 2005-2008	0.008
x 2008 dummy ( $\beta_1$ )	(0.071)	x 2008 dummy ( $\beta_1$ )	(0.077)
Female director dummy 2005	0.031	Female director 2005-2008	0.038
x 2009 dummy ( $\beta_1$ )	(0.072)	x 2009 dummy ( $\beta_1$ )	(0.078)
Female director dummy 2005	0.054	Female director 2005-2008	0.042
x 2010 dummy ( $\beta_1$ )	(0.072)	x 2010 dummy ( $\beta_1$ )	(0.078)
Female director dummy 2005	0.076	Female director 2005-2008	0.047
x 2011 dummy ( $\beta_1$ )	(0.073)	x 2011 dummy ( $\beta_1$ )	(0.079)
Female director dummy 2005	0.114	Female director 2005-2008	0.082
x 2012 dummy ( $\beta_1$ )	(0.073)	x 2012 dummy ( $\beta_1$ )	(0.079)
Female director dummy 2005	0.090	Female director 2005-2008	0.052
x 2013 dummy ( $\beta_1$ )	(0.073)	x 2013 dummy ( $\beta_1$ )	(0.079)
Female director dummy 2005	0.089	Female director 2005-2008	0.081
x 2014 dummy ( $\beta_1$ )	(0.074)	x 2014 dummy ( $\beta_1$ )	(0.080)
Female director dummy 2005	0.159**	Female director 2005-2008	0.161**
x 2015 dummy ( $\beta_1$ )	(0.075)	x 2015 dummy ( $\beta_1$ )	(0.080)
Female director dummy 2005	0.130*	Female director 2005-2008	0.119
x 2016 dummy ( $\beta_1$ )	(0.075)	x 2016 dummy ( $\beta_1$ )	(0.080)
Female director dummy 2005	0.096	Female director 2005-2008	0.052
x 2017 dummy ( $\beta_1$ )	(0.076)	x 2017 dummy ( $\beta_1$ )	(0.081)
Female director dummy 2005	0.110	Female director 2005-2008	0.054
x 2018 dummy ( $\beta_1$ )	(0.077)	x 2018 dummy ( $\beta_1$ )	(0.082)
Firm size quartile 2 ( $\beta_2$ )	-0.063	Firm size quartile 2 ( $\beta_2$ )	-0.044
	(0.050)		(0.042)
Firm size quartile 3 ( $\beta_2$ )	-0.162**	Firm size quartile 3 ( $\beta_2$ )	-0.032
	(0.065)		(0.058)
Firm size quartile 4 ( $\beta_2$ )	-0.222***	Firm size quartile 4 ( $\beta_2$ )	-0.123
	(0.087)		(0.078)
Leverage ( $\beta_2$ )	0.155	Leverage ( $\beta_2$ )	0.055
	(0.108)		(0.102)
Return on sales ( $\beta_2$ )	-0.282***	Return on sales ( $\beta_2$ )	0.218***
	(0.048)		(0.038)
Number of directors ( $\beta_2$ )	0.02***	Number of directors ( $\beta_2$ )	0.019***
	(0.005)		(0.004)
Constant ( $\alpha$ )	1.124***	Constant ( $\alpha$ )	1.156***
	(0.101)		(0.093)
Observations	2374	Observations	2832
Firm fixed effects ( $\gamma$ )	Yes	Firm fixed effects ( $\gamma$ )	Yes
Time fixed effects ( $\delta$ )	Yes	Time fixed effects ( $\delta$ )	Yes
Adjusted R-squared	0.75	Adjusted R-squared	0.73

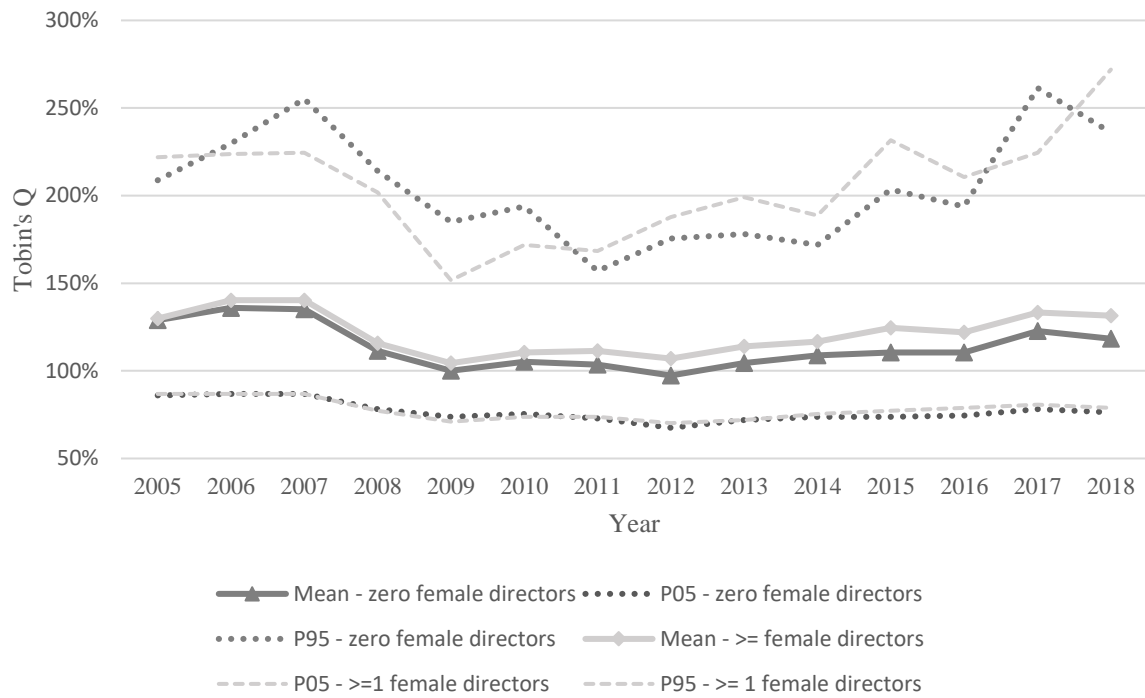


Figure III

Difference in Tobin's Q values between firms with and without female directors in 2005

The values are normalised by the mean of the subsample without female directors in 2009. The dotted lines indicate the 90% confidence intervals. Number of firm observations in 2005 is 231 in total. 124 without a female director, 107 with at least one.

### B. Effects on corporate policy

Table IV describes the results of the analysis on the effects on corporate policy. Because the results suggest that the gender quota has damaged firm value, it is interesting to explore any underlying causes. This is why the following tests examine changes in corporate policy as a result of the quota. Tests are performed on leverage, capital expenditures, cash holdings and growth of total assets and revenues. The same methodology is used as in the analysis on long-term firm value. Because leverage cannot be included as a control variable in the regression on leverage itself, I use the leverage of one year later.

The tests on leverage, capital expenditures, and revenue growth do not show clear effects of the quota. Therefore, hypotheses 2a, 2b and 2e are rejected. However, cash holdings and revenue growth are negatively and significantly impacted by the quota. Firms without female directors have cash to asset ratios of 0.01 lower and a lower growth of total assets of 0.029. This result is in line with the expectation that the quota negatively influences cash holdings and asset growth. Therefore, hypotheses 2c and 2d are accepted.



Table IV  
Corporate policy analysis

Regression of female directors dummy on corporate policy indicators					
Dependent variable	Leverage <sub>t+1</sub>	Capex/assets	Cash/assets	Asset growth	Revenue growth
	1	2	3	4	5
Female director 2005 dummy x post initiation dummy ( $\beta_1$ )	-0.001 (0.005)	-0.001 (0.002)	0.014*** (0.005)	0.029** (0.13)	0.024 (0.022)
Firm size quartile 2 ( $\beta_2$ )	-0.019** (0.008)	-0.005 (0.003)	-0.028*** (0.008)	0.099*** (0.023)	0.074* (0.039)
Firm size quartile 3 ( $\beta_2$ )	-0.011 (0.010)	-0.015*** (0.004)	-0.017* (0.010)	0.167*** (0.030)	0.051 (0.049)
Firm size quartile 4 ( $\beta_2$ )	0.007 (0.014)	-0.019*** (0.006)	-0.018 (0.013)	0.206*** (0.039)	-0.095 (0.065)
Leverage ( $\beta_2$ )	0.660*** (0.018)	-0.040*** (0.007)	-0.134*** (0.017)	-0.124*** (0.048)	-0.109 (0.080)
Return on sales ( $\beta_2$ )	-0.040*** (0.009)	0.013*** (0.003)	0.025*** (0.007)	0.118*** (0.021)	1.156*** (0.035)
Number of directors ( $\beta_2$ )	0.001 (0.001)	0.000 (0.000)	0.001 (0.001)	0.006*** (0.002)	0.009** (0.003)
Constant ( $\alpha$ )	0.206*** (0.016)	0.077*** (0.006)	0.196*** (0.015)	0.121** (0.052)	-0.347*** (0.073)
Observations	2173	2377	2377	2345	2345
Firm fixed effects ( $\gamma$ )	Yes	Yes	Yes	Yes	Yes
Time fixed effects ( $\delta$ )	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.89	0.65	0.63	0.18	0.85

### C. Effects on profitability

The last part of the analysis focuses on the effects on profitability and is reported in Table VI. The same methods are used as in the previous analyses. Profitability is measured as return on assets, return on equity or return on sales. While the coefficients in the analyses on Tobin's Q are significant, the regression on profitability does not lead to any meaningful results. The quota has not impacted profitability significantly in any of the three models. This is an interesting finding, as it suggests that the quota did not cause any harm in the current performance of the firm, while firm value is significantly affected. These results suggest that the loss in firm value because of the quota is mainly due to declined expectations.

Table V  
Profitability analysis

Regression of female directors dummy on profitability			
Dependent variable	Return on assets	Return on equity	Return on sales
	1	2	3
Female director 2005 dummy x post initiation dummy ( $\beta_1$ )	0.001 (0.002)	0.000 (0.014)	-0.004 (0.014)
Firm size quartile 2 ( $\beta_2$ )	0.010* (0.005)	0.075*** (0.027)	0.039 (0.024)
Firm size quartile 3 ( $\beta_2$ )	0.004 (0.007)	0.091*** (0.034)	0.080** (0.031)
Firm size quartile 4 ( $\beta_2$ )	-0.008 (0.008)	0.134*** (0.042)	0.083** (0.041)
Leverage ( $\beta_2$ )	-0.052*** (0.010)	-0.381*** (0.049)	-0.117** (0.050)
Return on assets <sub>t-1</sub> ( $\beta_2$ )	0.453*** (0.018)		
Return on equity <sub>t-1</sub> ( $\beta_2$ )		0.150*** (0.022)	
Return on sales <sub>t-1</sub> ( $\beta_2$ )			0.178*** (0.027)
Number of directors ( $\beta_2$ )	0.000 (0.000)	0.002 (0.002)	0.005** (0.002)
Constant ( $\alpha$ )	0.085*** (0.010)	0.191*** (0.046)	0.046 (0.047)
Observations	2492	2490	2170
Firm fixed effects ( $\gamma$ )	Yes	Yes	Yes
Time fixed effects ( $\delta$ )	Yes	Yes	Yes
Adjusted R-squared	0.74	0.26	0.80

## VI. Conclusion

Despite the wealth of literature on economic effects of gender diversity, there is not much evidence on the relationship between forced female representation by quotas and firm value. This is mainly due to the fact that most quotas have been introduced in the last 10 years. With Norway as the only exception, Ahern and Dittmar (2012) found that their gender quota has caused economic damage to the firms that were mandated to have boards that consisted of at least 40% females. Because many other countries have introduced or consider to introduce quotas at this time, it is interesting and relevant to seek answers to the following research question:

*Does increased female representation on corporate boards mandated by a gender quota influence firm value?*

The French gender quota was the subject of this thesis. The results of this thesis suggest in line with the hypothesis that firm value was influenced negatively because of the gender quota introduced in 2009. In both the short-term and long-term analysis, a significant decline in firm value was found. At the

announcement of the legislation, firms without female directors experienced worse returns compared to firms with at least one female director. This is evidence for the negative influence of the quota, as firms without female directors are the most affected by the legislation. The long-term analysis shows that firms without female directors before 2009 experience lower Tobin's Q values after the introduction of the quota. Furthermore, this thesis identified significant decreases in cash holdings and asset growth. An interesting note is that the damage to firm value was not found in any test on profitability. This result suggests that the quota may not have impacted the actual performance of firms, but only changed the expectations of future earnings.

This thesis contributes to the existing literature on gender quota and its economic effects. In line with the results of Ahern and Dittmar (2012), the French quota has caused negative economic impact on French firms. The results also conform to the theorem that restrictions on the free choice of board members hurt firm value.

Considering the empirical part of this thesis there are a few points of criticism to be pronounced. First, the dataset is limited by the availability of board data of the BoardEx database. The BoardEx database contains only listed firms, while non-listed firms with more than 500 employees or €50 million in total assets also fall within the scope of the quota. Because of this deficiency, the dataset is not 100% complete. Secondly, BoardEx indicates only the firms' total number of female directors and does not differentiate between one-tier boards and two-tier boards. This has the consequence that a firm's female director percentage may be under 40%, while their supervisory board has enough women to comply with the legislation, or vice versa.

In further research, it is interesting to widen the scope of this research to the quotas of other countries. Including Iceland, Germany and Belgium, other countries have introduced quotas as well. This field of research is relevant because many countries are struggling with female presence in high management levels of firms. It is particularly interesting to examine the effects on cash holdings and asset growth, as these were significantly affected by the French quota.

Concerning the French quota, in a few years researchers can analyse whether firms without female directors prior to the quota have eventually closed the gap in Tobin's Q values with their competitors. Appendix G shows that this already tends to happen. Next to that, more research can be done on whether firms avoid being restricted by the quota. One should then investigate whether firms cluster at number of employees just below 500 or total assets just below €50 million. If this is true, it suggests that firms want to avoid being required to appoint female directors as a result of the quota. Next to that, the focus can also be shifted on other value aspects than shareholder value. For example, research can be done on the effects on employee benefits or executive compensation.

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## VIII. Appendices

### Appendix A

#### Overview of arguments for and against gender quotas

Author	Pro / con	Ethical / economic	Argument
Brammer, Millington and Pavelin (2007)	Pro	Ethical	Equal distribution of board positions is fairer and better reflects society
Fullinwider (1980)	Con	Ethical	Restrictions to the freedom of appointing the best available candidates to the board
Cox and Blake (1991)	Pro	Economic	Heterogenous boards are more creative and innovative
Cox and Blake (1991)	Pro	Economic	Women have more flexible cognitive structures, yielding a board that has more organizational flexibility
Campbell and Mínguez-Vera (2008)	Pro	Economic	Women bring additional perspective, which improves the ability to monitor executives
Campbell and Mínguez-Vera (2008)	Pro	Economic	Heterogenous boards are better at penetrating new markets
Smith, Smith and Verner (2006)	Pro	Economic	Heterogenous boards have a better corporate image
Earley and Mosakowski (2008)	Con	Economic	People with the same characteristics communicate more frequently
Williams and O'Reilly (1998)	Con	Economic	Homogenous groups are less likely to end up in emotional conflicts
Lau and Murnighan (1998) and Bøhren and Strøm (2007)	Con	Economic	Heterogenous boards are less effective in terms of decision-making
Andreoni and Vesterlund (2001)	Con	Economic	When the price of giving away is high, men are less altruistic than women
Jianokoplos and Bersanek (1998)	Con	Economic	Women are more risk averse
Cox and Blake (1991) and Ichino and Moretti (2006)	Con	Economic	Women tend to change jobs more often and have higher absenteeism rates

Appendix B  
Overview of evidence on the relationship between diversity and firm value

Author	Area	Data period	Dependent variable	Finding
Shrader, Blackburn and Iles (1997)	USA	1992 and 1993	ROS, ROA, ROI, ROE	Not significant
Carter, Simkens and Simpson (2003)	USA	1997	Tobin's Q	Positive
Erhardt, Werbel and Shrader (2003)	USA	1993 and 1997	ROA ROI	Positive
Farrell and Hersch (2005)	USA	1990 - 1999	CAR	Not significant
Smith, Smith and Verner (2006)	Denmark	1993 - 2001	Gross profit/net sales Contribution margin/net sales Operating income/net assets Net income/net assets	Mixed
Rose (2007)	Denmark	1998 - 2001	Tobin's Q	Not significant
Bøhren, and Strøm (2007)	Norway	1989 - 2002	Tobin's Q	Negative
Randøy, Thomsen and Oxelheim (2006)	Norway, Sweden and Denmark		Stock price and ROA	Not significant
Campbell and Mínguez-Vera (2008)	Spain	1995 - 2000	Tobin's Q	Positive
Terjesen, Couto and Francisco (2015)	47 countries	2010	Tobin's Q and ROA	Positive



Appendix C  
Variable definitions

Variable	Definition
Announcement returns	5 days cumulative return
Quota-firm dummy	Is equal to 1 if the firm has more than €50 million in total assets or more than 500 employees for 3 consecutive years at that time
Female director dummy	Is equal to 1 if a board contains at least 1 female director
Female director %	Percentage of a board that is female
Board size	Number of directors in a board
Firm size	Natural logarithm of total assets
Leverage <sub>i,t</sub>	$\frac{\text{Total book liabilities}_{i,t}}{\text{Total assets}_{i,t}}$
Tobin's Q	$\frac{\text{Total assets} - \text{ordinary equity} + \text{market equity}}{\text{Total assets}}$
Market equity <sub>t</sub>	Average of each month's end (shares outstanding * share price) in year t
Cash / assets	$\frac{\text{Cash}_{i,t}}{\text{Total assets}_{i,t}}$
Capex / assets	$\frac{\text{Capital expenditures}_{i,t}}{\text{Total assets}_{i,t-1}}$
Asset growth (1)	$\text{Ln}(\text{total assets}_{i,t}) - \text{Ln}(\text{total assets}_{i,t-1})$
Asset growth (2)	$\frac{\text{Total assets}_{i,t} - \text{total assets}_{i,t-1}}{\text{Total assets}_{i,t-1}}$
Revenue growth (1)	$\text{Ln}(\text{revenues}_{i,t}) - \text{Ln}(\text{revenues}_{i,t-1})$
Revenue growth (2)	$\frac{\text{Revenues}_{i,t} - \text{revenues}_{i,t-1}}{\text{Revenues}_{i,t-1}}$
Return on assets <sub>i,t</sub>	$\frac{\text{Operating income before depreciation}_{i,t}}{\text{Total assets}_{i,t}}$
Return on equity <sub>i,t</sub>	$\frac{\text{Operating income before depreciation}_{i,t}}{\text{Market equity}_{i,t}}$

Appendix D  
Variable averages and number of firms per year

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Firm observations	234	243	261	266	263	266	297	296	316	317	360	368	364	356
Firms without female directors	109	115	110	101	101	77	34	20	9	4	8	11	4	4
Firms with at least one female director	125	128	151	165	162	189	263	276	307	313	352	357	360	352
Female director %	8.2%	8.2%	8.7%	9.4%	10.0%	11.8%	16.5%	19.6%	22.7%	26.7%	28.9%	32.6%	38.5%	39.7%
Board size	10.9	10.7	10.5	10.6	10.6	10.7	10.2	10.2	10.3	10.4	10.0	9.9	9.9	10.1
Tobin's Q	1.48	1.56	1.57	1.29	1.17	1.24	1.24	1.18	1.24	1.33	1.33	1.34	1.48	1.44
Employees	57,326	46,859	52,157	55,891	58,633	30,120	24,963	26,695	23,989	23,050	21,341	19,357	20,102	22,881
Firm size - total assets (€M)	26,460	29,934	30,538	32,893	32,466	30,120	30,762	31,950	28,486	30,994	27,086	27,431	26,657	28,448
Leverage	0.64	0.62	0.61	0.60	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.58	0.58	0.57
Cash/assets	0.10	0.10	0.10	0.09	0.11	0.11	0.12	0.11	0.11	0.11	0.12	0.13	0.14	0.14
Capex/assets	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.04
Asset growth	0.17	0.12	0.15	0.04	-0.01	0.06	0.05	0.02	0.01	0.07	0.05	0.06	0.06	0.06
Revenue growth	0.00	-0.05	-0.07	-0.16	-0.34	-0.21	-0.20	-0.23	-0.26	-0.27	-0.26	-0.34	-0.33	-0.41
Return on assets	0.11	0.11	0.11	0.09	0.08	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.07	0.07
Return on equity	0.13	0.12	0.14	0.05	0.03	0.08	0.08	0.06	0.04	0.06	0.05	0.06	0.04	0.03
Return on sales	0.13	0.13	0.14	0.11	0.07	0.08	0.09	0.08	0.05	0.08	0.06	0.03	0.01	-0.01

Appendix E  
Regressions on the share of female directors in a board

Variable	Female directors %	
2006 dummy	1.332 (0.931)	2006 dummy -0.276 (1.016)
2007 dummy	2.709*** (0.948)	2007 dummy 0.004 (1.015)
2008 dummy	3.764*** (0.961)	2008 dummy 0.842 (1.014)
2009 dummy	4.378*** (0.981)	2009 dummy 1.537 (1.029)
2010 dummy	6.987*** (0.981)	2010 dummy 4.010*** (1.031)
2011 dummy	12.864*** (0.988)	2011 dummy 11.464*** (1.036)
2012 dummy	17.122*** (0.988)	2012 dummy 15.766*** (1.039)
2013 dummy	21.797*** (0.997)	2013 dummy 20.421*** (1.047)
2014 dummy	26.075*** (1.016)	2014 dummy 25.375*** (1.056)
2015 dummy	28.833*** (1.027)	2015 dummy 27.729*** (1.062)
2016 dummy	33.093*** (1.027)	2016 dummy 33.404*** (1.062)
2017 dummy	39.199*** (1.044)	2017 dummy 39.866*** (1.077)
2018 dummy	40.500*** (1.061)	2018 dummy 40.557*** (1.093)
Female director dummy 2005 x 2006 dummy	-2.178* (1.273)	Female director dummy 2005- 2008 x 2006 dummy 0.697 (1.413)
Female director dummy 2005 x 2007 dummy	-4.016*** (1.300)	Female director dummy 2005- 2008 x 2007 dummy 1.491 (1.408)
Female director dummy 2005 x 2008 dummy	-4.702*** (1.318)	Female director dummy 2005- 2008 x 2008 dummy 1.210 (1.402)
Female director dummy 2005 x 2009 dummy	-5.236*** (1.334)	Female director dummy 2005- 2008 x 2009 dummy 0.753 (1.416)
Female director dummy 2005 x 2010 dummy	-6.060*** (1.334)	Female director dummy 2005- 2008 x 2010 dummy -0.506 (1.416)
Female director dummy 2005 x 2011 dummy	-7.975*** (1.335)	Female director dummy 2005- 2008 x 2011 dummy -5.027*** (1.428)
Female director dummy 2005 x 2012 dummy	-9.301*** (1.335)	Female director dummy 2005- 2008 x 2012 dummy -6.729*** (1.431)
Female director dummy 2005 x 2013 dummy	-10.915*** (1.359)	Female director dummy 2005- 2008 x 2013 dummy -8.524*** (1.441)
Female director dummy 2005 x 2014 dummy	-11.477*** (1.372)	Female director dummy 2005- 2008 x 2014 dummy -9.660*** (1.459)
Female director dummy 2005 x 2015 dummy	-11.858*** (1.384)	Female director dummy 2005- 2008 x 2015 dummy -9.694*** (1.459)

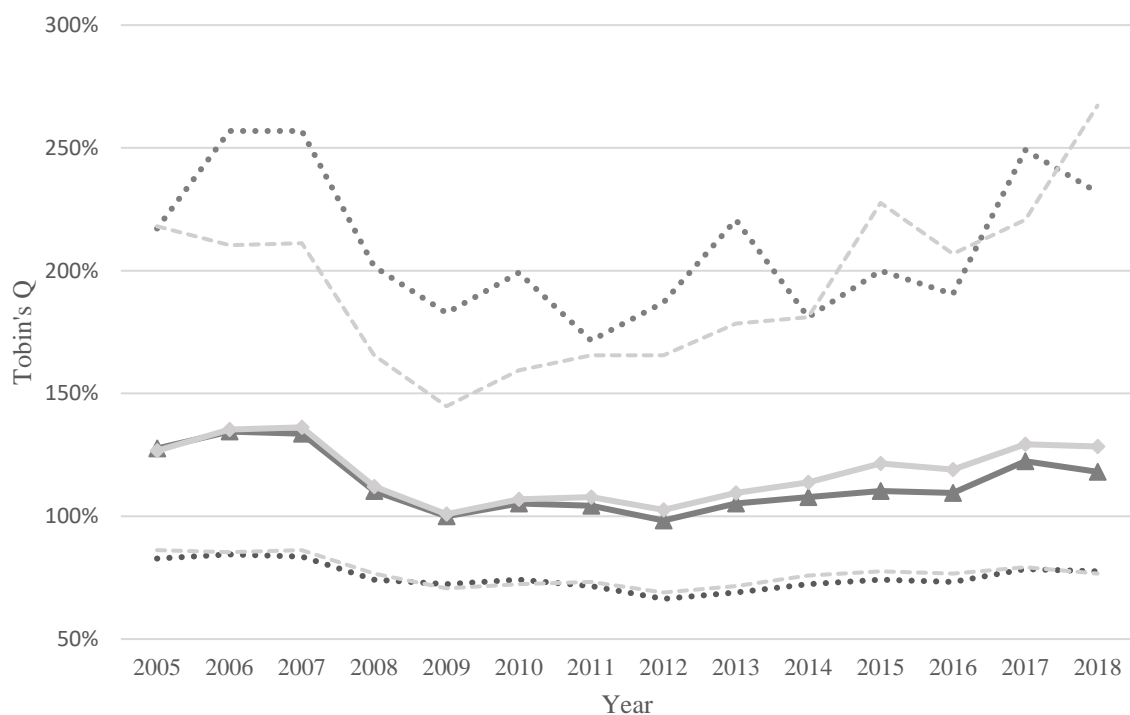
Female director dummy 2005 x 2016 dummy	-12.027*** (1.388)	Female director dummy 2005-2008 x 2016 dummy	-11.532*** (1.464)
Female director dummy 2005 x 2017 dummy	-13.269*** (1.141)	Female director dummy 2005-2008 x 2017 dummy	-13.537*** (1.481)
Female director dummy 2005 x 2018 dummy	-13.818*** (1.431)	Female director dummy 2005-2008 x 2018 dummy	-13.094*** (1.481)
Constant	8.208*** (0.456)	Constant	7.956*** (0.460)
Observations	2745	Observations	3342
Firm fixed effects	Yes	Firm fixed effects	Yes
Adjusted R-squared	0.42	Adjusted R-squared	0.48

Appendix F  
Regression of pre-quota female directors dummy on Tobin's  $Q_{(t+1)}$

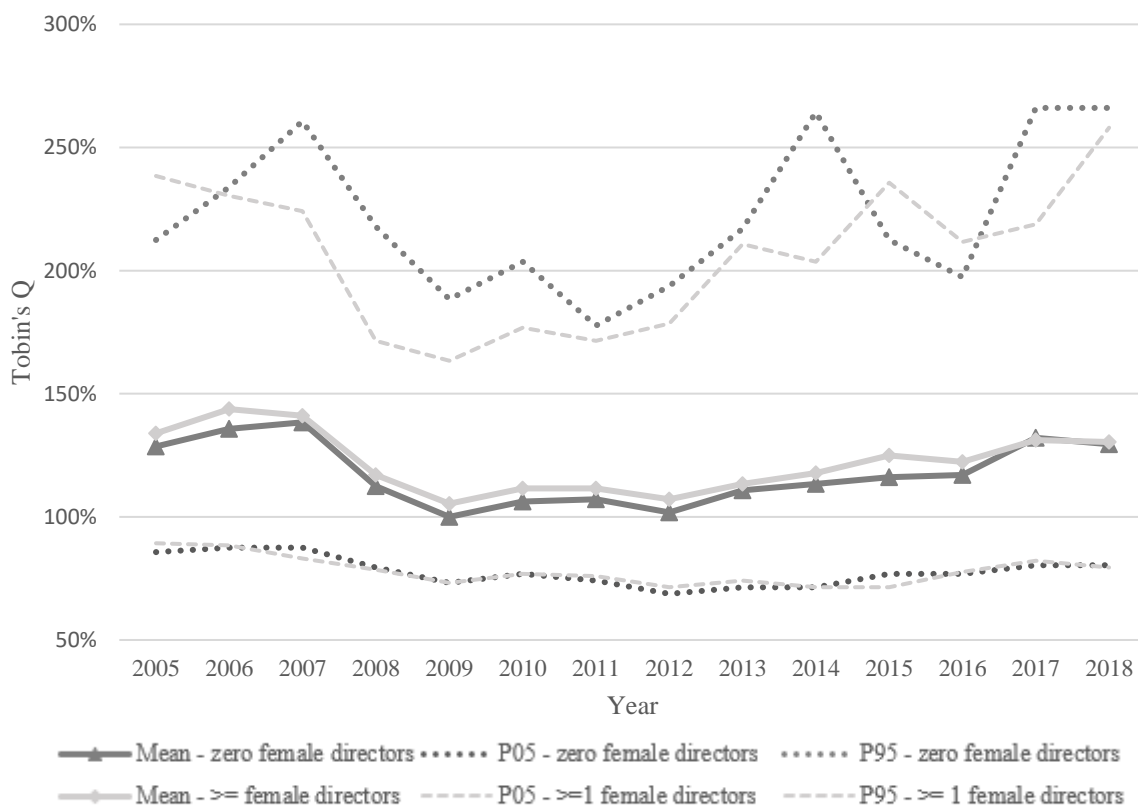
Panel B: Regression of female directors dummy interacted with event dummy on Tobin's $Q_{(t+1)}$				
	1	2	3	4
Female director 2005 dummy x post initiation dummy	0.061** (0.027)	0.065** (0.031)		
Female director 2005-2008 x post initiation dummy ( $\beta_3$ )			0.050* (0.027)	0.051 (0.031)
Firm size quartile 2 ( $\beta_4$ )		-0.101** (0.052)		-0.049 (0.043)
Firm size quartile 3 ( $\beta_4$ )		-0.154** (0.067)		-0.006 (0.061)
Firm size quartile 4 ( $\beta_4$ )		-0.274*** (0.093)		-0.149* (0.082)
Leverage ( $\beta_4$ )		-0.018 (0.115)		-0.147 (0.108)
Return on sales ( $\beta_4$ )		0.527*** (0.060)		0.343*** (0.043)
Number of directors ( $\beta_4$ )		0.021*** (0.005)		0.019*** (0.005)
Constant ( $\alpha$ )	1.317*** (0.011)	1.231*** (0.103)	1.306*** (0.011)	1.262*** (0.093)
Observations	2494	2168	3026	2579
Firm fixed effects ( $\gamma$ )	Yes	Yes	Yes	Yes
Time fixed effects ( $\delta$ )	Yes	Yes	Yes	Yes
Adjusted R-squared	0.76	0.76	0.75	0.75

Appendix G  
Differences in Tobin's Q values over time between firms with and without female directors  
in 2006-2009

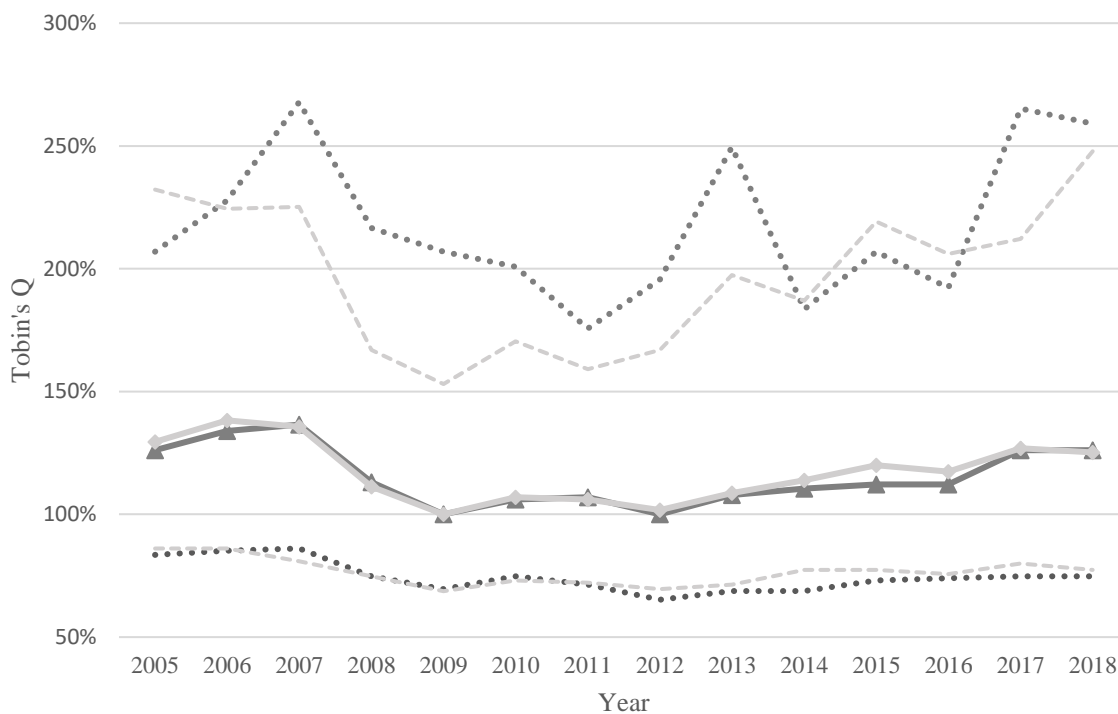
*I. 2006*



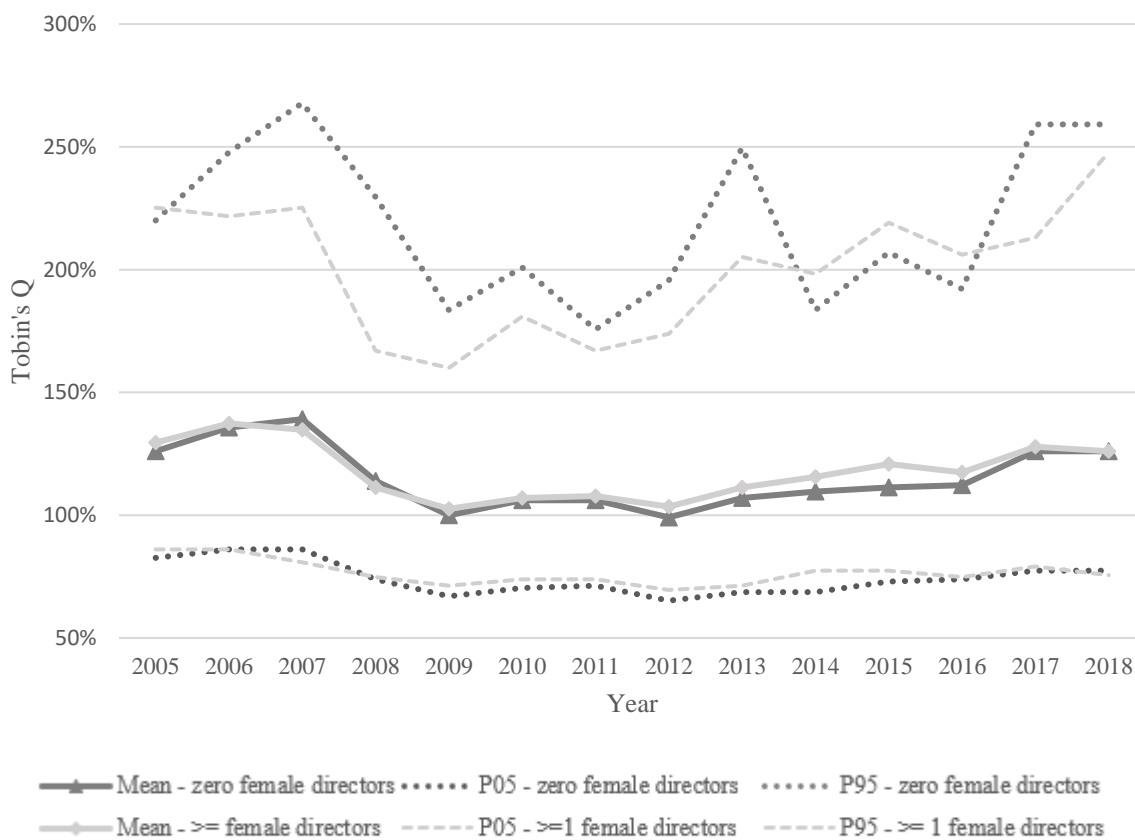
*II. 2007*



III. 2008



IV. 2009



The dotted lines indicate the 90% confidence intervals. Appendix D provides an overview of the number of firms with and without female directors in each year of the sample.