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TESIS DOCTORAL

Three essays on gender issues in Accounting, Governance and Risk Aversion

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DEPARTAMENTO DE ECONOMÍA DE LA EMPRESA

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Three essays on gender issues in Accounting, Governance and Risk Aversion

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Agradecimientos

En el relato *La escritura del Dios*, Jorge Luis Borges narra la historia de Tzinacán, "mago de la pirámide de Qaholom, que Pedro de Alvarado incendió", encerrado en una oscura prisión por los españoles, quienes lo han deformado físicamente al negarse a revelar la ubicación de un tesoro. Tzinacán utiliza su encierro—del que sabe no saldrá jamás—para descubrir ciertas palabras divinas que serían capaces de conjugar sus males. En su búsqueda, el mago considera que "*aun en los lenguajes humanos no hay proposición que no implique el universo entero; decir el tigre es decir los tigres que lo engendraron, los ciervos y las tortugas que devoró, el pasto de que se alimentaron los ciervos, la tierra que fue madre del pasto, el cielo que dio luz a la tierra*". Dicha reflexión de Borges—que la pluma del escritor ciego coloca en labios de Tzinacán—captura a la perfección mi sentimiento respecto a esta Tesis Doctoral. Seis años después de comenzar esta aventura, estas páginas encierran mi universo entero.

Esta aventura tiene como base mis alma mater: la Universidad Católica de Santa Fe, donde di mis primeros pasos en la Academia; la Universidad de San Andrés, en donde descubrí mi verdadera vocación; la University of Michigan, que me acogió para una estancia de investigación, ayudándome a la maduración de

este proyecto; y la Universidad Carlos III de Madrid, que me acobijó durante este doctorado, y fue el centro de mi crecimiento personal y profesional estos últimos años.

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A nivel familiar, la vida no entiende de carreras profesionales, y sigue su curso. He sido bendecido durante esta etapa con tres sobrinas—Milagros, Lola y Clara—que son el sol que ilumina mi vida. Quisiera también mencionar en estos agradecimientos a mi madre, Antonieta; a mi abuela, María; a mis hermanos Carolina y Diego; y a Carlos y Lidia; Alejandra, Silvina, Mariano y Raúl. Todos ellos han sido soportes importantes de este proyecto.

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He reservado las últimas palabras de estos agradecimientos a la persona que siempre me ha acompañado, y que ha sacrificado todo por mí, y a cambio yo le he dado todo lo que soy. Mi más dura crítica, pero mi mejor premio. Esta Tesis es tanto tuya como mía, Fer.

Madrid, Mayo de 2015

Contents

A Fernanda

The rain falls down on last year's man,
an hour has gone by
and he has not moved his hand.
But everything will happen if he only gives the word;
the lovers will rise up
and the mountains touch the ground.

Leonard Cohen
Last year's man

Abstract

This Thesis presents three studies on gender issues in accounting, governance and risk aversion. Chapter one analyzes the effects of the introduction of gender quotas on boards of directors on the monitoring role of boards. Chapter two studies whether males and females have different preferences over risk than their male counterparts in the particular setting of a multiple choice exam. Finally, chapter three studies the determinants—at firm level—of hiring female board members in a context characterized by increasing social pressure toward gender diversity on boards of directors.

Esta Tesis presenta tres estudios sobre temas de género en contabilidad, gobierno corporativo y aversión al riesgo. En el primer capítulo se estudia el efecto de implementar cuotas de género en consejos de dirección sobre el monitoreo que realizan dichos consejos. En el segundo capítulo se estudia si las mujeres presentan diferencias en sus preferencias sobre riesgo respecto a los hombres en un contexto particular, un examen de opción múltiple. Finalmente, el tercer capítulo estudia los determinantes de contratar mujeres como miembros del consejo en un contexto de fuertes presiones sociales para incrementar la diversidad de género en los consejos.

Introduction

Fostering gender diversity in corporate governance has become a central issue for policy makers in Europe. Regulators have tackled this issue using different approaches. France, Germany, Italy and Norway, among others, have issued regulations to impose a minimum proportion of females on boards (quotas). Other countries, like Spain and the United Kingdom, have set policies or issued recommendations to foster gender diversity in corporate governance. The European Union's commissioners approved in 2012 a plan forcing companies listed in the EU to reserve at least 40 percent of their board seats for women by 2020. The arguments used by regulators to justify quotas range from an apparent discrimination in the access of females to top positions, to the underutilization of a pool of highly skilled individuals. Regulators argue that quotas can reverse the pervasive effect of discrimination and underutilization of highly talented individuals.

However, there is no clear consensus among scholars about the consequences of affirmative action programs. Some authors argue that affirmative action programs lead to sub optimal solutions to contracting processes, including the hiring of less qualified individuals. On the other hand, other scholars provide

evidence that quotas increase women's educational achievements and their participation in top positions, without hindering efficiency. As an argument for fostering gender diversity on corporate governance, regulators claim that females have different skills than males, and these different skills can produce positive spillovers at the firm level. However, scholars also disagree about the extent of such gender differences in preferences, in particular risk aversion. Some authors even argue that the observed difficulties in the access to top positions are associated with gender differences in risk aversion; moreover, it is not necessarily the case that, among individuals occupying top positions like boards memberships, individuals present different attitudes toward risk, conditional on their gender.

I address the aforementioned conflicting results in this Doctoral Thesis. More specifically, this thesis presents three studies on the dynamic relationships between gender, corporate governance regulations, financial reporting and risk aversion. In chapter one, "*Accounting quality effects of imposing gender quotas on boards of directors*" (with Juan Manuel García Lara and José Penalva Zuasti), we study the consequences over the monitoring exerted by boards of directors of imposing a minimum proportion of female members on boards. To that end, we use as a natural experiment the Norwegian Gender Quota. This Quota—issued as voluntary in 2003— imposed a minimum 40 percent of females on Norwegian boards of directors. Using a hand-collected data base of 4,000 observations, we

provide evidence that, after the Quota, Norwegian boards are on average younger and less executive experienced. These younger, less experience boards are less likely to constrain earnings management practices, as we observe a positive and significant relationship between board changes due to the Quota and abnormal levels of the accrual component of earnings. In addition, we provide evidence that the effect of the Quota seems to be clustered around the years when board changes are taking place, and disappear thereafter. This evidence is consistent with the argument that the monitoring role of the boards could be affected either by the lack of experience of incoming board members due to the Quota, or by a disruption on the board's work, as a consequence of the massive entry of new board members in a short lapse of time.

In chapter two, "*Gender differences in risk aversion: Evidence from a multiple choice exam of accounting students*" (with Juan Manuel García Lara and Lluís Santamaría Sánchez), we study gender differences on preferences over risk. We also analyze whether these differences can be mitigated by personal characteristics, as some scholars argue that observed differences can be originated either on cultural factors—the nurture argument—or natural factors—the nature argument. To test these questions we take advantage of a natural experiment. We use a multiple choice exam, common to first year students of Universidad Carlos III de Madrid. In this exam, wrong questions are penalized, whereas blank questions are not. Hence, we use as a proxy for risk aversion the number of blank questions left

in the exam. Also, to control for student's skills, we collect information about students' scores in the university entry exam and their grade point average (average score of the courses that they took until that moment at the university). Moreover, we use personal information of the students to control for factors associated with observed differences in risk aversion. Our results provide evidence that, in our setting, females tend to be more risk averse than males, and this difference is exacerbated in situations perceived as riskier (when the student is close to either failing or passing the exam). However, this difference disappears among the more skilled students (those with higher scores in the university entry exam, GPA, or among those in the more demanding degrees). Our results support a line of research that suggest that gender differences in risk aversion do not apply to sophisticated individuals.

Finally, in the last chapter of my thesis, "*Determinants of early compliance with gender quotas on boards: Evidence from the Netherlands*", I study what firm-level factors lead to non-compliance with social pressures toward gender diversity. To that end I use a Dutch sample. In the Netherlands, the period 2003 – 2012 was characterized by an increasing social pressure to augment the participation of women on corporate governance, a pressure that lead eventually to the proposal of a Gender Quota in 2009. The Netherlands provide an intermediate case from an unregulated setting, where the inclusion of women on boards is completely discretionary, and settings with stringent affirmative action programs, where

penalization for firms that do not comply with gender-parity regulations is liquidation. This intermediate situation allows heterogeneity in firms' responses to regulations that, in turn, can be linked to certain firms' characteristics. My study provides evidence that bigger and profitable firms are more likely to include female board members, whereas older firms, with long tenured executives are less likely to include females on the executive board. These results can improve the understanding of the dynamics, at the firm level, of fulfilling regulations related to gender diversity on corporate governance.

These three studies provide evidence of the relationship between regulation of corporate governance and corporate's outcomes. Firstly, I provide evidence that although Quotas can increase the proportion of females on boards, regulators should be also aware of the short term negative consequences for firm's stakeholders, in particular related to the quality of financial reporting. Secondly, I provide evidence of the existence of gender differences in risk aversion, and that these differences disappear among the most skilled individuals. Finally, I contribute to the identification of the determinants of compliance with regulations aimed at increasing gender diversity on a setting where the penalization for delinquent firms is low. Overall, this Thesis provides an analysis of different problems associated with affirmative action programs, corporate governance, financial reporting and risk aversion, and the consequences of the interaction of these elements.

This Thesis is structured as follows: chapter one presents the study "*Accounting quality effects of imposing gender quotas on boards of directors*"; chapter two presents the study "*Gender differences in risk aversion: Evidence from a multiple choice exam of accounting students*"; chapter three presents the study "*Determinants of early compliance with gender quotas on boards: Evidence from the Netherlands*"; finally, chapter four presents the bibliography used in this Thesis.

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Chapter 1

Accounting quality effects of imposing gender quotas on boards of directors

1.1 Introduction

Gender quotas on boards of directors are an increasingly important issue for regulators around the world. At a national level, several countries have plans or have set objectives regarding the participation of women on corporate governance (Deloitte [2013]). Norway was the first country to implement a law imposing a minimum percentage (40 percent) of women on boards. Belgium, France, Italy, the Netherlands and Spain have issued corporate legislations including policies to increase gender diversity on boards of directors. In November 2012, the European Union's Commissioners approved a plan forcing companies listed in the EU to reserve at least 40 percent of their board seats for women by 2020. However, several European countries oppose the forced incorporation of female board members, and suggest that gender policies on corporate governance should be tackled differently. In the United States there is no explicit regulation regarding gender diversity on boards. This heterogeneity in the regulation of gender

diversity on boards may be associated with the existing paucity of empirical evidence on the effects of quotas.

The consequences of imposing quotas—aimed to redress discrimination against women and minority groups—are unclear. Some scholars believe these actions improve the participation of the targeted social group on highly competitive jobs, as politics (Beaman et al. [2009]; Balafoutas and Sutter [2012]). However, other authors have negative opinions of the effects of quotas over economic outcomes (Holzer and Neumark [1999a]; [1999b]; [2000]; Mollerstrom [2012]).

We contribute to this debate by analyzing the effects of the introduction of quotas on the monitoring role of boards of directors. To this end, we use the Norwegian "Rules for Gender Representation" quota (thereafter Gender Quota) issued as voluntary in 2003, which imposes a minimum female representation of 40 percent on boards of directors. The Gender Quota became compulsory in 2006—with a two years transition—after the failure of voluntary compliance. The penalty for delinquent firms was liquidation. By 2008, 40 percent of Norwegian Public Limited Companies' board seats were occupied by women. We can safely conclude that, between 2005 and 2008, many Norwegian firms were forced to conduct sometimes drastic changes in the composition of their main corporate governance body. We hypothesize that those drastic changes on board composition affected the level of monitoring exerted by Norwegian boards.

This natural experiment has already been the subject of research. Ahern and Dittmar [2012] provide evidence that there is a negative relation between the increase in the percentage of women on boards due to the Gender Quota and the value of Norwegian firms, measured by Tobin's Q. In a related study, Bøhren and Staubo [2014] find evidence suggesting that firms affected by the Gender Quota tend to switch legal forms to avoid the consequences of the legislation. Finally, Matsa and Miller [2013] find that firms affected by the Gender Quota undertake fewer workforce reductions, and that this leads to increases in labor costs and employment levels and to decreases in short term profits. Overall, these papers document that the Gender Quota, at least in the short run, had a negative influence on firm's value and corporate governance.

We extend these studies and analyze the effect of the Gender Quota on the monitoring role of corporate boards. To do so, we examine whether the implementation of the quota affected firms' accounting policies, and, in particular, earnings management. We first explore the profiles of board members using a hand-collected panel of personal attributes and characteristics of 4,000 Norwegian board members during the 2002 – 2010 period. We find that Norwegian firms replaced male board members with females in an attempt to fulfill the quota, instead of increasing board size. We find evidence that after the Gender Quota, new female board members are qualitatively different from exiting men. On average, these new female board members are younger, have lower executive

experience, and have more education compared to the exiting male board members that they replace. Consequently, after the Gender Quota, Norwegian firms' boards are qualitatively different from boards before the quota. We posit that these new, qualitatively different boards have lower monitoring skills on average than boards before the quota. Our evidence of differences in the qualitative attributes of directors in the pre- and post-quota periods is consistent with Ahern and Dittmar [2012] results.

As an outcome of the monitoring skills of the board, we explore the quality of accounting numbers. As a proxy for the quality of accounting numbers, we use unsigned abnormal accruals. We assume that the level of abnormal accruals is an outcome of the monitoring process, where better monitoring leads to a lower level of abnormal accruals. In our setting, firms forced to appoint more new female directors to comply with the Gender Quota requirements could, in fact, reduce the monitoring ability of the board over management. Consistent with our hypothesis that personal attributes and characteristics of new directors may hinder the monitoring ability of the board, we find that, after the Quota, companies that incur in higher costs to comply with the requirements of the quota have higher levels of abnormal accruals. Our results are robust to the inclusion of controls for known sources of earnings management.

In a second set of tests, we explore the effects of the quota over time. Firms can, over time, find adequate substitutes to highly skilled board members that are

replaced as a result of the quota. Also, board members in office appointed after the quota may obtain the adequate skills to become good monitors. Our results indicate that during the last years of our sample, the difference in earnings management between groups disappear, consistent with the notion that the quota may only have negative effects during the period where higher board changes occur. The results are consistent with the evidence in Ahern and Dittmar [2012] and Bøhren and Staubo [2014] that the Gender Quota was costly in terms of firm value for shareholders of Norwegian companies. Nevertheless, this effect seems to be short-lived, and clustered around the period where board changes where the highest. Finally, we study the association between abnormal accruals and board characteristics. As described before, newly appointed female board members are qualitatively different than exiting males. Consistent with this, we find that earnings management is associated with differences in the professional characteristics of the directors (like prior experience as CEO or CFO) and not with the gender of the directors.

Overall, our results provide evidence consistent with the endogenous relation between firm's characteristics and its optimal corporate governance structure (Adams et al. [2010]), and with the importance of the board of directors as a monitoring mechanism. Also, our results are consistent with the negative consequences of quotas on the hiring of skilled workers, at least in the short run, as suggested by Holzer and Neumark [1999a, 1999b]. Since European governments

are currently considering imposing gender quotas, our results indicate that such affirmative actions could have negative effects, though possibly only in the short run, in terms of corporate governance and, consequently, on shareholders' interests. Finally, prior research analyzing the relation between gender and accounting quality (Barua et al. [2010]; Srinidhi et al. [2011]; Abbott et al. [2012]; Francis et al. [2014]) focuses on the US, a setting where the selection of executives and directors is not regulated. Our research contributes to this literature by exploring a different setting, where the selection of female board members is regulated and a minimum percentage of female directors is imposed externally, through regulation.

The chapter is structured as follows: Section two reviews the literature on affirmative action and quotas; it also describes the Norwegian Gender Quota and presents our research hypothesis; Section three explains the sample construction and the research design; Section four presents the main empirical results, and robustness checks; Section five studies the relationship between discretionary accruals and board characteristics; finally, Section six concludes.

1.2 Literature review, background and hypothesis development

1.2.1 Prior evidence on the effects of affirmative action programs

Affirmative action programs aim to improve the status of minorities and women in the labor market and other areas (Holzer and Neumark [2000]). A common type of

affirmative action is the imposition of gender or minorities quotas. Although widely proposed in political arenas, there is no clear consensus among scholars about the effects and consequences of affirmative action. In particular, proponents of gender quotas call for the historical underrepresentation of women in high profile jobs. This difficulty for women to access top positions is, generally, accepted in the literature. Bilimoria and Piderit [1994] document sex-bias toward board committee memberships, since women are more likely to be appointed to public relation committees rather than executive committees. Westphal and Stern [2006], [2007] provide evidence of women facing different types of discrimination in accessing board positions. Moreover, evidence of the preference of men over women with the same abilities for top positions is also found in other areas, such as in biomedical research (Wennerås and Wold [1997]) or in leading symphony orchestras (Goldin and Rouse [2000]).

The imposition of gender quotas guarantees an increase in the participation of women in high profile jobs, breaking the so-called glass ceiling from above. The glass ceiling is defined as an invisible barrier that limits the access of females to top positions in the corporate world. Proponents of quotas suggest that although the presence of women in managerial and public service positions is increasing over time, once they reach a certain position in the company (the glass ceiling) it seems impossible for them to move further upward (Cotter et al. [2001]). As the presence of women in top positions is fostered by quotas, other women may reach top

positions by themselves. These new entrants may benefit from the observed labor outcomes of women who accessed highly competitive positions previously through quotas, which may eliminate biases in social norms (and stereotypes) regarding women's capabilities. Women who access top positions through quotas may also become role models for other women. In a study of female quotas for local governments in India, Beaman et al. [2009] provide evidence consistent with these benefits of quotas in the long run, and Balafoutas and Sutter [2012], using a lab experiment, also provide evidence consistent with these positive effects of quotas.

An expected additional positive effect of an increased female participation in top managerial positions (either enforced through quotas or not) is reduced discrimination practices against female workers at the lower echelons of the organization. In particular, Tate and Yang [2014], who focus on an unregulated environment, without quotas, show that firms with more women in the top decision-making processes implement more female friendly policies that decrease the gender pay gap between male and females with the same occupation in the same firm.

On the other hand, opponents to gender quotas argue that quotas may lead to the hiring of less qualified workers. In this sense, Welch [1976], Lundberg [1991] and Coate and Loury [1993] conclude that the imposition of quotas leads to suboptimal solutions on contracting problems. Holzer and Neumark [1999a] find

that the use of affirmative action programs leads to the hiring of minorities or female employees who are less qualified, and documents uncooperative behavior in groups formed with quota-based selection rules. Directly analyzing the Norwegian case, Bertrand et al. [2014, p.1] conclude that "the reform had very little discernable impact on women in business", beyond those that were appointed because of the quota. Finally, the use of quotas for public employment is banned in several US states, which suggests that a number of legislators have a negative opinion about the effects of quotas.

1.2.2 The Norwegian gender quota for boards of directors

Even though many countries are considering legislative changes to foster the presence of women on boards, Norway was the first country enforcing a minimum ratio of women in the board of directors of public limited liabilities companies—or ASA in Norwegian, which stands for *Allmennaksjeselskap*—. Through the "Rules for Gender Representation" quota the Norwegian government imposed a minimum female representation of 40 percent on boards of directors for public limited liabilities firms.

The first informal announcement of the quota was made on February 22nd, 2002. This public announcement was highly unanticipated, and was made public after a meeting between a journalist and Ansgar Gabrielsen, Minister of Trade and Industry. In December 2003—almost two years after the informal announcement of the quota—the Norwegian Parliament passed an amendment to the Public Limited

Companies Act, establishing a demand for gender balance in the companies' boards. The agreement between the Norwegian government and the private sector was that if the companies achieved a minimum gender representation on boards of 40 percent voluntarily before July 2005 there would be no penalties for delinquent firms. However, by July 2005, only 13.1 percent of the affected firms achieved the desired female representation: overall, only 16 percent of board members were women, a percentage lower than the targeted 40 percent.

After voluntary compliance failed, the rules requiring a minimum 40 percent female representation on boards of public limited liabilities companies became compulsory on January 1st 2006, and companies had two years (up to January 1st 2008) to comply with the law. Also, all new listed companies after January 1st 2006 had to fulfill the gender quota to be registered in the Oslo Stock Exchange. The penalty for noncompliance was the liquidation of the delinquent company. By April 2008—six years after the informal announcement of the quota—all Norwegian public limited companies fulfilled the Gender Quota. Figure 1.1 presents the increase of female presence on Norwegian boards for the firms in our sample during the period 2002 – 2010.

Norwegian companies' managers and owners complied with the Gender Quota with significant resistance. In particular, they complaint about the lack of qualified female candidates (Storvik and Teigen [2010]). Ahern and Dittmar [2012] provide early evidence supporting the quota opponents' claim that, at least in the

short run, there was a lack of qualified candidates. Ahern and Dittmar [2012] find that new female board members are younger and have less experience as executive managers or owner/partnership experience than retained and exiting male board members. In contrast, new female board members have more formal education. Similarly, Storvik [2011] conducted a survey on Norwegian board members at the beginning of 2009. Among the surveyed board members who answered that the Gender Quota had a negative effect on the board's work after the reform, their main reason for arguing a negative effect is that new female board members lack important skills and insight. Our data about board members' personal attributes provide evidence consistent with that of Storvik [2011] and Ahern and Dittmar [2012].

1.2.3 The effect of the quota on the quality of accounting numbers

Our main research hypothesis combines the evidence that the Norwegian pre and post-Gender Quota boards are qualitatively different (Ahern and Dittmar [2012]), with the evidence of affirmative action programs leading to the hiring of individuals that are not the best suited for the type of work (Holzer and Neumark [1999a]).

Regarding who is better suited to monitor the financial reporting decisions of top managers, prior research shows that the influence of directors on the financial reporting system depends upon whether the directors have prior experience in preparing or auditing financial statements. There is evidence that

firms with a larger number of directors with accounting expertise are less likely to present accounting irregularities (Badolato et al. [2014]), that firms with more financial experts in the audit committee suffer less internal control problems (Krishnan [2005]), and that accounting expertise in the audit committee is linked to more conservatism accounting numbers (Krishnan and Visvanathan [2008]) and improved accruals quality (Dhaliwal et al. [2010]; Krishnan et al. [2011]). Also, capital market participants value the presence of directors with accounting backgrounds in audit committees (DeFond et al. [2005]), and even prior research uses directly accounting expertise in the audit committee as a proxy for accounting quality (Engel et al. [2010]). There is also prior evidence that accounting/financial literacy (education) is not enough, and that prior experience is key to ensuring financial reporting quality (McDaniel et al. [2002]).

However, firms that had to made large changes to their board because of the quota will find it difficult to find candidates to board directorships with the proper characteristics. This lack of adequate candidates was in fact one of the main criticisms to the quota (Storvik [2011]), and the results in Ahern and Dittmar [2012] are in line with Norwegian boards after the law having younger and less experienced members. We expect that this lower experience will hinder the monitoring capability of boards of directors of the most affected firms. This lower monitoring capability will, in turn, permit managers to engage in earnings

management activities that will not be detected by the board. Given this, our main hypothesis as follows:

H: Firms forced to perform greater changes due to the Norwegian Gender Quota are more likely to suffer from a reduction in the monitoring ability of the board of directors. This reduced monitoring ability is expected to lead to increased earnings management practices.

1.3 Sample and research design

1.3.1 Sample

To test our hypothesis, we hand collect demographic and professional information about Norwegian CEOs and board members from several sources. For each board member and CEO we obtain the name, gender, and birth date from the Norwegian Business Register. We also record the nationality, education, prior experience as a CEO, current occupation and year elected to the board to compute tenure.[1]

We collect board and CEO information for companies that fulfill three conditions: (1) their financial statements information, needed to run our tests, is available on the Bureau Van Dijk's Osiris database from 2000 until 2010; (2) they were public limited liabilities companies—the organizational form affected by the quota—at the time of the informal announcement by the Ministry of Industry and Trade (2002); and (3) they were listed on the Oslo Stock Exchange before the passage of the stricter version of the Gender Quota in 2006. These three conditions

[1] An extensive description of each item collected is provided in Appendix A.

yield a sample of more than 4,000 person-year observations, for an unbalanced panel of 81 firms: we have data on 8 firms through 2008, 4 firms through 2009 and 69 through 2010.[2] Although all public limited liability companies are affected by the Quota, we focus on listed companies to test our hypothesis. We do this for two reasons. First, while the quota is mandatory for both types of firms, non-listed firms find it much easier and less costly to change legal status to avoid complying with the quota. However, delisting can be quite costly, and, therefore, one might think that the quota law is actually only compulsory for listed firms. Consistent with this argument, Bøhren and Staubo [2014] show that a large percentage of private firms affected by the quota law changed their legal status. Second, financial reporting incentives for listed and unlisted firms vary substantially (Burgstahler et al. [2006]).

CEOs and board members' biographical information comes from annual reports. If any of the information for a given board member is missing from the annual report, we check either other firms' reports or look for alternative sources of bio sketches, such as Business Week or the Forbes online service of executive profiles and biographies. We also obtain additional information from the Osiris and Amadeus databases. We match director-level data with firm level data to

[2] As the number of firms in our sample is small, if a firm has missing information for an item in a given year, we match the firm's financial information available in Osiris with data from Compustat, to fill-in the missing value, if available. The firms in our sample represent a variable fraction of all non-financial firms listed in the Oslo Stock Exchange for the period 2001 - 2010. This fraction fluctuates between 65 percent (in 2003) to 48 percent (in 2007).

calculate the average at the firm level of the following variables: percentage of female board members, age, directors' tenure, prior CEO experience of directors, level of studies, and current occupations. As in Ahern and Dittmar [2012], if more than a half of a firm's board members data are missing for any variable, we drop the firm-year observation when we perform tests related to board composition or board characteristics.

1.3.2 Identification strategies

The passage of the Gender Quota affected all public limited liabilities companies in Norway, but its impact on these companies varied as many already had an important number of women on their boards. Some companies were even fulfilling the minimum level of gender diversity imposed by the Gender Quota before the Quota's informal announcement in 2002. To analyze the impact of the Quota we implement a difference in difference approach and separate firms into those that were greatly affected by the Quota from those that were not, and analyze the differences between them. Since one can define the magnitude of the impact of the Quota on a firm in different ways, we perform our tests using two different identification strategies (ways to define what it means to be greatly affected by the Quota). In both cases, we separate companies into a *treatment group* (the group of companies that are greatly affected by the Quota), and a *control group* (those companies that are not greatly affected by the Quota).

Our first identification strategy classifies companies according to whether the company had female board members as of 2002, the year of the first (and informal) announcement of the Quota. This identification strategy is based on the premise that it is the qualitative presence of a female member on the board that determines whether the impact of the Quota is going to be important or not. A company that already had a female director in 2002 may find it easier to find and incorporate female board members without any major alteration of the functioning of the board. This can be the case because these firms have already in place proper mechanisms to identify the individuals that are better suited to become directors (for example, well-functioning nomination committees). Given the existence of these mechanisms, identifying additional women with the desired characteristics can be something that they can accomplish more easily than firms that do not have those mechanisms in place. This identification strategy yields the following groups: (1) the control group, composed of firms with at least a female board member in 2002, includes 26 firms (32 percent of the sample); (2) the treatment group, composed of firms with no female board members in 2002, includes 55 firms (68 percent of the sample).

In our second identification strategy we look at how far each company is from complying with the Quota. Because there is heterogeneity in the total number of board members, distance to compliance with the quota could be measured either in absolute terms (number of board members replaced) or in relative terms

(percentage of board members replaced). We focus on absolute distance, total number of new female members needed, although a classification in terms of relative distance leads to only minor changes in the control and treatment groups and the same qualitative results.

In our sample, companies have five board members on average. Thus, under the conditions of the Quota, an average board is required to include at least two board members of each gender. This proportion varies slightly conditional on the board's size: small boards with three members must include at least a board member of each gender, whereas boards with nine members (the largest in our sample) have to include four representatives of each sex. For our analysis, we classify a company as greatly affected by the Quota (the treatment group) if it had to hire two or more female board members, while firms that had to hire none or one female director make up the control group. Table 1.3 shows the number of companies per board size in 2007, and the number of female board members that were added to the board between 2002 and 2007. As can be seen in Table 1.3, the control group contains 19 firms (24 percent of the sample) and the treatment group 62 firms (76 percent of the sample).

To check that the two groups of firms (treatment vs control) differ only on the expected effects of the quota, and not on some other firm characteristics, in Tables 1.4 and 1.5 we study the differences in size, leverage, cash, assets turnover and profitability across the two groups. Table 1.4 includes the differences between

groups classified using strategy one (female presence on the board in 2002). The only difference we find between treatment and control firms is that companies in the control group are larger (e.g. they have higher book value of assets and more employees). Larger companies have more board members, allowing for an easier incorporation of women to boards (Hillman et al. [2007]). Other variables related to firm characteristics are not significantly different between groups, which justifies our method of analysis. Results in Table 1.5 for identification strategy two (distance from Quota) are in line with those for identification strategy one.

Further evidence that our criterion does indeed capture the impact of the Quota on companies comes from the fact that among all the firms in our sample that did not comply with the requirements of the Quota on the mandatory date (1st January 2008), and that were given a 4 week extension to comply or be liquidated, none had female board members in 2002 (they were all in the treatment group). We do not find evidence of this or other problems in complying with the Quota for firms in the control group.[3]

1.3.3 Discretionary accruals measure

Given the size of our sample of Norwegian firms we use the measure of discretionary accruals proposed by Francis and Wang [2008], adapted from DeFond and Park [2001]. This measure allows the computation of discretionary

[3] A total of 72 Norwegian firms violated the January 2008 deadline, receiving a letter from the Norwegian Business register giving them 4 week notice to comply with the Gender Quota (Norwegian Minister of Children, Equality and Inclusion). Of these, only eleven are in our sample.

accruals for small samples. Discretionary accruals (DAX) are defined as the firm's total accruals in year *t* minus the firm's predicted total accruals for year *t*. In the Francis and Wang [2008] model, predicted accruals are based on the firm's previous year ratio of current accruals to sales and the firm's prior year's ratio of depreciation expense to gross property, plant and equipment (PPE). The model is, thus, using a firm's own prior year accruals in calculating the expectation benchmark.

The model is as follows:

Predicted accruals$_{i,t}$ =

$$\frac{\left\{\left[Rev_t * \left(\frac{Current\ accruals_{t-1}}{Rev_{t-1}}\right)\right] - \left[PPE_t * \left(\frac{Depreciation_{t-1}}{PPE_{t-1}}\right)\right]\right\}}{TA_{t-1}} \quad (1)$$

where *TA* is total assets (S13077), *REV* is total sales (S13004), *PPE* is gross property, plant and equipment (S20245), Depreciation (S13019) is total depreciation. Current accruals is defined as the difference between the change in current assets (S13061) and the change in cash and short term investments (S20070) minus the difference between the change in current liabilities (S14011) minus the change in short term debt (S22110).[4] Discretionary accruals (DAX) are then defined as the firm's total accruals in year *t* minus predicted total accruals for year *t*.

[4] As in Leuz et al. [2003] and Burgstahler et al. [2006] if a firm does not report information on short-term debt, then the change in the variable is assumed to be zero.

Given that we need changes in current assets and liabilities to calculate current accruals, the model requires two years of previous information to compute the abnormal level of accruals of the current year. Consequently, we can estimate yearly abnormal accruals from 2002 onwards for the firms in our sample. We drop observations with discretionary accruals above the 99th percentile in absolute value. As it is common in prior research linking corporate governance mechanisms and financial reporting quality (e.g. Klein [2002]; Faleye et al. [2011]), we use the absolute value of the discretionary accruals (*absDAX*). Larger values of *absDAX* indicate poorer earnings quality.[5]

1.3.4 *Main model: Effects of the gender quota on accounting quality*

We use the following equation to test our hypothesis:

$$absDAX_{i,t} = \beta_0 + \beta_1 QuotaxNo\_Fem_i + \beta_2 Quota + \beta_3 No\_Fem_i + \beta_x Controls_{i,t} + fixed\ effects + u_{i,t} \quad (2)$$

where $absDAX_{i,t}$ is the unsigned value of abnormal accruals from the Francis and Wang [2008] model; the variable *Quota* takes value one for the 2005-2010 time period, which is when firm's boards are experiencing higher changes and three years into the time period when the Quota constraint is binding;[6] the variable *No_Fem* takes value one if the firm *i* belongs to the treatment group for any of our identification strategies, namely firms with no female board members in 2002

[5] We replicate our tests using discretionary accruals to the power of two, instead of the absolute value. Unreported results are in line with those in the main tables.
[6] In Section 1.4.3 we consider alternative (shorter) time periods and the results are qualitatively the same.

(strategy one) or firms forced to hire two or more female board members to fulfill the Gender Quota (strategy two); the interaction term *Quota x No_Fem* proxies for firms with higher Gender Quota's compliance cost, during the years where the mandatory quota was binding and board changes were the biggest (2005 – 2010). We include a set of controls for known sources of discretionary accruals (size, leverage, growth, profitability and a dummy variable equal to one if the firm had losses on the previous year). We also include industry (two-digit SIC level) fixed effects and industry clustered errors.

The main coefficient of interest is that of *QuotaxNo_Fem*, β_1. A positive and significant coefficient will tell us that companies that are highly affected by the Gender Quota are recording significantly higher levels of unsigned discretionary accruals during the period when the mandatory quota was binding and board changes were the biggest, than those companies least affected by the Quota.

1.4 Empirical results

1.4.1 Effects of the quota on board composition over time

A key effect of the Quota is that it generated unusually large changes in company boards. Norwegian firms in our sample started to make substantial changes to their boards due to the Gender Quota in 2005, at the end of the voluntary compliance period. The hiring of female board members peaked in 2007, the last year of the transition period after the issuing of the mandatory quota. Note also

that the number of new female entrants in 2008 was still high although firms were already fulfilling the 40 percent target, which implies a high level of turnover for female board members during that year.

In the process of understanding the effect of the Quota, we must look at whether the changes were not only large but also if they led to the hiring of new directors that were substantially different (not only gender-wise, but also regarding their professional backgrounds) than the directors they replaced. Indeed, one of the main arguments of quota opponents was that a lack of qualified candidates would have a negative impact on companies. Table 1.6 Panel A describes the average characteristics of boards and board members and Panel B identifies the concurrent outside occupation of board members over the time period of our study. Overall, we find that the total number of members in a board remains stable around five. This shows that firms that needed to increase the percentage of female board members to comply with the quota did not just hire additional female directors, thereby increasing the size of the board. Instead, they replaced male by female board members. We also find that the number of board members with CEO experience decreases. The percentage of insiders (board members that receive remuneration from the firm other than compensation for board membership) also decreases.

As mentioned before, panel B of Table 1.6 shows the outside occupation of board members over the time period of our study. After the quota, the percentage

of board members working in non-executive positions such as non-executive officer or CFO increases over time. Also, more executive oriented positions such as owner/partner decrease.[7] In unreported results, we replicate Table 1.6 with firms with no female board members in 2002; the results are similar to, but stronger, than the changes reported for all the firms in the sample.

Table 1.7 summarizes the average attributes of new, retained and exiting male and female board members, and the analysis of statistical differences in the means of these attributes between new female board members and retained and exiting male board members.

In Panel A of Table 1.7, we find that new female board members are on average 9 (7) years younger than retained (exiting) male board members. New women members are also less likely to be firm insiders or a major shareholder.[8] Also, new female board members have lower executive experience, almost 41 percent (37 percent) less compared with retained (exiting) male board members. However, entrant women are on average more likely to have Norwegian graduate education than exiting and retained men.[9] In terms of current occupation—Panel B of Table 1.7—new female board members have a different distribution of occupations than retained and exiting male board members. Specifically, new

[7] We classify board members working currently as owner/partner if they declare to be: partner, principal, owner, self-employed, independent, founder or/and investor.

[8] We define as a major shareholder a board member who owns directly or indirectly 5 percent or more of the companies' shares.

[9] We define as a Norwegian Graduate a board member who has Graduate level education from a Norwegian institution.

female members are more likely to occupy non-executive positions. In contrast, new female members are less likely to be board members in other firms, and they are less likely to be CEOs or owner/partners. Hence, the aforementioned reduction in the proportion of board members with CEO experience or working currently as owner/partners is attributable to the inclusion of female board members, who are less likely to have executive experience. Moreover, new male board members show no significant differences with respect to exiting men (last column of Table 1.7). Overall, our evidence of board changes is consistent with the evidence provided by Ahern and Dittmar [2012] and the survey by Storvik [2011].

We conclude that this descriptive evidence is consistent with Norwegian boards being now more diverse in terms of experience, education and current occupation than they were before the quota. This diversity is, though, at the expense of members with experience in executive or owner/partnership positions.

1.4.2 The effect of the quota over accounting quality

Table 1.8 summarizes the results of the estimation of model (2), described in Section 1.3.4, using identification strategy one (female presence on the board). In column (1), the coefficient for *Quota* identifies the effects that are common to all companies during the period when firms' boards experience higher changes and three years into the period when the Quota constraint is binding (from 2005 to 2010)—this effect is statistically insignificant. Column (2) considers the effect of belonging to the affected group over the whole sample period in isolation. This

effect is positive and weakly significant ($p < 0.1$). Finally, column (3) considers both the common time effect, membership to the treatment group, and the interaction term—belonging to the treatment group during the transition period. The coefficient *QuotaxNo_Fem1*, (β_1) is positive and statistically significant at standard levels (coefficient *0.039*, $p < 0.05$).

Thus, from Table 1.8, we conclude that firms with no female representation in 2002 are more likely to report higher levels of abnormal accruals over the period when changes to the boards were more pronounced and after the mandatory introduction of the quota (2005 - 2010). This evidence suggests that the Gender Quota negatively affected the level of monitoring exerted by boards, as reflected in higher discretionary accruals, for the firms most affected by the quota, in the period 2005-2010.

We repeat the analysis in Table 1.8 with the second identification strategy (distance from Quota) and gather the results on Table 1.9. The results lead to the same conclusions, as the coefficient *QuotaxNo_Fem2* is positive and significant (coeff. *0.040*, $p < 0.1$). The results with the second identification strategy support our argument that firms that had to hire more women to meet the Quota reported higher levels of discretionary accruals.

Overall, the results from Tables 1.8 and 1.9 suggest that after the passage of the mandatory Gender Quota the companies that were most affected by the Quota saw a reduced monitoring activity from their boards. These results are in line with

the view that firms optimally choose their boards (Adams et al. [2010]), appointing directors with certain attributes to optimize control over the firms' management, and with the imposition of the Gender Quota acting as an exogenous shock to these optimally chosen boards. The mandatory inclusion of members from a restricted pool of candidates in a short period of time hindered the monitoring capabilities of boards from the time of the introduction of the quota until the end of our sample period (2005 - 2010). We now turn to study the temporal aspects of the Quota in greater detail.

1.4.3 The effects of the quota over time

A key question is how the effects of the Quota on earnings quality that we identify in our prior tests (Tables 1.8 and 1.9) behave over time; whether they persist over time or are clustered around the initial years, when boards are experiencing greater changes. If the effects that we identify are driven by the compulsion of replacing board members over a relatively short span of time and from a limited pool of candidates, then it is not clear whether the effects should persist over time. The need to hire new board members over a short period of time would lead to boards with a large percentage of new directors with lower experience and lower monitoring abilities. However, with the passage of time, the overall monitoring skills of the board can return to the pre Quota level. This return to the pre-quota monitoring level can be achieved through two channels: a) by an improvement in the monitoring capabilities of the existing board members thanks to their

experience as board members in the company, or by an improvement in the directors' status as tenure increases, and/or b) by the replacement of less qualified board members by directors with more experience in accounting matters. Regarding the first channel, about directors improving their monitoring skills because of gaining experience and understanding better the firm, prior research suggests that experience as board members in the firm will not contribute to make directors better monitors of the accounting system (Kim et al. [2014]). However, it can be the case that directors with a good monitoring background (with accounting expertise) could not affect the financial reporting system because of, as being a newcomer, having a low status in the firm, and a lower ability to influence the overall view of the board (Badolato et al. [2014]). Therefore, as tenure increases, there directors would gain status and would be more able to influence board decisions. If this is the case, the monitoring ability of the board could increase with the passage of time.

Regarding the second channel, we observe that even in 2008, there is a high percentage of replacement among board members. This large replacement rate that could in fact respond to attempts at improving the monitoring skills of board members, replacing less experienced by more experienced directors. If the learning effect, or the increase in directors' status in a) takes place, or if the firm hires better board members over time, then we expect that, over time, the monitoring differences between control and treatment firms will tend to disappear.

To study the temporal aspects in greater detail we consider several alternative definitions of the *Quota* variable and summarize our results in Table 1.10. In particular, we consider using the periods 2005 – 2009 (columns (1) and (2)), 2005 – 2008 (columns (3) and (4)) and 2009 – 2010 (columns (5) and (6)). Results are as follows: We find that the coefficients on the *QuotaxNo_Fem* in Columns (1) to (4) from Table 1.10 are positive and significant, consistent with the results in Tables 1.8 and 1.9. However, *QuotaxNo_Fem1* and *QuotaxNo_Fem2* are not significant for columns (5) and (6) implying that during the period 2009 – 2010 the Gender Quota had no effect over monitoring.[10] Results are consistent with our assumption that the effects of the Gender Quota are clustered around the time period when boards experience higher changes, specifically the time period 2005 – 2009. We choose these time periods given the rate of female entrants: even though firms must comply with the quota in January 1st 2008, still in 2008 the appointment of new female directors remains high. Moreover, during the year 2009 female board members' turnover was low, implying that the same directors of 2008 were in office.

Unreported univariate tests are consistent with these results, suggesting that the difference in the level of earnings management between the treatment and

[10] We re-estimate columns 5 and 6 dropping the years 2005 to 2008 from the sample (the years where changes to the boards were more pronounced). With this, we focus on the differential effects of 2009 and 2010, with respect to the period before the introduction of the massive changes to the boards (in particular, 2002 to 2004). Results also show that there is no difference in discretionary accruals between the two periods. This provides additional evidence that the effects of the quota over monitoring were short-lived.

control groups of firms appears in the period between 2005 and 2009, and disappears in 2010. Overall, these results are consistent with the expectation that the Gender Quota effects on monitoring are short lived, and clustered around the years when firms suffered greater changes in board composition to fulfill the quota.

1.4.4 Robustness tests

1.4.4.1 Measuring the effects using the Ahern and Dittmar approach

Ahern and Dittmar [2012] analyze the effect of the introduction of the Quota on firm value using an instrumental variable approach. Even though the gender quota provides an exogenous shock to boards' composition, Ahern and Dittmar [2012] raise concerns about the strategic timing of quota's adoption by managers and shareholders. As the authors state, male board members could give up their board's position in advance of the firm's poor performance, or firms may relocate to a foreign country or go private to avoid the law. To address this, Ahern and Dittmar [2012] use as an instrument the pre-quota variation in female board representation across firms. As all firms have to comply with the targeted 40 percent quota, firms with a higher proportion of female members are less time-constrained when it comes to fulfilling the Quota than firms with a lower proportion of female members.

We repeat our analyses using the pre-quota percent of women board members as the independent variable. We do this using both the period (2003 –

2010) and the one proposed by Ahern and Dittmar [2012] (2003 – 2009), including year-specific dummies to control for market wide time effects. Table 1.11 presents the results.

We find that the instrument has a weakly positive and significant coefficient (coeff. *0.164*, $p < 0.1$) for the period 2003 – 2009, but not for 2003 – 2010. We interpret the positive and significant coefficient as an additional support to the negative effect of the quota on the quality of accounting numbers. More interestingly, the effect seems to disappear when year 2010 is included. This result strengthens our findings that the quota's effects were short lived, and clustered around the years when changes are taking place.

1.4.4.2 Extending the sample and implementation of Jones-type discretionary accruals models

Given the relatively small sample size we work with, we cannot use directly typical measures of discretionary accruals estimated at the industry-year level. However, if we extend our sample and include firms from countries with similar accrual generating processes, we can construct the Jones measure of discretionary accruals for the Norwegian firms in our sample. To extend our sample, we use the institutional clustering in Leuz et al. [2003], where Norwegian firms are clustered together with those in Denmark, Finland, Sweden and the UK. We then extend our sample by including the firms from those four countries with data availability in Osiris and estimate the Jones [1991] discretionary accruals model in cross-section for each industry-year but for all countries considered together. Even after

clustering with firms from these four countries, there are some industry-year combinations without enough observations to estimate the model (we impose a minimum of 7 observations per two digit industry-year combination). Given this, we are not able to estimate accruals for all the Norwegian firms in our sample, and we had to drop 25 firm-year observations overall.

Using the abnormal discretionary accruals estimated in this fashion, we replicate our main tests using the new unsigned discretionary accruals and regressing them against the *QuotaxNo_Fem* and the set of control variables (as in Model (2)). We explore different specifications and combinations of countries but results are inconclusive.

This is not entirely surprising, given that the use of the Jones model in international settings has been criticized in the literature for failing to capture earnings management. In an international setting, differences in institutional and economic diversity amongst countries may increase the noise in the estimation so much as to make it impossible to detect earnings management (Peek et al. [2012]).

1.4.4.3 Use of balanced panels

We also analyze the robustness of the results using a reduced set of firms for which we can build balanced panels. Therefore, we repeat the analysis of Tables 1.8 and 1.9 for the 73 firms with data for the period 2002 – 2009 and the 69 firms with data for the period 2002 – 2010. Again, we find the interaction coefficient *QuotaxNo_Fem* to be positive and significant using the 2002 – 2009 panel for both identification

strategies. When we use the smaller sample that is complete for the 2002 – 2010 period, we only find significant results for identification strategy one. This result is in line with the effects concentrating around the years when the changes to the boards were more pronounced.

1.5 Board characteristics and accounting quality

1.5.1 Board members personal attributes and characteristics

Thus far, we have focused on determining what effect, if any, the introduction of the Quota had on earnings management. A simplistic interpretation of the above results would link the negative effects we have found to the gender of the new board members. However, as we report in the descriptive statistics (Tables 1.6 and 1.7), the changes associated with the introduction of the Quota did not just affect the gender of board members, but it also led to changes in the overall distribution of the skills and characteristics of the boards. Thus, the natural next step is to identify what skills or characteristics are more closely associated with the negative effects of the Quota. We thus proceed by first estimating the relationship between changes in board gender diversity and board characteristics, and then turn to study the relationship between discretionary accruals and board characteristics.

In a first set of tests, we use the pre-quota percentage of women on the board as an explanatory variable of several board characteristics. In particular, we explore the relationship between having a greater percentage of women on the

board and: board size, average board age (as a proxy for overall experience), proportion of members with experience as CEO, major shareholders, and the proportion of board insiders. The results are consistent with the descriptive statistics in Table 1.7. Once the Quota is implemented and the proportion of female board members increase, the proportion of board members with CEO experience diminishes. Also, while the average board is younger, the size of the board remains constant.

To continue our analysis, we look at the relationship between these board characteristics and unsigned discretionary accruals. Table 1.13, column (1) contains the results for the regression of the main characteristics (Female, board size, age, major shareholder, CEO experience and CEO experience squared) plus the usual controls. In column (2) CEO experience (and its squared) are replaced by a set of dummy variables indicating the presence on the board of a member working currently in any of the following occupation: vice-president, consultant, professor, CEO, non-executive officer, CFO, accountant or lawyer.

We find that the proportion of variable female board members is not significantly associated with earnings quality. On the other hand, the presence of major shareholders is negatively associated with the level of discretionary accruals (coeff. *-0.05*, $p < 0.1$), while CEO experience has a statistically significant non-linear effect. When we replace CEO experience with the set of dummy variables accounting for the presence of at least one board member with a given current

occupation, we find that only CFO experience is statistically significant (with a negative coefficient), though the power of that estimation is lower because of the large number of additional variables added to the estimation.

The negative and significant coefficient on major shareholder is consistent with prior evidence of the positive effect of block holders on boards over monitoring (Klein [2002]). The non-linear effect of CEO experience can be interpreted as follows: board members with previous CEO experience reduce the level of discretionary accruals. However, the marginal contribution of more board members with CEO experience to monitoring is not significant. The negative association between previous CFO experience and the absolute value of discretionary accruals (coeff. *-0.038*, $p < 0.05$) is consistent with the assumption that earnings management is less likely when the monitoring is performed by directors with higher levels of financial expertise (McDaniel et al. [2002]; DeFond et al. [2005]; Krishnan and Visvanathan [2008]; Dhaliwal et al. [2010]). Overall, we interpret these results as evidence that the economic effect of the Quota must not be interpreted in terms of gender, but must be evaluated in the context of the characteristics of board members.

1.5.2 Co – opted boards

Hermalin and Weisbach [1998] and Coles et al. [2014] provide evidence that when CEOs are more entrenched they appoint new directors that are acquiescent. Coles et al. [2014] define board co-option as the percentage of board members elected

during the current CEO's tenure. As boards become more co-opted, the level of monitoring over the CEO activities diminishes. In this sense, the massive appointment of board members given the Norwegian Gender Quota provides an adequate setting for testing the hypothesis of increasing earnings management as boards' co-option (the presence of 'captured' directors) increases. We use the two measures of co-option proposed by Coles et al. [2014]—proportion of co-opted board members and proportion of director-years served by directors appointed by the current CEO—to study the relation between discretionary accruals and boards' co-option. In unreported results, we do not find a statistically significant relationship between both co-option measures and discretionary accruals. Thus, our results of increased earnings management because of the passage of the quota do not seem to be attributable to changes in board co-option.

1.6 Conclusions

We study whether the Norwegian law requiring a minimum of a 40 percent of women on the boards of public firms had effects on the monitoring capabilities of boards of directors. In particular, we analyze whether the quality of accounting numbers was affected. Using a hand-collected database of board members' personal and professional attributes, we test the assumption that after the Gender Quota new boards are younger, have different backgrounds and have lower executive experience. We hypothesize that these younger, less experienced boards,

are less prepared to fulfill one of the main roles of board of directors: monitoring. We argue that the boards monitoring capability of the firms most affected by the quota is reduced, compared to boards whose members were chosen freely by shareholders, before the passage of the quota. To test this decrease in monitoring capability, we look at an output of monitoring: the quality of accounting numbers. As a proxy for the quality of accounting numbers we use the unsigned discretionary accruals from the Francis and Wang [2008] model. Our results suggest that, after the passage of the Gender Quota, earnings management is more pronounced in firms for which the impact of the passage of the quota was larger. To identify the firms for which implementing the quota was most costly we focus on firms without women in 2002 (the year before the quota was announced) and on firms who needed to hire more women to comply with the requirements of the quota.

We also find evidence of associations between board characteristics and the current occupation of board members and earnings management. In particular, the presence of major shareholders and board members with executive experience is negatively related to abnormal accruals. Also, our results provide evidence of a negative and significant relation between boards with at least one board member working currently as a CFO and our proxy for earnings management.

Overall, our results suggest that forced changes in corporate governance weaken internal control mechanisms, as monitoring. This effect could be one of the

forces leading to the reduction of firm value driven by the introduction of the quota documented by Ahern and Dittmar [2012], and to the decision to change to a legal status not affected by the quota documented by Bøhren and Staubo [2014]. Though we find evidence that gender quotas have negative effects in terms of accounting quality, these effects are limited to a short time period after the quota implementation. This study leaves an open window for further research on the long run effects of the Gender Quota on accounting quality. As proponents of gender quotas claim, once there is a critical mass of women on top positions more women can find their way to executive positions and acquire the desired skills to become efficient monitors. Overall, considering the current debate regarding whether gender quotas should be imposed, our evidence is especially relevant to widen our understanding of the consequences of such regulations in the short run.

1.A Appendix

For each board member in our sample we collect the following personal/demographic characteristics, as well as her/his current occupation(s). The collected items are the same as in Ahern and Dittmar [2012], with the exception of *Major Shareholder* and *Norwegian Graduate*.

For personal/demographic characteristics we collect the following data:

- **Age:** age of the board member.
- **Gender:** gender of the board member.
- **Tenure:** tenure of the board member.
- **Insider:** the board member receives a monetary compensation other than boards' salary from the firm.
- **Family:** the board member shares the same family name as the CEO or other current board member.
- **Major shareholder:** the board member owns 5 percent or more of the companies' shares, directly or indirectly.
- **CEO experience:** prior or actual experience as Chief Executive Officer or owner.
- **MBA:** the board member has a Master in Business Administration.
- **Norwegian graduate:** the board member has Graduate level education from a Norwegian institution.

- **High education:** the board member has Graduate level education from an institution outside Norway or a PhD.

Definition for current occupation(s) is as follows:

- **Vice-president:** vice-presidency of any kind.
- **Consultant:** consultant, advisor, counselor.
- **Board member:** chair, deputy chair, member.
- **Professor:** university professor.
- **CEO:** Chief Executive Officer, general manager, president, managing director, administrative director.
- **Attorney:** attorney, lawyer, advocate, studies in law.
- **Non–executive Officer:** Manager, Head of (sales, Human Resources, etc.), Chief Operating Officer, marketing, general secretary.
- **CFO:** Chief Financial Officer, Investment Officer.
- **Partner/principal:** partner, principal, owner, self-employed, founder, independent, investor.
- **Accountant:** chartered accountant, payroll, controller, controlling.
- **Other:** any other occupation not described before.

1.B Tables

Table 1.1 – Descriptive statistics of variables included in the study

Variable	Mean	Median	Standard Deviation
Log of Sales	12.152	12.148	2.037
Log of Assets	12.560	12.427	1.868
Log of Employees	6.497	6.555	1.870
Leverage	0.563	0.596	0.201
Cash over Assets	0.166	0.111	0.168
Short Term Debt over Assets	0.066	0.040	0.209
Working Capital over Assets	0.157	0.127	0.209
Assets Turnover	0.946	0.883	0.633
Return over Assets	0.027	0.051	0.159
Lag Loss	0.332	0.000	0.471
Growth of Sales	0.287	0.122	1.315
Abs. Accruals over Assets	0.095	0.066	0.103
Abs. Abnormal Accruals over Assets	0.116	0.073	0.137
Board Size	5.332	5.000	1.057
Females on Boards	0.283	0.400	0.181
Observations	692		

Notes to Table 1.1: Descriptive statistics of variables included in the study. *Log of Sales* is the log of firm's sales; *Log of Assets* is the log of the book value of firm's assets; *Log of Employees* is the log of firm's employees, when available; *Leverage* is total liabilities over total assets; *Cash over Assets* is firm's cash holdings over assets; *Short Term Debt over Assets* is the ratio of firm's stock of short term debt over assets; *Working Capital over Assets* is the ratio of firm's working capital over assets, where working capital is defined as current assets minus current liabilities; *Assets Turnover* is sales over total assets; *Return over Assets* is EBIT over total assets; *Lag loss* is a dummy variable taking value one if the firm has recorded a loss in the previous year; *Growth of sales* is the yearly change in sales; *Abs. Accruals over Assets* is the ratio of firm's total accruals in absolute value estimated using the Francis and Wang (2008) model over assets; *Abs. Abnormal Accruals over Assets* is the ratio of firm's abnormal accruals in absolute value estimated using the Francis and Wang (2008) model over assets; *Board Size* is the size of firm's Board of Directors; *Females on Boards* is the proportion of female board members in firm's Board of Directors.

Table 1.2 – Pairwise correlation between variables included in the study

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.Log of Sales														
2.Log of Assets	**0.8283**													
3.Log of Employees	**0.9050**	**0.8161**												
4.Leverage	**0.3732**	**0.2316**	**0.3738**											
5.Cash over Assets	**-0.3569**	**-0.3043**	**-0.4143**	**-0.4783**										
6.ST Debt over Assets	-0.0049	-0.0297	-0.0209	**0.4197**	**-0.2401**									
7.Work. Capital over Assets	**-0.2125**	**-0.2478**	**-0.2815**	**-0.5646**	**0.7440**	**-0.4690**								
8.Assets Turnover	**0.1754**	**-0.2701**	**0.0866**	**0.1992**	**-0.1553**	0.0212	0.0214							
9.Return over Assets	**0.4100**	**0.3880**	**0.3544**	0.0095	**-0.1742**	**-0.1586**	0.0355	**0.1178**						
10. Lag Loss	**-0.2671**	**-0.3079**	**-0.2804**	0.0402	**0.0916**	0.0670	0.0050	0.0133	**-0.4703**					
11.Growth of Sales	-0.0687	-0.0167	**-0.0791**	-0.0692	0.0653	-0.0451	0.0315	**-0.0810**	-0.0226	0.0530				
12.Abs. Accruals over Assets	**-0.0814**	**-0.1108**	**-0.1246**	0.0389	-0.0055	**0.0814**	**-0.1128**	-0.0254	**-0.2498**	**0.1294**	0.0142			
13.Abs. Abnormal Accruals over Assets	**-0.1653**	**-0.2242**	**-0.2526**	0.0076	0.0189	**0.0983**	0.0213	0.0446	**-0.1668**	**0.1836**	**0.1663**	**0.5956**		
14.Board Size	**0.3333**	**0.4061**	**0.3815**	**0.1170**	-0.0577	-0.0454	**-0.1153**	**-0.1962**	**0.1264**	**-0.1291**	-0.0037	0.0113	-0.0706	
15.Femlaes on Boards	**0.3686**	**0.4348**	**0.3533**	-0.0055	**-0.1573**	0.0183	**-0.1171**	**-0.0877**	**0.1922**	**-0.2108**	-0.0366	**-0.0950**	**-0.0752**	**0.1787**

Notes to Table 1.2: Correlations between variables included in the study. *Log of Sales* is the log of firm's sales; *Log of Assets* is the log of the book value of firm's assets; *Log of Employees* is the log of firm's employees, when available; *Leverage* is total liabilities over total assets; *Cash over Assets* is firm's cash holdings over assets; *Short Term Debt over Assets* is the ratio of firm's stock of short term debt over assets; *Working Capital over Assets* is the ratio of firm's working capital over assets, where working capital is defined as current assets minus current liabilities; *Assets Turnover* is sales over total assets; *Return over Assets* is EBIT over total assets; *Lag loss* is a dummy variable taking value one if the firm has recorded a loss in the previous year; *Growth of sales* is the yearly change in sales; *Abs. Accruals over Assets* is the ratio of firm's total accruals in absolute value estimated using the Francis and Wang (2008) model over assets; *Abs. Abnormal Accruals over Assets* is the ratio of firm's abnormal accruals in absolute value

estimated using the Francis and Wang (2008) model over assets; *Board Size* is the size of firm's Board of Directors; *Females on Boards* is the proportion of female board members in firm's Board of Directors.

Table 1.3 – Number of companies by amount of hired female-directors in the period 2002 – 2007 and board size in 2007

Hired Women	Board size in 2007					
	3	4	5	6	7	8
0	1	0	2	2	1	0
1	0	0	11	0	2	0
2	//	8	33	3	3	1
3	//	//	//	8	6	0

Notes to Table 1.3: board size in 2007 is the number of shareholder elected board members as reported by the Norwegian Business Register at the end of the year 2007. *Hired women* is the difference between the number of female board members in 2007 compared to 2002.

Table 1.4 – Difference in firms characteristics in the year 2002. Identification strategy one

	Control	Treatment	Difference	Standard Error
Log of Sales	12.989	11.014	1.975***	0.418
Log of Assets	13.293	11.248	2.045***	0.397
Log of Employees	7.557	5.585	1.973***	0.418
Leverage	0.629	0.565	0.063	0.053
Cash over Assets	0.143	0.205	-0.062	0.046
Assets Turnover	1.024	1.083	-0.059	0.182
Return over Assets	-0.014	-0.064	0.050	0.067
Observations	26	55		

Notes to Table 1.4: control group is the set of firms with at least a female board member in 2002. Treatment is the rest of the sample. *Log of Sales* is the log of firm's sales; *Log of Assets* is the log of the book value of firm's assets; *Log of Employees* is the log of firm's employees, when available; *Leverage* is the ratio of Total Assets over Total Liabilities; *Cash over Assets* is cash and other short term investments over total assets; *Assets Turnover* is sales over total assets; *Return over Assets* is EBIT over total assets. *** Significance at the 1 percent level.

Table 1.5 – Difference in firms characteristics in the year 2002. Identification strategy two

	Control	Treatment	Difference	Standard Error
Log of Sales	12.786	11.303	1.483***	0.494
Log of Assets	13.206	11.506	1.700***	0.468
Log of Employees	7.307	5.872	1.434***	0.498
Leverage	0.589	0.585	0.004	0.059
Cash over Assets	0.173	0.189	-0.016	0.052
Assets Turnover	0.969	1.094	-0.125	0.200
Return over Assets	-0.038	-0.050	0.012	0.074
Observations	19	62		

Notes to Table 1.5: control group is the set of firms fulfilling the quota in 2002 or firms having to hire only a single female board member to fulfill it. Treatment is the rest of the sample. *Log of Sales* is the log of firm's sales; *Log of Assets* is the log of the book value of firm's assets; *Log of Employees* is the log of firm's employees, when available; *Leverage* is the ratio of Total Assets over Total Liabilities; *Cash over Assets* is cash and other short term investments over total assets; *Assets Turnover* is sales over total assets; *Return over Assets* is EBIT over total assets. *** Significance at the 1 percent level.

Table 1.6 – Average Board of Directors' characteristics by year

Panel A. Board characteristics

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Members	5.37	5.32	5.16	5.22	5.27	5.42	5.37	5.46	5.26	5.45
Retained (%)		78.46	78.24	83.87	81.74	80.99	73.24	80.49	82.31	81.04
Female (%)	6.71	7.69	11.43	15.18	23.23	30.51	40.94	42.06	42.12	43.43
Age	51.89	51.97	52.55	52.76	52.10	52.07	51.73	52.26	52.59	52.77
Norwegian (%)	89.56	89.86	86.23	85.41	85.41	84.87	85.28	84.93	83.73	81.14
Tenure	3.62	3.81	3.78	3.99	4.13	4.27	3.92	4.04	4.49	4.37
Insider (%)	9.30	7.08	4.86	5.11	5.19	5.50	3.70	3.77	3.41	4.23
Family (%)	4.61	4.46	3.38	3.32	3.04	2.90	2.96	3.11	3.29	4.24
Major Shareholder (%)	28.81	31.15	28.57	29.42	26.08	24.87	23.74	24.07	26.80	27.48
CEO experience (%)	70.01	72.90	74.55	72.44	68.30	65.34	62.36	63.74	65.47	64.22
MBA education (%)	24.60	25.70	24.72	24.80	25.45	25.70	25.77	26.25	24.83	26.50
Norwegian Grad (%)	20.02	19.62	18.02	19.15	19.80	23.26	24.61	23.11	23.33	23.38
Other Grad (%)	16.48	15.89	15.61	16.73	19.87	19.47	16.64	16.82	18.87	20.42

Notes to Table 1.6 Panel A: Average Board Characteristics for firms in our sample, where available. *Retained* is the percentage of board members present in year t-1 and year t; *Female* is the percentage of female board members; *Norwegian* is the percentage of board members with Norwegian citizenship; *Tenure* is the average tenure of board members; *Insider* is the percentage of board members who are firm's employees; *Family* is the percentage of board members sharing any family relationship with respect of other board members or the executive team; *Major Shareholder* is the proportion of board members owning directly or indirectly more than 5 percent of the firm's shares; *CEO experience* is the percentage of board members with executive experience; *MBA education* is the percentage of board members with executive education; *Norwegian Grad* is the percentage of board members with graduate level education from a Norwegian institution; *Other Grad* is the percentage of board members with graduate level education from a non-Norwegian institution. Data of *Tenure*

is computed using information from the Annual Reports or from the Norwegian Business Register, where available.

Table 1.6 – (Continued)

Panel B. Outside occupation of shareholder elected directors (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Vice President	5.21	4.99	4.29	4.06	4.29	5.48	5.26	5.33	6.26	4.67
Consultant	10.84	14.26	18.29	16.45	15.00	13.75	14.99	12.95	13.12	12.57
Board Member	75.61	79.64	81.16	80.23	79.66	80.89	78.64	79.22	80.30	79.28
Professor	2.88	1.93	1.29	1.63	2.12	2.06	1.96	2.29	1.68	1.56
CEO	28.71	27.85	28.98	29.58	29.37	28.56	26.43	27.35	27.74	27.33
Attorney	9.24	8.27	7.18	7.49	8.23	8.21	9.49	8.08	8.34	9.34
Non-exe. Officer	5.93	4.11	3.83	5.03	6.19	7.62	8.41	7.50	6.75	9.41
CFO	1.59	1.43	2.31	3.52	3.89	4.28	4.22	4.46	4.31	5.70
Owner/partner	41.62	44.45	41.65	39.97	36.91	34.18	32.43	31.58	33.13	30.66
Accountant	2.42	1.82	3.03	2.44	2.87	3.33	2.60	2.58	2.99	2.50
Other	4.31	3.86	3.95	4.19	4.47	5.94	6.00	5.38	4.96	4.77
Observations	72	80	80	80	80	80	80	80	73	69

Notes to Table 1.6 Panel B: Average outside occupation of shareholders elected directors for firms in our sample, where available. We exclude from this analysis firms with missing data for any variable for more than a half of firm's board members. Occupations are defined as: *Vice-president*: vice-presidency of any kind; *Consultant*: consultant, advisor, counselor; *Board member*: chair, deputy chair, member; *Professor*: professor of any kind; *CEO*: Chief Executive Officer, general manager, president, managing director, administrative Director; *Attorney*: attorney, lawyer, advocate, studies in law; *Non–executive Officer*: Manager, Head of (sales, Human Resources, etc.), Chief Operating Officer, marketing, general secretary; *CFO*: Chief Financial Officer, Investment Officer; *Partner/principal*: partner, principal, owner, self-employed, independent, founder, investor; *Accountant*: chartered accountant, payroll, controller, controlling; *Other*: any other occupation not described before. Outside occupations are not mutually exclusive and so do not add 100 percent.

Table 1.7 – Characteristics of New, Retained and Exiting board members, by Gender

	New		Retained		Exiting		Differences		
	Women	Men	Women	Men	Women	Men			
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(4)	(1)-(6)	(2)-(6)
Panel A. Demographics									
Age	46.10	50.32	48.74	55.13	47.68	53.17	-9.03***	-7.07***	-2.85***
							(0.442)	(0.563)	(0.584)
Tenure	0.00	0.00	2.95	5.85	2.10	4	-5.85***	-4.00***	-4.00***
							(0.135)	(0.191)	(0.191)
Norwegian (%)	79.94	79.15	84.25	86.68	83.55	83.92	-6.75***	-3.98	-4.77**
							(2.394)	(2.751)	(2.507)
Insider (%)	1.30	4.45	3.30	5.68	2.00	6.69	-4.36***	-5.39***	-2.24*
							(0.813)	(1.232)	(1.445)
Family (%)	2.26	1.16	3.67	3.66	1.31	2.10	-1.40	0.16	-0.94**
							(0.935)	(1.037)	(0.794)
Major Share. (%)	6.19	27.87	10.03	35.03	4.70	24.20	-28.84***	-18.02***	3.66
							(1.713)	(2.268)	(2.822)
CEO exp. (%)	37.29	79.04	43.54	77.99	30.82	74.54	-40.70***	-37.24***	4.50
							(2.921)	(3.358)	(2.751)
MBA (%)	22.22	26.97	26.50	25.86	22.69	24.25	-3.64	-2.03	2.72
							(2.599)	(3.092)	(2.952)
Norw. Grad (%)	30.20	20.36	28.72	17.19	33.33	18.67	13.01***	11.53***	1.68
							(2.789)	(3.186)	(2.682)
Other Grad (%)	21.55	19.85	19.57	17.58	17.73	19.44	3.97	2.11	0.41
							(2.531)	(2.976)	(2.684)

Notes to Table 1.7: Differences on personal characteristics by shareholder elected Board Members' type for the 81 firms in our sample is estimated for the period 2002 – 2010, where available. *New* are Board Members entering the board in year t; *Exiting* are Board Members present in year t-1 but not in year t; *Retained* are Board Members present both in year t and t-1. *Tenure* is the average tenure of board members; *Norwegian* is the percentage of board members with Norwegian citizenship; *Insider* is the percentage of board members who are firm's employees; *Family* is the

percentage of board members sharing any family relationship with respect of other board members or the executive team; *Major Shareholder* is the proportion of board members owning directly or indirectly more than 5 percent of the firm's shares; *CEO experience* is the percentage of board members with executive experience; *MBA education* is the percentage of board members with executive education; *Norwegian Grad* is the percentage of board members with graduate level education from a Norwegian institution; *Other Grad* is the percentage of board members with graduate level education from a non-Norwegian institution. *Data of Tenure* is computed using information from the Annual Reports or from the Norwegian Business Register, where available. Differences are obtained from a two sample t test with unequal variances. Standard errors reported in parenthesis. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Table 1.7 – Continued

	New		Retained		Exiting		Differences		
	Women	Men	Women	Men	Women	Men			
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(4)	(1)-(6)	(2)-(6)
Panel B. Primary outside occupation (%)									
Vice President	7.59	5.05	7.26	3.77	11.64	5.72	3.82**	1.87	-0.89
							(1.578)	(1.822)	(1.452)
Consultant	16.83	17.55	12.80	14.67	18.49	15.87	2.16	0.96	1.77
							(2.283)	(2.665)	(2.446)
Board Member	68.98	80.29	71.37	84.41	64.38	78.23	-15.44***	-9.25***	1.96
							(2.773)	(3.199)	(2.645)
Professor	3.63	0.00	4.35	1.19	4.79	1.48	2.43**	2.15*	-1.48***
							(1.101)	(1.195)	(0.518)
CEO	21.78	32.21	27.44	28.51	19.86	27.68	-6.72***	-5.89**	4.45
							(2.565)	(3.061)	(2.996)
Attorney	10.56	6.97	13.06	6.90	10.96	7.56	3.66**	3.00	-0.56
							(1.850)	(2.102)	(1.694)
Non-exe. Officer	18.48	2.40	12.66	3.13	16.44	4.43	15.35***	14.05***	-2.01
							(2.272)	(2.402)	(1.163)
CFO	5.61	5.53	4.88	2.99	3.42	2.58	2.62*	3.03**	2.73**
							(1.374)	(1.489)	(1.297)
Owner/partner	13.20	37.02	19.26	44.18	15.75	41.14	-30.98***	-27.94***	-3.94
							(2.220)	(2.876)	(3.183)
Accountant	1.98	2.16	3.43	3.26	2.05	1.66	-1.28	0.32	0.52
							(0.888)	(0.972)	(0.904)
Other	7.59	3.61	7.78	4.09	9.59	4.06	3.50**	3.53**	-0.44
							(1.582)	(1.744)	(1.251)
Observations	317	433	770	2255	159	599			

Notes to Table 1.7 (continued): Differences on personal characteristics by shareholder elected Board Members' type for the 81 firms in our sample is estimated for the period 2002 – 2010, where available. *New* are Board Members entering the board in year t; *Exiting* are Board Members present in year t-1 but not in year t; *Retained* are Board Members present both in year t and t-1. Occupations are defined as: *Vice-president*: vice-presidency of

any kind; *Consultant*: consultant, advisor, counselor; *Board Member*: chair, deputy chair, member; *Professor*: professor of any kind; *CEO*: Chief Executive Officer, general manager, president, managing director, administrative director; *Attorney*: attorney, lawyer, advocate, studies in law; *Non–executive Officer*: Manager, Head of (sales, Human Resources, etc.), Chief Operating Officer, marketing, general secretary; *CFO*: Chief Financial Officer, Investment Officer; *Partner/principal*: partner, principal, owner, self-employed, independent, founder, investor; *Accountant*: chartered accountant, payroll, controller, controlling; *Other*: any other occupation not described before. Differences are obtained from a two sample t test with unequal variances. Standard errors reported in parenthesis. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Table 1.8 – Panel Regressions for Identification Strategy One. Dependent variable: unsigned discretionary accruals estimated using the Francis and Wang [2008] model

	(1)	(2)	(3)
Quota	0.014		-0.014
	(0.015)		(0.017)
No_Fem1		0.043*	0.016
		(0.022)	(0.022)
QuotaxNo_Fem1			0.039**
			(0.018)
Log of Sales	-0.009**	-0.005	-0.005
	(0.004)	(0.004)	(0.004)
Growth	0.016**	0.016***	0.017***
	(0.006)	(0.006)	(0.006)
Leverage	0.079*	0.063	0.062
	(0.039)	(0.041)	(0.040)
Lag loss	0.028**	0.026*	0.028**
	(0.014)	(0.014)	(0.014)
Return over Assets	-0.052	-0.055	-0.059
	(0.049)	(0.048)	(0.048)
Constant	0.164***	0.095*	0.113**
	(0.049)	(0.052)	(0.052)
Industry Effects	Yes	Yes	Yes
F – Statistics	6.04 (0.00)	5.03 (0.00)	5.15 (0.00)
Adj R-sqr	0.064	0.076	0.080
Observations	692	692	692

Notes to Table 1.8: *Quota* is a dummy variable taking value one for the period 2005 – 2010, zero otherwise; *No_Fem1* is a dummy variable taking value one for firms with no female representation on their Boards in 2002. *Log of Sales* is the natural logarithm of sales; *Growth* is the yearly change in sales; *Leverage* is total liabilities over total assets; *Lag loss* is a dummy variable taking value one if the firm has recorded a loss in the previous year; *Return over Assets* is EBIT over total assets. Standard errors clustered at industry (two-digit) level are presented beneath the coefficients, within parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Table 1.9 – Panel Regressions for Identification Strategy Two. Dependent variable: unsigned discretionary accruals estimated using the Francis and Wang [2008] model

	(1)	(2)	(3)
Quota	0.014		-0.018
	(0.015)		(0.022)
No_Fem2		0.030*	0.003
		(0.018)	(0.023)
QuotaxNo_Fem2			0.040*
			(0.020)
Log of Sales	-0.009**	-0.006	-0.007*
	(0.004)	(0.004)	(0.004)
Growth	0.016**	0.016***	0.017***
	(0.006)	(0.006)	(0.006)
Leverage	0.079*	0.063	0.064
	(0.039)	(0.043)	(0.042)
Lag loss	0.028**	0.026*	0.027*
	(0.014)	(0.014)	(0.013)
Return over Assets	-0.052	-0.053	-0.056
	(0.049)	(0.048)	(0.048)
Constant	0.164***	0.122***	0.142***
	(0.049)	(0.043)	(0.047)
Industry Effects	Yes	Yes	Yes
F – Statistics	6.04 (0.00)	5.64 (0.00)	6.70 (0.00)
Adj R-sqr	0.064	0.068	0.072
Observations	692	692	692

Notes to Table 1.9: *Quota* is a dummy variable taking value one for the period 2005 – 2010, zero otherwise; *No_Fem2* is a dummy variable taking value one for firms forced to hire two or more female board members to fulfill the Gender Quota at the end of 2007. *Log of Sales* is the natural logarithm of sales; *Growth* is the yearly change in sales; *Leverage* is total liabilities over total assets; *Lag loss* is a dummy variable taking value one if the firm has recorded a loss in the previous year; *Return over Assets* is EBIT over total assets. Standard errors clustered at industry (two-digit) level are presented beneath the coefficients, within parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Table 1.10 – Panel Regressions for Identification Strategies One and Two. Dependent variable: unsigned discretionary accruals estimated using the Francis and Wang [2008] model

	Quota 2005 - 2009		Quota 2005 - 2008		Quota 2009 - 2010	
	(1)	(2)	(3)	(4)	(5)	(6)
Quota	-0.016	-0.017	-0.009	-0.011	-0.006	-0.008
	(0.015)	(0.020)	(0.013)	(0.017)	(0.012)	(0.015)
No_Fem1	0.017		0.025		0.044	
	(0.020)		(0.017)		(0.026)	
No_Fem2		0.007		0.014		0.031
		(0.020)		(0.017)		(0.021)
QuotaxNo_Fem	0.043**	0.041**	0.037*	0.036*	-0.002	0.001
	(0.019)	(0.018)	(0.021)	(0.020)	(0.025)	(0.025)
Log of Sales	-0.005	-0.007	-0.005	-0.006	-0.004	-0.006
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)
Growth	0.016***	0.016***	0.016***	0.016***	0.016***	0.016***
	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)
Leverage	0.061	0.062	0.058	0.059	0.060	0.060
	(0.040)	(0.042)	(0.040)	(0.043)	(0.044)	(0.040)
Lag loss	0.029**	0.028**	0.031**	0.030**	0.027*	0.027*
	(0.014)	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)
Return over Assets	-0.060	-0.058	-0.060	-0.058	-0.057	-0.055
	(0.049)	(0.050)	(0.050)	(0.051)	(0.048)	(0.048)
Constant	0.111**	0.139***	0.102*	0.130***	0.092	0.120**
	(0.050)	(0.045)	(0.052)	(0.045)	(0.056)	(0.045)
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes
F – Statistics	5.77 (0.00)	7.64 (0.00)	9.15 (0.00)	12.15	4.46 (0.00)	5.72 (0.00)
Adj R-sqr	0.082	0.073	0.081	0.073	0.074	0.066
Observations	692	692	692	692	692	692

Notes to Table 1.10: *Quota* is a dummy variable taking value one for the time period specified over the columns' headlines, zero otherwise; *No_Fem1* is a dummy variable taking value one if firm has not at least a female board member in 2002, zero otherwise; *No_Fem2* is a dummy variable taking value one for firms forced to hire two or more female board members to fulfill the Gender Quota at the end of 2007. *Log of Sales* is the natural logarithm of sales; *Growth* is the yearly change in sales; *Leverage* is total liabilities over total assets; *Lag loss* is a dummy variable taking value one if the firm has recorded a loss in the previous year; *Return over Assets* is EBIT over total assets. Standard errors clustered at industry (two-digit) level are presented beneath the coefficients, within parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Table 1.11 – Ahern and Dittmar [2012] methodology. Dependent variable: unsigned discretionary accruals estimated using the Francis and Wang [2008] model

	2003 – 2009 Sample	2003 – 2010 Sample
	(1)	(2)
Percent women	0.164*	0.133
	(0.096)	(0.085)
Time effects	Yes	Yes
Firm effects	Yes	Yes
F - Statistics	3.17 (0.00)	2.97 (0.01)
Observations	545	614

Notes to Table 1.11: Data are yearly observations from 2003—2009 in column (1) and 2003 – 2010 in column (2). Regressions are estimated using the proportion of female board members in 2002 as instrument for the independent variable *Percent women*. Standard errors clustered at firm level are presented beneath the coefficients, within parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Table 1.12 – Panel Regressions for testing the effect of increasing board gender diversity on board characteristics. Dependent variable: board characteristics

	Board Size	Age	CEO exp.	Major Shareholder	Insider
	(1)	(2)	(3)	(4)	(5)
Percent women	0.450	-9.334**	-0.404**	-0.121	-0.181**
	(0.832)	(3.399)	(0.162)	(0.150)	(0.066)
Time effects	Yes	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes	Yes
F - Statistics	1.76 (0.10)	2.35 (0.03)	3.49 (0.00)	1.20 (0.30)	1.85 (0.08)
Observations	614	614	608	608	608

Notes to Table 1.12: All variables are defined in Appendix A. Regression using the proportion of female board members in 2002 as instrument for the independent variable *Percent women*. *Board Size* is the number of shareholder elected board members; *Age* is the average age of board members; *CEO exp.* is the percentage of board members with executive experience; *Major Shareholder* is the percentage of board members owning 5 percent or more of the firm's shares, directly or indirectly; *Insider* is the percentage of board members who are firm's employees. Standard errors clustered at firm level are presented beneath the coefficients, within parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Table 1.13 – Panel Regressions for Board Characteristics. Dependent variable: unsigned discretionary accruals estimated using Francis and Wang [2008] model

	(1)	(2)
Female	-0.056	-0.075
	(0.053)	(0.054)
Board Size	0.009	0.015
	(0.008)	(0.009)
Age	-0.002	-0.002
	(0.002)	(0.001)
Major Shareholder	-0.050*	-0.053*
	(0.027)	(0.029)
CEO experience	-0.270*	
	(0.158)	
CEO experience^2	0.247*	
	(0.122)	
Vice – President		-0.007
		(0.014)
Consultant		-0.027
		(0.016)
Professor		-0.030
		(0.029)
CEO		-0.013
		(0.018)
Attorney		-0.011
		(0.009)
Non-exe. Officer		-0.008
		(0.011)
CFO		-0.038**
		(0.014)
Accountant		-0.024
		(0.015)

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Log of Sales	-0.009**	-0.007*
	(0.004)	(0.004)
Growth	0.014**	0.013**
	(0.005)	(0.005)
Leverage	0.076	0.078
	(0.046)	(0.052)
Lag loss	0.028**	0.032**
	(0.015)	(0.015)
Return over Assets	-0.066	-0.062
	(0.051)	(0.050)
Constant	0.256**	0.205**
	(0.125)	(0.093)
Industry Effects	Yes	Yes
Time effects	Yes	Yes
F – Statistics	18.72 (0.00)	4068 (0.00)
Adj R-sqr	0.096	0.100
Observations	685	685

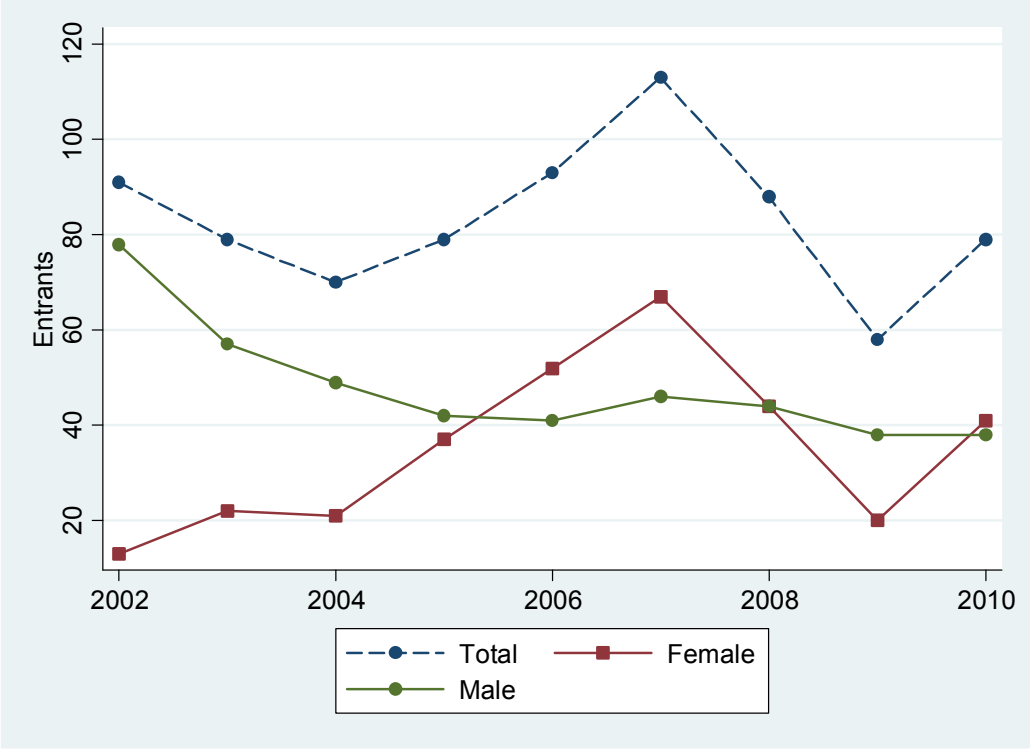
Notes to Table 1.13: Variables in column (1) are defined as: *Female* is the percentage of female board members; *Board size* is the number of shareholder elected board members; *Age* is the age of the board members; *Major Shareholder* is the percentage of board members owning directly or indirectly 5 percent or more of the firm's shares; *CEO experience* is the proportion of board members with executive experience; *CEO experience*^{2} is the square of the percentage of board members with executive experience. Variables in column (2) are defined as: *Vice-president*: vice-presidency of any kind; *Consultant*: consultant, advisor, counselor; *Professor*: professor of any kind; *CEO*: Chief Executive Officer, general manager, president, managing director, administrative director; *Attorney*: attorney, lawyer, advocate, studies in law; *Non–executive Officer*: Manager, Head of (sales, Human Resources, etc.), Chief Operating Officer, marketing, general secretary; *CFO*: Chief Financial Officer, Investment Officer; *Accountant*: chartered accountant, payroll, controller, controlling. The occupation variables are dummy variables equal to one if the Board includes at least one member with the current occupation. Board Member and Owner/partner current occupations are not included due to low variability. Controls for column (1) and column (2) are; *Log of Sales* is the natural logarithm of sales; *Growth* is the yearly change in sales; *Leverage* is total liabilities over total assets; *Lag loss* is a dummy variable taking value one if the firm has recorded a loss in the previous year; *Return over Assets* is EBIT over total assets. Standard errors clustered at firm level are presented beneath the coefficients, within parentheses. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

1.C Figures

Figure 1.1 - Percentage of Women Directors and CEOs of Norwegian Public Limited Companies in our sample

Notes to Figure 1.1: Data is from Norwegian Business Register for the 81 firms in our sample

Figure 1.2 – Number of total entrants and number of entrants by Gender in Norwegian Public Limited Companies in our sample



Notes to Figure 1.2: Data is from Norwegian Business Register for the 81 firms in our sample.

Chapter 2

Gender differences in risk aversion: Evidence from a multiple choice exam of accounting students

2.1 Introduction

Regulators around the world are pushing for an increment in the participation of females in corporate governance, including affirmative action policies as quotas on Boards of Directors. Belgium, Germany, France, Italy, Norway, Spain and The Netherlands have issued policies or have set recommendations toward increasing gender diversity on corporate governance. In November 2012, the European Union's Commissioners approved a plan forcing companies listed in the EU to reserve at least 40 percent of their boards seats for women by 2020 (Deloitte [2013]). In general, these regulations aim to increase the presence of females on executive and non-executive positions arguing that gender diversity have positive effects over corporate governance. Proponents of such regulations maintain that females have specific managerial skills and preferences that complement those of their

male counterparts, as documented by Eagly and Johnson [1990] and Adams and Ferreira [2009]. Experimental evidence show that females are more selfless (Eckel and Grossman [1998]), more socially oriented (Eckel and Grossman [2008]) and less competitively inclined than their male counterparts (Croson and Gneezy [2009]). Moreover, these gender differences in skills and preferences have material effects over individual performance. For example, females tend to outperform males in reading comprehension, but underperform males in mathematics (Hedges and Nowell [1995]; Goldin et al. [2006]). The origin of these differences is also debated. Some scholars argue that these differences in outcomes are related to innate differences between men and women, while others maintain that these differences may be shaped by the environment through culture and social learning (Guiso et al. [2008]; Hyde and Mertz [2009]; Strauss and Strauss [2009]; Gong and Yang [2012]; Booth et al. [2014]).

Even though regulators have focused on the documented positive aspects of gender diversity in corporate governance, few references are made by policy makers to the existence and effects of gender differences in risk aversion. Preferences over risk are central in any decision process, as many economic interactions involve some type of risk (Charness and Gneezy [2012]). Previous literature shows that different attitudes toward risk may have material effects over firm's outcomes, e.g. on investing decisions (Miller [1977]). Thus, the goal of this chapter is to analyze whether females differ systematically in their exhibited risk

aversion with respect to males and, more specifically, to explore whether these differences are rooted in gender specific factors (i.e. the nature argument) or can be shaped by cultural and social factors (i.e. the nurture argument).

The common stereotype indicates that women are more risk averse than males. Researchers generally find evidence supporting the argument of females taking less risk; however, studies focused on particular groups of individuals—highly skilled, like managers—tend to find inconclusive results (Croson and Gneezy [2009]). Moreover, most of the prior evidence about gender differences in risk aversion has been obtained from laboratory experiments. These laboratory experiments are designed by researchers to answer a specific set of research questions. Hence, one of the major drawbacks of experiments is the difficulty of comparing results among them, since decision problems faced by participants are not constant through experiments. Also, participants of experiments may have different personal characteristics with respect of the general population. Finally, some scholars raise concerns about a possible selection bias of experiments with positive results in terms of reporting gender differences in risk aversion (Charness and Gneezy [2012]).

To overcome some of the drawbacks related to laboratory experiments, in this study we use a natural experiment. In particular, we use a multiple choice exam of the course "Introduction to Accounting", common to all first year students at a large Spanish public university, to study whether females and males with

similar characteristics differ on their attitudes toward risk. Given that wrong answers are penalized, risk averse students focus more on the negative effects of a wrong answer over the final score, whereas risk neutral or risk lover students put more weight on the positive effects of answering a question right.

Our data presents the following attributes: first, we have data for an important number of individuals (3,383 observations) facing the same decision problem; second, participation in the exam is mandatory, precluding selection bias of participants; third, the decision problem faced by an individual in our sample has material effects over his/her personal welfare; finally, we have collected a set of personal information regarding respondents to study the mitigation of gender differences due to nurture factors. We take advantage of this setting to provide robust evidence about whether women and men differ systematically in their preferences over risk, and whether these differences can be mitigated—or exacerbated—due to cultural or environmental factors.

Our results provide evidence that, in our setting, females tend to be more risk averse than males. Also, some personal characteristics seem to mitigate these differences. In particular, we do not find evidence of gender differences in risk aversion among highly skilled individuals. We identify highly skilled individuals as those with higher Scores in the University's entry exam and students enrolled in double-degrees. Overall, our study provides support to the argument that females tend to be more risk averse than males. However, our results are also consistent

with the findings of Gneezy et al. [2009] and Gong and Yang [2012], that gender differences in risk aversion are mitigated among highly skilled individuals. This evidence can be interpreted in line with the nurture argument about the mitigating role exerted by the environment (through culture, social interaction or education) over risk attitudes.

The chapter is structured as follows: Section two presents the literature review and discusses the research hypotheses; Section three describes the setting, the collected data and our main variables; Section four reports results from our univariate and multivariate analysis; Section five discusses the results and concludes.

2.2 Literature review and hypotheses

2.2.1 Literature review

The observed gender differences in several domains, including labor, investing and consumption have drawn the attention of regulators and scholars. One of the explanations for these observed differences is that females seem to have different skills or preferences than males. Males, on average, outperform females in math and science, while females outperform males in reading comprehension (Hedges and Nowell [1995]; Goldin et al. [2006]). The origin of these differences is subject of debate itself. Some scholars highlight the importance of biological factors—i.e. the nature argument—as an explanation for gender differences in skills (Strauss and

Strauss [2009]). However, other scholars have noted that these differences in skills tend to revert in countries with higher levels of gender–equal culture (Guiso et al. [2008]; Hyde and Mertz [2009]; Nosek et al. [2009]). These authors support the thesis that gender differences in skills are influenced by nurturing.

The evidence of the effects of gender differences in skills and preferences are also observed in corporate governance. Eagly and Johnson [1990] show that female executives tend to lead more democratically and have a more participative style of leadership as compared to their male counterparts. In the same vein, Tate and Yang [2014], using data on workers displaced after the closure of plants, find that women in leadership positions cultivate more female-friendly cultures inside their firms. Also, Matsa and Miller [2014] provide evidence that female manager are less likely to lay off workers during recessions. Finally, Huang and Kisgen [2013] provide evidence that male managers are more overconfident than their female counterparts, and this overconfidence is associated with lower returns on investments and debt issues. Regarding financial information, Barua et al. [2010] and Francis et al. [2014] provide evidence that female CFO's are more likely to produce financial reports of higher quality. In the case of gender diverse board of directors, scholars find that the presence of females on boards has a positive impact in terms of better attendance to meetings by male members (Adams and Ferreira [2009]). Females prefer to sit on monitoring committees on these gender diverse boards, exerting higher levels of monitoring compared with less gender

diverse boards. This is consistent with the effects over financial reporting of gender diverse boards (Srinidhi et al. [2011]; Abbott et al. [2012]) However, Adams and Funk [2012] provide evidence that, although female board members are more benevolent and concerned about universalism, but less power oriented than male directors, they are less tradition and security oriented and more risk loving than their male counterparts. With respect of group dynamics, Apesteguia et al. [2012] find that, in a lab experiment involving undergraduate and MBA students in a large business game, gender diverse teams outperform groups composed only by members of the same gender.

Despite the observed positive effects of gender diversity, scholars have also documented difficulties for females to reach top positions, a phenomenon described as the glass ceiling effect. Evidence of these difficulties for females to reach top positions is documented in different settings, as leading positions in orchestras (Goldin and Rouse [2000]) or academic promotion (Wennerås and Wold [1997]). From a corporate governance point of view, Westphal and Stern [2006] and [2007] provide evidence of an apparent discrimination of females in the access to Boards of Directors. Moreover, Bertrand and Hallock [2000], Bertrand et al. [2010] and Kulich et al. [2011] provide evidence of a gender gap on executive compensations. Taken together, both the objective evidence of positive effects of gender diversity on corporate governance and difficulties faced by women to reach

top positions have increasingly fostered political action toward gender equality in corporations.

However, some scholars argue that female under-representation in corporate governance is associated with gender differences in risk aversion (Booth et al. [2014]). Regarding corporate governance, risk preferences are a key issue since different attitudes toward risk exert material effects over firm's outcomes, e.g. on investing decisions (Miller [1977]). Moreover, some scholars argue that part of the difficulties faced by women to access top positions are originated by observed gender differences in risk aversion (Bertrand [2011]; Azmat and Petrongolo [2014]). Gender bias on risk aversion appears consistently on different settings, for example when choosing objective probability lotteries with known probabilities and dollar outcomes (Eckel and Grossman [2008]) or deciding to enter in competitions (Croson and Gneezy [2009]). However, these findings are not conclusive: gender differences in attitudes toward risk depend upon the composition of the group of study. In particular, gender differences in risk aversion seem to be mitigated within highly skilled individuals. This conflict between gender differences in risk aversion and group of study is also linked to the aforementioned theories explaining the origin of these differences: the nature versus nurture arguments.

2.2.2 *Hypotheses development*

Both the nurture and nature arguments provide explanations to the origin of gender differences in risk aversion. According to the nature arguments, risk preferences are innate and, therefore, females tend to differ on their preferences regarding risk with respect of males because of nature-linked reasons. Sapienza et al. [2009] support this argument, as they show that there is a negative relationship between the level of testosterone (highly present on males) and risk aversion on a sample of MBA students. Croson and Gneezy [2009] offer three explanations supporting the nature argument: 1) emotions; 2) overconfidence; and 3) risk as challenge or threat.

The first explanation is related to the different feelings experienced by women regarding negative outcomes. There is evidence about women showing more intense nervousness and fear than men in anticipation of negative outcomes (Fujita et al. [1991]). Thus, if women, compared to men, experience worse emotions against negative outcomes it seems reasonable to expect they will be more risk averse when facing risky situations.

The second explanation for gender differences in risk preferences is related to the degree of confidence. There is evidence showing that men are more overconfident in their success in uncertain situations (Lundeberg et al. [1994]). More specifically, prior research shows that men are more confident than women in investment decisions (Estes and Hosseini [1988], Huang and Kisgen [2013]), in

statistical estimations (Soll and Klayman [2004]) and in solving mathematical problems (Niederle and Vesterlund [2010]). Therefore, if men are more overconfident than women when facing uncertain decisions it can be expected they will be less risk averse than women.

Finally, the third explanation about gender differences in risk preferences is the interpretation of a risky situation. According to Arch [1993], males are more likely to see a risky situation as a challenge that calls for participation, while females perceive the same situation as a threat to avoid. This explanation is more related to differences in motivations than in skills, but in any case, it is supporting the nature argument around gender differences in risk preferences.

Given the previous discussion, linked to the nature argument, our first hypothesis is stated as follows:

H1: Females are more risk averse than males

However, according to the so-called nurture argument, gender differences in risk preferences may be shaped by the environment. Put in other words, the abovementioned gender differences in risk aversion might actually reflect social learning, educational levels or particular skills. Actually, in managerial and professional settings there is evidence about smaller (often nonexistent) gender differences in risk aversion (Adams and Funk [2012]). In the same vein, scholars have provided evidence that gender differences in skills are mitigated in more gender egalitarian countries (Guiso et al. [2008]; Gneezy et al. [2009]; Nosek et al.

[2009]; Hyde and Mertz [2009]; Alesina et al. [2013]). Specifically, differences in the type and amount of education received affect agents' behavior, whereas more egalitarian environments are associated with a better access to education for females (Buchmann et al. [2008]). In terms of risk aversion, Gneezy et al. [2009] and Gong and Yang [2012] also support the nurture argument, as they show that females tend to be less risk averse than males in a matriarchal society. Using a sample of first year colleague students, Booth et al. [2014] provide evidence that female risk aversion is mitigated in a single-sex class environment. Overall, these authors conclude that female oriented environments, or where females tend to dominate, mitigate gender differences in risk aversion. This mitigation in gender difference in risk aversion is associated with personal characteristics, acquired in, or shaped by, these more egalitarian environments. Consequently, we expect that, conditional on the nurture argument, gender differences in risk aversion might be shaped by personal characteristics of respondents, and that these personal characteristics will reduce the gender gap in risk preferences. We state this research expectation in our second hypothesis:

> *H2: Personal characteristics, such as the level of education and skills, mitigate gender differences in risk aversion*

2.3 Sample and research design

2.3.1 Data

Scholars have documented the existence and extent of gender differences in risk aversion using mostly laboratory settings. However, this approach presents some difficulties in term of external validity. In particular, experiments present variations in the methods used to study relationship between gender and risk aversion. Also, individuals participating on these experiments are not necessarily randomly selected from the general population. Finally, some scholars argue that there is a publication bias of experiments with a positive finding in terms of gender differences in risk aversion (Charness and Gneezy [2012]). For all these reasons we exploit a natural experiment using the results of a multiple choice exam.

Our sample consists of 3,383 students taking the final exam of the course "Introduction to Accounting", a first year course common to several undergraduate degrees from Universidad Carlos III de Madrid. The sample corresponds to scores recorded during the years 2007, 2008, 2010 and 2011.[1] The exam is of the multiple choice type, where each question has four possible answers. A correct answer yields 1 point, whereas an incorrect answer yields -0.33 point. A blank answer yields 0 points. Hence, answering a question choosing randomly among available options yields an expected payoff of 0. Although every year the exam has two different types (A and B), both types include the same questions, being the only difference among the exams' types the ordering of the

[1] The information for the year 2009 is not available.

questions. We assume that this change in the order of the questions do not affect the outcome of the exam, given that on both types the questions do not follow any given pattern. [2] The exam contains 40 questions and students have two and a half hours to complete it. The exam answers are filled in a special answer sheet so that exams are scored by a computer, which determines the final score mechanically based on the sum of points obtained in the exam.

Multiple choice exams are a widely used educational tool. It precludes measurement errors from the grader in the scoring process, and guarantees a wider sampling on the course content. However, multiple choice exams may encourage guessing, adding noise to the student's evaluation of knowledge. To control for this guessing, multiple choice exams include penalties for wrong answers. In particular, multiple choice questions with controls for guessing are a proxy for lotteries with an expected payoff. Although widely used, there is scarce literature analyzing optimal behavior in multiple choice exams (Bernardo [1998]; Burgos [2004]; Espinosa and Gardeazabal [2005]). Optimal behavior when answering the exam depends on various factors, including scoring rules and personal attributes. These personal attributes may have different origins, from nature to nurture. Hence, multiple choice exams provide an interesting setting where observed differences in personal attributes may affect agents' behavior.

[2] Marín and Rosa-García [2011] use a similar setting than us, but in their case the multiple choice questions do not follow a random order, that is, the order of the questions follow the course contents.

More important, these differences can be measured, and linked to preferences over risk.

The original sample is composed of 4,023 students. We eliminate from our sample observations using the following criteria: students with missing information regarding scores in the final exam, lack of information about which group he/she belongs to, unique id number or regarding the Group's professor survey. We also drop students retaking the exam, to avoid the effects of learning processes that may bias risk attitudes in solving the exam for a second time. The final sample is composed of 3,383 students/observations that fulfill the previous criteria.

2.3.2 *Variables and research design*

For each student in our sample we record *Gender*, *Age*, *City of Origin*, *Score in the University's Entry Exam* and *Grade Point Average* (thereafter GPA).[3] Students in our sample are grouped into two different clusters: Class and Group. Class encompasses students sharing theoretical classes (Lectures), whereas the cluster Group encompasses students sharing practical classes (Tutorials). Each class is split into several Groups; therefore, the number of students per Group is smaller than the number of students per Class. The level of interaction among students is higher at the Group level, as students have to team up for certain assignments with other students within the same Group. Also, students are more likely to observe

[3] Grade Point Average is the average of the final grades earned over time. For each student, we observe his/her GPA available at the moment of data collection, namely 2013.

qualitative attributes of their fellow classmates at the Group level, given that they are usually asked for activities on the blackboard in practical classes. Each Class and Group evaluates the works of the correspondent professors at the end of the term, but before the exam.

The final score of the course is composed by three different elements: course-work assessment (score assigned by the professor of the Group, including scores from different types of assignments and other subjective elements as participation in class), score in a mid-term exam and score in the final exam. To pass the course, students should have a final score of 5 (out of ten) or higher. In the final score, 20 percent corresponds to the course-work assessment, 20 percent to the midterm exam and 60 percent to the final exam. Before taking the final exam, students know their scores in the course-work assessment and in the mid-term exam. We therefore refer to the sum of the course-work assessment and the mid-term exam as the "continuous evaluation". The importance of the final exam for the final score in the course is also reflected, in Table 2.3, by the correlation between both variables: 0.915, whereas the correlation between the continuous evaluation and the final score is 0.753. However, the correlation between the continuous evaluation and the final exam score is comparably low, 0.437. We interpret these correlations as an assessment of the importance of the final exam to pass the course.

Table 2.1 presents descriptive statistics of the variables in our study. The number of observations is evenly distributed in terms of gender (53 percent females, 47 percent males)[4] but not in terms of year observations: 63 percent of observations are evenly distributed on the years 2007 and 2008, whereas the rest of the observations are distributed between the years 2010 and 2011. The average age of students is 19.5 years (females 19.4, males 19.7), and 76 percent of the sample are students from the Madrid area. The average score for a student in the sample is 5.15 (a 5 is required to pass the exam). Females' average score is 5.18 and males' average score is 5.11. This difference is not statistically significant using a mean comparison test.

To test our first hypothesis we use the following specification:

$$\text{Risk Proxy} = \beta_1 + \beta_2 Gender + \gamma_3 Controls + \varepsilon \qquad (1)$$

Where our proxy for risk aversion is the number of blank questions left in the exam. As described before, risk averse students are more likely to focus on the negative consequences of a wrong answer over the final score; hence, they are more likely to leave more blank answers. *Gender* is an indicator variable of the gender of the student (1 for females, 0 for males). The variable *Controls* includes a set of control variables: We control for *Local*—a dichotomous variable for whether the student is originally from the province where the University is located (Madrid)—students from outside the community of Madrid are more likely to

[4] There is a small female bias with respect of the general population in Spain. In 2007, 50.6 percent of the population was female versus 53 percent in our sample.

have different nurturing factors than students from the community of Madrid, e.g. they are more independent with respect to their families. Hence, we use *Local* as a factor that can mitigate gender differences in risk aversion; *Age*—older or younger than 21 years old, dichotomous variable—; *Score in the University's Entry Exam*; *GPA*, and, finally, student´s score in the *Continuous Evaluation* process. We include year fixed effects and errors are clustered at the Group level.

To test our second hypothesis we use a modified version of our baseline model (1). In particular, we assume that students with high *Scores in the University´s Entry Exam* and higher *GPA* are less likely to be affected by gender biases, as these variables are proxies for students being raised in more gender egalitarian environments. Hence, we include in model (1) an interaction term of the aforementioned variables with *Gender*. A negative and significant coefficient of the interaction variable *Gender* and *Score in the University's Entry Exam* or the interaction variable *Gender* and *GPA* is interpreted as evidence that more skilled females have different risk aversion than their male counterparts. Furthermore, as an alternative test for hypothesis two, we re-estimate model (1) for each quartile of scores in the final exam. As described before, males are more likely to see a risky situation as a challenge that calls for participation. Therefore, when the decision is more costly, i.e. answering a question wrong may induce failing the exam, men are more likely to answer a question in the exam than women. Hence, if females are

more risk averse than males in our setting, this difference should be more evident in the lower quartiles of the distribution of scores in the final exam.

Finally, we take advantage of the heterogeneity of students' characteristics conditional on the type of degrees in our sample to provide an additional test for hypothesis two. In particular, we use as an identification strategy for highly skilled students those enrolled in double-degrees (for example the degree in Business and Law). Entry requirements for these degrees are more stringent than for single-degrees (only Business, or only Law). In particular, the average *Score in the University's Entry Exam* is 9.8 for double-degrees students versus 7.36 for single-degree students. Moreover, 35 percent of students of the double-degree are from outside the Madrid area, versus 21 percent of students of the single-degree. Hence, we re-estimate model (1) for two subsamples: students enrolled in double-degrees, and students enrolled in single-degrees.

2.4 Empirical results

2.4.1 Univariate analysis

Figure 2.1 presents the density of scores in the final exam by gender. In terms of scores, there is a higher density of females with respect to males around the score 5, which is the pass/fail threshold. Moreover, there is more density of male students with scores below 4 than females. There is no observed differences between females and males on the higher scores levels. This higher density of

females around the pass/fail threshold and higher density of males in lower scores is consistent with the observed difference in average scores between females and males reported in Table 2.2.

Figures 2.2 and 2.3 present, respectively, the density distribution and histogram of the number of blank answers left in the exam conditional on gender. These graphs provide evidence that males tend, in general, to leave less blank questions in the exam than females. Differences tend to disappear after 10 blank answers, which represents 25 percent of the exam. A Kolmogorov–Smirnov test rejects the null hypothesis of equality among cumulative distributions. In Table 2.4 we more directly address whether these differences between men and women that we already observe in the graphical evidence is actually significant using a univariate test. The difference between the number of answers left blank by females and males is significant (0.574; $p < 0.01$). Hence, the univariate analysis allow us to infer that, indeed, females tend to be more risk averse than males in this setting.

Next, we turn to test whether this difference in risk aversion is clustered around certain areas of the distribution of the scores. As Croson and Gneezy [2009] discuss, among talented and highly skilled individuals, gender differences are less likely to appear. Hence, it is less likely to observe gender differences in the number of blank questions left in the exam in the upper quartiles of the final exam's score distribution. On the other hand, given that a wrongly answered question may

induce failing the exam for the students in the lower quartiles of the final exam scores distribution, this situation can be interpreted as exacerbating risk aversion. To test this argument, we conduct univariate analyses that we present in Tables 2.5 and 2.6.

Table 2.5 presents evidence consistent with our assumption that among skilled individuals, gender differences disappear, since we do not find evidence of gender differences in the number of blank questions left in the exam in the upper quartiles of the score distribution. Also, Table 2.5 shows that in cases where the cost of answering a question wrongly is higher—i.e. the risk of failing the exam is high—females tend to be more risk averse than males. In Table 2.6 we present the same analysis but using as a proxy for skills the University entry exam scores. The correlation between the final exam score and the University entry exam score is relatively low (0.221) and, hence, we assume that the University entry exam score is a good measure of skills not fully captured by the final exam's score.[5] Results in Table 2.6 are consistent with our assumption that gender differences in risk aversion are not observed among highly skilled individuals, as females with higher University entry exam score leave on average the same number of blank questions in the exam as their male counterparts. Jointly, we interpret the results of the univariate tests as evidence that, in our setting, females have higher level of risk

[5] Other variable that is related to general skills is the GPA of the student, that has higher correlation with the exam's final score (0.543) than the University's entry exam score, and, hence, can be capturing the same information as the final exam's score.

aversion than males, but females tend to behave similar to males when they are highly skilled. In the next Section we turn to the multivariate analysis of our data.

2.4.2 *Multivariate analysis*

In Table 2.7, we present the results of the baseline regression using our model (1). The dependent variable is our proxy for risk aversion, namely the number of blank questions left in the exam. To tests hypothesis one, the independent variables are the gender of respondents and a set of controls. As a first test of hypothesis two, the last column of Table 2.7 includes the interaction between *Gender* and *Scores in the Entry Exam* and *GPA*.

Results from Table 2.7 present consistent evidence with hypothesis one (women being more risk averse), as the coefficient for the variable *Gender* is positive and significant, through model specifications 1 to 3, (coefficients *0.640*, $p < 0.01$; *0.620*, $p < 0.01$; *0.771*, $p < 0.01$, respectively). Results are robust to the inclusion of control variables for personal characteristics, as *Age* or *Province of Origin*, and proxies for skills, as *Score in the University Entry Exam* and *GPA*.

However, when the interaction term *Score in the Entry Exam* and *Gender* is included, significance of the *Gender* dummy drops (coeff. *1.735*; $p < 0.10$) and the interaction term is negative and weakly significant (coeff. *-0.169*; $p < 0.10$). We interpret this result as evidence that highly skilled females, using as a proxy for skills *Score in the University Entry Exam*, are more likely to have, in our setting, similar risk preferences with respect to their male counterparts, consistent with our

second hypothesis. The included controls, apart from the dummy for *Province of origin*, are significant across specifications and risk aversion.

In Table 2.8 and 2.10 we provide further tests for hypothesis two. In particular, we test whether the results supporting hypothesis one—gender differences in risk aversion—are consistent along the distribution of skills. First, we use the distribution of scores in the final exam as a proxy for skills. To that end, we split the sample in four quartiles given the distribution of the scores in the final exam, and repeat the tests of column (3) of Table 2.7 for each quartile. Our results, presented in Table 2.8, provide robust evidence that women are more risk averse than men when they are in the *Quartile2* of the score distribution (coeff. *1.008*; $p < 0.01$). Students in *Quartile2* have a mean score in the final exam of 4.6 points (below the pass—5—threshold). Hence, in this particular quartile, a wrong answer implies the difference between a pass and a fail. This result provides also support to the argument that gender differences in risk aversion are more likely to occur among people with normal skills instead of highly skilled people. In unreported results, we repeat the analyses conducted in Table 2.8, but splitting the sample this time in four quartiles given the distribution of the scores in the continuous evaluation process and course's final score. We do not observe significant coefficients for the interaction term in any quartile of the distribution of the score in the continuous evaluation or in the course's final score. In these cases, females tend to leave more blank questions than males independently of their position in these two scores'

distribution. However, both scores in the course and in the continuous evaluation are not perfectly correlated with score in the final exam. Hence, we interpret that it is more difficult to match students' perception of relative costs and answering strategies with the aforementioned variables.

As described before, our sample is composed by students from different degrees. These degrees have different entry requirement (e.g. a degree in Law and Economics has higher entry requirements that a single-degree). Table 2.9 presents descriptive statistics of both types of degrees. The mean score in the University entry exam is 2.5 higher for students in double-degrees versus single-degrees ($p < 0.01$); also, students in double-degrees are less likely to be from the same state as the University, as 35 percent of double-degrees students come from outside of the province of Madrid, whereas only 21 percent of single-degrees students come from outside the state. We interpret this evidence as supporting the argument that students from double-degrees are more skilled than their single-degrees counterparts. Table 2.10 presents the results of model (1) estimated separately by single or double-degrees. Consistent with our previous findings, women in double-degrees present similar levels of risk aversion than men, as the Gender variable is not significant at conventional levels. Also, we find evidence that female students from single-degrees are more likely to exhibit higher levels of risk aversion than their male counterparts (coeff. *0.857*; $p < 0.01$).

As a robustness test of our findings, we perform the previous study—the effect of belonging to a particular degree, single or double,-majors on gender differences in risk aversion—on the subsample of students above or below the median of the scores in the final exam. The objective of this analysis is to control for the possibility that students in the double-degrees are, on average, less likely to face costly decisions. Results for both tests are presented in Table 2.11. Columns (A) and (B) from Table 2.11 present results consistent with our previous findings that females show a similar behavior than males within the double-degrees, independent of their position in the score's distribution, as the variable of interest (Gender) is not statistically significant. However, female students from single-degrees show higher levels of risk aversion than their male counterparts. Table 2.11, columns (C) and (D), show that females on single-degrees leave consistently more blank answers than their male counterparts, both below the median score (coeff. 0.871; $p < 0.01$) and above the median score (coeff. 0.580; $p < 0.05$).

2.5 Conclusions

The existence of gender differences in risk taking is a controversial topic. The general idea of women being more risk averse than men is largely based on gender innate characteristics such as emotions, overconfidence or interpretations of risky situations. This traditional vision of women as more risk averse than their male counterparts given their gender inherent traits falls into the so-called nature

arguments. This perspective, however, has been challenged by other arguments suggesting that gender differences in risk aversion can be shaped by the environment, i.e. the nurture argument. Educational levels, skills development or social learning might mitigate the gender gap in risk preferences.

Despite the lack of consensus on this issue, little empirical evidence exists on the factors that explain gender differences in risk aversion. In general, the empirical evidence provided by the literature analyzing the gender gap in risk preferences is limited by issues associated with the research design, as problems with the external validity of lab experiments. These limitations in the empirical evidence also limit the study of competing theoretical arguments explaining gender differences in risk aversion. Our study advances the knowledge on this issue by taking advantage of a natural experiment approach, which allows us testing both the nurture and the nature argument explaining the gender gap. Moreover, our setting provides identification strategies to identify individuals who are more likely to be affected by risky decisions. It also allows us to compare individuals across the distribution of abilities and skills.

The empirical analysis is performed on a large sample of students taking a final multiple choice exam from the course "Introduction to Accounting", common to all first year students from the Social Science area from Universidad Carlos III de Madrid. We use the fact that wrong answers in the exam are penalized as a proxy for risk aversion. Moreover, we collect personal characteristics of students to

test whether these gender differences in risk aversion are explained by these personal characteristics. This dataset provides a suitable setting to test our hypotheses; this is especially worthy given empirical evidence from field data is still scarce.

In line with the traditional nature arguments, our unconditional results indicate that—in our particular setting—women are more risk averse than men. However, when controlling for observable personal characteristics these gender differences are mitigated, as stated in our second hypothesis. Even more, gender differences are not significant when we focus on the best students (those with high marks in their University entry exams, and with high marks in the multiple choice test). This result is coherent with the arguments of Gneezy et al. [2009], Adams and Ferreira [2009] and Gong and Yang [2012] that in settings where females are highly skilled—or are not affected by nurture limitations—they are more likely to exhibit similar risk preferences as their male counterparts.

These findings contribute to the current debate about whether policies should be issued to foster gender equality (e.g. affirmative action policies, as quotas) as we show that some gender differences in risk aversion are still present after controlling for observable proxies of skill and personal characteristics. Moreover, we provide evidence that these differences are related to the relative cost of a wrong answer.

One indirect implication of our results for the debate around the effects of imposing gender quotas is that, if there is a lack of suitable candidates to fulfill the quota, attention should be pay to the fact that new board members, appointed because of quotas, can be subjects with intrinsically different risk preferences than the pre-quota candidates. If managerial teams and boards of directors are endogenously determined by firms, and firms choose optimally the level of risk aversion of their executives and directors, constrains over these optimal levels of risk aversion may have material effects over firm's outcomes.

2.A Appendix

Variables used in this study.

We collected the following data for each student in our sample. Descriptive statistics for these variables are presented in Table 2.1**.**

- **Gender:** Gender of the student.
- **Blank:** Number of blank answers left in the exam.
- **Degree:** Student's degree. Degrees can broadly be classified in two types: Double and single-degrees. Double-degrees are characterized by higher entry requirements than single-degrees.
- **Class (Lecture):** Group of students sharing theoretical classes. A class in composed by several Groups.
- **Group (Tutorial):** Group of students sharing practical classes.
- **Score:** Score in the final exam of the course.
- **Grade:** Final score in the course.
- **Local:** Native from the Province where the University is located (Province of Madrid).
- **Age:** Older than 21 years old.
- **Entry:** Score in the University Entry Exam.
- **GPA:** General Point Average of the student. It is the number representing the average value of the accumulated final grades earned in courses over time by an individual student.
- **Continuous Evaluation:** Score in the continuous evaluation process, previous to the exam.
- **Professor:** Professor's score in the student's survey at the Group level. Collected before the Final Exam.

2.B Tables

Table 2.1 - Descriptive Statistics of variables of study

	Mean	SD	p25	p50	p75	Min	Max
Gender	0.528	0.499	0.000	1.000	1.000	0.000	1.000
Blank	6.570	4.870	3.000	6.000	10.000	0.000	28.000
Score	5.150	1.880	3.930	5.090	6.420	0.000	10.000
Grade	6.010	1.530	5.000	6.000	7.000	0.100	10.000
Local	0.763	0.425	1.000	1.000	1.000	0.000	1.000
Age	0.112	0.315	0.000	0.000	0.000	0.000	1.000
Entry	7.910	2.200	6.510	7.610	9.140	0.000	13.700
GPA	5.920	1.620	5.400	6.200	6.900	0.000	9.800
Cont Eva	7.290	1.590	6.480	7.490	8.370	1.000	10.000
Professor	4.140	0.587	3.680	4.270	4.640	2.750	5.000
Group Gender	0.528	0.110	0.464	0.531	0.603	0.133	0.895

Notes to Table 2.1: Descriptive statistics of the variables used in our study. *Gender* is a dummy variable taking value one if female, zero otherwise; *Blank* is the number of blank questions left in the exam; *Score* is the score obtained in the final exam; *Grade* is the final grade in the course; *Local* is a dichotomous value taking value one if origin is the same autonomous community as the University (Madrid), zero otherwise; *Age* is a dichotomous variable taking value one if older than 21 years old, zero otherwise; *Entry* is the score in the University entry exam; *GPA* is the grade point average; *Cont Eva* is the score in the continuous evaluation process, before the exam; *Professor* is the score obtained by the Group professor on the students' survey before the exam; *Group Gender* is the proportion of females by Group.

Table 2.2 – Mean values of variable of interest, by Gender

	Gender	
	Females	Males
Blank	6.840	6.270
Score	5.180	5.110
Grade	6.050	5.970
Local	0.760	0.767
Age	0.094	0.132
Entry	8.070	7.730
GPA	6.070	5.760
Cont Eva	7.350	7.220
Professor	4.160	4.110
Observations		

Notes to Table 2.2: Mean values of variable of interest by Gender. *Blank* is the number of blank questions left in the exam; *Score* is the score obtained in the final exam; *Grade* is the final grade in the course; *Local* is a dichotomous value taking value one if origin is the same autonomous community as the University (Madrid), zero otherwise; *Age* is a dichotomous variable taking value one if older than 21 years old, zero otherwise; *Entry* is the score in the University entry exam; *GPA* is the grade point average; *Cont Eva* is the score in the continuous evaluation process, before the exam; *Professor* is the score obtained by the Group professor on the students' survey before the exam.

Table 2.3 – Correlation Matrix

	a	b	c	d	e	f	g	h	i	j	k
a – Gender	1.000										
b – Blank	**0.059**	1.000									
c – Score	0.018	**-0.492**	1.000								
d – Grade	0.029	**-0.461**	**0.915**	1.000							
e – Local	-0.008	**0.035**	**-0.054**	**-0.052**	1.000						
f – Age	**-0.060**	-0.030	0.023	0.006	0.022	1.000					
g – Entry	**0.078**	**-0.092**	**0.221**	**0.219**	**-0.092**	**-0.242**	1.000				
h – GPA	**0.094**	**-0.237**	**0.543**	**0.596**	-0.023	**-0.097**	**0.343**	1.000			
i – Cont Eva	**0.039**	**-0.226**	**0.437**	**0.753**	-0.027	-0.008	**0.118**	**0.460**	1.000		
j – Professor	**0.044**	-0.030	**0.052**	**0.095**	-0.007	0.028	**0.070**	**0.035**	**0.139**	1.000	
k – Group Gender	**0.221**	0.023	**0.047**	**0.085**	-0.032	-0.012	**0.124**	**0.099**	**0.114**	**0.245**	1.000

Notes to Table 2.3: Correlation matrix of the variables use in our study. Pair wise correlations significant at five percent or higher in bold letter. *Gender* is a dummy variable taking value one if female, zero otherwise; *Blank* is the number of blank questions left in the exam; *Score* is the score obtained in the final exam; *Grade* is the final grade in the course; *Local* is a dichotomous value taking value one if origin is the same autonomous community as the University (Madrid), zero otherwise; *Age* is a dichotomous variable taking value one if older than 21 years old, zero otherwise; *Entry* is the score in the University entry exam; *GPA* is the grade point average; *Cont Eva* is the score in the continuous evaluation process, before the exam; *Professor* is the score obtained by the Group professor on the students' survey before the exam; *Group Gender* is the proportion of females by Group.

Table 2.4 - Descriptive Statistics of Blank Answers left in the Exam. Full sample and by Gender.

	25 percent	Median	75 percent	Mean	Std. Deviation	Observations
Full Sample	3	6	10	6.570	4.866	3383
Females	3	6	10	6.840	4.881	1785
Males	2	6	9	6.270	4.833	1598
Difference				0.574***		

Notes to Table 2.4: Descriptive statistics of blank answers left in the exam, for the full sample and by gender. Difference is computed using a t-test for equal means assuming equal variance. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Table 2.5 - Descriptive Statistics of Final Scores in the Exam and number of Blank Answers conditional by Quartile distribution of scores in the Final Exam.

Quartiles	1	2	3	4
Mean Score	2.77	4.57	5.75	7.55
Females – Blank	9.642	8.677	6.171	2.838
Males – Blank	8.808	7.676	5.823	2.706
Difference	0.835**	1.001***	0.343	0.132

Notes to Table 2.5: Descriptive statistics of the final score in the exam by quartiles and the correspondent mean value of the variable *Blank Answers*. Quartiles are defined using scores in the final exam. Quartile 1 encompasses the lowest scores in the final exam; Quartile 4 the highest scores. Difference is computed using a t-test for equal means assuming equal variance. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Table 2.6 - Descriptive Statistics of Scores in the University Entry Exam and number of Blank Answers conditional by Quartile distribution of scores in the University Entry Exam.

Quartiles	1	2	3	4
Mean Score	5.47	7.07	8.33	10.78
Females – Blank	8.035	7.187	5.954	6.514
Males – Blank	6.975	6.081	5.813	5.997
Difference	1.060***	1.106***	0.141	0.517

Notes to Table 2.6: Descriptive statistics of scores in the University entry exam by quartiles and the correspondent mean value of the variable *Blank Answers*. Quartiles are defined using scores in the University's entry exam. Quartile 1 encompasses the lowest scores; Quartile 4 encompasses the highest scores. Difference is computed using a t-test for equal means assuming same variance. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Table 2.7 – Regression. Dependent variable: Number of blank questions left in the exam.

	(1)	(2)	(3)	(4)
Gender	0.640***	0.620***	0.771***	1.735*
	(0.196)	(0.198)	(0.191)	(0.883)
Cont Eva	-0.658***	-0.658***	-0.347***	-0.346***
	(0.069)	(0.070)	(0.082)	(0.082)
Local		0.283	0.217	0.216
		(0.229)	(0.220)	(0.219)
Age		-0.553**	-1.325***	-1.290***
		(0.278)	(0.275)	(0.219)
Entry			-0.304***	-0.218***
			(0.058)	(0.068)
GPA			-0.464***	-0.495***
			(0.072)	(0.081)
*Entry*Gender*				-0.169*
				(0.096)
*GPA*Gender*				0.062
				(0.109)
Constant	11.603***	11.448***	13.861***	13.359***
	(0.581)	(0.654)	(0.662)	(0.781)
Year Effects	Yes	Yes	Yes	Yes
F - Statistics	29.38	22.83	32.15	27.98
Adj-R Sqr	0.073	0.074	0.108	0.109
Observations	3383	3383	3383	3383

Notes to Table 2.7: Results from multivariate analysis. Dependent variable is the number of blank questions in the exam. Independent variables are: *Gender* is a dummy variable taking value one if female, zero otherwise; *Cont Eva* is the score in the continuous evaluation process, before the exam; *Local* is a dichotomous value taking value one if origin is the same autonomous community as the University (Madrid), zero otherwise; *Age* is a dichotomous variable taking value one if older than 21 years old, zero otherwise; *Entry* is the score in the University entry exam; *GPA* is the grade point average. Clustered standard errors by *Group* reported beneath the coefficients. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Table 2.8 – Regression by Quartiles of score in the Final Exam. Dependent variable: number of blank questions left in the exam.

	Quartile in the Exam			
	(1)	(2)	(3)	(4)
Gender	0.562	1.008***	0.353	0.247
	(0.374)	(0.320)	(0.258)	(0.189)
Cont Eva	0.051	0.061	-0.311**	-0.365***
	(0.131)	(0.144)	(0.123)	(0.087)
Local	-0.719	-0.050	0.402	0.310
	(0.485)	(0.412)	(0.279)	(0.199)
Age	-1.658***	0.747	-0.577	-0.691***
	(0.557)	(0.547)	(0.497)	(0.247)
Entry	-0.206*	-0.260**	-0.104	-0.085
	(0.116)	(0.124)	(0.094)	(0.061)
GPA	0.047	0.289**	0.056	-0.342***
	(0.108)	(0.126)	(0.116)	(0.085)
Constant	10.314***	7.333***	8.529***	8.865***
	(1.357)	(1.433)	(1.278)	(0.742)
Year Effects	Yes	Yes	Yes	Yes
F - Statistics	6.47	3.82	4.71	16.79
Adj-R Sqr	0.054	0.033	0.027	0.108
Observations	855	845	840	843

Notes to Table 2.8: Regression by Quartile of score in the final exam. Quartile (1) is the group of students with lower scores; Quartile (4) is the group of students with higher scores. Dependent variable: number of blank answers in the exam; independent variables: *Gender* is a dummy variable taking value one if female, zero otherwise; *Local* is a dichotomous value taking value one if origin is the same autonomous community as the University (Madrid), zero otherwise; *Age* is a dichotomous variable taking value one if older than 21 years old, zero otherwise; *Entry* is the score in the University entry exam; *GPA* is the grade point average; *Cont Eva* is the score in the continuous evaluation process, before the exam. Clustered standard errors by *Group* reported beneath the coefficients. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Table 2.9 – Descriptive statistics by type of Degree.

	Double Degree			Single Degree		
	Mean	Median	Std dev	Mean	Median	Std Dev
Gender	0.548	1.000	0.498	0.522	1.000	0.500
Blank	5.840	5.000	4.930	6.790	6.000	4.830
Score	5.640	5.580	1.800	5.010	4.930	1.880
Grade	6.350	6.300	1.470	5.910	5.900	1.530
Local	0.653	1.000	0.476	0.795	1.000	0.404
Age	0.016	0.000	0.124	0.140	0.000	0.347
Entry	9.810	10.100	2.250	7.360	7.240	1.840
GPA	6.530	6.600	1.120	5.740	6.100	1.700
Eva Cont	7.370	7.610	1.590	7.260	7.490	1.580
Professor	4.200	4.470	0.697	4.120	4.190	0.550
Observations			766			2617

Notes to Table 2.9: Descriptive statistics of variables of study by type of Degree. *Gender* is a dummy variable taking value one if female, zero otherwise; *Blank* is the number of blank questions left in the exam; *Score* is the score obtained in the final exam; *Grade* is the final grade in the course; *Local* is a dichotomous value taking value one if origin is the same autonomous community as the University (Madrid), zero otherwise; *Age* is a dichotomous variable taking value one if older than 21 years old, zero otherwise; *Entry* is the score in the University entry exam; *GPA* is the grade point average; *Cont Eva* is the score in the continuous evaluation process, before the exam; *Professor* is the score obtained by the Group professor on the students' survey before the exam.

Table 2.10 – Regression by type of Degree. Dependent variable: Number of blank questions left in the exam.

	Double Degree	Single Degree
Gender	0.373	0.857***
	(0.428)	(0.214)
Cont Eva	-0.168	-0.375***
	(0.188)	(0.088)
Local	-0.433	0.400
	(0.345)	(0.279)
Age	-2.332	-1.348***
	(1.649)	(0.273)
Entry	-0.039	-0.346***
	(0.096)	(0.079)
GPA	-1.018***	-0.393***
	(0.231)	(0.070)
Constant	13.124***	13.773***
	(1.879)	(0.752)
Year Effects	Yes	Yes
F - Statistics	15.282	29.145
Adj-R Sqr	0.098	0.111
Observations	766	2617

Notes to Table 2.10: Results from multivariate analysis by type of Degree. (1) is the regression for students in double majors; (2) is the regression for students in single majors. Dependent variable: number of *Blank Answers* in the exam; independent variable: *Gender* is a dummy variable taking value one if female, zero otherwise; *Local* is a dichotomous value taking value one if origin is the same autonomous community as the University (Madrid), zero otherwise; *Age* is a dichotomous variable taking value one if older than 21 years old, zero otherwise; *Entry* is the score in the University entry exam; *GPA* is the grade point average; *Cont Eva* is the score in the continuous evaluation process, before the exam. Clustered standard errors by *Group* reported beneath the coefficients. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

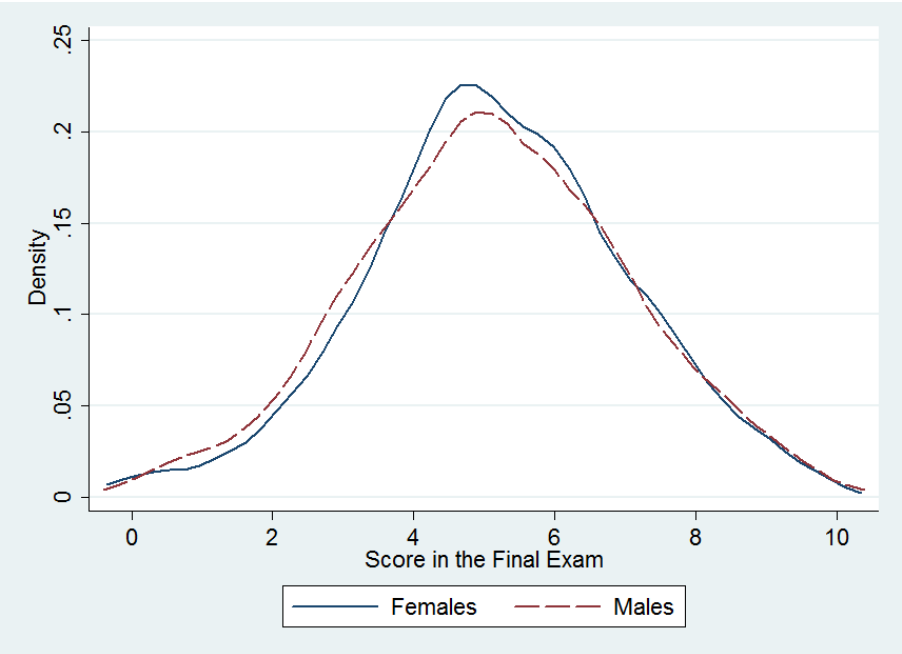
Table 2.11 – Regression by type of Degree and position with respect of the median of the Score in the Final Exam. Dependent variable: Number of blank questions left in the exam.

	Double-Degree		Single-Degree	
	Below Med	Above Med	Below Med	Above Med
	(A)	(B)	(C)	(D)
Gender	0.236	0.187	0.821***	0.580**
	(0.537)	(0.227)	(0.289)	(0.222)
Cont Eva	0.160	-0.454***	-0.018	-0.494***
	(0.284)	(0.126)	(0.123)	(0.110)
Local	-0.923	0.165	-0.142	0.532**
	(0.579)	(0.302)	(0.424)	(0.218)
Age	-0.514	-1.667*	-0.617	-1.136***
	(2.378)	(0.942)	0.442)	(0.287)
Entry	-0.157	0.060	-0.250*	-0.231***
	(0.167)	(0.129)	(0.130)	(0.073)
GPA	0.022	-0.742***	0.042	-0.316***
	(0.301)	(0.213)	(0.088)	(0.066)
Constant	7.661***	11.177***	10.037***	12.129***
	(2.612)	(1.521)	(1.351)	(0.948)
Year Effects	Yes	Yes	Yes	Yes
F – Statistics	2.394	8.783	3.661	18.503
Adj-R Sqr	0.046	0.132	0.027	0.117
Observations	382	384	1313	1304

Notes to Table 2.11: Multivariate analysis by Degrees, conditional on scores above or below the median score in the Final Exam, by type of Bachelor. (1) is the regression for students in double majors; (2) is the regression for students in single majors. Dependent variable: *Blank Answers* in the exam; independent variables: *Gender* is a dummy variable taking value one if female, zero otherwise; *Local* is a dichotomous value taking value one if origin is the same autonomous community as the University (Madrid), zero otherwise; *Age* is a dichotomous variable taking value one if older than 21 years old, zero otherwise; *Entry* is the score in the University entry exam; *GPA* is the grade point average; *Cont Eva* is the score in the continuous evaluation process, before the exam. Clustered standard errors by *Group* reported beneath the coefficients. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

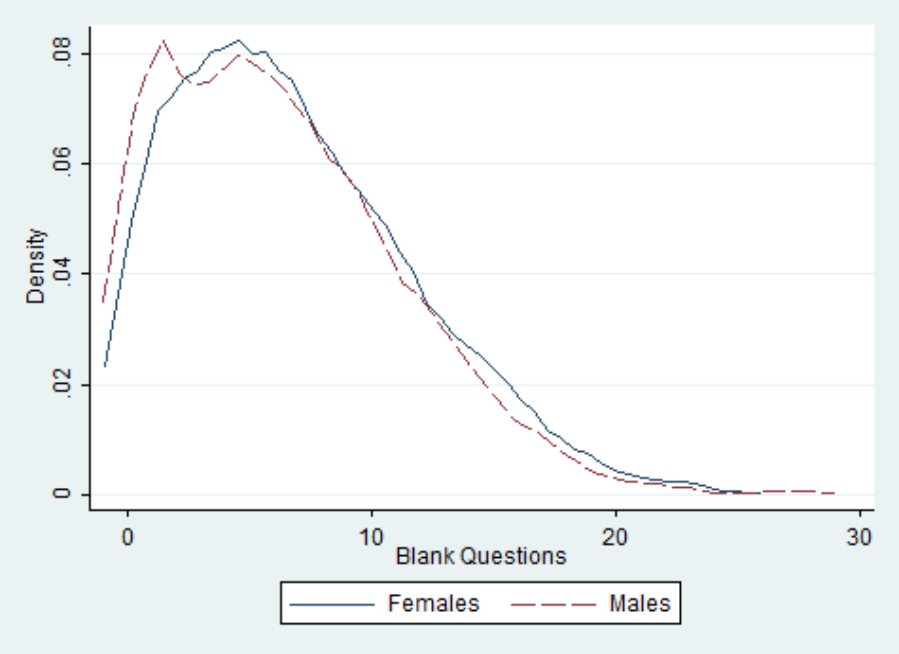
2.C Figures

Figure 2.1 - Density distribution of scores in the exam, by Gender.



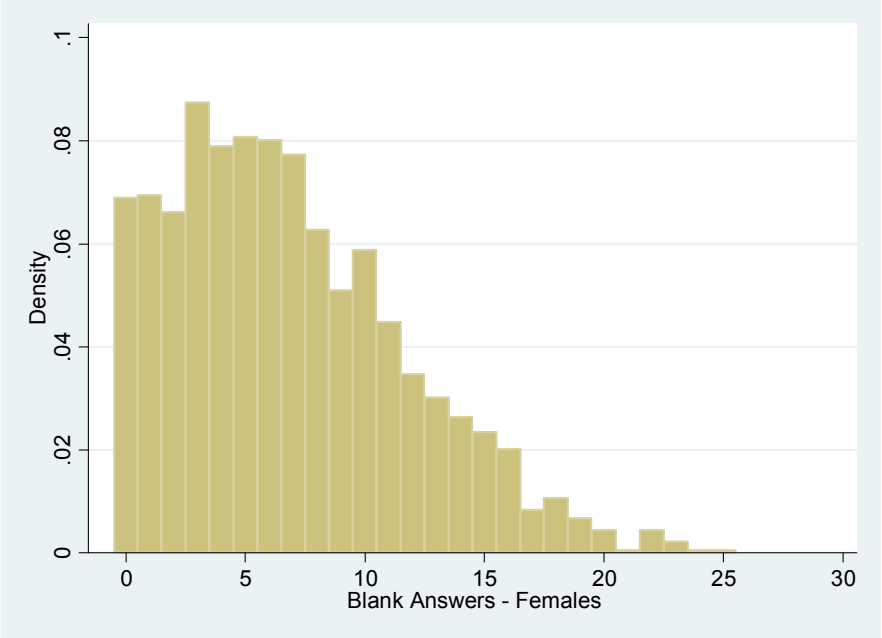
Notes to Figure 2.1: Density distribution of scores in the final exam of the course *Introduction to Accounting*, by gender.

Figure 2.2 – Density distribution of blank answers in the exam, by Gender.



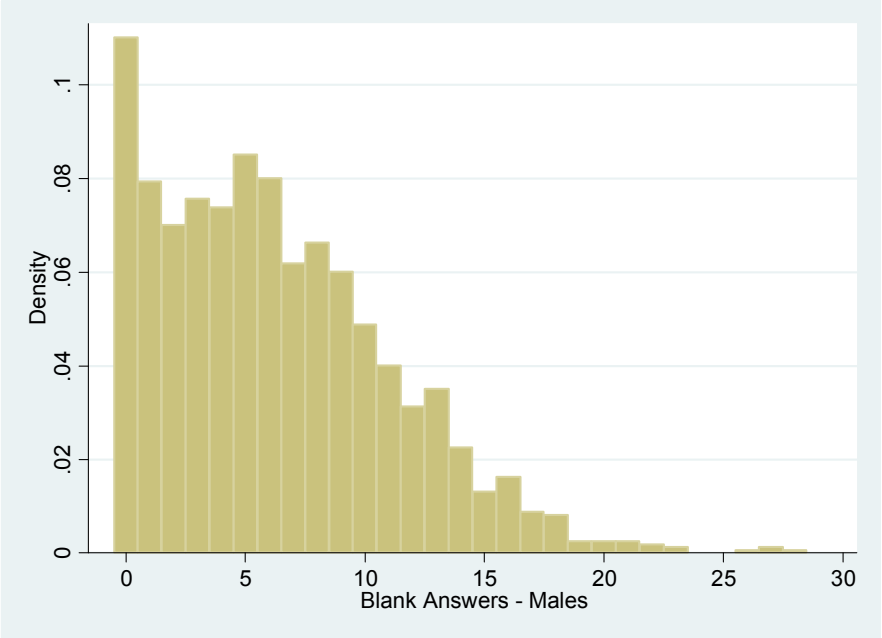
Notes to Figure 2.2: Density distribution of blank answers left in the final exam of the course *Introduction to Accounting*, by gender.

Figure 2.3 – Histogram of blank answers, females.



Notes to Figure 2.3: Histogram of blank answers left in the final exam of the course *Introduction to Accounting*, by female students in our sample.

Figure 2.4 – Histogram of blank answers, males.



Notes to Figure 2.4: Histogram of blank answers left in the final exam of the course *Introduction to Accounting*, by male students in our sample.

Chapter 3

Determinants of early compliance with gender quotas on boards: Evidence from the Netherlands

3.1 Introduction

This chapter provides evidence of the determinants of voluntary compliance with Gender Quotas. Gender diversity in corporate governance is increasingly becoming a central issue in the European political arena, as there is an increasing social attention to improve the mechanism of access of women to managerial and supervisory positions. This pressure takes different forms: Finland, France, Germany, Italy and Norway have imposed quotas on boards of directors; other countries like Spain and the United Kingdom issued recommendations toward an increment in gender diversity on boards.

Firms face different incentives to fulfill these social pressures. From a theoretical point of view, under Resource Dependence Theory, a firm requires, as a strategy for survival, external resources (Pfeffer [1972]). In the same vein, Institutional Theory argues that access to these resources is primarily determined

by the firm's external legitimacy, where legitimacy is defined as the degree to which a firm is merged with its institutional environment (Meyer and Rowan [1977]). This external legitimacy is achieved, among other factors, through corporate governance in general, and the board of directors in particular (Pfeffer [1973]; Dowling and Pfeffer [1975]; Blum et al. [1994]; Luoma and Goodstein [1999]; Certo [2003]). This is because directors provide organizations with a pool of external resources through their professional and personal experiences, networks and human capital. Also, directors provide legitimacy, as the board of directors is a channel that the firm uses to merge with its institutional environment in exchange for legitimacy from societal members.

Hillman et al. [2007] find evidence that, in unregulated settings, specific organizational characteristics affect the demand for external resources and drive the organization's demand for external legitimacy. The authors find that big organizations, operating in industries with a high proportion of female workers, diversified operations and highly interlocked boards are more likely to include a female board member in the board. Hillman et al. [2007] find these results using a sample of US firms, where the appointment of female board members is unregulated. In the other extreme of the spectrum, on highly regulated environments with high enforcement (e.g. Norway), firms are force to include female board members, independently of firms' characteristics. However, in the intermediate case where quotas are present, but not enforced, pressures toward

gender diversity are associated with firm characteristics. This intermediate case (quotas with low enforcement) provides complementary insights toward the determinants of gender diversity within organizations' corporate governance. To study this, I use the Netherlands as a case study.

The Dutch House of Representatives promoted a gender quota in 2009, after a period of social debate and pressures toward gender diversity in corporate positions. The Dutch quota has an enforcement mechanism that is different to the other gender quotas issued previously, such as the one in Norway. In particular, the Dutch quota imposes no penalizations on firms that did not follow the law. Conditional on this, Dutch firms react differently at their organizational level to the social pressure—that ends up in the quota—as few firms fulfill the regulation toward gender diversity. This heterogeneity in the compliance with regulations provides a setting where I can complement the findings of Hillman et al. [2007]. Using a sample of Dutch listed firms during the period 2003 - 2012 and the period 2009 - 2012, I provide evidence that, consistent with the results in Hillman et al. [2007], observable organizational characteristics help predict the likelihood of including a female board member. Specifically, firm's size, profitability and tenure of the board members are factors which are likely to influence the likelihood of including a female board member.

Overall, my study contributes to the debate regarding the consequences of implementing affirmative actions to boost gender diversity in corporate

governance, in particular in environments with minimum costs for delinquent firms; my study also complements the findings of Hillman et al. [2007], as I provide evidence of determinants of including female board members in regulated settings, where social pressure toward gender diversity leads to affirmative action programs; and, finally, I provide evidence on the heterogeneity in the organizational response to the survival strategies described by the resource dependence approach and the institutional theory.

The chapter is structured as follows: Section two presents the literature review, hypothesis and describes the Dutch setting; Section three describes the sample and the research design; Section four presents univariate and multivariate results from the research design; Section five concludes.

3.2 Literature review. Determinants of female presence in corporate governance in the Dutch case

3.2.1 Literature review

Organizations are assumed to generate two, not mutually exclusive, strategies for survival. The first strategy deals with internal processes inside the firm, in the sense that organizations should concentrate on improving the efficiency of internal transformation processes, so resources can be used as economically as possible and continuously exchanged. A second strategy is to guarantee favorable exchanges with external organizations, through political actions taken between the firm and those external organizations. These exchanges with external organizations provide

external resources. This view that firms depend on successful exchanges with external organizations through different channels is defined as the resource dependence approach (Pfeffer [1972]).

Firms construct different links to obtain external resources. One particular connection between the firm and external organizations is the board of directors, which plays a central role in the process of guarantying access to external resources for the organization (Pfeffer [1973]; Dowling and Pfeffer [1975]). Traditionally, boards fulfill two different roles inside the firm: monitoring and advising. Through monitoring and advising, boards contribute to the mitigation of potential conflicts of interests between stakeholders. Complementary to these responsibilities, boards provide links to external resources due to the social capital of board members and board interlocking: the access to those external resources increase organizational legitimacy and reduce external dependence (Pfeffer and Salancik [2003]; Jensen and Zajac [2004]). However, as external or environmental dependencies change, so do the needs for specific resources and thus the need for specific types of directors (Hillman et al. [2000]; Hillman et al. [2007]). Hence, apart from the traditional benefits of boards—supervision and counsel—board members provide legitimacy to organizations.

The legitimacy provided by board members is linked also to the institutional theory approach, which complements the resource dependence theory. Meyer and Rowan [1977] state that the success of an organization depends

upon other factors than efficiency in coordination and control of productive activities. Companies that work in highly elaborated institutional environments and succeed in becoming isomorphic with these environments gain the legitimacy and resources required for survival. Hence, a successful organization interacts with its environment, understanding, accepting and modifying the cultural and social components of an organization field, becoming isomorphic with it. Therefore, the firm can take advantage of the resources available, and, hence, fulfill its goals (Suchman [1995]; Luoma and Goodstein [1999]; Certo [2003]).

However, two problems arise from this institutional perspective. First, isomorphism can confront efficiency, a conflict that erodes organizational survival. Second, as demands for organizational change come from different parts of the environment, they can contradict each other. Part of the solution for this problem is that the organization becomes itself an active part in the creation and dissemination of change. The organization may be forced to create an intermediate point between confronting beliefs, and, hence, to create new paradigms that can be taken as rules for the organizational field (Meyer and Rowan [1977]; Ashforth and Gibbs [1990]; Henisz and Zelner [2005]).

As described in previous paragraphs, Pfeffer [1972] explains that business organizations use their boards of directors to coopt or absorb important external organizations, which are interdependent. This is achieved exchanging some degree of control and private information for continued support from external

organizations. That is, firms with larger capital requirements are more likely to reserve a greater percentage of their board to representatives from financial institutions. Firms may face a range of different resource constraints and associated demands for legitimacy, from regulation to public pressure toward desirable social outcomes, as, in the particular case of this study, granting gender balance on managerial and control positions.

It is well documented the difficulties of women to reach top positions (Bilimoria and Piderit [1994]; Wennerås and Wold [1997]; Ellemers et al. [2004]; Westphal and Stern [2006]; Bornmann et al. [2007]; Westphal and Stern [2007]). However, the evidence regarding the effects of gender diversity on managerial and control positions seems inconclusive, due to different approaches to the solution of the gender underrepresentation problem (better governance mechanism or affirmative action programs). Also, methodological issues make it difficult to disentangle the endogenous relationship between firms characteristics and corporate governance (Hermalin and Weisbach [2001]; Adams et al. [2010]; Ferreira [2015]).

Scholars have documented important differences between women and men performing managerial roles. Females tend to show a more employee-friendly behavior (Matsa and Miller [2014]), whereas they are more likely to reduce gender asymmetries on salaries inside the firm (Tate and Yang [2014]). Also, Barua et al. [2010] and Francis et al. [2014] provide evidence that female CFOs provide better

financial reporting quality. Regarding the effects of the presence of females on boards, association studies show that gender diverse boards are associated with better financial performance (Erhardt et al. [2003]). Also, Gul et al. [2011] provide evidence that large firms with gender-diverse boards are more transparent, as they increase public disclosure of firm-specific information. Regarding board members, Adams and Ferreira [2009] show that female board members attend more board meetings than their male counterparts, and that women are more likely to join monitoring committees. Also, these authors find evidence that the presence of female board members improve the meeting attendance of their male counterparts. In the other hand, Adams and Funk [2012] provide evidence that female board members are less risk averse than their male counterparts, providing arguments against the vision that women are more conservative in terms of financial risk, at least on the population of highly skilled workers. Regarding the supervisory role of boards, Srinidhi et al. [2011] and Abbott et al. [2012] show that firms with gender diverse boards are more likely to exhibit better financial reporting practices. Other scholars have an opposite view toward the inclusion of females in managerial roles. In particular, Ryan and Haslam [2005],[2007] provide evidence that females are more likely to be appointed in financially distressed firms, and the performance of these distressed firms get worse after the inclusion of these female managers.

Given the aforementioned evidence that the presence of female board members is associated with better organizational outcomes, and the perceived difficulties for females to reach top positions, social agents are increasingly pushing for the implementation of policies to foster female presence on boards, in particular affirmative action programs. However, the evidence regarding the effects and consequences of affirmative action programs is mixed. Some scholars believe that affirmative action programs lead to suboptimal solutions to contracting problems (Lundberg [1991]; Coate and Loury [1993]) Also, there is empirical evidence that quotas led to the hiring of less qualified candidates (Holzer and Neumark [1999a]). However, quotas positively affect the participation of women in politics (Beaman et al. [2009]) and in competitions (Balafoutas and Sutter [2012]). Quotas also have a positive effect over female education (Beaman et al. [2012]).

Despite this mixed evidence about the effects of quotas, there is an increasing political pressure to include females on boards of directors. In particular, the European Union has a long tradition fostering gender balance in governance. The treaty of Rome in 1957 included a provision toward that end. The first recommendations issued by the European Union (EU) promoting balanced participation of men and women in the decision-making process date back to 1984—ensure active participation by women in decision-making bodies—and 1996—encourage the private sector to increase the presence of women at all levels

of decision-making. However, the responses to these initiatives were poor. In 2010, the EU adopted a strategy for equality between women and men for the next five years. One of the most controversial outcomes of this strategy was the proposed law to improve gender balance in Europe's company boards by 2020.

In addition to the EU regulations, many European countries have set regulations or recommendations. The most direct approach was implemented by Norway, through the imposition of a compulsory gender quota for corporate board seats. Issued as voluntary at the end of 2003, the Quota imposed a minimum 40 percent representation of each gender on public firms. After voluntary compliance failed, a mandatory version was announced in 2005, becoming effective in 2006, with a two year transition. The penalty for delinquent firms was liquidation. The empirical evidence on the effects of the Norwegian quota offers evidence consistent with the quota having negative effects for Norwegian firms and their shareholders. In particular, Ahern and Dittmar [2012] show that there is a negative relationship between the proportion of female board members and Norwegian firms Tobin's Q; also, these authors find a negative market reaction for firms with no female board members at the moment of the informal announcement of the quota.[1] Also, Matsa and Miller [2013] provide evidence of a negative

[1] On February 22nd, 2002, the Minister of Trade and Industry in Norway, Ansgar Gabrielsen, sent a message through the media that if Norwegian companies were not implement policies to revert the reduced gender diversity on their boards the Norwegian government was ready to implement radical actions to address this imbalance. The Norwegian Gender Quota became a law less than two years later.

relationship between Norwegian firms operating profits and the gender quota, through an increase of labor costs. These scholars link explicitly the gender of the new board members due to the Quota and the poorer firm performance. Finally, Bøhren and Staubo [2014] provide evidence that Norwegian firms switched legal status to avoid the quota. Regarding the effects of the quota over the career decisions of Norwegian females, Bertrand et al. [2014] provide evidence that Norwegian women do not change neither professional nor educational choices after the implementation of the quota.

Following Norway, other countries as Belgium, France, Germany, Iceland and Italy have set quotas on boards in the recent years. Other countries like Spain offer economic incentives (e.g. preference for public contracts) to firms that achieve gender balanced boards. A particular case is the Netherlands, which passed a less stringent Gender Quota, which is the object of this study and that I comment in detail in following sections.

3.2.2 Research question

Hillman et al. [2007] argue that the main benefits of including females on boards are advice and counsel; communication, commitment and resources, and legitimacy. Regarding legitimacy, as aforementioned, it is conferred by societal members through the fulfillment of social demands. Societal members include a wide range of individuals and organizations, as politic parties, consumer organizations and other group of interests, even firms' stakeholders. Legitimacy,

defined as a social judgement of acceptance, appropriateness and desirability, grant access to external resources deemed important for the survival of the organization. Legitimacy, associated with the society's rules, norms and values, helps to alleviate firm's informational asymmetries. For example, firm investment opportunities are associated with the expected return over investment (ROI). However, ROI is associated with risk, as the firm's future is uncertain. However, legitimacy reduces this uncertainty as it signals investors that the firm fulfills society's rules, norms and values, e.g. sound corporate governance practices (Zimmerman and Zeitz [2002]). In my setting, legitimacy is, at least partially, provided by societal members who push for gender diversity. However, organizational characteristics can affect the demand toward legitimacy provided by those social organizations. In particular, Hillman et al. [2007] provide evidence that a number of firm characteristics are associated with gender diversity on boards; these determinants of gender diversity on boards are linked to different levels of demand for legitimacy by organizations. However, the authors base their study on an unregulated setting, where the demand and supply of external legitimacy is different from a regulated environment. In particular, in countries where social pressure toward diversity is more stringent, this pressure can lead to affirmative action programs.

Firms facing quotas suffer from a higher social and political pressure to increase gender diversity on boards than in unregulated environments. However,

the response to quotas can be heterogeneous, depending both on the punishment for delinquent firms and the enforcement of the quota (Becker [1974]). These factors (punishment and enforcement) are directly related the demand for legitimacy by the organization. As both punishment and enforcement are high, firms have to clearly fulfill social pressure, namely legitimacy, in order to survive. For example, the aforementioned Norwegian Gender Quota imposes an extreme punishment, namely liquidation of the firm. If enforcement is also high, firms must gain external legitimacy, namely fulfill the quota, to survive. However, if either the punishment or the enforcement are weak, firms may have different reactions toward the fulfillment of the quota. Hence, conditional on low punishment or low enforcement and despite the aforementioned social pressure to the mandatory inclusion of females on boards—exerted by quotas—some firms may even do not include any female board member, if their demand for external legitimacy is low. Hence, it can be inferred that the demand for external legitimacy to access outside resources is not constant among firms. I assume that the heterogeneity in the fulfillment of social pressure that leads, eventually, to affirmative action programs is associated with observable organizational characteristics. In the following paragraphs, I describe factors that drive heterogeneity on the demand for legitimacy on this particular setting.

Organizational size: larger and more visible organizations are more likely to suffer higher pressure to conform social expectations (Meyer and Rowan [1977];

Demsetz and Lehn [1985]). Large companies are more visible, and are more easily identified by customers and regulators. In addition to the visibility of the firm associated with size, larger boards have on average more seats, making easier—or at least less costly—the inclusion of new board members. Hence, ceteris paribus, larger organizations are more likely to include women in their boards.

H1: Larger organizations are more likely to include women in their boards.

Profitability: Pfeffer [1972] describes that firms depend upon two not mutually exclusive mechanisms for survival. One mechanism is the successful linkage with external organizations to draw resources from the environment through political action. The second mechanism is an efficient transformation of resources internally, used for exchange. As organizations become more successful in one of these mechanisms, it is more likely that they will depend upon less on the other one (Boeker and Goodstein [1991]). An alternative approach to this argument is that firms with higher legitimacy attract more resources, achieving higher profitability (Russo and Fouts [1997]; Zimmerman and Zeitz [2002]), or, conversely, more profitable firms are forced to increase its legitimacy (Boyd [1990]). Finally, scholars also provide evidence than females are more likely to be appointed to executive positions when the firm is suffering financial distress, a phenomenon label *Glass Cliff* (Ryan and Haslam [2005]; [2007]). Hence, firms doing poorly are more likely to demand external legitimacy as a substitution for poor performance. Conditional on these three arguments, I hypothesize that

organization's profitability is related to the demand of legitimacy from outside organizations to survive.

H2: The profitability of the firm, used as proxy for the level of resources generated internally, affects the inclusion of female board members.

Tenure: Board members develop more human capital as long as they retain their positions, as these positions grant visibility and networking. Visibility and networking create human capital, valuable for economic agents (Simon and Warner [1992]). Also, board members with longer tenure are more likely to be appointed to key committees inside the firm (Kesner [1988]). Hence, long tenured board members are less likely to leave the board, independently of social pressure. However, Corporate Governance Codes (CGC) throughout Europe recommend that board members should only be on the same board position for a limited number of terms. Hence, after a number of terms, a current board member is likely to leave his/her position in the board, making easier the allocation of available seats to new female board members, gaining legitimacy. These two arguments run in different directions in terms of likelihood of the appointment of female board members. Hence, I state the hypothesis relating board tenure and likelihood without an ex ante direction:

H3: The length of the tenure of the members of the board has an effect over the likelihood of incorporate female board members.

3.2.3 Research setting

To test the aforementioned hypotheses I use as a setting the Netherlands, in a period characterized by an increasing social pressure toward gender diversity that end up in the issuing of a Gender Quota. The Dutch Gender Quota is an affirmative action passed by the House of Representatives in 2009. Contrary to more stringent Quotas (as in France, Germany, Italy or Norway), the Dutch Quota only imposes comply or explain type of penalty for delinquent firms.[2] Hence, the enforcement of the quota is relatively low, whereas most pressures toward the fulfillment of the Quota come from social pressures.

The Netherlands is one of the biggest and most dynamics economies of the Eurozone. By 2013, Dutch GDP per capita is 38,300€ (average EU – 28 countries 26,600€), unemployment was 6.7 percent (10.8 percent) and female participation in the workforce is around 70 percent (Eurostat, 2014).

Companies in the Netherlands follow a two-tier board system: boards are composed of an executive body and a supervisory body. The executive body is in charge of the daily management of the firm, whereas the supervisory body is in charge of supervising and advising the management board. Members of the executive team are full time employees of the firm, whereas members of the supervisory board are not full time employees, but they meet periodically to fulfill their duty (Dutch Corporate Governance Code 2009). This two-tier system is

[2] "Comply or explain" means that the company needs to explain the reason for a breach and the actions it is undertaking to correct the imbalance in its annual report.

common around Europe: 10 out of 27 countries in the Union recommend in their Corporate Governance Code a two tier board system.

Corporate governance in the Netherlands is regulated by the Dutch Corporate Governance Code (CGC). The CGC contains best practices provisions and principles for a sound relationship between the executive board, the supervisory board and interested parties. This CGC was generated by the Monitoring Committee, which is also in charge of supervising the implementation of the good practices. The CGC is not a legal provision: it only provides guidelines for sound corporate governance. Nevertheless, over time, some provisions of the CGC became enforced by law.

Regarding the inclusion of females on boards, the Monitoring Committee—in charge of verifying the fulfillment of the CGC suggestions—included a gender diversity clause in the CGC in 2007. Before the 2009 law, gender diversity—on the supervisory board—was included as a suggestion in the item III.3.1 of the CGC, as *"(…) promoting independent action of the supervisory board is to ensure the diversity of its composition in terms of such factors as age, gender, expertise, social background or nationality"* (CGC, 2009, pp. 42). However, the Monitoring Committee highlighted both on its Annual Report 2011 and 2012 that gender diversity on supervisory boards has scarcely increased. Although an increased social and political pressure for gender diversity, and the slow rate of incorporation of females into the boards, the CGC does not include any specific target toward gender diversity.

In terms of public policy, on December 2009 the Dutch House of Representatives adopted a law requiring that at least 30 percent of the seats of the executive and the supervisory board should be occupied by members of each gender.[3] This law—which was expected to be approved by June 2012—was fully adopted by the Dutch government in January 2013. Companies subject to this law that do not fulfill the 30 percent target should explain in the Annual Report why the seats are not evenly distributed, how the company has tried to balance the distribution of seats, and how the company seeks to achieve the balance of seats in the future. No further penalties are proposed. Moreover, the scope of the quota in terms of time is also limited: the law is expected to be derogated by January 2016.

Contemporary to the adoption of the Dutch Quota, the European Union Commissioners proposed the aforementioned plan for gender balance in November 2012. The gender balance proposal requires reserving a minimum 40 percent of the non-executive seats for each gender by 2020. This plan was formally approved by the European parliament in 2013, and in order to become a law, the proposal requires to be approved by the EU Member States in the Council.

Dutch firms responded to this social pressure differently. The Dutch Female Board Index, collected yearly by Lückerath-Rovers since 2007 (when the possibility of a Dutch Gender Quota started to be discussed in political arenas), shows that by

[3] The target provisions only apply to larger Ltds and PLCs. These are not subject to the proposed statutory provision, if they meet two of the following three requirements: a) the value of the assets according to its balance sheet does not exceed € 17.500.000; b) net sales for the financial year does not exceed € 35.000.000; c) the average number of employees for the financial year is less than 250.

2014 only three companies comply with the Dutch Quota, whereas nine comply with the executive board quota and sixteen with the supervisory board quota. Moreover, only six companies comply with the EU Quota. However, the number of firms that have at least a female board member increased from 38 in 2009 to 57 in 2014 among the firms surveyed by Lückerath-Rovers. This heterogeneity on the fulfillment of gender balance regulations confirms the assumption that under affirmative action programs—with low punishment or enforcement—organizations may find sub-optimal to obtain the external legitimacy associated with the quota (Ashforth and Gibbs [1990]). If gender balance is demanded by society, i.e. it provides legitimacy, lack of gender balance on boards implies limited access to outside resources predicted by the resource dependence theory. Hence, the fact that firms are not systematically fulfilling the quota posits the question of which are the within firm determinants of such behavior.

3.3 Research design and sample

3.3.1 Research design

To test the hypotheses described in Section 3.2.2 I use the following specification:

$$Fem\_pres_{i,t} = \beta_x Variables_{i,t} + \gamma_x Controls_{i,t} + \text{Time Effects} + \varepsilon_{i,t} \qquad (1)$$

where $Fem\_pres_{i,t}$ is a dummy variable equal to one if firm i at time t has a female on the general board, zero otherwise. As a general rule, I define through the rest of the chapter that the general board is the single body obtained through the addition

of the executive and managerial board. As penalties for firms not fulfilling the Dutch Quota were weak (comply or explain type), compliance with the Quota was low. I define that a firm is responding—at least partially—to social pressure to gain legitimacy in this setting through the inclusion of at least a female board member. This assumption is consistent with the descriptive evidence presented by Lückerath-Rovers that, although the number of firms fulfilling the quota is low, Dutch firms with at least a female board member almost double between 2009 and 2014. I will define this variable for two different sample periods: during the full time-span of my sample (2003 – 2012) and the post quota period (2009 – 2012). Given the nature of the boards in the Netherlands (a dual system, with executive and supervisory boards) I repeat the specification (1) for the presence of a female board member on either the executive or in the supervisory boards. $Variables_{i,t}$ are the set of proxies for the determinants that I hypothesize have an effect over the likelihood of having a female on the board. To test hypothesis one I use as a proxy for size *log of Total Assets* (Peng [2004]). To test hypothesis two I include *Returns over Assets* (ROA) and *Market Returns*, defined as annual returns of holding a share of the target firm over a calendar year (Hillman et al. [2007]). Finally, to test hypothesis three I include *Board Tenure* (average tenure of the board members). Complementary to these variables, I use also as a proxy for visibility (and, therefore, a larger probability of including a female board member) a dummy variable taking value one for boards bigger than the median of *Board Size* (8

members) and, depending on the specification, the size of the *executive* or the *supervisory board*. I also include as a control *Firm's Age* (to control for inertia, measured as the number of years that the firm appears in the sample) and *MTB* for the firm's growing potential. Finally, I include the ratio between *Cash Flow from Investment Activities* and *Total Assets*, to control for investment complexity.

3.3.2 Data

The sample is composed of a varying number of listed Dutch firms for the period 2003 to 2012. The total number of unique firms that appear in my sample is 102. However, the number of firms in my sample in a given year ranges from 53 firms in 2003 to 68 firms in 2006. Board data is obtained from the BoardEx database, whereas firms' financial data comes from the Bureau van Dijk's Osiris database. The final sample is composed of 570 observations with both financial and board data.[4]

Table 3.1 provides descriptive statistics of this study's data. In terms of corporate governance variables, the average Dutch board is composed by 8.37 members (median 8), whereas the smallest (biggest) board is composed by 3 (18) members. The average Executive Board is composed of 2.81 members (median 3) whereas the average Supervisory Board is composed by 5.55 members (median 5).

[4] If I drop from my database firms fulfilling at least two of the conditions required for the quota waiver (firms with less than €17,500,000 in assets, net sales below €35,000,000 or less than 250 employees), results remain qualitatively unchanged.

The proportion of female board members on Dutch firms increases from 4 percent in 2003 to 13 percent in 2012. This increment in the proportion of female board members is explained by the increment of the proportion of females on supervisory boards (from 5 percent in 2003 to 16 percent in 2012). On the contrary, the proportion of women on executive boards remains low (2 percent in 2003, 6 percent in 2012).

3.4 Determinants of having female board members

3.4.1 Univariate tests

Table 3.2 presents correlations between the variables in my study, whereas Table 3.3.a and 3.3.b present results of univariate tests comparing firms with at least a female board member with firms with no female board members during the full sample (2003 – 2012) and the quota period (2009 – 2012), respectively. As predicted in hypothesis one, firms with a female board member are bigger in terms of both market capitalization and assets than firms with no female board members in both periods. Also, bigger firms—both measured by log of assets and log of market capitalization—are positively correlated with the number of seats available on boards, both at the Supervisory and Executive level. Firms with bigger supervisory and executive boards are more likely to include a female board member. Regarding hypothesis two, profitability also seems to be driving the likelihood of including a female board member on the board, as the ROA for these firms is

higher than for firms with no female board members, at least during the pre-quota period. However, this relationship is inverted in the post quota period, as firms with no females on boards are more profitable in terms of ROA. Overall, I interpret this result as evidence that there are observable factors driving the inclusion (or not) of women on Dutch boards. Regarding hypothesis three, average board members tenure seems to be similar on firms with and without female board members.

3.4.2 Multivariate tests

To test the determinants of having a female on board in the Dutch setting I use a standard logistic regression. As in Hillman et al. [2007], the use of a firm fixed effects approach is inappropriate for this setting, as many firms have either no women or systematically have females on the board for the entire period. Hence, I use a population-averaged logistic regression model with firms as the cross-sectional units. In particular, I use a population-averaged model where the generalized estimating equation (GEE) adjusts for the correlation between independent variables and fixed effects. This estimation technique corrects for violations of the assumption that unobserved firm-specific random effects and fixed effects are uncorrelated (Jensen and Zajac [2004]; Hillman et al. [2007]).

To make it easier the interpretation of my results, I report the odds ratios. Odds ratios represent a change in probabilities of a dependent variable related to changes in the independent variable. An independent variable with an odds ratio

higher than one indicates that this independent variable has a positive effect over the likelihood of the dependent variable. An independent variable with an odds ratio smaller than one indicates a negative relationship between the independent and the dependent variable. In this particular setting, an odds ratio higher than one implies higher likelihood of having a female on the board; an odds ratio smaller than one implies lower likelihood of having a female on the board.

To test my hypotheses, I perform two different analyses. In the first set of tests I use the full sample, that is, all firms during the period 2003 - 2012. In the second set of tests I study the determinants during the period 2009 - 2012. Table 3.4 presents the results for the full sample period (2003 - 2012). Column A presents the results for the general board. Hypothesis one—positive relationship between female presence on board and size—is verified, as the odds ratio for size is positive and significant (odds ratio = *1.408*; $p < 0.05$). Regarding hypothesis two—the success in generating internal resources affects the likelihood of including a female board member—the odds ratio for ROA is higher than one and significant (odds ratio = *4.647*; $p < 0.05$), implying that more successful firms in generating internal resources are more likely to include women on boards. Finally, the odds ratio of the variable average tenure does not provide evidence supporting hypothesis three—the tenure of board members is associated with the likelihood of the presence of at least a female board member—. Regarding the control variables, firm's age is positive and significant (odds ratio = *1.150*; $p < 0.05$). This implies that

older, well stablished firms are more likely to include females on its boards during that period. As the variables firm age and tenure can be collinear, I perform a Variance Inflation Factor test, reported in Table 3.5.

Given that Dutch boards of directors follow a dual system, with an executive and a supervisory board, I test what drives the inclusion of female board members in either the boards during the period 2003 – 2012. These results are reported in columns B and C of Table 3.4, respectively. Regarding executive boards, the most important determinant in my sample is the size of the executive board (odds ratio = *2.262*; $p < 0.01$). Contrary to the findings for the general board composition, a high ROA is not associated with the presence of female board members on executive boards. However, there is a significant and negative relationship between average tenure of executive board members (odds ratio = *0.780*; $p < 0.1$) and a positive and significant relationship between size of the executive board (odds ratio = *2.262*; $p < 0.01$) with the likelihood of having a female on the executive board. Regarding supervisory boards, the picture is more similar to the results from the general board. This similar picture between the general board and the supervisory board is associated with the aforementioned description that there is a higher proportion of supervisory female board members in Dutch companies; hence, it is more likely that if a woman is appointed to a board, she will be included in the supervisory board.

In the second set of test, I perform the same analysis as before, but only for the period 2009 – 2012, that is, the period when the gender quota was in place. The results for this specification are reported in Table 3.6. In terms of general board composition (column A), only the control variable firm age (odds ratio = *1.152*; $p < 0.1$) seems to affect the likelihood of having a female board member, supporting only hypothesis one. When I consider only the executive committee, results are more in line with my hypotheses. In particular, the size of the executive board affects positively the likelihood of having a female board member (odds ratio = *3.313*; $p < 0.01$). Also, the average tenure of the members of the executive board affects negatively the likelihood of having a woman sitting on the executive board (odds ratio = *0.742*; $p < 0.01$). Regarding control variables, the odds ratio of the variable firm age indicates a positive effect over the likelihood of having a woman in the executive board (odds ratio = *0.748*; $p < 0.05$). An interpretation of this result is that firms listed after the announcement of the Dutch Quota are more likely to include women on their boards. A high MTB is also positively related to the likelihood of having an executive female board member (odds ratio = *2.145*; $p < 0.01$). Regarding the supervisory boards (column C), as described before for general board composition, only the size of the board have a positive and significant effect on the likelihood of including a female board member.

3.5 Summary and conclusions

This chapter study how heterogeneity in the organizational response to increasing social pressure to foster gender diversity can be predicted using firm specific information. As organizations demand external resources from the environment as a survival strategy, these resources must be obtained through legitimacy from external organizations. I argue that under certain conditions (in environments with higher pressure for gender diversity) this legitimacy is achieved through the inclusion of females on boards. However, the observed heterogeneity in gender diversity at firm level in the Netherlands (a country that imposed, after a transition period, a quota with low enforcement) is associated to heterogeneity in the demand for external legitimacy. This posits the question of what factors drive these different reactions. I hypothesize that observable firm characteristics drive the demand for legitimacy and external resources. Consistent with the hypothesis one, large (and visible) firms are more likely to include female board members. This positive relationship between size and the presence of female board members can be linked to the fact that more visible firms are more likely to suffer from external pressure to fulfill demands for external legitimacy. Also, bigger firms have also bigger boards, making easier the inclusion of female board members. Hypothesis two states that the generation of internal resources by the organization is related to gender diversity on boards. I find a positive and significant relationship between return on assets and the likelihood of including a female board member. Finally, I test the relationship between board tenure and the likelihood of including a female

board member. Although the results from the general and supervisory boards are inconclusive, I find evidence that the tenure of the board members in executive boards is negatively associated with the likelihood of the presence of a female board member.

I acknowledge that my research has several limitations. The size of the sample and the availability of data limit the tests that I can perform in this setting. In particular, I am unable to test two important determinants of female presence on boards. First, previous studies show that the proportion of females employed in the firm's industry is positively associated with the likelihood of including female board members. Second, diversification strategy and competition are also factors that influence the likelihood of hiring female board members.

Overall, my study provides evidence of the factors driving compliance with gender diversity regulations in environments where regulation is not stringent, and compliance is heterogeneous among firms. As more European countries are pushing toward actions to increase the presence of females on boards, this evidence is particularly important for regulators and policy makers to provide a better understanding of forces driving gender diversity within firms.

3.A Tables

Table 3.1 – Descriptive statistics of variables included in the study.

Variable	Mean	Median	Standard Deviation
Market Capitalization	13.725	13.704	1.658
Assets	14.129	14.099	1.585
General Board Size	8.370	8	2.480
Females on Boards (%)	5.487	0	7.995
Firms with at least a female on Board (%)	36.667	0	48.232
Firm Age	7.149	8	2.287
Executive Board Size	2.814	3	1.406
Females on Executive Boards (%)	2.491	0	8.738
Supervisory Board Size	5.557	5	1.834
Female on Supervisory Boards (%)	6.541	0	10.189
Tenure	5.375	5.1	2.743
ROA (%)	5.229	4.98	10.624
Returns (%)	13.983	9.176	55.659
Scaled Cash Flow from investment activities	-0.055	-0.047	0.147
Scaled Research and Development Expenses	0.0127	0	0.0319
Market to Book ratio	1.037	0.695	1.205
Observations	570		

Notes to Table 3.1: Descriptive statistics of variables included in the study. *Market Capitalization* is the ln of firm's market capitalization; *Assets* is the ln of the book value of firm's assets; *General Board Size* is the number of board members both from the Executive and Supervisory boards; *Females on Boards (%)* is the percentage of females sitting on both the executive and supervisory boards; *Firms with a least a female on Board (%)* is the percentage of firms with at least a female sitting on any of the boards (executive or supervisory); *Firm Age* is the number of years that a given firm appears in my sample; *Executive Board Size* is the number of members of the Executive Board; *Females on Executive Boards (%)* is the percentage of females sitting on Executive Boards; *Supervisory Board Size* is the number of members of the Supervisory Board; *Females on Supervisory Boards (%)* is the percentage of females sitting on Supervisory Boards; *Tenure* is the average time in years of the board members tenure; *ROA* is return over assets; *Scaled Cash Flow* from investment activities is the ratio between Cash Flow from investment activities and total assets; *Scaled Research and Development Expenses* is the ratio between Research and Development Expenses and total assets; *Market to Book* is the ratio between Market Capitalization over book value of assets.

Table 3.2 – Pairwise correlation between variables included in the study.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.Market Capitalization															
2.Assets	**0.8075**														
3.General Board Size	**0.5742**	**0.6059**													
4.Percentage Female	**0.2721**	**0.2543**	**0.1357**												
5.One Female on Board	**0.2960**	**0.2761**	**0.2551**	**0.9028**											
6.Firm's Age	**0.2908**	**0.1888**	**0.0903**	0.0811	**0.1160**										
7.Executive Board Size	**0.2476**	**0.2400**	**0.6821**	0.0026	**0.0930**	0.0207									
8.Percentage Female on Executive Boards	**0.1128**	**0.1123**	**0.0951**	**0.4574**	**0.3750**	**-0.1020**	**0.1294**								
9.Supervisory Board Size	**0.5877**	**0.6366**	**0.8279**	**0.1838**	**0.2749**	**0.1071**	**0.1548**	0.0292							
10. Percentage Female on Sup. Boards	**0.2453**	**0.2169**	**0.1672**	**0.8888**	**0.8444**	**0.1213**	0.0422	0.0573	**0.1955**						
11.Tenure	**0.1718**	**0.0929**	**-0.1252**	**0.1192**	0.0733	**0.3415**	**-0.1088**	**-0.1561**	**-0.0822**	**0.1468**					
12.ROA	**0.2568**	0.0001	0.0437	**0.0984**	**0.0939**	**0.1501**	0.0327	0.0100	0.0339	**0.1037**	**0.1101**				
13.Returns	**0.1463**	0.0070	0.0017	-0.0753	-0.0595	0.0031	-0.0391	-0.0813	0.0321	-0.0480	0.0081	**0.1349**			
14.Scaled CF from investment activities	-0.0048	-0.0405	0.0505	0.0270	0.0377	**0.1027**	0.0211	-0.0599	0.0514	0.0798	-0.0155	**0.0844**	-0.0387		
15.Scaled R& D Expenses	0.0132	**-0.0952**	**0.1115**	-0.0740	-0.0608	0.0379	0.0618	**0.0976**	**0.1030**	**-0.1369**	-0.0811	**-0.1355**	0.0276	-0.0294	
16.Market to Book ratio	**0.2021**	**-0.2629**	0.0214	0.0079	0.0100	**0.1212**	0.0237	-0.0067	0.0104	0.0175	0.0736	**0.4246**	**0.1256**	**0.2089**	**0.1670**

Notes to Table 3.2: Correlations between variables included in the study. *Market Capitalization* is the ln of firm's market capitalization; *Assets* is the ln of the book value of firm's assets; *General Board Size* is the number of board members both from the Executive and Supervisory boards; *Females on Boards (%)* is the percentage of females sitting on both the executive and supervisory boards; *Firms with a least a female on Board (%)* is the percentage of firms with at least a female sitting on any of the boards (executive or supervisory); *Firm Age* is the number of years that a given firm appears in my sample; *Executive Board Size* is the number of members of the Executive Board; *Females on Executive Boards (%)* is the percentage of females sitting on Executive Boards; *Supervisory Board Size* is the number of members of the Supervisory Board; *Females on Supervisory Boards (%)* is the percentage of females sitting on Supervisory Boards; *Tenure* is the average time in years of the board members tenure; *ROA* is return over assets; *Scaled Cash Flow* from investment activities is the ratio between Cash Flow from investment activities and total assets; *Scaled Research and Development Expenses* is the ratio between Research and Development Expenses and total assets; *Market to Book* is the ratio between Market Capitalization over book value of assets.

Table 3.3.a – Mean comparisons of variable in the study. Group variable: At least one female sitting on the general board. Period 2003 – 2012 (Full Sample)

Variable	At least one Female	No Female	Difference
Market Capitalization	14.369	13.352	1.018*
Assets	14.703	13.796	0.907*
General Board Size	9.201	7.889	1.311*
Executive Board Size	2.986	2.715	0.271*
Supervisory Board Size	6.220	5.174	1.046*
Tenure	5.640	5.223	0.417
ROA	0.065	0.045	0.021*
Returns	0.096	0.165	-0.068
Cash Flow from investment activities	-0.048	-0.060	0.011
Research and Development Expenses	0.010	0.014	0.004
Market to Book ratio	1.052	1.027	0.025
Observations	209	361	

Notes to Table 3.3.a: Univariate test for differences in firm characteristics for the period 2003-2012. Group variable: presence of at least a female on the executive or supervisory board of directors. *Market Capitalization* is the ln of firm's market capitalization; *Assets* is the ln of the book value of firm's assets; *General Board Size* is the number of board members both from the Executive and Supervisory boards; *Executive Board Size* is the number of members of the Executive Board; *Supervisory Board Size* is the number of members of the Supervisory Board; *Tenure* is the average time in years of the board members tenure; *ROA* is return over assets; *Returns* is the calendar return of investing one euro in the firm's stock; *Cash Flow from investment activities* is the ratio between Cash Flow from investment activities and total assets; *Scaled Research and Development Expenses* is the ratio between Research and Development Expenses and total assets; *Market to Book* is the ratio between Market Capitalization and book value of assets. T-test assuming equal variance between groups.

Table 3.3.b – Mean comparisons of variable in the study. Group variable: At least one female sitting on the general board. Period 2009 – 2012 (Post-quota announcement)

Variable	At least one Female	No Female	Difference
Market Capitalization	14.363	13.205	1.158*
Assets	14.753	13.821	0.932*
General Board Size	9.385	7.292	2.093*
Executive Board Size	3.156	2.226	0.930*
Supervisory Board Size	6.229	5.066	1.163*
Tenure	5.837	5.149	0.688
ROA	0.049	0.036	0.012
Returns	0.070	0.233	-0.155*
Cash Flow from investment activities	-0.057	-0.048	-0.009
Research and Development Expenses	0.016	0.010	0.005
Market to Book ratio	0.953	0.892	0.062
Observations	96	106	

Notes to Table 3.3.b: Univariate test for differences in firm characteristics for the period 2003-2012. Group variable: presence of at least a female on the executive or supervisory board of directors. *Market Capitalization* is the ln of firm's market capitalization; *Assets* is the ln of the book value of firm's assets; *General Board Size* is the number of board members both from the Executive and Supervisory boards; *Executive Board Size* is the number of members of the Executive Board; *Supervisory Board Size* is the number of members of the Supervisory Board; *Tenure* is the average time in years of the board members tenure; *ROA* is return over assets; *Returns* is the calendar return of investing one euro in the firm's stock; *Cash Flow from investment activities* is the ratio between Cash Flow from investment activities and total assets; *Scaled Research and Development Expenses* is the ratio between Research and Development Expenses and total assets; *Market to Book* is the ratio between Market Capitalization and book value of assets. T-test assuming equal variance between groups.

Table 3.4 – Odds ratios from a fit-population averaged panel data model. Dependent variable: At least one female sitting on the board. Period 2003 – 2012

	(A)	(B)	(C)
	General Board	Executive Board	Supervisory Board
Assets	1.408**	1.288	1.404**
	(0.206)	(0.369)	(0.210)
ROA	4.647**	1.634	4.316*
	(3.362)	(1.596)	(3.371)
Returns	0.869	0.814	0.905
	(0.114)	(0.128)	(0.133)
Investment	1.009	0.369	0.966
	(0.362)	(0.391)	(0.293)
Firm Age	1.150**	0.639***	1.207**
	(0.080)	(0.098)	(0.108)
MTB	0.971	1.042	1.042
	(0.089)	(0.375)	(0.076)
General Board Size	1.329	0.527	0.910
	(0.387)	(0.452)	(0.274)
General Board Avg. Tenure	0.931		
	(0.051)		
Executive Board Size		2.262***	
		(0.633)	
Executive Board Avg. Tenure		0.780*	
		(0.099)	
Supervisory Board Size			1.276*
			(0.178)
Supervisory Board Avg. Tenure			0.908
			(0.062)
Time Effects	Yes	Yes	Yes
Wald test	32.83 (0.01)	45.63 (0.00)	29.65 (0.04)
Observations	570	570	570

Notes to Table 3.4: Odds ratios from a fit-population averaged panel data model. Dependent variables are: *General Board* is a dummy variable taking value one if there is at least a female board member sitting in any of the two boards (executive or supervisory); *Executive Board* is a dummy variable taking value one if there is at least a female board member sitting in the executive board; *Supervisory Board* is a dummy variable taking value one if there is at least a female board member sitting in the supervisory board; *Assets* is the ln of book value of assets; *ROA* is return over assets; *Returns* is the return of investing one euro in the firm's stock over a calendar year; *Investment* is the ratio between Cash Flow from investment activities and total assets; *Firm Age* is the number of years that the firm appears in the sample; *MTB* is the Market to Book value of the firm; *General*

Board Size is a dummy variable taking value one for firms with boards bigger than 8 members; *General Board Avg. Tenure* is the average tenure of members of the board; *Executive Board Size* is the number of members of the executive board; *Executive Board Avg. Tenure* is the average tenure of the members of the executive boards; *Supervisory Board Size* is the number of members of the supervisory board; *Supervisory Board Avg. Tenure* is the average tenure of the members of the supervisory board. Robust standard errors reported in parenthesis. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

Table 3.5 – Reporting the Variance Inflation Factor of the model tested in Table 3.4

	(A)	(B)	(C)
	General Board	Executive Board	Supervisory Board
Assets	1.61	1.60	2.14
ROA	1.34	1.34	1.33
Returns	1.54	1.56	1.54
Investment	1.10	1.10	1.11
Firm Age	1.26	1.16	1.24
MTB	1.48	1.51	1.53
General Board Size	1.44	1.73	1.91
General Board Avg. Tenure	1.19		
Executive Board Size		1.34	
Executive Board Avg. Tenure		1.10	
Supervisory Board Size			2.54
Supervisory Board Avg. Tenure			1.16

Notes to Table 3.5: Variance Inflation Factor of the dependent variables of the models tested in Table 3.4. Dependent variables are: *General Board* is a dummy variable taking value one if there is at least a female board member sitting in any of the two boards (executive or supervisory); *Executive Board* is a dummy variable taking value one if there is at least a female board member sitting in the executive board; *Supervisory Board* is a dummy variable taking value one if there is at least a female board member sitting in the supervisory board; *Assets* is the ln of book value of assets; *ROA* is return over assets; *Returns* is the return of investing one euro in the firm's stock over a calendar year; *Investment* is the ratio between Cash Flow from investment activities and total assets; *Firm Age* is the number of years that the firm appears in the sample; *MTB* is the Market to Book value of the firm; *General Board Size* is a dummy variable taking value one for firms with boards bigger than 8 members; *General Board Avg. Tenure* is the average tenure of members of the board; *Executive Board Size* is the number of members of the executive board; *Executive Board Avg. Tenure* is the average tenure of the members of the executive boards; *Supervisory Board Size* is the number of members of the supervisory board; *Supervisory Board Avg. Tenure* is the average tenure of the members of the supervisory board.

Table 3.6 – Odds ratios from a fit-population averaged panel data model. Dependent variable: At least one female sitting on the board. Period 2009 – 2012

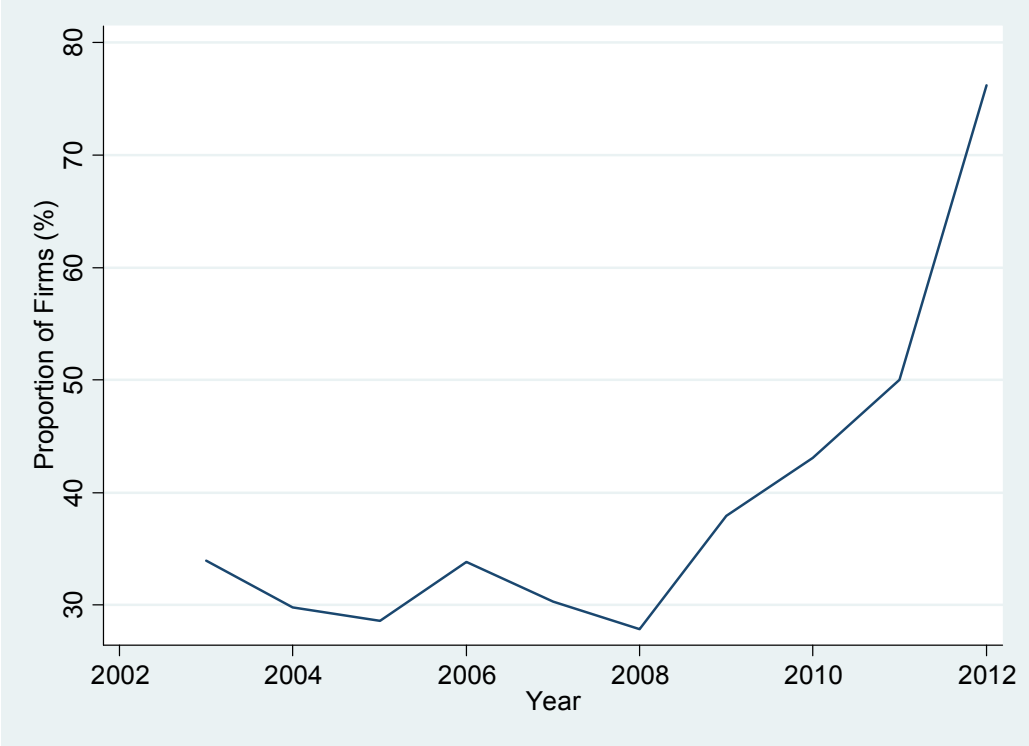
	(A)	(B)	(C)
	General Board	Executive Board	Supervisory Board
Assets	1.159	1.400	0.978
	(0.197)	(0.450)	(0.191)
ROA	0.831	0.178	1.280
	(0.883)	(0.226)	(1.239)
Returns	1.014	1.146	1.085
	(0.163)	(0.241)	(0.199)
Investment	0.850	3.224	1.039
	(0.433)	(2.670)	(0.428)
Firm Age	1.152*	0.748**	1.251**
	(0.095)	(0.103)	(0.139)
MTB	0.985	2.145***	0.910
	(0.133)	(0.552)	(0.135)
General Board Size	2.314	1.597	0.949
	(1.436)	(0.943)	(0.578)
General Board Avg. Tenure	0.971		
	(0.055)		
Executive Board Size		3.313***	
		(1.111)	
Executive Board Avg. Tenure		0.742***	
		(0.072)	
Supervisory Board Size			1.479**
			(0.281)
Supervisory Board Avg. Tenure			0.945
			(0.090)
Time Effects	Yes	Yes	Yes
Wald test	19.32 (0.05)	35.12 (0.00)	21.89 (0.04)
Observations	202	202	202

Notes to Table 3.6: Odds ratios from a fit-population averaged panel data model. Dependent variables are: *General Board* is a dummy variable taking value one if there is at least a female board member sitting in any of the two boards (executive or supervisory); *Executive Board* is a dummy variable taking value one if there is at least a female board member sitting in the executive board; *Supervisory Board* is a dummy variable taking value one if there is at least a female board member sitting in the supervisory board; *Assets* is the ln of book value of assets; *ROA* is return over assets; *Returns* is the return of investing one euro in the firm's stock over a calendar year; *Investment* is the ratio between Cash Flow from investment activities and total assets; *Firm Age* is the number of years that the firm appears in the sample; *MTB* is the Market to Book value of the firm; *General*

Board Size is a dummy variable taking value one for firms with boards bigger than 8 members; *General Board Avg. Tenure* is the average tenure of members of the board; *Executive Board Size* is the number of members of the executive board; *Executive Board Avg. Tenure* is the average tenure of the members of the executive boards; *Supervisory Board Size* is the number of members of the supervisory board; *Supervisory Board Avg. Tenure* is the average tenure of the members of the supervisory board. Robust standard errors reported in parenthesis. Significance at the 10%, 5% and 1% level is indicated by *, **, and ***, respectively.

3.B Figures

Figure 3.1: Proportion of Dutch firms with at least a female board member in the general board



Notes to Figure 3.1: Proportion of Dutch firms with a female board member (executive and supervisory) in our sample.

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