### DISCRIMINATION ON THE SPANISH BOARDS OF DIRECTORS: ANALYSIS AND ECONOMIC IMPLICATIONS

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#### Abstract:

Gender diversity on the Boards of Directors has become a relevant topic in the field of corporate governance. According to this study, only 6.61% of the directors in the top 1085 Spanish companies are women. Distinct types of discrimination could have different economic implications, which is why it is necessary to identify the causes of this low female representation.

In this study, discrete variable models are used to estimate the proportion of women on the Boards of Directors. In those cases with more positions available this proportion is even greater, which suggests the exclusion of women from the pool of candidates for both executive and independent positions. Furthermore, companies where the homogeneity of the board prevails, consider women as an unwanted element in the success of reaching agreements. Therefore, there could be companies that systematically underestimate the abilities of women for these positions, a situation that tends to disappear when the companies already have female directors.

*Key words:* gender discrimination, corporate governance, Board of Directors, glass ceiling.

Classification JEL: G34, J16, M14, C35.

#### **1. Introduction**

In this study, we analyze the inequality in the professional promotion of men and women, specifically the inequality of gender in terms of participation on the Boards of Directors of the largest Spanish companies. Evidence shows that although women's participation in the labour market has increased steadily in Spain from the end of the 1970's until the present day, this same increase is not observed in women's participation in director positions and, especially on the Board of Directors that is the highest decision-making body of any company.

According to the 2002 report of *Corporate Women Directors International* (CWDI) only 4.6% of the direct members of the Boards of Directors of the top 300 Spanish companies are women. In accordance with the data given by the study of *Ethical Investment Research Service* (EIRIS) in 2004, only 3.8% of the Boards of Directors' positions of the 24 Spanish companies that form part of the *FTSE All World Developed Index* are held by women. The Spanish partner of EIRIS (the Ecological and Development Foundation) expands this sample by including the companies that together form the Ibex-35, which shows 3.57% of female participation on their boards. For its part, the *Fundación de Estudios Financieros* (Foundation of Financial Studies) in its June 2005 report also found a low female representation (4.04%) among the Boards of Directors of 119 Spanish companies that are listed in the stock market. This low representation of women on the Boards of Directors in Spanish companies can be considered as an indicator that in our labour market a series of difficulties or obstacles exist that make it difficult or hinder the development or professional promotion of women, obstacles that, on the contrary, are not faced by men to the same extent.

In this paper, distinct explanations are offered for this low representation that can be grouped into three major areas (Wolfer, 2006). In the first place, the profile<sup>1</sup> of the candidates to held a position on the Board of Directors in few cases fit with that which women possess. So, in accordance with the companies' standard criteria, women would

<sup>&</sup>lt;sup>1</sup> Generally, candidates to become part of the Board of Directors are demanded to have, among other prerequisites, an elevated previous experience on positions of responsibility in departments such as production and finance, whereas the heads of other areas like human resources or marketing, where there are a greater presence of women, are not considered to the same degree as possible candidates to occupy a director position.

be excluded from the pool of potential candidates to hold these positions. The second explanation is related to the well-known, *Taste-Based discrimination*. In this sense, if the company considers the admission of women to its Board of Directors would be harmful to its performance, the individuals that decide the composition of the board would not give the same opportunities to women simply for the fact of being a woman (Becker, 1957). And thirdly, it is possible that women's capability to hold these positions is systematically underestimated, or in other words, there could be a *Mistake-Based Discrimination* in respect to women skills.

In fact, it is a key question to identify the type of reasons that are causing this low representation of women on the Boards of Directors of Spanish companies, because the type of existing discrimination would provide different conclusions about how to obtain a greater presence of women on the boards and, even about if it is actually desirable to increase their presence.

Therefore, the objective of this paper is to find indicators of the possible existence of discrimination against women<sup>2</sup> on the Boards of Directors of the largest Spanish companies, as well as identifying observable firm factors related to their presence on the boards. We also offer an analysis of their possible relationship with the above mentioned types of discrimination previously provided by the literature.

In this study we analyze the composition, in terms of gender, of the Boards of Directors of the top 1000 Spanish companies that have the highest operating revenues. The number of available observations, as well as the discrete nature of the variable object of this study, allows the use of discrete outcome models, from which it is possible to estimate the probability that a director position will be held by a woman, according to the characteristics of the company<sup>3</sup>. The obtained results identify significant indicators

 $<sup>^{2}</sup>$  According to Heckman (1998), we can define discrimination against women like any situation in which a woman is treated in a different manner than a man, in terms of her salary, her promotion or her accessibility to Boards of Directors as an exclusive consequence of her sex, without any objective causes that determine that the sex of an individual implies any type of direct effect on his or her capability to fulfil his or her functions inside the company.

<sup>&</sup>lt;sup>3</sup> The sample used in this study extends former analysis to types that had been previously excluded. These studies were primarily focused on listed companies or on a smaller sample of the largest Spanish companies. Furthermore, the size of our sample is in line to those used in other countries to monitor board's diversity as a sign of good corporate governance, as mentioned later in the paper, which allow us to compare Spanish companies with our surrounding countries.

of discrimination, The highest proportions of female directors it is found in familyowned firms, cooperatives, and in general, those companies in which the shareholders have great power in choosing directors. In all of these cases the proportion of dominical directors tends to be higher than in other companies indicating that the majority of women that hold positions on Spanish Boards of Directors are dominical directors, being practically excluded from the pool of candidates for executive and independent director positions, because their profile does not fit with the standard criteria to occupy these positions on the boards.

Other characteristics such as the board size, the age of the company, or the level of risk of the company could indicate a taste-based discrimination in certain companies in which the homogeneity of the board is considered as an objective, and so the presence of women could be seen as a distorting element of this so-called goal. Furthermore, we find that the barriers encountered by women in their access to the Board of Directors are reduced if other females are already on the Boards of Directors. This later result highlights the benefits of eliminating stereotypes on women's lack of leadership skills or on their lack of competitive impulse in comparison with men, and thus would contribute to a better evaluation of the curricula of female candidates in the process of hiring directors.

The rest of the paper is organized as follows. In the second section, the evidence of low representation of women on the Boards of Directors of Spanish companies is studied; comparing it to Spain's surrounding countries, and once this evidence of low-representation is found, an analysis of the possible causes of this low representation and its economic implication is done. In section three, the main factors driving, according to the literature, the presence of women on the Boards of Directors are revised. In the fourth section, the sample and methodology of sampling is described, and the independent variables latterly used are presented. The discrete outcome models used to estimate the probability of a director being a woman are presented in the fifth section, while the sixth one presents the results and studies the effects that companies' features have on this probability, analyzing the implications that these results have in terms of discrimination. Lastly, the seventh section concludes the paper.

# 2. Analysis and implications for the low representation of women on the Boards of Directors of Spanish companies.

#### 2.1. The infra-representation of women on the Spanish Boards of Directors.

In order to justify the low representation of women in the highest executive positions and on the Boards of Directors, numerous studies have found evidence of many difficulties and obstacles to the professional development or promotion of women. This phenomenon has been named *the glass ceiling*, meaning an impassable wall or barrier made up of procedures, structures, power relations, beliefs or habits, which complicate a woman's access to high directive positions. Qualified women look through this glass ceiling and see what they could be able to obtain, but invisible barriers do not let them pass (Morrison *et al.*, 1987; Segerman-Peck, 1991; Powell and Butterfield, 1991; Davidson and Cooper, 1992).

According to data from the *Instituto de la Mujer* (Women's Institute) for the fourth quarter of 2006, women represent 50.57% of the Spanish population, 42.26% of the active population, 40.85% of the employed population and 57.82% of the unemployed population. In terms of their participation in the labour market, the majority of women holds administrative positions (64.69%), while they also have a considerable participation in scientific and intellectual professions (52.9%).

The presence of women in executive positions of companies and the public sector is 31.76%, according to data from the *Instituto de la Mujer* (Women's Institute) for the same period, but vary depending on the type of company. Therefore, while the major presence of executive women is found in companies without wage-earners (45.06%), or companies with less than 10 employees (27.14%), the lowest proportion correspond to the women executives of companies with 10 or more employees (22.3%). Although the proportion of women in executive positions is rather low (31.76% average), the percentage of female on the Boards of Directors found in the available reports (around 4%) is quite lower than that of female executives, what seems to point to their infrarepresentation on the Boards of Directors. Furthermore, if corporate governance trends signal to expanding the range of talents for their Boards of Directors and increasing

their diversity (Tyson, 2003; Higgs, 2003), scientific and intellectual professions, in which women are better-represented, could be a good source of potential candidates.

As an example of the low representation of women on the companies' major decisionmaking organs, has recently appeared a series of studies (see table 1). In the case of Spain, the scarce presence of women in its Boards of Directors is clearer when compared to other European countries. Spain has a lower percentage of representation on boards than in those countries that occupy the top positions in the international field, and it does not progress at the pace of its closer neighbors.

#### [Table 1]

Thus, according to the 2002 report of *Corporate Women Directors International*<sup>4</sup> (CWDI), Spain has 4.6% female representation on the Boards of Directors of the 300 most important Spanish companies, only ahead of Japan, which has of women representation in all the companies listed in their nine stock exchanges. In the international ranking, including those countries where data on women directors was available, the first place belongs to the United States, with 12.4% of corporate boards seats in the Fortune 500 companies being held by women. Australia follows with 10.7%, Canada with 9.1%, South Africa with 5.8%, and United Kingdom with 5%.

A research conducted by *Ethical Investment's* study *Research Service*<sup>5</sup> (EIRIS) in 2004 showed that only 3.8% of board members of the 24 Spanish companies included in the *FTSE All World Developed Index* were women. Only Italian, Portuguese and Japanese companies had a lower percentage of women on their boards. This percentage was quite lower than the European average of 7.1%. Nordic countries (Norway, Sweden and Denmark) appeared as global leaders, followed by countries of Anglo-Saxon tradition such as The United States, New Zealand, and Canada.

The *Fundación Ecología y Desarrollo* (Ecological and Developmental Foundation) (ECODES) in April 2004, expanded the sample by including the companies that

<sup>&</sup>lt;sup>4</sup> CWDI is a non-profit international institution that works in the framework of *Globe Women* and promotes a worldwide movement to increase the participation of women on the Boards of Directors. They act as a link for national and international networks of women directors, promoting the development of executive skills.

<sup>&</sup>lt;sup>5</sup> EIRIS is a British agency specialized in the services of corporate social responsibility for institutional investors.

together form the Ibex-35, finding that of the 532 positions of directors in the Ibex-35, only 19 were held by women, which is a percentage of 3.57% of female participation, less than the percentage found in the Spanish companies in the *FTSE All World Developed Index*.

The 2004 *European Professional Women's Network*<sup>6</sup> Monitor, a report of more than 250 European companies, found a percentage of 8% of female representation on corporate boards in Europe. The report highlighted the big differences among countries. Spain was in the "Slow-going" group, with a female representation of just 3%, which is the same figure of Belgium, and only ahead of Italy with 2%. Norway, Sweden and Finland are among the "Trail-Blazers" while the "Middle-of-the-Roaders" group consisting on Germany, United Kingdom, Switzerland, Netherlands, Austria, France, and Denmark. In a wider international comparison, Europe with 8% is behind the USA and Canada, with 13.6% and 10.6% respectively. Japan is much further behind with an extremely low figure of 0.4%.

The international consultant firm *Spencer Stuart* elaborate periodically the Index Spencer Stuart on the Boards of Directors of the top companies in the Spanish stock market. Concretely, the Index in 2004 is composed of 90 companies<sup>7</sup>. In relation to the female presence on the Board of Directors, the 2004 Index indicates that only 4% of the total directors of these 90 companies are women, the majority being dominical positions.

The biennial *Heidrick & Struggles*<sup>8</sup>, corporate-governance studies provide a unique and comprehensive overview of boards of some 300 of Europe's top companies. The 2005 report studies a sample of 294 companies from ten countries (Belgium, France, Germany, Italy, the Netherlands, Portugal, Spain, Sweden, Switzerland and the United Kingdom) selected by market capitalization and finding a percentage of 7.3% of women in the boardroom. Once again, the worst countries regarding gender diversity on boards are (in this order): Portugal, Italy, Spain and Belgium. The study also remarks that

<sup>&</sup>lt;sup>6</sup> EPWN is a Pan-European association of professional women whose objective is to promote the professional development of women and their presence on corporative leadership positions.

<sup>&</sup>lt;sup>7</sup> Among all of them are in the Ibex-35 except ARCELOR due to having its headquarters outside of Spain. For details of the companies from the *Spencer Stuart* study (2004): "Spain2004. Spencer Stuart Index of Boards of Directors," *Spencer Stuart*.

<sup>&</sup>lt;sup>8</sup> Heidrick & Struggles is one of the major head-hunter consultants in the world.

diversity has become a serious topic on board agendas of Spanish companies yet: Spanish boards have just 2.6% women on average, and 69% of companies have no women on its board.were, in this order: Portugal, Italy, Spain, and Belgium. The report also highlighted the reduced number of Spanish independent directors with respect to other countries.

Lastly, the *Fundación de Estudios Financieros* (Foundation of Financial Studies), in its June 2005 report, also found a low female representation among the Boards of Directors of the 119 Spanish companies listed in the Spanish stock market. According to the data, only 53 of the 1,211 directors of the sample were women, which represent just a 4.04% female participation. The study also found that the majority of women that hold positions on the boards of these companies were named as dominical directors, the majority with family ties.

Although the above mentioned studies are numerous, the majority of them are focused on companies listed in the stock market, or in a quite reduced sample of the largest companies. Furthermore, those studies are limited to a descriptive analysis, thus giving up any effort to explain exactly what are the causes that origins that Spanish companies do not reach the levels of developed countries in terms of gender diversity on the Boards of Directors.

#### 2.2 Causes of Discrimination

As mentioned above, three sets of reasons are normally offered to explain the low representation of women on Boards of Directors. According to the group of causes with which we face up to, we find distinct analyses and economic or business implications about the reasons of the low representation of women in Spanish companies' Boards of Directors.

In the first group, among the factors that explain that there are fewer "potential" women than men to hold a seat on the board, there are some observable explanations such as the existing occupational segregation, which tends to place men in financial or more technical positions within the production process. Other not directly observable factors could be behind the small proportion of women with the required experience, for instance, familiar responsibilities that in many cases, unlike men, interrupt the development of the professional activity of the female worker, or the anticipation by many women of the glass ceiling which drives them to sacrifice their professional development in favour of their family life. Therefore, according to data from the *Instituto de Mujer* (Women's Institute) in its fourth quarter of 2006, of the total number of inactive persons that do not search for employment due to family reasons, 97.04% are women, being women too those who request maternity/paternity leave in 98.35% of the cases.

In this case, the limited presence of women on Boards of Directors would not be due so much to gender discrimination in the selection process of the board members, as to the existence of socio-cultural obstacles in the stages leading up to the professional promotion of women. Likewise, the concentration of candidates into a defined profile wouldn't implicate gender discrimination but rather the perpetuation of habits within companies when it comes time to appoint candidates to the board.

In the case of taste-based discrimination, if the only reason for its appearance is the existence of social clichés among those responsible for naming board members, this will imply a clear economic cost for the company, since as it includes spurious hiring criteria it would be renouncing to select those candidates best prepared for the position, independently of their gender. Nevertheless, some authors suggest (Wolfers, 2006) that the appearance of this type of discrimination could have, at least in certain cases, an economic rationale in the sense that if there were a hostile environment for women, employing a woman in certain positions could make more difficult for the company to obtain contracts or cause problems among employees under her management or even among its clients and shareholders. Another type of behavior that is occasionally found on Boards of Directors (Pearce and Zahra, 1992) and that could be generating this type of discrimination is the existence of a bias towards the homogeneity of the group, considering heterogeneity in the heart of boards as a potential source of conflict and of difficulties in decision making processes. In this last case, there could be agency costs derived from the CEO dominance over the main decision-making organs in companies (Hermalin and Weisbach, 1998).

Finally, in the third group we can also find other focuses like *implicit discrimination* (Bertrand et al., 2005) according to which the attitudes or implicit or unconscious

feelings of the evaluators of different candidates can include a discriminatory bias against women although their explicit feelings or attitudes could be just the opposite of discrimination; and *statistic discrimination* from Phelps (1972), according to which discrimination will always appear when a person is judged according to the average characteristics of the group to which he or she belongs and not on the basis of their own personal characteristics as an individual. All of these factors combined imply a biased knowledge of the true capacity of women that will lead to a smaller female presence on Boards of Directors. This biased knowledge has its roots in stereotyped profiles of men and women that have no real and objective basis. Therefore, if the low representation of women on the board were caused by this type of discrimination, the companies would be inefficient in their resource allocation, which has a clear cost for them.

Thus, eliminating discrimination against women in entry to Boards of Directors can also have arguments in favor of efficiency. In this sense, there are numerous arguments that support economic efficiency and they have been the object of many studies, among which, we will highlight the following.

Some studies concentrate on the fact that the female presence on Boards of Directors contributes to improving the corporate governance. For example, the study<sup>9</sup> of *The Conference Board of Canada*<sup>10</sup> for a sample of 141 Canadian companies from different sectors between 1995 and 2001, came to the conclusion that the companies with two or more women on their boards in 1995 showed a greater probability of being leaders, in terms of profit, of their industrial sector six years later. Additionally, the companies with greater female representation on the board tends to be more active boards and demonstrated better results in terms of client satisfaction, and risk or audit management. Robinson and Dechant (1997) argue that corporate diversity promotes a better understanding of the environmental complexities and, consequently, improve strategic planning. Another argument for women's appointment is that their presence on the boards influences the decision making and leadership styles of the organization (Rosener, 1990). Thus, Brandeshaw et al. (1992), affirm that the presence of women on

<sup>&</sup>lt;sup>9</sup> Brown, D.A.H, Brown, D.L. and Anastasopoulus, V. (2002). "Women on Boards: Not Just the Right Thing... But the 'Bright' Thing", *The Conference Board of Canada*, May.

<sup>&</sup>lt;sup>10</sup> Canadian Association of high executives that include members of executives of public and private boards of renowned prestige such as IBM, Hewlett-Packard, and General Electric.

boards contributes to improve corporate governance by providing, especially the nonexecutive directors, a "power sharing" style, thus reducing CEO prevalence.

Other authors argue that female presence on boards is particularly important for those organizations where women represent an important share of its consumers and workforce. Chinchilla and Leon (2004) hold that women should be on boards due to a very practical reason which is that 50% of consumer decisions fall on them. In the same way, Crain and Snyder (1998) add as an argument the strong female influence on consumer purchases as well as on the labor market.

Some empirical studies find a positive relationship between the presence of women on corporate boards and firm value. Thus, Adler (2001) in his extensive 19-year study (from 1980 to 1998) of 215 Fortune 500 companies showed a strong correlation between a strong record of promoting women into the executive suite and high profitability. He demonstrated for that period that the 25 Fortune 500 firms with the best record of promoting women to high positions were between 18 and 69 percent more profitable than the median Fortune 500 firms in these industries. Although the study warns that correlation does not imply causality, it signals the importance that the executives have these results in mind when it comes time to promote talented staff to top executive positions.

Carter et al. (2003) also suggest a positive relation between board diversity and firm value. In their study they explored the economic implications of board diversity (defined as the percentage of women or minorities on the board of directors) for Fortune 1000 firms. The authors found a significant positive relationship between the fraction of women or minorities on the board and firm value (measured by Tobin's Q), after controlling for size, industry, and other corporate government measures. On the other hand, Erhardt et al. (2003) find evidence of a positive relation between the percentage of women and minorities on Boards of Directors and return on assets (ROA) and return on investment (ROI). Similarly, a report by Catalyst (2004) analyzes the connection between corporate performance and gender diversity in top management teams. The study analyzes 353 Fortune 500 companies form 1996 to 2000. The report documents that the 88 companies with the highest representation of women on their top management teams experienced significantly higher returns on equity (ROI) and total

returns to shareholders (TRS) when compared to the 89 companies with the lowest women's representation. However, the study warns that its objective is to find a link between diversity and financial performance and not to demonstrate causality.

Finally, Cox and Blake (1991) argue that substantial costs exist for companies that do a poor job integrating their diverse workforce. These costs are related to turnover and the absenteeism of women and minorities who feel dissatisfied with their careers and prospects for advancement. So, gender diversity on boards and in top executive suite can be considered as a way of attracting and retaining talent no matter where it comes from. In this sense, the presence of women on boards can also be perceived as the best way to provide role models, guides, and mentors for highly qualified women with the potential to access to board positions as well as to monitor the application of policies that favor equality in the selection process and in the assignment of future positions (Burke and McKeen, 1993). Farrell and Hersch (2005) suggest that the existence of women board members can have influence on attracting other women to the board, either by the nomination of professional colleagues, or by applying pressure so that the company maintains its demand for female board members. In addition, women candidates can feel more attracted by companies that have already achieved a certain degree of diversity in their governing organs.

All of these results demonstrate an obvious need to analyze the possible existence of efficiency failures in regards to female representation on the Boards of Directors.

#### 3. Explanatory factors of women's presence on the Boards of Directors.

Our objective is to find indications of the possible presence of gender discrimination on the Boards of Directors of the largest Spanish companies. In order to do that, we will attempt to identify those factors related to their low representation on boards. With this purpose, we begin this section by revising the variables used to study the presence of women on boards in the related economic literature.

As possible explanations of the role of gender diversity on corporate boards we find the possibility of a positive relationship between board diversity and firm value, as well as the external pressures for greater diversity on the board.

Some empirical studies, as aforementioned, suggest a positive relationship between the presence of women in governing organs and firm value (Adler, 2001; Carter et al., 2003; Erhardt et al., 2003; Catalyst, 2004). A frequently used argument to support this evidence is that women add new perspectives to the board, which is value-enhanced after their integration. Another possible interpretation of this positive relationship is offered by Farrell and Hersch (2005) who argue that if qualified women to hold a seat on the board constitute a scarce resource<sup>11</sup>, they may have the opportunity to select the better performing firms or it could be that better performing firms are able to focus more on diversity<sup>12</sup>.

Other studies argue that a greater presence of women on Boards of Directors can be a response to an external pressure for greater diversity, rather than the result of a direct positive relationship with firm performance. Following this reasoning, previous researches (Gillan and Starks, 2000) document the influence of shareholder activism in the objectives of diversity on the Boards of Directors of the companies. Carleton et al. (1998) found that firms that had received pressure from institutional investors<sup>13</sup> demanding greater diversity on boards from 1993 to 1996 placed new women or

<sup>&</sup>lt;sup>11</sup> Companies still tend to configure the structure of their boards from top executives positions, where women are also under-represented.

<sup>&</sup>lt;sup>12</sup> In order to empirically contrast this argument the authors analyze the response of the market to announce the addition of a female to the Boards of Directors, they document insignificant abnormal returns on the announcement or a woman added to the board even if the company had a board composed entirety by men.

<sup>&</sup>lt;sup>13</sup> TIAA-CREF is the major pension foundation of the United States.

minorities on their board by 1997. These results suggest that firms have an incentive to avoid pressure or activism from shareholder groups by achieving some level of gender diversity on the board, and that a greater dependence of shareholders on the companies could affect the number of women on their boards.

Moreover, there are studies showing a relationship between firm specific characteristics and the representation of women on corporate boards. Thus, Agrawal and Knoeber (2001) suggest that the representation of women on the boards of leading companies is larger, in part, due to a greater demand for diversity directed at these companies through public opinion. Carter et al. (2003), in their study on the relationship between diversity on boards and firm value, also find a significant positive relationship between the presence of women on boards and the size of the company measured by total assets. It has also been tested (Carter et al., 2003; Agrawal and Knoeber, 2001) that there is a positive relationship between the board size and the presence of women on that board.

On the other hand, Adams and Ferreira (2004), find a strong negative relation between the variability in stock returns and the proportion of women on boards, they also find that companies with a larger proportion of women on their boards provide directors greater pay-performance incentives. The authors interpret these results as an empirical confirmation of Kanter's hypothesis (1997) according to which when uncertainty is high, explicit pay-for-performance contracts are too costly and therefore the organization trusts more in the homogeneity of the group as a way to assure the attainment of its objectives. This means that incentive pay and group homogeneity are substitutes, and therefore, the variability in stock returns (or the uncertainty as a proxy for the cost of providing formal incentive schemes) and the diversity within the board have a negative relationship, while the relationship between diversity and incentive based pay is positive. Another possible explanation of the negative relationship between risk and the number of women on a board is self-selection. There is solid evidence to argue that women are more risk-adverse than men (Jianakoplos and Bernasek, 1998). Therefore, one could argue that women are less willing to work for companies that offer a salary too exposed to risk.

To further account for firm level heterogeneity, particularly the cultural aspects of the firm than pertain to women, Farrell and Hersch (2005) include cultural aspects of the

company as an explanatory variable that can have a positive effect on the presence of women on Boards of Directors. In their study, the authors find that among the firms appeared in the *Working Mothers ranking*<sup>14</sup> the likelihood of adding women to the board is greater than among those not included. Thus, those organizations that promote and apply family friendly policies can have a greater number of women board members as a result of a greater demand for women directors and also a comparative advantage in their recruitment.

Some empirical evidence also suggests that industry is significant in explaining women's representation on boards (Fryxell and Lerner, 1989; Harrigan, 1981). Harrigan (1981), for example, finds that women directors are more prevalent in labor-intensive industries than in manufacturing sectors<sup>15</sup>.

Some differences have also been found in the female representation in companies that are listed in the stock market versus those that are not. In accordance with the report CWDI (2002), within the group of 300 companies analyzed that were listed on the stock exchange (45), the percentage of women was only 3.8%, while in the remaining 255 companies that were not listed, the percentage rose to 4.9%. The report suggested that the larger percentage of female representation on the boards of companies not listed on the stock exchange could be related to the existence of family ties, highlighting the difficulties faced by women when acquiring positions without the help of family ties. However, the study is limited to suggest the hypothesis, without performing any type of empirical test.

<sup>&</sup>lt;sup>14</sup>Ranking of the 100 Best Companies for Working Mothers by the north-American *Working Mother* magazine that attempts to measure a culture in the firm that values family friendly policies by the consideration of five categories: childcare, flexibility, leaves for new mothers, advancement of women, and work/life benefits.

<sup>&</sup>lt;sup>15</sup> Bertrand and Hallock (2000) find that women are more likely to be managing companies that specialize in social services, health, and in trade, while women directors are scarcely found in agriculture, construction, mining, and in heavy manufacturing industries.

#### 4. Data selection and descriptive statistics

The following section describes the methodology of data selection used to carry out the quantification of women's presence on the Boards of Directors in 1085 largest Spanish companies, as well as the associated descriptive statistics.

#### 4.1 Methodology of data selection and source of data.

The present study is focused on the Spanish companies whose operating revenues exceeded 100 million euros in year 2003 according to the data base SABI<sup>16</sup>. We have chosen to analyze the largest companies given that they constitute a clear business and social reference. Additionally, this criterion corresponds with those used in other countries that usually monitor the diversity on boards as an indicator of good corporate governance, already mentioned in previous sections, which facilitate a comparison with surrounding countries. Also, this is the criterion of economic literature when validating empirical hypotheses related to diversity on boards. For example, Carter, et al. (2003) use *Fortune* 1000 companies as their sample, while Farell and Hersch (2005) base their study on *Fortune* 500 lists, as do Adams and Ferreira (2004).

The search showed a total of 1,148 companies once the closed down ones<sup>17</sup> were eliminated. The list does not include insurance companies or intermediary monetary institutions (Banks and Savings Banks) given that SABI does not include them. The information on board members of companies was also obtained from the SABI database, updated in June 2005<sup>18</sup>. Nevertheless, in some cases it was necessary to complete that data with information obtained from files from the Mercantile Registry,

<sup>&</sup>lt;sup>16</sup> SABI (Analysis System of Iberian Balances) is a data base that contains general and financial information about more than 800,000 Spanish companies. The information is obtained from distinct official sources, Mercantile Registries, BORME, newspapers, etc. and is updated periodically. SABI is distributed in Spain by *Informa y Bureau Van Dijk*. <u>http://www.bvdep.com/SABI.html</u> <u>http://www.informa.es/infornet/Main/idioma/01/screen/SShowPage/pagina/sabe.html</u>

<sup>&</sup>lt;sup>17</sup> IZAR was also eliminated for being in a liquidation process and so was EMYTEC Coop. Valenciana, since, according to the annual accounts of the *Registro de Cooperativas de la Comunidad Valenciana* (Community of Valencia Cooperative Registry), their operating revenues in 2003 did not exceed 100 million euros.

<sup>&</sup>lt;sup>18</sup> An alternative way to obtain data about the composition of Boards of Directors is the use of surveys. However, survey data has low response rates which could drastically reduce the base of analyzed companies. Furthermore, as Carter et al. (2003) suggests, survey data would likely be biased toward those firms wishing to "showcase" their diverse boards.

the database e-Informa which is made from these files, annual reports, and companies' web sites<sup>19</sup>.

To determine the gender composition of the board, the first names of the board members' were examined. When inferring gender from the first names, institutional board seats held by other corporations were excluded, since they are represented by a changing group of individuals whose identities and gender are unknown. That is, to measure the number of women board members, only individual direct members were counted. Since, there are only 633 institutionally-held board positions out of the 6,636 (9.54%) in the top 1,148 companies, the exclusion of these seats from this study has a relatively limited impact on the proportion of women on the Boards of Directors in these companies<sup>20</sup>. Thus, by focusing the study on the measurement of the presence of individual female board members among the individual direct members of the board, 63 companies were eliminated whose Boards of Directors were entirely formed by institutional board members, reducing the final sample to a total of 1,085 companies.

In addition, the functions of Commissioner (comisario)<sup>21</sup>, Manager/Administrator, General Manager and Secretary of the Board, were eliminated form the Board of Directors since these, by general rule, do not qualify as board members when identified by SABI<sup>22</sup>. The study holds as board members the functions of President, Vice-President, Executive Director, Administrator, Joint Administrator (Member of the Board), Sole Administrator and Other functions<sup>23</sup>. In reference to the board of those companies in which a sole administrator represents the Board of Directors, in the absence of a complete board, these companies are counted as a board formed by a single individual within the universe of board directors represented in this study.

<sup>&</sup>lt;sup>19</sup> In order to know the composition of the Boards of Directors of the company C&A Modas, S.L., that did was not included in SABI, we looked for it in the *Registro Mercantil Central* (Central Mercantile Registry) archives.

<sup>&</sup>lt;sup>20</sup> Additionally, under the hypothesis that the percentage of women among the total individual direct members is, or should be, approximately the same that is found among the total administrators, it should not produce significant biases to exclude institutional board seats in the calculated percentage of female participation on boards. In this sense, anecdotal evidence indicates that these institutional positions also are usually represented by men, which can be explained by the fact that the percentage of female representatives should not significantly differ from the percentage of women on Boards of Directors of companies that are represented.

<sup>&</sup>lt;sup>21</sup> Corresponding to a unique firm: Autopistas del Atlántico, S.A.

<sup>&</sup>lt;sup>22</sup> According to the information given by *Informa*.

<sup>&</sup>lt;sup>23</sup> Such as the treasurer and those on the Governing Boards of three cooperative companies: COFARES, COREM, and ANCOOP.

With regard to the characteristics of the Board of Directors (table 2), we conclude that only 6.61% (397) of individual board directorships of the 6,003, in the top 1,085 Spanish companies are held by women, according to data by June 2005. The average number of direct members per board is 5.53 of which only 0.37 correspond to women, thus the remaining 5.16 are held by men. As a sample maximum, one firm (MERCADONA<sup>24</sup>) had six female individual members on its board, while in the case of men, the maximum is  $47^{25}$ .

#### [Table 2]

#### 4.2 Description of the variables used in analysis.

The most common specifications used in the economic literature for examining the factors that influence female representation on corporate boards specify the dependent variable as either the number of women on the board or the percentage of females on the board (Adams and Ferreira, 2004; Carter et al., 2003).

With regard to the explanatory variables used in the analysis, different firm characteristics are identified as independent variables. In our models it has been included measures of the board size, if it is a family-based firm, if the firm is listed on the stock market, the degree of independence of the company with regard to its stockholders, firm size, firm age, firm profitability, productivity by employee, firm risk, gearing and proxy variables for cultural aspects of the company related to women. It has been also included the association form of the company and industry controls. In the case of financial variables (profitability, productivity, risk, gearing, as well as firm size), they have been taken lagged a minimum of two years to reduce the risk of a possible endogeneity between these variables and female representation. In this way, we can casually speak about causality in Granger's sense in such a way that the financial variables could cause the distinct proportion of women on Boards of Directors, and not the other way around.

<sup>&</sup>lt;sup>24</sup> MERCADONA occupies the ninth place among the top companies in terms of its operating revenues, and it is a familiar company.

<sup>&</sup>lt;sup>25</sup> Corresponding to Ecoembalajes España, S.A. that has an exceptionally large Board of Directors with 50 individual members.

As previously noted, prior studies suggest industry is significant at the time to explain the presence of women on corporate boards (Fryxell and Lerner, 1989; Harrigan, 1981). In order to take into account these differences, the companies of the sample have been grouped into industry classes based on the sector classification by Spanish Stock Markets (Bolsas y Mercados Españoles<sup>26</sup> (BME)), and industry fixed effects based on these classifications<sup>27</sup> have been included.

In order to consider firm heterogeneity within industries, diverse firm variables were included being firstly analyzed the board size. Different studies (Carter et al., 2003 and Agraway and Knoeber, 2001) document a positive relation between board size and women representation on the board. In order to test this result in the Spanish case, the board size is measured taking into account the number of individual direct members on the board accounted by SABI. However, the linear specification is not considered adequate, since it could imply the possibility to achieve an equal board for a sufficiently large size. To avoid this situation, and to consider other causes of exclusion, the squared variable is also included.

The CWDI report (2002) considers the hypothesis that the familiar character of the company can be playing a relevant role in explaining the differences in the number of female members on the Boards of Directors of the companies, thought, the study did not have the information about which companies were familiy-based firm so it could not verify the above mentioned hypothesis. To statistically validate this argument, after taking into account other related factors of the feminine presence on boards, the dichotomy variable about the familiar character of the company that indicates if the firm is family owned «1» or not «0» has been included in the analysis. One of the fundamental motives for which women appear more frequently on the Boards of Directors of family-owned companies is that the family owners apply an effective pressure in order that its family members, independent from sex, are named to these positions, which would benefit the women of these families. This could be also

<sup>&</sup>lt;sup>26</sup> This classification is done by the Spanish Stock Market Society (Sociedades Rectoras de las Bolsas de Valores).

<sup>&</sup>lt;sup>27</sup> These six sectors are the following: Oil and energy; Commodities, Industry and construction; Consumer goods; Consumer services; Financial services and Real Estate agencies, Technology and telecommunications.

indicating that women could occupy dominical positions on the Spanish Boards of Directors<sup>28</sup>.

Furthermore, different authors maintain that family-based firms offer women abundant opportunities and advantages in their professional career. These advantages include more flexible work schedules, access to positions in traditionally male dominated industries like construction, greater job security, and better professional challenges (Barnett and Barnett, 1988; Nelton, 1986; Salganicoff, 1990). In a study elaborated by Jaffee (1990), from a survey to graduates of a university for women, the author comes to the conclusion that the majority of women perceive their family business as a reserve to develop brilliant careers. Thus, when a women works outside of the familiar field she is aware that she may encounter the feared "glass ceiling" despite the talent that she possesses. The main difference for Cole (1997) between family-based companies and non-family-based companies is that while the majority of companies make decisions based solely on the profitability, family -based companies allow more freedom to make work and personal issues compatible, which is particularly important for women<sup>29</sup>. All of this shows that women find a secure place to develop a promising professional career in family -based firms, although the majority of family and personal duties<sup>30</sup> will fall upon them.

In order to obtain this variable, the 1,085 companies are classified in family-based firms or non-family-based firms. The dimensions of ownership and power have been used in order to define a company as a family-based firm (Ginebra, 1997; Gersik, 1997). Thus, a company is considered a family-based firm when various members (at least two) of the same family hold seats on the board of directors and/or a significant part of the

<sup>&</sup>lt;sup>28</sup> Although it remains to be clarified to what extent family members who become board directors of family-owned corporation are active members of the board or their names are included for a company's reporting purposes (León and Chinchilla, 2004). However, the objective of this study is not to contrast the mentioned hypothesis.

<sup>&</sup>lt;sup>29</sup> Nevertheless, family-based firms can also reflect many gender stereotypes and discrimination that are found in society.

<sup>&</sup>lt;sup>30</sup> The argument that family-based firms can posses their own characteristics that favour the selection of women (of the family owner or not) for directive positions is less probable in this case, since examining the shareholder's file along with the members of the board of these companies prove that in the majority of cases last names of female directors of these companies coincide with that of the company's owner.

shares of the company is possessed by the same family<sup>31</sup>. When a company is a subsidiary or forms part of a family group<sup>32</sup>, but no member of the family is part of the Board of Directors of the company, this said company is not classified as family-based firms if the family is not directly implied in its management. The verification of the familiar character of these 1,085 companies of the analyzed sample has been counted, furthermore, with consultancy from the *Instituto de la Empresa Familiar*<sup>33</sup> (Family Business Institute), which has made a list of the possible errors or omissions that have been committed. The final inventory offers a total of 244 family-based firms, which represent 22.5% of the studied sample.

The dummy variable determining if the company is listed or not on a stock market is justified by evidence found in previous reports (CWDI, 2002) about the female presence on boards of companies that are not listed on the stock market, which is greater than in those which are listed on the stock market. This could be a consequence of the distinct composition of the boards of the listed companies that usually have fewer dominical positions, and more executives and independents members, than those non-listed companies.

The control of the shareholders is included as an explanatory variable of the possible existence of external pressure coming from the shareholders in demand of a greater presence of women on the boards (Gillan and Starks, 2000; Carleton, et al., 1998). Another possible explanation of the positive effect of this variable could be the tendency, mentioned above, that women held seats on the boards as dominical members in this case of representation of major shareholders<sup>34</sup>. The shareholders' control in the company is measured by the *Independence Indicator* of *Bureau van Dijk*. Through its Data Base of Ownership, an indicator is used to measure the degree of independence of

<sup>&</sup>lt;sup>31</sup> For those companies with a sole administrator, it can be considered as a family-based firm when the family (at least two members) possesses a significant part of the shares of the company, and when the function of Sole Administrator is hold by one member of the family.

<sup>&</sup>lt;sup>32</sup> A company forms part of a familiar group when a significant part of its shares are controlled by the same family or by another company of the family.

<sup>&</sup>lt;sup>33</sup> <u>http://www.iefamiliar.com/</u>

<sup>&</sup>lt;sup>34</sup> Given that in Spain the presence of activism in favour of diversity on the Boards of Directors by institutional shareholders has not been detected, like in the TIAA-CREF case in the United States, it is not probable that a positive sign in the coefficient responds to the pressure of this type, but because the female proportion among significant shareholders is greater.

the society in relation to its shareholders<sup>35</sup>. The Independence Indicator of  $BvD^{36}$  is designated as A, B, C, and U. In order to include the variable in the model it has been categorized with values 1 to 6, where 1 indicates the lowest grade of independence (C) and 6 the highest (A+). A greater independence of the company in respect to its shareholder could negatively affect the number of women on the board. This negative effect could have as explanation, the tendency to name women on the board as dominical members, that is to say, on behalf of shareholders that have the ability to influence the company.

The analysis of the firm size is difficult to implement because of the need to numerically quantify it and also for the multiple ways to define it. The most utilized quantitative criteria can be arranged in the following order (Osteryoung and Newman, 1993): number of employees, annual sales, total assets, governmental and organizational structure, power in the sector, etc. In the bibliography (Camisón, 2001; McMahon, 2001) the dominance of the quantitative  $3^{37}$  criteria over the qualitative can be seen, and it is desire to establish only one quantitative variable, that's why in the most recent studies there is a combination of the most used quantitative variables and from them a new definition in the form of a single variable is created. The great advantage of this definition is its simplicity, since the size should be an infallible concept comparable between companies and studies. In this study we have chosen a hybrid definition based on the analysis of the three most commonly used variables (number of employees, total assets, and operating revenues). In order to avoid that the especially unusual results in one year distorts the obtained measurement, we have included in this analysis the values observed in 2002 and 2003. The concrete results of the factorial analyses done can be found in table 3, where we have extracted two factors. The main factor can be

<sup>&</sup>lt;sup>35</sup> The collectively designated shareholders are registered in a way so that they are not able to vote. Consequently, these types of shareholders are excluded in the indicator of independence.

<sup>&</sup>lt;sup>36</sup> The indicator is built as follows: the A indicator denotes the maximum independence degree and is assigned when there are no shareholders registered with direct or complete ownership equal to or higher than the 25% of the capital. It is also divided into A+, A, or A- based on the criteria that the higher the number of shareholders the more difficult will be to control a company. The B indicator is applied to companies in which none of the registered shareholders possess 50% or more (direct or total) of the company's equity, again this is classified as B+, B, or B- depending on the identified number of shareholders; the C indicator is applied to a company with a registered shareholder that has a percentage of more than 49.99% (direct or total), and also if a source indicates that there is a final ownership; lastly, the indicator U indicates an unknown degree of independence. For details about these distinct indicators see INFORMA (2003): Base de datos sobre Vinculaciones Financieras. Bureau van Dijk Electronic Publishing.

<sup>&</sup>lt;sup>37</sup> Specifically, from the sales and number of employees.

interpreted as a measurement of the firm size because it is a linear combination of the six variables used in the factorial analysis<sup>38</sup>.

#### [Table 3]

In order to contrast the possible existence of a positive relationship between the female representation on the board and the company's performance found by previous studies (Adler, 2001; Carter *et al.*, 2003; Erhardt *et al.* 2003; Catalyst, 2004), two ratios have been selected in the case of Spain. These ratios are the mean of the return on assets (ROA) in percentages for the years 2001, 2002, and 2003, computed as a net income divided by total assets and the mean of the productivity by employee as the dividend of the operating revenues in thousands of euros among the number of employees for these years. The log of the productivity is preferred to correct the lack of normality.

On the other hand, given that previous studies (Adams and Ferreira, 2004) found a negative relationship between the risk and the presence of women on the boards, we have chosen two alternatives that can involve the effect of the risk that is assumed by different companies considered on the presence of women on the boards. The first of these variables is the of the company's gearing for 2001, 2002, and 2003, measured as the long term debts of the company divided by share capital plus reserves. So, it is considered that companies with greater debts assume more risk while those companies that have lower debts and use its own funds as a main financial source have less risk. The second alternative considered in the risk measurement is the volatility of the profitability obtained by the company. The companies with less risk should obtain a stable return, while those companies with unstable returns from one year to another have more risk. To measure the volatility of returns, the standard deviation of the annual ROA has been computed in the period between 1991 and 2003. In order to avoid problems of a lack of normality, it has been transformed by its logarithm.

Another variable that can be used to characterize different attitudes toward the presence of women on Boards of Directors is the firm age. So, those companies that are more

<sup>&</sup>lt;sup>38</sup> The second extracted factor is directly correlated to operating revenues and assets, and negatively correlated to the number of employees. This could be an approximation of the productivity, and in fact, the correlation between this factor and the variable of productivity that we have used in this study is higher than 90%.

recently created could stimulate a more agile decision-making to survive in the market, so they might tend to look for more homogeneity on their boards. The firm age is introduced in the model in logarithms in order to correct the lack of normality.

In order to include the cultural aspects of the firm that pertain to women (implementation and strengthening of measures to favour equality opportunities, implementation of family-friendly policies, and work and life balance) as a determining factor, two quantitative factors have been defined: the participation of the company in the *Programa Óptima del Instituto de la Mujer* (Optimum Program of the Women's Institute) and if the company is ranked in the *Monitor Español de Reputación Corporativa* (MERCO) (Spanish Monitor Corporative Reputation Index).

In Spain there is not a ranking of the top companies for working women<sup>39</sup> as the one used by Farrell and Hersch (2005) in their study, and so the list of the companies which are participating in the *Programa Optima*<sup>40</sup> (Optimum Program) has been used in this study to construct a variable which takes value «1» if the company is recognized as a "Collaborative Organization in Equal Opportunities between Men and Women," and «0» in the opposite case. The Optimum Program is an initiative of the Women's Institute (Ministerio de Trabajo y Asuntos Sociales) to promote the equal opportunity between men and women in companies. To be recognized as a "Collaborative Organization in Equal Opportunities between Men and Women" inside the Optimum Program, a company has to guarantee equality policies for women, and promote the acquisition, permanence and promotion of women inside the company. Currently there are 40 companies recognized by the Women's Institute and another 30 participating in different phases to become recognized.

It is important to note that this list, the same as the Working Mother Ranking, is not free from drawbacks. Firstly, not to be included in this list, it does not imply that the company does not promote equal opportunities and/or implement policies that help the work and family life balance. On the other hand, it could be possible that this list does

<sup>&</sup>lt;sup>39</sup> On 21 November 2005, the *Fundación+Familia*, a social organization created in April 2003 to promote the protection of the family in the work environment, awarded to the urgent transport network (MRW) the first *Certificado de Empresa Familiarmente Responsible (CEFR)* (Responsible Family Business Certificate), created to distinguish companies that favor the work and family balance. Currently it is in the process of certifying half a dozen companies.

<sup>&</sup>lt;sup>40</sup> <u>http://www.tt.mtas.es/optima/contenido/empresas.html</u>.

not reflect the value the company places on woman directors or what attracts them to a firm.

Also, a second alternative has been considered as a proxy variable of cultural factors, taken from the ranking of *Monitor Español de Reputación Corporativa*<sup>41</sup> in 2005. The corporative reputation is a recognition that the *stakeholders*<sup>42</sup> of a company make of their corporative behaviour, depending on the level of accomplishments of compromises with their clients, employees, and stockholders, as well as the community in general. MERCO's evaluation is based on six variables: economic results, product-quality, corporate culture and work life, business ethics, and corporative responsibility, global dimension and international presence, and innovation.

Lastly, to show possible differences of female representation on the boards of different types of companies, a dummy variable that indicates if the company is a cooperative<sup>43</sup> «1» or not «0» is included. The expected positive value in the coefficient of this variable could be explained by the practice of these companies to represent its partners on the board. Furthermore, in the organizational characteristics and the philosophy behind these types of companies, different authors find fewer obstacles for women to be promoted to its governing organs. According to Ribas and Sajardo (2005) cooperatives present a series of fundamentally distinct values to other companies such as equality, equity, and solidarity which are more likely to create equal work opportunities.

The cooperatives not only involve a context that increases the work participation of women or facilitates the acquisition of the partner's condition for the women, but also the democratic participation in the decision making process on behalf of the partners (each member has a vote), offers women (Chávez, 1996) ways to gain experience which helps them to develop their directive skills and promoting upward the hierarchic structure. And so, being the major power in the partners' hands, and being the members

<sup>&</sup>lt;sup>41</sup> From year to year, MERCO establishes a ranking of organizations and business leaders with the best corporative reputation, and evaluates companies and directors in each sector. MERCO could be an approximation to the lists that *Fortune* or *Financial Times* make abroad.

<sup>&</sup>lt;sup>42</sup> Stakeholders are composed of suppliers, distributors, workers, shareholders and clients.

<sup>&</sup>lt;sup>43</sup> The inclusion of the cooperative variable against the remainder types of companies is due to the fact that between the 1085 Spanish companies studied the representation of women in the governing organs of cooperative companies is greater than in any other type of company (public limited companies, limited liability companies, etc)

of the Board of Directors elected democratically among the cooperative partners<sup>44</sup>, independent of their sex, women have easier access to the board in these types of companies.

<sup>&</sup>lt;sup>44</sup> According to article 34.2 of Law 27 on 16 July 2007 the directors could also be qualified persons and experts that do not possesses partner status, but in number do not exceed a third of the total, and that in no other case will be named President or Vice President.

#### 5. Modelling the Women's Presence

The gender of a Board of Directors member can be considered as a binary variable that only can take the value «0» if the director is a man and «1» if the director is a woman. In this sense, the number of women on the Board of Directors of a company could be modelled as a binomial random variable B(n,p), where *n* is the number of direct members on the board and *p* is the probability of a position being held by a woman. The results obtained in the descriptive phase (see table 2), showed that this probability is very low among the largest Spanish companies.

However, according to the hypothesis discussed in the previous section, this p probability will vary from one company to another depending on a series of factors or independent variables of each company ( $\mathbf{X}_i$ ), so a *Grouped Probit* model<sup>45</sup> could be specified, where  $p_i$  in each company will be given by the function,

$$p_i = \Phi(X_i \beta) \tag{1}$$

Where  $X_i$  is the vector of independent variables referred to the company that can be influencing the said probability,  $\beta$  is the vector of coefficients and  $\Phi(\cdot)$  is the inverse of a normal distribution function (Greene, 2000) and, therefore, will have values between zero and one.

The *Number of female directors of the Board*  $(y_i)$  could be considered as a dependent variable in an alternative specification, which could be adequate given the low frequency of women on the Boards of Directors. In this case, the observations would be the whole board instead of individual members, using then count data models, such as the *Poisson* regression model<sup>46</sup>.

<sup>&</sup>lt;sup>45</sup> It is possible to use a grouped data model if all the independent variables are referred to the whole company, and therefore, all of them are common to each one of the directors of each company.

<sup>&</sup>lt;sup>46</sup> Farrel and Hersh (2005) used this model for the appointment of new directors. Adams and Ferreira (2004), for their part, use a *Poisson* regression to examine the relationship between the social interaction of the company and the diversity on boards.

In the *Poisson* regression model each observation is a random variable with a *Poisson* distribution of parameter  $\lambda_i$ 

$$\Pr[Y = y_i] = \frac{(\lambda_i)^{y_i}}{y_i!} e^{-\lambda_i}$$
(2)

Parameter  $\lambda_i$  can be interpreted as the expected number of direct female members of the board  $(E[y_i/\mathbf{X}_i] = \lambda_i)$  that will be linked to the independent variables  $\mathbf{X}_i$ . In our case, given that the size of the board changes from one company to another, this variable must be included as an exposition factor  $(n_i)$ , and so in this way,

$$\lambda_i = n_i p_i = n_i e^{X_i \beta} \tag{3}$$

Where  $p_i$  would be the proportion of female directors, equivalent in our analysis to the probability obtained from the *grouped probit* model in equation (1). The estimation results of these two models are presented in table 4.

#### [Table 4]

Although these results are commented in detail in next section, we can point out to the significance of some variables such as family-based firms, cooperatives, the independence indicator or industry that could be showing that one of the causes of the low representation corresponds to a lower proportion of female candidates. This gender exclusion from the pool of potential candidates could be due to the fact that companies prefer directors with specific profiles that are difficult to find in women, making difficult for them to reach a high representation in these organs.

However, this is not the only group of explanations of low female representation for which evidence is showed. The significance of variables such as the board size or the risk of the company could indicate a preference for homogeneity on the board, which could be an evidence of *Taste-based discrimination*. Another indicator of this type of discrimination is the existence of not just a low proportion of women on the boards, but

rather a higher proportion of companies without women that could be expected in a binomial or a *Poisson* distribution such as the ones estimated (in fact, just as indicated in table 2, the variance of women in the board is greater than its average, 0.67 compared to 0.37, while in a *Poisson* regression both magnitudes must be approximately equal).

The presence of more companies without women on their Boards of Directors than those that could have been expected from the unconditional probabilities for the *Poisson* distribution can be incorporated into the model by the specification of a *Zero-Inflated Poisson* model. In these models we differentiate between cases in which, with a probability q, the possibility of appointing a woman to the Board of Directors is not even considered (*Taste-based discrimination*) and those in which women are considered. In the later case, other factors could come into consideration and the probability of appointing a woman could be determined by the *Poisson* model above mentioned. This type of models, therefore, could imply that there are a greater number of companies without women than that described by a simple *Poisson* model. The parameter q could be considered as an approximation of the probability that a company prefers not to have any women on its board.

A second alternative to explain the observed over-dispersion of the *Number of direct female members of the board* variable is the *Mistake-based discrimination* based on stereotypes about the ability of women to hold positions on boards, implying a higher rejection proportion of women during the selection process because their professional skills are underestimated. If this were the case, what we could find is that once a woman enters the board, tends to eliminate the tendency to prejudices in the evaluation of her abilities so it is easier that those companies appoint more women to occupy other positions. In this case, the gender of each member of the council would not be independent from other members, but instead a *contagious* factor makes the presence of women on the boards more possible if there are already women on it. This said *contagious* factor can be estimated via a *negative binomial distribution*.

This negative binomial distribution can be considered as a gamma mixture of *Poisson* distributions, where the *Number of direct female members of the board*  $(y_i)$  is distributed as a *Poisson* of parameter  $v_i \lambda_i$ ,

$$\Pr[Y = y_i] = \frac{(\nu_i \lambda_i)^{y_i}}{y_i!} e^{-\nu_i \lambda_i}$$
(4)

Where  $v_i$  is an unobserved parameter that is distributed as a gamma of parameters  $\frac{1}{\alpha}$  and  $\alpha$ ,

$$g(\nu) = \frac{\nu^{(1-\alpha)_{\alpha}} e^{-\nu_{\alpha}}}{\alpha^{\nu_{\alpha}} \Gamma(\nu_{\alpha})}$$
(5)

which is a distribution with mean one and a variance of  $\alpha$ . In this negative binomial, the average of  $y_i$  will be equal to  $\lambda_i$ , while the variance will be  $\lambda_i (1 + \alpha \lambda_i)$ . The parameter  $\alpha$  allows us to quantify the grade of over-dispersion of the variable  $y_i$  (the greater  $\alpha$ , the greater the variance will be with respect to the mean). In this way, if  $\alpha = 0$ , the negative binomial becomes a *Poisson* distribution (equal mean and variance). However, if  $\alpha \neq 0$  then there is a contagious effect, that is, having a positive case makes it more probable to have other positive cases.

Lastly, in order to test which of these two effects prevail, if the *Taste-Based* discrimination (q, obstacle) or Mistake-based discrimination ( $\alpha$ , infection), we estimate a Zero-inflated negative binomial model that allows the specification of both parameters: q and  $\alpha$ . If q is zero, the model is transformed into a negative binomial, meanwhile if  $\alpha$  is equal to zero it will become a Zero-Inflated Poisson. The results of these three estimations are presented in table 5.

#### [Table 5]

Likelihood ratio tests confirm the existence of over-dispersion of the number of women on the Boards of Directors, and both the Zero-Inflated *Poisson* model and the negative binomial model are preferable to the simple *Poisson* regression model. Finally, the analysis of the Zero-inflated negative binomial allows us to conclude that this model is superior to the *Zero-Inflated Poisson*, but it is not better than the negative binomial model (in fact, we obtain the probability of an obstacle, q, very close to 0), that is, the contagious factor is able to explain sufficiently the observed over-dispersion.



From the comparison of the estimated models, we can conclude saying that there are signs of an underestimation (*Mistake-based discrimination*) of women's skills when considered to hold positions of responsibility on the boards which implies that companies would be inefficient in terms of utility (the resources are used in an incorrect manner). This implies that companies may be inefficient in appointing their directors, since, actually, if the companies eliminate those bias, they would appoint more women to their Boards of Directors.

#### 6. Analysis of the results

Estimations of the models by maximum likelihood are presented in tables 4 and  $5^{47}$ . In all of the models, two estimates have been presented. The first of them includes all of the independent variables considered, while the second ones have been obtained by eliminating one-by-one all non-significant variables in terms of individual likelihood ratio test (Engle, 1984) until obtaining a model with only those variables that are statistically significant.

From the model tests, such as the *Wald* test, or the Likelihood test, we can conclude that the estimated models describe the behaviour of the dependent variable (proportion of women in board of directors) even at a 1% significance level.

In regard to the independent variables that are finally found significant, it can be observed that they are always the same in all proposed models (except the listed company variable that is replaced by the firm size for the negative binomial models)., All of them also have a very similar effect on the dependent variable as it will be showed in the following sensitivity analysis<sup>48</sup>, which is a sign of the robustness of the results in terms of the chosen functional specification<sup>49</sup>.

Thus, it can be observed that the number of members of the Board of Directors is effectively a significant variable, in which an increase in board size implies an increase in the proportion of positions held by women. The negative sign in the variable squared board size means that the increase of the size in this probability is reduced insofar as those boards begin to be large enough; therefore a maximum of 16-17 members is reached (see Figure 1). This behaviour can indicate that in the companies that have small Boards of Directors, as each director has great individual power, the organization,

<sup>&</sup>lt;sup>47</sup>A robust variance-covariance matrix is used in order to correct *heterocedasticity* and correlation among directors of the same board.

<sup>&</sup>lt;sup>48</sup> In this analysis it is considered as a *reference* company of the sample; a non-family based firm, noncooperative company, with an indicator of independence BvD equal to C, non-listed in the stock market (or the average sized company for a non-listed company in the case of the binomial negative models), 23 years old, with a medium risk and not belonging to financial services and Real Estates agencies, nor consumer goods and consumer services sectors, and with a Board of Directors formed by 5 direct members.

<sup>&</sup>lt;sup>49</sup> Nevertheless, and given that in the previous section have found that the binomial negative model is the better approach, the probabilities mentioned in the text will be referred to this model.

in order to secure the loyalty of the group, prefers the homogeneity of the board, since diversity in small groups could have a high cost in terms of reaching agreements, this can signal an inclination towards *taste-based discrimination*. However, if a company has a larger board it can indicate that that organization has less preference for a homogeneous board, and this indifference is reinforced by the fact that the power of each individual member is reduced. In this case it is more likely that one of them, individually considered, is a woman.

#### [Figure 1]

The results also show that the *risk*, measured as the standard deviation of the ROA between 1991 and 2003<sup>50</sup>, helps to explain the different proportion of women directors. Given the sign of the estimated coefficient, we can affirm that companies with greater uncertainty in their results are those in which it is less probable that a woman is a director (see figure 2). This result is in accordance with Adams and Ferreira  $(2004)^{51}$ . When the risk is high, the explicit pay-for-performance incentives are very expensive, and therefore, the homogeneity of the group becomes more valuable. In the context of Boards of Directors, which are usually composed of men, a high uncertainty could cause the organization to recruit a higher proportion of men than women. The preference for homogeneity on the board in the case of companies with high risk can also be interpreted as an indicator of *taste-based discrimination*. And therefore, the majority of women find greater opportunities in positions of a lower risk profile (Kanter, 1977, p.54).

#### [Figure 2]

In line with this result, we find the greater female representation in sectors intensive in work-force and services (financial services and real estate agencies, consumer goods and consumer services), compared to industrial and technological services (oil and energy, basic materials, industry and construction, and technology and telecommunications). This result is in line with the tendencies found by Harrigan (1981)

<sup>&</sup>lt;sup>50</sup> However, significant effects have not been found for the risk measured through the variable *Debt Ratio* (2001-2003).

<sup>&</sup>lt;sup>51</sup> Nevertheless, Adams and Ferreira (2004) used the volatility of stock prices as an approximation of the uncertainty in the results.

and Bertrand and Hallock (2001) for other countries in which is easier to find women directors in companies of more stable sectors such as commerce and services in general, ahead of other sectors with greater risk such as construction or manufacturing.

#### [Figure 3]

The obtained results for the risk variable, as well as industry, can be also explained by the higher proportion of women among the possible candidates for the boards in commerce and service companies. Jianokoplos and Bernasek (1998) found that women have greater risk-aversion than men, while Farell and Hersch (2005) stated that if female candidates are a scarce resource, they will prefer those companies that offer the greatest security.

It is also observed that the firm age has a positive relationship to the proportion of women on the board. In fact, the youngest companies have greater uncertainty, so, the preference for homogeneous board would play the dominant role. Oldest companies also produce generational changes, in which senior executives promote and facilitate the development of the professional career of their youngest relatives or colleagues despite their gender.

#### [Figure 4]

Nevertheless, the variable that has the greater impact on the presence of women on the Boards of Directors is the family-based firm (see figure 5). For example, the probability that a director is a woman can rise from 4.58% for the median company to 14.02% in a family-based firm. These results can be caused by the tendency to favour family ties, independently of the gender, at the time of promoting directors, which implies that women have less barriers to become a board member. The highlighted effect of this variable points out that, being a woman, one of the main ways to get on the boards is through family ties.

Cooperatives are another exception to the scarce presence of women on the Boards of Directors (see figure 6). The probability of a director being a woman increases from 4.58% to 12.58% if the company were a cooperative. These results can be considered as a consequence of the democratic voting procedure of these companies (one member, one vote) that allows the female partners to enter the board easily, no matter their gender.

#### [Figure 6]

Family-based firm and cooperative variables are related, at least partially, to the easiness of partners or shareholders of the company to appoint directors. When shareholders have more control to appoint members of the board, women are obtaining access to the board more easily. This is confirmed by the influence that the Independence Indicator possesses. Therefore, it can be observed that the less power the shareholders have in the company, the smaller is the probability for the directors of being women (see figure 7). This result confirms the aforementioned tendency to appoint women to dominical positions.

### [Figure 7]

There is a negative relationship between the presence of women on the Boards of Directors and the fact of being a listed company (see figure 8). Nevertheless, in the models based in the negative binomial distribution this variable is substituted by the firm size variable. Both variables are correlated, since listing in a stock market is more frequent in larger companies. The average proportion of women on boards found in our sample (6.61%), is higher than the one detected in prior studies (in comparison to 4%), where the sample of companies were reduced to a smaller number of the largest companies. Usually, these types of companies (large and listed) include a smaller proportion of dominical directors on their boards. The negative sign in this variable could give additional evidence that women tend to be on the boards as dominical directors being more difficult for them to become independent and/or executive directors.

Thus, given the numerous variables that are related to the dominical character of a woman as a director (family-based firms, cooperatives, independence indicator BvD, listed company), it could be said that this is the main way for women to enter the Boards of Directors, while the other two (as executive and independent directors) would be practically closed, given the reduced probability of a woman manager to be promoted to the board, or women chosen as independent directors. This exclusion of women from the pool of potential candidates (executives and independents), could be derived from the preferences of the companies, which look for directors with profiles that do not easily match with those that women have. In fact, where there is evidence that there are more positions as dominical directors (i.e. family-based firms or cooperatives, strong support from shareholders with control over the board) the proportion of women on the boards increases.

There are other variables, however, that do not have a significant influence over the director gender. So, variables related to profitability (ROA) and productivity (turnover per employee) do not have an effect on the representation of women on the boards. However, given that in the specification of the model, the financial variables have a two year lag; this result does not imply that the presence of women on boards cannot have a positive effect on firm profitability. To test this hypothesis, the model specification should be the reverse, with the profitability as the dependent variable and the gender composition of the board as a lagged independent variable<sup>52</sup>.

Lastly, with regard to the variables related with cultural aspects like the ÓptimaProgram and Corporative Reputation no significant effects were showed on the presence of women on the Boards of Directors. In order to correctly interpret these results, it has to be considered that, on one hand, the Óptima Program has been recently created and so some time should pass previously to consider that such a program produce a correlation between this variable and the proportion of women on the boards. On the other hand, the Corporative Reputation variable seems to be influenced by factors related to the company size of the company or its financial results rather than the ones

<sup>&</sup>lt;sup>52</sup> This type of study about the correlation between profitability and diversity, which is not the objective of this study, can be found in Adler (2001), Carter et al. (2003), Erhardt et al. (2003) or Catalyst (2004).

that could help to increase the presence of women on the Boards such as the corporative responsibility, the quality of work-life, or business ethics.

#### 7. Conclusions

In terms of the professional career development, to be appointed to the Board of Directors of a company could be considered as to reach the peak of one's career. So far, the percentage of women found in every previous or actual study show that very few women actually get there.

Through this paper we have quantified the presence of women on the Boards of Directors of the top 1000 Spanish companies. It is possible to conclude that the probability of an individual director being a woman in the leading Spanish companies is very low. In fact, only 6.61% of the positions of the board held by direct members are women.

This low representation of women would imply a lack of efficiency in the companies depending on the causes that generates it. In this sense, the model, that adjusts the number of female directors, allows to detecting a contagious factor, that is, the presence of women on the Boards of Directors facilitates the incorporation of more women to the board. This contagious factor may be interpreted as a signal of the presence of *mistake-based discrimination*, where women's curricula would be systematically underestimated in respect to those of men. This would imply an obvious inefficiency in the companies, with sure economic repercussions.

Additionally, from the analysis of the possible factors causing variations in the proportion of women on the Boards of Directors, we can deduce that there are companies that have a preference for the homogeneity on the boards, which would produce little gender diversity. These indicators of *taste-based discrimination* are found in the low presence of women in companies with small boards, recently created companies, and in those that have a greater uncertainty on its results or that belong to riskier sectors (manufacturing and technological). All of these factors are related to the incentives towards homogeneity on the Boards of Directors.

Lastly, we have detected problems related to the exclusion of women from the pool of potential candidates, especially for executive or independent directors in the board. In fact, we found a greater proportion of women in those companies where there are some clues of a higher number of dominical directors. Therefore, we have found a higher percentage of female directors in family-based companies, cooperatives, those companies where shareholders have a greater power to appoint members to the board, and those that are not listed in the stock market or have smaller size. All these are clear signs that when a woman is in a company's Board of Directors it is more likely that she is there representing a significant ownership participation (frequently with a family character) than holding an executive or independent position.

From all these results we can conclude that in order to improve the gender diversity on the Boards of Directors of the leading Spanish companies, there is no single way.

On one hand, the shortage of women with a desired profile can only be resolved in the medium-long term by improving the *work and family life balance* and an equal share on family care between men and women. The later responsibilities are actually biased to women, causing a slowdown in her professional career making almost impossible for them to reach a board position. Another way to mitigate the problem is to expand the selection criteria to include other talent sources usually discarded (such as human resources or costumer relationships managers, or independent directors from liberal professionals, universities, research centres, or non-profit organizations in which women are highly represented).

Taste-based discrimination produced by preferences for homogeneity on the boards can be reduced by the incentives toward improving *good corporate governance practices* that are usually promoted by regulating institutions (i.e. objectiveness and precision in directors selection criteria, elaboration of training programs for directors of appointment and incentive committees to select and evaluate candidates, promotion of independent director figure).

Lastly, mistake-based discrimination can only be overcome by establishing *quotas* that would banish in the medium-term biased evaluations on the curricula of female candidates to form part of the Boards of Directors.

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			Boards
		Women	without
year	sample	participation	women
2002	300 companies ranked by operating	4,6%	76%
	revenues (Fomento de la Producción		
	2001)		
2004	FTSE All World Developed Index (24	3,8%	_
	companies)		
2004	Ibex-35 (35 companies)	3,57%	63%
2004	250 European companies by	3%	60%
	operating revenues		
2004	90 Spanish companies	4%	66%
2005	Ibex-35 (35 companies)	2,6%	69%
2005	119 Spanish listed companies	4,04%	68,07%
	year 2002 2004 2004 2004 2004 2004 2005 2005	yearsample2002300 companies ranked by operating revenues (Fomento de la Producción 2001)2004FTSE All World Developed Index (24 companies)2004Ibex-35 (35 companies)2004250 European companies by operating revenues200490 Spanish companies2005Ibex-35 (35 companies)	yearSampleWomen participation2002300 companies ranked by operating revenues (Fomento de la Producción 2001)4,6%2004FTSE All World Developed Index (24 companies)3,8%2004Ibex-35 (35 companies)3,57%2004250 European companies by operating revenues3%200490 Spanish companies4%2005Ibex-35 (35 companies)2,6%

#### Table 1: Previous research on women presence on the Boards of Directors of Spanish companies

#### **Table 2: Boards of Directors. Descriptive statistics**

Variable	Sum	Mean	Std. Dev.	VC	Min.	Max.
Number of board members	6525	6,01	4,59	0,76	1	57
Number of direct board members	6003	5,53	4,08	0,74	1	50
Number of female direct board members	397	0,37	0,82	2,22	0	6
Number of male direct board members	5606	5,16	3,89	0,75	0	47
Boards without women	830	76,5	0,42	0,01	0	1
Boards with one woman	174	16,0	0,37	0,02	0	1
Boards with two women	44	4,1	0,20	0,05	0	1
Boards with more than two women	37	3,4	0,18	0,05	0	1
% of women among direct members		6,61	13,96	2,24	0	100

#### Table 3: Firm size via Factor Analysis. Total variance explained. Communalities, factor matrix and factor loadings

Component	Jes	e	extraction sum of squared loadings						
Component	Total	% of variance	cumulative %	Tota	I % c	f variance	cum	cumulative %	
1	3,848	64,130	64,130	3,84	8	64,13	64,130		
2	1,177	19,620	83,750	1,17	7	19,62	0 83,750		
3	,645	10,753	94,503						
4	,190	3,159	97,662						
5	,080,	1,339	99,001						
6	,060	,999	100,000						
			Communalit	C		ent Matrix	Factor Loadings		
			Communant	162	1	2	1	2	
Total Active th EUR 2002 (Log)		0,8	05	0,864	-0,242	0,224	-0,206		
Total Active th EUR 2003 (Log)		0,8	00	0,860	-0,245	0,224	-0,208		
Operating revenues th EUR 2002 (Log)		0,7	24	0,818	-0,336	0,204	-0,276		
Operating revenues th EUR 2003 (Log)		0,7	82	0,786	-0,325	0,213	-0,286		
number of employees 2002 (Log)		0,9	58	0,737	0,643	0,192	0,547		
number of employees 2003 (Log)		0,9	57	0,729	0,653	0,189	0,554		

Extraction method: Principal components analysis. Kaiser-Meyer-Olkin measure of sampling adequacy: 0,696.

#### Bartlett's test of Sphericity ( $\chi^2_{15}$ ): 6396 (Significance:0,000)

		Groupe	ed Probit		Poisson				
Variables	Mode (Al variab	el I les)	Model (only signific variable	ll , ant es)	Model III (All variables)		Model IV (only significant variables)		
Constant	-1.612		-1.994		-2.865		-3.652		
Number of direct members of the board	0.025	**	0.022	**	0.041	*	0.041	*	
Number of direct members of the board (squared)	-0.001	**	-0.001	**	-0.001	*	-0.001	**	
Listed firm	-0.177		-0.211	*	-0.410	*	-0.430	**	
Family-based firm	0.541	***	0.594	***	0.971	***	1.093	***	
Independence indicator BvD	-0.068	***	-0.071	***	-0.119	**	-0.131	***	
Cooperative	0.705	***	0.471	***	1.159	***	0.827	***	
Firm size	-0.065	*			-0.116	*			
Return on Assets (2001-2003) (%)	0.000				-0.001				
Return on Assets (1991-2003). Standard deviation (Log)	-0.094	***	-0.104	***	-0.184	***	-0.194	***	
Indebtedness ratio (2001-2003)	-0.111				-0.303				
Productivity by employee (2001-2003) (Log)	-0.042				-0.096	*			
Óptima Program	-0.339				-0.702				
Corporate reputation	0.705	***			0.052				
Firm age (Log)	0.095	**	0.088	**	0.170	**	0.158	**	
Industry fix effects	Yes		Yes		Yes		Yes		
LR test <sup>(a)</sup>	179.1	***	195.6	***	164.1	***	179.32	***	
Wald test <sup>(a)</sup>	182.8	***	191.5	***	145.2	***	144.47	***	
Goodness of fit (deviations) (b)					729.4		898.3		
Goodness of fit (Pearson) (a)					1052.5	***	1244.3	***	

#### Table 4: Grouped Probit model on the probability of a board position to be held by a woman and Poisson model on the number of women on the board.

For each variable a LR test has been performed between a model with and without this variable.

(a) The null hypothesis is that independent variables are not jointly significant.
 (b) The null hypothesis is that independent variables are jointly significant.

	Zero-inflated Poisson				Negative binomial				Zero-inflated negative binomial			
Variables		Model V (All variables)		Model VI (only significant variables)		Model VII (all variables)		VIII ly cant les)	Model IX (all variables)		Model X (only significant variables)	
Constant	-2.940		-3.444		-3.119		-3.831		-3.119		-3.831	
Number of direct members of the board	0.045	*	0.040	*	0.055	*	0.049	*	0.055	*	0.049	*
Number of direct members of the board (squared)	-0.001	**	-0.001	**	-0.001	*	-0.001	*	-0.001	*	-0.001	*
Listed firm	-0.411	*	-0.465	**	-0.316				-0.316			
Family-based firm	0.955	***	1.061	***	1.024	***	1.119	***	1.024	***	1.119	***
Independence indicator BvD	-0.126	**	-0.130	***	-0.124	**	-0.156	***	-0.124	**	-0.156	***
Cooperative	1.040	***	0.778	***	1.306	***	1.011	***	1.306	***	1.011	***
Firm size	-0.109				-0.163	**	-0.121	*	-0.163	**	-0.121	*
Return on Assets (2001-2003) (%)	-0.003				-0.001				-0.001			
Return on Assets (1991-2003). Standard deviation (Log)	-0.163	**	-0.177	***	-0.165	**	-0.189	***	-0.165	**	-0.189	***
Indebtedness ratio (2001-2003)	-0.142				-0.147				-0.147			
Productivity by employee (2001-2003) (Log)	-0.072				-0.081				-0.081			
Óptima Program	-0.563				-0.618				-0.618			
Corporate reputation	0.005				0.011				0.011			
Firm age (Log)	0.219	**	0.189	**	0.194	**	0.191	**	0.194	**	0.191	**
Industry fix effect	Yes		Yes		Yes		Yes		Yes		Yes	
Probability of being zero the number of women	0.211	***	0.237	***					0.000		0.000	
lpha (contagion factor)					0.497	***	0.147	***	0.497	**	0.567	***
LR test <sup>(a)</sup>	112.11	***	122.9	***	115.28	***	125.32	***	113.98	***	124.39	***
Wald test <sup>(a)</sup>	145.45	***	141.31	***	152.75	***	156.2	***	156.07	***	157.79	***
LR Test against a Poisson model	11.37	***	17.46	***	20.24	***	30.68	***	20.24	***	30.68	***
LR Test against a Zero-inflated Poisson model									8.87	**	13.22	***
LR Test against a Negative binomial model									0.00		0.00	

#### Table 5: Zero-inflated Poisson, Negative binomial, and Zero-inflated negative binomial models on the number of women on the board.

For each variable a LR test has been performed between a model with and without this variable. Stars give the significant level of the null hypothesis rejection: 1% \*\*\*, 5% \*\*, y 10% \*. <sup>(a)</sup> The null hypothesis is that independent variables are not jointly significant.

# Figure 1: Probability for a board position to be held by a woman. Board size influence



Probabilities computed for models in table 4 and 5 with only significant variables (pair models). A representative company has been considered to be a non family-based one, non-listed and not a cooperative, 23 years old, with and independence indicator equal to C, median risk and not belonging to financial services and real estates agencies, nor consumer goods and consumer services industries. The only difference is in the number of direct members of the board.



Figure 2: Probability for a board position to be held by a woman. Risk influence.

Probabilities computed for models in table 4 and 5 with only significant variables (pair models). A representative company has been considered to be a non-family-based one, non-listed, and not a cooperative, 23 years old, with and independence indicator equal to C, and not belonging to financial services and real estates agencies, nor consumer goods and consumer services industries and with 5 direct members of the board. The only difference is in the risk variable.

# Figure 3: Probability for a board position to be held by a woman. Industry influence.



Probabilities computed for models in table 4 and 5 with only significant variables (pair models). A representative company has been considered to be a non-family-based one, non-listed, and not a cooperative, 23 years old, with and independence indicator equal to C, median risk and with 5 direct members of the board. The only difference is in the industry.





Probabilities computed for models in table 4 and 5 with only significant variables (pair models). A representative company has been considered to be a non-family-based one, non-listed, and not a cooperative, with and independence indicator equal to C, median risk and not belonging to financial services and Real Estates agencies, nor consumer goods and consumer services industries and with 5 direct members of the board. The only difference is in the firm age variable.

# Figure 5: Probability for a board position to be held by a woman. Family-based variable influence



Probabilities computed for models in table 4 and 5 with only significant variables (pair models). A representative company has been considered not to be a cooperative, non-listed, 23 years old, with and independence indicator equal to C, median risk and not belonging to financial services and Real Estates agencies, nor consumer goods and consumer services industries and with 5 direct members of the board. The only difference is if it is a family based firm or not.

### Figure 6: Probability for a board position to be held by a woman. Cooperative variable influence



Probabilities computed for models in table 4 and 5 with only significant variables (pair models). A representative company has been considered to be a non-family based one, non-listed, 23 years old, with and independence indicator equal to C, median risk and not belonging to financial services and Real Estates agencies, nor consumer goods and consumer services industries and with 5 direct members of the board. The only difference is if it is a cooperative or not.

### Figure 7: Probability for a board position to be held by a woman. Independence indicator BvD influence.



Probabilities computed for models in table 4 and 5 with only significant variables (pair models). A representative company has been considered to be a non-family based one, non-listed, and not a cooperative, 23 years old, with median risk and not belonging to financial services and Real Estates agencies, nor consumer goods and consumer services industries and with 5 direct members of the board. The only difference is in the independence indicator variable.





Probabilities computed for models in table 4 and 5 with only significant variables (pair models). A representative company has been considered to be a non-family-based one, not a cooperative, with and independence indicator equal to C, 23 years old, median risk and not to financial services and Real Estates agencies, nor consumer goods and consumer services industries and with 5 board directors. The only difference is if it is a listed company or not. (In the case of binomial negative models, we consider changes in the size of a representative listed firm in the sample versus a representative non-listed one).