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Board Gender Diversity and Firm Performance: An Analysis of the Causal Relationship in Spanish Listed Companies

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Abstract: Applying a mixed theoretical approach, this paper addresses the causal relationship between the presence of women on steering committees (SC) and in senior management positions and the firm's stock return, measured through the price–earnings ratio (P/E). To do so, we disaggregate the composition of the boards of 27 IBEX 35 companies over the period 2018–2021 by gender and type of female director and analyze the relationship between the number and proportion of women on the SC, their distribution by category, and the P/E. The sample contains a total of 108 observations, and its structure follows a panel data methodology. Validation of the working hypotheses was carried out using Poisson logistic regression. The results indicate a positive and significant relationship between stock returns and the percentage of women on the SC. The results also indicate that stock returns are not significantly affected by the category distribution of female directors.

Keywords: corporate governance; firm performance; board of directors; gender quotas; gender diversity

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1. Introduction

Activities that promote sustainability have the potential to create closer relationships between companies and their stakeholders. This explains why recent years have seen corporate social responsibility (CSR) and sustainability being incorporated into the business strategies of an increasing number of companies (Peloza and Shang 2011).

Researchers highlight the importance of reputational capital to understand how sustainability helps companies achieve different benefits, such as improved customer product perception, employment promotion, or talent retention (Gardberg and Fombrun 2006; Servaes and Tamayo 2013). This refers to the collective impression of a company by its stakeholders, including investors, consumers, employees, suppliers, and others.

Whether sustainability is oriented towards better economic performance largely depends on how stakeholders value the company's commitment to society. For example, the fact that sustainability is positively regarded by investors can improve the value of a company and reduce the cost of its equity capital (Lin et al. 2018).

In this context, many researchers propose greater diversity in the composition of workforces in general and management cadres in particular as one of the ways of increasing firm value and business competitiveness (Catalyst 2004; Catalyst 2008; Farrell and Hersch 2005; Krishnan and Park 2005). This is why, given that the first major distinction is gender, the representation of men and women in top-level positions is an important milestone to be achieved. There have been many studies arguing both for and against balanced representation between men and women in the workplace (Adler 2001; Carter et al. 2003; Erhardt et al. 2003; Adams and Ferreira 2004; Daunfeldt and Rudholm 2012; Dezsö and Ross 2012; Ali et al. 2014; Abdullah et al. 2016; Dezső et al. 2016). These studies have been conducted in parallel with political and social initiatives aimed at achieving a greater female presence in the corporate managerial environment.

Although women have progressively joined the labor market in recent decades, increasing not only their participation but also their educational level (Goldin 2006), and despite the fact that several studies have found that decision-making improves when carried out by heterogeneous groups, which is assumed to increase overall intellectual capital and bring with it the advantages derived from knowledge, perspective and creativity (Francoeur et al. 2008), this situation has not translated equally into a proportional increase in women in positions of greater responsibility (Bombuwela and de Alwis 2013). The issuance of legislation regarding the promotion of women and the reduction of the gender gap also had positive effects. For example, some countries, such as the United Kingdom, Denmark, or Spain, have developed regulatory standards in order to end the gender pay gap (in 2017, the UK passed the UK Equality Act-2010, which obliges public and private companies to disclose their gender pay gaps; Denmark issued the Consolidation Act No. 899 on 5 September 2008 on equal pay for men and women; and in 2020 Spain issued the Royal Decree 901/2020, 13 October, which regulates equality plans and their registration). According to Abudy et al. (2023), this type of regulation reduces the wage gap in a sustained manner over time. Bennedsen et al. (2022) pointed out in their study how the entry of force reduced the wage differential by 13%, relative to the pre-legislation average, and Gamage et al. (2020) note in their study of a transparency initiative on gender pay gaps in the university sector, how the measure reduced the gender pay gap by 4.27%.

In this context, June 2022 saw the Council and the European Parliament reach a provisional agreement on a new EU Directive that will require listed companies to reach a minimum quota of "at least 40% of their non-executive directorships to be held by persons of the underrepresented sex" by 2026. However, should Member States decide to apply the regulation to any type of directors, executive or otherwise, the quota is reduced to 33% (Council of the European Union 2022).

If all goes according to plan, this new directive will result in Member States developing laws that will form part of the so-called hard law, which, unlike the soft law, requires compliance with gender quotas and imposes sanctions on those companies that do not reach the target. In this way, the existing divergences between the EU Member States with regard to the percentage of women's participation in the SC will be reduced in accordance with several studies that have shown the greater effectiveness of hard quotas compared to soft quotas in achieving targets (Figure 1). However, it remains to be seen whether this translates into women gaining real access to decision-making or simply constitutes symbolic access (Martínez-García and Gómez-Ansón 2020; Martínez-García et al. 2023; Reddy and Jadhav 2019; Piscopo and Clark Muntean 2018; Casey et al. 2011).

Apart from the obvious suitability of policies and regulations aimed at mitigating gender differences in all areas to achieving social justice and fulfilling the legitimate objective of breaking the "glass ceiling" by imposing quotas on SCs, there is the question of how the presence of women on such boards contributes to improved decision making, information transparency, corporate reputation, and company performance, financial or otherwise. In this regard, many empirical studies have been conducted around the world related to the appointment of women to boards and the effect of the practice on corporate performance. Following a literature review of these studies (Nguyen et al. 2020; Benito-Osorio et al. 2019), the authors conclude that the relationship between gender diversity in SCs and firms' financial and non-financial performance remains an inconclusive issue that produces conflicting results. Although there are many studies that find a positive relationship, there are others that either find no relationship at all or a negative one.

Added to this issue is the fact that the quota system refers only to a percentage of women on the board but does not go into the type of position held. This can lead to problems because requiring a gender balance on the board can lead to an imbalance between the "supervisory value" exercised by independent directors and the "advisory value" exercised by internal or executive directors. Taking the SCs of Denmark as an example, Bøhren and Staubo (2016), empirically show how mandatory gender quotas can lead to excessive independence on the board and a decrease in firm value due to the fact that the skill profile of women is more akin to the role of independent directors.

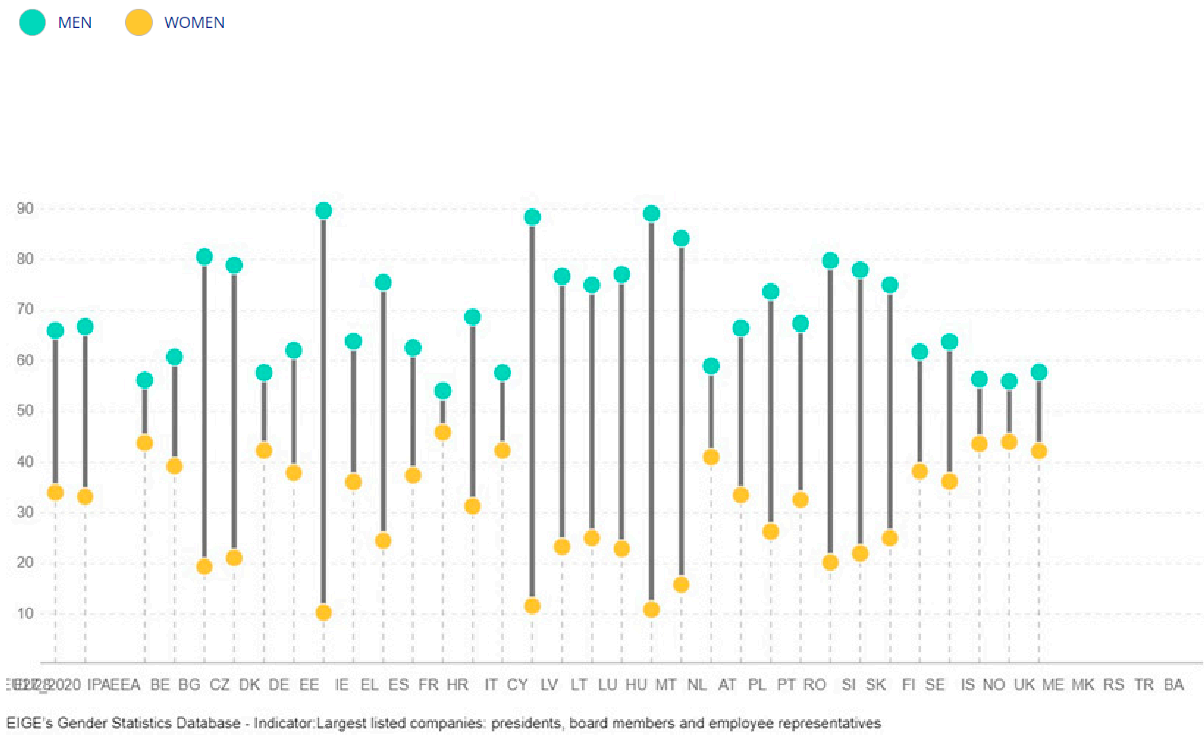

Figure 1. Board members by gender distribution in the largest listed companies. Source: European Institute for Gender Equality (EIGE).

Taking these issues into account, the main objective of this paper is to determine the existence of a causal relationship between the profitability of IBEX-35 companies and the number of women on the SC and the board in absolute and relative terms, considering whether, in addition to being board members, they are internal (executive) and/or external (proprietary and independent). This was assessed using IBEX-35, the index that records the most valuable companies by capitalization in Spain, as measured indirectly through their P/E. The companies comprising this selective index have been selected for two reasons; first, they were chosen because Spain is the EU Member State that has made the most progress in the scope of the Gender Equality Index power since measurement began in 2010. Second, the companies that comprise this index have led to this change in Spain, these being the only ones to have exceeded the target of 30% of women in the SC in 2020, established in the reform of the Good Governance Code (ATREVIA-IESE 2021) and, therefore, the ones that may be closest to enabling women to form a sufficient critical mass to have an impact on firm performance (Torchia et al. 2011). In addition, data on the presence of women on the board of directors of the CAC-40 companies were requested from the Autorité des Marchés Financiers and the DAX-30 from the Bundesanstalt fur Finanzdienstleistungsaufsicht—these indexes being equivalent to the IBEX-35—since the aforementioned authorities do not have records on the composition of the board of directors of their listed companies.

This article makes three important contributions to the literature. First, it provides an update of the empirical studies conducted in Spain on gender diversity and financial performance. Until this point, the last year investigated was 2009, with the exception of one study conducted in 2018 by Safiullah et al. (2022). Second, this study is the first to analyze the effect of gender diversity on financial performance on an individualized basis for different classes of female directors, which will deepen the knowledge base for policy decision-making. Finally, it is the first study in Spain to use P/E as a measure of financial performance and to apply a Poisson logistic regression, allowing us to analyze the impact of gender diversity by establishing causal relationships from a new perspective.

The rest of the article is structured as follows. In Section 2, we discuss the regulations on gender quotas and corporate governance in Spain. Section 3 sets out the theoretical framework on which we base our hypotheses. In Section 4, we present the model used to test our working hypotheses, consisting of a Poisson logistic regression, the description of the sample, the justification of the variables that make up the model, and the working methodology. Then, in Section 5, we develop the analysis. Section 6 discusses the results, and Section 7 presents our conclusions.

2. Regulations on Gender Quotas in Spain and Corporate Governance

Spain is one of the EU member countries that has increased its Gender Equality Index score in recent years, ranking sixth in 2021 with 73.7 points out of 100 and being above the European average (68 points). One of the areas in which it has made the most progress is in women's participation in the highest decision-making and supervisory bodies of listed companies, tripling the percentage of women's participation in just 8 years. However, there is still a long way to go to achieve a balanced composition of these bodies from a gender perspective. In the absence of a European Directive to harmonize the regulations of the Member States in this respect, European countries have followed very different paths to achieve gender diversity in this area.

In the European Union, regulation on the presence of women on the board of directors has followed two paths that are not incompatible. Firstly, there is the option of making recommendations on gender diversity in corporate governance codes based on the "comply or explain" principle. Secondly, there is the method of legislating through the establishment of gender diversity quotas. Under the second modality, some countries have established soft quotas, which do not impose sanctions for non-compliance, and other countries have opted for hard quotas, which do include sanctions (Martínez-García and Gómez-Ansón 2020). Among the former are countries such as Spain, Denmark, Luxembourg, Ireland, the Netherlands, Poland, Slovenia, and Sweden. Among the latter are Belgium, France, Italy, Germany, Austria, Portugal, and Greece. The remaining Member States have not taken legislative action. According to the European Union (2021), the impact of legislative actions is evident as the number of women in SCs has increased considerably. However, in average terms, the rate of growth has been much higher in countries with hard quotas (3% per year) than in countries with soft quotas or without legislative measures (0.7% per year).

In the SCs of Spain, it was decided to combine the introduction of soft quotas through the Organic Law 3/2007 of 22 March for the effective equality of men and women with recommendations on gender diversity in the Unified Code of Good Governance of Listed Companies (hereinafter, CGG) approved by the CNMV (Spanish Stock Exchange Supervisor) in 2006 and subsequently amended in 2013, 2015, and 2020. The aforementioned Organic Law 3/2007 was one of the first national regulations in the European Union to introduce a 40% quota for companies that are required to present the profit and loss account in a non-abbreviated model, with the objective of being achieved by 2015. However, this measure did not prove to be very effective in itself, as only 1.7% of listed companies met the target in 2015 despite the incentive of having priority in establishing contracts with public administrations. In parallel, in 2006, a recommendation on gender diversity was introduced in SCs under the comply or explain principle. Subsequently, in the 2015 CGG reform, the recommendation of a percentage of 30% to be reached by 2020 was introduced. Finally, in the 2020 GBG reform, the percentage was increased to 40%, with the objective of reaching it in 2022 (Martínez-García and Gómez-Díaz 2021).

According to the latter authors, a company's compliance with gender recommendations included in the codes of good governance was greater than that with the soft quota law, especially in the case of companies that make up the IBEX35 (Figure 2). The results from the study indicate that, for Spanish companies, the recommendations in the CGG are more effective than the incentive to formalize contracts with public administrations established by the quota law.

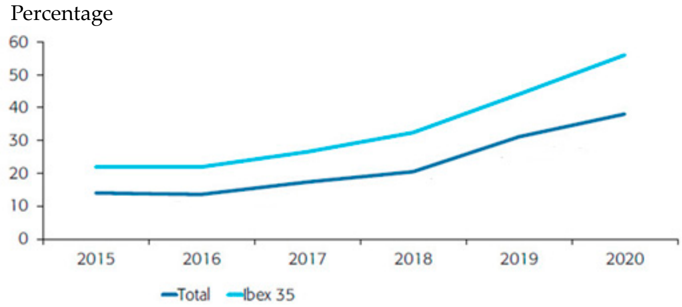

Figure 2. Companies complying with the CGG gender diversity recommendation of listed companies. Source: Martínez-García and Gómez-Díaz (2021).

Milestones and Challenges of Gender Diversity on Spanish Boards of Directors

Regardless of the degree of compliance with the quotas, we believe that, for the purpose of evaluating the possible relationship between gender diversity in board members and financial performance in companies, it is relevant to know how the presence of women is distributed among different types of board members. This is necessary for two reasons. First, this is because the functions of directors differ on whether they are executive, proprietary, or independent and, therefore, and whether their contribution to decision-making is for the benefit of the company or for all stakeholders. Second, this is because quota laws only bind supervisory bodies, but not executive management (El Mundo 2022; CNMV 2022), and in order for women to achieve real power, it is necessary for gender diversity to be present in all decision-making bodies, a threshold that is not currently met in Spain (Table 1) or in the EU. In this regard, the latest reform of the CGG in 2020, apart from recommending reaching a 40% quota by 2022, highlights the advisability of companies encouraging an increase in the number of female senior managers.

Table 1. Presence of women on the Boards of Directors of IBEX 35 companies.

Ibex Companies	2018		2019		2020		2021	
	NO.	%	NO.	%	NO.	%	NO.	%
Total Board Members	103	22.8%	110	23.9%	123	27.5%	136	31.26%
Proprietary board members	19	16.5%	25	20.8%	19	17.3%	23	23.47%
Executive	3	4.2%	4	5.4%	4	5.8%	4	6.06%
Independent	77	33.9%	77	34.1%	96	41.2%	105	43.93%
Other external	4	10.3%	4	10.0%	4	11.4%	4	12.50%
Women in senior management (excluding female directors)	62	14.3%	71	16.0%	70	15.7%	73	17.10%

Source: CNMV (2022).

3. Theoretical Framework

The study of the relationship between gender diversity in SCs and financial and non-financial performance has been approached from mixed theoretical approaches (Nguyen et al. 2020; Benito-Osorio et al. 2019), and it is recommended that this work be extended (Roberts et al. 2005; Low et al. 2015).

In the specific SC of financial performance, the most commonly used theories, although not the only ones, are agency theory, stakeholder theory, and resource dependency theory. These theories are not incompatible and often complement each other. After conducting a literature review, Kirsch (2018) identified two causal paths, implicit in most studies on this topic, that can be used to explain why gender diversity in SCs affects the results of organizations. Namely, this occurs through the effect that gender diversity produces in the group that forms the board itself and through the effect that this diversity produces on the stakeholders of the company, whether internal or external.

Under the first path, studies based on agency theory and resource dependence theory abound. Agency theory is especially applicable to large publicly traded companies, where agency problems are more relevant. This theory visualizes the firm as a set of contracts between the owners of the different factors of production. In this context, the main agency problem lies in the relationship established between the firm's managers (agent) and its owners or shareholders (principal) in the event that the agent puts their own interests before those of the firm or the shareholders. This possibility arises in the face of three types of divergences between the two parties: information asymmetries, divergent motivations, and different approaches to risk. These give rise to so-called agency costs. The formalization of a contract between the two parties is not enough to avoid possible opportunistic behavior on the part of managers. For this reason, agents impose other control mechanisms, such as corporate governance structures (Jensen and Meckling 1976).

In addition, agency theory has an impact on the relationship between corporate governance and firm performance. Thus, gender diversity is considered a strategic issue for the firm as it influences corporate governance practices (Hindasah and Harsono 2021) and, therefore, can help to reduce agency problems between shareholders and managers (Boubaker et al. 2014). The advantages of bringing women onto boards from this theoretical perspective include:

1. the incorporation of new perspectives and a greater breadth of view on supervisory issues that give rise to more questions being raised on boards and a greater likelihood of "challenging the status quo" (Yi 2011);
2. women are often more hardworking, communicate better, have higher levels of education, and are more rigorous in their work, leading to improved decision-making, better governance, and thus better company performance (Singh and Vinnicombe 2004; Liu et al. 2020). In this regard, research conducted by Schwartz-Ziv (2017) concludes that boards with at least three directors of each gender are at least 79% more active at their meetings than those without such representation, a phenomenon driven in particular by female directors, who are more active when a critical mass of at least three women attends;
3. women tend to be more independent than their male colleagues, are not part of "the old boys' networks", and more often occupy the positions of independent directors, giving them a special qualification and neutrality in exercising their functions in the board.

An extension of agency theory is stakeholder theory. A stakeholder is understood as "any group or individual that can affect or be affected by the achievement of the firm's objectives" (Freeman and McVea 2001). This theory adopts a community perspective of the company, not only on a legal scale but also on a moral scale. In this sense, the company's decision-making processes must be carried out in a way that considers the interests of all those affected, whether economically, socially, ethically, environmentally, politically, etc. (González Esteban 2007). From the perspective of gender diversity, this theory advocates for diverse CA as women have contact with stakeholders that must be considered in informed decision-making (Benito-Osorio et al. 2019). As an example that illustrates the great impact that diversity has on the profitability of companies, women represent 51% of the global market and make 80% of purchases, according to a paper presented by Cazcarra (2021) at the Great World Forum on Arts, Culture, Creativity, and Technology (Cartagena) and collected by Forbes.

On the other hand, the central thesis of the resource dependence theory is that, in order to understand the behavior of an organization, it is necessary to know the environment in which it operates because organizations need to capture critical resources from their environment in order to survive (Pfeffer and Salancik 1978). This theory assumes that dependence on very critical resources conditions the organization's behavior and that the decisions and actions taken by the organization can be explained in terms of its "particular situation of dependence" (Nienhüser 2017).

Under this theory, the main function of board members is to serve as a link between the firm and its environment, helping to reduce uncertainty and providing critical resources to the firm, whether information, skills, contacts with external agents, or legitimacy. In this sense, the value that board members bring to the company depends on their ability to provide these resources and reduce uncertainty, which will, in turn, lead to a reduction in transaction costs (Hillman et al. 2000). Under these assumptions, it is assumed that female directors bring resources that their male counterparts cannot bring (Kirsch 2018; Carmo et al. 2022). The advantages of incorporating women into SCs from this theoretical perspective include:

1. women have different knowledge, experiences, and values that affect decision-making processes and board activities, resulting in better financial performance (Granovetter 1978; Post and Byron 2015);
2. female board members' interests and social networks provide relevant information for multiple stakeholders linked to the firm, creating valuable resources that ultimately result in better performance (Post and Byron 2015);
3. women are more risk-averse, take more ethical perspectives, and have a more long-term view. These differences in traits and values versus men influence how the board proceeds and how it performs financially (Kirsch 2018).

Under the second path proposed (Kirsch 2018), there are studies that are based on the use of signaling theory to analyze how the presence of women in SCs is perceived by corporate stakeholders. This theory focuses on the reduction in information asymmetries between different parties Spence (2002), and in the SCs of companies, it is based on the assumption that they possess information that their stakeholders are not aware of, thus producing information asymmetries. In the presence of these asymmetries, stakeholders make their decisions based on objective signals issued by companies (Kirmani and Rao 2000; Connelly et al. 2011). From a gender diversity perspective, this theory suggests that the presence of women in the SC is an aspect positively valued by the company's stakeholders and by the markets in general for several reasons (Kirsch 2018; Carmo et al. 2022):

1. the presence of women enhances the company's reputation by showing legitimacy and adherence to the social values of the environment in which it operates. This signal prompts different stakeholders to make decisions that can ultimately exert a positive impact on a company's financial performance and the valuation of its shares in the markets;
2. the presence of women in the CA contributes to reducing information asymmetries because, as several studies have shown, their presence contributes to improving the quality and quantity of information disclosed by companies. This increased transparency is expected to have a positive influence on the market value of a company and its share price;
3. there is evidence that the market reacts positively to announcements of the incorporation of women on boards of directors, indicating that, on average, investors believe that the presence of women on boards of directors adds value to the company.

Complementing the two previous trajectories are the critical mass theory and the concept of tokenism (Granovetter 1978; Kanter 1977) Under this theory, the levels of influence of majorities and minorities in small groups are studied, and the nature of the interactions established in a group of people depends on the size of the subgroups that comprise it. When the size of a minority within a group increases and reaches a critical mass, the influence of this minority increases, and the nature of intragroup relations changes. As long as this does not occur, minorities are underrepresented and treated as symbols or tokens, i.e., they suffer from a lack of trust and are stereotyped, marginalized, and isolated (Kanter 1977).

In this regard, several empirical studies have found that the relationship between the presence of women on boards of directors and financial performance turns from negative to positive when companies approach or exceed the 30% threshold of women on boards of directors, corroborating the predictions of the critical mass theory. However, some other studies conducted in different contexts place the threshold at lower percentages, indicating that more research is needed on the factors affecting the tipping point (Nguyen et al. 2020). Along these lines, Kanter (1977) asserts that, in numerical terms, there is an influence when the number of female counselors on the SC is at least three.

4. Materials and Methods

As mentioned in previous sections, the companies that make up the IBEX 35 are the ones that lead the incorporation of women into SCs in Spain and, therefore, are the closest to reaching the critical mass necessary to achieve influence and have its effects shown in the financial and market performance variables chosen (Table 1).

Based on the arguments presented under the three previous theories (agency theory, resource dependence theory, and signaling theory), and considering that the overall percentages of women are close to the thresholds suggested by the critical mass theory, we put forward our first hypothesis:

Hypothesis 1 (H1). *The number of women in the SC, in absolute or relative terms, has a positive influence on the growth of share prices and share performance and, therefore, on the investors' perception of the share, raising share prices and improving the results for the year as measured by the P/E.*

As we have already mentioned in the previous section, we consider it relevant to know how the presence of women is distributed among the different categories of directors since their functions are different and because gender quotas only apply to supervisory bodies. This degree of linkage can lead to women not being represented homogeneously across the different categories of the board, which can affect the financial performance and profitability of the companies. This aspect has not been addressed in the literature despite the importance of knowing this fact for political decision-making on gender quotas. To fill this gap in the literature, we propose the following hypotheses:

Hypothesis 2 (H2). *In contrast to H1, the total number of female executive directors, in absolute or relative terms, has a positive influence on the growth of share prices and share performance and, therefore, on the perception that investors have of the company, reflecting no impact on its share price and results for the year as measured by the P/E ratio.*

Hypothesis 3 (H3). *In contrast to H1, the total number of female proprietary directors, in absolute or relative terms, has a positive influence on the growth of share prices and share performance and, therefore, on investors' perception of the company, raising its share price and improving the results for the year as measured by the P/E ratio.*

Hypothesis 4 (H4). *In contrast to H1, the total number of independent female directors, in absolute or relative terms, has a positive influence on the growth of share prices and share performance and, therefore, on the investors' perception of the company, raising its share price and improving the results for the year as measured by the P/E ratio.*

Most of the arguments put forward by agency and stakeholder theory, resource dependence theory, and signaling theory have been employed in the literature to argue for the positive influence of the presence of women in DP positions on financial performance, whether or not they are part of SCs. Specifically, Datta et al. (2021) list numerous empirical studies linking the presence of women in executive positions to firm performance, financial reporting quality, investment decisions, corporate risk-taking, and capital allocation, and bank lending. Since empirical studies on IBEX-35 companies in this area have focused exclusively on gender diversity in SCs, we consider it relevant to fill this gap and measure the effect of gender diversity in executive positions on firm profitability by proposing the following hypothesis in this paper:

Hypothesis 5 (H5). *In contrast to H2, the total number of women in positions of responsibility and/or senior management outside the AC in absolute or relative terms has a positive influence on the growth of share price and performance and, therefore, on investors' perception of the stock, having no impact on its share price, nor on the results of the year measured through the P/E.*

The hypotheses will be tested using Poisson regression, which is the regression model that best models events in which outcomes are counted, or, more specifically, count data, discrete data with non-negative integer values, are used. The Poisson model models the count of values as a kind of generalized linear model (GLM) and allows for the inclusion of a link function, which in our database will be logarithmic. For this reason, the inverse of the coefficients from the exponential shows us the causal effects on the count of the dependent variable.

The following elements required to carry out the analysis are defined.

4.1. The Sample

The selected sample consists of 27 companies listed on the Ibex 35 for the period from 2018 to 2021 and counted a total of 108 observations. The sample structure follows a panel data methodology, whereby each of the selected companies is considered as a cross-section, and the time dimension is the years indicated above. It should be noted that the companies considered are those for which data are available. However, with the selected companies, we represent more than 80% of the market capitalization of the Ibex 35, and so the sample is more than representative of this stock market.

The structure of the data is as follows: four types of directors are available, namely, executive, proprietary, independent, and external. Within each type, we differentiate the total number of board members, the total number of women, and the percentage of women. Further, the number of non-director senior managers, the number of women among them, and the percentage of women are given. In addition, data are available on the companies' share price (annual average of adjusted closing prices) and the P/E (price–earnings ratio), which is calculated as the closing price divided by the earnings per share at the close of each year.

4.2. Poisson Regression Model Specification and Variables Justification

With the sample of Ibex 35 companies selected, the Poisson model is developed to quantify the improvements in the P/E ratio, which is considered the dependent variable. For this purpose, a logarithmic function is used to estimate the coefficients of the causal effects on the P/E.

The general specification of the logarithmic equation of the Poisson model obeys the following expression:

$$\log[\mathrm{Yit}] = \mathrm{X} \cdot \beta + \varepsilon_{\mathrm{it}}. \tag{1}$$

Using our database, in which 26 companies, 3 periods, and 19 exogenous explanatory variables are considered, we obtain the following expression:

$$\log[\mathrm{Y}_{\mathrm{it}}] = \mathrm{C} + \alpha 1\ \mathrm{E1} + \cdots + \alpha 26\ \mathrm{E26} + \beta 1\ \mathrm{T1} + \beta 2\ \mathrm{T2} + \beta 3\ \mathrm{T3} + \gamma 1\ \mathrm{X}\ [1,\mathrm{it}] + \gamma 2\ \mathrm{X}\ [2,\mathrm{it}] + \cdots + \gamma 15\ \mathrm{X}\ [14,\mathrm{it}] + \varepsilon \mathrm{it} \tag{2}$$

$$\log[\mathrm{Y}_{\mathrm{it}}] = \mathrm{C} + \sum\nolimits_{[\mathrm{i}=1]}^{\mathrm{n}} \alpha_{\mathrm{i}}\ \mathrm{E}_{\mathrm{i}} + \sum\nolimits_{[\mathrm{t}=1]}^{\mathrm{m}} \beta\mathrm{t}\ \mathrm{T}_{\mathrm{t}} + \sum\nolimits_{[\mathrm{j}=1]}^{\mathrm{J}} \gamma_{\mathrm{j}}\ \mathrm{X}_{[\mathrm{j},\mathrm{it}]} + \varepsilon_{\mathrm{it}} \tag{3}$$

where

- n denotes the number of companies (n = 26), m the number of years (m = 3), and i the number of exogenous variables (aside from company and time dummy variables);
- the dependent variable of the model, Y_{it}, is the P/E of company "i" in period "t";
- E_i is a dummy variable that takes value 1 when the company is company "i" and zero for any other company (see Table 2 for more details);
- T_i is a dummy variable that takes value 1 when the year of study coincides with year "t" and zero in any other database (see Table 3 for more details);

- $X_{j,it}$ is the exogenous variable "j" for company "i" in period "t". Table 4 lists all the exogenous variables included in the model.

Table 2. Results of analysis (I).

Variable	Coefficient	Exp [coef]	Lower Limit CI	Upper Limit CI	Lower Limit Exp [coeff]	Upper Limit Exp [coeff]
Constant Std. Error. *p*-value.	11.1216 0.8595 ***	1.16	9.42	12.82	0.11	9.42
E1 Std. Error. *p*-value.	4.792 0.7103 ***	0.21	3.39	6.2	0.3	3.39
E2 Std. Error. *p*-value.	0.4575 0.2271 *	2.19	0.01	0.91	0.01	127.52
E3 Std. Error. *p*-value.	1.2125 1.0484	0.82	−0.86	3.29	−1.16	−0.86
E4 Std. Error. *p*-value.	1.6625 0.5668 **	0.6	0.54	2.78	0.54	1.85
E5 Std. Error. *p*-value.	1.5892 0.3299 ***	0.63	0.94	2.24	0.94	1.07
E6 Std. Error. *p*-value.	−0.3669 0.523	−2.73	−1.4	0.67	−0.71	−1.4
E7 Std. Error. *p*-value.	1.1689 0.332 ***	0.86	0.51	1.83	0.51	1.95
E8 Std. Error. *p*-value.	3.63 0.5905 ***	0.28	2.46	4.8	0.41	2.46
E9 Std. Error. *p*-value.	5.169 0.7135 ***	0.19	3.76	6.58	0.27	3.76
E10 Std. Error. *p*-value.	−2.4794 0.3448 ***	−0.4	−3.16	−1.8	−3.16	−0.32
E11 Std. Error. *p*-value.	2.7834 0.2546 ***	0.36	2.28	3.29	0.44	2.28
E12 Std. Error. *p*-value.	1.0887 0.2531	0.92	0.59	1.59	0.59	1.7
E13 Std. Error. *p*-value.	0.6964 0.3769	1.44	−0.05	1.44	−20.06	−0.05
E14 Std. Error. *p*-value.	−0.882 0.4513	−1.13	−1.78	0.01	−1.78	−0.56

Table 2. *Cont.*

Variable	Coefficient	Exp [coef]	Lower Limit CI	Upper Limit CI	Lower Limit Exp [coeff]	Upper Limit Exp [coeff]
E15 Std. Error. *p*-value.	1.8996 0.3568 ***	0.53	1.19	2.61	0.84	1.19
E16 Std. Error. *p*-value.	1.1123 0.3566 **	0.9	0.41	1.82	0.41	2.46
E17 Std. Error. *p*-value.	3.9324 0.316	0.25	3.31	4.56	0.3	3.31
E18 Std. Error. *p*-value.	0.1336 0.5306	7.49	−0.92	1.18	−1.09	−0.92
E19 Std. Error. *p*-value.	1.8555 0.4931 ***	0.54	0.88	2.83	0.88	1.14
E20 Std. Error. *p*-value.	1.0734 0.2789 ***	0.93	0.52	1.63	0.52	1.92
E21 Std. Error. *p*-value.	0.0712 0.3709	14.04	−0.66	0.81	−1.51	−0.66
E22 Std. Error. *p*-value.	−1.2135 0.3447 ***	−0.82	−1.9	−0.53	−0.53	−1.9
E23 Std. Error. *p*-value.	−2.755 0.345 ***	−0.36	−3.44	−2.07	−0.29	−3.44
E24 Std. Error. *p*-value.	3.5165 0.6377 ***	0.28	2.25	4.78	0.44	2.25
E25 Std. Error. *p*-value.	0.3752 0.2955	2.67	−0.21	0.96	−4.76	−0.21
E26 Std. Error. *p*-value.	−2.6282 0.423 ***	−0.38	−3.47	−1.79	−3.47	−0.29

(*) Significant at 10%, (**) significant at 5%, (***) significant at 1%.

Table 3. Results of analysis (II).

Variable	Coefficient	Exp [coef]	Lower Limit CI	Upper Limit CI	Lower Limit Exp [coeff]	Upper Limit Exp [coeff]
T_1 Std. Error. *p*-value.	−0.902 0.0788 ***	−1.11	−1.06	−0.75	−0.95	−1.06
T1 Std. Error. *p*-value.	−1.3057 0.1007 **	−0.77		−1.11	−1.51	−0.66

Table 3. *Cont.*

Variable	Coefficient	Exp [coef]	Lower Limit CI	Upper Limit CI	Lower Limit Exp [coeff]	Upper Limit Exp [coeff]
T3 Std. Error. *p*-value.	0.087 0.05977	11.49	−0.03	0.21	−31.9	−0.03
X1 Std. Error. *p*-value.	−0.6133 0.0759 ***	−1.63	−0.76	−0.46	−1.31	−0.76
X2 Std. Error. *p*-value.	1.4463 0.6982 *	0.69	0.06	2.83	0.06	15.66
X3 Std. Error. *p*-value.	−31.099 3.4085 ***	−0.03	−37.85	−24.35	−37.85	−0.03
X4 Std. Error. *p*-value.	0.3573 0.0844 ***	2.8	0.19	0.52	0.19	5.26
X5 Std. Error. *p*-value.	−2.3944 0.9302 ***	−0.42	−4.24	−0.55	−4.24	−0.24
X6 Std. Error. *p*-value.	−2.6992 1.9024	−0.37	−6.47	1.07	−6.47	−0.15
X7 Std. Error. *p*-value.	0.0736 0.0472	13.59	−0.02	0.17	−50.36	−0.02
X8 Std. Error. *p*-value.	1.8248 0.6778 **	0.55	0.48	3.17	0.48	2.07
X9 Std. Error. *p*-value.	0.7913 1.0559	1.26	−1.3	2.88	−1.3	−0.77
X10 Std. Error. *p*-value.	0.454 0.085 **	2.2	0.29	0.62	0.29	3.5
X11 Std. Error. *p*-value.	−0.0938 0.6603	−10.66	−1.4	1.21	−1.4	−0.71
X12 Std. Error. *p*-value.	10.0419 1.2155 ***	0.1	7.64	12.45	0.13	7.64
X13 Des. Typical. Significance.	0.3154 0.085 ***	3.17	0.15	0.48	0.15	6.8
X15 Std. Error. *p*-value.	0.8918 0.6975	1.12	−0.49	2.27	−2.04	−0.49
X16 Std. Error. *p*-value.	−0.2362 0.027 ***	−4.23	−0.29	−0.18	−3.45	−0.29

Table 3. *Cont.*

Variable	Coefficient	Exp [coef]	Lower Limit CI	Upper Limit CI	Lower Limit Exp [coeff]	Upper Limit Exp [coeff]
X17 Std. Error. *p*-value.	1.3194 0.149 ***	0.76	1.02	1.61	0.98	1.02
X18 Std. Error. *p*-value.	−17.1523 1.4269 ***	−0.06	−19.98	−14.33	−19.98	−0.05
X19 Std. Error. *p*-value. R2 Macc Fadden Null deviance ResidualDeviance	−0.0243 0.0036 *** 0.9363 11074.63 707.49	−41.15	−0.03	−0.02	−31.82	−0.03

(*) Significant at 10%, (**) significant at 5%, (***) significant at 1%. The variable X14 was omitted from the estimation due to an exact multicollinearity problem.

Table 4. Descriptive statistics.

	Num of Obs.	Average	Std. Error	VC	Jarque Bera	Distrib
Total of Counselors	108	13.19	2.11	0.16	225.07	No Normal
Number of Women in the SC	108	3.67	1.23	0.34	230.26	No Normal
% women out of total counselors	108	0.28	0.09	0.31	197.99	No Normal
Number of total executives	108	2.05	1.09	0.53	63.06	No Normal
Number of women executives	108	0.14	0.35	2.5	84.68	No Normal
% women out of total counselors	108	0.05	0.14	2.61	156.63	No Normal
Total of Dominical Counselors	108	3.01	2.25	0.75	148.27	No Normal
Number of women Dominical Counselors	108	0.63	0.96	1.53	56.26	No Normal
% women out of dominical counselors	108	0.15	0.2	1.37	186.89	No Normal
Total of Independent Counselors	108	7.1	1.73	0.24	249.09	No Normal
Number of women Independent Counselors	108	2.8	1.26	0.45	244.04	No Normal
% women out of independent counselors	108	0.39	0.15	0.39	172.4	No Normal
Total of External Counselors	108	1.06	1.3	1.22	221.53	No Normal
Number of women External Counselors	108	0.1	0.3	2.98	217.47	No Normal
% women out of External counselors	108	0.06	0.21	3.46	2733.29	No Normal
Number of executives no counselors	108	12.71	9.91	0.78	225.15	No Normal
Number of women executives no counselors	108	2.04	1.39	0.68	215.26	No Normal
% of women executives no counselors out of total	108	0.19	0.13	0.71	163.69	No Normal
Annual Quotation	108	22.23	31.61	1.42	953.69	No Normal
P/E	108	−4.07	137.93	−33.86	110,992.57	No Normal
Ln (P/E)	108	2.8	1.04	0.37	18.95	No Normal

Source: own elaboration.

4.3. Methodology

To contrast the hypotheses established above (H1, H2, H3, H4, and H5), we performed a descriptive study of the variables used and established their correlation coefficients beforehand in order to summarize the characteristics and relationships of these variables with regard to the shape of the distributions. Its purpose is to approximate the representativeness and distribution of women in the SC positions outside the boards.

The estimated value of the P/E for the selected sample of companies was then quantified. Subsequently, the inverse (in this database, the exponential value of the coefficients of this model) is determined for the dependent variable, reflecting the causal effects of unit variations in the exogenous explanatory variables.

Once the causal effects had been calculated using the Poisson model, individual significance tests were carried out using the Wald restriction test in order to find those variables that were significant in the P/E counting process. Likewise, confidence intervals were calculated for a significance level of 95%, the usual level in social science studies required to verify the effect of the variables (positive equals an increase in P/E, negative equals a reduction in P/E).

The development of this methodology using panel data allows us to capture the unobservable heterogeneity and solve the endogeneity problem of the independent variables, obtaining correct estimates and adequate conclusions derived from the proposed regression model to answer the working hypothesis stated in Point 3 of this article.

5. Results

5.1. Analysis of Descriptive Statistics

As indicated in the methodology, a descriptive analysis of the variables was performed by calculating their mean, standard deviation, Pearson's coefficient of variation, and Jarque Bera statistic for the normality test. The following observations were obtained from this analysis.

From the descriptive statistics shown in Table 4, the dispersion of the variables is high in the number and percentage of female executives, the number and percentage of female directors, the number and percentage of external men and women, and in terms of the share price and P/E.

Table 5 shows the linear relationship between the variables based on the correlation coefficients. The results suggest a low linear correlation between these explanatory variables on the P/E. However, given that the model used in the regression analysis is a Poisson model, this does not necessarily imply the non-significance of these variables in terms of event counts. However, we can indicate that the variables inversely related to the P/E would be the number of women on the board, the % of women on the board, the total number of female proprietary directors, the number of female proprietary directors, the % of female proprietary directors, the % of total independents and the share price. These variables have an inverse relationship, meaning that an increase translates into reductions in the P/E, implying an improvement in profitability. In addition, Table 5 shows that the correlation between the explanatory variables is very low, meaning there is not a high degree of multicollinearity.

Table 5. Correlation coefficients.

	Total of Counselors	Number of Women in the SC	% Women out of Total Counselors	Number of Total Executives	Number of Women Executives	% Women out of Total Counselors	Total of Dominical Counselors	Number of Women Dominical Counselors	% Women out of Dominical Counselors	Total of Independent Counselors	Number of women Independent Counselors	% Women out of Independent Counselors	Total of External Counselors	Number of Women External Counselors	% Women out of External Counselors	Number of Executives No Counselors	Number of Women Executives No Counselors	% of Women Executives No Counselors out of Total	Quotaton	P/E
Total of Counselors	1																			
Number of Women in the SC	0.4	1																		
% women out of total counselors	−0.03	0.89	1																	
Number of total executives	0.41	0.02	−0.15	1																
Number of women executives	0.01	0.13	0.13	0.3	1															
% women out of total counselors	−0.05	0.13	0.16	0.21	0.96	1														
Total of Dominical Counselors	0.14	0.02	−0.04	−0.26	−0.3	−0.29	1													
Number of women Dominical Counselors	0.03	0.23	0.26	−0.22	−0.26	−0.25	0.61	1												
% women out of dominical counselors	−0.14	0.12	0.23	−0.19	−0.29	−0.28	0.4	0.86	1											
Total of Independent Counselors	0.45	0.36	0.17	0	0.18	0.12	−0.46	−0.38	−0.37	1										
Number of women Independent Counselors	0.33	0.72	0.61	0.08	0.07	0.07	−0.29	−0.43	−0.42	0.54	1									
% women out of independent counselors	0.12	0.61	0.61	0.13	−0.01	0.03	−0.07	−0.29	−0.29	0.04	0.84	1								
Total of External Counselors	0.36	0.07	−0.1	0.29	0.06	0.09	−0.53	−0.31	−0.24	0.18	0.2	0.1	1							
Number of women External Counselors	0.13	0.17	0.12	0.13	−0.05	−0.08	−0.32	−0.16	−0.15	0.23	0.05	−0.08	0.34	1						
% women out of External counselors	0.08	0.11	0.1	0.1	0.01	−0.05	−0.19	−0.1	−0.06	0.16	−0.03	−0.12	0.15	0.86	1					
Number of executives no counselors	0.14	−0.15	−0.19	0.44	0.01	0	−0.14	−0.08	−0.05	−0.15	−0.09	−0.01	0.37	0	0.01	1				
Number of women executives no counselors	0.1	−0.04	−0.07	0.29	0.14	0.19	−0.25	−0.16	−0.19	0.01	0.05	0.06	0.38	−0.01	−0.04	0.61	1			
% of women executives no counselors out of total	−0.06	0.03	0.05	−0.07	0.04	0.1	−0.06	−0.07	−0.06	−0.03	0.07	0.11	0.07	0.01	0.04	−0.28	0.39	1		
Quotaton	−0.04	−0.15	−0.14	−0.21	−0.23	−0.22	0.27	0.42	0.23	−0.17	−0.38	−0.37	−0.1	−0.1	−0.04	0.26	0.29	0.07	1	
P/E	0.06	−0.03	−0.06	0.1	0.03	0.03	−0.06	−0.06	−0.06	0.03	0	−0.01	0.09	0.04	0.04	0.08	0.15	0.12	−0.04	1

Source: own elaboration. When the colour is blue, the more intense the colour is, the correlation between the variables is more intense and negative. When the colour is red, the more intense the colour is, the correlation between the variables is more positive and stronger.

5.2. Observations and Poisson Estimation Results

In the regression results, we have included the result of the estimated coefficient, its standard error, and its statistical significance. The exponential of these coefficients is also presented since this value shows us the count over the P/E when we vary each of the explanatory variables in a unitary way. In addition, the confidence intervals are shown.

The following table shows the results of the analysis performed.

5.3. Analysis of Descriptive Statistics

Before analyzing the results, it is important to note the following observations about the estimated model:

- O.1. As can be seen in Table 2 above, most of the coefficients are statistically significant at the 5% and 10% significance levels;
- O.2. We find some company-level dummy variables to be statistically insignificant such, as E3, E6, E13, E14, E18, E21, and E25, indicating that the average P/E for these companies is the SC as for the base firm (Telefónica);
- O.3. On the other hand, as we can observe in Table 3, the time variable T3 is not statistically significant, confirming that the average P/E for this year is not statistically different from the year 2021 (reference year);
- O.4. Regarding the explanatory variables: X6, X7, X9, X11, X14, and X15 were not able to explain the variations in the PER count as they were statistically insignificant at the 5% significance level;
- O.5. Of the statistically significant explanatory variables included in Table 3, we can indicate that most of them have a negative effect on the price–earnings ratio, resulting in an improvement in the profitability of the company studied;
- O.6. On the other hand, among the variables that show a negative effect in Table 3, that is, an improvement in the profitability of the companies, we find the following variables: E10, E1, E22, E23, E26, T1, T2, T3, X1, X3, X5, X11, X15, X16, X18, and X19;
- O.7. Regarding the validation of the estimates made, included in Table 4, the Mc Fadden R2 was calculated, obtaining a value of 93.61%. This result shows that the inclusion of the variables indicated in the model equation improves the log-likelihood by 93.61%.

6. Discussion

After conducting this analysis, the results were interpreted from the perspective of previous studies and of the working hypotheses hereinafter. Each result has been numbered according to the same numbering as the hypotheses formulated above:

- R1. Regarding H1, the number of women on the board, and how this affects the P/E, we obtained a 95% confidence interval (0.06; 15.66), implying that if the number of women on the board increased by one person, the average P/E would increase, and profitability would decrease. However, when analyzing the same results for the percentage of women on the board, the confidence interval was (−37.85; −0.03). This indicates that if the proportion of women on the board increased by 1%, the P/E would decrease on average between 0.03 times and 37.85. This confirms an increase in profitability. Therefore, there was not sufficient evidence that the number of women on the board increased in terms of absolute value. What is relevant is that the participation of women increases in terms of proportion since the increases are considered in this way. On the basis of all of the above, H1 is verified.
- R2. Regarding H2, the impact of increasing the number of female directors on the P/E, we obtained an associated confidence interval of (−4.24; −0.24), which showed that the increase of one female executive director on the board of directors would reduce the company's P/E by an average of 0.24 to 4.24 times, improving profitability. As for the influence of the increase in the percentage of female executive directors on the board, it is not statistically significant, i.e., it does not cause changes in the P/E. In absolute terms, the increase in the number of female executives on the board is sufficient, given

that the average number of such directors is very low. However, the increase in the percentage of female executive directors does not provide relevant information since it starts from a very low initial value. This implies that the percentage increase in female executives is not significant and does not determine the P/E, while the absolute increase in these female directors does have a positive effect on this measure. The results do not verify H2.

- R3. Regarding H3, the increase in the number of female proprietary directors in absolute terms provided us with a confidence interval (0.48; 2.07), so that an increase in the number of female proprietary directors would increase the P/E by an average of 0.48 to 2.07, indicating a decrease in profitability. Additionally, the percentage of female proprietary directors on the board of directors does not influence the determination of P/E. The results do not verify H3.
- R4. Regarding H4, the increase in the number of independent female directors on the board of directors gives us a confidence interval (−1.40; −0.71), with both values being negative; however, the coefficient was not statistically significant and, therefore, did not show causality either in the P/E or in profitability. As for the percentage increase in the number of independent female directors, the confidence interval was (0.13; 7.64), taking positive values. This confirms an increase in the P/E when the participation of female proprietary directors increases by 1%, reducing profitability. H4 is not verified.
- R5. Regarding H5, the increase in the number of women in positions of responsibility and/or management outside the board of directors gave us a confidence interval (0.98 to 1.02), indicating that the increase in the P/E would be positive, producing a reduction in profitability. On the other hand, increasing the percentage participation of women in positions of responsibility and/or management yielded a confidence interval (−19.98; −0.05), indicating that the P/E would decrease, causing growth in profitability. This implies that, in order to improve profitability, the percentage increase should be greater than the absolute increase in terms of the causal effect to ensure an increase in profitability. The required increase in absolute value should exceed 21 female directors to reduce profitability, provided that the increase in the number of female directors is less than 21, assuming that the percentage increase is 1% would improve the company's profitability. H5 is verified.

7. Conclusions

This study offers new contributions to the literature on the effect of gender diversity on the board of directors and on the board of management regarding the financial performance of IBEX 35 companies. In accordance with the objectives of this work set out in the introduction, the empirical analysis carried out confirms the existence of a negative and statistically significant causal relationship between the percentage of women on the board and the P/E. We find that an increase in this percentage results in an increase in the profitability of the company's shares, regardless of whether or not profits are distributed. In this respect, it is also shown that it is not enough to increase the number of women on the board in absolute terms for there to be an improvement in profitability, but that it is also necessary to increase their representation with respect to men. Regarding the participation of women in the SC, our study detects a threshold of 21 women, above which an increase in the percentage of women would not produce increases in profitability. However, the average number of women on the board of directors in IBEX 35 companies is presently 2.04. So there is a very wide margin for companies to increase their profitability by increasing the percentage of women on the board of directors.

Disaggregating the presence of women on the board by type of director, the analysis does not confirm the existence of a negative and statistically significant causal relationship between the percentage of female executives, proprietary and independent directors and the P/E, and therefore cannot confirm that an increase in the percentage of women in specific categories leads to an increase in profitability. However, these last results should be interpreted with caution, since women are highly underrepresented in the categories of executive and proprietary directors, with percentages of 5% and 15%, respectively. If we interpret these data under the critical mass theory, one possible reason why a 1% increase in women in these categories would not lead to increased profitability is because the women in these categories are far from reaching critical mass.

Therefore, the findings of this study confirm the hypotheses discussed at the beginning of this paper, making new contributions to the literature and demonstrating how the presence of women on the board of directors improves a company's profitability, their inclusion being fundamental for political and business decision-making.

In future works to be developed in this line of research, an extension of this article will be carried out incorporating all the companies in the continuous market between 2017 and 2023, which will increase the sample by approximately 100 additional companies. For this extension, it will be necessary to change the econometric model to a GMM model and extend the model with control variables as suggested in the literature, for which financial variables such as debt, leverage, solvency, and liquidity), and valuation ratios (EV/EBITDA, EV/Sales, and WACC) will be included. In addition, the model will be extended by studying other dependent variables such as Tobin's q, ROA, and ROE. In this extension, binary dummy variables will be added to determine the differentiating effect of the inclusion or not of the company in the IBEX, since it will be especially enriching to check whether the effects of the composition of the board on the P/E ratio vary significantly between companies listed in the continuous market and those listed in the selective IBEX-35, so we consider the contributions made in this work to be relevant.

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