International Journal of
Financial Studies

MDPI

Article

The Influence of Women on Boards on the Relationship between Executive and Employee Remuneration

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Abstract: The growing presence of women at the top of companies has sparked interest in examining their role in the remuneration gap between senior managers and employees. This article analyses the traditional Chief Executive Officer (CEO)-to-employee pay ratio but includes a new relation, the senior-management-to-employee pay ratio, and extends the research by including six positions for women in company management: on the board of directors, executive directors, CEOs, proprietary directors, independent directors, and senior managers. The study is based on a sample of 77 listed companies in Spain from 2015 to 2022 and the panel data models have been estimated using the Generalised Method of Moments (GMM). The main findings indicate that the proportion of women in different categories of board and senior management positions has a positive effect on the CEO-to-employee pay ratio, especially in companies with higher market capitalisation. In contrast, the proportion of women in senior management positions has a negative effect on the CEO-to-employee pay ratio in all the samples analysed. Government agencies should prioritise the participation of women in non-board senior management positions in order to at least reduce the pay gap between senior managers and employees.

Keywords: women on boards; CEO–employee pay ratio; senior management–employee pay ratio; Spanish listed companies

Citation: Gallén, María L., and Carlos Peraita. 2024. The Influence of Women on Boards on the Relationship between Executive and Employee Remuneration. *International Journal of Financial Studies* 12: 84. https://doi.org/10.3390/ijfs12030084

Academic Editor: Khaled Hussainey

Received: 10 July 2024
Revised: 19 August 2024
Accepted: 20 August 2024
Published: 23 August 2024

1. Introduction

The growth in the remuneration of Chief Executive Officers (CEOs) and senior managers compared to that of company employees has been the subject of public debate for decades (Hendriks et al. 2023; Malan et al. 2023). To reduce stakeholder pressure to limit the growth of senior management compensation, some countries have regulated CEO-to-employee pay ratio disclosure requirements for listed companies. Thus, in 2015 in the United States, Section 953(b) of the Dodd–Frank Act requires the SEC to adopt rules requiring listed companies to disclose the ratio of the median annual compensation of the company's employees to the annual compensation of its CEOs beginning in fiscal year 2017. Following this example, countries such as the Netherlands since 2017, France since 2019, and the UK since 2020 have regulated the obligation for listed companies to report the CEO pay ratio. Based on this available information, a few studies (e.g., Jung et al. 2021; Alan et al. 2021; Bardos et al. 2021; Rouen 2020) have examined the impact of the increasing presence of women on boards of directors on the difference in remuneration between the CEO and employees.

High executive remuneration has traditionally been advocated as the solution to the agency problem that arises from the delegation of decisions from shareholder to managers (Jensen and Meckling 1976). From this approach, it is argued that executive remuneration contracts are the optimal outcome of bargaining to obtain the best deal for shareholders and maximise firm value. In contrast, other studies (Bebchuk et al. 2002; Bebchuk and Fried 2006) argue for the managerial power approach, which assumes that executive

compensation is not negotiated under conditions of perfect competition because executives have the power to influence their own pay and use this power to extract rents for their own benefit and against the interests of shareholders.

The existing literature on the determinants of the CEO-to-employee pay ratio is limited. The majority of research in this field (Chalmers et al. 2006; Bouteska and Mefteh-Wali 2021; Sonenshine et al. 2016) has focused on CEO compensation and the effect of the financial and economic characteristics of the firm (such as size, financial performance, and industry) and, to a lesser extent, the effect of ownership structure and board composition. In the area of the relationship between the CEO-to-employee pay ratio and the board of directors composition, there is a notable absence of papers that analyse the influence of the presence of women as CEOs and the proportion of women on boards. Even fewer studies analyse the relationship between the CEO-to-employee pay ratio and women (Alan et al. 2021). Nevertheless, the incorporation of gender differences has been conducted in other areas of economic research and is based on the argument that women and men have different social behaviours and different economic objectives (Brody 1985; Ruegger and King 1992).

The objective of this study is to analyse the influence of the presence of women on boards of directors and in senior management in a sample of Spanish listed companies in the period of 2015–2022 on two key ratios: the ratio of CEO compensation to that of employees and the ratio of senior management compensation to that of employees. In Spain, listed companies are not required to report the CEO-to-employee pay ratio or the senior-management-to-employee pay ratio, but they are required to report CEO compensation, total senior management compensation, and the number of senior managers. However, we have calculated the corresponding information from the two previous ratios. The study controls, as usual, for firm characteristics, industry, financial situation, and other commonly used variables to explain remunerations at the company level. The influence of women on these two ratios is analysed by incorporating their presence in six positions in company management: women on boards of directors, women as executive directors, women as CEOs, women as proprietary directors, women as independent directors, and women in senior management who are not on the board of directors. Finally, the analysis is carried out on the entire sample of companies and on two subsamples, one comprising companies with a higher market capitalisation relative to the median and the other comprising companies with a lower market capitalisation.

The results of our study indicate that the CEO-to-employee pay ratio is positively correlated with variables measuring the representation of women in the categories of the board of directors and senior management in the sample of companies with higher market capitalisation. However, women's participation as executive directors, CEOs, and senior management has a negative effect on the pay ratio between CEOs and employees in the sample of companies with lower market capitalisation. Furthermore, the senior-management-to-employee pay ratio is negatively correlated with the proportion of women in senior management positions in all the samples analysed.

There are two main implications of this study. The first is that the efforts of government agencies to increase the participation of women on boards does not seem to have a significant impact on the reduction of either the CEO-to-employee pay gap or the senior-management-to-employee pay gap. The second is that government agencies should prioritise women's participation in senior management, as this does reduce the pay gap between senior management and employees.

We structure the remainder of the article as follows. Section 2 presents a review of the literature and develop our hypotheses. Section 3 describes the data, and the variables used in the study. Section 4 presents the methodology used to estimate the model and the results obtained, together with a correlation analysis. The final Section 5 presents the conclusions and implications of the study.

2. Literature Review and Hypotheses

High management remuneration can be explained by the separation between ownership and control in the company. The analysis of this separation from the perspective of agency theory postulates that managers' utility-maximising action consists of increasing the consumption of unproductive resources above the optimal level that maximises firm value in the absence of incentive and monitoring mechanisms (Holmström 1979). Thus, managers receive the full benefits of consumption and bear only part of the cost of information deficiencies. Unproductive resources may take the form of the consumption of perks (above-market wage setting, excessive staffing, lavish buildings and furnishings, etc.) and the consumption of unnecessary time or leisure at work (Jensen and Meckling 1976). On the other hand, this separation of ownership and control in the company allows shareholders to reduce the risk of their investments through diversification, preventing their wealth from being dependent on a single company, but they experience a loss of control due to the dispersion of capital ownership (Demsetz 1983). However, the delegation of shareholder decisions to corporate managers is an agency relationship that is subject to the costs generated by the divergence of objectives between principal and agent, information asymmetries, and agent risk aversion (Ross 1973).

Agency theory applied to the shareholder–management relationship argues that in order to ensure that management performance is aligned with shareholder objectives, it is necessary to design compensation plans and enhance management oversight through the board of directors and the general meeting of shareholders (Jensen and Murphy 1990; Weisbach 1988). In addition, other authors argue that external mechanisms such as the managerial labour market (Fama 1980) and hostile takeovers (Weisbach 1993; Jensen 1986) reinforce internal incentive and monitoring mechanisms to reduce agency costs and align managers' objectives with those of shareholders. Morck et al. (1989), Amihud et al. (1990), and Franks and Mayer (1996) argue that hostile takeovers occur to replace managers who act in their own self-interest; when the process of replacing management is too costly and time-consuming, the capital market protects investors from managerial mismanagement through hostile takeovers.

In light of the recognition that there is an agency problem due to the delegation of decisions from shareholders to management, several approaches have been developed that attempt to explain the remuneration of management and the supervisory roles of the board of directors, the general meeting of shareholders, and the external market (Eisenhardt 1989). Thus, high managerial remuneration can be explained by two opposing approaches. The optimal contracting approach is the conventional approach. It argues that manager compensation is the efficient solution to the incentives needed to reduce agency problems. Managers can improve firm performance, but that requires effort and risk-taking, and to do so, compensation plans must be designed that connect managers' objectives with those of shareholders, and thus with firm value. In contrast, the managerial power approach (Bebchuk et al. 2002; Bebchuk and Fried 2004) critiques the optimal contracting approach and argues that managers have the power to influence their own remuneration and that they use this power to extract rents for their own benefit and against the interests of shareholders. Ultimately, the managerial power theory argues that higher CEO pay ratios are the consequence of agency problems.

Research on the internal control mechanisms of CEOs and senior managers has focused on the analysis of their compensation plans and supervisory mechanisms for managers (Gomez-Mejia and Wiseman 1997). The analysis of these monitoring mechanisms focuses on the effects of board composition and ownership structure on the reduction of agency costs. Studies on CEO and senior management compensation plans have analysed both of the most efficient components of compensation: the types of rewards that induce agents to act in the interests of the firm's owners, and the response of firm value to changes in compensation plans and changes in management. These studies are briefly discussed below, since the aim of this paper is to measure the effect of the presence of women in

senior management and on boards of directors on the remuneration of CEOs and senior managers compared to that of the company's employees.

The literature on CEO and senior management compensation certainly indicates that reconciling managers and shareholder objectives is not easy, hence the complexity of CEO compensation plans. A traditional objective of shareholders is to maximise share value, and therefore part of management compensation is linked to share price. However, CEOs and senior management consider that share prices are affected by factors beyond their control and do not measure their contribution to value creation in the company (Lambert 1993). Therefore, top management compensation plans use accounting variables such the result of the year, which are subject to earnings management (Healy 1985), leading to an increase in the remuneration of managers. Rehnert (1984) argues that the problem is not excessive compensation to managers, but the perverse incentives created by compensation plans that reward executives according to accounting measures. Thus, Jensen and Murphy (1990) argue that the compensation of CEOs is usually insufficient to motivate them to act in the interests of shareholders because the percentage of variation in the wealth of managers relative to the variation in the wealth of shareholders is too small to expect compensation plans to play a significant role in reducing agency costs. In recent years, remuneration plans for CEOs and senior managers have included objectives that are positively associated with environmental, social, and governance disclosure (Blanes et al. 2021).

The literature on the board of directors and the monitoring of CEOs and senior managers starts from the premise that the company's board of directors supervises senior management to protect the interests of shareholders. Its functions include agreeing on the remuneration, hiring, and replacement of CEOs and senior managers. The board of directors is divided into executive directors and outside directors. The role of outside directors in disciplining senior managers is reported in numerous works. According to Fama and Jensen (1983), outside directors make decisions on controversial issues, such as the replacement of their own managers, and have incentives to disagree with executive directors, defending the interests of shareholders, because the value of their human capital is at stake. Supporting this argument, studies by Hermalin and Weisbach (1988) and Warner et al. (1988) find that poor company results increases the probability of replacing top managers and strengthens board performance by increasing the proportion of outside directors. Weisbach (1988) argues that the proportion of outside directors is an explanatory variable for the supervisory capacity of the board of directors because companies with more than 60% outside directors are more likely to replace senior executives. However, the studies by Hermalin and Weisbach (1991) and Shivdasani (1993) do not find a significant relationship between the number of outside directors, board members who are not part of the company's management, and the rate of management turnover. These outside directors can be independent directors and proprietary directors, the latter being those board members who have significant shareholdings and therefore the right to sit on the board of directors in accordance with the laws of the respective country.

Board composition or corporate governance certainly affects the monitoring of senior managers, but some studies also include the effects of the proportion of outside directors, whether the CEO and chairman of the board are the same person, the number of board members, and the number of annual meetings (Core et al. 1999; Brick et al. 2006). More recent research has also considered the issue of gender diversity on boards. We will now focus on this latest addition to the literature.

Early studies on the presence of women on boards of directors and in senior management in the 1990s observed a low representation of women in such positions in companies. The Catalyst (1993) report showed the small number of women CEOs, chairpersons, board members, and in senior management positions in Fortune 500 companies in the early 1990s. Using the same database and covering the years 1987–1996, Daily et al. (1999) confirm an increase in the representation of women on boards of directors and in the proportion of outside directors but find no evidence that there are more women occupying the role of CEO or other senior management positions.

The significant increase in the presence of women on boards of directors and in senior management positions did not become apparent until the early 2000s. This integration of women into the senior management has been widely reported in the literature. Burgess and Tharenou (2002) argue that increasing women's representation on boards of directors increases the diversity of opinion on the board, improves governance through their "power-sharing" style, creates new forms of organisational leadership, and improves the company's image with stakeholders. Hillman et al. (2002) find that female directors are more likely to come from non-business backgrounds and to have higher educational qualifications than male directors. The literature review by Terjesen et al. (2009) describes different theoretical perspectives on the role of women on boards of directors. Nielsen and Huse (2010) suggest that theories of gender differences in leadership can be applied to explain how the gender composition of the board affects its effectiveness. However, this study shows that the proportion of women on the board of directors is not directly related to the operational decisions of the board, i.e., those related to financial and accounting issues. Finally, the handbook edited by Madsen (2024) analyses the current situation of women leaders worldwide and examines the representation of women leaders in companies, particularly the situation of women on boards, as CEOs, and in senior management positions. The handbook notes that numerous studies show positive correlations between the presence of women on boards and in senior management positions and company performance.

The relationship between the proportion of women on the board of directors and agency costs is perfectly captured by the question posed by Carter et al. (2003): "Should we expect a more diverse board to be a better monitor of management and less likely to subvert the interests of shareholders?" Their study shows a positive relationship between firm value, as measured by Tobin's Q, and the proportion of women on the board, implying a reduction in agency costs. In contrast, Rose (2007) finds in Denmark that gender on the board of directors has no impact on Tobin's Q. Similarly, Francoeur et al. (2008) find no significant differences in return on equity (ROE) performance between companies with low and high representation of women on the board. Adams and Ferreira (2009) provide evidence of greater board oversight in boards of directors with gender diversity, although they suggest that gender quotas may reduce shareholder value in firms with strong governance, as measured by their ability to resist external takeover bids. Finally, Carter et al. (2010) find no significant relationship between board gender diversity and firm financial performance as measured by Tobin's Q and return on assets.

There is little research on the impact of the presence of women on the board of directors on the remuneration of CEOs and senior management. One possible reason for this is that the obligation for listed companies to report in detail on the remuneration of their directors is more recent than the obligation to report on the composition of the board of directors. In the case of Spain, in 2004 the National Securities Market Commission (CNMV 2004) required the submission of an annual report on corporate governance of listed companies, which only requires aggregate information on the remuneration of all directors, although distinguishing by remuneration concepts. Since 2013, the National Securities Market Commission of Spain (CNMV 2013) has required the submission of an annual remuneration report of the directors of listed companies and the members of the board of directors and the control committee.

Lucas-Pérez et al. (2014), using a sample of Spanish listed companies, find a positive relationship between the proportion of women on the board of directors and the proportion of variable pay in total board compensation. Benkraiem et al. (2017) show that there is a positive and statistically significant relationship between the proportion of women on the board of directors and the CEO's total and variable remuneration. Conversly, Harakeh et al. (2019) identify a negative relationship between the proportion of women in senior management roles and the remuneration of managers, and that this presence is associated with lower levels of CEO incentive compensation. The study by Alan et al. (2021) shows that companies with minority and female CEOs have a stronger relationship between CEO pay and average employee pay.

The following paragraphs present an analysis of the impact of the company's ownership structure and the monitoring of CEOs and senior managers on the company´s performance. Shareholders who are dissatisfied with the management or with the functioning of the board of directors can use their vote at the company's general shareholders' meeting to replace directors and remove executives. However, small shareholders believe that their votes have negligible weight in the aggregate and, given that the costs of monitoring the performance of management are high, they prefer that the costs of monitoring be borne by the majority shareholders. Therefore, in the absence of shareholders with a very significant percentage of shares, the result will be an absence of monitoring (Grossman and Hart 1980). Thus, the general meeting of shareholders is conditioned by the share ownership structure, which in turn depends on the degree of shareholder concentration and the identity of the shareholders.

If we focus on the dispersion of the ownership of the company's shares, we find that the higher the concentration of ownership, the lower the power of senior management and the greater the effective control over senior management. Since only shareholders with a significant proportion of shares are willing to incur monitoring costs on management (Shleifer and Vishny 1986; Shivdasani 1993), ownership concentration is likely to have a negative impact on the level of total executive compensation (Hassen et al. 2015). However, some studies (Demstez and Lehn 1985) find no significant relationship between the concentration of the company's ownership and company performance. Similarly, Holderness and Sheehan (1988) find that whether the firm is fully controlled or not has no significant effect on either Tobin's Q or return on equity (ROE). McConnell and Servaes (1990) also find no significant correlation between Tobin's Q and the presence of shareholders with a significant percentage of capital.

The analysis of the effects of the percentage of shares held by management and the presence of institutional investors on company performance yield inconclusive results. A study (Jensen and Meckling 1976) suggests that a high level of managerial ownership aligns their objectives with those of shareholders, while other studies (Morck et al. 1989; Hermalin and Weisbach 1991; McConnell and Servaes 1990) show that a small percentage of shares held by managers (less than 5%) helps to align managers' interests with those of shareholders by increasing firm value, although their findings are different when managers hold large percentages of shares. For example, some studies (Hermalin and Weisbach 1991; McConnell and Servaes 1990) find that Tobin's Q decreases when managers own more than 20% or 25% of the equity, implying that at these levels of share ownership, managers are more protected from hostile takeovers, and that the entrenchment effect reduces firm value. On the other hand, another study (Morck et al. 1988) presents a positive relationship between Tobin's Q and percentages of shares greater than 25% owned by managers.

Institutional investors are typically more active than minority shareholders in voting at shareholder meetings. However, there is inconclusive evidence on whether institutional investors are more likely to oppose management proposals that are detrimental to shareholders (Brickley et al. 1988), or whether they are more likely to oppose management proposals the lower the percentage of shares they hold (Pound 1988). The results of studies on the effects of institutional investors on firm performance are also mixed. Some studies (McConnell and Servaes 1990) show that firm value is positively related to the percentage of shares held by these institutional investors, and that these types of investors are also more effective in reducing CEO compensation (Khan et al. 2005). The paper by Hassen et al. (2015) presents the opposite view, as they do not find a significant effect of institutional ownership on the level of CEO compensation.

There is an abundance of literature analysing the evolution of senior management compensation in companies. The objective of this study, as mentioned in the Introduction, is to analyse the effects of the presence of women on boards of directors and in senior management on the difference between the average remuneration of the CEO and senior managers and the average remuneration of the company´s employees. Two approaches (Rouen 2020) can be identified to explain the growing wage disparity at the firm level.

On the one hand, tournament theory (Lazear and Rosen 1981) argues that greater wage inequality increases the value of promotions and thus contributes to increased effort and better performance. On the other hand, equity theory (Akerlof and Yellen 1990) suggests that wage inequality creates resentment among lower-paid workers and their behaviour is detrimental to firm performance. It can be argued that women in management positions are more likely to adopt a more empathetic management style, which should help to reduce the inequality gap. However, some argue that discrimination against female managers in the labour market means that only the most talented women can reach the top of corporate management. This could explain their higher productivity and consequent higher remuneration, contributing to the growing pay gap between senior managers and employees within the company (Alan et al. 2021).

The literature has examined the impact of the gender composition of boards of directors on company performance, and the results of these examinations have been mixed. Recently, Nawaz (2022) showed that the higher proportion of female directors is positively associated with higher CEO compensation. However, most research is inconclusive (Alan et al. 2021; Nawaz 2022; Ahmed et al. 2021) on whether women in senior management positions reduce or widen the gap between CEO and senior management compensation and the average compensation of the company's employees. Zimmermann (2022) highlights that it is the second level of women in management who mainly interact with employees and reduce the pay gap. The study of Owen and Temesvary (2018) on the impact of gender diversity on bank boards of directors presents inconclusive results, as the impact of board gender diversity on bank performance shows a non-linear relationship. The majority of papers have concentrated on analysing the factors influencing the CEO-to-employee pay ratio and its impact on employee behaviour, firm performance, and the corporate social responsibility of the company (e.g., Faleye et al. 2013; Bao et al. 2020; Chen et al. 2019; Przychodzen and Gómez-Bezares 2021; Boone et al. 2024), as well as gender differences in CEO compensation (e.g., Adams et al. 2007; Elkinawy and Stater 2011; Harris et al. 2019; Liu 2021). The study of Tarkovska et al. (2023) analyses how a greater presence of women on boards reduces the gender pay gap for senior managers who are not on the board of directors.

A review of the literature reveals a paucity of empirical evidence concerning the relationship between the presence of women on the board of directors and the remuneration of senior managers. There is even less empirical evidence on the relationship between the presence of women on the board and the CEO-to-employee compensation ratio. In particular, we have not identified any papers that analyse the effect of the presence of women in senior management and non-board members on senior management compensation. However, some of the literature suggests that greater representation of women on board of directors improves board effectiveness and reduces agency costs. Consequently, we assume that a higher presence of women on the board improves board governance and results in lower remuneration for senior managers, thus reducing the ratio of CEO to employee pay and the ratio of senior management to employee pay.

It is important to recall that in order to examine the determinants of the CEO-to-employee pay ratio and the senior-management-to-employee pay ratio, six categories of women were established according to their presence in the management of the company: on the board of directors, executive directors, CEOs, proprietary directors, independent directors, and senior management not on the board. Therefore, having considered the above arguments, we test the following research hypotheses:

Hypothesis 1 (H1). *A higher proportion of women on the board of directors and in senior management reduces the pay ratio between the CEO and employees.*

Hypothesis 2 (H2). *A higher proportion of women on the board and in senior management reduces the pay ratio between senior management and employees.*

Furthermore, we want to analyse whether there are differences in the effects of women on the board and in senior management positions on the relative remuneration between senior management and employees depending on the level of market capitalisation of the company. The existing literature confirms a positive correlation between company size, as measured by assets or sales, and executive compensation (Alan et al. 2021; Lin et al. 2013; Bryson et al. 2014; Conyon 2014; Newton 2015). Companies with the highest market capitalisation are not always those with the highest assets or sales. However, these companies have the highest public visibility, which places them under the greatest pressure from stakeholders (Bai et al. 2023). This justifies the interest in differentiating the above analysis according to the market capitalisation of the companies, although it is not possible to establish in advance the sign of the relationship because there are two opposing effects. On the one hand, it is to be expected that companies with higher market capitalisation will have higher CEO-to-employee pay ratios and senior-management-to-employee pay ratios. On the other hand, companies with higher market capitalisation have greater agency problems because of the higher probability of ownership dispersion. Consequently, assuming that a higher presence of women on the board and in senior management positions reduces agency costs, a negative effect on the CEO-to-employee pay ratio and on the senior-management-to-employee pay ratio is to be expected.

3. Research Design

3.1. Sample and Data Sources

The sample consisted of 77 companies that had been listed on the Madrid Stock Exchange (Ibex35 and Spanish Continuous Market) during all financial years from 2015 to 2022. This sample is smaller than the total number of listed companies. The process followed for the selection of the sample is detailed below. In 2013, Circular 4/2013 of the Spanish National Securities Market Commission (CNMV 2013) established the model for the Annual Report on Remuneration of Directors of Spanish listed companies. This Circular made it mandatory to report the remuneration of the CEO separately from that of the other members of the board of directors. Thus, no detailed information is available prior to that date. The effects of the 2008 financial crisis led to a decrease in Gross Domestic Product (GDP) in Spain from 2009 to 2013. Furthermore, annual GDP growth in Spain in 2014 was only 1.4%. As it is possible that this poor GDP performance may have affected the remuneration of top managers and workers in companies, information has been collected from 2015 onwards, when GDP growth was 3.8%. For this reason, the analysis contains data from 2015 to 2022, which is the last year with information available at the date of our research.

The initial sample of 138 listed companies in Spain in 2015, which had submitted the annual reports required to obtain CEO and senior management compensation, was reduced to 96 companies following the elimination of 42 companies that had ceased trading during the period under review. A further nine companies did not submit any corporate governance information during the period under analysis. Consequently, the final sample comprised 77 Spanish listed companies that had submitted the information required for this research from 2015 to 2022, amounting to a total of 616 observations.

The classification of the sample of companies according to the unified sector criteria of the Spanish Stock Exchange (Bolsas y Mercados Españoles 2024) is presented in Table 1. The sectors with the greatest number of companies in the sample are Basic Materials, Industry, and Construction and Consumer Goods, with 31.2% and 23.4%, respectively, followed by Consumer Services and Financial Services. The remaining sectors each contain less than ten percent of the total number of companies in the sample.

The data on corporate governance and senior management were compiled manually from the Annual Corporate Governance Report and Annual Report on Directors' Remuneration for each company and year, both of which are deposited in the official registers of the CNMV. The majority of the financial data for the companies were obtained from the Consolidated Annual Financial Report (CNMV 2024). Data on market capitalisation and

Tobin's Q of the companies were obtained from the Iberian Balance Sheet Analysis System (SABI 2024).

Table 1. Classification of companies according to sectors of the Spanish Stock Exchange.

Sector	Companies	%
Oil and Energy	7	9.09
Basic Materials, Industry, and Construction	24	31.17
Consumer Goods	18	23.38
Consumer Services	10	12.99
Financial Services	9	11.69
Technology and Telecommunications	6	7.79
Real Estate Services	3	3.90
Total	77	100.00

Source: Bolsas y Mercados Españoles (2024).

3.2. Dependent, Independent, and Control Variables

The Table 2 presents the variables employed in our analysis, accompanied by their definitions and the sources from which they were obtained. In order to test Hypothesis 1, the dependent variable employed was the CEO-to-employee pay ratio (CEOPayRatio), which was calculated as the ratio between the CEO's total annual compensation and the average annual compensation of the company's employees. To test Hypothesis 2, the dependent variable was the senior manager to employee pay ratio (SeniorManagPayRatio), calculated as the ratio between the average annual compensation of senior managers and the average annual compensation of the company's employees. Unfortunately, with the data provided by the Spanish companies, it was not possible to obtain the value of the median compensation of employees of the company. This was due to the fact that in Spain, the Annual Report on the Remuneration of Directors of Listed Companies, in the section on employee remuneration, does not provide individual data or the median value of remuneration, but only the average value of employee remuneration. Of course, we are aware of the disadvantage of our ratio calculations as the average values will include the effects of outliers.

The independent variables whose effects we want to measure in Hypotheses 1 and 2 are the proportion of women members of board of directors by category and the proportion of women as senior managers. Board members are defined executive directors and outside directors (non-executive directors). The designation of outside directors may be either proprietary or independent. Proprietary directors are those who have significant shareholdings in the company's share capital (a fact that is not specified in Spanish law). Independent directors are appointed on the basis of their professional qualifications. In Spain, the Good Governance Code of Listed Companies (CNMV 2020) stipulates that the number of executive directors should be the minimum practical number, and that the majority of the board should be compromised of proprietary and independent directors. The Good Governance Code (CNMV 2020) also establishes that the number of women directors should represent at least 40% of the board of directors by the end of 2022, with a minimum of 30% representation in previous years. In Spain, listed companies are subject to the "comply or explain" principle in the Annual Corporate Governance Report. On average, they complied with 86.8% of the recommendations set out in the Good Governance Code.

To capture the effect of women on boards and in senior management positions on the two dependent variables, we employed the six independent variables (see Table 2) in an alternative way: (1) the ratio of women directors to the total of board members (BoardWomen); (2) the ratio of women as executive directors to the total of executive directors (ExecDirWomen); (3) a dichotomous variable indicating if the CEO is a woman (CEOWomen); (4) the ratio of women as proprietary directors to the total number of proprietary directors (PropDirWomen); (5) the ratio of women as independent directors to

the total number of independent directors (IndepDirWomen); and (6) the ratio of women as senior managers to the total number of senior managers (SenManagWomen).

Table 2. Variable definitions.

Variable Name	Variable Description (and Source)
EmployeeComp	Average compensation of employees. Measured by the total annual compensation of all employees (GBP) divided by the number of employees. Source: Official Records of the CNMV (2024).
CEOComp	CEO compensation. Measured by the total CEO compensation (GBP). Source: Official Records of the CNMV (2024).
SeniorManagComp	Average compensation of senior managers. Measured by the total annual compensation of all senior managers (GBP) divided by the number of senior managers. Source: Official Records of the CNMV (2024).
CEOPayRatio	CEO-to-employee pay ratio. Measured by the ratio of the CEO compensation to the average compensation of employees. Source: Official Records of the CNMV (2024).
SeniorManagPayRatio	Senior manager to employee pay ratio. Measured by the ratio of the average compensation of senior managers to the average compensation of employees. Source: Official Records of the CNMV (2024).
BoardWomen	Women on the Board of Directors. Measured by the ratio of the number of women directors to the total number of board members. Source: Official Records of the CNMV (2024).
ExecDirWomen	Women executive directors. Measured by the ratio of the number of women executive directors to the total number of executive directors. Source: Official Records of the CNMV (2024).
CEOWoman	CEO woman. Dichotomous variable that takes the value of 1 if the CEO is a woman, and 0 otherwise. Source: Official Records of the CNMV (2024).
PropDirWomen	Women proprietary directors. Measured by the ratio of the number of women proprietary directors to the total number of proprietary directors. Source: Official Records of the CNMV (2024).
IndepDirWomen	Women independent directors. Measured by the ratio of the number of women independent directors to the total number of independent directors. Source: Official Records of the CNMV (2024).
SenManagWomen	Women in senior management. Measured by the ratio of the number of women senior managers to the total number of senior managers. Source: Official Records of the CNMV (2024).
RelevantShare	Relevant shareholders. Total percentage of voting rights held by significant shareholders of the company (those with a directly or indirect share of 3% or more). Source: Official Records of the CNMV (2024).
MeetingBoard	Meetings of the Board of Directors. Number of meetings held by the Board of Directors during the year. Source: Official Records of the CNMV (2024).
CEODual	CEO Dual. Dichotomous variable that takes the value of 1 if the CEO and the Chairman of the Board are the same person, and 0 otherwise. Source: Official Records of the CNMV (2024).
VotAgainst	Votes against. Consultative vote at the General Shareholders' Meeting against the remuneration of de board of directors in the previous year, measured as a percentage of the total number of votes. Source: Official Records of the CNMV (2024).
Assets	Firm size. Measured as the natural logarithm of the total assets of the company. Source: Official Records of the CNMV (2024).
MarketCap	Market capitalisation. Measured as the natural logarithm of the market price per common share multiplied by the number of common shares outstanding. Source: SABI (2024).
Leverage	Leverage. Measured as the ratio of liabilities to equity of the company. Source: Official Records of the CNMV (2024).
ROOA	Return on operating assets. Measured as the ratio of Earnings Before Interest and Taes (EBIT) to operating assets of the company. Source: Official Records of the CNMV (2024).
ROE	Return on equity. Measured as the ratio of net income to equity of the company. Source: Official Records of the CNMV (2024).
TobinQ	Tobin's Q. Measured by the ratio of the market value of equity to the assets of the company. Source: SABI (2024).

The analysis also incorporates control variables on corporate governance, ownership structure, and financial characteristics of the company, in line with previous studies on the relative compensation of senior management to employees (e.g., Alan et al. 2021; Anginer et al. 2019; Hahn and Lasfer 2016; Crawford et al. 2021; Mahmoudian and Jermias 2022). The four variables on corporate governance and ownership structure are as follows: The first variable (CEODual) captures whether the CEO is the same person who chairs the board of directors. The second variable (RelevantShare) captures the total percentage of voting rights held by significant shareholders of the company (relevant shareholders are those with a direct or indirect share of 3% or more). The third variable (VotAgainst) represents the advisory vote at the annual general meeting of shareholders against the remuneration of the board of directors in the previous year, expressed as a percentage of the total number of votes. The fourth variable (MeetingBoard) reflects the number of meetings held by the board of directors during the year.

The following variables were employed to examine the financial characteristics of the companies included in the study. The firm size (Assets) was measured as the natural logarithm of the company's total assets. Leverage (Leverage) was measured as the ratio of liabilities to equity of the company. Return on operating assets (ROOA) was measured as the ratio of Earnings Before Interest and Taxes (EBIT) to the operating assets of the company. Return on equity (ROE) was measured as the ratio of net income to equity of the company. Finally, Tobin's Q (TobinQ) was defined as the ratio of the market value of equity to the company's assets. Furthermore, the variable market capitalisation (MarketCap), calculated as the natural logarithm of the market price per ordinary share multiplied by the number of ordinary shares outstanding, was employed to categorise the total sample of companies into two subsamples: those with market capitalisation above the median and below the median.

4. Empirical Results

4.1. Descriptive Statistics

The Table 3 presents summary statistics for all variables used in the regression models for the period of 2015–2022. Additionally, it includes information on the average compensation in euros of the CEO (CEOComp), senior management (SeniorManagComp), and employees (EmployeeComp), along with the actual values of the two dependent variables: the CEO-to-employee pay ratio (CEOPayRatio) and the senior-management-to-employee pay ratio (SeniorManagPayRatio). Table 3 also shows the number of observations, the mean, the 25th percentile (Q1), the median, the 75th percentile (Q3), and standard deviation of the variables. The mean of the CEO-to-employee pay ratio in the sample is 46.48, with the first and third quartile values being 9.23 and 48.52, respectively. Similarly, the mean of the senior-management-to-employee pay ratio is 10.89 and the values of the Q1 and Q3 quartiles are 3.68 and 13.21, respectively.

The proportion of women on the board of directors according to the established typology and the proportion of women in senior management are the independent variables of interest in our study. Thus, the average ratio of women on the board of directors is 0.23. The proportion of women as executive directors among executive directors is 0.04 on average. The ratio of women CEOs is 0.08 overall. The ratio of women as proprietary directors among proprietary directors is 0.17. The ratio of women as independent directors among the independent directors is the highest, with an average of 0.34, as a consequence of the recommendations of the Corporate Governance Codes. Finally, the ratio of women in senior management positions among this category has a measure of 0.15.

Table 3. Descriptive statistics.

Variable	N	Mean	Q1	Median	Q3	S. D.
EmployeeComp (GBP)	616	58,504	42,142	54,247	72,275	25,458
CEOComp (GBP)	616	2,228,088	510,500	1,314,000	2,699,500	3,008,125
SeniorManagComp (GBP)	616	556,691	240,229	340,603	658,325	597,497
CEOPayRatio	616	46.488	9.235	22.963	48.521	79.728
SeniorManagPayRatio	616	10.897	3.686	6.095	13.210	13.631
BoardWomen	616	0.235	0.133	0.250	0.333	0.131
ExecDirWomen	616	0.046	0.000	0.000	0.000	0.155
CEOWoman	616	0.084	0.000	0.000	0.000	0.278
PropDirWomen	616	0.179	0.000	0.000	0.250	0.270
IndepDirWomen	616	0.341	0.166	0.333	0.500	0.253
SenManagWomen	616	0.156	0.000	0.130	0.250	0.154
RelevantShare	616	36.870	17.490	34.310	55.740	22.494
MeetingBoard	616	10.992	8.000	11.000	13.000	3.881
CEODual	616	0.329	0.000	0.000	1.000	0.470
VotAgainst	616	6.444	0.175	2.3000	9.275	9.107
Assets	616	14.846	13.052	14.732	16.392	2.336
MarketCap	616	7.083	5.388	7.205	8.527	2.124
Leverage	616	3.682	0.863	2.020	4.372	11.173
ROOA	616	0.039	0.001	0.352	0.074	0.118
ROE	616	0.109	0.050	0.106	0.171	0.934
TobinQ	616	0.763	0.243	0.463	0.844	0.928

See Table 2 for variable definitions.

4.2. Correlation Analysis

Table 4 presents three correlation matrices. Panel A contains the correlation matrix of the total sample, while Panels B and C contain the correlation matrices of the subsamples corresponding, respectively, to companies with market capitalisation above and below the median of the whole sample.

In the sample comprising all firms (Panel A), the dependent variable CEOPayRatio exhibits a negative and significant correlation with MeetingBoard. However, the significance of the relationship with MeetingBoard is lost in the subsample of companies with market capitalisation below the median of the whole sample (Panel C). Conversely, in the sample with all companies, the dependent variable CEOPayRatio exhibits a positive and statistically significant correlation with the variables IndepDirWomen, BoardWomen, CEODual, IndepDirWomen, SenManagWomen, VotAgainst, Assets, and TobinQ. In the subsample of firms with higher market capitalisation (Panel B), the dependent variable CEOPayRatio maintains a positive and significant correlation with CEODual, Assets, TobinQ, and additionally, with the variables PropDirWomenWomen, MeetingBoard, and ROOA. In the subsample of companies with smaller market capitalisation (Panel C), the variable CEOPayRatio maintains the significant and positive correlation with IndepDirWomen, CEODual, VotAgainst, and Assets, as observed in the total sample.

Continuing with Table 4, the correlations of the dependent variable SeniorManagPayRatio with BoardWomen, Assets, and TobinQ are significant and positive in all three samples. The variable IndepDirWomen has a positive and significant correlation with SeniorManagPayRatio in the full sample and in the subsample of companies with smaller market capitalisation. The variable SenManagWomen has a negative and significant correlation with SeniorManagPayRatio in all three subsamples of companies. Furthermore, SeniorManagPayRatio has a positive and significant correlation with BoardWomen, ExecDirWomen, CEOWoman, and IndepDirWomen in the subsample of companies with market capitalisation above the median of the total sample (Panel B). The previous dependent variable also presents a positive and significant correlation with the variable Leverage in the full sample and in the subsample of companies with higher market capitalisation.

Table 4. Correlation matrix.

Panel A: All sample (N = 616, companies = 77)									
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) CEOPayRatio	1.00								
(2) SeniorManagPayRatio	0.76 ***	1.00							
(3) BoardWomen	0.13 ***	0.20 ***	1.00						
(4) ExecDirWomen	−0.00	0.07 *	0.28 ***	1.00					
(5) CEOWoman	−0.01	0.08 **	0.27 ***	0.84 ***	1.00				
(6) PropDirWomen	0.03	−0.00	0.39 ***	0.11 ***	0.11 ***	1.00			
(7) IndepDirWomen	0.07 *	0.10 **	0.64 ***	−0.08 *	−0.06	−0.15 ***	1.00		
(8) SenManagWomen	0.06 *	−0.10 **	0.23 ***	0.16 ***	0.15 ***	0.12 ***	0.09 **	1.00	
(9) RelevantShare	−0.01	−0.04	−0.09 **	0.01	0.02	0.14 ***	−0.13 ***	−0.02	1.00
(10) MeetingBoard	−0.11 **	0.01	0.16 ***	0.00	−0.02	−0.07	0.14 ***	−0.02	−0.21 ***
(11) CEODual	0.09 **	−0.02	−0.05	−0.02	0.01	−0.12 ***	0.03	−0.11 ***	−0.12 ***
(12) VotAgainst	0.11 ***	0.04	0.10 ***	−0.01	0.01	−0.06	0.15 ***	0.08 **	−0.26 ***
(13) Assets	0.37 ***	0.48 ***	0.24 ***	−0.03	−0.03	−0.24 ***	0.27 ***	0.07	−0.13 ***
(14) Leverage	0.04	0.08 **	0.08 *	0.09 **	0.09 **	−0.03	0.04	0.02	−0.09 **
(15) ROOA	0.06	0.00	−0.09 **	0.01	0.09 **	−0.01	−0.06	−0.05	0.11 ***
(16) ROE	0.01	0.01	0.00	−0.01	0.01	0.10 **	−0.03	−0.07 *	−0.05
(17) TobinQ	0.12 ***	0.07 *	−0.07 *	−0.04	0.04	0.09 **	−0.15 ***	0.09 **	0.13 ***
Variable	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
(10) MeetingBoard	1.00								
(11) CEODual	−0.06	1.00							
(12) VotAgainst	−0.01	0.06	1.00						
(13) Assets	0.21 ***	−0.14 ***	0.23 ***	1.00					
(14) Leverage	0.21 ***	−0.13 ***	0.03	0.22 ***	1.00				
(15) ROOA	−0.32 ***	0.08 *	−0.02	−0.12 ***	−0.04	1.00			
(16) ROE	−0.04	−0.03	−0.03	−0.09	0.12 ***	0.34 ***	1.00		
(17) TobinQ	−0.27 ***	0.07 *	−0.05	−0.31 ***	−0.12 ***	0.47 ***	0.06	1.00	
Panel B: Companies with market capitalisation above the median (N = 312, companies = 39)									
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) CEOPayRatio	1.00								
(2) SeniorManagPayRatio	0.76 ***	1.00							
(3) BoardWomen	0.14 **	0.19 ***	1.00						
(4) ExecDirWomen	0.04	0.13 **	0.22 ***	1.00					
(5) CEOWoman	0.05	0.19 ***	0.26 ***	0.83 ***	1.00				
(6) PropDirWomen	0.19 ***	0.08	0.25 ***	−0.12 **	−0.08	1.00			
(7) IndepDirWomen	0.04	0.10 *	0.71 ***	0.09 *	0.15 ***	−0.24 ***	1.00		
(8) SenManagWomen	0.14 *	−0.20 **	0.26 ***	0.14 **	0.18 ***	0.05	0.27 ***	1.00	
(9) RelevantShare	0.02	−0.03	−0.25 ***	−0.09	−0.15 ***	0.27 ***	−0.33 ***	−0.12 **	1.00
(10) MeetingBoard	−0.17 ***	−0.04	0.18 ***	0.15 ***	0.16 ***	−0.09	0.12 **	0.03	−0.13 **
(11) CEODual	0.19 ***	0.12 **	0.07	−0.09	−0.15 ***	0.05	0.10 *	−0.19 ***	−0.06
(12) VotAgainst	−0.00	−0.08	0.07	−0.05	−0.01	−0.07	0.17 ***	0.10 *	−0.22 ***
(13) Assets	0.18 ***	0.38 ***	0.33 ***	0.26 ***	0.36 ***	−0.14 **	0.24 ***	0.05	−0.27 ***
(14) Leverage	0.03	0.10 *	0.30 ***	0.46 ***	0.49 ***	−0.07	0.09	0.04	−0.12 **
(15) ROOA	0.21 ***	0.14 **	−0.00	−0.12 **	−0.12 **	0.19 ***	−0.01	0.11 *	0.06
(16) ROE	0.08	0.03	−0.05	0.05	0.04	0.11 **	−0.05	0.04	0.03
(17) TobinQ	0.26 ***	0.22 ***	−0.12 **	−0.20 ***	−0.18 ***	0.13 **	−0.13 **	0.11 *	0.20 ***
Variable	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
(10) MeetingBoard	1.00								
(11) CEODual	−0.10 *	1.00							
(12) VotAgainst	−0.10 *	0.05	1.00						
(13) Assets	0.37 ***	−0.11 **	0.04	1.00					
(14) Leverage	0.37 ***	−0.27 ***	−0.05	0.57 ***	1.00				
(15) ROOA	−0.36 ***	0.21 ***	−0.08	−0.18 ***	−0.39 ***	1.00			
(16) ROE	−0.43 ***	0.07	−0.04	−0.01	−0.31 ***	0.63 ***	1.00		
(17) TobinQ	−0.30 ***	0.23 ***	−0.11 **	−0.37 ***	−0.39 ***	0.55 ***	0.12 **	1.00	
Panel C: Companies with market capitalisation below the median (N = 304, companies = 38)									
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) CEOPayRatio	1.00								
(2) SeniorManagPayRatio	0.41 ***	1.00							
(3) BoardWomen	−0.01	0.16 ***	1.00						
(4) ExecDirWomen	−0.04	0.08	0.34 ***	1.00					

Table 4. *Cont.*

(5) CEOWoman	−0.03	0.04	0.30 ***	0.84 ***	1.00				
(6) PropDirWomen	−0.13 **	0.05	0.53 ***	0.21 ***	0.21 ***	1.00			
(7) IndepDirWomen	0.15 **	0.12 **	0.59 ***	−0.17 ***	−0.19 ***	−0.10 *	1.00		
(8) SenManagWomen	−0.16 **	−0.27 ***	0.18 ***	0.19 ***	0.16 ***	0.21 ***	−0.04	1.00	
(9) RelevantShare	−0.05	−0.05	0.06	0.09	0.16 ***	0.03	0.02	0.08	1.00
(10) MeetingBoard	−0.02	0.11 **	0.15 ***	−0.10 *	−0.15 ***	−0.04	0.15 ***	−0.07	−0.28 ***
(11) CEODual	0.17 ***	−0.12 **	−0.10 *	−0.00	0.10 *	−0.29 ***	−0.02	−0.02	−0.20 ***
(12) VotAgainst	0.32 ***	0.10 *	0.08	0.03	0.07	−0.00	0.10 *	0.01	−0.31 ***
(13) Assets	0.52 ***	0.28 ***	0.08	−0.21 ***	−0.27 ***	−0.25 ***	0.46 ***	−0.19 ***	0.03
(14) Leverage	−0.00	0.03	0.01	−0.01	−0.01	0.01	0.02	−0.01	−0.09
(15) ROOA	0.01	−0.12 **	−0.11 **	0.05	0.16 ***	−0.05	−0.07	−0.09	0.16 ***
(16) ROE	0.01	0.06	0.02	−0.02	0.00	0.10 *	−0.02	−0.10 *	−0.09
(17) TobinQ	−0.09	−0.14 **	−0.02	0.07	0.20 **	0.09	−0.15 **	0.12 **	0.12 **

Variable	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(10) MeetingBoard	1.00							
(11) CEODual	−0.01	1.00						
(12) VotAgainst	0.08	0.13 **	1.00					
(13) Assets	0.17 ***	0.11 *	0.28 ***	1.00				
(14) Leverage	0.16 ***	−0.08	0.03	0.07	1.00			
(15) ROOA	−0.35 ***	0.06	−0.00	−0.19 ***	0.02	1.00		
(16) ROE	0.07	−0.06	−0.03	−0.08	0.17 ***	0.31 ***	1.00	
(17) TobinQ	−0.26 ***	−0.02	0.03	−0.44 ***	−0.03	0.48 ***	0.05	1.00

Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

4.3. Methodology

The econometric models presented in our study employ the General Method of Moments (GMM), formalised by Hansen (1982) on a balanced panel data set, initially proposed by Arellano and Bond (1991), due to its capacity to regulate the issues of endogeneity and heterogeneity. GMM estimation is one of the most widely used estimation methods for models in economics and finance. The GMM approach allows for the control of unobserved heterogeneity and the persistence of the dependent variable, resulting in more consistent estimates of the regression parameters in comparison to more traditional fixed or random effects panel regressions.

We utilise STATA software STATA V.16 (using xtdpdsys) to execute our GMM models in order to address the issue of endogeneity. This robust technique enables us to control for a range of endogeneity problems, thereby ensuring the accuracy and reliability of our estimates. The regression tests are based on the two-step GMM, which employs the systematic estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998). This estimator utilises instrumental variables based on the lags and differences of all variables in the model. The quality of the GMM systematic estimation results is contingent upon the validity of the instrument matrix and the assumption of no residual autocorrelation. To this end, we employ Sargan's test to ascertain the validity of the instruments and Arellano and Bond's (1991) second-order serial correlation test to buttress our estimates of the GMM system.

4.4. Regression Results

Table 5 presents the results of the econometric models used to test the validity of Hypothesis 1 in relation to the dependent variable CEOPayRatio. The table reports the results in three panels: The first is for the entire sample, comprising 77 companies and 616 observations spanning the period from 2025 to 2022 (Panel A). Two additional analyses are conducted, one focusing on companies with capitalisation above the median and the other on those below the median. The former analysis includes 39 companies and 312 observations, while the latter includes 304 observations and 38 companies (Panels B and C). Tables 5 and 6 present the results of a series of tests conducted on GMM estimations. The Wald Chi2 statistic represents the degree of fit of each model. The Arellano–Bond test for first- and second-order correlations, AR(1) and AR(2), represents the statistics employed for the purpose of testing the existence of first and second time series correlations of the resid-

uals. The Sargan test presents the statistics for testing overidentifying restrictions through the correlation between instrumental variables and error terms, and for determining the validity of the econometric model and the correctness of the instruments' specification.

Table 5. Regression analysis. Panel data model with Generalised Method of Moments (GMM).

	Dependent Variable: CEOPayRatio					
Panel A: All sample						
BoardWomen	67.011 *** (12.49)					
ExecDirWomen		75.963 *** (23.28)				
CEOWoman			26.179 (31.87)			
PropDirWomen				21.088 *** (6.40)		
IndepDirWomen					40.753 *** (5.11)	
SenManagWomen						27.398 * (15.73)
RelevantShare	−0.612 *** (0.14)	−0.655 *** (0.11)	−0.666 *** (0.13)	−0.749 *** (0.14)	−0.424 *** (0.14)	−0.612 *** (0.13)
MeetingBoard	−0.826 *** (0.18)	−0.470 ** (0.23)	−0.454 *** (0.16)	−0.530 *** (0.17)	−0.904 *** (0.21)	−0.438 *** (0.16)
CEODual	−33.254 *** (8.49)	−31.588 *** (9.52)	−30.308 *** (9.32)	−30.707 *** (9.70)	−36.129 *** (8.14)	−30.943 *** (9.66)
VotAgainst	0.407 *** (0.13)	0.487 *** 0.13)	0.384 *** (0.14)	0.412 *** (0.14)	0.410 *** (0.14)	0.431 *** (0.14)
Assets	37.276 *** (4.64)	43.907 *** (4.62)	44.096 *** (4.55)	43.109 *** (4.57)	40.009 *** (4.82)	43.652 *** (4.56)
Leverage	0.087 (0.15)	0.082 (0.14)	0.102 (0.14)	0.106 (0.13)	0.141 (0.14)	0.105 (0.14)
ROOA	−8.951 (15.32)	−20.326 (14.54)	−17.380 (14.12)	−16.998 (13.57)	−7.725 (14.27)	−16.009 (13.13)
ROE	−0.854 (1.44)	−0.236 (1.45)	−0.821 (1.42)	−0.885 (1.37)	−0.856 (1.55)	−0.284 (1.23)
TobinQ	3.050 (3.09)	1.765 (2.14)	1.359 (2.12)	2.230 (2.68)	2.172 (3.03)	1.414 (2.21)
Constant	−486.41 *** (74.9)	−573.67 *** (72.9)	−573.23 *** (73.0)	−558.07 *** (73.5)	−515.30 *** (76.8)	−569.67 *** (73.0)
No. of instruments	38	38	38	38	38	38
Wald Chi2	2228.74 ***	727.22 ***	1095.49 ***	1160.47 ***	2732.58 ***	798.30 ***
AR(1)	−1.68 *	−1.66 *	−1.68 *	−1.68 *	−1.69 *	−1.68 *
AR(2)	0.61	0.57	0.62	0.51	0.74	0.46
Sargan's test	33.83	31.44	31.04	31.17	32.63	29.61
Panel B: Companies with market capitalisation above the median						
BoardWomen	178.85 *** (13.37)					
ExecDirWomen		166.82 *** (16.55)				
CEOWoman			58.361 *** (17.49)			
PropDirWomen				81.483 *** (9.44)		
IndepDirWomen					94.857 *** (5.50)	
SenManagWomen						41.495 *** (10.43)
RelevantShare	0.180 (0.11)	0.228 *** (0.08)	0.146 (0.09)	0.319 *** (0.08)	0.406 *** (0.11)	0.206 ** (0.10)
MeetingBoard	−2.368 *** (0.35)	−0.101(0.16)	−0.839 ** (0.33)	−1.095 *** (0.34)	−2.365 *** (0.26)	−1.032 *** (0.35)
CEODual	−97.234 *** (6.50)	−88.983 *** (9.46)	−84.198 *** (8.98)	−90.842 *** (7.70)	−89.221 *** (8.02)	−83.076 *** (8.94)
VotAgainst	0.951 *** (0.06)	1.137 *** (0.09)	1.096 *** (0.11)	1.164 *** (0.12)	1.039 *** (0.08)	1.108 *** (0.12)
Assets	33.750 *** (3.74)	51.005 *** (4.43)	53.597 *** (3.31)	47.515 *** (3.69)	29.535 *** (4.63)	52.345 *** (3.17)
Leverage	−0.580 (0.50)	1.911 *** (0.46)	1.621 *** (0.49)	0.571 (0.44)	0.220 (0.42)	1.588 *** (0.49)
ROOA	175.37 *** (21.51)	154.30 *** (17.77)	180.35 *** (18.43)	121.75 *** (18.16)	215.53 *** (20.90)	182.20 *** (18.16)
ROE	−14.714 *** (3.59)	6.901 ** (2.74)	2.552 (3.24)	1.199 (3.69)	−13.067 *** (3.06)	0.900 (3.23)
TobinQ	24.1666 *** (1.90)	9.912 * (3.13)	9.353 (3.24)	19.001 *** (2.08)	19.147 *** (2.20)	10.472 *** (3.45)
Constant	−529.2 *** (62.5)	−811.54 *** (70.4)	−840.03 *** (54.7)	−718.32 *** (59.1)	−464.21 *** (77.7)	−824.77 *** (50.9)
No. of instruments	38	38	38	38	38	38
Wald Chi2	71,361.69 ***	38,808.13 ***	23,670 ***	32,415 ***	83,448 ***	22,904 ***
AR(1)	−1.66 *	−1.66 *	−1.66 *	−1.67 *	−1.66 *	−1.67 *
AR(2)	0.78	0.83	0.85	0.79	0.89	0.90
Sargan's test	34.51	26.51	27.31	32.03	34.54	28.81
Panel C: Companies with market capitalisation below the median						
BoardWomen	1.669 (1.92)					
ExecDirWomen		−28.619 ** (11.61)				
CEOWoman			−64.82 *** (13.56)			
PropDirWomen				4.522 *** (1.36)		
IndepDirWomen					0.447 (0.95)	
SenManagWomen						−25.864 *** (3.09)
RelevantShare	−0.756 *** (0.05)	−0.796 *** (0.05)	−0.778 *** (0.05)	−0.76 *** (0.06)	−0.760 *** (0.05)	−0.901 *** (0.05)
MeetingBoard	0.595 *** (0.08)	0.517 *** (0.11)	0.249 *** (0.08)	0.573 *** (0.10)	0.582 *** (0.09)	0.557 *** (0.11)
CEODual	3.772 ** (0.68)	3.907 ** (0.64)	1.478 ** (0.72)	4.082 *** (0.64)	3.796 *** (0.69)	3.654 *** (1.11)
VotAgainst	−0.070 (0.01)	−0.001 (0.02)	−0.058 ** (0.01)	−0.025 (0.19)	−0.002 (0.19)	−0.031 (0.02)
Assets	24.443 *** (0.59)	24.845 *** (0.62)	23.600 *** (0.65)	24.733 *** (0.54)	24.430 *** (0.59)	23.405 *** (0.77)
Leverage	0.331 *** (0.01)	0.310 *** (0.01)	0.316 *** (0.01)	0.336 *** (0.01)	0.330 *** (0.01)	0.342 *** (0.01)
ROOA	−4.650 ** (1.88)	−5.136 (1.64)	−4.519 * (2.42)	−5.065 ** (1.93)	−4.636 (1.86)	−6.140 ** (2.20)
ROE	0.201 (0.28)	0.170 (0.27)	−0.082 (0.29)	0.003 (0.27)	−0.183 (0.26)	−0.203 (0.28)
TobinQ	4.352 *** (0.66)	3.957 *** (0.61)	3.741 *** (0.51)	4.380 *** (0.60)	4.383 *** (0.62)	3.972 *** (0.61)
Constant	−288.03 *** (7.83)	−285.60 *** (6.98)	−259.199 *** (7.6)	−288.04 *** (7.06)	−283.49 *** (7.93)	−262.04 *** (9.99)
No. of instruments	38	38	38	38	38	38
Wald Chi2	22,516.82 ***	54,758 ***	100,045.43 ***	26,224.08 ***	22,445.39 ***	208,764.75 ***
AR(1)	−1.55	−1.54	−1.53	−1.54	−1.54	−1.56
AR(2)	0.77	0.76	0.78	0.78	0.77	0.74
Sargan's test	28.84	30.79	29.24	29.92	28.90	29.85

Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Standard errors are reported in parentheses.

Table 6. Regression analysis. Panel data model with Generalised Method of Moments (GMM).

	Dependent Variable: SeniorManagPayRatio					
Panel A: All sample						
BoardWomen	8.346 *** (2.49)					
ExecDirWomen		3.321 (3.91)				
CEOWoman			1.324 (2.31)			
PropDirWomen				1.594 * (0.90)		
IndepDirWomen					4.270 *** (1.08)	
SenManagWomen						−3.802 ** (2.44)
RelevantShare	0.128 *** (0.02)	0.093 *** (0.02)	0.106 *** (0.02)	0.102 *** (0.02)	0.126 *** (0.01)	0.092 *** (0.02)
MeetingBoard	−0.0.23 (0.06)	0.009 (0.04)	0.031 (0.04)	0.001 (0.04)	0.008 (0.05)	0.029 (0.04)
CEODual	0.312 (0.45)	0.309 (0.48)	0.180 (0.43)	0.459 (0.39)	0.083 (0.55)	0.070 (0.45)
VotAgainst	0.050 *** (0.01)	0.048 *** (0.01)	0.049 *** (0.01)	0.050 *** (0.01)	0.048 *** (0.01)	0.051 *** (0.01)
Assets	−0.092 (0.8)	−0.089 (0.39)	0.079 (0.35)	0.052 (0.34)	−0.101 (0.41)	0.319 (0.43)
Leverage	0.026 ** (0.01)	0.029 (0.01)	0.023 (0.01)	0.027 (0.02)	0.013 (0.01)	0.021 (0.01)
ROOA	−2.065 (1.39)	−1.169 (1.46)	−1.634 (1.66)	−0.792 (1.49)	−1.505 (1.53)	−2.313 (1.91)
ROE	0.135 (0.15)	0.063 (0.17)	0.184 (0.18)	0.126 (0.18)	0.256 (0.17)	0.175 (0.18)
TobinQ	−0.701 *** (0.26)	−1.015 *** (0.37)	−0.684 * (0.39)	−0.714 * (0.40)	−0.723 ** (0.38)	−0.853 ** (0.36)
Constant	−1.986 (4.96)	0.284 (5.37)	−2.935 (4.59)	−2.531 (4.58)	−1.935 (5.31)	−4.910 (5.50)
No. of instruments	38	38	38	38	38	38
Wald Chi2	2267.22 ***	5442.76 ***	2824.80 ***	3336.96 ***	2550.05 ***	3545.07 ***
AR(1)	−3.41 ***	−3.40 ***	−3.39 ***	−3.43 ***	−3.41 ***	−3.42 ***
AR(2)	−0.80	−0.67	−0.70	−0.69	−0.76	−0.72
Sargan's test	30.44	33.88	29.61	31.25	33.83	31.43
Panel B: Companies with market capitalisation above the median						
BoardWomen	35.215 *** (2.62)					
ExecDirWomen		20.537 *** (2.06)				
CEOWoman			−8.105 *** (2.73)			
PropDirWomen				1.136 (1.98)		
IndepDirWomen					20.679 *** (1.04)	
SenManagWomen						−11.836 *** (2.36)
RelevantShare	0.157 *** (0.02)	0.132 *** (0.01)	0.152 *** (0.01)	0.140 *** (0.01)	0.164 *** (0.01)	0.132 *** (0.01)
MeetingBoard	−0.254 ** (0.07)	0.078 ** (0.03)	0.002 (0.04)	0.029 (0.05)	−0.198 ** (0.08)	−0.014 (0.05)
CEODual	−0.282 (0.54)	−1.599 *** (0.34)	−0.155 (0.30)	−1.065 *** (0.32)	1.651 *** (0.22)	0.307 (0.32)
VotAgainst	0.037 *** (0.01)	0.113 *** (0.01)	0.119 *** (0.01)	0.102 *** (0.01)	0.032 ** (0.01)	0.101 *** (0.01)
Assets	−2.275 *** (0.31)	−1.820 *** (0.33)	−0.919 ** (0.35)	−1.515 *** (0.27)	−2.500 *** (0.31)	−1.581 *** (0.28)
Leverage	0.226 *** (0.08)	0.494 *** (0.05)	0.528 *** (0.06)	0.551 *** (0.05)	0.237 *** (0.05)	0.477 *** (0.05)
ROOA	22.040 *** (4.68)	24.461 *** (4.26)	30.177 *** (4.48)	24.669 *** (4.04)	35.491 *** (2.97)	32.529 *** (3.65)
ROE	−1.728 ** (0.75)	0.057 (0.39)	−0.381 (0.42)	0.136 (0.43)	−2.818 *** (0.44)	−1.067 *** (0.36)
TobinQ	0.207 (0.52)	−2.396 *** (0.46)	−2.966 *** (0.40)	−1.832 *** (0.50)	−1.126 ** (0.44)	−2.589 *** (0.48)
Constant	26.449 *** (4.90)	24.668 *** (4.87)	10.299 * (5.29)	19.633 *** (4.05)	30.569 *** (4.99)	19.830 *** (4.22)
No. of instruments	38	38	38	38	38	38
Wald Chi2	66,888.05 ***	205,684.31 ***	92,767.97 ***	275,825.02 ***	616,355.49 ***	2,500,000 ***
AR(1)	−3.41 ***	−3.21 ***	−3.21 ***	−3.23 ***	−3.37 ***	−3.20 ***
AR(2)	−0.65	−0.60	−0.54	−0.57	−0.57	−0.53
Sargan's test	31.55	32.47	32.87	32.58	32.72	35.40
Panel C: Companies with market capitalisation below the median						
BoardWomen	4.332 *** (0.54)					
ExecDirWomen		1.860 *** (0.46)				
CEOWoman			2.221 *** (0.38)			
PropDirWomen				4.461 *** (0.44)		
IndepDirWomen					−0.522 *** (0.12)	
SenManagWomen						−21.506 *** (1.51)
RelevantShare	−0.089 *** (0.01)	−0.075 *** (0.01)	−0.068 *** (0.01)	−0.100 *** (0.01)	−0.081 *** (0.01)	−0.127 *** (0.01)
MeetingBoard	−0.032 ** (0.01)	.045 *** (0.02)	0.060 *** (0.01)	0.065 (0.01)	0.071 *** (0.01)	0.039 ** (0.01)
CEODual	−0.294 ** (0.14)	−0.073 (0.17)	−0.109 (0.15)	−0.141 (0.14)	−0.358 *** (0.13)	0.016 (0.13)
VotAgainst	0.046 *** (0.01)	0.034 *** (0.01)	0.043 *** (0.01)	0.039 *** (0.01)	0.042 *** (0.01)	0.020 ** (0.01)
Assets	1.394 *** (0.15)	1.567 *** (0.15)	1.670 *** (0.13)	1.736 *** (0.18)	1.641 *** (0.17)	1.084 *** (0.24)
Leverage	0.028 *** (0.01)	0.042 *** (0.01)	0.032 *** (0.01)	0.034 *** (0.01)	0.035 *** (0.01)	0.030 *** (0.01)
ROOA	−4.188 *** (0.38)	−4.841 *** (0.40)	−4.651 *** (0.46)	−5.044 *** (0.35)	−5.419 *** (0.36)	−4.874 *** (0.85)
ROE	0.121 (0.08)	−0.047 (0.10)	0.129 (0.11)	0.098 (0.11)	0.054 (0.10)	−0.073 (0.09)
TobinQ	−0.071 (0.15)	−0.247 *** (0.09)	−0.225 * (0.13)	−0.174 (0.13)	−0.160 (0.12)	−0.183 * (0.10)
Constant	−11.076 *** (2.17)	−13.298 (2.20)	−15.183 (1.94)	−15.684 *** (2.39)	−13.965 *** (2.37)	−2.772 (3.05)
No. of instruments	38	38	38	38	38	38
Wald Chi2	2,360,000 ***	171,035.03 ***	139,176.11 ***	9,824.07 ***	293,32.65 ***	55,418.15 ***
AR(1)	−3.24 ***	−3.49 ***	−3.42 ***	−3.47 ***	−3.49 ***	−3.58 ***
AR(2)	−0.54	−0.56	−0.42	−0.52	−0.49	−0.64
Sargan's test	30.90	27.76	29.07	32.09	31.62	30.80

Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Standard errors are reported in parentheses.

The results presented in Table 5 demonstrate that the variables ExecDirWomen, PropDirWomen, and SenManagWomen exert a significant influence on CEOPayRatio across all three samples. However, the coefficients of the variables ExecDirWomen and SenManagWomen are positive for the total sample and the subsample of companies with market capitalisation above the median, and negative for the smaller capitalisation subsample. The variable PropDirWomen has a positive and significant coefficient in all three

samples. The BoardWomen and IndepDirWomen variables are significant and positive in the total sample and in the larger capitalisation sample, but not significant in the smaller capitalisation sample. The variable CEOWoman is not significant in the total sample but is significant in the two subsamples with different signs in the coefficients: positive in the larger capitalisation companies and negative in the smaller capitalisation companies.

The results indicate that Hypothesis 1, which posits that a higher proportion of women on the board of directors and in senior management has a negative influence on the CEOPayRatio variable, is only confirmed for companies with smaller market capitalisation in the models that include ExecDirWomen, CEOWoman, or SenManagWomen as explanatory variables. All categories of women on the board of directors and in senior management have a positive and significant effect on the CEOPayRatio in the sample of companies with higher market capitalisation.

It should be noted that, although our Hypothesis 1 predicts a negative coefficient between CEOPayRatio and the proportion of women on the board of directors and in senior management, some studies (Mahmoudian and Jermias 2022) present evidence of positive relationships between CEOPayRatio and the proportion of women on the board. Nevertheless, it is not feasible to draw comparisons with other studies, as, to the best of our knowledge, no other studies have been conducted that differentiate the presence of women on the board and in top management according to the typology established in our study, and that also consider the impact of women on the CEO-to-employee pay ratio.

The RelevantShare variable exerts a negative and statistically significant influence on CEOPayRatio in all models within the total sample and in the subsample of companies with market capitalisation below the median. However, in five of the six models within the subsample of large capitalisation companies, its effect is positive and statistically significant. Therefore, it can be concluded that ownership concentration has a positive effect on CEOPayRatio for larger capitalisation companies and a negative effect for smaller capitalisation companies. Furthermore, the sign of the coefficients of the MeetingBoard and CEODual variables differs depending on the estimated samples. Thus, the coefficients of both variables are significant and negative in the total sample and in the subsample of large capitalisation companies but are significant and positive in the subsample of companies below the median capitalisation.

The negative relationship between the frequency of annual board meetings and CEO remuneration is evidenced in the studies of Al-Najjar (2017) and Usman et al. (2019). The variable VotAgainst has a positive and statistically significant effect on the total sample and on the subsample of companies with higher capitalisation. However, it is not statistically significant in the subsample of companies with lower capitalisation. The variable Assets exerts a positive and statistically significant influence on CEOPayRatio in all models across all three samples. The results indicate that TobinQ has a positive and statistically significant influence on CEOPayRatio in the two subsamples, although this is not the case in the total sample. The positive association between TobinQ and CEOPayRatio has been previously reported by Alan et al. (2021), Crawford et al. (2021), and Mahmoudian and Jermias (2022).

The effect of Leverage, ROA, and ROE variables on CEOPayRatio is inconclusive due to the differing coefficients of these variables across the various company samples. The Leverage variable is found to be significant and positive in the subsample of companies with smaller capitalisation, and in three of the six models in the subsample with larger capitalisation. The ROOA variable is significant and positive in all models within the subsample of larger capitalisation companies, while it is significant and negative in four of the six models within the subsample of smaller capitalisation companies. The ROE variable is only significant in three models within the subsample of larger capitalisation companies, but its coefficients have a different sign in some cases.

Similarly, Table 6 presents the results of the estimated models used to test the validity of Hypothesis 2 in relation to the senior manager to employee pay ratio (SeniorManagPayRatio). In a manner analogous to that observed in Table 5, Table 6 presents the results in three panels: Panel A for all companies, Panel B for companies with market capitalisation

above the median, and Panel C for companies with market capitalisation below the median. Furthermore, six models have been estimated for the total sample and each of the two subsamples, corresponding to the six independent variables on which this study focuses.

The results in Table 6 indicate that SenManagWomen is the sole category of women that confirms Hypothesis 2 in all samples of companies, which predicts a negative relationship with SeniorManagPayRatio. The coefficients of the models that include SenManagWomen as an explanatory variable for SeniorManagPayRatio are negative and significant in all three samples. Similarly, the variables BoardWomen and PropDirWomen have a positive and significant effects on SeniorManagPayRatio in all three samples. Additionally, the variable ExecDirWomen also has a positive and significant coefficient in the two subsamples and is not significant in the total sample. The variable CEOWoman is not statistically significant in the total sample and the coefficient is positive and significant in smaller capitalisation companies but confirms Hypothesis 2 in the sample of larger capitalisation companies. The variable IndepDirWomen is significant and positive in the samples of total and larger capitalisation companies but confirms Hypothesis 2 in the smaller capitalisation sample of companies.

Hypothesis 2 is therefore confirmed by the variable SenManagWomen in all samples. It is also confirmed by the variable CEOWoman in the subsample of larger capitalisation companies and by the variable IndepDirWomen in the subsample of smaller capitalisation companies.

The effect of the control variables on the SeniorManagPayRatio variable is inconclusive. In the total sample of companies, the only significant control variables in all models are RelevantShare, VotAgainst, both with a positive coefficient, and TobinQ, which has a negative effect. The significance of the control variables RelevantShare and VotAgainst also holds in all models in the two subsamples of companies, but not in all models for the variable TobinQ.

5. Conclusions and Implications

The objective of this research is to analyse the effect of the presence of women on the boards of directors and in senior management positions on the remuneration differentials of CEOs and senior management with respect to employees. One of the two novelties of this study is that, in addition to the traditional CEO-to-employee pay ratio (CEOPayRatio) used by existing studies to date, a new variable, the senior-management-to-employee pay ratio (SeniorManagPayRatio) is incorporated to capture the difference in remuneration between senior managers and company employees. The other novelty is that our study incorporates the analysis of the effects on both ratios of six positions of women in company management: on the board of directors, executive directors, CEOs, proprietary directors, independent directors, and senior managers. The analysis is conducted on the entire sample of companies and on two subsamples, one comprising companies with a higher market capitalisation relative to the median and the other comprising companies with a lower market capitalisation.

Regarding the CEO-to-employee pay ratio, the results indicate that women in the different categories of the board of directors and in senior management positions have a significant and positive effect in companies with higher market capitalisation. However, higher proportions of female executive directors, CEOs, and senior managers have a significant and negative effect on the CEO-to-employee pay ratio in companies with lower market capitalisation. These findings suggest that an increase in the proportion of women in each category of the board, on the board as a whole, and in senior management positions leads to higher CEO-to-employee pay ratios in large companies with a high market capitalisation. However, in smaller market capitalisation companies, the effect on the CEO-to-employee pay ratio is negative when the proportion of women on the board of directors, female CEOs, and women in senior management positions increases.

The results of the study on the senior-management-to-employee pay ratio indicate that the higher proportion of women in senior management positions has a negative and significant relationship in the samples of companies with largest and smallest market

capitalisation, as well as in the total sample of companies. The results also indicate that there is a positive relationship between higher female board membership and the ratio of senior-management-to-employee compensation, but the results are inconclusive when female board membership is analysed by category. This suggests that in order to reduce the gap between senior management and employee pay in companies, it is necessary to increase the participation of women in non-board senior management roles.

This study has implications for government agencies and for future research. The first implication is that the participation of women in senior management who are not part of the board of directors should be encouraged to reduce the gap between the compensation of senior management and employees within companies. The increased participation of women in senior management positions outside the boards reduces the pay ratio between senior management and employees in all samples, and perhaps this effect can be extended in the future to reduce the relative pay of CEOs to employees. The second implication arises from the evidence of the positive effect that a greater participation of women in all board categories has on the relationships between the remuneration of CEO and employees. This suggests that women with greater power in the management of large companies may be more interested in increasing CEO pay than in reducing the pay gap with employees. The third implication is that the efforts of government agencies to increase women on boards of directors through women as independent directors have no effect on reducing either the CEO pay gap with employees or the pay gap between senior management and employees. On the contrary, the greater participation of women as independent directors has a positive effect on the two compensation ratios analysed in all the companies in the sample.

This research should be extended to other countries by including different types of women´s participation on boards of directors and in particular analysing the category of women in senior management. It should also focus less on analysing the CEO-to-employee pay ratio and more on other pay ratios between senior management and employees.

Author Contributions: Conceptualisation, M.L.G. and C.P.; methodology, M.L.G. and C.P.; software, M.L.G. and C.P.; validation, M.L.G. and C.P.; formal analysis, M.L.G. and C.P.; investigation, M.L.G. and C.P.; resources, M.L.G. and C.P.; data curation, M.L.G. and C.P.; writing—original draft preparation, M.L.G. and C.P.; writing—review and editing, M.L.G. and C.P.; visualisation, M.L.G. and C.P.; supervision, M.L.G. and C.P.; project administration, M.L.G. and C.P.; funding acquisition, M.L.G. and C.P. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: The data of this study has been collected from CNMV (https://www.cnmv.es/portal/consultas/busquedaporentidad.aspx?lang=en) (accessed on 30 January 2024) and SABI (https://login.bvdinfo.com/R0/SabiNeo) (accessed on 6 February 2024).

Acknowledgments: The authors would like to express their gratitude to the two anonymous reviewers of this journal for their constructive comments and insightful suggestions, which have greatly improved the quality of the article.

Conflicts of Interest: The authors declare no conflicts of interest.

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