DISCLOSURE OF SOCIAL INFORMATION AND WOMEN ON THE BOARD OF DIRECTORS

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ABSTRACT

Objective: the objective of this article is to verify if there is a critical mass of women to be reached in the board of directors to impact the extent of disclosure of information of a social nature and if the functional training and experience of the director in the sector of activity of the companies moderates this relationship.

Theoretical framework: the research is based on studies on how the characteristics of the members of the board of directors affect the decision-making process about the disclosure of information of a social nature, using the literature on corporate social responsibility and the theory of the mass criticism.

Method: the research is quantitative, descriptive, carried out by linear regressions with fixed effects panel data. The tests were applied to a sample of 104 publicly traded companies that voluntarily disclosed sustainability reports over a five-year period (2016 to 2020).

Results and conclusion: The main findings reveal that the presence of women on the board of directors positively affects the extent of disclosure of information of a social nature. The critical mass of 4 women or more positively impacts the extent of disclosure of social information. And, when there is a critical mass of 4 women, the extent of this type of disclosure increases by 9.95%. The board member’s functional training and experience in the company's sector of activity were not significant to moderate the relationship between the critical mass of women on the board and the extent of disclosure of information of a social nature.

Research implications: the study has implications for academia, companies and regulatory bodies, as it implies the structure, composition and functioning of boards of directors, and the advantageous knowledge of the number of women needed on boards to make a difference in the improvement of policies for dissemination of social responsibility information.

Originality/value: the research innovates by verifying the percentage of variation in the rate of disclosure of information of a social nature when there are one, two, three, four and five women on the councils; and when it includes moderation variables to verify if the individual characteristics of the council members moderate the relationship studied.

Keywords: Critical Mass, Social Dissemination, Brazil, Gender.

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DIVULGAÇÃO DE INFORMAÇÕES DE CARÁTER SOCIAL E MULHERES NO CONSELHO DE ADMINISTRAÇÃO

RESUMO

Objetivo: o objetivo deste artigo é verificar se existe uma massa crítica de mulheres a ser atingida no conselho de administração para impactar a extensão de divulgação de informações de caráter social e se a formação funcional e a experiência do conselheiro no setor de atuação das empresas moderam essa relação.

Referencial teórico: a pesquisa baseia-se em estudos sobre como as características dos membros do conselho de administração afeta o processo de tomada de decisão acerca da divulgação de informações de caráter social, utilizando-se da literatura de responsabilidade social corporativa e da teoria da massa crítica.

Método: a pesquisa é de natureza quantitativa, descritiva, realizada por regressões lineares com dados em painel de efeitos fixos. Os testes foram aplicados a uma amostra de 104 empresas de capital aberto que divulgaram voluntariamente relatórios de sustentabilidade num período de cinco anos (2016 a 2020).

Resultados e conclusão: Os principais achados revelam que a presença de mulheres no conselho de administração afeta positivamente a extensão de divulgação de informações de caráter social. A massa crítica de 4 mulheres ou mais impacta positivamente a extensão de divulgação de informações de caráter social. E, quando há uma massa crítica de 4 mulheres, a extensão desse tipo de divulgação aumenta em 9,95%. A formação funcional e a experiência do conselheiro no setor de atuação da empresa não formam significativas para moderarem a relação entre a massa crítica de mulheres no conselho e a extensão de divulgação de informações de caráter social.

Implicações da pesquisa: o estudo apresenta implicações para a academia, empresas e órgãos reguladores, pois implica na estrutura, composição e funcionamento dos conselhos de administração, e no conhecimento vantajoso da quantidade de mulheres necessárias nos conselhos para fazerem a diferença no aprimoramento das políticas de divulgação de informações de responsabilidade social.

Originalidade/valor: a pesquisa inova ao verificar o percentual de variação no índice de divulgação de informações de caráter social quando há uma, duas, três ou quatro e cinco mulheres nos conselhos; e quando inclui variáveis de moderação para verificar se as características individuais dos membros do conselho moderam a relação estudada.

Palavras-chave: Massa Crítica, Divulgação Social, Brasil, Gênero.

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1 INTRODUCTION

Corporate social responsibility (CSR) is a fundamental issue in the strategic management of companies, as it can affect their competitiveness, reduce informational asymmetry, increase stakeholder confidence, improve the company’s image and reputation and reduce the cost of capital (Bebbington et al., 2008&Patten, 2019&Richardson et al., 1999). In their strategy, companies must take into account the demand of various stakeholders, such as shareholders, employees, customers, suppliers, creditors, activists, unions, the government, among others, and interact with them, including the demand for CSR (Kent & Zunker, 2017). And, the board of directors has a relevant and significant impact on the fulfillment of corporate social responsibility, including, the disclosure of social information.

The composition and structure of a companies’ board of directors, when it brings together in a group, skills, competences and different experiences, these affect the decision-
making process of this board or group. And, in addition to these individual characteristics, the
decision-making process can also be affected by environmental factors, such as the sector in
which the company operates, organizational culture and beliefs, some sectors being more
regulated than others, competitiveness, etc. In this sense, it is believed that the presence of
women on the board of directors can impact the extent of disclosure social information, as
several studies show evidence that women are more committed to corporate social
responsibility, including the disclosure of social information. However, social psychology
indicates that if there are different members in the decision-making group, and if that minority
does not reach the majority, they cannot solve the group's decision problems (Yang et al., 2019).
Critical mass refers to the idea that a group needs to reach a certain size to affect the entire
group (Konrad et al., 2008). Thus, there is a need for a number of women, that is, a critical mass
of women on the board of directors so that they can positively impact decisions (Torchia et al.,
2011) regarding the extent of disclosure of social information. The amount of women under the
critical mass can be ignored by most members, in this case, men, and not have enough voice to
influence the decision-making process.

In this sense, the research aims to verify if there is a critical mass of women to be reached
on the board of directors to impact the extent of disclosure of social information and if the
functional training and experience of the board member in the sector in which the company
operates can moderate this relationship through the following research questions: Is there a
critical mass of women on the board of directors that impacts the extent of disclosure of
social information? And does the board of directors' functional training and experience
in the company's sector of activity moderate this relationship?

Brazil presents itself as a favorable country for carrying out this type of research, as it
has a low representation of women on the boards of directors of its listed companies, despite
the fact that women are the majority in the country according to data from the Brazilian Institute
of Geography and Statistics (IBGE) - 51.8% in 2019. According to the IBGE, the female
participation rate in the labor market in the 3rd quarter of 2021 was 54.6%, and the survey
“Women in the boardroom” carried out by Delloite Touche Tohmatsu Limited (Delloite) in
more than 10 thousand companies from 51 countries, in 2022, revealed that in Brazil women
occupy 10.4% of leadership positions, significantly lower than the global average of 19.7%. And
still, Brazil does not have any mandatory or voluntary norms, as in other countries that
adopt quota laws or the “comply or explain” approach (such as the Netherlands, Spain,
Malaysia, Italy, France, Norway, etc.), suggesting a percentage of women for the board of
directors of publicly traded companies. Even the Brazilian Corporate Governance Code, issued
by the Securities and Exchange Commission of Brazil (CVM) in 2016, does not address the
issue.

This research contributes in several ways, first, although critical mass theory is popular
in many disciplines, it is not widely used in empirical testing (Yang et al., 2019); second, it
brings innovation by verifying the percentage of variation in the rate of disclosure of social
information when there are one, two, three, four and five more women in the councils; third, it
includes moderation variables contributing to verify whether individual characteristics of the
board members moderate the relationship studied; and fourth, it exclusively considers one
dimension of CSR, the social dimension, providing an opportunity to examine the role of gender
in the social dimension of CSR. The literature on gender diversity and CSR is still emerging
and the empirical studies carried out mainly focus on the US and some European countries
(Yarram & Adapa, 2021). And finally, the results of this survey will help clarify the need for a
critical mass of women on boards of directors.

The research is organized as follows: in section 2, the literature review that supports the
research hypotheses was described; section 3 demonstrates data collection, measurement of

variables and model specification; in section 4 the descriptive and empirical results are presented, and the results are discussed; and finally, section 5 shows the final considerations, implications and limitations of the study.

2 LITERATURE REVIEW AND RESEARCH HYPOTHESES

The CSR literature has focused on why and how some companies are more socially responsible than others, using more elaborate disclosures. This literature suggests that both the structure and composition of the board of directors may partially explain these differences. Therefore, some characteristics of the board of directors may determine the extent of disclosure of company CSR information.

Several studies have identified factors that influence or determine the disclosure of information on CSR, such as board independence, board size, presence of a CSR committee, age of directors, nationality of directors, CEO duality, among other factors (Amorelli & García-Sánchez, 2020 & Calabrese & Manello, 2021 & Yang et al., 2019 & Yarram & Adapa, 2021). Empirical evidence suggests that the presence of women on the board of directors - or gender diversity among its members - present a higher likelihood of disclosing more relevant and reliable information. (Giannarakis et al., 2014). Thus, the structure of the board, specifically in terms of gender diversity, seems to be a determining factor in promoting greater disclosure of CSR, and consequently greater transparency of the actions carried out by the company.

Gender diversity on the board expands the body of knowledge used in the decision-making process, which improves the boards’ ability to exercise their strategic and monitoring roles (García-Meca et al., 2022 & Tuggle et al., 2010). According to the agency theories, senior management, signaling and legitimacy, and gender diversity on the board of directors improve independence, monitoring and the decision-making process, increases the company’s legitimacy, acceptance and reputation with its stakeholders, and also improves the company's financial performance, signaling equality, transparency and good governance (Akerlof, 1978 & Deegan, 2019 & Hambrick & Mason, 1984 & Jehn & Bezzukova, 2004 & Rhaman et al., 2022).

2.1 Women on the board of directors and CSR disclosure

The literature so far has sought to examine the contribution of women on boards of directors, taking into account that boards that are heterogeneous in terms of composition and structure perform better because their members have different points of view, professional experience, skills and abilities. Heterogeneity can be approached from the point of view of diversity, defined as the difference between the characteristics of its members (Amorelli & García-Sánchez, 2020). Diversity is a relevant factor in the decisions by the boards of directors, because it enhances and improves disclosure, transparency and the accountability processes, when it contributes with a wider range of knowledge, opinions and perspectives.

In this sense, gender diversity brings different perspectives, competences, skills and resources to boards, improving group performance and effectiveness. Social identity theory, for example, believes that women are more moral, diligent, inclusive and stakeholder-oriented, respond to social expectations, and are more sensitive to ethical issues (Bernardi et al., 2006). And, the presence and number of women on the board can indicate the company's commitment to minority groups and to a socially responsible behavior (Bear et al., 2010). A greater number of women on boards of directors is positively related to an increase in their influence on CSR decisions (Elstad & Ladegard, 2012) and the company tends to develop broader social responsibility actions (Yang et al., 2019).
Women tend to be more sensitive than men and can influence decisions about organizational practices, such as CSR reporting and performance policies (Nielsen & Huse, 2010). And more and more companies are being evaluated on the basis of their broader environmental, social and economic performance that do not involve exclusively economic objectives (Yarram & Adapa, 2021). Thus, a greater number of women on boards of directors seem to positively influence the extent of social outreach, supporting the premise that women are more aware of social demands. Women make strategic decisions from a more socially responsible perspective, improving relationships with stakeholders and their demands, and promoting ethical behavior in companies (Amorelli & García-Sánchez, 2020 & Cook & Glass, 2018). Empirical evidences suggest a positive relationship between gender diversity on boards of directors and (i) greater commitment to CSR (Cuadrado-Ballesteros et al., 2017) and (ii) greater transparency (Fernandez-Feijoo et al., 2014 & Post et al., 2011).

2.2 Women on the board of directors and critical mass theory

Despite advances and achievements in terms of representation, the integration of women on boards of directors is still incipient, and boards continue to be dominated by men, despite the emphasis given by regulators after the corporate scandals at the beginning of the 21st century (Rhaman et al., 2022). In this context, there is a tendency to pay more attention to the ideas of the majority members, in the cases of the boards of directors, men, or the solo member imitating the behavior of the majority members, resulting in their assimilation by the majority, and their views end up being just a symbolic representation or just replicating the vision of their male peers (García-Meca et al., 2022 & Yarram & Adapa, 2021).

Symbolic representation can limit opportunities for women to share their experiences or have their views seen as issues (Cook & Glass, 2018 & Kanter, 1977 & Mathisen et al., 2013). Ethical and economic arguments highlight, first, the moral failures in limiting women's opportunity and participation in leadership positions, as they also have the right to collaborate in corporate governance, and second, women's skills, abilities and experiences can significantly contribute to optimal financial results and corporate strategy formulation (Yarram & Adapa, 2021).

Thus, several studies have emphasized the numerical representation of women on boards of directors. There are two central ideas, the first one suggests that as the number of women on boards of directors increases, so does their impact on the disclosure of CSR in companies (Bear et al., 2010 & Kassinis et al., 2016); and the second core idea suggests that to allow female representation to impact board decisions, a critical mass must be reached (Ben-Amar et al., 2017 & Post et al., 2011). The latter idea rests on the argument that when critical mass exists, women will have a greater influence on the content and discussion process of decision-making, rather than having minority or symbolic representation (Yang et al., 2019 & Yarram & Adapa, 2021).

Critical mass is primarily based on the fact that minority groups may encounter barriers to expressing their opinions and being heard because they are members of an underrepresented group (Kanter, 1977). These barriers can reduce women's ability to contribute effectively to organizations, as well as limit their access to organizational resources, as well as force them into roles that limit or impede their success (Amorelli & García-Sánchez, 2020 & Kanter, 1977). From this perspective, counselors may be impeded or have their ability to contribute limited in terms of impacting decisions on disclosure policies and practices, and CSR actions. When three or more women are present on boards of directors, it is believed that their opinions and contributions are likely to be heard and supported by the majority, exerting an influence on decision-making and, consequently, on results. (Cook & Glass, 2018 & Konrad et al., 2008).
The evidences are still not consistent. Torchia et al. (2008) examined whether a greater number of women on the board would result in a substantial contribution to company innovation, and concluded that when the number of women to a consistent minority of at least three, constituted a critical mass, so that their opinions could contribute to the company's level of innovation. Konrad et al. (2008) showed that boards with three or more women raised issues considered “soft” by men, such as diversity, community or company reputation. Bear et al. (2010) found that when the number of women on the board of directors increased, so did the rates of corporate social responsibility, and companies paid more attention to the environmental consequences of their activities and their reputation (Bear et al., 2010).

Post et al. (2011) found that a critical mass of 3 women or more increased the environmental strength score in a sample of electronics and chemical companies (Post et al., 2011). Liao et al. (2018) found results that reveal a positive and significant relationship between the percentage of women on boards of directors and voluntary assurance/guarantee of corporate social responsibility reports (Liao et al., 2018). Yang et al. (2019) do not find a significant relationship between the number of directors and the critical mass of 3 women and corporate social responsibility. Yarram and Adapa (2021) found a positive and significant relationship between a critical mass of 3 women on the board and positive and negative CSR scores. In this sense, to understand the impact of women on boards of directors in the dissemination of social information, it is essential to consider their presence and their number (Fernandez-Feijoo et al., 2014 & Torchia et al., 2011). In view of the aforementioned arguments, the first research hypothesis is proposed, expecting a positive effect on the extent of dissemination of social information, when women are present on boards, examining the critical mass necessary to influence decision-making:

H1: councilwomen influence the extent of disclosure of social information when they represent a critical mass on the board of directors.

2.3 Women on boards of directors: background, skills and experience

It is assumed that the environment influences decision making, and often favors or limits behavior, attitudes and decisions of individuals, in this case, councilwomen (Johns, 2001). It is proposed here to examine in more depth the context that influences women and their commitment to the extent of dissemination of social information. In relation to the human capital of directors, several variables were identified by the literature as being relevant to the decision-making process, and in this research, functional training and experience in the company's sector of activity stand out as determinants that can impact this process (Tuggle et al., 2010). The human capital of the board of directors is associated with the different experiences, knowledge, values, origins and capabilities of its members, being resources that favor the understanding and solution of problems (Bear et al., 2010 & van der Walt & Ingley, 2003 & Yang et al., 2019).

The director's functional training and experience in the company's sector of activity can moderate the impact of a certain number of directors in decision-making regarding the disclosure of social information. The idea is to verify whether the functional training and experience in the company's sector of activity affect the ability of women to become equal members of the board of directors, because in order to evaluate and favor strategies for disseminating social information, the company needs that their advisors have sufficient knowledge, experience and skills for such a task (Hillman & Dalziel, 2003 & Michel & Hambrick, 1992). And female directors may have functional training and professional experience that offer different perspectives to increase the quality of board decisions (Hambrick...
Evidence suggests that functional training and professional experience influence decision-making and dissemination processes. Kassinis and Valfeas (2002) stated in their study that educational and functional training plays a relevant role in decisions about CSR. Chang et al. (2017) investigated whether education and professional training influence disclosure, concluding that these are determinants that impact better engagement in CSR issues. Thus, it is expected that the decision on the disclosure of information of a social nature can benefit from the functional training and professional experience of the members of the board of directors, if councilwomen are perceived as equal members of the board and can influence the extent of social information disclosure. In view of this, the second hypothesis is proposed:

**H2:** The functional training and experience of the board members in the company's sector of activity moderates the positive orientation of councilwomen to the extent of disclosure of social information when they represent a critical mass on the board.

### 3 DATA, MEASUREMENTS AND MODEL SPECIFICATION

This section presents how the data and sample formation were collected, as well as the measurements of the dependent, independent and control variables. Finally, the econometric models developed for the statistical tests are shown.

#### 3.1 Data and sample

Data were collected from reference forms (FRE), sustainability reports and financial statements of publicly traded companies registered with the Securities and Exchange Commission of Brazil (CVM) and [B] for a period of 5 years (2016 a 2020). The sample is restricted to publicly traded companies that voluntarily disclosed sustainability reports in the analyzed period, totaling 115 companies. After excluding companies with missing financial data, a final sample of 509 observations remained, with 99 companies in 2016, 101 companies in 2017 and 2018, and 104 companies in 2019 and 2020.

#### 3.2 Dependent, independent and control variables

The dependent variable is the rate of disclosure of social information (IDICS) collected through the content analysis technique, according to the social dimension of the Global Reporting Initiative (GRI). The social dimension of the GRI includes indicators on employment, labor/management relations, occupational health and safety, training and education, diversity and equal opportunities, non-discrimination, freedom of association and collective bargaining, child labor, forced or compulsory labor, safety, indigenous peoples’ rights, human rights assessment, local communities, supplier social assessment, public policy, customer health and safety, marketing and labeling, customer privacy, and socioeconomic compliance. The checklist consists of 201 items covering all these indicators. After calculating the score of disclosure items, an average of items disclosed for each year was raised, and this average represents the IDICS.

The independent variables used were the presence of women on the board, the number of councilwomen, the critical mass of councilwomen, the directors' functional training, and the
director's experience in the company's sector of activity. The variable presence of women on the board was measured using a dummy variable, coded as 1 if there is a woman on the board, and 0 otherwise (Bilimoria & Piderit, 1994). The number of female counselors was measured using two variables, as a dummy variable coded as 1 if the boards had three women or more, and 0 otherwise; and a dummy variable coded as 1 if the boards had four or more women, and 0 otherwise (Amorelli & García-Sánchez, 2020 & Torchia et al., 2011). Following previous studies regarding the specific training of the board, proxies were used to represent the functional training and experience of the board member in the company's sector of activity (Jehn & Bezrukova, 2004 & Torchia et al., 2011). The variable functional training of directors was measured through an adaptation of the Blau Index to measure the similarity of the experience of directors in the areas of management, law, accounting, auditing, operations, marketing, human resources, finance, logistics, among others (Anderson et al., 2011 & Tuggle et al., 2010). The formula to calculate the adapted similarity of the Blau Index was:

\[
Simil = 1 - [(1 - \sum_{i=1}^{n} S_i^2) \times imh]
\]  

(1)

Where \(n\) represents the number of analyzed categories, \(S_i\) represents the proportion of company members in a category, and \(imh\) represents the maximum heterogeneity index calculated by \((n-1)/n\). This index has a maximum value of 1 when the homogeneity/similarity, in fact, is maximum in contradiction to the metrics that use the proportion of members (Vasconcelos & Silva, 2020). And the variable experience of the director in the company’s sector of activity was measured through the percentage proxy of members of the board of directors that have a specific history in the company’s sector of activity (Amorelli & García-Sánchez, 2020 & Tuggle et al., 2010).

Control variables that influence the extent of voluntary information disclosure according to previous research were included (Martínez-Ferrero et al., 2019 & Torchia et al., 2011). These control variables include company characteristics, board of directors’ characteristics and sustainability report characteristics. As company characteristics, were included: a) company size, measured through the natural logarithm of gross sales for the period; b) profitability, measured through the return on equity ratio (ROE); c) indebtedness, measured as the ratio of long-term debt to total assets; and d) age of the company, measured as the natural logarithm of the number of years of existence since its constitution. As board characteristics, the following were included: a) board size, measured as the total number of board members; b) independence of the board, measured through the number of independent directors on the board; and c) nationality of the board, measured by the percentage of foreign board members. And as a characteristic of the sustainability report, the report audit variable was included, measured through a dummy variable coded as 1 for reports audited or assured by third parties, and 0, otherwise.

3.3 Models and analysis techniques

The proposed econometric models are examined using dependency techniques for panel data. Panel data set allows the study to overcome the low explanatory capacity of cross-sectional analysis and time series, considering several periods and companies, providing greater consistency and explanatory power (Hsiao, 2007). Panel data allows research to track the particular behavior and characteristics of each company that are invariant over time. And, it
leads to more informative data, greater variability, less collinearity between variables, more
degrees of freedom, and greater efficiency than cross-sectional methods or time series (Baltagi,
2005 & Gujarati, 2019). In the first model, the company is represented by \( i \) and \( t \) refers to the
period of time, and, \( \delta \) are the parameters to be estimated:

\[
IDICS_{it} = \delta_1 \text{PresMul}_{it} + \delta_2 \text{NumCons}_{it} + \delta_3 \text{CritMass}_{3it} + \delta_4 \text{CritMass}_{4it}
+ \delta_5 \text{TamEmp}_{it} + \delta_6 \text{Lucrat}_{it} + \delta_7 \text{Endiv}_{it} + \delta_8 \text{TamCons}_{it}
+ \delta_9 \text{IndepCons}_{it} + \delta_{10} \text{NacCons}_{it} + \delta_{11} \text{IdeadeEmp}_{it} + \delta_{12} \text{AudRelato}_{it} + \mu_{it}
\]

(2)

A second model was developed to examine the moderating role of directors' functional
training and the director's experience in the company's sector of activity:

\[
IDICS_{it} = \delta_1 \text{PresMul}_{it} + \delta_2 \text{FormFunc}_{it} + \delta_3 \text{ExpCons}_{it} + \delta_4 \text{NumCons}_{it}
+ \delta_5 \text{CritMass}_{3it} + \delta_6 \text{CritMass}_{4it} + \delta_7 \text{CritMass} \times \text{FormFunc}_{it}
+ \delta_8 \text{CritMass} \times \text{ExpCons}_{it} + \delta_9 \text{TamEmp}_{it} + \delta_{10} \text{Lucrat}_{it} + \delta_{11} \text{Endiv}_{it}
+ \delta_{12} \text{TamCons}_{it} + \delta_{13} \text{IndepCons}_{it} + \delta_{14} \text{NacCons}_{it} + \delta_{15} \text{IdeadeEmp}_{it}
+ \delta_{16} \text{AudRelato}_{it} + \mu_{it}
\]

(3)

A third model was developed to verify the impact of the number of women on the extent
of dissemination of social information, in order to reinforce the argument of critical mass. For
this, we chose to develop an econometric model with qualitative regressors using dummy
variables that assume values 0 and 1, where 0 indicates the absence of the attribute and 1
indicates its presence. The model with qualitative regressors used was:

\[
IDICS_{it} = \delta_1 \text{CritMass}_{it}
+ \delta_2 \text{FormFunc}_{it} + \delta_3 \text{HistEsp}_{it} + \delta_4 \text{ExpCons}_{it} + \delta_5 \text{CritMass} \times \text{FormFunc}_{it}
+ \delta_6 \text{CritMass} \times \text{HistEsp}_{it} + \delta_7 \text{CritMass} \times \text{ExpCons}_{it} + \delta_8 \text{Temp}\_it + \delta_9 \text{Lucrat}\_it
+ \delta_{10} \text{Endiv}_{it} + \delta_{11} \text{TCons}\_it + \delta_{12} \text{NAtiv}_{it} + \delta_{13} \text{IndCons}_{it} + \delta_{14} \text{NacCons}_{it} + \mu_{it}
\]

(4)

In the model, \( IDICS \) represents the index of disclosure of social information; \( \delta_1 \)
represents the reference category, or, no women on the board of directors; \( \delta_2 \text{UmaMul}_{2it} \)
demonstrates the presence of only one woman on the board of directors during the period,
represented by dummy 1, and 0, otherwise; and the variables \( \text{DuasMul}, \text{TrêsMul}, \text{QuatroMul}, \text{CincoMulMais} \) represent the presence of the indicated number of women through the dummy
1, and 0, otherwise.
4 RESULTS AND DISCUSSIONS

This section presents descriptive analyses, correlations and multivariate analysis, as well as discussions about the research findings.

4.1 Descriptive results

Table 1 presents descriptive statistics and correlations for all variables analyzed. The descriptive statistics shown in Panel A show that the average disclosure of social information is 23.32%, the highest rate of disclosure was 58.71% and the lowest rate of disclosure was 0%. Note that the average disclosure is low, however, if we compare with other research, for example, Yang et al. (2019) reports that Chinese companies disclose an average of 38.598% of CSR information. Yarram and Adapa (2021) show that on average Australian companies disclose 42.5% of CSR information. Amorelli and García-Sánchez (2020) found that companies from 26 different countries, including Australia, Canada, Germany, Belgium, UK, USA and others, disclose an average of 14.779% of CSR information. It can be seen that the average disclosure of companies registered with the CVM and listed in [B]³ is not so far from the averages of other countries. In 61.49% of the companies sampled there are women on the boards, with an average of 1.18 women per board. In 14.34% of the companies there is an average of three women or more on the boards and in 7.27% there is an average of four women or more. On average, 17.54% of the directors have similar/homogeneous functional training, and 21.22% of these directors have experience in the company's sector of activity.

The correlation matrix presented in Table 1, Panel B, shows that there is no high correlation between the independent variables that could alter the results of the proposed models. It is noteworthy that the variables number of counselors and critical mass of 3 women or more showed a correlation of 0.812. However, because the value is very close to 0.8, it is assumed that it does not violate any regression assumption, since, according to Gujarati (2019) even in cases of quasi-multicollinearity, ordinary minimum square estimators will still retain the property of better unbiased linear estimators.

4.2 Multivariate results

The results of the regression models with panel data were obtained using the Gretl 2022a software. Regression models with panel data with fixed effects were used, since both the Breush-Pagan test and the Hausman test indicated the fixed effects as the most appropriate. An unbalanced panel was used, when some units are not observed in each period, and a short panel was used in which the number of individuals is greater than the number of analyzed periods (Fávero, 2013). A one year distributed lag model was used, as the independent and control variables may have behavioral implications beyond the period in which they occurred (Gujarati & Porter, 2011 & Wooldridge, 2018). In order to correct any heteroscedasticity problems, the models were tested using robust standard errors (HAC). The results of models 1 and 2 are shown in Table 2.
Table 1 – Descriptive statistics and correlation matrix of the variables used in the research

<table>
<thead>
<tr>
<th>PANEL A</th>
<th>Variables</th>
<th>Mean</th>
<th>Median</th>
<th>Standard Deviation</th>
<th>Minimum</th>
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**Source:** Prepared by the authors (2022)
Model 1 was designed to test hypothesis 1, whether the councilwomen influence the extent of disclosure of social information when they represent a critical mass in the board of directors, demonstrating that the independent variables included in the model explain 80.73% of the variation in the extent of disclosure ($R^2=0.8073$). The explanatory variables presence of women ($p=0.0266$) and critical mass of 4 women or more ($p=0.0002$) were significant and positive. Supporting the hypothesis that when reaching a critical mass of 4 or more women, they can influence the dissemination of social information, and here, this influence is positive, that is, when a critical mass of 4 women or more is reached, there is an increase in the extent of dissemination of social information. In fact, the very presence of women on the board of directors already has a positive effect, that is, an increase in the extent of disclosure of social information.

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$R^2$ LSDV                                           | 0.807285  | 0.810990|
| Standard regression error                           | 0.075178  | 0.074972|
| Verisimilitude Log                                  | 541.7642  | 545.6947|
| R-square (Inside)                                   | 0.151784  | 0.168089|
| Schwarz Criteria                                    | -387.0775 | -370.9230|
| Akaike Criteria                                     | -851.5284 | -851.3895|
| Rho                                                 | -0.055665 | 0.075984|
| Hannan-Quinn Criteria                               | -667.6899 | -661.2117|
| Durbin-Watson                                       | 1.367063  | 1.401898|

Significance levels: *$p<0.10$ (10%); **$p<0.05$ (5%); and ***$p<0.001$ (1%).

Source: Prepared by the authors (2022)

It can be seen that when the critical mass of 4 women or more is reached, the idea that women are perceived as equals within the group is supported, and therefore they are heard and included in the decision-making process about social disclosure policies (Amorelli & Garcia-
Sánchez, 2020 & Bratton, 2005). It is noteworthy that only 37 boards of directors had a critical mass of 4 women or more in a dataset of 509 observations. This result supports the evidence reported by Konrad et al. (2008), Post et al. (2011), Cook and Glass (2018) and Yarram and Adapa (2021) that there is a positive and significant relationship between a critical mass of councilwomen and CSR, emphasizing that the critical mass is based on the minimum amount necessary to cause a reaction (Oliver, 2013), and in this sense, the critical mass can be 3, 4 or more women, as long as it is reached, it can provide the inclusion of women in the decision-making process of the board of directors.

The variable number of women on the board is significant (p=0.0115), but negative, indicating that when there is an increase in the number of women on the board, there is a reduction in the extent of disclosure. The explanation for this result comes from the critical mass that as the number of women increases within the board, they become a threat to the dominant members, that is, men, causing dissatisfaction and tension in the decision-making process (Bratton, 2005). Or, when there is the inclusion of only symbolic representation, women can imitate male behavior (Yarram & Adapa, 2021). This result does not support previous evidence, such as Yarram and Adapa (2021) and Bear et al. (2010) who found a positive and significant relationship between the increase in women on the board and CSR indices/scores.

The control variables company size (p=0.0272), indebtedness (p=0.0591), company age (p=0.0005) and report audit (p=0.0122) are significant and positive, all influencing the increase in the extent of disclosure of social information. The size of the board (p=0.0790) was significant and negative, indicating that the more members the board of directors has, the smaller the extent of social information disclosed. The other variables were not significant.

Model 2 was designed to test hypothesis 2, whether the functional training and experience of board members in the company's sector of activity moderate the positive orientation of female directors to the extent of disclosure of social information when they represent a critical mass in the board. The independent and moderating variables included in the model explain 81.10% of the variation in the extent of disclosure ($R^2=0.81099$). In this model, the only significant explanatory variables were the presence of women on the board (p=0.0266) and number of women on the board (p=0.0193), being positive and negative, respectively. The critical mass of 4 women or more than in model 1 was significant, in model 2 it loses its effect with the inclusion of the variables functional training and experience of the board member in the company's sector of activity, and the inclusion of interaction variables (critical mass of 4 women x functional training and critical mass of 4 women x sector experience).

The new explanatory variables included in model 2, functional training (p=0.1105), board member's experience in the company's sector of activity (p=0.7993), critical mass of 4 women x functional training (p=0.2902) and critical mass of 4 women x sector experience (p=0.8125) were not significant, indicating that the councilwoman's functional training and the councilwoman's experience in the company's sector of activity does not make women seen as more equal before men in boards, being more listened to and participating more in decision-making processes (Amorelli & García-Sánchez, 2020). And, even though, the functional training and experience of the councilwomen combined with the critical mass does not affect the extent of dissemination of social information. This result can be explained by the fact that when women arrive in directorship or presidency positions, they reject female stereotypes and adopt male stereotypes, thus there is no distinction between genders in terms of commitment to CSR (Amorelli & García-Sánchez, 2020 & Nielsen & Huse, 2010). Critical mass also explains negative results, because as the number of women increases, it can provoke a reaction, becoming a threat to the dominant members (men), and tension and dissatisfaction are greater.
in groups in which there are several women, but not enough to balance the numbers (Bratton, 2005).

The control variables, in the application of model 2, company size (p=0.0476), company age (p=0.0003) and report audit (p=0.0117) were significant and positive, indicating that they increase the extent of disclosure of social information. The board size variable (p=0.0748) was significant and negative, indicating that when the number of board members increases, the tendency is for a reduction in the extent of this type of disclosure. The other variables were not significant in the model.

Model 3, an econometric regression model with fixed effects panel data with qualitative regressors with dummy variables and the regression log was applied to obtain the variation in the disclosure of social information when women on the board increased (none, one, two, three, four and five or more). In this type of regression, to obtain the percentage variation, one has to apply the antilog of the coefficient of the dummy variable, and after subtracting this result from 1, and finally, just multiply the difference by 100 (Wooldridge, 2018). Following this procedure, the percentages shown in Table 3 were obtained. These percentages represent the variation in the rate of disclosure of social information when the number of women on the board of directors of the analyzed companies increases.

| Table 3 – Result of regression with panel data with qualitative regressors |
|-----------------------------------|---------|---------|----------------|----------------|
| **Variable**                      | **Coefficient** | **p-value** | **Antilog Result** | **% of Increase or Reduction** |
| Const                             | -0.69347 | 0.0000  | 0.50016          | 50.02           |
| One woman on the board            | 0.034812 | 0.4245  | -0.03543         | -3.54           |
| Two women on the board            | 0.043512 | 0.3861  | -0.04447         | -4.45           |
| Three women on the board          | 0.005639 | 0.9365  | -0.00565         | -0.57           |
| Four women on the board           | -0.104819| 0.4726  | 0.09951          | 9.95            |
| Five or more women on the board   | 0.124513 | 0.3659  | -0.13260         | -13.26          |
| **R² LSDV = 0.7007**              |          |         | **R² (Inside) = 0.009507** | **Durbin-Watson = 1.3912** |

**Source:** Produced by the authors (2022)

The constant coefficient is the reference and represents the percentage of disclosure when there is no woman on the board of directors. Based on this reference percentage, it can be seen that when there is one woman, two women and three women on the board, the extent of disclosure of social information is reduced by -3.54%, -4.45% and -0.57%, respectively. However, when a critical mass of four women is reached, there is an increase in the extent of disclosure of social information of 9.95%, which corroborates the result of the regression of data in model 1 panel, in which the critical mass of women to positively affect the extent of disclosure of social information is 4 women or more. However, when there are five or more women on the board, there is a reduction in the extent of disclosure of social information of -13.26%. It is believed that the fact of having grouped five or more women in the same category may have influenced this result, which requires further investigation.

### 5 CONCLUSION

The objective of the research was to verify if there is a critical mass of women to be reached on the board of directors to impact the extent of disclosure of social information and if the functional training and director's experience in the company's sector of activity moderate...
this relationship. Our findings indicate that the presence of women on the board of directors positively affects the extent of disclosure of social information. And, that a critical mass of 4 women or more exerts a significant influence on the extent of that disclosure. When the board has 4 women in its composition, the extent of disclosure of information of a social nature increases by 9.95%. Critical mass refers to the smallest amount needed to sustain a chain reaction, and has its foundation in nuclear physics. Here, it can be said that the critical mass is the smallest amount of women needed to affect the decision-making process about the extent of disclosure of social information, and based on our sample, 4 women or more are needed to influence this decision-making process.

It should be noted that in our sample, the functional training and director's experience in the company's sector of activity were not significant, and that the functional training and councilwomen's experience in the company's sector of activity based on critical mass was also not significant, which can be explained by the similarity between men and women members of the boards, since the functional training and sector experience were measured based on the similarity/homogeneity between the members.

This research contributes to the literature in several ways. First, the relationship between women as board members and voluntary information disclosure is not yet established in the literature and empirical evidence is inconclusive. Second, it reinforces the understanding of studies already carried out on the theory of critical mass in the fields of corporate social responsibility and corporate governance, bringing relevance to the number of women in the composition and structure of boards of directors. Third, it evaluates the moderating role of functional training and the director's experience in the company's sector of activity and its relevance in moderating the relationship between critical mass and the dissemination of social information.

The study has some implications for academia, companies and regulatory bodies. For the academy, the study implies the structure, composition and functioning of the boards, because, through previous experiences, women bring skills, competence and specialized resources that contribute to the decision-making process, making it more productive and effective. However, a merely symbolic representation does not actually contribute to corporate governance. For companies, it implies the advantage of knowing the necessary number of women on boards so that they can make a difference in improving CSR information disclosure policies. And, when CSR information disclosure policies are improved, previous evidence indicates benefits such as greater profitability, lower cost of capital and improvement in the image and reputation of these companies.

For regulators, the study provides evidence on the number of female advisors needed by boards to make a difference in the decision-making process, specifically, in light of the global trend towards mandatory inclusion of women on the boards of directors of publicly traded companies. Several countries, such as Norway, Germany, Spain, Belgium, France, Portugal, Austria, Iceland, the Netherlands and Italy have already adopted mandatory quotas for women on boards of directors by the end of 2018, however, the percentage is still not a consensus and remains low. And other countries such as the US, Australia, Malaysia and the UK still focus on voluntary principle-based approaches, such as the Corporate Governance Code adopted based on a “comply or explain” approach. And policies aimed at improving diversity and gender equality in leadership positions should be encouraged, as it actively contributes to improving the CSR of companies.

In Brazil, there is Bill 785/2021 with the aim of adopting mandatory quotas in a percentage of 30% for publicly-held companies, public companies, mixed capital companies and their subsidiaries and controlled companies, however, the project is awaiting approval, and there is no set date for it to happen. The Brazilian Corporate Governance Code – Publicly-held
Companies issued by the CVM under the “apply or explain” approach does not include the indication of voluntary quotas for women to the boards of directors. Advocates of mandatory quota laws argue that these are more effective than voluntary or self-regulatory approaches as, after the implementation of quota laws in European countries, companies have increased gender diversity on boards, from 12% in 2010 to 23% in 2016, according to European Union data.

The study has limitations. The sample consists only of publicly traded companies registered with the CVM and that voluntarily disclosed the sustainability report, therefore, in order to generalize the findings, it is recommended that the evidence in other publicly traded companies and medium and small companies be explored. It should be taken into account that some CSR dimensions or indicators may be more relevant for certain directors than for others. This research did not explicitly consider cultural and legal differences, and therefore, the conclusions should not be applied to companies from different legal and cultural backgrounds than the sample. It is suggested for future research that they test with different or the same moderating variables, however, using different proxy.

REFERENCES


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