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DIGITALNI AKADEMSKI ARHIVI I REPOZITORIJI

Gender diversity in the boardroom and earnings management during the period of the COVID-19 crisis*

Toni Šušak¹, Tomislava Pavić Kramarić², Marijana Bartulović³

Abstract

This paper investigates the effect of the COVID-19 crisis on the relationship between gender diversity in management and supervisory boards and the level of earnings management. The research sample comprised companies listed on the Croatian national stock exchange, and the panel data was obtained for the 2015-2020 period to estimate regression models. Findings indicated that the presence and higher share of female directors on management boards were beneficial for curtailing earnings management but only for the financial statements disclosed during the first year of the COVID-19 pandemic. At that time, such effort was vital due to the escalation of earnings management caused by extremely pessimistic economic expectations. In the financial statements disclosed during the second year of the pandemic, the level of earnings management considerably declined, and female directors were not as effective in restraining these activities as in the first year. It could imply greater prudence of female directors when anticipating the intensity of public scrutiny regarding financial statements in a period of crisis. Gender diversity in supervisory boards proved to be an insignificant determinant of earnings management during the COVID-19 crisis.

Keywords: COVID-19 crisis, boardroom, earnings management, gender, diversity

JEL classification: G01, M41, G32, J16, M14

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1. Introduction

Numerous research papers argued that gender diversity or female representation in the boardroom per se positively influences corporate performance.. It is widely held view that women possess superior monitoring capabilities and strong motivation to limit opportunistic activities (Zalata et al., 2021), they are more cautious and risk-averse (Li et al., 2021), they enhance the board's advisory efficiency (Kim and Starks, 2016), their presence increases transparency reducing information asymmetry (Srinidhi et al., 2011), it is less likely for women to have attendance problems (Adams and Ferreira, 2009). Furthermore, women are associated with more creative companies' strategies (Campbell and Mínguez-Vera, 2008), and they are more sensitive to ethics (Ghaleb et al., 2021) which are the attributes that should consequently lead to enhanced performance.

However, the findings of the relevant literature on this issue are ambiguous. Specifically, papers by Carter et al. (2003), Campbell and Mínguez-Vera (2008), Miller and del Carmen Triana (2009), Low et al. (2015) find board diversity to have a positive influence on corporate performance. Adams and Ferreira (2009) find the negative impact of diverse boards on company performance, whereas Rose (2007) finds gender diversity in the boardroom to be an insignificant determinant of company performance. Findings by Ho et al. (2015) support the view that gender diversity increases the integrity of financial reporting, while Cumming et al. (2015) add that females have a lower propensity to commit fraud. In this context, and having in mind all the unique features of female executives stated above, it is considered important to investigate their potential impact on earnings management, which is deemed as a "legal and very effective method of accounting techniques and may be used to obtain specific objectives of the enterprises involving the manipulation of accruals" (Kliestik et al., 2020: 372).

In terms of scarce literature relating to the impact of gender diversity in the boardroom on earnings management practices, Srinidhi et al. (2011) find a positive impact of board gender diversity on earnings quality in the sample of US companies. Moreover, Li et al. (2021) find support for the thesis that female presence on supervisory boards and executives in Chinese companies constrain real earnings management during both bear and bull periods which was not the case with management boards although women acting as executives (without chief executive officers and chief financial officers) limit earnings manipulation. However, Arioglu (2020) shows that the presence of women on companies' boards does not impact their earnings management. Zalata et al. (2021) find that the presence of women directors with financial education in auditing committees enhances earnings quality and that in the crisis period, the presence of women per se constrains earnings management. While studying the corporate social responsibility reporting practices on the sample of Jordanian-listed companies, Ghaleb et al. (2021) find that board gender significantly mitigates, either directly or indirectly, earnings manipulation activities.

After taking previous research into consideration and including the COVID-19 crisis in the primary relationship, research hypotheses were established as follows:

- H1a. *There is a statistically significant negative effect of the first year of the COVID-19 crisis on the relationship between the gender diversity of management boards and earnings management.*
- H1b. *There is a statistically significant negative effect of the first year of the COVID-19 crisis on the relationship between the gender diversity of supervisory boards and earnings management.*
- H2a. *There is a statistically significant negative effect of the second year of the COVID-19 crisis on the relationship between the gender diversity of management boards and earnings management.*
- H2b. *There is a statistically significant negative effect of the second year of the COVID-19 crisis on the relationship between the gender diversity of supervisory boards and earnings management.*

Due to the specific characteristics and skills inherent in women, but primarily due to their superior monitoring capabilities, it is believed that the presence of women in the boardroom mitigates earnings management. Therefore, the aim of this study is to explore the influence of gender diversity in the boardroom of Croatian listed companies on their earnings management during the COVID-19 crisis, including both the management board and the supervisory board. The COVID-19 pandemic represents a major global health threat in recent decades causing unfavourable social as well as economic consequences. Suspension of activities has hit many companies and their existence, having significant financial reporting effects emphasizing the significance of complete and quality disclosure of financial information (Lassoued and Khanchel, 2021).

This research adds to the scientific thought firstly due to the fact that gender diversity in the boardroom and its role in the context of earnings management is a rather under-investigated area. It holds true particularly for an emerging economy such as the Croatian one, due to the fact that earnings management practices are more prevalent in companies in emerging markets (Zweig, 2019, Ghaleb et al., 2021). In addition, the appointment of women directors in the boardroom of Croatian companies is on a voluntary basis. Besides filling the gap with a kind of research that has not been conducted on a sample of Croatian companies so far, it sheds new evidence on the presence of female directors on the both management and supervisory board and corporate earnings quality, enriching existing literature in this way. Moreover, as the timeframe covered with the analysis encompasses the financial crisis period caused by the coronavirus pandemic when companies' financial reporting practices were under intensified scrutiny by investors, regulators as well as the general public, the analysis provided a useful insight into whether female representation in the boardroom

constrains companies' opportunistic practices in such environment. The comparative analysis between the first year and the second year of the pandemic proved to be insightful in terms of the divergence of the attitudes adopted by the female directors. Furthermore, since earnings management can be determined by a number of factors these were also controlled for in our research.

The rest of the manuscript is structured as follows. After the introductory section, which discusses the theoretical framework focusing on the importance of female representation in the boardroom and companies' earnings management practices, the literature review follows. The third and fourth sections provide methodology, empirical data, statistical analysis, and robustness analysis. The fifth section deals with the discussion of research results and analysis. The conclusion follows in the sixth section.

2. Literature review

The literature relating the impact of gender diversity in the boardroom on earnings management practices is scarce, and research results are inconclusive. Some authors (for example, Srinidhi et al. 2011, Li et al., 2021, Zalata et al., 2021, Ghaleb et al., 2021...) confirm that female presence positively impacts earnings quality and constraints of real earnings management, while others like Arioglu (2020) and Hili and Affes (2012) argue that gender diversity in companies' boards does not impact their earnings management practices. This section presents the most relevant studies for research design and establishment of the hypotheses.

Peni and Vähämaa (2010) focused on the impact of chief executive officers' and chief financial officers' gender on reporting quality. The research carried out on a sample of S&P 500 companies indicates the presence of income-decreasing activities in companies with female chief financial officers, supporting the thesis that women in positions of the chief financial officer are more conservative when choosing financial reporting strategies. On the contrary, the chief executive officers' gender was not significantly related to earnings management practices. Srinidhi et al. (2011) have found a positive relation between the board's gender diversity and earnings quality using a sample of US companies. Research on this issue in the emerging market of Kazakhstan was performed by Orazalin (2020). The research sample included public companies in the period from 2010 to 2016. According to the results, board gender diversity is an effective constraint of earnings management activities (Orazalin, 2020). Li et al. (2021) analyzed the influence of gender diversity in supervisory boards and executives on real earnings management in the period from 2000 to 2017 in a sample of Chinese companies which was divided into bull and bear period sub-samples. Research results confirmed the thesis that female presence in supervisory boards and

executives of Chinese companies limits real earnings management during both analyzed periods. Moreover, no relation was found in the case of management boards. Additionally, results suggest that women acting as executives (without chief executive officers and chief financial officers) are more likely to limit earnings manipulation. Research performed by Ghaleb et al. (2021) found, on a sample of Jordanian-listed companies in the period from 2011 to 2016, that board gender diversity negatively impacted real earnings management practices. These results have emphasized the added value of having female directors in a boardroom in terms of monitoring capacities and ethical behaviour regarding disclosed financial statements (Ghaleb et al., 2021), which results in improved earnings quality. Zalata et al. (2021) focused on the financial background of female directors in audit committees and analyzed its impact on earnings quality and earnings management practices in a sample of US companies in the period from 2007 to 2013. Authors have concluded that enhanced earnings quality is not the result of gender differences, but female directors' financial background.

Some authors, such as Arioglu (2020) or Hili and Affes (2012) showed opposite results and did not prove a connection between female board members and earnings management activities. Arioglu (2020), who used a sample of Turkish listed companies in the 2009-2017 period, suggested that female directors' inclusion on boards does not impact earnings management practices. Similar results were obtained by Hili and Affes (2012) on a sample of French-listed companies, indicating insignificant differences regarding earnings persistence or earnings management practices regarding gender diversity in corporate boards. Due to inconsistent research conclusions in this area, the question of the impact of board gender diversity on earnings management practices is still under debate, especially in the case of an emerging economy such as Croatian.

3. Methodology

In this section, the models applied to estimate the level of earnings management and to show gender structure in a boardroom are presented. Discretionary accruals were measured using the Modified Jones Model, while the share of women on boards, the Blau index, the Shannon index, and binary variable showing if there was at least one woman in the boardroom are used as measures for the gender structure of a boardroom.

3.1. Measurement of Earnings Management

There are various methods of estimating earnings management, but among those that are the most commonly used are the Jones Model (Jones, 1991) and the Modified Jones Model (Dechow et al., 1995). Thus, the research model's dependent

variable was estimated using the later version, which, if compared to its preceding model, is modified to alleviate measurement error related to revenues (Dechow et al., 1995).

Discretionary accruals were estimated by subtracting non-discretionary accruals from total accruals to measure earnings management (Bzeouich et al., 2019). Non-discretionary accruals of the Modified Jones Model can be expressed with the following equation (Orazalin, 2020):

$$\frac{TA_t}{A_{t-1}} = \alpha_1 \left(\frac{1}{A_{t-1}} \right) + \alpha_2 \left(\frac{\Delta REV_t - \Delta REC_t}{A_{t-1}} \right) + \alpha_3 \frac{PPE_t}{A_{t-1}} + e_{i,t} \quad (1)$$

where ‘ TA_t – total accruals, measured as the difference between net profit and operating cash flows from activities; A_{t-1} – total assets at the end of year t-1; ΔREV_t – the difference in operating revenues in year t and year t-1; ΔREC_t – the difference in net receivables in year t and year t-1; PPE_t – property plant and equipment at the end of year t’ (Orazalin, 2020: 45).

Absolute discretionary accruals are applied in this research based on the approach applied in previous research (Warfield et al., 1995; Gabrielsen et al., 2002; Barth et al., 2008, in Orazalin, 2020), in order to take into account both downward and upward earnings management (Orazalin, 2020). The lower value of this indicator is more desirable given that it signifies higher financial reporting quality (Kim and Jeong, 2018).

3.2. Measures for the Gender Structure of a Boardroom

Board composition has gained substantial attention from researchers in recent decades, which is true, particularly for the gender composition of the board. To analyse how this demographic characteristic affects earnings management, the authors employed a set of gender-oriented variables in the analysis as used in previous relevant studies, including the share of women on boards, Blau index, Shannon index, and binary variable if there is at least one woman in the boardroom. The share of women is calculated as the proportion of female board members in the total number of board directors following Saona et al. (2019), Ghaleb et al. (2021), Li et al. (2021) and Zalata et al. (2021).

Furthermore, in order to account for gender diversity in the board room the Blau index was included following Saona et al. (2019) and Fan et al. (2019) as well as studies dealing with company performance such as Campbell and Mínguez-Vera (2008), Miller and del Carmen Triana (2009), Joecks et al. (2013), Kılıç and Kuzey (2016) and Li and Chen (2018). Based on previously mentioned studies, the Blau index is computed using the following formula:

$$\text{Blau index} = 1 - \sum_{i=1}^n p_i^2 \quad (2)$$

where p_i stands for the share of male and female directors and n represents the total number of board members. The Blau index ranges between zero, if there are no women in the boardroom, and 0.5 in case there is an equal number of male and female board members.

Furthermore, the Shannon index is used in the analysis to reflect gender diversity based on the papers by Campbell and Mínguez-Vera (2008), Saona et al. (2019), Dobija et al. (2021). Based on these studies, the Shannon index is calculated as follows:

$$\text{Shannon} = - \sum_{i=1}^n p_i * \ln(p_i) \quad (3)$$

where, once again, p_i represents the proportion of board directors in each category, i.e. proportion of male and female directors and n stands for the total number of board members. The Shannon index reaches its minimum value of zero when there is no diversity in the boardroom and a value of 0.693 when both categories, i.e. genders are equally represented in the boardroom. Since the value of the natural logarithm of zero is not defined, in the case when the share of women equals zero, the authors have followed an approach suggested by Campbell and Mínguez-Vera (2008) who applied the convention that in that case the expression $p_i \ln(p_i)$ equals 0.

Since all these gender-specific variables mentioned above are measured as continuous variables, as suggested by Zalata et al. (2021) high percentages might suggest a higher number of female directors, but also a smaller number of total board directors with the number of female board members remaining the same. Thus, to consider the mere presence of women on board, the binary or dummy variable, which equals one in case there is at least one female board member and zero otherwise, is employed in the analysis.

4. Empirical data and analysis

The research data was collected from secondary sources related to the large listed Croatian companies legally organised as public limited companies (PLCs) available at the Zagreb Stock Exchange official website. Two categories of data were used – financial data required for measuring earnings management construct, as well as for the financial ratios included in the research model as control variables and non-financial data on the gender structure of management and supervisory boards. The entire population of 103 Croatian PLCs listed on the Zagreb Stock Exchange on the 1st of October 2020 was considered for the sample. Companies that have

operated in sector K – Financial and insurance activities according to the National Classification of Activities (Official Gazette, 2007) were eliminated from the sample due to the accounting differences (Bzeouch et al., 2019), as well as the companies with unavailable financial data in the research period. All companies that operated in an activity that had not met the conventional minimum requirement of at least six companies were also excluded (DeFond and Jiambalvo, 1994; Subramanyam, 1996, in Yang and Krishnan, 2005). Therefore, the final research sample comprised data for 53 companies over the six-year period from 2015 to 2020. Similar to research conducted by Kim and Jeong (2018) and Du et al. (2016), the winsorisation procedure at 1 percent and 99 percent was applied for all the continuous variables to decrease the impact of outliers.

According to the hypotheses, the following research models were constructed:

$$aDACC_{it} = \beta_0 + \beta_1 * M_{it} + \beta_2 * M * C_{it} + \beta_3 * BF_{it} + \beta_4 * CS_{it} + \beta_5 * PF_{it} + \beta_6 * LV_{it} + e_{it} \quad (4)$$

$$aDACC_{it} = \beta_0 + \beta_1 * S_{it} + \beta_2 * S * C_{it} + \beta_3 * BF_{it} + \beta_4 * CS_{it} + \beta_5 * PF_{it} + \beta_6 * LV_{it} + e_{it} \quad (5)$$

where aDACC stands for absolute discretionary accruals which were used for measuring the level of earnings management in financial statements, M represents four measures of management boards' gender diversity, S represents four measures of supervisory boards' gender diversity, C represents two dichotomous variables indicating in which year after the declaration of the COVID-19 pandemic financial statements were disclosed – the first year starts after 11th March 2020 when global COVID-19 pandemic was declared (Cucinotta and Vanelli, 2020) and ends on 31st December 2020, while the second year starts on 1st January 2021 and ends on 31st December 2021, CS is the size of a company, PF represents profitability measured by return on assets, LV is leverage, and BF is the dichotomous variable indicating if a company was audited by a Big Four auditor.

Table 1: Variable measurement

Abbreviation	Variable	Definition
aDACC	Absolute discretionary accruals	Discretionary accruals are calculated using the Modified Jones model elaborated in section 3.2.
C1	The first year of the COVID-19 pandemic	1 denotes companies that disclosed their annual financial statements during the first year of the COVID-19 pandemic (from 11 th March 2020 to 31 st December 2020), 0 denotes other periods included in the sample
C2	The second year of the COVID-19 pandemic	1 denotes companies that disclosed their annual financial statements during the second year of the COVID-19 pandemic (from 1 st January 2021 to 31 st December 2021), 0 denotes other periods included in the sample
M1	Presence of women in management board	1 denotes at least one female director in a management board, 0 denotes a management board without female directors
M2	Share of women in management board	% of female directors in a management board
M3	Blau index for management board	Computed for management boards using the formula presented in section 3.3.
M4	Shannon index for management board	Computed for management boards using the formula presented in section 3.3.
S1	Presence of women in supervisory board	1 denotes at least one female director in a supervisory board, 0 denotes a supervisory board without female directors
S2	Share of women in supervisory board	% of female directors in a supervisory board
S3	Blau index for supervisory board	Computed for supervisory boards using the formula presented in section 3.3.
S4	Shannon index for supervisory board	Computed for supervisory boards using the formula presented in section 3.3.
BF	Big Four audit firm	1 denotes that a company was audited by a Big Four audit firm, 0 denotes that a company was audited by a non-Big Four audit firm
CS	Company size	Natural logarithm of total assets
PF	Profitability	Return on assets (net profit/total assets)
LV	Leverage	Total liabilities/total assets

Source: Authors' creation

Having in mind the fact that earnings management can be affected by other factors and following the previous research (Lakhal et al., 2015; Du et al., 2016; Damak, 2018; Orazalin, 2020; Mnif and Cherif, 2021), the authors have employed a set of control variables – the size of a company (CS), profitability measured as return on assets (ROA), leverage (LV), and a variable indicating the size of an audit firm (BF).

Sixteen regression models were estimated. Models 1-8 were focused on the financial statements disclosed during the first year of the COVID-19 pandemic, while Models 9-16 were focused on the financial statements disclosed during the second year of the pandemic. Models 1-4 and 9-12 were estimated using measures for gender diversity of management boards, while Models 5-8 and 13-16 were estimated using identical measures for supervisory boards. Panel analysis was applied to estimate regression models and the Hausman test was utilised to decide on which type of panel regression model was more suitable – the fixed effects model or the random effects model (Khan et al., 2019; Orazalin, 2020). For the purpose of statistical analysis and generating regression models, R statistical software (R Core Team, 2022) was applied, as well as three packages that are the prerequisite for its functionality in the context of this research – the stargazer (Hlavac, 2022), The plm Package (Croissant and Millo, 2008) and the car package (Fox and Weisberg, 2019). PAST 3.16 (Hammer et al., 2001) was used for the estimation of correlation coefficients.

Measures of descriptive statistics are displayed in Table 2, correlation coefficients are included in Table 3 and results of the panel models are presented in Table 4 and 5.

Table 2: Descriptive statistics

Variable	Minimum	First quartile	Median	Mean	Third quartile	Maximum
aDACC	0.0008	0.0136	0.027	0.0441	0.054	0.2243
M1	0	0	0	0.2633	1	1
M2	0	0	0	0.1209	0.2	1
M3	0	0	0	0.0922	0	0.5
M4	0	0	0	0.0825	0	0.6931
S1	0	0	1	0.6267	1	1
S2	0	0	0.1429	0.1556	0.2857	0.7143
S3	0	0	0.2449	0.2092	0.4082	0.4898
S4	0	0	0.4101	0.3179	0.5983	0.6829
BF	0	0	1	0.5651	1	1
CS	17.80	19.20	20.27	20.22	21.03	23.73
PF	-0.6339	-0.0146	0.0177	0.0043	0.0485	0.1744
LV	0.0512	0.2798	0.3976	0.4447	0.5651	1.6226

Source: Authors' calculation

Table 3: Correlation coefficients

	C1	C2	M1	M2	M3	M4	S1	S2	S3	S4	BF	CS	PROF	LVG
C1	1.00													
C2	-0.19*	1.00												
M1	0.01	0.06	1.00											
M2	0.02	0.04	0.81*	1.00										
M3	-0.01	0.08	0.84*	0.50*	1.00									
M4	-0.03	0.24*	0.63*	0.33*	0.74*	1.00								
S1	0.03	0.08	-0.02	-0.15*	0.04	0.06	1.00							
S2	0.04	0.09	-0.04	-0.13*	-0.01	0.01	0.73*	1.00						
S3	0.05	0.09	-0.01	-0.12*	0.04	0.04	0.88*	0.92*	1.00					
S4	0.04	0.08	-0.02	-0.13*	0.03	0.04	0.92*	0.89*	0.99*	1.00				
BF	-0.06	-0.03	0.28*	0.15*	0.23*	0.14*	0.02	-0.04	-0.004	-0.01	1.00			
CS	-0.03	-0.01	0.16*	0.05	0.17*	0.06	0.12*	0.17*	0.17*	0.17*	0.46*	1.00		
PROF	-0.03	-0.02	0.17*	0.16*	0.11	0.06	-0.01	0.07	0.04	0.02	0.04	0.10	1.00	
LVG	0.06	0.04	-0.18*	-0.14*	-0.13*	-0.13*	-0.11*	-0.16*	-0.12*	-0.12*	-0.11	-0.02	-0.37*	1.00

Source: Authors' calculation

Correlation coefficients in Table 3 indicate an absence of the multicollinearity problem given that all correlation coefficients for independent variables which were simultaneously included in a certain model were lower than 0,7 (Pallant, 2007, in Orazalin, 2020). Exceptions are the variables measuring related concepts (e.g. correlation coefficient between the presence and the share of women on the management board).

Table 4: Panel estimations for models 1-8

Dependent variable: aDACC									
Var	(1)	(2)	(3)	(4)	Var	(5)	(6)	(7)	(8)
C1	0.027*** (0.008)	0.023*** (0.007)	0.024*** (0.007)	0.020*** (0.007)	C1	0.004 (0.011)	0.012 (0.010)	0.006 (0.011)	0.005 (0.011)
M1	0.014* (0.007)				S1	-0.010 (0.006)			
C1M1	-0.038*** (0.015)				C1S1	0.021 (0.014)			
M2		0.026** (0.013)			S2		-0.025 (0.021)		
C1M2		-0.048* (0.025)			C1S2		0.033 (0.042)		
M3			0.017 (0.018)		S3			-0.024 (0.018)	
C1M3			-0.072* (0.038)		C1S3			0.052 (0.037)	
M4				0.004 (0.015)	S4				-0.015 (0.012)
C1M4				-0.037 (0.038)	C1S4				0.038 (0.025)
BF	0.004 (0.007)	0.005 (0.006)	0.006 (0.007)	0.006 (0.006)	BF	0.005 (0.007)	0.005 (0.007)	0.005 (0.006)	0.005 (0.006)
CS	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	CS	0.002 (0.003)	0.003 (0.003)	0.002 (0.003)	0.002 (0.003)
PF	-0.115*** (0.027)	-0.117*** (0.027)	-0.112*** (0.027)	-0.111*** (0.027)	PF	-0.112*** (0.027)	-0.110*** (0.027)	-0.110*** (0.027)	-0.110*** (0.027)
LV	0.030** (0.012)	0.030*** (0.012)	0.030** (0.012)	0.030** (0.023)	LV	0.027** (0.012)	0.028** (0.012)	0.028** (0.012)	0.028** (0.012)
Cons.	-0.022 (0.054)	-0.023 (0.052)	-0.017 (0.054)	-0.016 (0.054)	Cons.	-0.016 (0.054)	-0.021 (0.054)	-0.018 (0.054)	-0.016 (0.054)
Obs.	279	280	280	280	Obs.	279	280	280	280
R ²	0.157	0.154	0.145	0.137	R ²	0.145	0.140	0.143	0.144

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; Obs. = Observations; Cons. = Constant. Standard errors are included in parentheses

Source: Authors' calculation

The results in Table 4 indicate that the interaction between the presence of women on management boards and the first year of the COVID-19 crisis is statistically significant indicating that companies which had at least one female director on their management boards were more likely to have lower discretionary accruals during the first year of the COVID-19 crisis. The value of absolute discretionary accruals was on average -0.038 lower in companies whose management board was composed of at least one female director during the first year of the COVID-19 crisis.

Similarly, the interaction variable between the share of women on management boards and the variable that indicates the first year of the COVID-19 crisis is statistically significant indicating that companies with a higher proportion of female directors on their management boards were more likely to have lower discretionary accruals during the first year of the COVID-19 crisis. In other words, for every additional percentage point in favour of women's participation in a management board, the value of absolute discretionary accruals has decreased by -0.00048 on average during the first year of the COVID-19 crisis.

When analysing years other than the first year of the COVID-19 crisis, results indicate that the presence and higher share of female directors in management and supervisory boards contribute to earnings management, which could be attributed to their more prudential opportunism in comparison to their male colleagues. In other words, they are more cautious in carrying out earnings management activities during periods of crisis when public scrutiny of financial statements is more pronounced.

Regarding the Blau and the Shannon indices, the interaction variable between the gender diversity in a management board and the variable that indicates the first year of the COVID-19 crisis is significant in the case of the Blau index – companies with higher gender diversity in management boards were more probably to have lower discretionary accruals during the first year of the COVID-19 crisis.

It is noteworthy that the relationship between gender diversity in supervisory boards and the level of earnings management was not statistically significant during the first year of the COVID-19 crisis.

On the other side, the results presented in Table 5 show that all relations analysed in the previous table were not statistically significant in the context of the second year of the COVID-19 crisis.

Table 5: Panel estimations for models 9-16

Dependent variable: aDACC									
Model	(9)	(10)	(11)	(12)	Model	(13)	(14)	(15)	(16)
C2	-0.020*** (0.008)	-0.016** (0.008)	-0.016** (0.008)	-0.017** (0.008)	C2	-0.024** (0.012)	-0.022** (0.009)	-0.023** (0.010)	-0.024** (0.010)
M1	0.005 (0.008)				S1	-0.007 (0.007)			
C2M1	0.020 (0.014)				C2S1	0.016 (0.014)			
M2		-0.014 (0.022)			S2		-0.020 (0.022)		
C2M2		0.018 (0.028)			C2S2		0.049 (0.039)		
M3			0.004 (0.019)		S3			-0.015 (0.019)	
C2M3			0.022 (0.035)		C2S3			0.043 (0.034)	
M4				0.0002 (0.018)	S4				-0.010 (0.013)
C2M4				0.018 (0.027)	C2S4				0.031 (0.024)
BF	0.003 (0.007)	-0.006 (0.009)	0.004 (0.007)	0.005 (0.007)	BF	0.004 (0.007)	0.004 (0.007)	0.005 (0.006)	0.005 (0.006)
CS	0.002 (0.003)	0.002 (0.014)	0.002 (0.003)	0.002 (0.003)	CS	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)
PF	-0.115*** (0.027)	-0.118*** (0.030)	-0.112*** (0.027)	-0.111*** (0.027)	PF	-0.113*** (0.027)	-0.112*** (0.027)	-0.112*** (0.027)	-0.113*** (0.027)
LV	0.033*** (0.012)	0.021 (0.022)	0.032*** (0.012)	0.032*** (0.012)	LV	0.031** (0.012)	0.031*** (0.012)	0.032*** (0.012)	0.032*** (0.012)
Cons.	-0.004 (0.053)		-0.008 (0.055)	-0.006 (0.054)	Cons.	-0.013 (0.054)	-0.012 (0.055)	-0.010 (0.054)	-0.010 (0.054)
Obs.	279	280	280	280	Obs.	279	280	280	280
R ²	0.136	0.107	0.128	0.129	R ²	0.132	0.132	0.132	0.132

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; Obs. = Observations; Cons. = Constant. Standard errors are included in parentheses

Source: Authors' calculation

A plausible explanation could be that the intensity of earnings management was reduced in the second year of the COVID-19 crisis, rendering the deterrence of earnings management by management board or supervisory board unnecessary. This conclusion is based on the results indicating a negative relationship between earnings management and the second year of the COVID-19 crisis in Table 5, while the relationship between earnings management and the first year of the COVID-19 crisis was positive (Table 4).

Two additional robustness analyses were conducted following the approach applied by Orazalin (2020). More specifically, the original Jones model (1991) was applied to verify the primary results (Orazalin, 2020) in Tables 4 and 5. Also, VIF coefficients were calculated as a part of the multicollinearity problem testing.

Table 6: Panel estimations for models 17-24

Dependent variable: aDACC									
Var	(17)	(18)	(19)	(20)	Var	(21)	(22)	(23)	(24)
C1	0.021*** (0.008)	0.018** (0.007)	0.017** (0.007)	0.013* (0.007)	C1	-0.001 (0.011)	0.005 (0.009)	-0.0004 (0.010)	-0.001 (0.010)
M1	0.015** (0.007)				S1	-0.010 (0.006)			
C1M1	-0.034** (0.014)				C1S1	0.020 (0.014)			
M2		0.026** (0.013)			S2		-0.026 (0.021)		
C1M2		-0.047* (0.024)			C1S2		0.042 (0.041)		
M3			0.021 (0.018)		S3			-0.025 (0.018)	
C1M3			-0.060 (0.037)		C1S3			0.056 (0.036)	
M4				0.006 (0.015)	S4				-0.016 (0.012)
C1M4				-0.019 (0.037)	C1S4				0.040 (0.024)
BF	0.003 (0.007)	0.003 (0.006)	0.004 (0.007)	0.004 (0.006)	BF	0.003 (0.006)	0.003 (0.007)	0.003 (0.006)	0.003 (0.006)
CS	0.003 (0.003)	0.003 (0.003)	0.002 (0.003)	0.002 (0.003)	CS	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)
PF	-0.114*** (0.026)	-0.115*** (0.026)	-0.111*** (0.026)	-0.110*** (0.026)	PF	-0.110*** (0.026)	-0.109*** (0.026)	-0.109*** (0.026)	-0.109*** (0.026)
LV	0.029** (0.012)	0.029** (0.012)	0.029** (0.012)	0.028** (0.012)	LV	0.026** (0.012)	0.027** (0.012)	0.027** (0.012)	0.027** (0.012)
Cons.	-0.029	-0.031	-0.025	-0.024	Cons.	-0.023 (0.054)	-0.029 (0.055)	-0.026 (0.055)	-0.025 (0.054)
Obs.	279	280	280	280	Obs.	279	280	280	280
R ²	0.143	0.141	0.130	0.121	R ²	0.132	0.127	0.131	0.131

Note: * p < 0.1; ** p < 0.05; *** p < 0.01; Obs. = Observations; Cons. = Constant. Standard errors are included in parentheses

Source: Authors' calculation

The results in Table 6 represent the models estimated using the Jones model for analysis of the relationship between gender diversity in management boards and

earnings management during the first year of the COVID-19 crisis. Since the results resemble the ones obtained using the Modified Jones model, the conclusions remain the same and provide additional validation. The only significant difference is the interaction variable between the gender diversity in management boards and the variable that indicates the first year of the COVID-19 crisis which is not statistically significant for the Blau index.

Table 7: Panel estimations for models 25-32

Dependent variable: aDACC									
Model	(25)	(26)	(27)	(28)	Model	(29)	(30)	(31)	(32)
C2	-0.019** (0.008)	-0.014* (0.008)	-0.014* (0.007)	-0.015** (0.008)	C2	-0.023** (0.012)	-0.020** (0.009)	-0.022** (0.010)	-0.023** (0.010)
M1	0.006 (0.008)				S1	-0.008 (0.007)			
C2M1	0.018 (0.014)				C2S1	0.017 (0.014)			
M2		-0.015 (0.021)			S2		-0.022 (0.021)		
C2M2		0.016 (0.028)			C2S2		0.048 (0.038)		
M3			0.012 (0.019)		S3			-0.017 (0.019)	
C2M3			0.013 (0.034)		C2S3			0.043 (0.033)	
M4				0.008 (0.018)	S4				-0.012 (0.013)
C2M4				0.010 (0.026)	C2S4				0.031 (0.023)
BF	0.002 (0.007)	-0.005 (0.009)	0.003 (0.007)	0.003 (0.006)	BF	0.003 (0.006)	0.003 (0.006)	0.003 (0.006)	0.003 (0.006)
CS	0.002 (0.003)	-0.003 (0.014)	0.002 (0.003)	0.002 (0.003)	CS	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)
PF	-0.114*** (0.026)	-0.120*** (0.030)	-0.111*** (0.026)	-0.110*** (0.026)	PF	-0.112*** (0.026)	-0.111*** (0.026)	-0.111*** (0.026)	-0.111*** (0.026)
LV	0.031*** (0.012)	0.012 (0.021)	0.030** (0.021)	0.031*** (0.021)	LV	0.029** (0.012)	0.030** (0.012)	0.030** (0.012)	0.030** (0.012)
Cons.	-0.014 (0.055)		-0.017 (0.055)	-0.018 (0.054)	Cons.	-0.022 (0.054)	-0.022 (0.055)	-0.020 (0.054)	-0.020 (0.054)
Obs.	279	280	280	280	Obs.	279	280	280	280
R ²	0.134	0.105	0.125	0.125	R ²	0.130	0.129	0.129	0.129

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; Obs. = Observations; Cons. = Constant. Standard errors are included in parentheses

Source: Authors' calculation

The results for the relationship between gender diversity in supervisory boards during the second year of the COVID-19 crisis presented in Table 7 are in line with the conclusions drawn for the models with the Modified Jones model.

Table 8: Variance inflation factors for models 1-16

Var	Model 1	Model 2	Model 3	Model 4	Var	Model 5	Model 6	Model 7	Model 8
C1	1.38	1.25	1.27	1.16	C1	2.92	2.10	2.58	2.64
M	1.35	1.32	1.27	1.19	S	1.22	1.29	1.27	1.26
C1*M	1.59	1.51	1.46	1.30	C1*S	3.16	2.37	2.87	2.92
BF	1.38	1.31	1.33	1.30	BF	1.32	1.33	1.31	1.30
CS	1.29	1.28	1.28	1.28	CS	1.31	1.34	1.32	1.32
PF	1.18	1.19	1.17	1.17	PROF	1.17	1.17	1.17	1.17
LV	1.19	1.18	1.18	1.20	LVG	1.19	1.20	1.19	1.19
Var	Model 9	Model 10	Model 11	Model 12	Var	Model 13	Model 14	Model 15	Model 16
C2	1.47	1.32	1.39	1.41	C1	3.34	2.13	2.51	2.64
M1	1.39	1.27	1.39	1.75	S	1.23	1.35	1.34	1.32
C2*M	1.76	1.55	1.73	2.22	C2*S	3.66	2.51	2.92	3.02
BF	1.38	1.31	1.33	1.32	BF	1.32	1.31	1.30	1.30
CS	1.30	1.29	1.28	1.30	CS	1.32	1.34	1.32	1.32
PF	1.18	1.19	1.17	1.17	PROF	1.18	1.17	1.17	1.17
LV	1.19	1.18	1.18	1.19	LVG	1.19	1.20	1.19	1.19

Source: Authors' calculation

To provide additional validation for conclusions drawn on the basis of correlation coefficients presented in Table 3, variance inflation factors for all variables included in models 1-16 were calculated and they did not exceed the conventional threshold of 10 (Chatterjee et al., 2000, in Orazalin, 2020), what denoted that there was no multicollinearity problem.

5. Results and discussion

Most important scientific result of the research implies that the COVID-19 crisis resulted in increased earnings management, but only regarding financial statements disclosed in the first year after the pandemic was declared. This could be attributed to the initial shock caused by gloomy predictions about the future course of the pandemic, as well as to the scarce and often contradictory information which led to further aggravation. In the second year of the pandemic, the effect was contrastive – companies were more focused on reducing the level of their earnings management.

In the time when financial statements were prepared and disclosed in the following year, the situation was significantly different because the consequences of the pandemic were not as far-reaching as predicted and the optimism was high due to the start of the vaccination against the virus.

The presence and representation of women in management boards were found to have a positive impact on curbing earnings management, exclusively in the first year of the pandemic, when the need for such action was necessary. However, in the second year, the threat to the reliability of financial statements decreased, and the efforts of female directors in reducing earnings management were less pronounced. The positive relationship between the presence and share of female directors in management boards and earnings management in years other than the first year of the pandemic, in which financial statements were disclosed indicates that women on management boards are generally oriented toward corporate interests, but in times of fiercest crisis, they reason wisely because every corporate action is scrutinised by the public concerned.

These findings are consistent with previous research by Zalata et al. (2021), which also highlighted the positive role of women in constraining earnings management during periods of crisis. Results also indicate that gender diversity in supervisory boards is not so useful in decreasing earnings management. Above mentioned scientific findings also have practical implications in terms of assessing the behaviour of (potential) members of management board, as well as for forensic accountants' investigations.

6. Conclusion

The research findings strongly support hypothesis H1a, as they reveal a negative relationship between the level of earnings management in financial statements during the first year of the COVID-19 pandemic and various measures of gender diversity in management boards, with the exception of the Shannon index. However, when considering other business years, the relationship between the presence and higher share of female directors in management boards and earnings management becomes either positive or insignificant. These contrasting findings highlight the key scientific contribution of this research, which suggests that women on boards can serve as an additional monitoring mechanism during severe economic crises and periods of high uncertainty, which often drive companies to resort to earnings management techniques in order to mitigate economic difficulties. However, it is important to acknowledge the limitations of this research. The study sample was confined to large listed public limited companies operating in the Republic of Croatia, which limits the generalizability of the results. Future research should aim to validate these conclusions in other countries and consider non-listed companies,

although data availability may pose challenges in that regard. Additionally, further investigation is needed to clarify the role of the supervisory board, as this research has left questions unanswered regarding its effectiveness.

Given the findings that the presence of female directors in management boards helps restrain earnings management during crises, regulatory measures could be considered to promote their inclusion in board compositions. This would contribute to maintaining a more objective overview of a company's financial position and practices.

Overall, this research provides valuable insights into the relationship between gender diversity in management boards, earnings management, and crisis situations. It highlights the need for continued exploration in this area to inform policy decisions and foster a more inclusive and transparent corporate environment.

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Spolna raznolikost u upravljačkoj strukturi i upravljanje financijskim rezultatom tijekom razdoblja COVID-19 krize

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Sažetak

U ovom radu istražuje se učinak COVID-19 krize na povezanost spolne raznolikosti u upravama i nadzornim odborima s razinom upravljanja financijskim rezultatom. Uzorak istraživanja čine trgovačka društva uvrštena na hrvatsko nacionalno tržište kapitala, a za potrebe procjene regresijskih modela prikupljeni su panel podaci u razdoblju od 2015. do 2020. Rezultati su pokazali da su prisutnost i veći udio ženskih članova u upravama bili korisni za smanjivanje upravljanja financijskim rezultatom, ali samo za financijska izvješća objavljena tijekom prve godine pandemije COVID-19. U to vrijeme takav napor bio je ključan zbog eskalacije upravljanja financijskim rezultatom izazvane krajnje pesimističnim gospodarskim očekivanjima. U financijskim izvješćima objavljenima tijekom druge godine pandemije razina upravljanja financijskim rezultatom znatno je opala, a članice uprava nisu bile tako učinkovite u obuzdavanju ovih aktivnosti kao u prvoj godini. To bi moglo upućivati na veću opreznost ženskih članova uprave prilikom predviđanja intenziteta javnog nadzora financijskih izvještaja u razdoblju krize. Spolna raznolikost u nadzornim odborima nije se pokazala značajnom odrednicom upravljanja financijskim rezultatom tijekom COVID-19 krize.

Ključne riječi: COVID-19 kriza, upravljačka struktura, upravljanje financijskim rezultatom, spol, raznolikost

JEL klasifikacija: G01, M41, G32, J16, M14

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