Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 2

10.15678/EBER.2024.120203

Women on management board and firm performance: Evidence from the Visegrad Group companies

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ABSTRACT

Objective: The aim of this study is to investigate the relationship between the presence of women on management boards and firm performance in publicly traded companies within the Visegrad Group countries during the 2019-2021 period.

Research Design & Methods: The study focuses on 451 publicly traded companies in the Visegrad Group countries over the 2019-2021 period, examining the composition of management boards in terms of gender diversity. The study uses four types of characteristics to describe the management board's composition, including the presence of women on the board, the percentage of female directors, Blau's index of heterogeneity, and the gender of the CEO. The t-tests, Mann-Whitney U tests, and data regression are applied to investigate the influence of female managers on company efficiency, as well as market performance.

Findings: The data shows that only 32.8% of companies have at least one woman on their management board and the average share of women on these boards is low at 12%. We found a positive relationship between operating efficiency and the percentage of women on the management board and board gender diversity, but no statistically significant association between women's presence on the management board and market performance. Our study supports the hypothesis that a woman's presence on the management board affects firm performance.

Implications & Recommendations: The findings can be valuable and may have practical implications for policymakers and company executives. Policymakers can use this information to support and promote policies that encourage gender diversity in corporate leadership. Companies interested in promoting diversity can use this information to support their efforts to increase female representation on their management boards and potentially improve their performance.

Contribution & Value Added: This study contributes to the ongoing discussion on gender diversity in corporate leadership and its potential impact on firm performance. Thus, it might affect the behaviour of companies operating in similar institutional environment, namely in Visegrad Group countries. We used different measures of firm performance – both based on the operating (accounting) data and market data. We included several measures of women's presence on the boards (e.g. Blau index or women as the CEO).

Article type:	research article
Keywords:	board gender diversity; operating performance; market performance; the Visegrad Group; two-tier corporate governance system
JEL codes:	G30, G39

Received: 18 March 2023 Revised: 30 October 2023 Accepted: 13 December 2023

Suggested citation:
Bukalska, E., Sosnowski, T., & Wawryszuk-Misztal, A. (2024). Women on management board and firm performance: Evidence from the Visegrad Group companies. *Entrepreneurial Business and Economics Review,* 12(2), 43-59. https://doi.org/10.15678/EBER.2024.120203

INTRODUCTION

The issue of women on board attracts many researchers. There are several theories used to support appointing women to the board (*i.e.* resource dependence theory, agency theory, human capital theory, social capital theory) but there are also others providing arguments against gender diversity of boards (*i.e.* the self-categorization theory and the social identity theory). However, existing research

has inconclusive findings; some prove a positive impact of women on firm performance and some show the lack of this impact.

However, most of the research is conducted for a single country sample. Some researchers provide evidence that the association between the presence of women on board and firm performance might be moderated by the institutional environment (Grosvold *et al.*, 2007), and, in particular, a culture of gender equality (Post & Byron, 2015). Therefore, we wondered what was the impact of the women's presence on the board on firm performance when including companies from several countries (especially countries with similar backgrounds) in the sample.

We aimed to explore how women on management boards impact firm performance when taking into account companies coming from the Visegrad Group (V4) incorporating four post-communist countries from Central Europe: Poland, Hungary, the Czech Republic, and Slovakia. Specifically, we sought to determine whether the inclusion of women on management boards positively impacts company efficiency and certain aspects of market performance while considering various characteristics of board composition and the background of the V4 countries. Moreover, this research aims to contribute to the broader discourse on gender diversity in corporate leadership by providing empirical evidence on its potential influence on firm performance in the Central and Eastern European (CEE) context.

Our research sample consists of 451 and covers three years, *i.e.* 2019-2021. Since the role of the supervisory board is limited to supervising functions, our analysis focused on the gender composition of the management board. We expected to find a positive association between women's presence on the management board and firm performance reflected both by operating measures and market measures. To achieve our research aim and to verify research hypotheses, we implemented the two-sample *t*-test, the Mann-Whitney *U* test, and regression analysis. However, we documented only that there was a positive relation between the presence of women and operating performance. Furthermore, we showed that there was a specific type of company more prone to appoint women to the board. Such companies are bigger and older.

While acknowledging the extensive research on women in leadership positions and gender diversity, we went beyond existing literature to address a notable gap in several ways. It especially stands out by presenting a unique contribution by exploring the impact of women on corporate management boards in the V4 countries, aligning with impending regulatory changes, and adopting a distinctive approach by employing a comprehensive measurement methodology. These aspects collectively distinguish the research and offer new insights into the complex interplay between gender diversity and firm performance within a specific and hitherto underexplored regional context.

First and foremost, the investigation's concentration on the V4 countries, characterized by common historical backgrounds, societal expectations, and legal frameworks, underscores the significance of cultural and institutional factors in shaping gender diversity in corporate leadership. Furthermore, according to Human Development Report 2020, they are in the group of countries with very high Human Development Index. They have also a similar value to the Gender Development Index, which is used to measure gender inequalities. None of these countries has adopted gender mandatory quotas on management or supervisory boards for listed companies. However, Poland is the only country that uses 'soft law' (*i.e.* The Corporate Governance Code for Polish Listed Companies 2021) to encourage listed companies to implement diversity policy in management and supervisory boards, and especially to include women in these bodies. The V4 is the set of countries that are leaders in transition among CEE countries. The V4 countries have 64 million inhabitants, with Poland standing for more than half of them. The number of inhabitants in V4 is higher than in France (62 million), GB (61 million), or Spain (40 million) but lower than in Germany (82 million). Moreover, Poland and the Czech Republic have a high level of masculinity – *ca.* 60, Hungary and Slovakia – *ca.* 90, while West European countries: France and Germany – *ca.* 50, and Sweden – 5 (https://www.hofstede-insights.com). Thus, the study provides valuable insights into how context influences board compositions, with potential implications for understanding gender dynamics in similar settings. Moreover, most of the previous research focuses on West European or the U.S. economies. Within the European Union, diverse country conditions arise due to historical, social, or legal factors. Our analysis focuses on four post-communist economies that share similar traditions and values, with an aim to overcome the vicissitudes of history and challenge

stereotypes of women. The V4 is an informal group that in 1991 decided on closer cooperation due to their neighbourhood and some similarities (Valaskova *et al.*, 2022). These similarities refer to the fact that they made the transition from the communist system to their market economy at the same time. Acknowledging the V4 countries' leadership role in transitioning among CEE nations further enhances the study's contribution. By considering the unique position of these countries in post-communist economic development, the research provides insights into the dynamics of gender diversity within transitional economies. Finally, the regional focus on CEE, specifically the V4 countries, expands the geographic scope of existing literature. By examining gender diversity in a region with its own set of challenges, opportunities, and regulatory contexts, the study provides a unique contribution to the understanding of gender dynamics in corporate leadership.

Furthermore, the research underscores its policy relevance and timeliness by aligning with expected regulatory changes. The motivation to provide empirical arguments for the advantages of women's presence in leadership positions makes it a timely contribution, especially in the evolving landscape of EU regulatory frameworks. With this article, we contribute to the lively discussion about the role of women in leadership positions and gender quota law. European institutions have addressed a lot of actions to increase board diversity (see European Parliament, https://www.europarl.europa.eu/news/pl/press-room/20220603IPR32195/women-on-boards-deal-to-boost-gender-balance-in-companies). Thus, some EU countries (*e.g.* France, Germany, Italy, Belgium) decided to implement gender quota law for corporate boards of all public companies or companies of a certain size. Other countries took voluntary initiatives such as the adoption of corporate governance codes to increase female representation on the boards (*e.g.* Poland). There are also EU member states that have not implemented any tolls to achieve gender balance on boards (*e.g.* the Czech Republic, Slovakia, Hungary). Therefore, the Directive (EU) 2022/2381 of the European Parliament and of the Council of 23 November 2022 on improving the gender balance among directors of listed companies and related measures was adopted. It requires EU countries to introduce the gender quota law (40% of non-executive positions or 33% of all director positions should be held by underrepresented sex by 30 June 2026) before 28 December 2024. Motivated by anticipated regulatory changes, the research aligns itself proactively with shifts in board composition regulations. This not only shows the study is timely and relevant but also enables the provision of implications and recommendations for policymakers and practitioners preparing for such changes. The uniqueness of gender diversity initiatives within the V4 countries, exemplified by Poland's use of 'soft law' through The Corporate Governance Code for Polish Listed Companies 2021, adds a distinctive dimension to the study. This approach highlighted the practical aspects of encouraging diversity policies and offers context-specific insights that may apply to regions contemplating similar initiatives. Then, the focus on countries with a two-tier corporate governance system added a layer of complexity to the examination, particularly emphasizing the separation between management and supervisory boards. All these V4 countries have a two-tier corporate governance system. It is based on a clear organizational and functional separation of the management and the supervisory board (Velte, 2016). This organizational structure enhances the relevance of the study by providing a unique perspective on the influence of women on corporate management boards within this specific governance framework.

Moreover, this study employed a multifaceted analysis to investigate the impact of gender diversity on companies, going beyond a simplistic analysis, and enriching the overall findings. The incorporation of multiple measures for women's presence on boards, including the Blau index and the appointment of women as CEOs, contributes to a better understanding of the different dimensions of gender diversity on management boards. Furthermore, the article contributes through a comparative analysis of firm performance measures, considering both operating and market data. This dual perspective offers a more refined explanation of how gender diversity may impact various aspects of a company's performance. By adopting this comprehensive approach, the research offers a more holistic view compared to studies concentrating on specific aspects.

The rest of our article is organized as follows. The literature review section will present the main theories and research findings on gender diversity. The next section – methodology – will describe the

sampling process, variables definition, and the description of models implemented in hypothesis verification. The findings section includes our key results. The article will end with conclusions.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Recently, there has been an increasing trend in research on diversity on management boards. The basis of the diversity might be gender, age, educational background, or professional experience. Following the upper echelons theory, these demographic dimensions of managers affect the company's strategic choices, and finally – its outcomes (Hambrick & Mason, 1984). Other theories, that appeal to upper echelons theory, try to explain how demographic characteristics of group members contribute to the firm's behaviour and performance (Shauki & Oktavini, 2022).

There are several theories supporting the gender diversity of management boards regarding women: the agency theory (Jensen & Meckling, 1976; Fama & Jensen, 1983), the resource dependence theory (Pfeffer & Salancik, 1978), the human capital theory (Mincer, 1958; Schultz, 1961), the social capital theory (Coleman, 1988), the signalling hypothesis, the stewardship theory. However, some theories provide arguments against appointing a diversified board, these are the self-categorisation theory (Turner, 1985) and the social identity theory (Tajfel & Turner, 1979; 1986).

The agency theory shows several positive effects of women on board, *i.e.* voluntary disclosure of information such as profit forecast (Gyapong & Afrifa, 2019), quality of financial reporting (Pucheta-Martínez *et al.*, 2016), the accuracy of profit forecast (Qu *et al.,* 2015). These lead to a decrease in information asymmetry and problems in agency relations and better perception by shareholders. This is in line with the signalling hypothesis assuming that appointing women to the board will be a positive signal to shareholders (Certo, 2003; Miller & Del Carmen Triana, 2009). The resource dependence theory posits that female directors possess unique skills (different from male skills), that are provided to the board (Hillman *et al.*, 2002). Women have also a better understanding and feeling of the environment and clients. The human capital theory and social capital theory point to the role of human capital and social capital that are provided to the board. Since the educational background and the way to the management board of female directors is different than men's (Singh *et al.*, 2008; Dang & Vo, 2012), they contribute to the diversity of social and human capital that is available to the board. Following the stewardship theory (Davis *et al.*, 1997), women are more stewards than agents due to their skills and human capital. In line with this theory, women are more able to behave in favour of all stakeholders than shareholders only. Women are more able to balance the interests of different groups diminishing potential conflict situations.

However, some theories show negative aspects of gender diversity and appointing females to boards with only male directors. Theories supporting board homogeneity were developed on the grounds of social psychology and appeal to the similarity attraction paradigm. The rationale for hiring members on board who are similar in terms of demographic characteristics is that making decisions is more effective than in the case of a diversified board. Group members that differ in terms of gender, age, education, ethnicity or experience are likely to avoid cooperation and communication, which results in misunderstanding, conflicts, and finally, makes a decision process longer. Following this, higher group effectiveness is expected if its members are similar to each other. Thus, the inclusion of women on the male board will result in decreasing the board's effectiveness and the company's profitability.

Since theoretical conceptions on the role of board diversity and the role of women on board for firm performance provide different or opposite arguments, many researchers cope with this problem on the empirical ground. Research on women's impact on firm performance is very extensive but results are inconclusive.

Among the research proving a positive impact of women, there is research on Spanish public companies (Campbell & Mínguez-Vera, 2008; Reguera-Alvarado *et al.*, 2017; Valls Martínez & Cruz Rambaud, 2019). Although they implement different measures of women's presence on management boards (binary variable, percentage, Blau's Index, Shannon Index), they report a positive impact of women's presence on firm value (Q-Tobin). Similar conclusions were drawn for French companies (Sabatier, 2015; Dang *et al.*, 2018), Fortune1000 companies (Carter *et al.*, 2003; Erhardt *et*

al., 2003), European companies (Isidro & Sobral, 2015), UK companies (Brahma *et al.,* 2021), and Indian companies (Duppati *et al.*, 2020).

However, it seems that the way scholars measure firm performance matters for the findings. There is research showing a negative relationship between gender board diversity and return on equity (Mínguez-Vera & Martin, 2011). This negative influence was explained by women's impact on more conservative strategies resulting in lower profitability.

There is also research with mixed findings, *e.g.* Bennouri *et al.* (2018) found that for French companies there is a positive relation between women's presence on the management board and return on equity (ROE) and return on assets (ROA) and negative between women's presence on board and firm value (Q-Tobin). Vafaei *et al.* (2015) found that for Australian companies there is a positive impact of women's presence and both ROA, ROE, operating cash flow, and Q-Tobin. In line with these findings, the research of Terjesen *et al.* (2016) for companies from 49 countries showed a positive relation between women's presence on board and firm performance.

One can also find research showing the lack of impact of women on firm performance, *e.g.* Marinova *et al.* (2016) for Dutch and Danish companies, Rose *et al.* (2013) for Nordic and German companies, Rose (2007) for Dutch companies, Randøy *et al.* (2006) for Scandinavian companies, Kagzi and Guha (2018) for Indian companies, and Marquez-Cardenas *et al.* (2022) for Latin America companies. Loy and Rupertus (2022) report that gender diversity does not impact any effect on long-term stock performance for the firms included in Thomson Reuters' Asset4 database.

Since the association between gender diversity on the board and firm performance has been extensively studied, some investigations apply the meta-analysis to show the results of multiple scientific studies. Post and Byron (2015) analysed 144 research articles and stated that the presence of female directors on boards is positively associated with accounting measures of financial performance. However, if financial performance is reflected by market measures, such a relationship is not statistically significant. They report that a positive correlation is stronger in countries with stronger protection of shareholders and with higher gender parity score (Post & Byron, 2015). The results of the meta-analysis conducted by Hoobler *et al.* (2018) show that the relationship between women's presence on the board and firm performance is not conclusive, however, gender board diversity might contribute to firm performance, and especially sales performance. They emphasize that the positive role of female directors might be stronger in the case of gender egalitarian culture.

In turn, the meta-analysis of Pletzer *et al.* (2015) including data from 20 research papers (34 models) shows that the inclusion of women on boards is positively related to the firm's efficiency, however, this association is not statistically significant. On the one hand, there are no economic arguments for diversity, but, on the other hand, there are no arguments against women's appointment to the boards (Pletzer *et al.,* 2015). Nonetheless, the ethical arguments for the inclusion of female directors are still valid. Thus, apart from business arguments for women's appointment to the boards, there are also ethical arguments – no one can be excluded from the team because of gender, age, etc.

Although the relationship between board gender diversity and firm performance is examined by many researchers, studies including companies from Central and Eastern European countries are very limited. For example, the research for Czech travel agencies and tour operators for the period 2008-2015 reveals that women's presence in executive bodies has no statistically significant relationship with both firm performance (*i.e.* ROE and return on sales – ROS) and the companies' financial health (Hedija & Němec, 2021). Moreover, previous research including Czech stock companies from the IT industry shows that the percentage of women in management and supervisory boards does not affect firm performance measured as ROA and ROS (Janošová & Mikuš, 2018). There has been also research on women in Poland, conducted by Bohdanowicz (2011), who found a positive relation between ROA, ROE, and Blau's Index. While Kompa and Witkowska (2017) found no significant or negative relations between women's presence and profitability.

One reason for the inconclusive findings might be the way firm performance is measured. There are two attitudes toward firm performance measurement. One way of measuring firm performance is focused on operational firm performance and based on accounting data. The other way is focused on market firm performance and based on share prices. Operating firm performance relies on past and

solid evidence recorded in the accounting books. Market firm performance relies on shareholders' expectations and subjective shareholders' perceptions, which are based not only on the company's past financial results but also on the expected future value (Loy & Rupertus, 2022). Shareholders' perceptions and expectations might be explained by the institutional theory (DiMaggio & Powell, 1983). Institutional theory posits that organizations are influenced and shaped by the prevailing norms, regulations, and cultural expectations of their institutional environment (Azfali *et al.*, 2021), which may include shareholders' expectations. Consequently, firms operating in a similar environment are likely to conform to established practices and expectations, including those related to gender diversity (Allemand *et al.*, 2014). Therefore, this study analyses how these organizations respond to pressures for gender diversity on management boards. In this study, the institutional environment encompasses the sociocultural context, regulatory framework, and gender equality norms within the V4 countries.

The above considerations allow us to ask the research questions: can the presence of women on corporate boards influence the performance of a company? Does it matter more for operating or for market firm performance? So, we formulate the following research hypotheses:

H1: Firms having women on their management boards exhibit higher operating efficiency.

H2: Firms having women on their management boards exhibit higher market performance.

The justification for our hypotheses might be the fact that for many years European institutions have addressed a lot of actions to increase board diversity, and right now we might expect positive results from this policy.

RESEARCH METHODOLOGY

We based our sample on publicly traded companies at the end of 2021 within every stock exchange situated in the V4 countries. The four markets represented in the study are the following: the Warsaw Stock Exchange, the Prague Stock Exchange, the Budapest Stock Exchange, and the Bratislava Stock Exchange. The study examines data from 2019 to 2021 for a total of 451 companies. Table 1 characterizes the composition of the study sample.

Our research sample consisted of 451 companies from V4 countries, however, most of our sample were Polish companies. Since the Polish capital market is the biggest one in Central Europe, Polish companies represented 83.37% of the sample. The companies belonged to 11 industries, but the most numerous sector was industrials. On average, the age of research companies was 17.9 years. The financial data showed that the analysed companies were very diversified. The standard deviation for financial data was very high. Thus, the difference between their mean and median values was also very high.

We employed four primary types of characteristics to describe the composition of the management board from the perspective of gender diversity. To investigate the presence of women on board, we used the binary variable W_YES_MB which equals 1 if at least one woman is present on the management board, and 0 otherwise. To check the share of female directors in the composition of the board, we used the variable W_PER_MB which was the ratio of the number of female directors to all directors on the board of the firm. Then, to examine not only the percentage of female directors but also the level of gender diversity in the management board, we included also BLAU_MB which is Blau's Index of heterogeneity. It is calculated as $1 - \sum_{i=1}^{n} p_i^2$ where p_i is the percentage of each category and n = 2 (men and women). The lower value it takes the more homogeneous in terms of gender the individuals are (Solanas *et al.*, 2012). Finally, last but not least, we checked who holds the role of CEO by introducing the binary variable CEO_YES which equals 1 if a woman held the CEO position and otherwise 0.

Since our study involved assessing the influence of female managers on company efficiency and market performance, in the first stage, we checked whether there were any statistically significant differences between firms including women on the management board. For this purpose, we used the two-sample *t*-test and the Mann-Whitney *U* test. Then, for further investigation, we employed data regression using ordinary least squared. Specifically, we examined the following equation:

$$\text{Performance}_{i,t} = \beta_0 + \beta_1 \begin{bmatrix} \text{W\_YES\_MB} \\ \text{W\_PER\_MB} \\ \text{BLAU\_MB} \\ \text{CEO\_YES} \end{bmatrix}_{i,t} + \beta_2 \ ln(\text{ASSETS})_{i,t} + \beta_3 \ ln(\text{AGE})_{i,t} + \\ + \beta_4 \ \text{DEBT RATIO}_{i,t} + \beta_5 \ \text{INDUSTRY}_{i,t} + \beta_6 \ \text{COUNTRY}_{i,t} + \varepsilon_{i,t} \quad (1)$$

Table 1. Sample characteristics

Cross-country distribution					
Country	**Number of Companies**		**Percentage**		
The Czech Republic	11		2.44		
Hungary	39		8.65		
Poland	376		83.37		
Slovakia	25		5.54		
Total	451		100.00		
Cross-industry distribution					
Industry	**Number of Companies**	**Percentage**	**Industry**	**Number of Companies**	**Percentage**
Utilities	16	3.55	Real Estate	36	7.98
Telecommunications	10	2.22	Industrials	106	23.50
Consumer Staples	32	7.10	Energy	8	1.77
Health Care	27	5.99	Financials	67	14.86
Consumer Discretionary	71	15.74	Technology	44	9.76
			Basic Materials	34	7.54
			Total	451	100.00
Sample characteristics at the end of the 2021 fiscal year					
Specification		**Mean**	**Std. Dev.**	**Median**	**N**
Age	in years	17.90	7.73	19.19	451
Market Capitalization	million EUR	24 903.89	254 345.01	200.40	445
Total Revenue	million EUR	532.77	2 187.27	44.96	376
Net Income After Taxes	million EUR	52.31	221.31	3.55	392
Total Assets	million EUR	2 330.52	9 969.76	72.77	391

Source: own study.

The explanatory variable is the company performance characteristics measured by ROE (net income to equity), ROA (net income to total assets), OPR (operating profit margin, which is a measurement of management's efficiency calculated as operating income divided by total revenue), market to book value (MV/BV), and 52-week total return, respectively. Next, to mitigate multicollinearity among the management board variables, we split our analysis into four separate models depending on the women's presence measure (W_YES_MB, W_PER_MB, BLAU_MB, CEO_YES respectively). Furthermore, all the models incorporated control variables to account for the effect of size (the natural log of total assets) and age (the natural log of the number of years since incorporation), capital structure (debt ratio), type of business (industry dummies) and location (country dummies). To mitigate the influence of outliers, we winsorized all continuous variables in the 5%-95% range.

The quantitative methods used in the study are commonly used and provide valuable insights into the relationship between female directors, company efficiency, and market performance. While this approach offers statistical evidence, it is essential to be mindful of its limitations, such as the challenge of establishing causation. Moreover, the focus on quantitative metrics may overlook qualitative factors that also influence board dynamics and organizational culture. Moreover, taking into account the territorial limitation of the sample, our findings may be specific to the V4 countries and may not necessarily apply to other regions with different cultural, regulatory, and economic contexts.

As we have not found any comprehensive database providing governance data of stock companies in the V4 countries, the individual characteristics of the management board of each company are hand-collected and checked using Internet searches. To ensure the numbers are comparable across four countries and all industries, the market and financial data are retrieved from the Refinitiv Eikon database.

RESULTS AND DISCUSSION

Table 2 provides some insight into women's representation on management boards in the research sample.

Table 2. Characteristics of management boards of listed companies in the V4 countries

Specification	Mean	Std. Dev.	Q1	Median	Q3	N
Whole Sample						
W_YES_MB	0.3281	0.4701	0.0000	0.0000	0.0000	448
W_PER_MB	0.1199	0.2003	0.0000	0.0000	0.0000	448
BLAU_MB	0.1309	0.1977	0.0000	0.0000	0.0000	448
CEO_YES	0.0469	0.2116	0.0000	0.0000	0.0000	448
The Czech Republic						
W_YES_MB	0.6364	0.5045	0.0000	1.0000	1.0000	11
W_PER_MB	0.1684	0.1980	0.0000	0.1429	0.2000	11
BLAU_MB	0.2088	0.1782	0.0000	0.2449	0.3200	11
CEO_YES	0.0909	0.3015	0.0000	0.0000	0.0000	11
Hungary						
W_YES_MB	0.5000	0.5067	0.0000	0.5000	1.0000	38
W_PER_MB	0.1510	0.1857	0.0000	0.0455	0.2000	38
BLAU_MB	0.1892	0.2038	0.0000	0.0826	0.3200	38
CEO_YES	0.0526	0.2263	0.0000	0.0000	0.0000	38
Poland						
W_YES_MB	0.2914	0.4550	0.0000	0.0000	1.0000	374
W_PER_MB	0.1091	0.1947	0.0000	0.0000	0.2000	374
BLAU_MB	0.1188	0.1944	0.0000	0.0000	0.3200	374
CEO_YES	0.0348	0.1834	0.0000	0.0000	0.0000	374
Slovakia						
W_YES_MB	0.4800	0.5099	0.0000	0.0000	1.0000	25
W_PER_MB	0.2124	0.2746	0.0000	0.0000	0.3333	25
BLAU_MB	0.1898	0.2224	0.0000	0.0000	0.4444	25
CEO_YES	0.2000	0.4082	0.0000	0.0000	0.0000	25

Source: own study.

Female representation on management boards was very low in our sample. Only 32.8% of companies appointed at least one woman to the management board, which means that management boards in most of the companies (67.2%) were composed of only male directors. The average share of women on the management board was very low – at the level of 12%.

The mean value of BLAU_MB amounted to 0.131 and was much lower than its maximum value of 0.5 (the highest possible level). It seems that companies are not likely to appoint women to CEO positions – only 4.7% of companies hired a female director as CEO. However, the high values of standard deviation for our variables give evidence that our research sample is strongly diversified in terms of women's presence on the management boards.

Some differences are also observed in the composition of the management board between countries. Although only Poland implemented 'soft law' referring to the presence of women on the board, the data show that the presence of women on management boards of Polish companies was

the lowest. However, the explanation of this finding might lie in the fact that Polish companies constitute the most numerous group in the sample.

The low women's participation in management boards might be connected with specific national cultures of Central and Eastern European countries. Poland and the Czech Republic have a high level of masculinity – *ca.* 60, Hungary and Slovakia – *ca.* 90, while West European countries: France and Germany – *ca.* 50, and Sweden – 5 (https://www.hofstede-insights.com).

Next, we divided our research sample into two groups. The first group includes companies with at least one woman on the management board (Panel A), and the other one – without any women on the management board (Panel B). Table 3 shows descriptive statistics for the firm performance and company characteristics for both groups of companies and the results of parametric and non-parametric tests for these variables.

Table 3. Company characteristics and firm performance

Characteristics	Mean	Std. Dev.	Median	n
Panel A. At least one woman on the management board				
Firm performance				
ROE [%]	13.15	35.63	11.18	107
ROA [%]	5.41	14.32	4.57	123
OPR [%]	-1 101.83	12 367.20	10.56	124
MV/BV	75.15	243.84	6.27	124
52-week total return	29.25	53.29	20.16	138
Company characteristics				
Company market capitalization	46 679.39	390 034.31	626.50	144
Age	18.92	8.05	20.32	147
Total revenue	1 053.44	3 495.46	89.37	112
Net income before extraordinary items	117.06	321.19	7.46	124
Net income after taxes	123.46	333.09	6.80	123
Total assets	5 760.75	16 448.87	179.98	124
Total debt	895.51	5 670.79	35.75	124
Cash from operating activities	239.48	885.81	7.97	122
Cash from investing activities	-123.58	561.55	-3.31	121
Cash from financing activities	-35.31	412.54	-2.42	120
Panel B. No women on the management board				
Firm performance				
ROE [%]	1.82	57.65	10.25	241
ROA [%]	53.14	849.81	4.46	265
OPR [%]	-396.75	6 192.27	6.03	261
MV/BV	200.24	2 500.86	5.00	265
52-week total return	144.26	1 687.04	20.48	289
Company characteristics				
Company market capitalization	14 596.55	152 061.72	127.76	298
Age	17.43	7.57	18.38	301
Total revenue	314.25	1 229.27	39.19	262
Net income before extraordinary items	19.35	129.97	2.03	267
Net income after taxes	19.98	133.00	2.06	267
Total assets	742.95	3 560.75	49.93	265
Total debt	104.83	407.48	6.20	265
Cash from operating activities	57.92	258.44	1.67	265
Cash from investing activities	-28.37	121.84	-0.79	264
Cash from financing activities	-12.32	103.76	-0.71	262

Panel C. Statistical significance of differences between Panel A and Panel B				
Specification	***t*-statistics**	***p*-value**	***U* Mann Whitney Statistics**	***p*-value**
Firm performance				
ROE [%]	1.8795	0.0610	0.9030	0.3665
ROA [%]	-0.6225	0.5340	0.7034	0.4818
OPR [%]	-0.7457	0.4563	3.2289	0.0012
MV/BV	-0.5554	0.5790	1.8545	0.0637
52-Week total return	-0.8002	0.4240	0.3819	0.7025
Company characteristics				
Company market capitalization	1.2395	0.2158	4.6832	0.0000
Age	1.9171	0.0559	2.2111	0.0270
Total revenue	3.0183	0.0027	3.4633	0.0005
Net income before extraordinary items	4.2782	0.0000	4.1439	0.0000
Net income after taxes	4.3792	0.0000	4.0863	0.0000
Total assets	4.7405	0.0000	5.0860	0.0000
Total debt	2.2606	0.0243	5.1001	0.0000
Cash from operating activities	3.0688	0.0023	4.6845	0.0000
Cash from investing activities	-2.6271	0.0090	-4.4240	0.0000
Cash from financing activities	-0.8465	0.3978	-1.6157	0.1062

Note: unwinsorized data.
Source: own study.

The data show that companies that appointed at least one woman to the board differ quite significantly. These companies have higher capitalization, are older, have higher revenues, higher profit, total assets, and debt. All of these differences have statistical significance. This means that there is a specific picture of the company that appoints women to the board. However, in terms of firm performance (both market and operational), there were fewer differences. The differences are noticeable in the median for OPR and MV/BV ratios. Companies with women on management boards have slightly higher OPR and MV/BV ratios. We might conclude that there are strong specific characteristics of a company that decides to appoint women to the board, while the presence of women on the board does not result in spectacular financial success (operating or market).

These findings lead us to our central question of whether the presence of woman directors on management boards could impact firm performance. Following the results of parametric and non-parametric tests, we employed two dependent variables as a measure of efficiency: OPR and MV/BV ratios. By applying both operating and market measures, we analysed the role of female directors from the perspective of accounting books and shareholders' perception.

Table 4 documents the results of a regression analysis with OPR as a dependent variable.

The results show that two variables referring to women's presence on the management board positively related to operating efficiency (OPR). We might conclude that there was a higher OPR if the percentage of women on the management board (W_PER_MB) is higher. Thus, we confirmed our first hypothesis (assuming that firms having women on the management board exhibit higher operating performance). We observed a similar effect if the management board was more diversified in terms of gender (BLAU_MB). However, taking the position of CEO by a woman (CEO_YES) or having at least one woman on the management board (W_YES_MB) does not affect performance.

Regarding control variables, the results show that company size (in assets) is positively related to OPR. It confirms the economics of scale that occurs in larger companies. This result is consistent with previous studies (Dang *et al.*, 2018; Duppati *et al.*, 2020).

Table 5 presents the result of a regression analysis with the MV/BV ratio as the dependent variable.

Table 4. Regression analysis of the impact of women on board on the OPR ratio

Variable	OPR	OPR	OPR	OPR
Intercept	-70.82*** (-5.2502)	-73.25*** (-5.4556)	-71.66*** (-5.3311)	-72.57*** (-5.3957)
W_YES_MB	3.77 (1.4933)	–	–	–
W_PER_MB	–	**12.70** ** **(2.1993)**	–	–
BLAU_MB	–	–	**10.62** * **(1.7987)**	–
CEO_YES	–	–	–	-1.43 (-0.2457)
LN_ASSETS	5.01*** (7.6769)	5.16*** (8.1034)	5.03*** (7.8064)	5.22*** (8.1790)
LN_AGE	-1.04 (-0.3673)	-1.23 (-0.4339)	-0.94 (-0.3344)	-0.98 (-0.3463)
DEBT RATIO	-7.37 (-1.0424)	-7.74 (-1.0970)	-7.80 (-1.1039)	-7.62 (-1.0751)
Industry sector	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Adj. R-squared	0.1562	0.1581	0.1569	0.1546
F-statistic	14.0015	14.1855	14.0724	13.8483
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000
Total observations	1195	1195	1195	1195

Note: ***, **, and * denote significance levels of 1%, 5%, and 10%, respectively.
Source: own study.

Table 5. Regression analysis of the impact of women on board on the MV/BV ratio

Variable	MV/BV	MV/BV	MV/BV	MV/BV
Intercept	337.27*** (24.7014)	335.82*** (24.7164)	335.86*** (24.6806)	335.83*** (24.7314)
W_YES_MB	2.88 (1.1038)	–	–	–
W_PER_MB	–	-4.64 (-0.2697)	–	–
BLAU_MB	–	–	1.11 (0.1822)	–
CEO_YES	–	–	–	8.34 (1.3812)
LN_ASSETS	-1.34** (-2.0246)	-1.15* (-1.7751)	-1.20* (-1.8238)	-1.21* (-1.8740)
LN_AGE	-6.40** (-2.2292)	-6.38** (-2.2214)	-6.41** (-2.2326)	-6.75** (-2.3458)
DEBT RATIO	1.45 (0.2025)	1.44 (0.2003)	1.33 (0.1848)	2.04 (0.2842)
Industry sector	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Adj R-squared	0.7805	0.7834	0.7803	0.7806
F-statistic	256.7872	256.6206	256.4654	256.97
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000
Total observations	1224	1224	1224	1224

Note: ***, **, and * denote significance levels of 1%, 5%, and 10%, respectively.
Source: own study.

Taking the perspective of investors, we did not find any statistically significant association between women's presence on the management board and MV/BV ratio. Thus, our findings did not support our second hypothesis (assuming that firms having women on the management board exhibit higher market performance). The control variables the company size (LN_ASSETS) and its age (LN_AGE) related negatively to MV/BV ratio. It suggests that older and larger companies have lower growth opportunities (*i.e.* lower MV/BV ratio) than their younger and smaller counterparts.

Our results showing a positive impact of management board diversity on performance measured as operating profit margin allowed us to confirm our research hypothesis assuming that the inclusion of women on the management board impacts positively company's performance.

The analysis showed that, as in other geographic areas, there was a significant gender gap in the composition of corporate boards. For the 500 biggest Australian companies in 2011, Vafaei *et al.* (2015) found that 12.3% was the average share of women on board. Sabatier (2015) found that for the French largest listed companies included in the CAC40 index companies, the fraction of female directors was 16% on average in 2012, and the percentage of female directors on boards increased to nearly 27% in 2012. Moreover, Singh *et al.* (2015) reported that the presence of women on the board in French companies in 2012 was 12.7%. Noteworthy, our results for the V4 countries were noted for 2021, while similar results in other Western and developed countries were achieved several years before.

Our findings on the positive impact of women on operating firm performance are in line with previous research by Liu *et al.* (2014). They prove the positive relationship between performance measured as return on sales and board gender diversity document for Chinese listed firms. Isidro and Sobral (2015) who investigated companies from 16 European countries and Kılıç and Kuzey (2016) for Turkish companies also found a positive impact. A positive impact on firm performance proves that women have specific skills that positively affect company running. In this way, our findings provide evidence supporting resource dependence theory.

Our results on the lack of the impact of women on the management board on the market firm performance confirm the results of Loy and Rupertus (2022). They report the lack of association between women's presence and long-term stock performance. This might imply that investors do not expect and thus do not appreciate companies appointing women to the board. Thus, appointing women to the board is not a signal (nor positive or negative). In this way, our findings do not provide evidence supporting the signalling theory.

CONCLUSIONS

The main aim of our research was to find whether the presence of women on the management boards affects the firm performance in stock companies from the V4 countries.

Firstly, we found that only 33% of companies had women on board, women constituted only 12% of board members, and less than 5% of the companies had a female CEO. This low level of women's presence on board is the same as Western and developed countries achieved several years ago. This low level of women's presence on board might be explained by the national cultures of the countries constituting the V4 group, and especially their high masculinity score.

Secondly, we also found that there was a specific type of company that appoints women to the board. These companies are bigger and older. This might imply that these companies are more mature and established and are looking to diversify their management methods by meeting the requirements of society development (not only the clients).

Our findings show a positive and statistically significant impact of women on management boards on operating profit margins. We might conclude that women's presence on management boards is important for the business running and firm operating performance. However, it is not enough to appoint one woman to the board or to the CEO position as these variables (W_YES_MB and CEO_YES) are of no importance. But the more women on the board (W_PER_MB and BLAU_MB), the higher the operating firm performance. More women on the management board makes them feel more confident and active.

However, we found no impact of women on management boards on market performance. Thus, we might conclude that women's presence on management boards is not particularly important for investors. It might suggest that they are not aware of the women's role in leadership positions or regulatory changes that are to take place.

We found economic arguments supporting women's appointment to the boards. However, apart from economic arguments on women's appointment to the boards, there were also ethical arguments for the inclusion of female directors – no one can be excluded from a team because of gender, age, etc. We believe that these ethical arguments are valid for the V4 countries, especially since there are positive economic consequences of including women in decision-making. Our findings show that the more women on the board the higher operating performance. Companies should encourage women to play active roles in the companies. It is not enough to appoint more women to the board. Companies should also consider women's skills and competencies. Companies are advised to introduce motivational programs for women and create a culture of women's inclusion. We believe that our results might provide arguments for gender diversity in leadership positions. This issue seems to be important since EU countries will have to introduce the gender quota regulation for large publicly traded firms before 28 December 2024. Gender equality, and especially gender equality in decision-making positions is one of the goals included in the 2030 Agenda for Sustainable Development. We believe it might influence the awareness of gender diversity. Our research shows that although the inclusion of female directors on boards positively impacts operating performance, the lack of association between market firm performance and women's presence on management boards might suggest that female presence is not important for investors. Thus, more initiatives promoting the advantages of gender diversity are recommended.

Our research is not limitations free. Firstly, it includes only listed companies. We expect that the inclusion of private companies, especially family firms might provide some interesting findings. Secondly, our analysis is limited to four countries with similar historical, social, and economic contexts. Thirdly, we included in our analysis only quantitative variables.

The above limitations indicate directions for future research. Expanding the sample to companies from a bigger number of countries that differ to a greater extent than V4 countries might provide new evidence. Furthermore, a more thorough examination of the cultural and institutional factors at play within each country could be undertaken to illuminate the specific drivers and barriers shaping gender diversity on management boards. Further investigations may also extend to analyzing the impact of other forms of diversity, like age, ethnicity, and educational background, on firm performance, and delve into the implications of gender diversity on various performance dimensions such as innovation, corporate social responsibility, or sustainability. The inclusion of other variables, especially those referring to corporate governance or of qualitative nature might provide some interesting insights into the investigation of the role of female directors. Moreover, exploring mediation analysis with women on management boards as a mediator for firm performance could provide valuable insights into the underlying mechanisms.

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Acknowledgements and Financial Disclosure

We would like to extend our gratitude to the anonymous reviewers for their valuable feedback and insightful suggestions, which have significantly contributed to the improvement of this manuscript.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme “Development of Scientific Journals” (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.