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Gender diversity and financial performance in Mexican stock companies

Diversidad de género y desempeño financiero en empresas bursátiles mexicanas

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Abstract: since profit maximization is the main objective of private companies, it is important to know how the behavior of decision-making agents can influence the performance of the company. The objective of this document is to estimate if gender diversity on the board of directors has any effect on the financial performance of Mexican stock companies. We use a sample of Mexican non-financial companies listed in the Mexican Stock Exchange and that are part of the IPC Index, during the 2011-2021 period. Four regression models were used: panel data regression, OLS2S regression, GMM system, and DiD. Results show that the presence of only one woman on the board of directors had a negative effect on the ROA of companies and that the recommendation for female inclusion on boards had an effect on the presence of women on the boards of directors. These results support the Critical Mass Theory that in biased groups women are symbolic, and their presence has negative or no effect. In order to have an effect, the number of women on the board of directors must increase

Keywords: corporate finance, governance, behavioral finance, financial performance, gender diversity, women on boards, corporate decision making, critical mass theory.

Resumen: debido a que la maximización de utilidades es el principal objetivo de las empresas privadas, es importante conocer cómo puede afectar el comportamiento de los agentes que toman las decisiones. El objetivo del artículo es estimar el efecto que la diversidad de género en la junta directiva tiene en el desempeño financiero de las empresas y evaluar si la sugerencia de la Bolsa Mexicana de Valores de incorporar a mujeres en los consejos de administración tuvo un efecto en la diversidad de la junta directiva. Para ello, se utilizó una muestra de las empresas bursátiles no financieras del Índice IPC de la BMV en el periodo 2011-2021. Se aplicaron cuatro modelos de regresión: de datos panel, MC2E-VI, sistema GMM y DiD. Los resultados muestran que la presencia de solo una mujer en el consejo de administración tuvo un efecto negativo sobre el ROA de las empresas y que la sugerencia de inclusión femenina en los consejos tuvo un efecto sobre la presencia de mujeres en las juntas directivas. Esto respalda la teoría de la masa crítica de que en grupos sesgados las mujeres son símbolos y su presencia no tiene efecto o tiene efectos negativos. Para que haya un efecto debe incrementar el número de mujeres en el consejo de administración.

Palabras clave: finanzas corporativas, gobernanza, finanzas conductuales, desempeño financiero, diversidad de género, mujeres en los consejos, toma de decisiones corporativas, teoría de la masa crítica.

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Introduction

At present, studies about gender diversity have generated interest, perhaps because diversity enables that members of a group identify themselves within it, since this broadens the group overview by including different points of view. In addition, gender diversity enables to reduce the working gaps that affect the women insertion possibilities in the job market (Iranzo and Richter, 2002), which increase as they move up in the corporate hierarchy. According to the OECD (2022), in both developed and developing countries, between 52 % and 60 % of the women are employed in badly remunerated job sectors.

As it is known, the main objective of companies is to maximize the profits of shareholders; therefore, it is important to study how the behavior of decision makers may affect the company results. In the corporate scope, it has been studied gender differences among decision makers, such as general manager, owner and members of the board of directors. One way to investigate diversity is the behavioral finances approach, which studies how cognitive biases of individuals influence decision making (Hirshleifer, 2015). Such biases include overconfidence, mainly attributed to men, and risk aversion, attributed to women; it is known that there may be differences in the financial performance of companies due to these biases.

The objective of this research is to estimate the effect that the gender diversity in the board of directors had on the financial performance of Mexican stock companies that are part of the Prices and Quotes Index (IPC, Índice de Precios y Cotizaciones) during the 2011-2021 period, controlling the endogeneity under different approaches. In addition, it is evaluated if the recommendation of the Mexican Stock Exchange (BMV, Bolsa Mexicana de Valores) in 2018 to incorporate women in the steering committee had an effect in the diversity of the board of directors.

This document provides an important contribution to the literature, since by this time there are few studies about the role of the gender of decision makers on corporate performances, and it is different from existing studies about Mexico because various approaches are applied with the purpose of controlling the inverse causality and the endogeneity. Therefore, it represents a novelty for the Mexican market; it helps to mitigate the existing knowledge gap about gender diversity in the boards of directors, and has a social contribution since it helps to reduce the social stigmas that limit the access of women to managerial positions.

Relationship between gender diversity and the performance of companies

In empirical investigations about gender diversity and its impact on corporate decision making, behavioral biases have been found that are attributed to men and women that may influence on the financial performances of a company; hence, it is important to investigate them. On one hand, women are more cautious and conservative than men in information handling (Adhikari, 2013) and, on the other hand, men are prone to have too much confidence when making decisions (Barber and Odean, 2001). For example, García Solarte *et al.* (2018) demonstrated that the gender influences the behavior promoted by directors; while the companies led by women promote aspects such as participation, sense of belonging and teamwork, those led by men stimulate competitiveness and productivity.

Those who make the main decisions in companies are often the owners, the members of the board of directors or the members of the senior management team, such as the general manager. Chirwa (2008) and Robb and Watson (2012) found that when women are the owners and decision makers, there are no differences on the profit margins of the companies.

Jeong and Harrison (2017), as well as Martín-Ugedo *et al.* (2018) found that having a female director increases the performance, mainly in the long term. Similarly, Naseem *et al.* (2019) also found a positive effect in the existence of female directors, although smaller than in companies with male directors. In contrast, Lam *et al.* (2013) and Adhikari (2013) verified an inverse effect between the existence of female directors and the performance of companies. Specifically, for Thai manufacturing companies, having a female

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director has a negative effect both in the short and long terms, although such effect is reduced as the educational level and experience increase (Singhathep and Pholphirul, 2015). Finally, Kaur and Singh (2018) and Baloyi and Ngwakwe (2017) did not find evidence that the existence of a female director affects the performance of companies.

Regarding the diversity of women in the boards of directors, the findings are diverse. On one hand, for the Spaniard market, Campbell and Minguez-Vera (2008) as well as Valls Martínez and Cruz Rambaud (2019); for India, Srivastava, *et al.* (2017), and in the STOXX600 European stock index the research work by Nuber and Velte (2020), all them found that as the number of women in the committees increase, a better financial performance is obtained. Controlling endogeneity and inverse causality, Chatterjee and Nag (2022) conclude that there are large and positive impacts of gender diversity on the performance of the company and on the creation of value. On the other hand, Yang *et al.* (2019) found a negative effect of gender diversity on performance, while Unite *et al.* (2019) and Dang *et al.* (2021) agreed that there is no significant effect of the gender diversity on the board of directors on the performance.

Critical mass theory

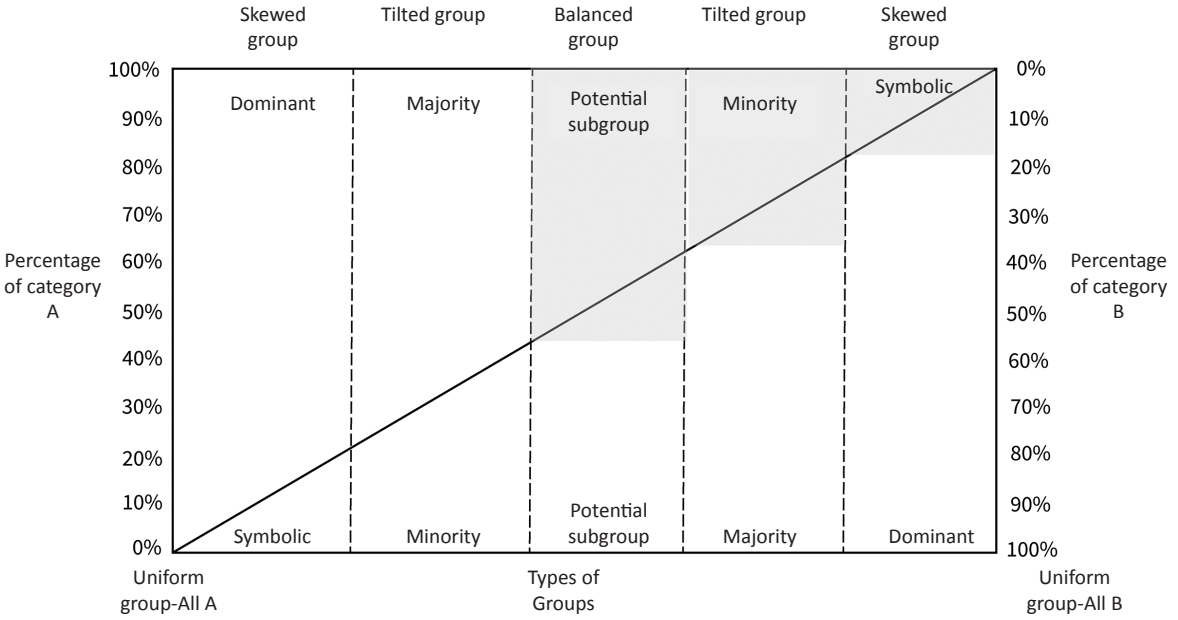
The critical mass social theory is an analogy of a known theory in nuclear physics, which suggests that it is required a critical mass of material to cause a nuclear fission. The critical mass social theory of Kanter (1977) is based on the idea that an appropriate percentage of socially and culturally different people is key to form the interaction dynamics in a group of people. Therefore, this theory explains the need of a minimum percentage of people so that their interaction within a group causes a significant reaction.

According to Kanter (1977), there may be three types of groups depending on the percentage composition of each category. Figure 1 presents its graphical representation. The first type are uniform groups, with a 100 % to 0 % ratio, where there are people of only one category. The second type, the skewed groups, occur when few people of one category are added to the group, causing that their presence is only symbolic. In skewed groups there is a group that is dominant on another symbolic group in an approximate ratio of 85 % to 15 %; the latter may consist of one or two people, a very small number to have an impact o for an alliance to be formed between both symbolic members. The third type, the tilted groups, with a 65 % to 35 % ratio. In this distribution, the dominant become majorities and the symbolic become minorities, but there may be alliances between the members of minorities that have effects on the total group. The fourth type is a balanced group, which occurs when a 60 % to 40 % or a 50 % to 50 % ratio is reached.

Aiming the critical mass social theory to the context of inclusion of women as members of the board of directors in companies, adding a few women to an organization might provide them a sole symbolic status, and although it might be expected that due to the presence of a few women it would become easier and faster to incorporate even more women, their symbolic status perpetuates their limited presence. Therefore, the number of members should be enough to counteract the effects of symbolism.

According to Kanter (1977), to improve the steering committees there should a critical mass of female directors of approximately 35 %, i.e., the one existing in tilted groups, so that female directors not anymore represent the "women´s perspective", and the other directors become aware of the opinion of female directors rather than of their gender.

Figure 1
Types of groups defined by the proportional representation of two social categories



Note. Adapted from Kanter (1977, p. 209).

Nevertheless, according to Levrau (2017), the majority of gender studies examine boards of directors that have, in average, less than 10 % of female directors, because this is the most common composition of boards of directors, and consequently, there is still a consensus that a critical mass of three women is necessary for an impact to exist. Kanter (1977) states that, once the minimum threshold of gender balance is passed, the presence of women will improve the performance of the board of directors.

Gender diversity in Mexico

According to the OECD (2022), from 2016 the percentage of women in the boards of directors of public companies listed in the USA and Canada exceeds 20 %. For 2014, in Latin America there were 9.5 % of women in steering committees, while in Mexico it was only 6 % (CEPAL, 2015). As it is shown in figure 2, in Brazil and Chile there is a greater presence of women in the boards of directors of the companies listed, with 16.9 % and 15.2 %, respectively; these numbers are almost triple for Brazil and double for Chile compared to 2015, when they were 5.8 % and 7.7 %, respectively. Meanwhile, Mexico is below Brazil, Chile and Colombia, and between 2016 and 2021 the percentage went from 7.2 % to 10.6 %.

The Mexican Institute for Competitiveness (IMCO, Instituto Mexicano para la Competitividad) pointed out that the percentage of employment of women in the companies listed in the BMV is 36 %, but it decreases as the hierarchical level of the position increases, to 10 % for the financial manager and 4 % for the general manager. In addition, about 32 of the total number of companies listed in the BMV had never had a female director, and the average participation of women in the boards of directors is 11.5 %, of which 8.5 % correspond to non-independent advisors; this might suggest that their participation involve a relationship with the team or with the shareholders (IMCO, 2022). The following hypothesis was formulated considering the context and the literature reviewed:

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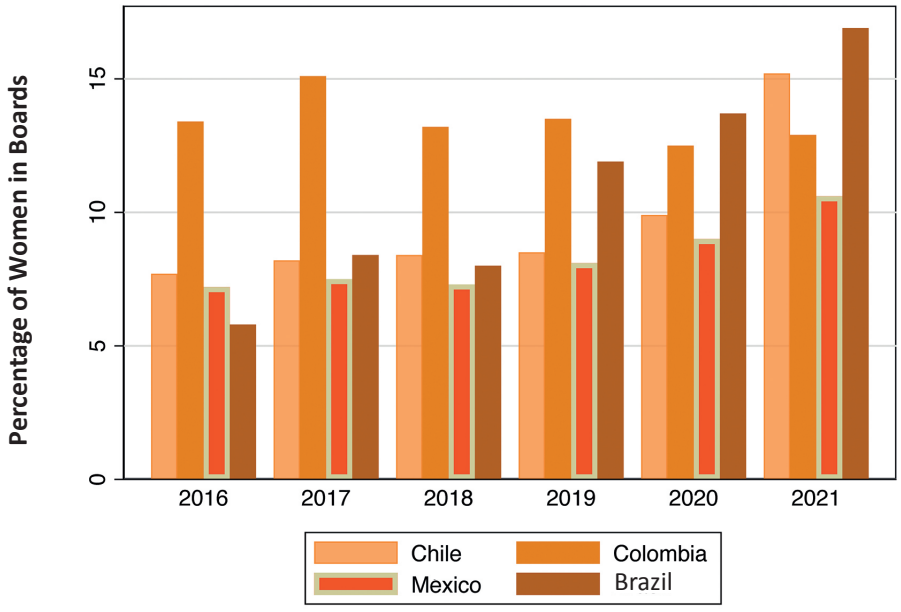
Hypothesis 1: due to the scarce presence of women in the boards of directors, their participation as advisors is at a symbolic level. Therefore, there may be negative, negligible or null effects on the financial performance of the company.

Figure 2

Percentage of women in steering committees of public companies in Latin American countries



Note. Made with data from OCDE (2022).

For the Mexican context, it is difficult to find data about female directors of companies over time due to the lack of information. Apparently, women face obstacles when trying to move up in the corporate hierarchy; a report by OCDE (2018) remarks that, although women have a good participation in high level positions in the public sector, it is necessary to increase their participation in the private sector. This limits the investigation about women in managing positions in the private sector. Mendoza-Quintero *et al.* (2018) investigated the impact of gender diversity in the boards of directors and in the management teams regarding performance and the level of debt of the companies listed in the BMV up to 2016, and they only found effect on the level of debt.

In Mexico, the BMV suggests the use of practices and principles about corporate governance stated by the Corporate Coordinator Board (CCE, Consejo Coordinador Empresarial). From 2018, the CCE added practices to diversify and enrich the knowledge and points of view in the boards; one of these practices recommend the incorporation of women in the boards of directors (CCE, 2018), and such suggestion was promoted by the BMV. The following hypothesis was formulated based on the previous literature:

Hypothesis 2: The inclusiveness suggestions of the BMV in 2018 help to increase the participation of women in the boards of directors.

Materials and methods

A challenge faced by studies about gender and its effect on decision making is the limited information (Adams, 2016); consequently, the research problem stated is analyzed using the IPC stock index of the BMV. With 141 companies current-

ly listed, the BMV is the second biggest stock exchange in Latin America, after the Sao Paulo Stock Exchange in Brazil (Bolsa Mexicana de Valores [BMV], 2022a). The IPC is the most important stock index of the BMV, since it contains the most important 36 companies listed in the domestic market, and represents a balanced, weighted and representative sample of the BMV and of the Mexican economy (BMV, 2022b). Therefore, studying the phenomenon under investigation using the companies of the IPC provides an adequate approximation for the Mexican economy in general.

The study population are the 36 companies that take part of the IPC index of the BMV. Nevertheless, since the companies that provide financial services were excluded —because they are treated differently due to the general provisions that are applicable— the final sample consisted of 30 companies of the IPC. The distribution by sector of the companies in the sample is as follows: 26 % of the companies are in the industry sector, 26 % in the sector of frequently consumed materials, 16.2 % in the sector of materials, 9.9 % in telecommunication services, 9.9 % in basic consumption services and 3.3 % in each of the energy, health and information technologies sectors.

The information about the companies was obtained through an analysis of the content of the reports that such companies submit annually to the BMV, through the Stock Information Transfer System (STIV-2, Sistema de Transferencia de Información sobre Valores) (Comisión Nacional Bancaria y de Valores [CNBV], 2022). The models used to fulfill the research objective are presented below.

Model specification

Equation 1 describes the model used to evaluate the impact of the presence of women in the boards of directors on the performance of the company, in order to test the first hypothesis.

$$PF_{it}=\alpha_{it}+PF_{it-1}\,\gamma+Diver_{it}\,\delta+x_{it}\,\beta+\varepsilon_{it} \qquad (1)$$

where t=2011-2021, PF_{it}, represents the performance, measured as the value of the return on assets at the operational level, of the total of companies, for years t; Div_{it} δ is the variable of interest, the diversity in the board of directors, given as the percentage of women in the boards of directors of the total of companies, for years t; PF_{it-1} is the lagged value of the performance in previous years of the total i of companies, for years t; x_{it} β represents the set of control variables which are shown in table 1.

There may a problem of endogeneity in the model stated due to (i) the non-randomness and the non-observable effects due to which companies include women in the board of directors, (ii) the heterogeneity between the information collected from the companies, and (iii) the relationship between the variables through time, due to which the independent variables may be correlated to the error term. In addition, there may be a problem of inverse causality because, as well as the performance affects diversity, the incorporation of women in the boards may be an effect of the individual features of the companies. An important reason to address both problems is that not attempting to identify the causal effects, indirectly contributes to perpetuate more stereotypes about women, erroneously overestimating the positive and negative effects that the female presence has on the performance of the companies (Adams, 2016).

A first solution is the panel data model with fixed effects estimator, but this might provide a biased estimator due to the correlation of the independent variables with the error term. Another alternative is the least squares model on the first difference of Equation 1; however, this might result in a biased estimator due to the correlation between the dependent lagged variable ΔPF_{it-1} and the error term $\Delta\varepsilon_{it}$. A least squares model with instrumental variable (MC2E-VI) where the instrumental variables are correlated with the independent variable of interest, but not with the dependent variable, may control the endogeneity but not the inverse causality. Another solution is the use of differences in differences (DiD) to find the effect, for instance, of gender in places that apply policies of gender diversity and in those that do not (Valls Martínez and Cruz Rambaud,

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2019; Yang *et al.*, 2018). At last, a solution for the endogeneity and inverse causality is the Generalized Methods of Moments (GMM) of Arellano and Bond (1991), in which a lag of the response variable is added to the model as independent variable (Arora, 2023; Chatterjee y Nag, 2022; Dang *et al.*, 2021).

According to the GMM in which, besides including the variable of interest, $Diver_{it}\,\delta$, and other independent control variables, $x_{it}\,\beta$, it is carried out a transformation of the first difference, including lags of the dependent variable as instrumental variable of the percentage of women in the board of directors. This model assumes sequential exogeneity, because adding sufficient lags eliminates the correlation of the independent variables and the error as well as the individual effects of each company; this is shown in Equation 2:

$$\Delta PF_{it}=\Delta PF_{it\text{-}1\gamma}+\Delta Diver_{it}\delta+\Delta x_{it}\,\beta+\Delta\varepsilon_{it} \qquad (2)$$

In order to test the second hypothesis, a model was built to know the effect of the change in the code of better corporate practices about diversity in the board of directors. The second model is explained as follows:

$$PDivCA_{it}=\alpha_{it}+\beta PDivE+\delta T2018_{it}+\delta T2018_{it} \times\beta PDivE+x_{it}\,\beta+\varepsilon_{it} \qquad (3)$$

where $PDivCA_{it}$ represents the diversity in the board of directors; $PDivCA_{it}$ is a fictitious variable of the treatment group, i.e., those companies that have more than 30 % of female employees in a first version of the model, and more than 40 % of female employees in a second version of the model. $\delta T2018_i$ is a fictitious variable that takes a value of 1 in the period after 2018, year in which it is recommended to incorporate women in the boards on the companies listed in the BMV. Finally, $x_{it}\,\beta$ is a set of control variables that have influence on the diversity in the board of directors.

Description of the variables

Table 1 presents the indicators of the dependent variable, the explanatory variables of interest and the explanatory control variables. The dependent variable was the financial performance and the indicators used to measure it were: ROA, operating ROA and ROE. The variable of interest, gender diversity, is measured using three indicators based on the ones used by Adams and Ferreira (2009), Arora (2022), Chatterjee and Nag (2022), Dang *et al.* (2021), Unite *et al.* (2019) and Valls Martínez and Cruz Rambaud (2019): the percentage of female directors, a fictitious variable when there is one female director, and a fictitious variable when there are three female directors. According to the critical mass social theory, the fictitious variable one woman in the board represents a board with symbolic presence, while the fictitious variable presence of three women corresponds to a board in which women are a minority.

At last, the control variables presented in table 1 were also used by Adams and Ferreira (2009), Arora (2022), Campbell and Minguez-Vera (2008), Chatterjee and Nag (2022), Dang *et al.* (2021), Nuber and Velte (2021), Unite *et al.* (2019) and Valls Martínez and Cruz Rambaud (2019).

Table 1
Operationalization of the variables

Identifier	Definition
Indicators of the dependent variable	
ROA	Net profit with respect to total assets.
ROAop	Operating profit with respect to total assets.
ROE	Net profit with respect to capital.
Independent variables of interest	
Div3Adm	Fictitious variable. 1, when there are 3 female directors; 0, otherwise.
Div1Adm	Variable Fictitious variable. 1, when there is 1 female director; 0, otherwise.
PDivAdm	Percentage of female directors in the board of directors with respect to the total number of members.
Independent control variables	
TAdm	Number of members of the board of directors.
TDirec	Number of members of the board of directors.
PCAInd	Independent directors with respect to the total.
CEOdual	Fictitious variable. 1 when the CEO is also president of the board of directors.
CEOCA	Fictitious variable. 1 when the CEO is also member of the board of directors.
PDirCA	Percentage of executives that are not members of the board of directors with respect to the total.
lnVentas	Value of annual sales.
lnActivos	Value of annual assets.
Sec	Fictitious variable of each industry.
Edad	Age of the company.

Note. The information was obtained from the annual reports of each company through the STIV-2 (CNBV, 2022).

Results

Table 2 shows the main features of the variables used. Three different regression approaches were implemented to test the first hypothesis: regression of panel data with fixed effects estimator and regression with instrumental variable to control the endogeneity, both based on Equation 1, and the dynamic model to control the endogeneity and inverse causality, based on Equation 2. In addition, a DiD model based on Equation 3 was applied to test the second hypothesis, to evaluate if there was a change in the diversity of boards after the recommendation of the BMV in 2018.

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Table 2
Descriptive statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
Dependent variables					
ROA	296	9.37	6.48	-9.10	40.20
ROAop	325	10.05	5.95	-10.61	38.01
ROE	307	21.20	23.71	-122.70	160.00
Independent variables					
DivAdm3	321	0.20	0.40	0	1
DivAdm1	321	0.65	0.47	0	1
TAdm	328	17.60	9.65	0.00	43.00
PDivAdm	321	7.53	6.85	0.00	36.36
PCAInd	307	41.14	16.42	0.00	83.33
TDirec	312	8.91	4.32	0.00	23.00
PDirCA	321	7.16	9.56	0.00	50.00
CEOdual	318	0.32	0.46	0	1
CEOCA	318	0.40	0.49	0	1
lnVentas	325	9.97	2.09	4.18	13.89
lnActivos	325	10.62	1.76	6.17	14.33
Edad	330	33.85	23.98	-4	96

Note. Prepared by the authors based on the data of the STIV-2 (CNBV, 2022).

The approach of panel data with fixed effects is presented in table 3. For the models with the panel data approach, it was carried out the Hausman test (unreported) of fixed effects with respect to random effects, and it was found that it is better to use the fixed effects estimator. Although the effect is positive for the presence of three women and negative for the presence of one woman, the fixed effects estimator was only significant when there is a female director and has negative effects on the ROA.

Table 3
Model of fixed effects with panel data

V. Explic.	ROA			ROA op			ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Div3	-0.008			0.149			2.555		
	(1.118)			(1.001)			(2.289)		
Div1		-2.312**			-1.145			0.981	
		(0.999)			(1.068)			(3.701)	
PDiv			-0.100			-0.041			0.188
			(0.062)			(0.055)			(0.153)
Cons	-77.428	-260.000	-210.000	24.687	-63.994	-46.291	-1500	-1500	-1300
	(426.141)	(471.307)	(464.527)	(343.863)	(354.396)	(367.538)	(1100)	(1100)	(1200)
TAdm	-0.091	-0.034	-0.076	-0.086	-0.055	-0.077	-0.427	-0.436	-0.443

V. Explic.	ROA			ROA op			ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(0.101)	(0.104)	(0.100)	(0.080)	(0.086)	(0.079)	(0.256)	(0.296)	(0.265)
PCAInd	-0.030	-0.020	-0.032	-0.007	-0.003	-0.007	0.010	-0.001	0.006
	(0.044)	(0.044)	(0.043)	(0.038)	(0.037)	(0.038)	(0.111)	(0.108)	(0.109)
PDirCA	-0.082*	-0.119**	-0.103*	-0.113***	-0.131***	-0.121***	-0.120	-0.101	-0.078
	(0.048)	(0.053)	(0.051)	(0.025)	(0.034)	(0.030)	(0.119)	(0.156)	(0.145)
TDirec	0.311*	0.299	0.292	0.232	0.221	0.225	0.734	0.696	0.725
	(0.181)	(0.187)	(0.183)	(0.148)	(0.150)	(0.149)	(0.434)	(0.446)	(0.443)
CEOdual	4.113	4.393)	4.328	2.928	3.054	3.022	1.914	2.127	1.857
	(3.053)	(3.061)	(2.991)	(2.383)	(2.394)	(2.349)	(7.283)	(7.267)	(7.298)
CEOCA	1.393	1.365	1.528	1.256	1.261	1.317	5.256	5.364	5.092
	(1.437)	(1.444)	(1.461)	(0.914)	(0.932)	(0.927)	(3.112)	(3.077)	(3.133)
lnActivos	-14.888***	-14.857***	-14.993***	-12.536***	-12.422***	-12.550***	-38.012***	-38.409***	-38.411***
	(2.944)	(2.936)	(2.874)	(2.706)	(2.710)	(2.706)	(5.214)	(5.501)	(5.370)
lnVentas	17.717***	17.758***	17.882***	14.942***	14.856***	15.003***	54.293***	54.303***	54.181***
	(4.051)	(4.049)	(4.082)	(3.260)	(3.285)	(3.281)	(12.465)	(12.641)	(12.541)
Edad	-0.121	-0.130)	-0.133	(-0.022	-0.025	-0.030	-0.716	-0.686	-0.661
	(0.129)	(0.147)	(0.137)	0.117	(0.122)	(0.120)	(0.425)	(0.412)	(0.418)
Año	0.035	0.123	0.102	(-0.015)	0.029	0.020	0.711	0.707	0.613
	(0.217)	(0.238)	(0.235)	(0.1749)	(0.179)	(0.185)	(0.558)	(0.562)	(0.583)
R2	.3657	.3769	.3725	.3651	.36833	.366	.2491	.2483	.2500

Note. * p<.1; ** p<.05; *** p<.01. Robust standard errors in parenthesis.

Although the panel data approach handles endogeneity to some extent, it exhibits biases. Consequently, models were estimated using the MC2E-VI approach. The size of the board of directors was used as instrument, following Campbell and Minguez-Vera (2008) and Nuber and Velte (2021), who consider it as a corporate governance variable which is expected to have a significant positive relationship with the appointment of female directors (Campbell and Minguez-Vera, 2008), and although it is not completely exogenous, it is relatively stable along time and may be much less affected by the performance of the company than other variables of corporate governance (Nuber and Velte, 2021).

The Durbin-Wu-Hausman (DWH) endogeneity test and the test for weak instruments were applied to the models of table 4; the results are also presented in such table. It was found that the indicators of the variable of interest are indeed endogenous. For the second test, results show that when the percentage of female directors in the board with the respect to the total number of members is used as dependent variable, the instrument is weak for the three performance indicators (ROA, ROE and operating ROA). On the other hand, when the fictitious variables about the presence of one or three female directors are used, the test show that the instrument is not weak. The models evidence that the existence of one or three female directors negatively and significantly affects the financial performance: when ROA is used as indicator of financial performance (models 1 and 2), when operating ROA is used (models 4 and 5) and when ROE is used (models 7 and 8).

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Table 4
MC2E-VI model

V. Explic.	ROA			ROA op			ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Div3	-3.883**			-3.501**			-17.434***		
	(1.882)			1.469			6.369		
Div1		-5.237**			-4.700**			-21.852**	
		(2.436)			(1.986)			(8.484)	
PDiv			-2.265			-0.961			-6.715
			(2.554)			(0.603)			(5.281)
Cons	19.108***	23.793***	47.402	14.439***	18.113***	20.184***	18.076	30.825***	64.819
	(3.318)	(4.569)	(35.246)	(2.724)	(3.361)	(5.782)	(11.302)	(13.709)	(47.241)
PCAInd	0.034	0.073**	0.014	0.043**	0.073***	0.110**	0.263**	0.465***	0.402*
	(0.038)	(0.033)	(0.089)	(0.023)	(0.027)	(0.049)	(0.108)	(0.114)	(0.219)
PDirCA	0.029	-0.020	-0.183	0.024	-0.010	-0.112	0.049	-0.152	-0.528
	(0.035)	(0.050)	(0.270)	(0.036)	(0.045)	(0.111)	(0.155)	(0.187)	(0.582)
TDirec	-0.132	-0.040	0.162	-0.049	0.024	0.180	0.554	0.964**	1.529
	(0.100)	(0.117)	(0.423)	(0.088)	(0.106)	(0.211)	(0.373)	(0.433)	(1.133)
CEOdual	-0.951	-1.343	-2.925	-0.385	-0.445	-0.327	0.192	-1.596	-6.290
	(0.885)	(0.935)	(3.377)	(0.849)	(0.925)	(1.273)	(3.709)	(4.017)	(9.569)
CEOCA	-0.419	-1.755	-10.776	-0.110	-1.276	-2.640	6.321*	1.182	-22.057
	(0.926)	(1.322)	(12.379)	(0.768)	(0.944)	(1.931)	(3.542)	(4.553)	(24.791)
lnActivos	-3.298***	-3.825***	-11.047***	-3.034***	-3.303***	-4.461***	-11.642***	-12.525***	-27.551***
	(0.830)	(0.945)	(9.714)	(0.609)	(0.688)	(1.393)	(2.775)	(3.075)	(15.486)
lnVentas	3.079***	3.237***	11.094***	3.067***	3.060***	4.544***	11.606***	11.172***	29.682***
	(0.839)	(0.835)	(10.125)	(0.554)	(0.599)	(1.407)	(2.747)	(2.851)	(17.580)
Edad	-0.011	0.001	0.005	0.004	0.017	0.021	0.164**	0.234***	0.317
	(0.025)	(0.024)	(0.054)	(0.019)	(0.021)	(0.029)	(0.077)	(0.084)	(0.196)
Fictitious years	YES	YES	YES	YES	YES	YES	YES	YES	YES
Fictitious sector	YES	YES	YES	YES	YES	YES	YES	YES	YES
R2	.1381	.0638	.	.1320	.0305	.	.1122	.0025	.
N	302	302	302	302	302	302	302	302	302
Test DWH	.347	.053	.031	.136	.007	.018	.069	.005	.005
Test Instrum.	115.161	46.705	0.833	128.539	59.528	4.242	121.153	53.580	1.950

Note. * p<.1; ** p<.05; *** p<.01. Robust standard errors in parenthesis.

Continuing the analysis, to examine the relationship between gender diversity and the financial performance of the company, controlling inverse causality and endogeneity, the GMM is considered more effective. The GMM addresses the problem of endogeneity using instruments

of lagged dependent variable and endogenous variables with appropriate lags (Chatterjee and Nag, 2022).

The Sargan test and the Hausman test regarding the overidentification of the model, and the Arellano-Bond autocorrelation test on the first AR(1) and the second lag AR(2), are applied to all models of table 5. It is observed that in the second lag there is no correlation between the errors. The results are only significant for model 9, which shows that the percentage of female directors in the boards has a negative effect on the financial performance measured through the ROE. In addition, the impact of the percentage of female directors in the boards is negative, but much less than the one shown by the MC2E-VI model (model 9 of table 4).

Table 5

Dynamic GMM system model

V. Explic.	ROA			ROA op			ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep	0.389***	0.376***	0.378***	0.336***	0.336***	0.334***	-0.299	-0.281	-0.284
t-1	(0.076)	(0.080)	(0.070)	(0.079)	(0.079)	(0.075)	(0.255)	(0.252)	(0.241)
Div3	-0.640			0.404			7.738		
	(2.130)			(1.912)			(11.417)		
Div1		-2.137			-0.884			-7.145	
		(1.459)			(1.428)			(4.232)	
PDiv			-0.183			-0.111			-0.769*
			(0.118)			(0.128)			0.379
TAdm	-0.121	-0.069	-0.104	-0.124	-0.103	-0.111	-0.415	-0.238	-0.333
	(0.099)	(0.112)	(0.089)	(0.082)	(0.089)	(0.077)	(0.322)	(0.341)	(0.363)
PCAInd	-0.025	-0.015	-0.030	-0.004	0.000	-0.004	-0.129	-0.109	-0.163
	(0.043)	(0.043)	(0.042)	(0.033)	(0.034)	(0.033)	(0.129)	(0.134)	(0.153)
PDirCA	-0.070	-0.110*	-0.109*	-0.059	-0.072	-0.078	-0.119	-0.224	-0.250
	(0.046)	(0.062)	(0.059)	(0.037)	(0.051)	(0.047)	(0.217)	(0.237)	(0.216)
TDirec	0.164	0.184	0.149	0.122	0.117	0.109	1.091**	0.973*	0.843
	(0.161)	(0.152)	(0.145)	(0.120)	(0.118)	(0.117)	(0.532)	0.512	0.553
CEOdual	2.887	3.125	3.196	2.015	2.091	2.142	8.547	10.047	10.591
	(2.148)	(2.159)	(2.194)	(1.410)	(1.478)	(1.503)	(9.089)	9.144	9.090
CEOCA	-0.159	-0.219	0.098	0.458	0.487	0.675	1.775	2.113	3.443
	1.090	1.110	1.233	0.750	0.788	0.894	4.284	4.306	4.804
lnAssets	-10.304***	-10.354***	-10.362***	-8.686***	-8.615***	-8.644***	-43.749***	-43.092***	-42.851***
	(2.219)	(2.217)	(2.229)	(2.018)	(2.166)	(2.213)	(7.978)	(8.136)	(7.826)
lnSales	9.413***	9.660***	9.758***	8.962***	8.947***	9.171***	56.298***	55.545***	55.803***
	2.624	2.606	(2.589)	(1.711)	(1.783)	(1.790)	(15.513)	(15.255)	(15.001)
Age	0.604	0.567	0.589	0.322	0.319	0.294	-1.873	-1.702	-1.633
	0.431	0.416	(0.415)	(0.442)	(0.455)	(0.451)	(2.113)	(2.113)	(2.234)
Fictitious years	SI	SI	SI	SI	SI	SI	SI	SI	SI

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V. Explic.	ROA			ROA op			ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
AR(1)	.007	.006	.006	.007	.007	.006	.007	.011	.015
AR(2)	.472	.424	.503	.238	.245	.268	.510	.816	952
Sargan Test	.516	.265	.075	.182	.057	.009	.000	.000	.000
Hansen Test	.948	.988	.974	.959	.984	.769	.805	.989	.997

Note. * p<.1; ** p<.05; *** p<.01. Robust standard errors in parenthesis.

Finally, to test the second hypothesis and know if the recommendations made by the BMV had an effect on gender diversity in the boards of directors after 2018, table 6 presents the results on the DiD model of Equation 3; the model without controls —models 1 and 3— and with controls —models 2 and 4— under two treatment groups: those companies that have more than 30 % of female employees and those companies with more than 40 %.

It is observed that both the companies with more than 30 % of female employees and those with more that 40 % of female employees have a positive effect on the diversity in the board of directors of the company, but the effect is greater on the companies with more than 40 % of female employees. Similarly, although there was a change in the diversity of the companies after 2018, it did not take place in companies that have more gender diversity in their employees.

Table 6

DiD model

V. Explic.	PDivAdm			
	(1)	(2)	(3)	(4)
30PDivE	2.1369**	2.9214***		
	(1.0098)	(1.009)		
40PDivE			2.872**	4.9502***
			(1.2617)	(1.2788)
T2018	3.6437***	3.8978***	4.0275***	4.2396***
	(1.0614)	(0.9649)	(0.9712)	(0.8873)
T2018x30PDivE	1.8937	1.1060		
	(1.8373)	(1.6699)		
T2018x40PDivE			0.9842	-0.7047
			(2.1788)	(1.9627)
Cons	5.6319***	-3.8462	5.8118***	-6.7988**
	(0.5543)	(3.4073)	(0.5072)	(3.4175)
TAdm		0.1317**		0.1244***
		(0.044)		(0.0432)
PCAInd		0.0457*		0.0314
		(0.0261)		(0.0265)

V. Explic.	PDivAdm			
	(1)	(2)	(3)	(4)
PDirCA		-0.0732*		-0.0909**
		(0.0427)		(0.0421)
TDirec		0.3013***		0.2638**
		(0.1024)		(0.1025)
CEOdual		-0.9295		-0.4484
		(1.0069)		(1.0084)
CEOCoAd		-3.1043***		-2.7392***
		(0.8972)		(0.8967)
InAssets		-1.5023***		-0.7314
		(0.6984)		(0.7139)
InSales		2.1774***		1.8265***
		(0.6409)		(0.6401)
Sec		-1.072***		-1.2064***
		(0.2695)		(0.2743)
Age		0.0007		0.0011
		(0.0219)		(0.0218)
Company		0.1684***		0.1514***
		(0.0448)		(0.0449)
R2	.0967	.2954	.0926	.3039
N	321	302	321	302
F	12.41	10.02	11.88	10.39

Note. * p<.1; ** p<.05; *** p<.01. Robust standard errors in parenthesis.

Conclusions and discussion

Gender diversity may guarantee the presence of members from different categories within a group, as well as equal conditions for the appointment of some of these members. In this study, it was tested the hypothesis that the presence of women in the boards of directors in Mexico is limited, resulting in a symbolic state with negative or slightly significant effects on the performance of the company. For this purpose, three regression approaches were applied: panel data with fixed effects, MC2E-VI and GMM. Similarly, it was evaluated the effect of the recommendation of incorporating more women in the advices about diversity of the boards of directors.

For the models of fixed effects regression, results suggest that the presence of one female director has significant and negative effects only on the ROA variable. When the endogeneity is controlled with the MC2E-VI regressions, it was found that both the participation of one woman or three women in the board of directors has significant and negative effects on the three performance indicators. Recalling that Adams and Ferreira (2009) and Adams (2016) remark that, to avoid effects that are erroneous and greater than the real ones, it should be addressed the endogeneity and inverse causality in the performance regressions; with the GMM model, results show that only the effects of the percentage of female directors on the ROA are significant.

If only the results of the MC2E-VI approach are considered, it would be concluded that there is a negative effect of the presence of female directors

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on financial performance. Nevertheless, with the additional contribution of the GMM approach, the results of regression models should be interpreted with caution to avoid contributing with stereotypes by erroneously overestimating the effects (Adams, 2016). Now, observing the GMM model approach, the percentage of women in the boards may have negative effects on the performance of the company. These results are similar to Unite *et al.* (2019) and Kumar *et al.* (2020), who find a negative or, in some cases, not significant effect of the diversity of the board on the performance of the company. Regarding this, and aligned with Kumar *et al.* (2020), it is considered in this document that the little impact is due to the limited presence of female directors.

In addition, the decrease of the negative effect when going from one model to another (table 4 to table 5), might suggest that in Mexico the women in the boards of directors only have a symbolic effect, aligned with Kanter (1977), and under such symbolism, there may be negative or null effects. According to the critical mass social theory, when the number of female directors increase to the level of minority, the effects might be positive. The above supports the first hypothesis presented since, due to the little presence of women in these positions, although the effect is negative under the MCO with instrumental variable approach, it is not when using the GMM approach.

A second hypothesis was that the recommendations of 2018 for female inclusion in the boards of directors increased the presence of women in the boards. Using the DiD method, it was tested that in Mexico there has been an increase in the number of female directors after the recommendations of the BMV in 2018. This is aligned with the results of Yang *et al.* (2019), who tested that mandatory female representation increases the presence of women in the boards of directors. However, it is important to point out that in Mexico this is still a recommendation. This implies that the recommendation of the BMV had impact after 2018, but not in the companies with greater gender diversity among its employees. A reason for this may have been that after the recommendation, the companies without high percentages of diversity considered to include women in their boards of directors.

The results of both hypotheses confirm that, although an increment has occurred in the number of female directors in the boards of directors after 2018, the number is still small for it to have an effect more than symbolic. In various countries, a common response to guarantee the existence of gender diversity has been the laws with gender quotas. As part of the learning process to such adoption, many advantages and disadvantages of setting a minimum and mandatory percentage of women in the boards of directors have arisen —which are out of the scope of this paper—. Nevertheless, according to Adams (2016) it should be acknowledged that it is not possible to study gender diversity if such diversity does not exist. Therefore, to analyze the impact of diversity in the boards it is necessary that there is a diversity great enough to produce effects.

As a consequence of the shortage of women in the boards, Mexico is in a situation in which their participation is still symbolic and, if it remains as such, there may be no increase in the presence of women and such symbolic situation may perpetuate. In addition, following the IMCO report (2022), the shortage of independent female directors represents an opportunity for the inclusion of female directors that are not related to the shareholders of the company.

Limitations of the study include, on one hand, the lack of information about the companies and, on the other hand, the lack of women in the boards of directors. It is important to acknowledge that, despite using companies of the IPC —known to be a representative sample of the BMV and of the Mexican economy (BMV, 2022b)—, the results may not be generalizable due to the size of the sample; in addition, due to the number of companies analyzed, this research differs from other more extensive studies conducted in countries where there is more information.

Future research works might compare various indices representative of Latin American companies, or either compare those countries that have mandatory gender quotas with those countries where it is only a recommendation. This research contributes to the literature about diversity in the private sector of Mexico. Similarly, it opens the debate about the need for methods that guarantee

diversity, such as mandatory gender quotas, which also help to reduce the gender gap and guarantee more inclusive companies.

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