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Impact of women in the board of directors on business risk of Vietnamese firms

Abstract. This article aims at assessing the influence of women in the board of directors (BOD) on risk management in Vietnamese firms. The study touches upon a sample of 284 companies listed on the HOSE (Ho Chi Minh City Stock Exchange - Vietnam) in the period of 2008-2014. Their data was regressed by the random effects model (REM) and the fixed effects model (FEM). To find out which method is the most appropriate, we used the Hausman test. The study clarifies women's role in society and the optimal ratio of women in the BOD to minimise risks at enterprises. The authors give recommendations to corporate managers regarding proper employment policies, in which the role of women is better recognised.
The most valuable result of the presented research is a grounded finding of an optimal female ratio in the BOD recommended for the Vietnamese enterprises. In order to achieve a positive impact of women on the risks reduction at the enterprise, the suggested female ratio in the BOD should be 34.96%, which will help to keep the lowest risk exposure. Hence, it could be recommended to raise a number of women in the BODs to approximately 1/3 of the total amount of members. Business owners may take this into account when planning human resource policies to maximise business performance.
Keywords: Women; Board of Directors; Impact; Firm; Risk, HOSE; Vietnam; Gender
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Вплив жінок, які беруть участь у роботі ради директорів в'єтнамських фірм, на запобігання ризиковим подіям у бізнесі

Анотація. Метою цієї статті є оцінка впливу жінок у складі рад директорів в'єтнамських фірм на запобігання ризиковим подіям у бізнесі. У дослідженні використано вибірку з 284 компаній, внесених до реєстру Фондової біржі Хошимін у період 2008–2014 років. У своїй роботі автори роз'яснюють роль жінок у суспільстві, а також надають пояснення щодо оптимального співвідношення жінок і чоловіків у раді директорів із метою мінімізувати виникнення ризикових подій на підприємствах. Доведено доцільність збільшення кількості жінок до 1/3 від загальної кількості членів ради директорів. Окрім цього, надано рекомендації корпоративним менеджерам стосовно вироблення належної політики у сфері зайнятості, яка робила би роль жінок у роботі підприємств більш вагомою.
Ключові слова: жінки; рада директорів; вплив; фірма; ризик; Фондова біржа Хошимін; В'єтнам.

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Влияние женщин, принимающих участие в работе совета директоров вьетнамских фирм, на предотвращение рисковых событий в бизнесе

Аннотация. Целью данной статьи является оценка влияния женщин в совете директоров вьетнамских фирм на предотвращение рисковых событий в бизнесе. В исследовании использована выборка из 284 компаний, внесенных в реестр Фондовой биржи Хошимин в период 2008–2014 годов. В своей работе авторы разъясняют роль женщин в обществе, а также дают объяснения относительно оптимального соотношения женщин и мужчин в совете директоров с целью минимизировать возникновение рисковых событий на предприятиях. Кроме того, даны рекомендации корпоративным менеджерам по выработке надлежащей политики в сфере занятости, которая делала бы роль женщин в работе предприятий более весомой.

Ключевые слова: женщины; совет директоров; влияние; фирма; риск; Фондовая биржа Хошимин; Вьетнам.

1. Introduction

The perception of women and their roles in society is surpassing traditional ideas of women being child bearers or housekeepers [1]. Today, women have been involved in different areas, especially in economic and political fields that were previously occupied by men. Successes of women with high qualifications and professional careers have encouraged others to assert themselves and gain higher positions.

A risk can be understood as the differences between the real and expected value (Bartesaghi, 2012 [2]). In history, various researches in the field of relationship between women in the BOD and risks at firms appear to have different results. Some authors believe that if a broad of directors has a high rate of women, the enterprise would be a lower risk taker than others [3]. Adams and Funk (2012) found that female directors tend to make more high risk decisions than their male counterparts [4].

According to the International Labour Organisation, Vietnam is ranked 76th out of 108 countries in the world with the proportion of women managers of 23 per cent. It also pointed out positive a relationship between female leadership and business performance but the rate of women attendance in the BOD still stood at a low level [5]. In Vietnam's research field, the topic has not been explored properly. Tran (2015) found that the larger is the number of women who are top executive directors, the higher is the rate of return for the firm [6]. This study, however, is not directly relevant to the linkage between the share of women in the BOD and risk exposure at Vietnamese firms. Moreover, it is not always appropriate to adopt foreign-built models in Vietnam's context.

Taking into account such considerations, this study aims at finding whether the risk level at a firm correlates with the difference in the number between male and female members in the BOD, as well as the extent of the correlation if such correlation exists.

2. Brief Literature Review

The board of directors plays an important role in making decisions of the firm. Many papers analyse the impact of females on the board of corporate governance, the firm's performance and risk exposure. Croson and Gneezy (2009) [7]; Eckel and Grossman (2002) [3]; Johnson and Powell (1994) [8], Byrnes and Schafer (1999) [9] are among the authors who studied the relevant issues. In addition, some theories, namely Agency Theory and Resource Dependence Theory, have been developed to map the relationship between gender diversity in the BOD and the performance of corporate governance.

2. 1. Conceptual Framework

Agency theory

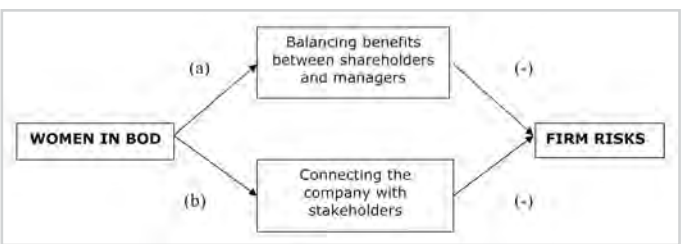
Agency theory was discovered by Alchian and Demsetz (1972) [10], and developed in 1976 by Jensen and Meckling [11]. In a company, shareholders are the owners, who authorize their representatives, directors or managers, in daily operation. However, it is believed that shareholders and representatives always make decisions for their own benefits and opportunities. Despite pursuing the same objectives, which is profit maximisation, of the same company, their interests are often antagonistic due to the nature of their ownership. Thus, a solution should be found to secure interests of shareholders.

According to the Agency Theory, managers are risk averse because they worry about the shortage of human resource diversity [13]. Hillman and Dalziel (2003) [14] emphasised the important role of the BOD in order to balance the benefit between shareholders and managers. Hence, gender diversity is considered as a tool to reduce agency costs and mitigate risks.

Resource dependence theory

Resource Dependence Theory (Aldrich and Pfeffer, 1976 [15]; Pfeffer and Salancik, 1978 [16]) has been used to analyse functions and actions of the BOD. In companies, BOD is a critical linkage between their operating environment and external resources, which they depend on. The closer the linkage is, the better the business performs. Conceptually, the BOD is the key connector in a company, bridging the external resources [17]. The presence of women in management brings benefits by connecting the company with the stakeholders and is accepted by employees, customers and investors [18].

Based on the ideas mentioned above, the authors suggest a conceptual framework (Figure 1).



Note: (a): Agency theory; (b): Resource dependence theory
Fig. 1: **Conceptual framework of the paper**
Source: Compiled by the authors

2. 2. Women and their impact on risks at the firm

Taking into consideration the CAPM model, Kolev (2012) [19] evaluated risks of the firm with female CEO and found that investors perceived women as lower risk takers than men. Based on a survey on the difference between risk appetite among men and women, Croson and Gneezy (2009) discovered that women tended to less prefer risk and competition [7]. Eckel and Grossman (2002) conducted a selected survey

from five alternatives which were likely to have equal benefits, but different expected returns and variances [3]. According to the survey, men chose riskier options with higher expected returns, which means that women had certain cautions in making decisions. Loukil and Yousfi (2014) proved that women only affected financial risks through cash-related policies and influenced risk management irregularly [20]. Sila, Gonzalez and Hagendor (2014) [21] suggested that a BOD with a higher rate of women would be risk-free or less risky than that with men only. Starting from the previous studies on women's presence in the BOD, the following hypothesis is proposed:

Hypothesis 1: Presence of women in the BOD reduces business risks

In some other studies, women are assumed take more risk in management than men. Johnson and Powell (1994) conducted a comparison of decisions made by women and men in «management» and «non-management» fields [8]. They pointed out that women had more risk aversion in «non-management». However, Adams and Funk (2012) saw more risky decisions made by female directors in «management», leading to profit loss and corporate value decline [4]. Therefore, a breakpoint is expected in the following hypothesis:

Hypothesis 2: Impact of women in the BOD on business risks takes a U-shape

Byrnes and Schafer (1999) analysed 150 different studies relevant to the relationship between gender diversity and risks at the firm [9]. The common theme in these papers is that males take more risk than females. In contrast, Atkinson et al. (2003) [22] studied the behaviour of managers in mutual funds and found no relationship between risk taking and gender diversity. Instead, risk is related to investment knowledge and bound in assets. The third hypothesis takes the ground partly on the second hypothesis and these studies:

***Hypothesis 3: Gender diversity in the BOD negatively correlates with business risk*.**

3. Research Methodology

3. 1. Data and sample

The data were collected from 284 firms listed on HOSE within a period of seven years from 2008 to 2014. The inputs or variables are from annual financial statements of those enterprises. However, some firms do not have data concerning the number of males and females and the gender structure of the BODs in their annual financial statements. In this case, the relevant data were obtained from annual management reports.

Financial statements and management reports were collected from www.hsx.vn (Official Website of Hochiminh Stock Exchange). If the data were neither published nor updated, the official website of each company was used instead.

An example of raw data from JSC «Mekong Seafood» (stock code: AAM) is shown in Table 1:

3. 2. Analytical methods

Panel data from 284 companies listed on HOSE within a period of seven years from 2008 to 2014 was used, and regressed by the random effects model (REM) and the fixed effects model (FEM). To find out which method is the most appropriate, we used the Hausman test [23].

3. 3. Proposed variables

Based on theories and previous studies on the relationship between the number of women in the BOD and business risks, the study comes up with the following variables:

3. 3. 1. Dependent variables

Parrotta and Smith (2013) [24] took the variation of net investments, profitability, return on equity (ROE) and sales to represent business risks. However, ROE volatility is used in this paper.

ROE volatility of is calculated by the following formula:

$$Risk_{i,t} = \frac{|ROE_{i,t} - ROE_{i,t-1}|}{ROE_{i,t-1}} \quad (1)$$

where $Risk_{i,t}$ is ROE volatility of firm i in year t; $ROE_{i,t}$ is ROE of the firm i in year t

3. 3. 2. Independent variables

There are many ways to measure the presence of women in the BOD of a business. Four variables are deployed as measurement in this study.

First, «Women» is taken as a dummy variable to identify the presence of women in the BOD: Women: equal to 1 when the BOD has at least one female, 0 in the other case.

Second, the percentage of women in the BOD is expressed as «PerWo».

$$PerWo = \frac{Number\ of\ women\ in\ BOD}{Number\ of\ members\ in\ BOD} \quad (2)$$

Some researchers insist that a BOD is gender diverse when it has both male and female participation [25]. Therefore, a BOD composing of only one gender (female or male) would be gender identical, which is why diversity indicators are more consistent than the proportion of women in the BOD or a dummy variable indicating women's presence in the BOD. Other two variables measuring gender diversity are the Blau Index [26] and the Shannon Index [27], in which:

$$Blauindex = 1 - \sum_{i=1}^{n} P_i^2 \quad (3)$$

$$Shannonindex = -\sum_{i=1}^{n} P_i ln\,(P_i) \quad (4)$$

where P_i is the gender ratio of BOD members (male or female).

The Blau index ranges from 0 to 0.5. It is equal to 0 when the BOD is occupied by only males or females. At the other extreme, it gets its maximum value of 0.5 when the BOD is composed of equal ratios of men and women. Similarly, the Shannon index has its value from 0, when the BOD consists of only males or females, to approximately 0.69 when the company has an equal number of males and females in its BOD. These two indicators are similar, however, the Shannon index is more sensitive to changes in the proportion of women in the BOD because of its wider value and higher volatility.

Tab. 1: **Handling raw data**

	Year	2007	2008	2009	2010	2011	2012	2013	2014
THE ORIGINAL DATA	ROE	12%	1%	18%	15%	22%	5%	3%	3%
	Total assets		300,655	363,935	331,336	329,977	285,761	302,072	297,191
	Total debts		19,713	59,602	39,676	42,824	30,440	43,782	39,846
	Year of establishment		1979	1979	1979	1979	1979	1979	1979
	Numbers of women in the BOD		3	3	3	3	3	2	3
	Numbers of members in the BOD		5	5	5	5	6	5	5
THE CACULATED DATA	Risk		0.9167	17.0000	0.1667	0.4667	0.7727	0.4000	0.0000
	Woman		1	1	1	1	1	1	1
	PerWo		0.6	0.6	0.6	0.6	0.5	0.4	0.6
	Blau index		0.48	0.48	0.48	0.48	0.5	0.48	0.48
	Shannon index		0.6730	0.6730	0.6730	0.6730	0.6931	0.6730	0.6730
	Leverage		6.5567	16.3771	11.9746	12.9779	10.6523	14.4939	13.4075
	Fsize		12.6137	12.8047	12.7109	12.7068	12.5629	12.6184	12.6021
	Fage		29	30	31	32	33	34	35

Source: Compiled by the authors

3. 3. 3. Control variables

In the research model, the used control variables are Leverage, *Fage* (age of the firm) and *Fsize* (size of the firm):

$$Leverage = \frac{\text{Total debts}}{\text{Total assets}} \times 100 \quad (5)$$

$$Fsize = \ln(\text{Total assets}) \quad (6)$$

These are common control variables in the studies of women's impact in the BOD according to the studies by Martin-Ugedo and Minguez-Vera (2014) [28]; Erhardt, Werbel and Shrader (2013) [29]; Ararat et al (2010) [30]; and Farrell et al (2005) [31].

3. 4. Analytical model

To determine the influence of women in the BOD, dependent variables employed in the model are «Women», «PerWo», «Blauindex», «Shannonindex» with three control variables, including «Leverage», «Fage» and «Fsize».

Models 1 to 4 are presented as follows:

$$Risk_{it} = \beta_0 + \beta_1 Gender_{it} + \beta_2 Leverage_{it} + \beta_3 FAge_{it} + \beta_4 Fsize_{it} + u_{it}$$

where Genderit is respectively independent variables: «Women», «PerWo», «Blauindex», «Shannonindex»; U_{it} is random error.

To test the hypothesis that the impact of women in the BOD on business risks takes a U shape, a squared variable proportion of women in the BOD («PerWo2») is used.

Model 5:

$$Risk_{it} = \beta_0 + \beta_1 PerWo_{it} + \beta_2 PerWo2_{it} + \beta_3 Leverage_{it} + \beta_4 FAge_{it} + \beta_5 Fsize_{it} + u_{it}$$

where U_{it} is random error.

4. Analytical Results

In Model 1, Prob = 0.000<0.5; the fixed effects of the model (FE) are more suitable while $\beta 1$ = -0.024 with the significance level of 1%. From this result, it can be concluded that firms with the presence of women in the BOD have lower ROE volatility than those without women in their BOD. Equally, the presence of women in the BOD reduces business risks.

In Model 2, Prob = 0.000<0.5; the fixed effects of the model (FE) are more suitable, while $\beta 1$ = -0.042 with the significance level of 5%. The result shows a negative relationship between the female ratio in the BOD and ROE volatility. It is interpreted that an increasing number of women in the BOD leads to a drop in business risks.

In Models 3 and 4, two indicators on gender balance, i.e. Blau and Shannon indices, are applied to determine the link between gender diversity in the BOD and corporate risk which is represented by the coefficient volatility of ROE. From the results, Prob = 0.000<0.05 the fixed pattern (FE) is more suitable. With the significance level of 1%, both Blau and Shannon indices inversely impact the volatility of ROE.

Thus, in Models 2, 3 and 4, both the proportion of women in BOD and the two indicators (Blau and Shannon indices) have a negative relationship with ROE volatility. However, when the proportion of women in BOD exceeds 50%, both Blau index and Shannon index begin to decline (Figure 2).

Figure 2 shows a possible breakpoint, at which the relationship between the female ratio in the BOD and ROE volatility reverses. A squared proportion of women in the BOD variable is added into the model (PerWo2) for testing. The results are presented in Table 4:

Tab. 4: **Analytical results of Model 5**

Variables	Risks (Model 5)
C	0.0962770
PerWo	-0.0421485*
PerWo2	0.0602777***
Leverage	0.097620
Fage	-0.056959**
Fsize	0.0730149***
Adjusted R^2	44.90%

Note: Significance levels: ***1%, **5%, *10%
Source: The analytical results of authors

In this model, the adjusted R^2 has a value of 44.90 per cent, which shows the relevance of regression equation to explain the phenomenon. $\beta 1$ = -0.421485 with its significance level of 10% and $\beta 2$ = 0.0602777 with its significance level of 1%. From these results, it can be said that the female ratio in BOD affects ROE volatility in an upside-down U-shape form. More specifically, when the female ratio is are less than

$$x = \frac{-\beta_1}{2\beta_2} = 34.96\%,$$

it has a positive impact on ROE volatility. If the female ratio exceeds 34.96%, the volatility of ROE declines. At the optimal level (i.e. female ratio is equal to 34.96%) the business risk represented by ROE volatility is smallest.

Finally, to test the optimal rate of women, at which the firm risks is lowest, a segmented regression analysis is conducted. The sample is separated into two data sub-sets based on Blau indicators. Model 3 is run in the small parts of data with a Blau index below 0.4547 (when the female ratio in BOD is 34.96%, the Blau index is 0.4547), and with a Blau index greater than 0.4547. When Blau index is equal to 0.4547, the female ratio in the BOD is either 34.96% or 65.04% (according to Formula 3). Nonetheless, it is unrealistic to have a proportion of 65.04% of females in the BOD. The reason is that according to the observed sam-

Tab. 2: **Analytical results of model 1 and model 2**

Variables	RISK			
	Model 1		Model 2	
	FE	RE	FE	RE
C	0.0436343	0.0133284	0.0461165	0.0182626
Women	-0.0241791***	-0.0323077***		
PerWo			-0.0418621**	-0.1151619***
Leverage	0.0123466*	0.0346474***	0.0130348**	0.0593097***
Fage	0.0158467***	0.0003166	0.0161422***	0.0005111
Fsize	0.0049419	0.0043776**	0.0056687	0.0021859
R^2 within	70.79%	70.21%	67.67%	67.47%
P_value of Hausman test	0.000		0.000	

Note: Significance levels: ***1%, **5%, *10%
Source: Compiled by the authors

Tab. 3: **Analytical results of Model 3 and Model 4**

Variables	RISK			
	Model 3		Model 4	
	FE	RE	FE	RE
C	0.0462416	0.0151101	0.0462577	0.0151298
Blau index	-0.0258381**	-0.0362175**		
Shannon index			-0.0165605**	-0.0234307**
Leverage	0.0130517**	0.0353596***	0.01306**	0.0353831***
Fage	0.0161301***	0.0004072	0.0161338***	0.0004075
Fsize	0.005697	0.0045619**	0.0056886	0.0045591**
R^2 within	68.67%	68.28%	75.06%	74.47%
P_value of Hausman test	0.000		0.000	

Note: Significance levels: ***1%, **5%, *10%
Source: Compiled by the authors

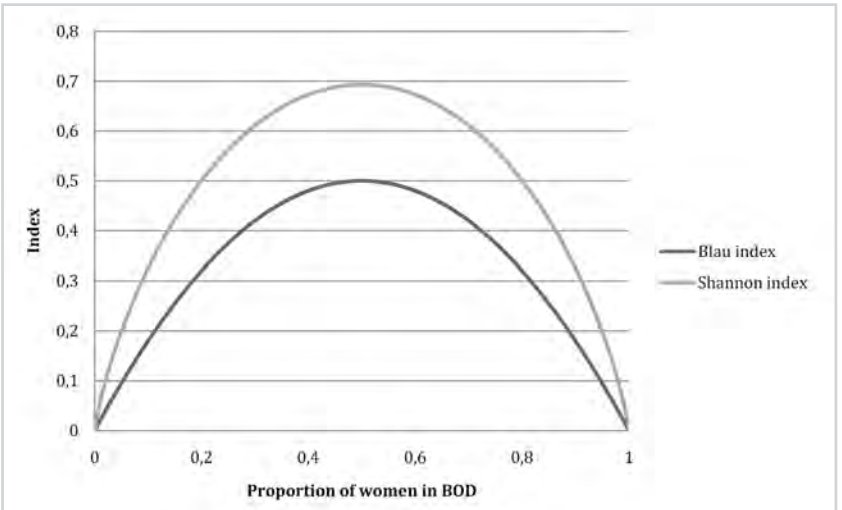


Fig. 2: **Relationship between female ratio in BOD and Blau Index and Shannon Index**
Source: Compiled by the authors

ples of the firms listed on HOSE, it is a low rate in the percentage of women in BOD which is higher than 65%. Blau index at 0.4547 indicates a female ratio in the BOD of 34.96% (Table 5).

Table 5 shows the relationship between fluctuations in ROE (Risk variable) and Blau index in the different range of the Blau index value. More specifically, for businesses with Blau index less than or equal to 0.4547, has a significant unintended effect on business risks (with 1% significance level). However, for businesses with larger Blau index 0.4547, the relationship becomes insignificant (with a 10% significance level). Binding to the regression results, the proposed hypotheses are accepted.

Tab. 5: **Analytical results of Model 3**

Risk	Blau<=0.4547	Blau>0.4547
(1)	(2)	(3)
…	…	…
Blau	-0.0121191***	-0.035364
…	…	…
Observations	1346	373
R^2	43.66%	1.95%
P_value (F test)	0.000	0.5056

Source: The analytical results of authors

5. Conclusions

The paper generates certain results with regards to the influence of women at enterprises through the relationship between the female ratio in the BOD and risks at the firm. Three hypotheses, which have been proved by the regression results, are proposed to test this correlation. Analysing data from 284 firms listed on HOSE in seven years from 2008 to 2014, it is concluded that the emergence of women in the BOD reduces the risk of enterprises. The ratio of women in BOD affects business risk by an upside-down U-shape form; Gender diversity in the BOD has a contrasting effect on business risk at two sides of the U-shape.

The most important result of this paper is the finding on an optimal female ratio in the BOD, which is recommended for Vietnamese enterprises. By pointing out the positive impact of women on the reduction of risks at the enterprise, the suggested female ratio in the BOD is 34.96%, which will help to have the lowest risk exposure. This means a strong and grounded recommendation to raise a number of women in the BODs to approximately 1/3 of the total amount of the BODs' members. Business owners may take this into consideration while formulating their human resource policies in order to maximise their business performance in short-term and long-term perspective.

Despite certain limitations, the exclusion of elements relating to «risk appetite» of the BOD members in general, as well as female BOD members in particular, this study contributes one important suggestion for Vietnamese enterprises in the recruitment, assessment and selection of gender composition in their BODs.

The study also emphasises the role of women in the corporate performances, thereby raising awareness of business owners and managers on the female participation. The finding may form a ground for changes of gender perception in the labour market, and feed the discussion on gender discrimination.

To do that, BODs should have a specific plan to appoint women as managers, give a clear strategy for the establishment of gender balance. To closely monitor the implementation of this objective, the board should organise a monitoring system, then the implementation of the particular report. The board should request the information given on the process of appointment of personnel and point out the gender diversification in the Report of the business regularly. In addition to the report on the results of their operations, companies need to do more reports on gender statistics: the number of female and male directors, the number of men and women in their senior management, the number of male and female employees of the enterprise. These reports give an overview of the issue of gender diversification of the company, based on which they offer solutions to implement the plan.

Furthermore, BODs should have appropriate policies for female staff, such as organising training programs for female staff, especially for young female employees in improving professional knowledge and managing skills. With such kind of assistance, these people will be more confident in communicating with colleagues. Consequently, they will be able to take on jobs with higher requirements more confidently. Finally, it is necessary to find solutions to help female staff balance between working and taking care of their families.

Limitations and Further Study

Despite the efforts to properly collect data, the compilation of data is not comprehensive in some aspects. Notwithstanding, findings have been obtained on a scientific basis. The analysis, conclusions and recommendations of the research are good reference for further studies on gender equality as well as inequality and risk management at Vietnamese firms and in the region. The study could be further accomplished by incorporating more variables and expanding sample size nationally and internationally.

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