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Board Gender Diversity and Firm Performance: A Study of Chinese Commercial Banks

Nan Zhu
The Western Business School,
Southwestern University of Finance and Economics, Chengdu, China;
email: *zhunan@swufe.edu.cn*

MengtianXiao
The Business Administration School,
Southwestern University of Finance and Economics, Chengdu, China;
email: *xmtteddy@126.com*

WasiUl Hassan Shah
The School of Statistics,
Southwestern University of Finance and Economics, Chengdu, China;
email: *wasi450@Yahoo.com*

Abstract

This paper examines whether an association exists between the presence of women on the boards of directors and firm performance of Chinese commercial banks from 2009 to 2015. Different from previous studies, we use the financial index-return on equityand DEA CCR-efficiency score as the firm performance indicator, respectively. The empirical analysis is conducted by using Kruskal-Wallis test, which is one of the non-parametric statistical methods.

Keywords: Board gender diversity, firm performance, Chinese commercial banks, Kruskal-Wallis test.

1. Introduction

Gender diversity issues have continually attracted an increasing amount of concern in policy setting and academics around the world in recent decades [1, 2, 3, 4]. The governments across the world usually propose various policies to improve gender equality. For instance, European Union proposed an initiative that aims to improve the presence of female non-executive directors in the corporate board of publicly listed firms to 40% by 2020[5]. Norwegian government required that female directors of publicly listed firms should account for 40%[6] and Spain government followed Norway by legislating a law that regulates companies to increase female directors to 40% by 2015 [7]. Despite, Denmark did not set quotas about female directors on the board; the

company can be fined if it has not set any target figures or provided any reporting about female directors. The general findings from empirical researches indicate that gender diversity has a certain impact on the firm performance (such as [2, 8, 9]), but the majority of studies have conducted in the western context.

Notably, scholars have a limited concern in the eastern societal context, especially in developing countries. In mainland China, Chinese government has not enacted legislation setting on the female director quota on boards. Hong Kong requires their listed companies to disclose their percentage of women directors. Many countries are considering encouraging gender equality through national legislation, such as India, China, and Middle East countries, because they are beginning to recognize the importance of developing female talent up to the board[10].

In China, commercial banks (CBs) is one kind of special firms. Although the bank has many common features with other profit-orientated firms, it plays an important role in Chinese economy as it facilitates capital allocations, investment and the risk management. At the end of 2015, the number of incorporated banking institutions in China totaled 4,262 with 3.8 million employees [11].

When we observe the bank employee distribution in China, we would easily find that a larger number of female employees exist. According to the report of Chinese CBs in 2015, female employees account for almost half of the whole number of employees, for instance, Industrial and Commercial Bank of China (ICBC, 51.1%), China Construction Bank (CBC, 53.09%), Bank of China (BOC, 56.8%) and China Merchants Bank (CMB, 57%). Compared to the large proportion of the women employees, the fact that upper layer lacks women leaders should be noticeable. The corresponding proportion of female directors in the board is ICBC (12.5%), CBC (20.0%), BOC (0%) and CMB (25%) in 2015. The female employees are under-represented in the senior management positions. The banking industry plays an important role in economic and social development in China. It is our interest that whether the banks with more gender balance have better performance than the banks without female directors.

Although a substantial body of researches has been conducted in the general areas of board diversity and firm performance, however, to our knowledge, the study of the effect of board gender diversity on the Chinese banking performance through Data Envelopment Analysis (DEA) method [12] has not been done in the field of human resource management (HRM). Meanwhile, in terms of performance management, most researches regard firm financial performance as indicator of the comprehensive firm performance. However, this measure cannot represent the whole performance of a firm.

This paper aims to fill the gap that the relationship between gender diversity in the board and the firm performance by using the data of Chinese CBs from 2009 to 2015. Different from previous studies, we use the financial index - return on equity (ROE) and DEA CCR- efficiency score as the firm performance indicator, respectively. The empirical analysis is conducted by using Kruskal-Wallis test, which is one of the non-parametric statistical methods.

This paper makes main contributions in the following three ways. First, we focus on the relationship between the board gender diversity and firm performance in Chinese banking industry. Different from the previous studies, we firstly introduce DEA CCR-efficiency score to measure the comprehensive firm performance. This significant progress highlights more careful consideration when researchers select the measurement of firm performance because the board gender diversity may benefit the company beyond the financial performance. Second, the banking industry is a special area to research. Most of previous studies on board gender diversity exclude banks in their samples due to that the bank industry mainly involves deposit and loan service, and belongs to a special service industry. This paper extends the study scope. Third, DEA CCR-efficiency score effectively considers the financial index and non-financial index, such as human capital, into the ranking of banks performance.

The structure of this paper is as follows. We review the literature on the relationship between gender diversity and firm performance in Section 2. Then we discuss the samples of Chinese CBs and the basic description about the representation of female directors in Chinese banking sector in Section 3. It is followed by an examination of the relationship between gender diversity and firm performance. Then we analyze the findings from the results in Section 4 and Section 5 ends with conclusion.

2. Literature Reviews on Board Gender Diversity

The extant researches on the board diversity usually focus on two general distinctions: the observable (demographic) and the non-observable (cognitive) diversity [2]. Observable diversity includes some factors such as gender, age, race and ethical etc., while unobservable diversity consists of some aspects like knowledge, education, values, perception, emotion and personality characteristic. There are a large number of prior researches exploring the relationship between presence of female directors and firm performance, however, in terms of firm performance, most studies focus on the financial performance, using a variety of financial measure to examine the link with gender diversity. The results from previous researches have remained inconclusive.

2.1 Positive Effect

Based on the cognition and behavioral theory, women are more likely to be considered as less risk taking preferences than their male counterparts. In consistence with this gender-based characteristic, Palvia et al. [4] investigated the CBs in America, and found that small banks with female CEOs and board chairs are less likely to suffer from failure in their operation. Adams and Ferreira [13] proposed that companies with gender diverse board performed better than those without gender diversity board because those female directors appeared to be tough monitors. Similarly, Erhardt et al. [2] explored the effect of board demographic diversity on the firm financial performance, using 1993 to 1998 financial performance data, namely, ROA and return on investment (ROI), respectively, and the data collect from 127 large American companies. They found that board diversity positively associated with the indicators of financial performance after correlation and regression analysis. Furthermore, Miller and Triana[8] examined mediators that explain

how board gender diversity affects firm performance. Based on the signaling theory and behavioral theory, they suggested two mediators, that is, corporate reputation and innovation, and select Blau's diversity index as the indicator of board gender diversity level and return on sales (ROS) as measure of firm financial performance. After the analysis of the Fortune 500 firms, they found that the extent of gender diversity in the board positively affected the company performance, however, the significant positive relationship between board gender diversity and corporate reputation was not been found. Conversely, Singh et al. [14] argued that the visible of women on the board enhance the corporate reputation (Blau's index or female directors' proportions).

Singh et al. [14] used data from FTSE (Financial Times/London Stock Exchange) index to study female directors in the UK. They found that companies with female director cluster in some industries like retail, banking, finance or insurance, health, media and publishing and in some more profitable companies. That cannot exact the converse reason, namely, more profitable firms prefer to hire female directors or female directors have positive effect on the company performance. Additionally, Krishnan and Park [15] studied the direct impact of presence of women leaders in TMTs (Top management team) on organization performance based on a sample of firms in the Fortune 500 list in 1998. The results indicated a positive relationship between the proportion of females on TMTs and organizational performance. This finding also supports the agreement that representation of women in the board benefits company performance. The presentation of women in TMTs minimized the social identity problems and increased power sharing, which improved organizational performance. Additionally, companies with a great presentation of women demonstrated that it selected executives from a larger labor pool, which further enhanced its performance [15].

There are some researches based on the critical mass theory. Joecks et al. [16] conducted an empirical research for 151 listed German firms from 2000 to 2005 to examine whether the link between gender diversity and firm performance follows a *U*-shape. Interestingly, they found that gender diversity at first negatively affect the firm performance, and then after a "critical mass" of around 30 percent women had been reached, it associated with higher firm performance. This finding also supports to the critical mass theory. According to the size of firm board, the critical number of women directors is around three. Additionally, Liu et al. [17] examined the relation between the board gender diversity and Chinese listed companies' financial performance. Their finding also supports the significant positive relation. Furthermore, they divide the female director into two categories (executive director, independent directors) and the female executive directors have more significantly positive effect on firm performance than female independent directors. Furthermore, boards with three or more female directors have a stronger influence on firm performance than boards with two or fewer female directors, consistent with the critical mass theory.

2.2 Negative Effect

On the other hand, there are some researches which argued that gender diversity in the board has negative relationship with firm performance. Adams and Ferreira[13] assumed

that though the correlation between gender diversity and either firm value or operating performance seems to be positive at first examination, this correlation disappear once they take actions to deal with omitted variables and reverse causality problems. They finally found that the average effect of board gender diversity on firm performance is negative, which is consistent with the arguments that too much mentoring can decrease shareholder value [13]. In addition, under a background of a new law mandating 40% of Norwegian firms' directors being women, Ahern and Dittmar [18] argued that the quota constraint imposed on the least number of female directors on the boards cause a significant drop in the stock price at the announcement of the law and a large decline in Tobin's Q over the following years. Consistent with this finding, Low et al. [19] conducted a study of board gender diversity and firm performance in East Asia and suggested that forcing female director appointment or mandating gender quotas can reduce company performance in countries with strong resistance.

2.3 No Significant Effect

Some scholars believe that there is no significant link between board structure and firm performance. Carter et al. [9] studied the major US companies, using Tobin's *Q* and ROA as measurement of firm performance. They pointed out that there is no significant relationship between gender diversity on boards and firm performance. The effect of the gender diversity of the board might be difficult under different circumstances at different times. Over several periods, the results probably offset to produce no effect. Smith et al. [20] claimed that board gender diversity is potentially positive with firm performance. Contrary to the findings based on the Danish companies from [20, 21] argued that there is not any significant link between firm performance and female board representation. It is believed that board members with an unconventional background are socialized unconsciously adopting the ideas of the majority of conventional board members.

Despite the common belief that gender diversity befits the firm performance, the previous studies have not achieved consistent findings on their positive relationship, which provides a topic for our study to answer the question with an empirical study using Chinese public listed commercial banks as research samples.

3. Hypothesis Development

In the field of Statistics, the Kruskal-Wallis H-test is used for comparing two or more samples that are independent, and that may have different sample sizes, and extends the Mann–Whitney U-test to more than two groups [22].

Rank all data from all groups together. If the data contains no ties the denominator of the expression for H. The test statistics is given as follows:

$$H = (N-1)\frac{\sum_{i=1}^{g} n_i(\bar{r}_i-\bar{r})^2}{\sum_{i=1}^{g}\sum_{j=1}^{n_i}(r_{ij}-\bar{r})^2},$$

Where, n_i is the number of observations in group i, r_{ij} is the rank (among all observations) of observation j from group i, N is the total number of all observations across all groups, $\overline{r_{ij}} = \frac{\sum_{j=1}^{n_i} r_{ij}}{n_i}$, is the average of all r_{ij}. Otherwise, the statistics is $H = \frac{12}{N(N+1)} \sum_{i=1}^{g} n_i \left(\overline{r_i} - \frac{N+1}{2}\right)^2$.

Additionally, in the field of management, the critical mass theory suggests that higher female participation and empowerment when the number of women directors increase beyond one threshold [19]. Tokenism also argues that the percentage of female directors on the board has to be enough significant to facilitate their participation in the decision-making process.

Therefore, with the purpose of this study, the null hypothesis for Chinese banks with different degree of board gender diversity is developed:

Hypothesis H_0: There is no significant difference between Chinese CBs without female directors, CBs with less than three female directors and the CBs with at least three female directors in terms of firm performance.

Hypothesis H_1: There is significant difference between Chinese CBs without female directors, CBs with less than three female directors and the CBs with at least three female directors in terms of firm performance.

4. Methodology

4.1 Sample

In this paper, 37 CBs are chosen as the study samples as the data required are easily obtained. They have been publicly listed in at least one of the Shanghai Stock Exchange, Shenzhen Stock Exchange, and Hong Kong Exchanges by the end of 2016. In terms of the bank types, there were5 big CBs, 9 national joint stock CBs, 15 city CBs, 7 rural CBs and Postal Savings Bank of China (PSBC).

According to critical mass theory, when the number of women directors is too small like single woman in the male-dominated board, their different perspective may either not be adequately expressed or not spotted by other counterparts. However, when in the gender-balanced board, the combination of women is more likely to positively participate in the group discussion and affect the firm performance [23]. Therefore, we divide the sample into different groups according to the number of female directors on the board: group 1 (firm without female directors); group 2 (firm with female directors but less than three); group 3 (firm with at least three female directors). In Table 1, we give the size of three groups from 2009 to 2015.

Table 1. Size for three groups from 2009 to 2015

Year	Banks without gender diversity	Banks with one or two female directors	Banks with at least three directors	Total
2009	3	21	10	34
2010	2	21	12	35
2011	7	14	15	36
2012	9	13	14	36
2013	8	15	13	36
2014	3	19	14	36
2015	3	22	12	37

Data source: all data is hand-collected from the annual report and CSR of the banks.

4.2 Measurement of Firm Performance

The measures of firm performance are return on equity (ROE) and DEA CCR efficiency score in this paper. ROE measures how much profit is being returned for each dollar (or other currency unit) that has been invested in assets [24], and gives a bank's efficiency of net profit after tax to average shareholders' equity. DEA CCR model[12] is a classical frontier analysis model concerning the ratio of multi-outputs to multi-inputs of using scarce resources to produce valuable items of a decision making unit (DMU) subjected to the condition that the similar ratios for all other DMUs be less than or equal to one. The model does not require a priori weights on inputs and outputs.

As results more than 5000 theoretical studies on DEA models as well as applications in the real world are reported in the literature. Sathye [25] studied DEA efficiency of the banking industry in India. In the Chinese banking sector, Zhu et al. [26, 27] studied the DEA efficiency of China's main CBs. Hada and Tamang [28] measured the relative efficiency of Nepalese CBs using DEA approach with two input variables (total expenses, and total deposit) and two output variables (total loans and advances, and total investment) for the five years: 2006-2010.

The data are collected by hand for the period of 2009 to 2015 from the bank annual report and Corporate Social Responsibility (CSR). Regarding the number of employee, bank deposits and non-performance loans （NPL, which is an unwanted output） as three inputs; net loans and non-interest operating income as two outputs, we can get CCR-efficiency scores of CBs. The efficiency scores are showed in Table 2. The DEA CCR model is solved by using the computer software DEA-Solver. The efficiency is calculated in the input-oriented measure. The data of ROEs of 37 CBs from 2009 to 2015 are omitted.

Table 2: CCR-efficiency scores of 37 CBs from 2009 to 2015

Year / Bank	2009	2010	2011	2012	2013	2014	2015
ICBC	0.774	0.801	0.857	0.847	0.859	0.921	0.917
CCB	0.808	0.839	0.885	0.878	0.879	0.929	0.932
BOC	1	0.988	0.983	0.9997	0.955	0.973	0.977
ABC	0.705	0.720	0.771	0.761	0.745	0.760	0.775
BCM	0.969	1	1	1	0.998	1	1
CMB	1	1	1	1	1	1	1
CMBC	0.982	0.997	1	0.999	1	1	1
SPDB	1	1	1	1	0.998	0.974	0.977
HXB	0.916	0.947	0.916	0.939	0.907	0.932	0.962
CIB	1	1	1	1	0.955	0.938	0.931
SDB	1	0.980	1	0.915	0.900	1	1
CCB	1	1	0.989	0.988	0.981	1	1
CEB	1	1	0.967	0.948	0.981	0.933	0.950
CZB	1	1	1	0.994	1	1	0.910
BOB	1	1	1	1	1	1	1
BONJ	0.820	0.818	0.823	0.785	0.770	0.795	0.897
BONB	0.957	0.921	0.921	0.941	0.863	0.956	1
CQRCB	0.796	0.746	0.739	0.757	0.777	0.902	0.845
BOCQ	0.939	0.961	0.987	1	1	1	0.935
HSCB	1	1	1	0.934	0.9213	0.986	0.967
Harbin	0.765	0.650	0.607	0.678	0.734	0.758	0.678
SHB	0.876	0.982	0.959	0.980	0.969	0.912	0.976
JSB	0.859	0.852	0.858	0.855	0.892	0.882	0.917
TCCB	0.612	0.660	0.752	0.809	0.794	0.804	0.761
SJBC	0.846	0.851	0.787	0.924	1	1	1
CBA	0.902	0.957	0.942	0.922	0.917	0.893	0.895
JZBC	0.867	0.675	0.825	0.981	1	0.980	0.852
BQD	0.862	0.722	0.742	0.806	0.807	0.830	0.857
ZZB	0.935	1	0.923	0.955	0.917	0.925	0.822
GYB	0.859	0.773	0.695	0.745	0.780	0.837	0.635
CSRCB	0.779	0.814	0.825	0.841	0.854	0.8957	0.889
WXRCB	0.896	0.892	0.930	0.918	0.872	0.846	0.890
JYRCB	0.878	1	1	0.980	1	0.964	0.893
ZJGRCB	0.847	0.724	0.832	0.901	0.899	0.835	0.843
WJRCB	0.853	0.838	0.851	0.830	0.848	0.865	0.861
JTRCB	0.984	1	1	1	1	0.794	0.714
PSBC	0.331	0.800	0.425	0.929	0.764	0.682	0.721

Table 2 depicts CCR-efficiency scores. From the table, the higher score means the higher level of performance compared to the peers. For instance, banks with 1 score performed better than those with less than 1 score in terms of the level of efficiency. The rest of banks with score equal 1 have good performance as well.

5. Empirical Analysis

Kruskal-Wallis H-test was used by SPSS 11 software. Table 3 indicates that when the firm performance, using DEA scores as indicators, the null hypothesis is rejected under 0.1 significant level only for year 2009. However, using financial firm performance ROEs as indicators, the null hypothesis is accepted at 0.1 confidence level in all of different years. For example, in 2015, it is shown that *p*-value is 0.769 > 0.1 (χ^2 = 0.549, *df* = 3-1 = 2), using ROE as an indicator; that *p*-value is 0.654 > 0.1 (χ^2 = 0.505, *df* = 2), using CCR score as an indicator; thus we cannot reject the null hypothesis.

Table 3. Effect of gender diversity on firm performance

	Year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
ROE	*p*-value	0.239	0.206	0.170	0.136	0.156	0.394	0.769
DEA	*p*-value	0.069	0.514	0.130	0.228	0.107	0.198	0.654

6. Discussion and Implications

This paper shows women directors in the board of Chinese CBs did not play an equally important role like their European counterparts. The results are similar to some of previous research. Carter et al. [9] reported no significant relationship between board gender diversity and firm performance. A number of reasons may contribute to this special result in China. For example, it is hard to break glass ceiling (*bo li tianhua ban* in Chinese) in China, especially for the financial sector. Women directors may be only a symbol for some CBs that pursue to good reputation. In order to improve the firm performance by activating female workforce in CBs, we suggest that banks can make gender-equality policies (such as increasing the number of female directors) and build the voice channels for women top directors and staffs.

This paper has a limitation in the small sample size. The future study can include more unlisted commercial banks to examine the effect of female top managers on the banks' performance. Additionally, whether the three female directors are appropriate threshold in Chinese context or not. This categorization was conducted according to previous studies but not add contextual adjustment. The criteria of our categorization based on the number of female board directors may be further discussed in the future.

Considering the multifaceted characteristic of firm performance, scholars can explore more comprehensive indicators to measure the firm performance in the future. The use of DEA efficiency score in performance evaluation can be taken into consideration to

expended industries to investigate the effect of board gender diversity in wider industries context.

7. Conclusion

This paper used a sample of 37 Chinese commercial banks to examine whether a relationship exists between female executive directors and firm performance that ismeasured by ROE and DEA CCR-efficiency score respectively. We considered the number of employee in the bank when we calculate the CCR-efficiency score, which aims to cover the more comprehensive performance rather than single finance performance in the previous relevant studies. The data is analyzed by using Kruskal-Wallis test. Using the DEA score as an indicator, the null hypothesis is rejected under 0.1 confidence level only for year 2009. However, using ROE as indicator, the null hypothesis is accepted at 0.1 confidence level in all of the years (2009-2015).

Even though findings of this study maintain consistent with the previous studies that gender diversity hardly improve the firm performance. But it should be notable that CCR-efficiency score may differ in the results from ROE measured performance. Additionally, the tokenism effect may not diminish in Chinese commercial banks context. Facing with a variousof challenges from the internal and external environments, corporations should pay more attention to develop and use their human capital.

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