

# Board Structure, State Ownership, Firm Age and Corporate Performance in Crisis: Evidence from China

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## ABSTRACT

This paper aims to study the relationship between the structure of the board and corporate performance in crisis. More specifically, the paper investigates whether CEO duality, board independence, board size and share concentration have an impact on corporate performance in a stock market crash. Furthermore, this paper tests whether state ownership and firm age will moderate this effect. Based on the panel data in 2007, 2008 and 2015, the empirical evidence suggests that CEO duality and share concentration positively affect corporate performance, while board independence works in the opposite direction. SOE and firm age are also confirmed to play a moderating role.

**Keywords:** Board structure, corporate performance in crisis, state ownership, firm age

## 1. INTRODUCTION

Due to the sudden outbreak of COVID-19, many companies in China received economic shocks of different degrees. How to ensure the company's performance in the epidemic situation has become a problem that managers must consider. To maintain the company's performance, effective corporate governance becomes exceedingly significant [1]. Corporate governance refers to implementing corporate governance structure in the company's practice by taking measures, strengthening policies, and imposing strict restrictions [2]. As the board of directors is responsible for governance and corporate strategy, the board is expected to play a vital role in corporate performance [3]. Thus, many studies exploring the impact of board structure on corporate performance find proof that these attributes have a significant impact on performance of a company.

The present studies on the relationship between board structure and firm performance mainly focus on several main characteristics of the board. Variables including CEO duality [4], board independence [3, 5] and board size [6] have all been examined by empirical studies. Their results indicate that the impact of board structure varies with respect to corporate company characteristics and environmental conditions. While some researches discuss the effect in a general setting [7], few have

paid attention to identifying the effect of board structure specifically on corporate performance under crisis.

Aside of these commonly used variables, there are other influencing factors that may moderate the relationship. One is the state ownership. For firms in China, the ownership of listed companies is highly concentrated, where many of the dominant investors being country-related [5]. Several studies noticed that the trait will also affect corporate performance [8], but not many have considered their effect during crisis period. Another neglected factor is the age of the company. Results have contended that firm age should be included as a separate variable when examining firm performance [9]. Different age stages of a firm induce vary in its productivity and profitability [10], which makes it differ in its performance during economic downturns. In this way, the effect of age also needs to be considered.

Thus, we decide to focus on corporate performance in crisis, as it has high practical significance for enterprises to identify the relationship between board structure and corporate performance in a crisis like the epidemic. This study selects the panel data of all A-listed companies in 2007, 2008 and 2015 for regression analysis. According to the complexity theory, a result may come from different combinations of many indicators [11]. From this perspective, board structures may lead to higher or lower corporate performance through the interaction with other firm attributes. For so, this study explores whether state

ownership and firm age can regulate the relationship between board structure and corporate performance in crisis.

This study is expected to contribute to the literature in the following ways. First, many former pieces of research on the relationship between board structure and corporate performance are mostly discussed in a common environment [12]. While some did focus on the performance in crisis [13], few specifically combine several crisis events for analysis. Thus, this study is expected to fill in this research gap. Second, due to a concentrated share structure of firms in China [3], this study discusses the impact of share concentration on corporate performance in crisis, in addition to the commonly used variables. Finally, while former studies have discussed the impact of state ownership [2] and firm age [14] on enterprise resilience, they have not verified their regulatory mechanism between board structure and performance. This study carried on the discussion to it.

The rest of the paper is organized as follows. The next section reviews and synthesizes the literature, establishes the theoretical framework of the research and puts forward the hypothesis. The third part summarizes the research methods, including sample description, variables and empirical methods. The fourth part reports the baseline results, regulatory analysis and robustness tests. The fifth part discusses the results and draws a conclusion.

## 2. RELATED LITERATURE AND HYPOTHESIS DEVELOPMENT

The examination of the relationship between board structures and the corporate performance has occupied researchers intensely. Many studies have found strong associations between them [12]. However, these researches didn't reach a unified conclusion, plus few of them have tried to analyze the relation in certain situations under crisis. Thus, given the lack of papers examining specifically the characteristics of the board with firm performance in crisis, a brief literature review for each of the characteristics is provided.

### 2.1. CEO Duality

CEO duality refers to the state when the positions of chairman and CEO are taken by the same person [1]. In firms, CEO duality plays a dynamic and vital role in the monitoring and execution of corporate governance. Researches has been conducted to test the relationship between CEO duality and firm performance. According to Agency Theory, the separation of CEO and chair of the board can help perform better than not doing so [15]. These studies claim that CEO duality has a negative impact on firm performance, as combining the two roles of the CEO and the chairman in one person will lead to an increase in their overall control [16], and will thereby

reduce the power of the board, which limits its effectiveness [1].

On the other hand, some argue CEO duality can be a positive factor to firm performance. They state that according to the Stewardship theory, when responsibility and decision-making are restricted to one person, he will better understand the company's operation and make better decisions thus reduce agency costs and improve company performance [2]. When firms encounter economic crisis, where the manager needs to make decisions and take actions rapidly, Stewardship Theory supports that CEO duality enables CEO to have a higher level of decision-making power, which might be required to more strongly align the interests of CEO and shareholders [4]. This autonomy can be helpful for CEO to handle hassle outside risks [1]. In this way, it can be assumed CEO duality will be more effective in dealing with crisis situations. Therefore, we propose the following hypothesis:

**H1:** CEO duality is positively related to corporate performance in crisis.

### 2.2. Board Size

There are several studies emphasizing the impact that board size has on corporate performance. Some empirical researches conclude that for those firms with complex structure, a positive relationship exists between board size and firm performance [6]. For instance, evidence from large bank holding companies confirms that a larger size of board provides the pool of expertise and resources available to the organization [17], which could be beneficial to financial performance. However, other scholars have found negative associations between board size and corporate financial performance [12]. They argue the relation could become a reason for delay in decision-making, the lack of communication, and an incompetent supervising function. This will lead to board directors' free riding phenomenon [18], which slowing down the process of problem solving, posing threats to corporate financial performance [19]. In an economic crisis, which requires timely response, larger boards may suffer from a diffusion of responsibility, which elicits group fractionalization and reduces group commitment to strategic change [20]. For this reason, we propose the following hypothesis:

**H2:** Board size is negatively related to corporate performance in crisis.

### 2.3. Board Independence

Board independence, namely the proportion of independent directors on the board, is one of the most discussed topics in the corporate governance literature [7]. There are mainly two perspectives about the role of independent directors in the board. First, based on Agency

theory, independent directors are considered to be more effective monitors of corporate management than insiders due to their independence outside of the company [21]. They can better perform monitoring function without any barrier and provide useful resources to the firm [3]. In this way, large number of independent directors can supervise the CEO's self-interest behavior, guaranteeing shareholders with greater returns [12].

On the other hand, some point out that more non-independent directors can help to improve firm performance. According to Stewardship theory, managers are trustworthy people who will be good stewards of resources entrusted to them, and will naturally work for shareholders to maximize profits [22]. Meanwhile, as non-independent directors, they have a better understanding of how corporate business operates, which help them make wise decisions [23]. Stakeholder theorists further supplement the negative relationship [7]. They believe that stakeholder representatives can promote procedural fairness and effectiveness by allowing stakeholder consideration to be represented directly in corporate decisions [24]. As independent directors consider less of the stakeholder's interests, their idea could be less practical and timely for firms to handle in economic dilemmas [7]. For so, we have the following hypothesis:

**H3:** Board independence is negatively related to corporate performance in crisis.

## 2.4. Share Concentration

Share concentration refers to that a small number of shareholders owns a large portion of the stake, usually represented by the largest share of shareholders [5]. Evidence has shown influence of ownership structures on corporate financial performance [25]. Due to the Incentive Alignment Hypothesis [26], large shareholders have greater power and stronger incentives to ensure shareholder value maximization, which benefits firm performance [5]. In contrast to small shareholders, large investors have much more shares, driving them to spend their private resources to monitor management, which improve the effectiveness of firm governance [27]. The difference between large shareholders and small shareholders is that the former not only have the motivation to reduce agency costs, but also have the right to do so [28]. Therefore, it is easier for major shareholders to coordinate their actions on management. This provides convenience in decision-making process in crisis. Then it can be inferred that a higher level of share concentration have merits to corporate performance under risk. So, we propose the below hypothesis:

**H4:** Share concentration is positively related to corporate performance in crisis.

## 2.5. State Ownership and Firm Age

As the Chinese government corporatized large SOEs during China's economic reforms, many Chinese public listed companies have high levels of state ownership [29]. So far, evidence about whether state ownership hinders or improves firm performance is still mixed. A few key studies find that the relationship between state-owned equity and market performance is inverted U-shaped or concave, revealing that state ownership could be valuable for revitalizing performance [29]. However, agency problems could arise more frequently in SOEs, which lead to limited willingness of state owners to advance firm financial performance [8]. This is because the interests of state owners include not only business objectives consistent with shareholders' goals, but also political and social goals, which indicate that SOEs may suffer lower performance due to the conflict [30]. This may be detrimental to firms when meeting economic crisis. Meanwhile, the role of board structure on performance will be affected by political connections. The board can gain support by subsidies, preferential credit or exclusive management rights from policies [31], while be forced to realize some non-profit visions. In this way, SOE, as a form of the political connection, will influence the function of board on corporate performance. Thus, while the effect of state ownership on firm performance can be recognized, we propose the following hypothesis:

**H5:** State ownership (SOE) moderates the relationship between board structure and corporate performance in crisis.

Furthermore, the effect of firm age on corporate performance also maintains ambiguous. A few studies have confirmed that firm age has close relationship with firm performance [9, 32]. For firms, they may hold different level of demand and profitability in different stages of their life cycles [10]. For example, aging businesses may steadily increase their productivity, profitability, and equity [14], which may help them to survive in economic earthquakes. But over time, aging reflects the institutionalization of organizational rigidities, which leads to slower sales growth, higher costs, reduced investment and outdated assets [32]. This age liability effect brings burden to companies [10]. Several studies have proved the negative impact firm age has on the corporate performance. Also, as the board's governance will be restricted by higher management costs and bloated organizational structure in old firms, the burden could hinder the board from functioning effectively on corporate performance. With all above review, we propose the following hypothesis:

**H6:** Firm age moderates the relationship between board structure and corporate performance in crisis.

### 3. METHODS

#### 3.1. Sample and Data

To identify the relationship between board structure and performance under risk, samples were selected in years when China's economic situation is depressed or in danger. In 2007-2008, China's market suffered a great shock when the economic crisis swept the world. In 2015, China's GDP growth slowed down, while overcapacity and other problems led to economic depression. Therefore, the sample used in this study is an unbalanced panel data consisting of 5820 firm-year records in 2007, 2008 and 2015, from firms listed on Shanghai and Shenzhen Stock Exchanges. Data was classified into 22 industries according to the standard industrial classification of China Securities Regulatory Commission. After excluding companies with missing variables, the final sample includes 5581 company-year observations, of which 24.57% in 2007, 26.12% in 2008, and 49.31% in 2015. Data are collected from the China Stock Market and Accounting Research (CSMAR) database.

#### 3.2. Variables

The data includes four sets of variables: financial performance variables, board structure variables, ownership structure variables, and financial characteristics variables. Short-term financial variables can better measure the ability of the company to deal with an external crisis. Thus the study uses the most common proxy  $ROA$  (Lee et al., 2016; Muriithi, 2016; Siminica et al., 2019) as the dependent variable. For the board structure variables, we use four proxies independence ( $Indep$ ), board size ( $Board$ ), CEO duality ( $Dual$ ) and share concentration ( $Top1$ ). In addition, Firm age ( $FirmAge$ ) and State ownership ( $SOE$ ) are used as moderating variables. Finally, firm size ( $Size$ ) and leverage ( $Lev$ ) are used as control variables for the financial characteristics of the firms. **Table 1** lists all the variables and definitions.

**Table 1** List of variables and their definitions

Variable	Definition
<b>Dependent Variable:</b>	
$ROA$	Return on assets; earnings after tax divided by total assets
<b>Independent Variables:</b>	
$Indep$	The proportion of independent directors on the board
$Board$	The number of directors of board
$Dual$	Equals 1 when the chair of board is also the CEO; otherwise equals 0
$Top1$	The percent of shares of the largest shareholder
<b>Regulatory Variables:</b>	
$SOE$	Equals 1 when the firm is state-owned; otherwise equals 0
$FirmAge$	Computed since firm went public
<b>Control Variables:</b>	
$Size$	The natural logarithm of total assets
$Lev$	The ratio of total debt to total assets

#### 3.3. Empirical Methodology

The variables explain a time-variant relationship between the board structure and corporate performance

in crisis. The sample is based on the firm-year observation. The results are based on fixed effect panel data regression analysis. As different years and kinds of industries may lead to the existence of missing variables, which will interfere with the final regression results. Therefore, the study use time-industry fixed effect regression with year and industry code (the initials of category C is represented as C + one code number). The formula of the research model is given below,

$$ROA_{it} = \alpha + \beta_1 Indep_{it} + \beta_2 Board_{it} + \beta_3 Dual_{it} + \beta_4 Top1_{it} + \beta_5 Size_{it} + \beta_6 Lev_{it} \quad (1)$$

where  $ROA_{it}$  represents the ROA of firm  $i$  in year  $t$ .  $Indep_{it}$ ,  $Board_{it}$ ,  $Dual_{it}$ , and  $Top1_{it}$  represents board independence, board size, CEO duality and share concentration of firm  $i$  in year  $t$  respectively. The study also controls for other factors that have been shown to affect the corporate performance under risk, namely firm size ( $Size_{it}$ ) and leverage ( $Lev_{it}$ ).

Besides, the study also introduces moderating variables, including state ownership ( $SOE$ ) and firm age ( $FirmAge$ ) to test their moderation roles. With the change of  $SOE$  and firm age, the influence of board structure on corporate performance will vary. Therefore, the study generates interaction term to express the moderating effect of  $SOE$  and firm age. The formula of the research model is given below,

$$ROA_{it} = \alpha + \beta_1 Indep_{it} + \beta_2 Board_{it} + \beta_3 Dual_{it} + \beta_4 Top1_{it} + \beta_5 SOE_{it} * Indep_{it} + \beta_6 SOE_{it} * Board_{it} + \beta_7 SOE_{it} * Dual_{it} + \beta_8 SOE_{it} * Top1_{it} + \beta_9 FirmAge_{it} * Indep_{it} + \beta_{10} FirmAge_{it} * Board_{it} + \beta_{11} FirmAge_{it} * Dual_{it} + \beta_{12} FirmAge_{it} * Top1_{it} + \beta_{13} Size_{it} + \beta_{14} Lev_{it} \quad (2)$$

where  $SOE_{it} * Indep_{it}$ ,  $SOE_{it} * Board_{it}$ ,  $SOE_{it} * Dual_{it}$  and  $SOE_{it} * Top1_{it}$  represents the interaction terms of  $SOE$  and board independence, board size, CEO duality and share concentration of firm  $i$  in year  $t$  respectively. Similarly,  $FirmAge_{it} * Indep_{it}$ ,  $FirmAge_{it} * Board_{it}$ ,  $FirmAge_{it} * Dual_{it}$  and  $FirmAge_{it} * Top1_{it}$  represents the interaction terms of firm age and board structure variables of firm  $i$  in year  $t$ .

### 4. RESULTS

#### 4.1. Descriptive Statistics

The descriptive statistical results are provided in **Table 2** (all continuous variables are 5% winsorized at both ends). It can be seen that in years of economic crisis, the mean value of  $ROA$  is 0.04, where the standard deviation is larger than the mean value. It shows that the financial performance under risk was not so profitable, also fluctuated greatly from the average level and varied among different enterprises. For independent variables, the board structure variables in crisis were relatively stable, with the mean values of  $Board$  and  $Indep$

registering 2.171 and 0.3661 respectively. As for control variables, most of them have little change, while *Lev* was relatively high, showing that the environment was uncontrollable.

**Table 2** Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>ROA</i>	5820	0.04	0.053	0.079	0.145
<i>Indep</i>	5738	0.366	0.041	0.333	0.444
<i>Board</i>	5738	2.171	0.188	1.792	2.565
<i>Dual</i>	5654	0.207	0.405	0	1
<i>Top1</i>	5820	0.35	0.141	0.136	0.618
<i>FirmAge</i>	5820	2.67	0.333	2.079	3.178
<i>SOE</i>	5808	0.474	0.499	0	1

**Table 3** Matrix of correlations

	<i>ROA</i>	<i>Indep</i>	<i>Board</i>	<i>Dual</i>	<i>Lev</i>	<i>Size</i>	<i>FirmAge</i>		<i>SOE</i>
<i>ROA</i>	1								
<i>Indep</i>	-0.013	1							
<i>Board</i>	-0.013	-0.473	1						
<i>Dual</i>	0.067	0.118	-0.194	1					
<i>Lev</i>	-0.380	-0.053	0.179	-0.121	1				
<i>Size</i>	-0.013	-0.011	0.264	-0.124	0.347	1			
<i>Top1</i>	0.125	0.002	0.017	-0.058	0.013	0.198	1		
<i>FirmAge</i>	-0.161	0.030	-0.063	-0.012	0.103	0.181	-0.181	1	
<i>SOE</i>	-0.139	-0.118	0.267	-0.240	0.234	0.267	0.247	-0.005	1

**Table 4** VIF results

Variables	VIF	1/VIF
<i>Dual</i>	1.05	0.948435
<i>Board</i>	1.44	0.693333
<i>Indep</i>	1.31	0.761044
<i>Top1</i>	1.05	0.954322
<i>Size</i>	1.27	0.786342
<i>Lev</i>	1.16	0.863904
Mean VIF	1.21	

### 4.3. Empirical Results

The results of the Time-Industry fixed effect panel data regression analysis are presented in **Table 5**. The results indicate that *Dual* had a significant positive association with *ROA* ( $p < 0.01$ ), *H1* receives firm support. In addition, the result shows that *Top 1* were also positively associated with corporate financial performance under risk ( $p < 0.01$ ). Thus *H4* is confirmed. On the contrary, the coefficient of *Indep* ( $p < 0.05$ ) to *ROA* was significantly negative. It reveals that when a higher

<i>Lev</i>	5819	0.476	0.205	0.133	0.852
<i>Size</i>	5819	21.794	1.214	19.917	24.479

### 4.2. Correlation Analysis

The bivariate correlations (Pearson correlation coefficients) between each pair of the included variables are shown in **Table 3**. The correlations among the independent variables are low to moderate and there is no indication of multicollinearity problems. For the regressions, we compute variance inflation factors (VIFs). None of the VIFs exceed 4 and this confirms that multicollinearity is not a problem in interpreting the regression results.

proportion of independent directors are in the board, it has a negative impact on corporate financial performance under risk, which supports *H3*. The variable *Board* has no significant association with financial performance under risk, which revealed the size of the board has a neutral effect upon it. Finally, there is a significant negative association between *Lev* and *ROA*, indicating the higher the external risk, the lower the enterprise performance.

**Table 5** Panel-data regression analysis with fixed-effects

Variables	<i>ROA</i>
<i>Dual</i>	0.00815*** (0.00159)
<i>Board</i>	-0.00516 (0.00415)
<i>Indep</i>	-0.0357** (0.0176)
<i>Size</i>	0.0369*** (0.00465)
	0.00800*** (0.000668)

<b>Lev</b>	-0.121*** (0.00359)
<b>Constant</b>	-0.0693*** (0.0171)
<b>Year Fixed</b>	YES
<b>Industry Fixed</b>	YES
<b>Observations</b>	5,581
<b>R-squared</b>	0.224

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

#### 4.4. Moderation Analysis

The study generated interaction variables between moderating variables and independent variables to see the moderating effect on the relationship. First, the moderation role of *SOE* upon the relationship between the independent test variables (*Dual*, *Board*, *Indep*, *Top1*) with corporate performance in crisis was tested by using fixed-effects panel data regression analysis. From the result, *SOE* was negatively associated with *Top1* ( $P < 0.01$ ). In the former regression results for the main effect, *Top1* was positively associated with *ROA*. The result verifies *H5*.

Furthermore, the test of FirmAge is also presented in **Table 6**. The outcome shows that *Dual\*age* is negatively related to *ROA* ( $p<0.05$ ). In regression for the main effect, *Dual* have a positive relationship with *ROA*. Thus, it indicates that firm age negatively moderated the relationship between CEO duality and corporate performance in crisis. This proves that when meeting economic jolt, while one person concurrently serves as chairman of the board and CEO can contribute to firms, those older ones are less able to maintain performance during the crisis. *H6* receives strong support. Meanwhile, firm age didn't have a significant association with board size, board independence and share concentration.

**Table 6** moderating analysis by Panel-data regression analysis with fixed-effects

<b>Variables</b>	<b>ROA</b>
<b>Dual</b>	0.0290** (0.0124)
<b>Board</b>	0.00968 (0.0310)
<b>Indep</b>	-0.131 (0.138)
<b>Top1</b>	0.114*** (0.0359)
<b>SOE</b>	0.0148 (0.0259)
<b>FirmAge</b>	-0.00736 (0.0373)
<b>Dual*SOE</b>	0.00354

<b>Dual*age</b>	(0.00352) -0.00948** (0.00462)
<b>Board*SOE</b>	-0.000682 (0.00788)
<b>Board*age</b>	-0.00356 (0.0114)
<b>Indep*SOE</b>	-0.0531 (0.0351)
<b>Indep*age</b>	0.0432 (0.0510)
<b>Top1*SOE</b>	-0.0342*** (0.00925)
<b>Top1*age</b>	-0.0199 (0.0132)
<b>Size</b>	0.00974*** (0.000673)
<b>Lev</b>	-0.115*** (0.00359)
<b>Constant</b>	-0.126 (0.202)
<b>Year Fixed</b>	YES
<b>Industry Fixed</b>	YES
<b>Observations</b>	5,570
<b>R-squared</b>	0.249

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

#### 4.5. Robust Check

Finally, we test the robustness of our results. **Table 7** represents the results. First, we run regressions for each sample year. We examine the relationship between board variables and firm performance for each year of the sample. Column (2) (3) (4) show results obtained according to the sample of year 2007, 2008 and 2015 respectively. The results are quite similar with those derived when using the full sample. More specifically, CEO duality and share concentration both have significantly positive associations with corporate performance in crisis, while board size shows no significant relationship. For the second test, the study estimates the models again by using return on equity (ROE) as the measure of firm performance in place of ROA. Result are presented in column (5). The central findings of this robust check are again similar to the initial ones. In addition, this paper rerun a fixed-effect regression based on the full industry classification code of China Securities Regulatory Commission. The final result is put in column (6). The regression result is basically consistent with the initial result, showing the positive influence of dual and Top1 on corporate performance in crisis.

**Table 7** robust check results

	(1)	(2)	(3)	(4)	(5)	(6)
	<i>m1</i>	<i>m2</i>	<i>m3</i>	<i>m4</i>	<i>m5</i>	<i>m6</i>
<b>Variables</b>	<b>ROA</b>	<b>ROA</b>	<b>ROA</b>	<b>ROA</b>	<b>ROE</b>	<b>ROA</b>
<b>Dual</b>	0.00815*** (0.00159)	0.00752** (0.00367)	0.00882** (0.00369)	0.00748*** (0.00194)	0.0154*** (0.00320)	0.00743*** (0.00159)
<b>Board</b>	-0.00516 (0.00415)	-0.00116 (0.00782)	1.78e-05 (0.00816)	-0.0101 (0.00615)	-0.00804 (0.00830)	-0.00194 (0.00417)
<b>Indep</b>	-0.0357** (0.0176)	0.00141 (0.0367)	-0.0582 (0.0358)	-0.0396 (0.0244)	-0.0758** (0.0351)	-0.0232 (0.0176)
<b>Top1</b>	0.0369*** (0.00465)	0.0255*** (0.00954)	0.0459*** (0.00959)	0.0326*** (0.00624)	0.0706*** (0.00928)	0.0397*** (0.00468)
<b>Size</b>	0.00800*** (0.000668)	0.00695*** (0.00136)	0.00793*** (0.00137)	0.00838*** (0.000924)	0.0194*** (0.00136)	0.00865*** (0.000678)
<b>Lev</b>	-0.121*** (0.00359)	-0.0958*** (0.00732)	-0.126*** (0.00724)	-0.127*** (0.00507)	-0.129*** (0.00754)	-0.118*** (0.00362)
<b>Constant</b>	-0.0693*** (0.0171)	-0.0760** (0.0340)	-0.0853** (0.0335)	-0.0942*** (0.0253)	-0.271*** (0.0348)	-0.0956*** (0.0184)
<b>Year Fixed</b>	YES				YES	YES
<b>Industry Fixed</b>	YES	YES	YES	YES	YES	
<b>Industry Fixed2</b>						YES
<b>Observations</b>	5,581	1,371	1,458	2,752	5,486	5,581
<b>R-squared</b>	0.224	0.166	0.259	0.266	0.135	0.248

Standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

## 5. DISCUSSION

The consequences drawn from the analyses are discussed as follow. First, the results prove that CEO duality and corporate performance in crisis are positively related. This finding supports Stewardship Theory, which indicates that when the chairman and CEO are the same person, they can quickly make effective adjustments in a short time to ensure the short-term financial performance [2]. Second, share concentration and corporate performance in crisis are also positively related. It confirms that in the short term, companies with higher share concentration and larger scale can quickly make decisions and gather necessary resources to deal with the crisis [27]. Lastly, board independence is negatively associated with corporate performance in crisis. It suggests that firms with a higher portion of independent

directors is less flexible and resilient to deal with poor economic situation. In all, the results further underscore the relevance of the arguments as advanced in this study. It firmly supports that during crisis, concentrated power is needed to carry out a timely decision-making process [2], which helps to overcome the current dilemma by effective management [29].

Also, the results prove the moderating role of state ownership and firm age. The negative association of the interaction *Top1\*SOE* indicates that when encountering an economic crisis, state-owned enterprises have lower financial performance, which may be due to their serious bureaucracy, slow decision-making process and poor implementation. On the contrary, state ownership has no significant relationship with other board structures, including CEO duality, board size and board independence. Meanwhile, The negative relationship

between *Dual\*age* and corporate performance in crisis indicates the liability of age for old or state-owned enterprises [10]. Compared with the young firms, older enterprises are more insensitive to the unexpected impact, having less flexibility and speed to deal with the crisis [33]. Thus they are more difficult to recover in crisis for the short term. As for state-owned enterprises, they have formed a heavier bureaucratic style [34] which limits them by cautious decision-making process and slow policy implementation, both being constraints on the performance in the crisis. These findings indicate that state-owned enterprises and older firms suffer from more political restrictions [30] and age liabilities [10], making them unable to respond to the crisis in time and ensure performance.

## 6. CONCLUSION

The findings lend support to our central proposition, that the board structure, as represented by four independent variables in this study, is quite influential to corporate performance in crisis. We found general support that CEO duality and share concentration are positively related to firm performance during an economic crisis, while board independence is just the opposite. The results also show that state ownership and firm age negatively moderate the relationship between certain board structure attributes and corporate performance during a jolt.

Currently, an increasing number of studies draw attention to the effect of board structures on firm performance, but literature studying specifically on corporate performance in crisis still lacks. Furthermore, evidence concerning the interaction of state ownership and firm age with board structure is scarce. Thus, this study addressed this gap by examining the mechanics of how the interplays among board structures, state ownership and firm age influence corporate performance under risk. In doing so, the study aims to provide implications for better configuration of board structures to improve the performance under risk.

The study also has limitations. First, the sample only includes firms for three years of 2007, 2008 and 2015. The sample size may be not enough to draw a universal conclusion. Moreover, this paper simplified different situations as crisis for convenience, without considering the content-specific variables like policy and market in a particular period. In addition, no empirical verification is designed to test the mechanism of the relationship we find in the study. These limitations promise room for future research studies. The results suggest that future studies could collect larger and more diversified samples, which may provide more generalized results in overcoming the economic crisis. In addition, future studies can examine the potential effects of other moderators between board structure and firm

performance, which might provide further guidance to firms.

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