

## The Impact of ESG and the Characteristics of the Board of Directors on Investment Efficiency: A Case Study of Chinese Listed Companies

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**Abstract:** The board of directors is an important organization leading the company's decision-making. The different personal characteristics of the members of the board of directors directly affect the choice of decision-making, and then affect the investment efficiency; Social responsibility is a behavior in that enterprises are closely connected with the external environment. Therefore, this paper takes Chinese listed companies from 2016 to 2020 as a sample and makes an empirical study with the Ordinary Least Square method to explore the impact of board characteristics and corporate social responsibility on corporate investment efficiency. The results show that: 1) the higher the proportion of male directors, the older the average age of directors, and the enterprises with no overseas background among directors, the more inclined to implement corporate social responsibility. 2) The better corporate social responsibility performance has a positive and significant impact on the company's investment efficiency. 3) The older the average age of the members of the board of directors, the company with no overseas background in the board of directors and no financial background in the board of directors, and the company with the same director as the chairman and general manager, the investment efficiency will be better. 4) The implementation of corporate social responsibility does not make up for the negative impact of the characteristics of board members on enterprise investment efficiency. This paper also puts forward corresponding suggestions based on the research findings.

**Keywords:** Board of Directors, Corporate Social Responsibility, Investment Efficiency.

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### 1. INTRODUCTION

By the end of 2021, Evergrande Group, one of the giants of Chinese private enterprises, is carrying two trillion dollars of bank debt. Such a highly leveraged operation model is extremely risky and irresponsible not only to the investors but also to the banks, the society, and the people who bought the property. The board of directors has an inescapable responsibility for implementing such a high-risk, single-minded pursuit of expansion of the operating model. On the contrary, Huawei, which initially started as a network communication equipment, has been developing its market and

expanding its cell phone business, while taking social responsibility as its responsibility. So it seems that the right or wrong investment decision will largely determine the fate of the company.

The board of directors is the representative of the core interests of the company's shareholders and the maker of the company's strategic decisions. The personal style and background of the board members are directly related to the choice of the company's operating strategy and have a great impact on the future direction of the company. Many direct and indirect factors contribute to the success

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of a company's operations, and some specific factors can make up for the lack of other factors or have the function of enhancing the role of other factors. Since the investment of a company is closely related to the internal and external factors of the company, ESG covers a wide range of behaviors that closely integrate the company and all stakeholders. The purpose of this paper is to find out whether there is any correlation between the characteristics of board members and the behavior of enterprises in implementing social responsibility, and whether there is any correlation between the characteristics of board members and the behavior of enterprises in implementing social responsibility. The purpose of this paper is to find out whether the characteristics of board members are related to the behavior of corporate social responsibility, and whether the characteristics of board members and corporate social responsibility are both factors influencing investment efficiency? The purpose of this paper is to find out whether the characteristics of board members and the behavior of socially responsible companies are factors influencing the efficiency of investment and to further analyze whether the various characteristics of board members and the behavior of socially responsible companies influence the efficiency of investment. It is hoped that the findings of this paper can provide a theoretical basis for the operation of the board of directors and the implementation of social responsibility, and provide a reference for the formulation of business strategies of enterprises.

## **2. LITERATURE REVIEW**

### **2.1 Board of Directors**

The "Company Law of the People's Republic of China" contains detailed provisions on the authority and composition of the Board of Directors. Article 46 lists the powers and functions of the Board of Directors, which reads: "The Board of Directors shall be responsible to the shareholders' meeting and shall exercise the following powers and functions: (1) convene the shareholders' meeting and report to the shareholders' meeting; (2) implement the resolutions of the shareholders' meeting; (3) decide on the Company's business plan and investment plan; (4) formulate the Company's annual financial budget plan and final account plan; (5) formulate the Company's profit distribution plan and plan to make up for losses; (6) formulate the Company's plan to increase or reduce the registered capital and issue corporate bonds; (7) designate the Company's merger and consolidation plan; and (8) designate the Company's merger and consolidation plan. (8) Decide on the establishment of the company's internal management organization; (9) Decide on the appointment or dismissal of the company's manager and his remuneration, and decide on the appointment or dismissal of the

company's deputy manager and financial director and their remuneration according to the nomination of the manager; (10) the establishment of the basic management system of the company; (11) other powers and functions stipulated in the articles of association of the company". Article 108 stipulates the composition of the board of directors and the manner of their selection, which reads: "A joint-stock company shall have a board of directors with five to nineteen members. The board of directors may include representatives of the employees of the company. The employee representatives on the board of directors shall be democratically elected by the employees of the company through the employees' representative assembly, the employees' general meeting, or other forms."

Zhang (2021) mentions that the board of directors is different from the organizational structure of a company that does not have statutory authority because it has statutory authority and presents itself as stable. Xu (2020) found that sometimes the interests of the shareholders and the management of a company are not the same, because the shareholders' goal is naturally to maximize profits, while the management has to consider factors such as the long-term development of the company while making profits, which leads to conflicts between them. The Board of Directors is the actual steering committee. The responsibilities of the board of directors and their position in the company can be understood from the above-mentioned laws and regulations and the studies of scholars.

### **2.2 ESG**

In recent years, the international community, including governments, organizations, companies, and stakeholders, has been paying more and more attention to the "Environmental, Social and Governance" (ESG) system as issues such as climate change, labor conditions, and corporate responsibility are increasing. Governance (G) is an acronym for Environmental (E), Social (S), and Governance (G), which covers the three core aspects of sustainability and ethical impact in a company or business investment. Social) refers to the social ecosystem that treats stakeholders equally and maintains the company's development. Governance is the result of the combined formation and action of governance environment, governance structure, governance mechanism, and governance behavior. In this series of concepts, the governance environment is the basis of the whole system, and the structure of governance can also be compared to the carrier of the system. From the 1980s to the present, the escalating conflicts between corporate owners and operators and the repeated emergence of negative news events such as financial fraud have

triggered widespread concern in the industry and academia about corporate governance issues. As a result, the concept of responsible investment, which focuses on environmental, social responsibility, and corporate governance, has gradually been accepted and emphasized. At present, the development of ESG in China is still at a backward stage compared with European and American countries, however, in recent years, due to the government's vigorous promotion progress is very fast, relevant government regulations and policies and supervision mechanisms have been established one after another, and since the specific implementation methods of ESG vary from field to field, scholars have successively developed suitable ESG evaluation systems and made relevant recommendations for different industries (Cao and Xu, 2019). 2019), which provides strong theoretical support to promote the development of ESG in China.

### 2.3 Investment efficiency

According to Yu (2008), the economic meaning of investment efficiency has not been explicitly proposed in the concept of investment efficiency in previous studies, although many scholars had put forward the concepts of effectiveness, effect, and effect. Thus, it has not been given a complete definition either. However, collating and summarizing the relevant scholars' statements, investment efficiency refers to the relationship between the extent to which enterprises invest a certain amount of resources in investment activities and use various ways to meet people's needs. Since the resources of investment are essentially capital, the process of enterprise investment activity is the process of capital operation, which includes three characteristics: first is profitability, including capital appreciation, profit realization, and profit maximization; second is liquidity, through the process of capital outflow and inflow cycle to achieve the purpose of investment profitability; third is safety, that is, the problem of capital preservation (Fan and Yuan, 2006; Huang, 2010).

Ji (2021) found that domestic and foreign scholars have studied the issue of corporate investment efficiency from the perspectives of free cash flow, capital structure, behavioral finance, etc. Modigliani *et al.* (1958) argued in MM theory that there is no relationship between intra-firm cash flow and the level of investment. Richardson (2006) used model testing methods and empirically analyzed them. The method used in his empirical analysis has been adopted by domestic and foreign scholars in the study of corporate investment efficiency and is known as Richardson's investment expectation model. The measurement of investment efficiency is the focus and difficulty of related research. At

present, there are three most commonly used models to measure investment efficiency: Fazzari *et al.*'s (1988) FHP model, Vogt's (1994) Vogt model, and Richardson's (2006) inefficient investment model. Among them, Richardson's model is widely used by academics because it can not only measure the inefficiency of investment directly, but also has a more reasonable design and easier operation compared with the other two models (Shi & Chen, 2016), so this paper will also adopt this method, and the model will be detailed in III. Research design.

### 2.4 Literature related to board characteristics, ESG, and investment efficiency

Lin *et al.* (2018) found that the implementation of corporate social responsibility has different effects on the board of directors with different characteristics in various decisions, including improving the majority decision-making behavior of older directors, "overseas" directors, and female directors, which has a good "reputation moderation effect" "When CSR performance is good, older directors discourage corporate surplus management, directors with overseas background not only reduce surplus management but also promote corporate R&D investment, and female directors pay more dividends and help improve corporate financial performance. However, CSR implementation has a negative "resource constraint effect" on most of the decision-making behaviors of politically connected directors and highly educated directors; at higher levels of CSR, politically connected boards increase the level of surplus management and inefficient investment, and also inhibit corporate innovation; highly educated. The high education level of directors reduces the dividend payout. This also suggests that the fulfillment of CSR can positively moderate and improve the decision-making behavior of non-politically connected directors and low-educated directors.

While Uyar *et al.* (2020) studied the relationship between board characteristics and ESG performance, their findings confirm that independent boards are particularly effective in improving the overall CSR commitment and governance pillar of the firm. This may imply the appointment of independent directors to the board to strengthen the governance structure to achieve long-term value creation and meet shareholder interests. The proportion of female directors on the board has a significant impact on driving corporate engagement across all Corporate Social Responsibility (CSR; CSR) dimensions. Previous research has found that women are more passionate about philanthropy and community help orientation, have a different perspective, and bring unique

experiences and competencies to the board. Disciplined directors also contribute to the composite score and the social and governance pillars of CSR engagement. By attending board meetings, directors have the opportunity to learn about CSR investments, vote for investments in specific CSR programs, and follow up on the results of those programs, as these meetings are the primary decision-making platform for such investments. Mai and Yang (2017) also found through a comparative study that board characteristics differ and directors make different decisions depending on their age, experience, and gender. The average age of board members is significantly and positively related to the value of social contribution per share, indicating that the higher the average age of board members, the more the board is concerned about the realization of self-worth and commitment to corporate social responsibility. The proportion of highly educated directors is significantly and positively correlated with the value of social contribution per share, which indicates that the higher the overall quality of the board of directors, the stronger the willingness of the company to undertake social responsibility. The proportion of female directors is negatively correlated with the social contribution per share, which may be due to the scarcity of female directors in China, who are more concerned about the development of the company and their interests, hoping to consolidate their position as directors. In contrast, the study of Tang and Lee (2019) shows that gender, age, and education heterogeneity of board members moderate the relationship between environmental administrative regulation and green development. In summary, the research hypotheses can be summarized as follows.

H1: Board member characteristics are significantly associated with the implementation of corporate social responsibility.

Sun and, Hou (2021) used the causal-comparative research method to measure the impact of considering ESG factors in investment on investment performance, and the results showed that ESG investment is ineffective in global mature markets and effective in global emerging markets, and the effectiveness of ESG investment in China is low from an overall perspective. The global emerging markets have better performance compared to the global mature markets for both ESG investments and investments without ESG factors. A study by Lee et al. (2020) integrating environmental, social, and governance (ESG) analysis into ongoing investment practices in Australia found that portfolios with high ESG ratings consistently provided superior performance, diversification efficiency, and lower overall risk compared to

portfolios with low ESG ratings. According to Naffa et al. (2020), ESG risks can be diversified and investors who are aligned with sustainability do not bear additional costs. Some of the sustainability goals include "ending hunger and achieving food security", "ensuring healthy lives and promoting the well-being of people of all ages", and "making cities and human settlements inclusive, safe, resilient, and sustainability". Although there are higher transaction costs, as in the case of some ETFs with expense ratios of 80-100 basis points. Gao et al. (2021) empirically examine the impact of ESG performance on corporate investment efficiency using a sample of 3,185 Chinese A-share listed companies from 2009 to 2020. The findings show that good ESG performance can improve corporate investment efficiency, and the lower the corporate investment efficiency, the more significant this effect is. In other words, better ESG performance can improve investment efficiency by alleviating agency problems and reducing financing constraints; further analysis reveals that the effect of good ESG performance on corporate investment efficiency is more significant for enterprises in the mature stage, with more efficient information transmission and higher marketization and better rule of law construction. The research hypothesis can be summarized from the above literature as follows.

H2: ESG is positively and significantly associated with investment efficiency.

Cai (2018) found that the background of board members is the most significant factor influencing corporate investment efficiency; while corporate governance structure and stability characteristics have different effects in the case of over-investment and under-investment, respectively; in addition, the frequency of board meetings is not significantly associated with the investment efficiency of the company. The empirical study of the relationship between board members' characteristics and investment efficiency by Jiang (2017) found that the higher the average age of board members, the better the investment efficiency of the company; the higher the proportion of female directors, the lower the investment efficiency; the longer the term of board members, the better the investment department rate of the company. From the above literature, the research hypotheses can be summarized as follows.

H3: There is a significant correlation between board members' characteristics and investment efficiency.

H4: Board member characteristics, ESG implementation effectiveness, and investment efficiency are significantly correlated.

### 3. METHODOLOGY

The four research hypotheses summarized from the literature review are 1) Board members' characteristics are significantly associated with CSR implementation. 2) ESG is positively and significantly associated with investment efficiency. 3) Board members' characteristics are significantly associated with investment efficiency. 4) Board members' characteristics, ESG implementation effectiveness, and investment efficiency are significantly associated with each other. The data of ESG rating are downloaded from the WIND database, while the rest of the board members' characteristics and related financial data are obtained from the CSMAR database. The remaining board member characteristics and related financial data were obtained from the CSMAR database. After the data were downloaded, those with incomplete information were removed first, and then the extreme values were removed, and a total of 2914 samples were obtained. The regression model was designed as follows.

Model 1 :

$$\begin{aligned} \text{ESG}_{it} = & \alpha_0 + \alpha_1 \text{BOARD}_{it} + \alpha_2 \text{INDEP}_{it} + \alpha_3 \text{MALE}_{it} \\ & + \alpha_4 \text{DIREAGE}_{it} + \alpha_5 \text{FIN}_{it} \\ & + \alpha_6 \text{OVERSEAS}_{it} + \alpha_7 \text{CHGM}_{it} \\ & + \alpha_8 \text{NETWORK}_{it} + \alpha_9 \text{SCALE}_{it} \\ & + \alpha_{10} \text{LEVERAGE}_{it} + \alpha_{11} \text{CF}_{it} \\ & + \alpha_{12} \text{STATE}_{it} + \varepsilon_{it} \end{aligned}$$

Model 2 :

$$\begin{aligned} \text{ININVEST}_{it} = & \alpha_0 + \alpha_1 \text{ESG}_{it} + \alpha_2 \text{SCALE}_{it} \\ & + \alpha_3 \text{LEVERAGE}_{it} + \alpha_4 \text{CF}_{it} \\ & + \alpha_{12} \text{STATE}_{it} + \varepsilon_{it} \end{aligned}$$

Model 3 :

$$\begin{aligned} \text{ININVEST}_{it} = & \alpha_0 + \alpha_1 \text{BOARD}_{it} + \alpha_2 \text{INDEP}_{it} \\ & + \alpha_3 \text{MALE}_{it} + \alpha_4 \text{DIREAGE}_{it} \\ & + \alpha_5 \text{FIN}_{it} + \alpha_6 \text{OVERSEAS}_{it} \\ & + \alpha_7 \text{CHGM}_{it} + \alpha_8 \text{NETWORK}_{it} \\ & + \alpha_9 \text{SCALE}_{it} + \alpha_{10} \text{LEVERAGE}_{it} \\ & + \alpha_{11} \text{CF}_{it} + \alpha_{12} \text{STATE}_{it} + \varepsilon_{it} \end{aligned}$$

Model 4 :

$$\begin{aligned} \text{ININVEST}_{it} = & \alpha_0 + \alpha_1 \text{ESG}_{it} + \alpha_2 \text{BOARD}_{it} \\ & + \alpha_3 \text{INDEP}_{it} + \alpha_4 \text{MALE}_{it} \\ & + \alpha_5 \text{DIREAGE}_{it} + \alpha_6 \text{FIN}_{it} \\ & + \alpha_7 \text{OVERSEAS}_{it} + \alpha_8 \text{CHGM}_{it} \\ & + \alpha_9 \text{NETWORK}_{it} + \alpha_{10} \text{SCALE}_{it} \\ & + \alpha_{11} \text{LEVERAGE}_{it} + \alpha_{12} \text{CF}_{it} \\ & + \alpha_{13} \text{STATE}_{it} + \varepsilon_{it} \end{aligned}$$

Variable Description

#### 3.1 Explained variables.

The explanatory variable in the research model of this paper is an inefficient investment (ININVEST), which is estimated using the efficient investment model developed by Richardson (2006), and the model is presented as follows.

$$\begin{aligned} \text{INVEST}_{it} = & \alpha_0 + \alpha_1 \text{GROWTH}_{i,t-1} + \alpha_2 \text{LEV}_{i,t-1} \\ & + \alpha_3 \text{CASH}_{i,t-1} + \alpha_4 \text{AGE}_{i,t-1} \\ & + \alpha_5 \text{SIZE}_{i,t-1} + \alpha_6 \text{RETURNS}_{i,t-1} \\ & + \varepsilon_{it} \end{aligned}$$

Where INVEST is the current period new investment (normalized by total assets),

GROWTH is the growth rate of operating income in the previous period, LEV is the balance sheet ratio in the previous period, CASH is the cash ratio in the previous period, AGE is the number of years listed in the previous period, SIZE is the natural logarithm of the book value of total assets in the previous period, and RETURNS is the annual return on company stock in the previous period.  $\varepsilon$  is The residual, which is the inefficient investment, represents over-investment. A value of  $\varepsilon$  greater than 0 indicates over-investment and less than 0 indicates under-investment. The explanatory variable (ININVEST) in this paper is the inefficient investment represented by  $\varepsilon$ , and the data are taken directly from the CSMAR database.

#### 3.2 Explanatory variables

3.2.1 ESG score (ESG): The ESG rating result of the SynTao Green Finance is used as the sample in this paper, and the rating level is converted into the corresponding score. The ESG ratings are divided into nine grades from high to low: A+, A, A-, B+, B, B-, C+, C, and C-, which are converted into scores from 9 to 1 in this paper. At present, the domestic ESG rating agencies include WIND, Sino-Securities, China Alliance of Social Value Investment, RKS, etc. SynTao Green Finance is a well-known and leading green agency in China, and is also the initiator of China SIF, the first signatory to the UN Principles for Responsible Investment (PRI) and the International Capital Markets Association (CMA) Green Bond Principles (GBP)/Social Bond Principles (SBP). ) / Social Bond Principles (SBP) of the International Capital Markets Association (CMA) first advisory board members. And considering the immediacy of the rating release and the adequacy of the sample obtained in this paper, the rating results of SynTao Green Finance were chosen as the sample data.

3.2.2 Board size (BOARD): calculated by the total

- number of board members.
- 3.2.3 Percentage of independent directors (INDEP): Calculated by dividing the number of independent directors among the board members by the total number of board members.
- 3.2.4 Percentage of male directors (MALE): Calculated by dividing the number of male members of the Board of Directors by the total number of members of the Board of Directors.
- 3.2.5 Average age of directors (DIREAGE): The average age of all members of the Board of Directors is used as the basis for calculation, and the age of each director is calculated as of December 31 of the sample year.
- 3.2.6 Whether or not the director has a financial or fiscal background (FIN): This is a dummy variable set to "1" if any member of the board of directors has a financial or fiscal background, otherwise it is set to "0".
- 3.2.7 Whether the director has an overseas background (OVERSEAS): This is a dummy variable, set to "1" if one of the directors has an overseas background, otherwise set to "0".
- 3.2.8 Combination of two positions (CHGM): This is a dummy variable and is set to "1" if the chairman and general manager are different; otherwise it is set to "0".
- 3.2.9 Network centrality of independent directors (NETWORK): NETWORK represents the importance of independent directors in social networks and whether independent

directors can contribute more resources and external information to the companies they work for.

### 3.3 Control variables

- 3.3.1 Company size (SCALE): considering that companies with large sizes usually have more professional investment talents and rigorous evaluation systems, which will affect the efficiency of investment, therefore, this paper selects company size as one of the control variables.
- 3.3.2 Financial leverage (LEVERAGE): Based on the fact that the high level of financial leverage of a company affects whether it can make larger investments with less capital, which will affect the degree of investment efficiency, this paper selects financial leverage as one of the control variables.
- 3.3.3 Cash flow (CF): Since the amount of cash flow of the enterprise will affect the planning of the use of funds, it will also affect the efficiency of investment, so cash flow is selected as one of the control variables in this paper.
- 3.3.4T Property nature (STATE): This is a dummy variable, which is set to "1" if the enterprise is a state-owned enterprise; otherwise it is set to "0".

## 4 RESULTS

**Table-1: The descriptive statistics for each variable (N=2914)**

	Min.	Max.	Ave.	Std.
ININVEST	0.000	0.281	0.036	0.045
ESG	2.000	7.000	4.285	0.986
BOARD	5.000	15.000	8.986	1.966
INDEP	0.333	0.571	0.382	0.059
MALE	0.550	1.000	0.824	0.106
DIREAGE	43.000	57.700	50.925	3.077
FIN	0.000	1.000	0.754	0.431
OVERSEAS	0.000	1.000	0.703	0.457
CHGM	0.000	1.000	0.224	0.417
NETWORK	0.000	1.500	0.438	0.351
SCALE	21.740	27.660	23.950	1.240
LEVERAGE	0.079	0.861	0.477	0.189
CF	-0.126	0.339	0.077	0.079
STATE	0.000	1.000	0.488	0.500

Note: For the description of each variable code, please refer to 3. Methodology.

Table 1 shows the distribution of the total sample data. In terms of the performance of ININVEST, the overall mean is low, indicating that the inefficiency should not be serious, and the ESG performance seems to be normally distributed in

terms of mean and standard deviation. As for the board characteristics, the average board size is about 9, which is much higher than the three people stipulated in the company law, but the large size of listed companies makes the number of directors

reasonable. The lowest percentage of independent directors is 33.3%, which is in line with the provisions of the governance code for listed companies, which requires at least 1/3 of all directors, but generally speaking, it does not increase the percentage of independent directors significantly. The generally high proportion of male directors is in line with traditional perceptions. In terms of age, the range and the average indicate that most companies tend to hire people with considerable experience as directors. In addition, on average, most companies hire directors with financial and overseas backgrounds. In addition, there is a high proportion of the chairman and general manager being the same person, which indicates that the supervision function of listed companies still needs to be improved. In terms of the network centrality of independent directors, the

mean is low, indicating that the independent directors hired by companies may not have sufficient external network resources, which should be related to the current situation that independent directors in China are generally selected by friends and relatives of the major shareholders of listed companies. As for the other control variables, the wide range of high and low ranges also indicates that the business environment of the sample companies varies greatly.

Before the analysis of the empirical results, the reasonableness of the regression model design is first examined. This can be judged by the F-value, and the F-values from Table 2 to Table 5 are all significant, indicating that this paper's linear regression model design is predictive.

**Table-2: The empirical results of model 1 (N=2914)**

	Coef.	t	p	VIF
Con_	-0.604	-1.280	0.200	
BOARD	-0.008	-0.806	0.420	1.422
INDEP	0.310	0.922	0.357	1.313
MALE	-1.257	-6.994	0.000***	1.220
DIREAGE	0.052	7.734	0.000***	1.445
FIN	0.056	1.360	0.174	1.059
OVERSEAS	0.193	4.979	0.000***	1.050
CHGM	-0.269	-6.092	0.000***	1.129
NETWORK	0.053	1.056	0.291	1.034
SCALE	0.129	6.510	0.000***	2.007
LEVERAGE	-0.315	-2.558	0.011**	1.816
CF	1.020	4.325	0.000***	1.153
STATE	0.129	3.052	0.002***	1.496
F value	28.172	Sig.	***	

Note 1: for the description of each variable code, please refer to 3. Methodology

Note 2: when  $p \leq 0.01$ , the significance shows as “\*\*\*”, when  $0.01 < p \leq 0.05$ , the significance shows as “\*\*”, when  $0.05 < p \leq 0.1$ , the significance shows as “\*”.

Table 2 analyzes what characteristics of board members are more inclined to implement social responsibility. The empirical results in the table show that the percentage of male directors shows a negative and significant relationship with social responsibility ratings, indicating that female directors tend to be sensitive, kind, and considerate in terms of gender traits and therefore tend to support socially responsible behavior; while the factor of whether the chairman and general manager are the same people shows a positive and significant relationship with social responsibility performance, being Since companies with a combined chairman and general manager are usually family-owned, such companies are weaker in terms of supervision, but they are usually more humane, thus influencing their decision-making and acting styles. In addition, the average age of the board of directors is positively

and significantly correlated with social responsibility performance, which should be attributed to the fact that older people have more life experiences and are more able to develop a sense of consideration and care. Finally, the factor of whether directors have overseas background is positively and significantly related to social responsibility performance, then it can indicate that the concept of social responsibility first originated in Europe and America, so directors with overseas backgrounds also have higher acceptance and recognition of the concept of social responsibility, so they tend to introduce the concept of social responsibility into the company. The results in Table 2 show that only some of the characteristics of research hypothesis 1 are valid when applied to Chinese listed companies.

**Table-3: The empirical results of model 2 (N=2914)**

	Coef.	t	p	VIF
Con_	0.038	1.994	0.046**	
ESG	-0.001	-1.694	0.090*	1.057
SCALE	0.000	0.241	0.809	1.828
LEVERAGE	-0.003	-0.544	0.587	1.791
CF	0.090	8.182	0.000***	1.143
STATE	-0.013	-7.653	0.000***	1.151
F value	34.842	Sig.	***	

Note 1: for the description of each variable code, please refer to 3. Methodology

Note 2: when  $p \leq 0.01$ , the significance shows as “\*\*\*”, when  $0.01 < p \leq 0.05$ , the significance shows as “\*\*”, when  $0.05 < p \leq 0.1$ , the significance shows as “\*”.

From the empirical results in Table 3, it is clear that social responsibility performance is inversely and significantly associated with investment inefficiency, which means that better

social responsibility performance will be followed by higher investment efficiency. Therefore, hypothesis 2 is proved to be valid by the empirical results.

**Table-4: The empirical results of model 3 (N=2914)**

	Coef.	t	p	VIF
Con_	0.098	4.459	0.000***	
BOARD	0.000	-0.503	0.615	1.422
INDEP	0.002	0.115	0.909	1.313
MALE	0.005	0.603	0.546	1.220
DIREAGE	-0.002	-6.354	0.000***	1.445
FIN	0.004	1.914	0.056*	1.059
OVERSEAS	0.003	1.773	0.076*	1.050
CHGM	0.004	1.912	0.056*	1.129
NETWORK	-0.003	-1.437	0.151	1.034
SCALE	0.001	1.527	0.127	2.007
LEVERAGE	-0.008	-1.320	0.187	1.816
CF	0.088	8.046	0.000***	1.153
STATE	-0.008	-4.013	0.000***	1.496
F value	19.478	Sig.	***	

Note 1: for the description of each variable code, please refer to 3. Methodology

Note 2: when  $p \leq 0.01$ , the significance shows as “\*\*\*”, when  $0.01 < p \leq 0.05$ , the significance shows as “\*\*”, when  $0.05 < p \leq 0.1$ , the significance shows as “\*”.

The empirical results in Table 4 show that the average age of the board members has a negative and significant relationship with investment inefficiency, indicating that the younger the average age of the board members, the less efficient the investment is, and the reason for this is that younger directors have the less practical experience and act more aggressively, while older directors have the more practical experience and make more prudent and well-thought-out decisions, thus helping to improve investment efficiency. In addition, the empirical results also show that the presence of members with financial backgrounds or overseas backgrounds on the board of directors may contribute to the inefficiency of investment,

indicating that the financial theory and practice of such directors are not well integrated, and the directors with the overseas background are not familiar with the domestic operation, thus resulting in the inefficiency of investment. In addition, the investment efficiency is better in companies where the chairman and the managing director are the same people, which indicates that directors other than the chairman may not be familiar enough with the company, which is related to the fact that a large percentage of director members are not actively involved in the company's operation in practice at present. The results in Table 4 show that only some of the characteristics of research hypothesis 3 hold when applied to Chinese listed companies.



**Table-5: The empirical results of model 4 (N=2914)**

	Coef.	t	p	VIF
Con_	0.097	4.437	0.000***	
ESG	-0.001	-0.882	0.378	1.117
BOARD	0.000	-0.516	0.606	1.422
INDEP	0.002	0.130	0.897	1.313
MALE	0.004	0.485	0.628	1.241
DIREAGE	-0.002	-6.164	0.000***	1.475
FIN	0.004	1.936	0.053*	1.060
OVERSEAS	0.003	1.847	0.065*	1.059
CHGM	0.004	1.800	0.072*	1.143
NETWORK	-0.003	-1.420	0.156	1.034
SCALE	0.001	1.622	0.105	2.036
LEVERAGE	-0.008	-1.360	0.174	1.820
CF	0.089	8.091	0.000***	1.160
STATE	-0.008	-3.957	0.000***	1.501
F value	18.039	Sig.	***	

Note 1: for the description of each variable code, please refer to 3. Methodology

Note 2: when  $p \leq 0.01$ , the significance shows as “\*\*\*”, when  $0.01 < p \leq 0.05$ , the significance shows as “\*\*”, when  $0.05 < p \leq 0.1$ , the significance shows as “\*”.

Table 5 is analyzed in combination with Table 4 because Table 5 adds the variables of social responsibility performance to Table 4, and we can see that the variables of social responsibility performance that are added do not show significant correlation results, and the relationship between board characteristics and inefficient investment does not change much, indicating that the performance of social responsibility does not compensate the board characteristics for inefficient investment and can only be changed by adjusting the board members. Therefore, hypothesis 4 is not proved to be valid by the empirical results.

## 5 CONCLUSION

Based on the fact that the board of directors plays an important role in the decision-making process of the company, and there are numerous characteristics of the board of directors, whether social responsibility performance can play a compensating role in the adverse effects of board characteristics on investment efficiency of the company, therefore, this paper conducts an empirical study using the Ordinary Least Squares method with a sample of Chinese listed companies from 2016 to 2020 to explore the relationship between board characteristics, social responsibility performance and investment inefficiency relationship among the three. The results of the study found that.

1. The higher the proportion of male directors, the older the average age of the board members and the absence of overseas background among the board members with the same chairman and general manager, the more companies tend to implement CSR.

2. The better CSR performance has a positive and significant effect on the investment efficiency of the company.
3. The older the average age of board members, the absence of directors with an overseas background on the board, and the absence of directors with a financial and financial background on the board with the same chairman and general manager, the better the investment efficiency of the company.
4. The implementation of CSR does not have a compensating effect on the negative impact of board members' characteristics on corporate investment efficiency.

According to the above findings, the actual performance of the current board of directors of Chinese listed companies is not fully in line with the corporate governance theory, for example, the combination of chairman and general manager, according to the connotation of the corporate governance theory, should strengthen the board of directors' supervision mechanism and make the company's decisions more rigorous, but the empirical study of this paper comes to the opposite conclusion. In addition, the empirical results also show that the inclusion of members with a financial background on the board of directors hurts investment efficiency, which is also contrary to the connotation of corporate governance theory, indicating that most of the leaders of financial professionals in Chinese listed companies do not have a good understanding of the application of financial theory in practice. This is also contrary to the connotation of corporate governance theory, which indicates that most of the current financial and financial professional leaders of Chinese listed companies are not appropriate for the application of

financial theory in practice, and this is what companies should pay special attention to.

Finally, based on the finding that CSR is positively and significantly related to investment efficiency, it is suggested that companies should still actively undertake social responsibility, but also consider the influence of the characteristics of board members, and hire directors with professional competence, practical experience, and responsibility to participate in company management, to make the company's operating performance better and better under the joint influence of corporate governance and social responsibility behavior. The company's operating performance can be improved under the joint influence of corporate governance and socially responsible behavior.

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