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Board gender diversity and sustainable growth rate: Chinese evidence

Qurat Ul Ain[a], Xianghui Yuan[a], Hafiz Mustansar Javaid[b] and Muhammad Naeem[c]

[a]School of Economics and Finance, Xi'an Jiaotong University, Xi'an, China; [b]School of Economics, Sapienza Università di Roma, Rome, Italy; [c]UCP Business School, University of Central Punjab, Pakistan

ABSTRACT

This study investigates the impact of women directors on a firm's sustainable growth rate. Using data from 2003 to 2017 for Chinese listed firms, we found a positive relationship between women directors and a sustainable growth rate. Our study also contributes to institutional theory by providing evidence that this positive relationship is more effective in legal-person-controlled firms than state-controlled firms. In comparison, women independent directors have a stronger influence than women executive directors on sustainable growth. Similarly, board gender diversity with three or more female directors substantially affects firms' sustainable growth, consistent with critical mass theory. Our study's findings are robust in terms of alternative estimations techniques, variable specifications, and different identification strategies, such as two-stage least squares and propensity score matching. Our study provides novel evidence on women directors' role in increasing firms' sustainable growth rate by adding a new dimension to the ongoing debate in the gender diversity literature.

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1. Introduction

Recent studies have revealed an upward trend in the participation of women directors on the boards of US public firms in the last decade (Catalyst, 2016). Conversely, women's involvement in the boardroom is under-represented worldwide (Catalyst, 2017; Institutional Shareholder Services Inc. (ISS),), 2017). Some countries, e.g., Spain and Norway, have introduced quotas for gender diversity; elsewhere, observers and regulators are still working towards greater participation by females in boardrooms (Adam, 2012). According to 2016 statistics for global listed companies, approximately 11.7% of the average board of directors and 4.6% of their CEOs are female in globally

CONTACT Qurat Ul Ain qurat057@gmail.com

listed companies.[1] On 29 August 2018, Californian legislators passed a bill requiring all significant listed companies to have at least one female director on the corporate board before the end of 2019. If corporations fail to adopt this quota, they may face severe financial penalties (Ye et al., 2019). These proposals and policies underscore the need to examine the benefits of corporate leadership and gender diversity. Additionally, an effective management of diversity and inclusion (D&I) avoid negative phenomena such as discrimination, exclusion and conflicts between individuals and, thus, enhancing the benefits for the economy and society (Milena, 2013).

Most of the finance literature in this context has examined women directors' involvement on boards as a business case (Adams & Mehran, 2012; Adams & Ferreira, 2009; Cumming et al., 2015; Liu, 2018; Post & Byron, 2015; Rose, 2007). Some studies have proposed that heterogeneous boards have better performance compared to non-diverse boards (Carter et al., 2003; Erhardt et al., 2003; Joecks et al., 2013; Liu et al., 2014), better governance (Adams & Ferreira, 2009), and increased market valuation (Campbell & Mínguez-Vera, 2008). Especially after the global financial crisis, research investigating gender diversity has been widely welcomed, with researchers interested in what will happen if more women join company boards (Adams & Funk, 2012). The biggest reason for this phenomenon is that recent literature has indicated that female executives show greater risk aversion in investment decisions than male executives (Levi et al., 2014). In addition, compared with male directors, female directors are considered more cautious (Adams & Ferreira, 2009).

However, prior research has also focused on other aspects of gender diversity, ignoring the importance of firms' long-term profitability, i.e., sustainable growth. Sustainable growth is becoming increasingly crucial for companies worldwide. Value creation is the ultimate mission of all firms; however, in today's globally competitive environment, simply maximising growth helps companies achieve their short-term rather than their long-term goals, namely 'value creation' (Ramezani et al., 2002). Therefore, many companies have been striving to achieve sustainable growth and incorporate it into their long-term strategic plans. Establishing an appropriate and effective corporate governance system is a prerequisite for attaining any firm's sustainable development (Sakai & Asaoka, 2003). Empirical evidence has also shown that corporate governance practices have an important impact on explaining a company's sustainable growth (Li et al., 2015). A few studies have tried to link corporate governance with sustainable growth, but these studies are scarce (Li et al., 2015; Mukherjee & Sen, 2019). The present study's novelty lies in examining the impact of board gender diversity (BGD) on firms' sustainable growth rate (SGR). It is noteworthy that the studies on gender diversity and sustainable growth are extremely scarce globally, with none currently existing in the Chinese context.

Our paper makes three substantial conceptual and empirical contributions. First, it adds to the increasing but limited study of sustainable growth (Li et al., 2015; Mathews et al., 2020; Mukherjee & Sen, 2019; Ramezani et al., 2002) by providing robust evidence supporting that BGD enhances firm's sustainable growth. Moreover, this study adds to the current global debate on whether having females on the board of directors should be enforced or voluntary. As a result of this growing discussion, deeper understanding of women directors' role in improving corporate governance

will help researchers, regulators, and policymakers to understand women directors' value and ultimately improve companies' sustainable growth.

Second, empirical evidence from an emerging economy (China) is provided in this study. The Chinese economy, like other emerging economies, is not as mature as many Western nations. Many economists assume that there are fundamental systemic and institutional differences between market organisations in developed and developing countries, restricting the universality of research findings to developing countries (Ghosh, 2006). Previous research has used evidence from Western developing nations, but there are inherent variations in the influence of culture, leadership style, personal actions, and the activities of management compared to China. In China's business environment, female directors have become a significant phenomenon, and their participation cannot be ignored. Over time, women's participation in various company sectors has provided a remarkable opportunity to explore their role in the effective use of resources. Therefore, we choose China, the largest emerging country globally and the second-largest economy, to examine the role of gender diversity on SGR.

Third, there is a unique institutional background in Chinese listed companies that may influence decisions linked to female board directors' participation. In China, for example, concentrated ownership is prominent, and investors' rights and governance mechanisms are less developed than in developing countries. The real control of most companies lies either with the state or legal-person owners. The effectiveness of decision-making due to women's participation may be affected by these differences in governance and systems. Therefore, we consider China's unique institutional factors when examining a gender-diversified board's role in achieving sustainable growth. Researchers believe that the most promising research on governance should understand the institutional background under which governance takes place (Davis, 2005). While addressing the effect of BGD on corporate governance, or performance, the literature has tended to overlook institutional factors. Only a few studies have identified the effect on corporate governance of multinational institutional factors (Van Essen et al., 2015). Therefore, researchers have concluded that the impact of BGD differs from country to country (Saeed & Sameer, 2017; Ye et al., 2019). The general conclusion of these studies is that the cross-border differences in corporate governance are affected by various institutional factors, such as corporate governance laws, legal structures, and government rules and regulations (Usman et al., 2020). Our research complements these studies by examining how within-country institutional contingencies influence female directors' governance role in affecting long-term firm growth, e.g., the SGR (Huang et al., 2011). Therefore, we demonstrate that BGD's impact on the SGR differs with the form of ownership by offering novel insights into this phenomenon, thus contributing to institutional theory.

The rest of the paper is organised as follows. Section 2 defines the theoretical background. Section 3 details the hypothesis development, while Sec. 4 provides details of the data and methodology. The empirical results and analysis are presented in Sec. 5. Additional testing details are described in Sec. 6, and endogeneity and robustness testing are discussed in Sec. 7. Conclusions are provided in Sec. 8.

2. Theoretical background and gender diversity

2.1. Resource dependence theory and board gender diversity (BGD)

Resource dependence theory postulates that companies rely on resources to survive in the external environment (Pfeffer & Salancik, 2003). These dependencies bring risks to the enterprise. In order to reduce dependence and the surrounding uncertainty, companies can establish contacts with external entities that control these resources (Nadeem et al., 2017). Pfeffer and Salancik (2003) pointed out three benefits of the company's board of director's links: advice and consultation; legitimacy; and communication channels. Regarding advice and consultation, the literature indicates that gender-diverse boards are associated with higher quality consultations on challenging issues, some of which may be perceived as unpleasant in an all-male board (Broadbridge et al., 2006; Kravitz, 2003). The company's practices are legalised concerning legitimacy by accepting social standards, norms, and values. Cox and Blake (1991) indicated that women's participation on the board of directors can promote women's rights, thereby enhancing companies' legitimacy in society. In terms of the communication channel, female leaders are more capable of linking firms with female consumers, women in the workforce, and society because of their diverse personal experiences and viewpoints. In short, the theory of resource dependency points to the positive impacts of gender diversification.

2.2. Agency theory and board gender diversity (BGD)

Agency conflicts arise in a corporate environment when managers do not consider shareholders' best interests while making corporate choices. One solution is to strengthen the monitoring role of the company's board of directors. Fama and Jensen (1983) believed that appropriate board direction and monitoring are necessary to mitigate these conflicts of interest. Empirical evidence has shown that female directors are often more actively involved in monitoring activities. The literature has also shown that greater BGD requires increased audit efforts and management accountability (Adams & Ferreira, 2009; Gul et al., 2008). In this context, Adams and Ferreira (2009) demonstrated that the gender diversity of the board of directors may harm the value of the company due to unnecessary over-monitoring in a well-managed firm. On the contrary, Gul et al. (2011) showed that companies can partially correct their weak governance systems by having gender-diversified boards. In this context, it is important to note that China is not quite as advanced in its corporate governance, gender diversity, and other institutional contingencies compared to developed countries such as the US; therefore, excessive monitoring should not be a problem for China (Allen et al., 2005). Given the current weak corporate governance in China, a gender-diversified board of directors may positively impact company performance due to the aforementioned partial substitution effects (Liu et al., 2014).

3. Hypothesis development

The role of females on the board directors influences the company's financial, social, and ethical success. Various empirical studies have explored the relationship between

BGD and corporate financial performance, although their outcomes are mixed and inconclusive. For instance, numerous studies, including Erhardt et al. (2003), Campbell and Mínguez-Vera (2008), Joecks et al. (2013), and Liu et al. (2014), have asserted that the financial performance of a firm is improved by BGD. However, other studies, such as Adams and Ferreira (2009) and Ahern and Dittmar (2012), have shown an inverse empirical relationship, arguing that BGD may increase conflicts and communication costs for the company. Furthermore, Owen and Temesvary (2018) found a nonlinear correlation between gender diversity and the firm's performance.

Many empirical studies have found that gender diversity has economic advantages and shifts the board's dynamics. For instance, female executives pay more attention to activities than male directors (Adams et al., 2011; Adams & Ferreira, 2009). Women on the board often also offer contrasting opinions, thereby adding to discussions regarding complex board decisions (Terjesen et al., 2009; Ye et al., 2019; Zahra & Pearce, 1989). Adams and Ferreira (2009) highlighted that female directors are more aligned with a monitoring role, which provides researchers with a greater incentive to examine the association between female directors and several relevant issues aside from corporate performance, e.g., agency costs (Ain et al., 2020), efficiency in innovation (Xie et al., 2020), stock liquidity (Ahmed & Ali, 2017), earnings management (Luo et al., 2017), sustainability disclosure (Zahid et al., 2020), dividend payment policies (Ain et al., 2021b; Chen et al., 2017), tax avoidance (Richardson et al., 2016), and sustainable investment (Atif et al., 2020).

The main goal of all these studies was to emphasise the effect of women board directors on governance mechanisms. They concluded that, due to women directors' participation on the board, internal governance practices were improved. The outcomes of the above studies show that women directors reduce agency costs (Ain et al., 2020) and the number of environmental lawsuits (Liu, 2018), promote sustainable investment (Atif et al., 2020), enhance corporate innovation (Ain et al., 2021a), are more accountable and careful (Fondas, 2000; Schmitt et al., 2008), mitigate earning management practices (Saona et al., 2019), increase dividend payments (Chen et al., 2017), reduce tax avoidance (Richardson et al., 2016), and also develop internal governance systems. Although the above theoretical and empirical studies have provided mixed evidence on the costs and benefits of BGD, in the present paper and in the Chinese context, we consider that more advantages are likely to be achieved through women directors' presence on the board. Thus, the following relationship is hypothesised:

H1: Board gender diversity (BGD) has a positive impact on a firm's sustainable growth rate (SGR).

In view of the distinctiveness of Chinese enterprises' ownership structure, the question arises as to whether the influence of female directors on sustainable growth varies with the company's ownership structure. In Chinese firms, the structure of shareholding is extremely concentrated, and the real control of most firms rests with the state or the legal-person owners. At the expense of minority shareholders, controlling shareholders may elect their chosen members to the board to further their own interests (Liu et al., 2014). However, the management motivations are distinct

between state-owned and legal-person owned firms. For example, instead of profit maximisation, state-owned companies can have social, political, or multiple objectives, such as gender equality and employment growth (Conyon & He, 2011). On the other hand, legal-person owners have a strong motivation to maximise profits and, thus, have a strong incentive to monitor the management activities of the board of directors (Liu et al., 2014). Compared with legal-person-controlled firms, state-controlled firms have lower economic performance because of their lower production efficiency (Allen et al., 2005; Lin et al., 1998). Borensztein and Ostry (1996) proposed that this lower productivity is due to greater government intervention in state-owned firms than in legal-person firms.

In the present study, we aim to determine whether having women on the board of directors has the same effect on sustainable growth under different ownership structures due to different dominant owners' different motives. We divided the sample into two sub-samples for this purpose: state-owned enterprises; and legal-person enterprises. The state subsample comprises companies with only state ownership, without any legal-person ownership, so the state has full power over the appointment of female directors. The subsample of legal-person owned firms does not have any state ownership, with the owners having full control over appointing female directors. As legal-person owned firms have a strong motivation to maximise profits, these companies may have better incentives for actively monitoring management activities; therefore, we make the following prediction:

H2: Board gender diversity (BGD) is more effective in achieving a firm's sustainable growth rate (SGR) in legal-person-controlled firms than state-controlled firms.

4. Data and methodology

4.1. Sample and data

Our sample comprises all A-share Chinese companies listed between 2003 and 2017 on the Chinese Stock Market & Accounting Research (CSMAR) database. We excluded all financial services companies because of their industry-specific and strict regulatory requirements. We also removed firm-year observations with missing data. Our final sample therefore consists of 25,164 observations.

4.2. Variable measurement

The dependent variable is 'sustainable corporate growth' (*SGR*). This variable measures the firm's long-term profitability and lasting competitiveness. Higgins introduced the idea of a SGR from the viewpoint of financial management, i.e., the company's overall growth rate without wasting its financial capital (Chen et al., 2017). In comparison, Van Horn claimed that the overall average growth rate of a company's revenues under a given operating and debt-to-dividend ratio represents a SGR, stressing that the target valuation, not the real value, is a SGR (McMillan & Woodruff, 1999). In order to calculate the SGR, we uses Higgins's (1977) model. Additionally, we also used Van Horne's static SGR model (Demirgüç-Kunt & Maksimovic, 1998; Yang

Table 1. List of variables and definition.

Notation	Measure
Sustainable growth rate (SGR)	
SGR	SGR can be presented with the following formula: SGR = Profit margin × Asset turnover ratio × Leverage factor × Retention ratio.
SusGR1	SusGR1 can be presented with the following formula: SusGR1 = (Profit margin × Asset turnover ratio × Leverage factor × Retention ratio)/(1 − Profit margin × Asset turnover ratio × Leverage factor × Retention ratio).
Gender diversity	
WDD	If the board has at least one female director, the variable is equal to 1; otherwise, it is 0.
WDP	The proportion of female directors on the board.
BLAU	Denoted as $1 - \sum_{i=1}^{n} P_i^2$, where P_i is the percentage of each category and $n = 2$ [female (male)].
SHANNON	Denoted as $-\sum_{i=1}^{n} P_i \ln P_i$, where P_i is the percentage of each category and $n = 2$ [female (male)].
WDD1	If the board has one female director, the variable is equal to 1; otherwise, it is 0.
WDD2	If the board has two female directors, the variable is equal to 1; otherwise, it is 0.
WDD3	If the board has three or more female directors, the variable is equal to 1; otherwise, it is 0.
WID	The percentage of independent female directors on the board divided by board size.
WED	The percentage of female executive directors on the board divided by board size.
Corporate governance	
BINDP	The no. of independent directors divided by the size of the board.
BSI	The total number of directors on the company's board of directors.
BMEET	The number of board meetings held in a year.
CEOD	If the CEO is also the chairman of the board, the dummy variable is equal to 1, otherwise equal to 0.
CEOT	Number of years as CEO.
Firm characteristics	
LEV	Divide the sum of short-term and long-term debt by total assets.
FSI	Natural log of the firm's total assets.
LSALE	Log of the firm's sales.
ASSG	Change in the firm's total assets.

et al., 2018). The variable of interest is gender diversity in our study. For BGD, we used the women directors' dummy (*WDD*) and women directors' percentage (*WDP*).

This research applied two sets of control variables, following Wintoki et al. (2012) and Nguyen et al. (2015). In the first group, we included corporate governance variables, such as board size, board independence, board meetings, CEO duality, and CEO tenure. In contrast, the other set includes firm characteristics such as leverage, firm size, the log of sales, and assets growth (see Table 1).

4.3. Empirical model

To explore the relationship between BGD and firm's SGR our baseline model is:

$$SGR_{i,t} = \alpha + \beta_1(\text{boardgenderdiversity})_{i,t} + \beta_2(\text{boardcharacteristics})_{i,t} + \beta_3(\text{firmcharacteristics})_{i,t} + \beta_4 \sum(\text{yeareffects})_{i,t} + \beta_5 \sum(\text{industryeffects})_{i,t} + \varepsilon_{it}$$

where *SGR* is the sustainable growth rate, β is the vector of coefficients on gender diversity variables and control variables respectively and ε_{it} is the error term.

5. Empirical results and discussions

5.1. Descriptive statistics

Table 2 lists summary statistics for dependent variables, independent variables, and control variables. The mean value of women's percentage is 12.8, which is higher than the value of 10.20 reported by Liu et al. (2014) in China and shows that female board directors' participation is increasing gradually. Similarly, the average value of the women directors' dummy is 0.647 in our research sample; approximately 67.4% of companies' boards of directors have at least one woman. This figure is higher than that reported by Liu et al. (2014) (36.5%) and Nadeem et al. (2017) (63%). Further variables demonstrate the appropriateness of the sample. For instance, the firm's size is 21.78, board size on average is 8.87, and 36.7% of board directors are independent.

We performed a Pearson correlation to check the multicollinearity among the variables. The results are reported in Table 3. The empirical literature provides guidance concerning the acceptable level of correlation. A value of correlation above 0.8 signifies the problem of multicollinearity (Field, 2005). Similarly, Liu et al. (2014) proposed that a value of above 0.7 signifies the problem of multicollinearity. High correlations are highlighted in bold in Table 3. However, this high correlation is the correlation between dependent variables and is also used in separate regressions. Table 3 also shows that the VIF value does not exceed 2.69, which is well below the acceptance level of 10 (Gujrati, 2003). Based on these results, we conclude that our study does not have any multicollinearity problems.

We conducted another major diagnostic test before further study to ensure the accuracy of our findings. In order to evaluate the unit root, we performed the augmented Dickey–Fuller (ADF) Fisher type test (see Table 4). All variables were found to be stationary, as shown in Table 4, where the presence of a unit root in the data is rejected by the significant *p*-values for each variable.

Table 2. Descriptive statistics.

	Mean	SD	p25	Median	p75
SGR	0.061	0.072	0.021	0.051	0.091
SusGR1	0.029	0.471	0.035	0.052	0.081
WDD	0.67	0.47	0.00	1.00	1.00
WDP (%)	12.80	12.21	0.00	11.10	22.22
BLAU	0.19	0.16	0	0.19	0.35
SHANNON	0.31	0.24	0	0.35	0.53
WID	0.056	0.08	0	0	0.11
WED	0.079	0.11	0	0.06	0.13
WDD1	0.37	0.48	0	0	1
WDD2	0.20	0.40	0	0	0
WDD3	0.08	0.27	0	0	0
BSI	8.87	1.95	8.00	9.00	9.00
BINDP	0.37	0.06	0.33	0.33	4.00
BMEET	9.27	4.01	7.00	9.00	11.00
CEOD	0.24	0.43	0.00	0.00	0.00
CEOT	2.91	2.83	0.92	2.00	3.83
LEV	0.54	5.44	0.28	0.45	0.61
FSI	21.78	1.29	20.91	21.64	22.51
LSAL	21.11	1.56	20.13	20.99	21.98
ASSG	0.21	0.46	0.02	.011	0.24

Note: All variables are as defined in Table 1.
Source: Authors' calculation.

Table 3. Correlation matrix.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	VIF
(1) *SGR*	1.000																		
(2) *SusGR1*	**0.827**	1.000																	
(3) *WDD*	0.011	0.006	1.000																1.04
(4) *WDP*	0.026	0.027	0.732	1.000															1.07
(5) *BLAU*	0.023	0.023	0.067	0.449	1.000														1.03
(6) *SHANNON*	0.022	0.020	0.036	0.507	0.092	1.000													1.06
(7) *WDD1*	−0.003	−0.008	−0.060	0.526	0.067	0.175	1.000												1.0
(8) *WDD2*	0.015	0.008	0.425	0.346	0.497	0.485	−0.377	1.000											1.01
(9) *WDD3*	0.020	0.028	0.503	0.201	0.451	0.401	−0.219	−0.144	1.000										1.02
(10) *BSI*	0.021	0.009	−0.110	0.046	−0.084	−0.060	−0.018	0.037	0.048	1.000									1.00
(11) *BINDP*	0.043	0.036	0.045	−0.024	0.031	0.021	0.027	−0.019	−0.032	−0.407	1.000								1.42
(12) *BMEET*	0.033	0.008	0.042	0.037	0.042	0.042	0.020	0.018	0.008	−0.041	0.079	1.000							1.24
(13) *CEOD*	0.053	0.034	0.109	0.065	0.106	0.100	0.005	0.038	0.037	−0.168	0.109	0.011	1.000						1.18
(14) *CEOT*	0.144	0.155	0.081	0.051	0.075	0.072	−0.002	0.020	0.050	−0.052	0.070	0.035	0.129	1.000					1.09
(15) *LEV*	−0.044	−0.167	0.001	−0.006	−0.001	−0.002	−0.009	−0.008	0.018	−0.003	0.001	0.002	0.005	−0.013	1.000				1.32
(16) *FSI*	0.363	0.306	−0.097	−0.060	−0.098	−0.093	−0.004	−0.024	−0.043	0.224	0.059	0.263	−0.132	0.154	−0.019	1.000			2.69
(17) *LSAL*	0.383	0.337	−0.100	−0.062	−0.101	−0.095	−0.004	−0.025	−0.041	0.215	0.036	0.174	−0.124	0.117	−0.035	0.864	1.000		1.99
(18) *ASSG*	0.110	0.058	0.021	0.014	0.021	0.021	0.003	0.010	0.010	−0.025	0.018	0.157	0.044	−0.033	−0.009	0.129	0.072	1.000	1.06

Note: This table shows the correlation between the dependent, independent, and control variables. All variables are as defined in Table 1.
Source: Authors' calculation.

Table 4. Augmented Dickey–Fuller (ADF) unit root.

	Level		1st difference	
Variable	Coefficient	PV	Coefficient	PV
SGR	39.5202	0.000	196.5915	0.000
SusGR1	79.5323	0.000	223.4885	0.000
WDD	64.2211	0.000	165.3642	0.000
WDP	69.6063	0.000	176.8434	0.000
BLAU	72.6695	0.000	177.8437	0.000
SHANNON	74.9383	0.000	179.4625	0.000
WDD1	86.9496	0.000	187.144	0.000
WDD2	73.4051	0.000	156.5312	0.000
WDD3	52.9353	0.000	109.3625	0.000
BSI	52.898	0.000	257.8947	0.000
BINDP	61.7966	0.000	264.6477	0.000
BMEET	103.1921	0.000	372.3772	0.000
CEOD	60.276	0.000	125.4821	0.000
CEOT	45.9833	0.000	262.0955	0.000
LEV	95.3943	0.000	203.4826	0.000
FSI	51.6355	0.000	175.1871	0.000
LSAL	70.3647	0.000	171.4609	0.000
ASSG	179.1543	0.000	260.2935	0.000

Source: Authors' calculation.

5.2. Multivariate results and discussions

5.2.1. Board gender diversity (BGD) and sustainable growth rate (SGR)

The main regression results are presented in Table 5, which shows the relationship between BGD and SGR. In columns (1) and (2), we used the Higgins model of SGR, and in columns (3) and (4), we used Van Horne's static SGR model (*SusGR1*) as a dependent variable. To measure BGD, we use the women director dummy (*WDD*) and women directors' percentage (*WDP*). The outcomes shows that BGD increases a firm's SGR (*WDD* = 0.058, *t*-stat = 3.538; *WDP* = 0.274, *t*-stat= 4.289) in columns (1) and (2). Similarly, the results in columns (3) and (4) also show a positive association between BGD and SGR (*WDD* = 0.014, *t*-stat = 2.851; *WDP* = 0.076, *t*-stat = 4.077). These results support *H1*, and resource dependence theory and agency theory, suggesting that directors are more concerned about the firm performance and more focused on stakeholder orientation (Adams et al., 2011; Carter et al., 2003; Rindova, 1999), which ultimately increases the SGR of the firm.

Regarding the control variables, larger boards reduce corporate sustainable growth (Huang et al., 2019). Simultaneously, the results for board independence show a significant positive relationship with the SGR (Liu et al., 2015). This shows that independent boards tend to enhance boards' functioning and efficiency due to their actions and oversight, and as a result, firms avail themselves of all the potential opportunities. The coefficient values of other control variables in Table 5, namely, CEO duality, CEO tenure, firm size, lag of sales, and asset growth, also show significant positive relationships, which indicates that they contribute to firms' SGR. Similarly, board meetings and leverage coefficient values provide significant negative results, indicating that the higher their value, the lower the firm's sustainable growth.

Next, we divided the sample into state-controlled firms and legal-person controlled firms. Specifically, a firm is considered as state-controlled if it is owned by the state and central government. In the case of legal-person owned firms, the state has no

Table 5. Relationship between BGD and the firm's SGR.

	OLS regressions			
	SGR		SusGR1	
Variable	(1)	(2)	(3)	(4)
WDD	0.058***		0.014***	
	(3.538)		(2.851)	
WDP		0.274***		0.076***
		(4.289)		(4.077)
BSI	−0.025***	−0.023**	−0.008*	−0.007**
	(−3.031)	(−2.518)	(−1.442)	(−2.099)
BINDP	0.103***	0.101***	0.436***	0.436***
	(7.135)	(7.117)	(9.674)	(9.670)
BMEET	−0.031***	−0.031***	−0.007***	−0.007***
	(−15.576)	(−15.580)	(−12.385)	(−12.409)
CEOD	0.095***	0.093***	0.006	0.005
	(5.035)	(4.936)	(1.061)	(0.951)
CEOT	0.017***	0.017***	0.006***	0.006***
	(5.696)	(5.666)	(7.373)	(7.342)
LEV	−0.006***	−0.006***	−0.696***	−0.696***
	(−4.359)	(−4.389)	(−55.467)	(−55.424)
FSI	0.156***	0.157***	0.030***	0.030***
	(11.145)	(11.185)	(7.114)	(7.140)
LSAL	0.253***	0.253***	0.112***	0.112***
	(23.493)	(23.516)	(33.711)	(33.775)
ASSG	0.197***	0.197***	0.021***	0.021***
	(11.520)	(11.491)	(4.239)	(4.204)
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
n	25,164	25,164	24,984	24,984
R^2	0.258	0.258	0.299	0.300

Note: All variables are as described in Table 1. *t*-statistics are provided in parentheses.
*, **, *** indicate the level of significance at 10%, 5%, and 1%, respectively.
Source: Authors' calculation.

involvement. The greater effect of gender diversity on SGR is shown in the sample of legal-person owned firms. The state-controlled sample results are shown in Panel A of Table 6 and the legal-person owned firms' results are shown in Panel B. The outcomes in Panel B ($WDD = 0.114$, t-stat = 5.262; $WDP = 0.305$, t-stat = 4.020) illustrate a stronger positive relationship between BGD and SGR in legal-controlled firms as compared to state-controlled enterprises. Similar results were obtained using *SusGR1* ($WDD = 0.027$, t-stat = 4.186; $WDP = 0.092$, t-stat = 4.077). Our findings are consistent with Usman et al. (2020) and indicate that, in legal-controlled firms, BGD is more effective because the owners of these firms have a strong incentive for profit maximisation (Liu et al., 2014).

6. Additional tests

6.1. Non-executive vs. executive women directors

The board's monitoring tendency depends upon its independence (Chen et al., 2015; Osma, 2008) and is calculated as the percentage of board non-executive directors (Adams & Ferreira, 2009; Gyapong et al., 2019). Accordingly, non-executive directors are more independent of the leadership and perform more dynamic monitoring (Liu et al., 2014), resulting in increased company performance and sustainable growth.

Table 6. Sub-samples of state-controlled firms and legal-person-controlled firms.

	OLS regressions			
	SGR		*SusGR1*	
Variable	(1)	(2)	(3)	(4)
Panel A: State-controlled firms				
WDD	−0.046*		−0.011	
	(1.904)		(−1.567)	
WDP		−0.084		−0.017
		(−0.760)		(−0.539)
Controls, year, and industry effects	✓	✓	✓	✓
n	11,486	11,486	11,424	11,424
R^2	0.301	0.301	0.309	0.309
Panel B: Legal-person-controlled firms				
WDD	0.114***		0.027***	
	(5.262)		(4.186)	
WDP		0.305***		0.092***
		(4.020)		(4.077)
Controls, year, and industry effects	✓	✓	✓	✓
n	13,414	13,414	13,414	13,414
R^2	0.271	0.270	0.309	0.309

Note: All variables are as described in Table 1. *t*-statistics are provided in parentheses.
*, **, *** indicate the level of significance at 10%, 5%, and 1%, respectively.
Source: Authors' calculation.

Non-executive directors are likely to be independent, enabling them to overcome agency disputes between principals and agents (Fama & Jensen, 1983). Peni and Vähämaa (2010) and Gavious et al. (2012) reported that women CEOs and CFOs are less opportunist and more likely to increase the SGR of the firm (Sah, 2021). Based on the above discussion, we expect that this relationship is stronger for women non-executive directors because of their greater independence compared to executive directors.

Hence, we divided women directors into two groups as independent directors (*WID*) and women executive directors (*WED*). The results are presented in Table 7 (Panel A), showing that women independent directors have a greater effect than women executive directors using both sustainable growth measures. The results are consistent with the arguments pertaining to better stakeholder relationships and monitoring functions (Adams et al., 2011; Atif et al., 2020). These findings reveal that BGD increases the SGR of a firm regardless of different groups. Our findings indicate that female directors can strengthen corporate governance by enhancing monitoring and strengthening management oversight (Gul et al., 2008).

6.2. Token vs. critical mass participation of women directors

The literature on BGD shows that having two women directors on the board is better than having one, and that having three is better than having two (Konrad et al., 2008). Previous studies have suggested that one woman director is considered a 'token', so her influence on board decisions may be limited. Kristie (2011) summarised critical mass theory as an extension of token status theory as 'one is a token, two is a presence, and three is a voice'. Terjesen et al. (2009) stated that the board may experience real change when more women are on the board because the women will

Table 7. Additional tests.

Variable	*SGR*	*SusGR1*
Panel A: Non-executive vs. executive women directors		
WID	0.185***	0.084***
	(4.979)	(3.459)
WED	0.163**	0.041*
	(2.320)	(1.826)
Controls, year and industry effects	✓	✓
N	25,164	25,164
R^2	0.373	0.297
Panel B: Token vs. critical mass participation of women directors		
FemD1	0.041**	0.006
	(2.289)	(1.036)
FemD2	0.053**	0.009*
	(2.491)	(1.724)
FemD3	0.133***	0.035***
	(4.406)	(3.949)
Controls, year and industry effects	✓	✓
N	25,164	25,164
R^2	0.258	0.300

Note: All variables are as described in Table 1. *t*-statistics are provided in parentheses.
*, **, *** indicate the level of significance at 10%, 5%, and 1%, respectively.
Source: Authors' calculation.

then feel more comfortable and less restricted. Critical mass theory predicts that female directors may influence the board's decision-making once the number of female directors reaches a certain critical point. Given this prediction of critical mass theory, we expect that women directors' critical mass on the board will have a greater effect on the SGR.

To verify this, we replaced the measures of BGD of the main regression with *WD1*, *WD2*, and *WD3*. The results are reported in Table 7 (Panel B), using both dependent variables (*SGR*, *SusGR1*). These results reveal that, as the number of women directors on the board increases, women directors' impact on SGR also increases, supporting critical mass theory.

7. Endogeneity and robustness checks

Due to endogeneity, our OLS results can be misleading. For instance, in some cases, gender diversity may be closely related to sustainable growth because of other characteristics (i.e., different board structures, ownership structures, and the firm's economic situation). In addition, it may be argued that the presence of women is an endogenous choice for companies. Bilimoria and Piderit (1994) reported that much depends upon women's will and which firms' boards they want to join. To address potential endogeneity, we adopted various methods. To overcome the issue of omitted variables, we used the instrumental variable approach (Chen et al., 2017). To address the problem of selective bias, we used the propensity score matching (PSM) approach. We also used the lag of the explanatory variable for reverse causality.

7.1. Two-stage least squares regression

Our results still face the problem of endogeneity, including the problem of omitted variables. Although our study utilises year and industry dummies to control for the

Table 8. Endogeneity.

	SGR		*SusGR1*	
Variable	(1)	(2)	(3)	(4)
Panel A: Two stage least square (2SLS)				
WDD	0.098***		0.024***	
	(4.683)		(3.853)	
WDP		0.383***		0.101***
		(4.998)		(4.526)
Controls, year, and industry effects	✓	✓	✓	✓
n	21,364	21,364	21,184	21,184
R^2	0.257	0.255	0.299	0.298
Panel B: Propensity score matching (PSM)				
WDD	0.047***		0.010*	
	(2.614)		(1.919)	
WDP		0.244***		0.068***
		(3.615)		(3.457)
Controls, year, and industry effects	✓	✓	✓	✓
n	18,220	18,220	18,030	18,030
R^2	0.254	0.255	0.301	0.301
Panel C: The lagged measure of gender diversity				
	(4.275)		(3.683)	
LWDD	0.069***		0.017***	
LWDP		0.300***		0.083***
		(4.583)		(4.366)
Controls, year, and industry effects	✓	✓	✓	✓
n	21,364	21,364	21,184	21,184
R^2	0.258	0.256	0.299	0.298
Panel D: Fixed effect method				
	(1.811)		(2.216)	
WDD	0.026*		0.009**	
FDP		0.126**		0.037*
		(1.985)		(1.899)
Controls, year, and industry effects	✓	✓	✓	✓
n	25,164	25,164	24,984	24,984
R^2	0.285	0.276	0.304	0.304

Note: All variables are as described in Table 1. *t*-statistics are provided in parentheses.
*, **, *** indicate the level of significance at 10%, 5%, and 1%, respectively.
Source: Authors' calculation.

potential determinants of sustainable growth, this could still be affected by certain unobservable variables. We therefore need to find an appropriate instrument variable (IV) that has no direct relation with the SGR of the firm, but that should directly influence BGD. Following Ain et al. (2020), we used the lagged values of the BGD measure, followed by the industry average of gender diversity measures. Ultimately, both were used as instrumental variables. The results are shown in Table 8 (Panel A), demonstrating a significant positive association between BGD and firms' SGR.

7.2. Propensity score matching (PSM)

Self-selection bias may be another possible problem in the robustness of our OLS results. As gender-diverse boards and non-gender-diverse boards may have different characteristics, firms may have greater sustainable growth due to reasons other than the presence of women directors. To address this potential issue, a PSM approach was used. First, we estimated the likelihood that a company will hire a woman director using a logit model, including the same control variables used in the main regression. By employing this method, the control group was defined (i.e., a firm

Table 9. Alternative measure of gender diversity.

	SGR		*SusGR1*	
Variable	(1)	(2)	(3)	(4)
BLAU	0.218***		0.056***	
	(4.461)		(3.904)	
SHANNON		0.144***		0.036***
		(4.373)		(3.729)
Controls, year and industry effects	✓	✓	✓	✓
n	25,164	25,164	24,984	24,984
R^2	0.258	0.258	0.300	0.300

Note: All variables are as described in Table 1. *t*-statistics are provided in parentheses.
*, **, *** indicate the level of significance at 10%, 5%, and 1%, respectively.
Source: Authors' calculation.

without a woman director) for every company associated with the treatment group (i.e., a company that has a woman director) based on all control variables (e.g., corporate governance and firm characteristics control variables). The control group was considered not to have significantly different characteristics, except for gender diversity. Table 8 (Panel B) reports the results of the PSM method. These findings are compatible with our previous results.

7.3. Lagged gender diversity measures

Following An and Zhang (2013) and Gul et al. (2011), we used the lag of gender diversity measures to control for reverse causality. After joining the board, women directors may take some time to understand a board of directors' functions and successfully perform their monitoring responsibilities. The findings for the lagged gender diversity measures (*LWDD* and *LWDP*) are presented in Table 8 (Panel C), and are consistent with our main regression's findings that BGD is linked with a greater SGR.

7.4. Fixed effect method

The OLS method of our principal regression has a major concern regarding endogeneity. It can be argued that the association between women directors and the sustainable growth of a firm may be affected by characteristics that are not noticeable at the firm level. Thus, the model was reassessed after including the firm's fixed effect and the firm's year fixed effect. The results of the fixed effect are presented in Table 8 (Panel D). The outcomes confirm the robustness of our previous findings.

7.5. Other robustness checks

7.5.1. Alternative measure of gender diversity

To check our outcomes' robustness, we used the Blau index (Blau, 1977) and the Shannon index (Shannon, 1948). The outcomes presented in Table 9 demonstrate the robustness of our previous findings. Overall, our paper's outcomes are consistent with the validity of agency and resource dependence theories.

8. Conclusion

This study provides new insights into the association between BGD and firms' SGR in China. Our study found credible evidence that female directors' participation on boards positively impacts the firm's SGR by controlling corporate governance and other company-related variables. These findings are consistent with Adams and Ferreira (2009), who posited that having women directors on the board mitigates agency problems and enhances the board's monitoring abilities; thus, the firm's sustainable growth is also enhanced. Our study also supports agency theory and resource dependence theory. In the Chinese institutional context, the ownership system is extremely concentrated. Most enterprises' real authority rests with the state or the legal-person owners. In this regard, we further note that BGD is more effective in legal-person-controlled firms because these firms' owners have a stronger incentive for profit maximisation (Liu et al., 2014) compared to state-controlled firms, reflecting differences in the main managerial motivations of the controlling shareholders. The findings of our study also suggest that BGD increases the sustainable growth of a firm regardless of different groups, but this influence is more pronounced if there are women independent directors on the board. Similarly, the number of women is also key. We found that boards with three or more women had a more significant impact on the company's sustainable growth than boards with two or fewer women, supporting critical mass theory (Kristie, 2011).

Our study provides meaningful insights for academics, regulators, and policymakers in decision-making concerning the value of female directors on the board. The results support the argument that female participation on the board improves its effectiveness. The policy implications for our study are twofold. The first aspect concerns the gender diversity of the board. Adams and Kirchmaier (2016) reported that, to implement gender quotas in listed companies, European countries frequently enact relevant laws. Our research indicates that female directors are valuable within the corporate governance (CG) framework, which is relevant to policymakers. The second aspect concerns the career development of females. To enhance sustainable growth, gender diversity on the board is likely to offer a wider range of perspectives. To encourage career development, policymakers must launch professional training mechanisms to improve skills and construct a rational competitive atmosphere for females. Furthermore, our findings also contribute new insights into how female directors' governance role is affected by within-country institutional factors.

There are some caveats in this study that may provide opportunities for future research. First, the research sample consists of Chinese listed companies (a developing country), which hinders its generalisability to developed countries. Second, diversity on the board of directors can refer to factors other than gender (such as race, nationality, education, expertise); future research may use other diversity measures. Third, our study included few institutional contingencies to explore the governance role of female directors. Future studies may include other within-country institutional contingencies, such as regional development, concentrated ownership, etc.

Note

1. http://www.gender-map.com/

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ORCID

Qurat Ul Ain http://orcid.org/0000-0002-8053-4613

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