



Female independent directors and financial irregularities in chinese listed firms: From the perspective of audit committee chairpersons



Xiaochong Li*, Yanxi Li

School of Economics and Management, Dalian University of Technology, Dalian, China

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ABSTRACT

This paper investigates the impact of female chairpersons of audit committee on financial irregularities of Chinese listed firms, and tests the influence of tenure and organizational decision-making environment on these two factors. The results show female chairpersons are more inclined than male chairpersons to reduce financial irregularities. In addition, we find that female chairpersons are more capable to reduce financial irregularities than male chairpersons in two circumstances: increased tenure and open organization decision-making environment. Finally, we find that, by reducing financial irregularities, female chairpersons can further improve financial report quality including internal control quality and external auditor opinion.

1. Introduction

The development of capital markets and regulatory environment in China has prompted Chinese listed firms to raise their governance level. However, because of information asymmetry between investors and listed firms, irregularities by listed firms infringing upon investors' rights remain a recurring problem. For example, in December 2017, the China Securities Regulatory Commission (CSRC) confirmed Jiangsu Yabaite Technology's act of financial irregularity in which the firm fabricated overseas business deals in 2015 to artificially add 260 million CNY (38 million US dollars) in profit. Another example is that also in 2017, the CSRC uncovered a case of financial irregularity by Jiamusi Electric Machine; the firm had inflated 198 million CNY (29 million US dollars) in profit during 2013 and 2014 by reporting less business operating costs and cost of sales.¹ According to the CSRC's report on the progress of case handling in 2017, 64 cases of corporate irregularities were reported in 2017, a 33% increase from 2016; financial irregularities accounted for 40% of all the reported cases, making it one of the major forms of corporate irregularities in China.² Therefore, the CSRC mandates all directors, supervisors, and senior management of listed firms to perform their duties with due diligence, and specified that "being unaware of," "being ignorant of," or "taking no part in" an act of irregularities should not be an excuse. On June 15 in 2018, the CSRC asked for opinions in public on the amendment of Listed Corporate Governance Rules in China which highlighted the importance of audit committee. The chairperson of an audit committee, as an independent director with accounting expertise, is responsible for internal audits and internal controls and plays a vital role in reducing corporate financial irregularities. Previous studies on the relationship between the characteristics of independent directors and corporate irregularities have focused on the social connectedness (Kuang and Lee, 2017; Wilbanks et al., 2017), financial expertise (Agrawal and

* Corresponding author: Li Xiaochong, Present address: School of Economics and Management in Dalian University of Technology, Dalian City of Liaoning Province in China.

E-mail address: xiaochong.li@foxmail.com (X. Li).

¹ More detail information can be found from http://www.csrc.gov.cn/shanxi/xxfw/tzsyd/alfx/201801/t20180123_333045.htm. (in Chinese)

² More detail information can be found from http://www.csrc.gov.cn/shanxi/xxfw/sxgzjx/201801/t20180123_333043.htm. (in Chinese)

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Chadha, 2005; Farber, 2005), and accountability (Brochet and Srinivasan, 2014) of independent directors. But these studies neglect the internal attributes (e.g., gender) of independent directors, which may be a fundamental factor that influences their external characteristics and decision-making (Peterson and Philpot, 2007). Moreover, there is no special research on female independent directors and corporate financial irregularities.

The rise in the status of women in corporate governance has spurred worldwide growth in female representation on corporate boards. According to statistical analyses of Chinese listed firms, in 2007, 89.13% of listed firms had female directors on the board and this figure increased to 96.16% at the end of 2016. Furthermore, the average percentage of female directors in Chinese listed firms has also risen from 27.43% in 2007 to 42.92% in 2016. This trend indicates that female representation on the boards of Chinese listed firms has been prevalent and increasing. However, there is little empirical research concerning the corporate governance effects of female independent directors on Chinese listed firms. Therefore, it is necessary to further examine and explore women's role in corporate governance in China. Compared with men, women on boards are more diligent, responsible, and independent. Using a sample of US firms, Adams and Ferreira (2009) find that female directors have better attendance records and are more likely to join monitoring committees than male directors. Female directors dislike financial fraud and are more likely to depart fraud firms than their male counterparts are (Gao et al., 2017). Not only do female directors demonstrate greater risk aversion and ethical behavior, but also they are better at obtaining voluntary information which may reduce information asymmetry between female directors and managers (Gul et al., 2011). Thus gender diversity on board promotes firms' accounting conservatism and earnings quality (García Lara et al., 2017). Women have been found to be more empathetic, cooperative, and willing to share their power, which are characteristics that enable women's leadership to be more effective (Eagly and Carli, 2003, 2007). Consensus regarding the effect of women on corporate governance has not yet been established, possibly because the effect hinges on expertise and leadership. In China, only the chairperson of a firm's audit committee is required to be an independent director and to have accounting expertise, but other audit committee members are not under such requirement, according to the Listed Firm Operational Guideline disclosed by CSRC and Directions of Audit Committees in Listed Firms announced by Chinese Stock Exchange. Besides, the chairperson of the audit committee should chair all the assignments within the committee and can request a meeting whenever he or she feels that it is needed, thus providing a necessary condition for female independent directors to fulfill their function in corporate governance. Moreover, there are differences in the composition of audit committees among different countries. Some countries, such as the U.S., the U.K., and Spain, require all audit committee members to be independent, while other countries, such as China, Australia, and Singapore, require only the majority of audit committee members (including the chairperson) to be independent. However, most previous studies focus on audit committees in the U.S and the U.K., which may not be suitable for other countries, including China. Therefore, in order to fill the gap in research, we use chairpersons of audit committees in Chinese firms as our research sample, so that we can draw general conclusions.

From the perspective of an audit committee chairperson, we empirically study the relationship between the gender characteristics of independent directors and financial irregularities of Chinese listed firms. The findings are useful both in theory and practice to clarify the role of women in corporate governance, strengthen the impact of audit committees, and improve corporate governance. Therefore, we use data on Chinese firms listed in the A-list market from 2007 to 2016. Focusing on the scope of responsibilities of an audit committee chairperson, this study examines the relationship between the gender characteristics of independent directors and corporate financial irregularities, and simultaneously takes into account how this relationship is affected by tenure and organizational decision-making environment. This paper complements the literature in this area in four aspects.

First, this paper expands the research on factors that influence corporate irregularities. We consider the impact of gender characteristics of independent directors and find that female independent directors can significantly reduce the probability and degree of corporate financial irregularities. Second, most studies have investigated the overall role of women in corporate governance by using the presence/absence or number/percentage of female independent directors. This approach does not account for the effect of individual differences among women, and therefore conclusions of existing studies are equivocal. By drawing on the perspective of audit committee chairpersons, we find female independent directors with financial expertise and leadership responsibility to be more capable of contributing to corporate governance than their male counterparts. This finding improves the theoretical understanding of the governance effect of female independent directors and provides a basis for the appointment of independent directors in Chinese listed firms. Third, based on the current situation of Chinese listed firms, we investigate the effects of director tenure and organizational decision-making environment on the role of female independent directors in corporate governance. The results may offer useful insights for improving corporate governance in order to enhance female representation in corporate governance, and thereby reduce corporate financial irregularities and protect investors' rights. Fourth, in further analysis, we find that female audit committee chairpersons can improve financial report quality through reducing corporate financial irregularities. This result enriches the literature in financial report quality and female independent directors.

2. Institutional background, literature review, and research hypotheses

2.1. Literature review

As a crucial component of the corporate governance mechanism, independent directors help lower information asymmetry and monitor the executives which lead to mitigate principal-agent problems and protect the interests of investors. Kuang and Lee (2017) find that independent directors with external social connectedness do not affect the likelihood of fraud commission but significantly reduce the likelihood of fraud detection given the occurrence of fraud. Wilbanks et al. (2017) also find that independent directors with personal ties to the CEO are negatively associated to assess fraudulent financial reporting risk. Agrawal and Chadha (2005) and

Farber (2005) find that the probability of financial restatement is lower in companies whose audit committees have an independent director with financial expertise. However, these studies do not consider whether or how the internal attributes (e.g., gender) of independent directors play a role in monitoring corporate irregularities.

Compared to men, women on boards are able to perform their duties more diligently and more independently (Adams and Ferreira, 2009), and thus help improve the firm's accounting conservatism (Ho et al., 2015) and information disclosure (Khlif and Achek, 2017). Both Zalata et al. (2018) and Gull et al. (2018) find that the presence of female members on audit committees is significantly associated with less earnings management. Parker et al. (2017) also find that the percentage of females on audit committees is positively associated with the disclosure of material weaknesses in internal controls. Pucheta-Martínez et al. (2016) use the audit committee members of Spanish listed firms as samples and find that female independent directors and female chairpersons can lead to a higher quality of auditor opinion. However, Sun et al. (2011) find that the presence of female independent directors in the audit committee of U.S. public firms cannot significantly improve firms' earnings quality. Unfortunately, prior studies do not distinguish the differences between female chairpersons and female non-chairpersons on audit committees, which lead to equivocal conclusions of existing studies.

Considering a sample of such special independent directors serving as audit committee chairpersons in China, we investigate whether female audit committee chairpersons, who are generally considered as possessing both expertise and leadership when serving as female independent directors, can more effectively reduce the probability and degree of corporate financial irregularities than their male counterparts. Subsequently, we tap into the conditions required for female chairpersons to optimize their role in corporate governance through examining the two aspects: female chairpersons' tenure and the decision-making environment of audit committees.

2.2. Research hypothesis

2.2.1. Gender characteristics of independent directors and corporate financial irregularities

Psychological studies indicate that female directors differ from male directors in job attitude, risk aversion, and ethical norm (Ben-Amar et al., 2017; Peterson and Philpot, 2007). First, regarding job attitude, women on boards work more diligently and allocate more efforts to monitoring executives (Adams and Ferreira, 2009). Female audit committee chairpersons tend to assess the firm's internal audits and internal controls more diligently and rigorously, and improve the advisory and monitoring functions of audit committee, therefore reducing financial irregularities. Second, regarding risk aversion, studies have indicated that women tend to value personal reputation more and therefore demonstrate greater risk-aversion in financial decision-making (García Lara et al., 2017; Ho et al., 2015). In Chinese listed firms, the chairperson of an audit committee, as an independent director with accounting expertise, is mostly an auditor or a university scholar, who is not willing to risk his or her reputation for opportunistic behavior of the firm. This tendency is because if a firm commits financial irregularities, the risk of lawsuits will increase, and the chairperson will be at greater risk of reputation loss, given that he or she bears full responsibility for this risk (Fich and Shivdasani, 2007). To protect her own reputation, a female chairperson tends to rigorously improve the firm's internal audits and internal controls, thus reducing the risk of corporate financial irregularities. Third, regarding ethical norm, women maintain a higher level of independence, because they do not pursue personal gains, are more ethical and more likely to detest corporate fraud (Gao et al., 2017; Krishnan and Parsons, 2008). The audit committee is a professional committee that operates under the board of directors, responsible for overseeing executives' conducts and reducing the agency cost. Because female directors do not belong to the "old boys club," they are more likely to think independently and less tolerant of the executives' opportunistic behavior (Adams et al., 2010). Hence, female chairpersons are less likely to conspire with executives, but more likely to monitor executives' opportunistic behavior effectively, thus reducing the probability and degree of corporate financial irregularities. Based on the discussions above, we propose Hypothesis 1: **H1**. Compared with their male counterparts, female chairpersons in audit committees are more capable to reduce the probability and degree of financial irregularities in listed firms.

2.2.2. The influence of independent directors' tenure

The ability of independent directors to exercise their duties can be affected by their tenure. Huang and Hilary (2018) find that board tenure captures the tradeoff between knowledge accumulation and board independence, thereby affecting the ability of independent directors to exercise their duties. On the one hand, executives tend to deliberately withhold information to resist efforts by outside directors, who are new, to elicit increased transparency. As tenure increases, independent directors can acquire more company information from other board of directors and executives, thereby reducing the level of information asymmetry between independent directors and executives. The learning effect of independent directors is increased which may strengthen directors' ability to reduce financial irregularities. On the other hand, the increased familiarity between directors and management can undermine board independence (Fracassi and Tate, 2012; Hwang and Kim, 2009), which in turn reduces independent directors' ability to reduce financial irregularities.

The learning ability and independence level of female chairpersons in audit committees, who are independent directors with accounting expertise and leadership, is also likely affected by tenure. As their tenure increases, the situation may be different between female and male chairpersons. In terms of learning ability, female chairpersons are more diligent and responsible compared with male chairpersons. Adams and Ferreira (2009) find that female directors have better attendance records than male directors. Another study also shows that female directors are better at obtaining voluntary information which may reduce information asymmetry between female directors and management (Gul et al., 2011). By attending board meetings and audit committee meetings, and by

communicating with other directors and committee members, female chairpersons gradually learn more about the internal controls and financial status of Chinese listed firms than their male counterparts and decrease information asymmetry between female chairpersons and management. Therefore, as tenure increases, the learning ability of female chairpersons is higher than that of their male counterparts. In terms of independence level, [Patro et al. \(2018\)](#) find the independence of directors decreases as their average tenure increases, but it ignores the gender difference of independent directors. Existing studies find that female are less inclined to participate in corporate crimes ([Steffensmeier et al., 2013](#)), are more ethical and socially responsible ([Arlow, 1991](#)). [Gao et al. \(2017\)](#) also prove that female directors emphasize more personal reputation and are more likely to depart fraud firms than their male counterparts are. As the tenure increases, female chairpersons are less motivated to conspire with executives and their independence remains consistently high over the course of their tenure. Based on the above discussions, female chairpersons keep higher learning ability and independence level than male chairpersons as tenure increases. Therefore, hypothesis 2 is proposed below:

H2. As tenure increases, female chairpersons are more capable to reduce the probability and degree of corporate financial irregularities than their male counterparts.

2.2.3. The influence of organizational decision-making environment

Based on critical mass theory ([Kanter, 1977](#)), only when the minority (e.g., women) within an organization reaches a certain critical mass can it produce a tangible effect on organizational decision-making and performance. Previous literature has verified that to reap the value of women's contributions, a board with at least three female directors can increase firm performance, consistent with the critical mass theory ([Joecks et al., 2013](#); [Konrad and Kramer, 2006](#); [Liu et al., 2014](#)). Accordingly, the role of a female chairperson in corporate governance may be affected by the gender diversity of the audit committee.

The chairperson of the audit committee oversees the daily tasks of the committee such as assessing the firm's internal/external audits and internal controls and coordinating communication among executives, committee members, and external auditors. The openness and democracy of the organizational decision-making environment are increased as the composition of men and women becomes more balanced and it is good for women to exert advantages ([Eagly and Carli, 2003](#)). First, an audit committee with gender diversity promotes trust and cooperation among members and encourages information sharing within the group ([Gul et al., 2011](#)), which provides the female chairperson more firm information. Thus, information asymmetry between the chairperson and executives is reduced, and the "informational barrier" facilitating executives' financial irregularities is eliminated. Second, the prior research finds that an organization with high levels of gender heterogeneity may not be inhibited by social identity processes ([Richard et al., 2004](#)). Thus, the organization with gender diversity increases the right to speak and proactivity of female chairpersons, promotes an open and democratic organizational decision-making environment which enables the female chairperson to involve herself in the committee's tasks and fulfill her role in corporate governance. Finally, [Apesteguia et al. \(2012\)](#) find that, compared with single-gender teams, gender-diverse teams are more efficient in team decision-making and therefore show better team performance. Different views and opinions are more accepted in an open and democratic audit committee which empower the female chairperson to assess and improve the firm's internal audits and internal controls more effectively. Based on the above discussion, female chairpersons can exert advantages in an open and democratic organizational decision-making environment and thus can be more capable to reduce financial irregularities in Chinese listed firms. Hypothesis 3 is proposed below:

H3. Female chairpersons are more capable to reduce the probability and degree of corporate financial irregularities than their male counterparts when the organizational decision-making environment of audit committees is open and democratic.

3. Empirical research design

3.1. Sample selection and data source

We collect data starting from 2007 because Chinese listed firms began adopting new accounting standards in 2007. It allows us to ignore changes in financial variables caused by changes in the accounting standards. The paper uses data of Chinese firms listed in the A-list market from 2007 to 2016. During this time period, there is no major event that may influence the frequency of financial irregularities. The financial and corporate governance data are from the China Stock Market & Accounting Research (CSMAR) database. The data of audit committee chairpersons also comes from the CSMAR databases. For missing information on the chairperson, we manually gather information from listed firms' annual reports and audit committee reports. The final sample consists of 12,559 firm-year data. To reduce the effect of extreme value, we winsorize all continuous variables at the upper and lower one percent.

Specifically, the data of financial irregularities are manually gathered from the Enforcement Actions Research of CSMAR database. Focusing on the responsibility scope of chairpersons, we define that there is financial irregularity in an annual data if the firm or its executive is penalized that year for any one of these categories—reporting of fictitious profits, reporting of fictitious assets, unlawful changes to the purpose of use of the funds, embezzlement of corporate assets, and inappropriate accounting treatment. Accordingly, the degree of financial irregularities is determined by the category of penalty imposed. We retrace the year in which irregularities are actually committed by examining firms' historical announcements about the firm's irregularities to mitigate the problem by partial observation.

3.2. Variables and methodology

3.2.1. Dependent variables and methodology

This paper uses *VIO* and *DEGREE* to denote the probability and degree of financial irregularities by listed firms. First, *VIO* represents whether the listed firm commits financial irregularities. If a firm or its executive is penalized by the CSRC or stock exchange for irregularities of any category (reporting of fictitious profits, reporting of fictitious assets, unlawful changes to the purpose of use of the funds, embezzlement of corporate assets, and inappropriate accounting treatment), *VIO* is 1; otherwise, it is 0. Second, *DEGREE* represents the penalty severity of financial irregularities. The degree of financial irregularities is divided into four levels: none (0)—no penalty is imposed on the firm by the authority; low (1)—only executives, not the firm, are subject to penalty, or the firm is subject to “other” type of penalty; medium (2)—the type of penalty on the firm is “criticism or reprimand”; and high (3)—the type of penalty on the firm is “disciplinary warning,” “fine,” or “confiscation of illegal gains.” When a firm receives multiple penalties at the same time or within one year, *DEGREE* is determined by the severest penalty.

To reduce endogenous problems, dependent variables, *VIO* (financial irregularity) and *DEGREE* (degree of financial irregularities), are based on data for the subsequent period, Year $t + 1$, whereas other variables are based on data for the current period, Year t . Therefore, Model (1) is constructed as follows.

$$VIO_{i,t+1}(DEGREE_{i,t+1}) = \alpha_0 + \alpha_1 GENDER_{i,t} + \sum \beta CONTROL_{i,t} + \varepsilon_{i,t} \quad (1)$$

The dependent variable *VIO* (*DEGREE*) is a binary variable (ordinal variable), and we also consider the influence of firm- and year-fixed effects on the regression results. Thus, we use panel logit model (panel ordered logit model) when *VIO* (*DEGREE*) is the dependent variable in Model (1). According to the hypotheses, α_1 should be negative which indicates female chairpersons of audit committees can reduce the probability and degree of financial irregularities. Other variables are defined below.

3.2.2. Other variables

(1) Gender characteristic of audit committee chairpersons

GENDER denotes whether the chairperson is a woman. If so, *GENDER* is 1; otherwise, it is 0.

(1) Tenure characteristic of audit committee chairpersons

This paper uses *TENURE*, a continuous variable, and *INITIAL*, a dummy variable, in the independent variables to measure the influence of tenure on women's role in corporate governance. *TENURE* denotes the years of employment of the audit committee chairperson. *INITIAL* represents whether it is within the chairperson's first year of tenure. If it is the chairperson's first year of tenure, *INITIAL* is 1; otherwise, it is 0.

(1) Organizational decision-making environment

OPEN denotes whether an organizational decision-making environment is open and democratic. First, according to previous studies (Blau, 1977; Joecks et al., 2013), we use the Blau index to calculate the degree of gender diversity in an audit committee. The equation is written in the form $Blau = 1 - \Sigma p^2$ (in which p represents the proportion of people in a group after grouping by gender). Its range is [0, 0.5]. A higher value indicates a closer divide between men and women (thus higher gender diversity) in the audit committee. If gender diversity in the audit committee is higher than the mean value of the sample, the organizational decision-making environment is considered open and democratic, and *OPEN* is 1; otherwise, it is 0. To further test the robustness of our results about the organizational decision-making environment, we not only group our data on whether gender diversity in the audit committee is higher than the mean value of the entire sample, but also group our data on whether gender diversity in the audit committee is higher than the median value of the entire sample.

(1) Control variables

Similar to previous studies (Chen, 2016; Johnson et al., 2009; Khanha et al., 2015), this paper controls for corporate operation, corporate governance, and risk of lawsuits to hold financial irregularities constant. These control variables are: corporate size (*SIZE*), business revenue growth (*GROWTH*), return on asset (*ROA*), percentage of shares held by the largest shareholders (*TOP1*), natural logarithm of board size (*BOARD*), percentage of independent directors (*IDSIZE*), nature of the firm's actual controllers (*STATE*), stock return volatility (*VOL*), turnover of the stock share (*EXCH_LIQ*), and analyst following (*ANALYST*). More details about the variables used in this paper can be found in [Appendix A](#).

Table 1
Descriptive statistics.

Variables	N	Mean	SD	Min	Median	Max
<i>VIO</i>	12,559.000	0.048	0.214	0.000	0.000	1.000
<i>DEGREE</i>	12,515.000	0.052	0.252	0.000	0.000	3.000
<i>GENDER</i>	12,559.000	0.235	0.424	0.000	0.000	1.000
<i>TENURE</i>	12,559.000	1.436	0.974	0.000	1.333	4.083
<i>OPEN</i>	12,559.000	0.581	0.493	0.000	1.000	1.000
<i>SIZE</i>	12,559.000	21.890	1.316	18.980	21.730	26.590
<i>GROWTH</i>	12,559.000	0.300	0.859	-0.333	0.140	7.322
<i>ROA</i>	12,559.000	0.032	0.061	-0.235	0.030	0.209
<i>TOP1</i>	12,559.000	35.230	15.280	8.330	33.220	74.980
<i>BOARD</i>	12,559.000	0.770	0.097	0.476	0.787	0.996
<i>IDSIZE</i>	12,559.000	0.370	0.052	0.308	0.333	0.571
<i>STATE</i>	12,559.000	0.512	0.500	0.000	1.000	1.000
<i>VOL</i>	12,559.000	0.032	0.011	0.016	0.029	0.062
<i>EXCH_LIQ</i>	12,559.000	581.900	393.300	61.230	483.900	2278.000
<i>ANALYST</i>	12,559.000	6.941	9.098	0.000	3.000	40.000

Table 1 reports descriptive statistics. *VIO* is 1 if a firm commits financial irregularities in the year concerned, else 0. *DEGREE* is a categorical variable of financial irregularity severity; in order of penalty severity from none to the highest, the value of 0, 1, 2, and 3 are assigned, respectively. *GENDER* is 1 if the chairperson is a woman, else 0. *TENURE* is computed as months of tenure as of the current period divided by 12. *OPEN* is 1 if the organizational decision-making environment is open and democratic, else 0. *SIZE* is the natural logarithm of the firm's total asset. *GROWTH* is the average annual growth of the firm's business revenue in the last 3 years. *ROA* is the ratio of a firm's net profit over total assets. *TOP1* is the percentage of shares held by the largest shareholder. *BOARD* is the natural logarithm of the number of board members. *IDSIZE* is calculated by the number of independent directors as a percentage of the total number of board members. *STATE* is 1 if the firm's actual controller is state-owned, else 0. *VOL* is the volatility of daily stock return for the year. *EXCH_LIQ* is the percentage of outstanding share turnover for the year. *ANALYST* is the number of follow-up analysis on the firm performed by the analyst (team) in one year. [Appendix A](#) provides more details for data. The number of samples for variable *DEGREE* was less than the total number of samples ($N = 12,559$) because the information about penalty was missing. All continuous variables are winsorized at the 1% and 99% level.

4. Empirical analysis and robustness test

4.1. Descriptive statistics and univariate analysis

Table 1 presents the descriptive statistics of the main variables. The mean value of *VIO* is 0.048, suggesting that 4.8% of listed firms commit financial irregularities. The standard deviation value of *DEGREE* is 0.252, showing that the degree of financial irregularities differs considerably among firms. The mean value of *GENDER* is 0.235, indicating that only 23.5% of listed firms appoint women as the chairpersons of audit committees. *TENURE* averaged at 1.436 ($SD = 0.974$) and this result indicates high turnover and short average tenure of audit committee chairpersons, which might reduce corporate governance effect of female audit committee chairpersons. Regarding organizational decision-making environment, the mean value of *OPEN* is 0.581; this result indicates that 58.1% of audit committees exhibit high gender diversity, the composition of men and women is relatively equal, and the organizational environment is open and democratic. These phenomena may affect female audit committee chairpersons when they participate in committee tasks.

Next, we classify all the samples on *GENDER* into an experimental group ($GENDER = 1$) and control group ($GENDER = 0$), and perform t-test and median test on the probability (*VIO*) and the degree (*DEGREE*) of financial irregularities. The results are displayed in **Table 2**. Both the probability and degree of financial irregularities by firms in the experimental group are significantly lower than those of firms in the control group, suggesting that firms with female audit committee chairpersons are less likely to commit financial irregularities. The result preliminarily confirms our hypothesis. We use the Pearson correlation coefficient test to analyze the correlation among the variables and the result can be found in [Appendix B](#). The correlation coefficients of financial irregularities and female chairpersons are significantly negative. This result provides evidence that female chairpersons may reduce financial irregularities. The coefficients of other variables are less than 0.5 which means there is no multicollinearity.

Table 2
Univariate analysis.

Variables	Audit committees with female chairpersons (experimental group)		Audit committees with male chairpersons (control group)		Difference between financial violation	
	Mean	Median	Mean	Median	T-test	Median-test
<i>VIO</i>	0.046	0.000	0.054	0.000	0.008*	0.000*
<i>DEGREE</i>	0.046	0.000	0.058	0.000	0.012**	0.000**

The values in mean and median columns are the difference between the values of the experimental group and the control group. *, ** and *** denote significance levels at 10%, 5%, and 1%, respectively.

Table 3
Results of the effect of female chairpersons on financial irregularities.

	(1) <i>VIO</i>	(2) <i>DEGREE</i>
<i>GENDER</i>	-0.317** (-1.981)	-0.373** (-2.253)
<i>SIZE</i>	-0.246*** (-5.385)	-0.299*** (-4.138)
<i>GROWTH</i>	0.246*** (4.711)	0.266*** (5.139)
<i>ROA</i>	-2.271** (-2.498)	-2.193** (-2.358)
<i>TOP1</i>	0.004 (0.749)	0.004 (0.777)
<i>BOARD</i>	1.737** (2.104)	1.219 (1.311)
<i>IDSIZ</i>	-1.067 (-0.806)	-1.300 (-0.856)
<i>STATE</i>	-0.096 (-0.577)	-0.055 (-0.313)
<i>VOL</i>	-12.623** (-2.089)	-12.895** (-2.070)
<i>EXCH_LIQ</i>	0.000 (1.141)	0.000 (1.075)
<i>ANALYST</i>	-0.044*** (-4.239)	-0.039*** (-3.665)
<i>Year-fixed</i>	Control	Control
<i>Firm-fixed</i>	Control	Control
<i>Log likelihood</i>	-2031.865	-2187.328
<i>Wald Chi²</i>	765.092	83.627
<i>N</i>	12,559	12,515

Table 3 shows results of measures of *VIO* (*DEGREE*) in the subsequent year $t + 1$, on *GENDER* and control variables in the current year t , regressing by panel logit model (panel ordered logit model). The number of samples used in Column (2) is less than that in Column (1) because the information about the penalty was missing. The sample period is 2007 to 2016. All continuous variables are winsorized at the 1% and 99% level. Z-values are reported in parentheses. *, ** and *** denote significance levels at 10%, 5%, and 1%, respectively.

4.2. Regression of audit committee chairperson's gender on financial irregularities

Table 3 shows the regression results of audit committee chairperson's gender on corporate financial irregularities, after we have controlled corporate management, corporate governance, risk of lawsuits, and firm- and year-fixed effects. The coefficients of *GENDER* are significantly negative, indicating that compared with male chairpersons, female chairpersons can more significantly reduce both the probability and the degree of financial irregularities. This finding provides support for Hypothesis 1. Firms with larger corporate size, return on asset, stock return volatility and analyst following would attract more attention from relative supervisory departments which increase the detection risk of financial irregularities, and thus there is lower probability and the degree of financial irregularities among these listed firms. Firms with higher growth are more inclined to engage in financial irregularity activities. Increasing the board of directors does not play a significant impact on financial irregularities. The conclusion is in accordance with prior research and our theoretical expectation.

Our results show that female independent directors with financial expertise and leadership can reduce corporate financial irregularities more effectively than their male counterparts do. Such results depend on two conditions. The first condition is that female independent directors must have expertise that complements their gender characteristics (i.e., diligence, risk aversion, and high ethicality). The second condition is that female independent directors must have a leadership responsibility. Chairing the audit committee precisely grants the female independent director a sense of leadership responsibility. Therefore, female chairpersons can fully utilize their leadership style (i.e., supportive and cooperative and power-sharing capability) to encourage internal information disclosure and decision-making within the organization. Combining these two allows female independent directors to improve corporate internal control and auditing progress more effectively, thereby lowering the probability and degree of corporate financial irregularities. The role of the committee chairperson reduces the possibility of female independent directors being fully capable of performing their duty but they fail to do so or being obligated to perform their duty but they are incapable of doing so. This subsequently helps eliminate the prejudicial image of female directors—who are likely to be described as “flower vase” in Chinese (meaning their inability to properly perform duty)—and the “free-riding” behavior of independent directors mentioned in previous literature, hence providing the necessary condition for female independent directors to fulfill their functions in corporate governance.

Table 4
Results of Heckman model.

	(1) <i>GENDER</i>	(2) <i>VIO</i>	(3) <i>DEGREE</i>
<i>INGENDER</i>	3.161*** (34.603)		
<i>MB</i>	0.015 (0.772)		
<i>LOSS</i>	-0.049 (-1.048)		
<i>AUDITSIZE</i>	-0.074*** (-7.103)		
<i>SIZE</i>	-0.018 (-1.232)	-0.142*** (-5.009)	-0.146*** (-3.321)
<i>BOARD</i>	-1.607*** (-9.101)	1.300** (2.555)	0.810 (1.421)
<i>IDSIZE</i>	-1.825*** (-5.968)	-0.071 (-0.082)	-0.424 (-0.421)
<i>GENDER</i>		-0.299** (-2.363)	-0.352*** (-2.672)
<i>GROWTH</i>		0.166*** (4.958)	0.178*** (5.312)
<i>ROA</i>		-3.132*** (-4.717)	-2.907*** (-4.192)
<i>TOPI</i>		-0.002 (-0.591)	-0.001 (-0.316)
<i>STATE</i> ²		-0.107 (-1.176)	-0.090 (-0.942)
<i>VOL</i>		-14.383*** (-2.804)	-15.940*** (-2.953)
<i>EXCH_LIQ</i>		0.000* (1.680)	0.000* (1.899)
<i>ANALYST</i>		-0.039*** (-5.228)	-0.033*** (-4.238)
<i>IMR</i>		-0.071* (-1.768)	-0.079* (-1.921)
<i>Year-fixed</i>		Control	Control
<i>Firm-fixed</i>		Control	Control
<i>Log likelihood</i>	-5441.816	-2254.149	-2373.268
<i>Wald Chi²</i>	8057.896	4632.235	137.568
<i>N</i>	12,175	12,175	12,133

Table 4 shows the results of robustness checks. Columns (1) to (3) lists the results using Heckman two-stage method by logit regression. Column (1) shows the result regressing in Model (2) using *GENDER* as the dependent variable. Column (2) and Column (3) show the results regressing in Model (1) which uses *VIO* and *DEGREE* as the dependent variable and also includes *IMR* into regression to control for self-selection bias. All columns measure of the dependent variable in the subsequent year $t + 1$, on *GENDER* and control variables in the current year t , regressing by panel logit model (panel ordered logit model). The number of samples used in Column (2) and Column (3) was less than the total number of samples ($N = 12,297$) because the added variables in Model (2) had missing values. All continuous variables are winsorized at the 1% and 99% level. Z-values are reported in parentheses. *, ** and *** denote significance levels at 10%, 5%, and 1%, respectively.

4.3. Robustness checks

Following the practice of previous studies (Srinidhi et al., 2011; Sun et al., 2011), we use the Heckman selection model to control for self-selection bias of a female audit committee chairperson. This model is divided into two stages. In the first stage, we run a probit model as Model (2) using *GENDER* (i.e., whether a firm appoints a female chairperson) as the dependent variable, and possible variables influencing this decision as the independent variables which are input into Model (2) for probit regression. In this stage, we compute the Inverse Mills Ratio (*IMR*). In the second stage, we put *IMR* into Model (1) for regression, to control for the endogenous problem that might be caused by self-selection bias. Our Model (2) is as follows.

$$GENDER_{i,t} = \eta_0 + \eta_1 INGENDER_{i,t} + \eta_2 MB_{i,t} + \eta_3 LOSS_{i,t} + \eta_4 AUDITSIZE_{i,t} + \eta_5 SIZE_{i,t} + \eta_6 BOARD_{i,t} + \eta_7 IDSIZ_{i,t} + \sigma_{i,t} \quad (2)$$

Similar to Model (1), the dependent variable, *GENDER* is the dummy variable whether the chairperson of the audit committee is a woman. More details of the variables in Model (2) are in Appendix A.

Table 4 shows the two-stage Heckman regression result. The first-stage regression results are provided in the first column of Table 4, which shows that the coefficients of *INGENDER*, *AUDITSIZE*, *BOARD*, and *IDSIZ* are all significant. The log likelihood of the model is -5441.816, and the Wald chi-squared is 8057.896. These results indicate that the independent variables are significantly

Table 5
Results considering the influence of tenure.

	(1) INITIAL = 0 VIO	(2) INITIAL = 1 VIO	(3) INITIAL = 0 DEGREE	(4) INITIAL = 1 DEGREE	(5) Longer tenure VIO	(6) Shorter tenure VIO	(7) Longer tenure DEGREE	(8) Shorter tenure DEGREE
<i>GENDER</i>	-0.405** (-2.088)	-0.166 (-0.828)	-0.465** (-2.334)	-0.133 (-0.662)	-0.489** (-2.082)	-0.181 (-0.942)	-0.498** (-2.096)	-0.262 (-1.314)
<i>SIZE</i>	-0.196*** (-3.651)	-0.267*** (-4.642)	-0.218*** (-2.687)	-0.296*** (-3.304)	-0.109* (-1.732)	-0.290*** (-5.218)	-0.136 (-1.436)	-0.332*** (-3.733)
<i>GROWTH</i>	0.230*** (3.612)	0.229*** (3.217)	0.249*** (3.998)	0.252*** (3.652)	0.215*** (2.680)	0.286*** (4.397)	0.225*** (2.877)	0.312*** (4.831)
<i>ROA</i>	-4.948*** (-4.321)	-0.841 (-0.636)	-4.708*** (-4.054)	-0.792 (-0.595)	-5.950*** (-4.172)	-1.247 (-1.054)	-5.914*** (-4.129)	-1.026 (-0.844)
<i>TOP1</i>	-0.003 (-0.523)	0.005 (0.736)	-0.005 (-0.745)	0.006 (0.994)	-0.007 (-1.050)	0.007 (1.062)	-0.007 (-1.003)	0.007 (0.999)
<i>BOARD</i>	1.215 (1.278)	2.299** (2.232)	0.565 (0.535)	1.966* (1.777)	-0.187 (-0.169)	2.663*** (2.645)	-1.121 (-0.927)	2.319** (2.068)
<i>IDSIZE</i>	-0.753 (-0.485)	0.980 (0.576)	-1.057 (-0.593)	0.572 (0.301)	-1.890 (-1.011)	-0.432 (-0.264)	-2.880 (-1.348)	-0.032 (-0.017)
<i>STATE</i>	-0.145 (-0.811)	-0.104 (-0.541)	-0.121 (-0.650)	-0.069 (-0.351)	-0.015 (-0.071)	-0.153 (-0.775)	-0.015 (-0.065)	-0.122 (-0.591)
<i>VOL</i>	-13.339* (-1.658)	-19.447** (-2.192)	-13.236 (-1.612)	-20.891** (-2.270)	-31.943*** (-2.932)	-9.519 (-1.261)	-32.522*** (-2.924)	-9.965 (-1.280)
<i>EXCH_LIQ</i>	0.000 (0.253)	0.000* (1.874)	0.000 (0.335)	0.000* (1.839)	0.000* (1.878)	0.000 (0.276)	0.001** (2.053)	0.000 (0.248)
<i>ANALYST</i>	-0.039*** (-3.228)	-0.044*** (-3.048)	-0.033*** (-2.642)	-0.037** (-2.537)	-0.032** (-2.280)	-0.052*** (-3.883)	-0.025* (-1.713)	-0.047*** (-3.405)
<i>Year-fixed</i>	Control	Control	Control	Control	Control	Control	Control	Control
<i>Firm-fixed</i>	Control	Control	Control	Control	Control	Control	Control	Control
<i>Log likelihood</i>	-1295.388	-898.262	-1384.742	-955.937	-864.854	-1260.841	-906.460	-1365.821
<i>Wald Chi²</i>	577.793	343.665	69.508	45.053	355.879	439.554	56.328	61.172
<i>N</i>	7848	4711	7825	4690	5425	7134	5410	7105

Table 5 shows results considering the influence of tenure. Columns (1) to (4) list the results regressing in Model (1) by dividing the full sample into subsamples according to whether it is within the first year of the chairperson's tenure. Column (1) and Column (3) use the subsample if it is not the first year of the chairperson' tenure. Column (2) and Column (4) use the subsample if it is the first year of the chairperson' tenure. Column (5) to Column (8) list the results regressing in Model (1) by dividing the full sample into subsamples according to whether the tenure is higher than the full sample's mean. Column (5) and Column (7) use the subsample if the chairperson's employment period is longer than the average tenure of the full sample. Column (6) and Column (8) use the subsample if the chairperson's employment period is shorter than the average tenure of the full sample. All continuous variables are winsorized at the 1% and 99% level. Z-values are reported in parentheses. *, ** and *** denote significance levels at 10%, 5%, and 1%, respectively.

associated with whether a firm hires a female audit committee chairperson (*GENDER*), and that the model fit is favorable. The second-stage regression results are provided in the second and third columns of Table 4. The *GENDER* is significantly negative with *VIO* and *DEGREE*, indicating that after controlling endogenous problem of chairperson gender selection, female chairpersons can still reduce both the probability and the degree of financial irregularities more significantly than their male counterparts. This result indicates that female independent directors with financial expertise and leadership can reduce financial irregularities more effectively.

4.4. The influence of tenure

Considering the influence of tenure, we group the sample according to whether it is within the first year of tenure and whether the employment period is higher than the mean value of the full sample, and perform regressions on the grouped data.

The results are shown in Columns (1) - (4) of Table 5. The second and fourth columns of Table 5 are the regression results of subsamples within an audit committee chairperson's first year of tenure. The coefficients of *GENDER* are not significant, indicating that within the first year of tenure, female and male chairpersons did not differ significantly in reducing the probability or degree of corporate financial irregularities. In the first year of tenure, female chairpersons are not fully informed of the corporate' information, which results in information asymmetry, they may be unfamiliar with the daily tasks of the audit committee, and therefore their gender characteristics cannot play an effective part in corporate governance. The first and third columns of Table 5 are the regression results of subsamples with audit committee chairpersons employed more than one year. The coefficients of *GENDER* are both significantly negative. This result shows that as their tenure increases, female chairpersons perform their duties with greater diligence and become more communicative with board and audit committee members than their male counterparts. Thus, information asymmetry is reduced considerably, and their learning ability strengthens over time. In addition, female chairpersons are less motivated to conspire with executives, and hence their independence is maintained at a higher level than their male counterparts'. Above all, at the start of tenure, there is no significant difference in reducing financial irregularities between female and male chairpersons on audit committees; but as their tenure increases, female chairpersons are more capable to reduce the probability and

Table 6
Results considering the influence of organizational decision-making environment.

	(1) Open VIO	(2) Not open VIO	(3) Open DEGREE	(4) Not open DEGREE	(5) Open VIO	(6) Not open VIO	(7) Open DEGREE	(8) Not open DEGREE
<i>GENDER</i>	-0.457** (-2.518)	-0.209 (-0.375)	-0.518*** (-2.752)	-0.158 (-0.283)	-0.454** (-2.407)	0.027 (0.081)	-0.539*** (-2.738)	0.123 (0.365)
<i>SIZE</i>	-0.311*** (-5.312)	-0.138** (-2.109)	-0.285*** (-3.107)	-0.261** (-2.478)	-0.295*** (-4.822)	-0.168*** (-2.795)	-0.273*** (-2.834)	-0.269*** (-2.820)
<i>GROWTH</i>	0.114 (1.513)	0.398*** (5.035)	0.135* (1.774)	0.430*** (5.522)	0.037 (0.425)	0.401*** (5.451)	0.040 (0.447)	0.430*** (5.976)
<i>ROA</i>	-1.666 (-1.383)	-4.486*** (-3.200)	-1.215 (-0.957)	-4.609*** (-3.298)	-1.930 (-1.539)	-3.553*** (-2.695)	-1.159 (-0.876)	-3.959*** (-3.009)
<i>TOP1</i>	0.002 (0.272)	0.003 (0.406)	0.003 (0.413)	0.004 (0.455)	0.005 (0.707)	-0.001 (-0.159)	0.006 (0.836)	-0.001 (-0.191)
<i>BOARD</i>	2.255** (2.144)	1.013 (0.854)	2.139* (1.805)	-0.038 (-0.029)	2.076* (1.892)	1.146 (1.046)	1.818 (1.474)	0.249 (0.205)
<i>IDSIZE</i>	1.799 (1.094)	-4.056** (-1.969)	1.645 (0.870)	-4.489* (-1.899)	1.575 (0.912)	-2.932 (-1.577)	1.198 (0.603)	-3.214 (-1.515)
<i>STATE</i>	-0.019 (-0.095)	-0.255 (-1.105)	-0.053 (-0.251)	-0.133 (-0.550)	-0.055 (-0.266)	-0.231 (-1.079)	-0.126 (-0.573)	-0.115 (-0.517)
<i>VOL</i>	-7.296 (-0.923)	-24.016** (-2.387)	-8.056 (-0.983)	-22.824** (-2.223)	-10.320 (-1.215)	-17.513* (-1.936)	-9.551 (-1.096)	-19.092** (-2.039)
<i>EXCH_LIQ</i>	0.000 (1.213)	0.000 (0.428)	0.000 (1.463)	-0.000 (-0.058)	0.000 (1.036)	0.000 (0.843)	0.000 (1.209)	0.000 (0.460)
<i>ANALYST</i>	-0.041*** (-3.044)	-0.056*** (-3.653)	-0.040*** (-2.868)	-0.043*** (-2.719)	-0.048*** (-3.287)	-0.045*** (-3.322)	-0.048*** (-3.187)	-0.034** (-2.431)
<i>Year-fixed</i>	Control	Control	Control	Control	Control	Control	Control	Control
<i>Firm-fixed</i>	Control	Control	Control	Control	Control	Control	Control	Control
<i>Log likelihood</i>	-1210.149	-891.234	-1297.736	-946.548	-1072.281	-1044.810	-1156.658	-1107.152
<i>Wald Chi²</i>	428.472	338.893	40.977	67.532	386.988	397.356	37.702	70.222
<i>N</i>	7303	5256	7279	5236	6504	6055	6484	6031

Table 6 shows results considering the influence of organizational decision-making environment. Columns (1) to (4) list the results regressing in Model (1) by dividing the full sample into subsamples according to whether the gender diversity of an audit committee is higher than the sample mean value. Column (1) and Column (3) use the subsample if gender diversity of an audit committee is higher than the mean value of the full sample which indicates organizational decision-making environment of the audit committee is open. Column (2) and Column (4) use the subsample if gender diversity of an audit committee is lower than the mean value of the full sample which indicates organizational decision-making environment of the audit committee is not open. Column (5) to Column (8) list the results regressing in Model (1) by subsample according to whether the tenure is higher than the sample median value. Column (5) and Column (7) use the subsample if gender diversity of an audit committee is higher than the median value of the full sample which indicates organizational decision-making environment of the audit committee is open. Column (6) and Column (8) use the subsample if gender diversity of an audit committee is lower than the median value of the full sample which indicates organizational decision-making environment of the audit committee is not open. All continuous variables are winsorized at the 1% and 99% level. Z-values are reported in parentheses. *, ** and *** denote significance levels at 10%, 5%, and 1%, respectively.

degree of corporate financial irregularities than their male counterparts. The conclusion verifies Hypothesis 2.

Second, this paper also performs grouped regression according to whether the chairperson's employment period is longer than the mean of the full sample. The results are shown in Columns (5) – (8) of Table 5. The fifth and seventh columns of Table 5 are regression results of subsamples in which audit committee chairpersons' employment period is higher than the mean of the full sample. The coefficients of *GENDER* are both significantly negative, indicating that as their tenure increases, female chairpersons are more capable to reduce the probability and degree of financial irregularities than their male counterparts. The sixth and eighth columns of Table 5 are the regression results of subsamples in which audit committee chairpersons' tenure is lower than the full sample mean. The coefficients of *GENDER* are not significant, indicating that shorter tenure limits the female chairpersons' ability to fulfill their role in corporate governance. In summary, the results support Hypothesis 2 again.

4.5. The influence of organizational decision-making environment

We measure the openness of organizational decision-making environment by whether the gender diversity of an audit committee is higher than the mean value of the full sample, and subsequently perform grouping regression to test the influence of organizational decision-making environment. The results are shown in Columns (1) – (4) of Table 6.

The first and third columns of Table 6 are the regression results of the subsample with an open and democratic organizational decision-making environment. The coefficients of *GENDER* are significantly negative, indicating that an open and democratic environment significantly helps female chairpersons reduce the probability and degree of financial irregularities. The second and fourth columns of Table 6 are the regression results of the subsample with an organizational decision-making environment that is not open or democratic. The coefficients of *GENDER* are not significant. These results show that in an open and democratic organizational decision-making environment, the audit committee embraces gender equality, is more likely to accept different views and opinions,

and encourages members to communicate and interact more frequently. In such an environment, female chairpersons are more capable to fulfill their responsibilities and reduce the probability and degree of financial irregularities than male chairpersons. Therefore, the conclusion supports Hypothesis 3.

Furthermore, we measure the openness of organizational decision-making environment by whether the gender diversity of an audit committee is higher than the sample median value, and subsequently perform grouping regression. The results provided in Columns (5) – (8) of Table 6 are consistent with Columns (1) – (4), which further support Hypothesis 3.

5. Further analysis: the mediation effect of financial irregularities

As the person in charge of the firm's internal audits, the chairperson of an audit committee might further reduce internal control weaknesses and improve external auditor opinion by reducing corporate financial irregularities. We measure financial report quality of Chinese listed firms from two dimensions: internal control quality and external auditor opinion and data information of listed firms are collected from CSMAR database. Using financial irregularity as the mediator, we examine the influence of female chairpersons on internal control quality (*DEFICIENCY*) and external auditor opinion (*OPINION*). *DEFICIENCY* is the dummy variable of internal control weaknesses. If there is internal control weakness including design and operating deficiency disclosed in the firm's internal control evaluation report, *DEFICIENCY* is 1; otherwise, it is 0. *OPINION* is the dummy variable of the external audit opinion. There are five types of audit opinion on the firm's financial report: "standard unqualified opinion," "unqualified opinion with additional explanatory paragraph," "qualified opinion," "adverse opinion," and "disclaimer of opinion." If the auditor issues a "standard unqualified opinion" on the firm's financial report, it indicates that the financial report is in high quality, so *OPINION* is 1; otherwise, it is 0. To mitigate endogenous problems, similar to Model (1), we use *DEFICIENCY* and *OPINION* measured in the subsequent year, $t + 1$, as the dependent variable and other variables measured in the current year, t , as independent variables and control variables. Consistent with the practice of existing research (Judd and Kenny, 1981), the mediation models are constructed as follows. A detailed list of the definitions of all the variables in these models is shown in Appendix A.

$$DEFICIENCY_{i,t+1}(OPINION_{i,t+1}) = \theta_0 + \theta_1 GENDER_{i,t} + \sum \lambda CONTROL_{i,t} + \omega_{i,t} \quad (3)$$

$$VIO_{i,t+1} = \alpha_0 + \alpha_1 GENDER_{i,t} + \sum \beta CONTROL_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$DEFICIENCY_{i,t+1}(OPINION_{i,t+1}) = \delta_0 + \delta_1 VIO_{i,t} + \delta_2 GENDER_{i,t} + \sum \varphi CONTROL_{i,t} + \pi_{i,t} \quad (4)$$

In order to test whether the mediation effect of financial irregularity exists, we perform stepwise regressions according to the practice of some researchers (Baron and Kenny, 1986). First, we study Model (3): we expect that θ_1 should be significantly negative (positive) if female chairpersons can reduce internal control weaknesses (improve external audit opinion). Second, we study Model (1): we expect that α_1 should be significantly negative if female chairpersons can reduce financial irregularities. Third, we study Model (4): we expect that δ_1 should be significantly positive (negative) if financial irregularities can increase internal control weaknesses (impair external audit opinion). Only three of the above conditions meet our expectations, so the mediation effect of financial irregularities does exist. Moreover, if δ_2 is significantly negative, then financial irregularities play a role of partial mediation effect³; if δ_2 is not significant, then financial irregularities play a role of perfect mediation effect.⁴ Fig. 1 illustrates the steps of the mediation effect test.

Table 7 presents the results of the first and third steps of the mediation effect test.⁵ First, the first and second columns show regression results using *DEFICIENCY* as the dependent variable. The first column is for Model (3): *GENDER* is significantly negatively associated with *DEFICIENCY*, indicating that female chairpersons can reduce internal control weaknesses; the second column is for Model (4), *GENDER* is still significantly negatively associated with *DEFICIENCY*, but *VIO* is significantly positively associated with *DEFICIENCY*, suggesting that female chairpersons not only directly decrease internal control weakness, but also raise internal control quality through reducing the firm's financial irregularities. Second, the third and fourth columns show regression results using *OPINION* as the dependent variable. The third column shows for Model (3): *GENDER* is significantly positively associated with *OPINION*, indicating that female chairpersons can significantly improve external audit opinion. The fourth column shows for Model (4): *GENDER* is still significantly positively associated with *OPINION*, but *VIO* is significantly negatively associated with *OPINION*, suggesting that female chairpersons not only improve audit opinion directly, but also improve external auditor opinion through reducing the firm's financial irregularities. To sum up, financial irregularity exhibits a partial mediation effect on the relationship between female chairpersons and financial report quality. Therefore, the results in Table 7 provide us with the mechanism of how female chairpersons improve financial report quality.

³ "Partial mediation effect" in this paper means that female chairpersons improve financial report quality not only indirectly by reducing financial irregularities, but also directly improve financial report quality.

⁴ "Perfect mediation effect" in this paper means that female chairpersons improve financial report quality completely by reducing financial irregularities.

⁵ Because Table 3 has verified the second step, Table 7 only lists the remaining results of the mediation effect test.

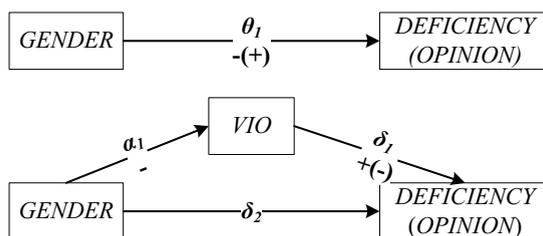


Fig. 1. The steps of mediation effect test.

Table 7

Results considering mediation effect of financial irregularities.

	(1) <i>DEFICIENCY</i>	(2) <i>DEFICIENCY</i>	(3) <i>OPINION</i>	(4) <i>OPINION</i>
<i>VIO</i>		0.390*** (3.556)		-0.919*** (-6.703)
<i>GENDER</i>	-0.122** (-2.257)	-0.119** (-2.194)	0.222** (2.036)	0.219** (1.999)
<i>GROWTH</i>	0.094*** (3.508)	0.089*** (3.329)	-0.224*** (-6.286)	-0.214*** (-6.030)
<i>ROA</i>	-2.673*** (-6.115)	-2.591*** (-5.916)	11.574*** (20.066)	11.418*** (19.646)
<i>TOP1</i>	-0.003** (-2.020)	-0.003** (-1.993)	0.033*** (9.208)	0.033*** (9.146)
<i>IDSIZE</i>	-0.994*** (-2.609)	-1.003*** (-2.629)	2.773*** (3.823)	2.873*** (3.940)
<i>STATE</i>	0.806*** (16.588)	0.811*** (16.668)	0.137 (1.474)	0.115 (1.229)
<i>VOL</i>	-33.676*** (-8.180)	-34.143*** (-8.288)	-8.686 (-1.324)	-7.296 (-1.108)
<i>EXCH_LIQ</i>	-0.000 (-0.261)	-0.000 (-0.250)	0.001*** (4.974)	0.001*** (5.031)
<i>ANALYST</i>	-0.002 (-0.844)	-0.002 (-0.660)	0.146*** (10.013)	0.143*** (9.837)
<i>Year-fixed</i>	Control	Control	Control	Control
<i>Log likelihood</i>	-5699.549	-5693.402	-1963.633	-1943.838
<i>Wald Chi²</i>	2022.283	2028.205	3673.588	3630.473
<i>N</i>	10,479	10,479	12,559	12,559

Table 7 shows results considering the mediation effect of financial irregularity in the relationship between gender and financial irregularities. Column (1) lists the result regressing in Model (3) using *DEFICIENCY* as the dependent variable. Column (2) lists the result regressing in Model (4) using *DEFICIENCY* as the dependent variable. Column (3) lists the result regressing in Model (3) using *OPINION* as the dependent variable. Column (4) lists the result regressing in Model (4) using *OPINION* as the dependent variable. The number of samples used in Column (1) and Column (2) was less than the total number of samples ($N = 12,297$) because *DEFICIENCY* has missing values. All continuous variables are winsorized at the 1% and 99% level. Z-values are reported in parentheses. *, ** and *** denote significance levels at 10%, 5%, and 1%, respectively.

6. Conclusion and implication

Corporate governance of Chinese listed firms has been improved significantly over the years. However, because of information asymmetry between investors and firms, firms may still infringe on investors' rights. In such an environment, it is important to study effective corporate governance mechanism in order to reduce agency cost. Especially, the chairperson of a firm's audit committee (an independent director with expertise and leadership) is an important focus, because he or she is responsible for assessing the firm's internal audits and improving the firm's internal control quality. This role is pivotal in curbing financial irregularities. Using a sample of audit committee chairpersons of Chinese firms listed in the A-share market from 2007 to 2016, this paper examines the effect of the gender characteristics of chairpersons on the probability and degree of firms' financial irregularities. We find that female chairpersons are more capable to reduce both the probability and the degree of firms' financial irregularities, compared with their male counterparts.

Moreover, we find that at the start of tenure, there is no significant difference in reducing financial irregularities between female and male chairpersons on audit committees. But as their tenure increases, female chairpersons significantly show better learning ability and a relatively higher level of independence than their male counterparts. So female chairpersons are more capable to reduce the probability and degree of financial irregularities than their male counterparts. Also, we consider the impact of organizational decision-making environment on the relationship between female chairpersons and financial irregularities. The results show that as the gender diversity of an audit committee increases, the organizational decision-making environment becomes more open and democratic. This environment allows female chairpersons to lower the probability and degree of financial irregularities more

effectively compared with male chairpersons. Finally, we examine how female chairpersons influence listed firms' financial report quality on two aspects: internal control quality and external auditor opinion. Female chairpersons not only improve the firms' internal control quality and external auditor opinion by reducing financial irregularities, but also directly improve financial report quality of listed firms.

The above results shed light on four things. First, this finding provides suggestions for recruiting female independent directors. Second, given that there are not enough female independent directors with accounting expertise in China, extending the tenures for female independent directors with such expertise should be beneficial, and this trend can also improve China's overall corporate governance level. Third, the female representation on the boards is still relatively low in Chinese listed firms. Increasing gender diversity of Chinese listed firms is beneficial because it is shown that in more gender diversified firms, female independent directors are more likely to reduce financial irregularities than male chairpersons. Fourth, by reducing firms' financial irregularities, female independent directors can significantly improve firms' financial report quality (including internal control quality and external auditor opinion).

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Supplementary materials

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Appendix A. Variables and definitions

Variable	Definition
Financial irregularity	
<i>VIO</i>	Dummy variable of financial irregularity. If a firm commits financial irregularities in the year concerned, it is 1; otherwise, it is 0.
<i>DEGREE</i>	Categorical variable of financial irregularity severity; in order of penalty severity from none to high, the value of 0, 1, 2, and 3 are assigned, respectively.
Gender of chairperson	
<i>GENDER</i>	If the chairperson is a woman, it is 1; otherwise, it is 0
Moderating variable	
<i>TENURE</i>	Months of tenure as of the current period divided by 12
<i>INITIAL</i>	If the year is the chairperson's first year of tenure, it is 1; otherwise, it is 0.
<i>OPEN</i>	Dummy variable of whether organizational decision-making environment is open and democratic. First, the degree of diversity in an audit committee is calculated using $Blau = 1 - \sum p^2$ (where p represents the proportion of people in a group after grouping by gender), with range [0, 0.5]. A high value indicates an equal composition of men and women in the audit committee and therefore high gender diversity. If gender diversity in the audit committee is higher than the sample mean, the organizational decision-making environment is considered "open and democratic", and hence <i>OPEN</i> is 1; otherwise, it is 0.
Corporate management	
<i>SIZE</i>	Natural logarithm of a firm's total asset
<i>GROWTH</i>	Average annual growth in business revenue in the last 3 years
<i>ROA</i>	Return on asset, which is represented by a firm's net profit as the percentage of total asset
Corporate governance	
<i>TOP1</i>	Percentage of shares held by a major shareholder
<i>BOARD</i>	Board size, which is calculated by the natural logarithm of the number of board members
<i>INDSIZE</i>	Percentage of independent directors, which is calculated by the number of independent directors as a percentage of the total number of board members
<i>STATE</i>	Dummy variable representing the property nature of the actual controller; for state-owned controllers, it is 1; otherwise, it is 0.
Risk of lawsuit	
<i>VOL</i>	Volatility of daily stock return for the year
<i>EXCH_LIQ</i>	Outstanding share turnover for the year (in%)
<i>ANALYST</i>	Analyst following, which indicates the number of follow-up analysis on the firm performed by the analyst (team) in one year
Additional variables in robustness tests	
<i>INGENDER</i>	Dummy variable representing whether the firm appoints female independent directors. If there is at least one female independent director, it is 1; otherwise, it is 0.
<i>MB</i>	Firm's book-to-market ratio
<i>LOSS</i>	Dummy variable of business loss. If net profit is negative, it is 1; otherwise, it is 0.
<i>AUDITSIZE</i>	Natural logarithm of the number of audit committee members
Variables in further analysis	
<i>DEFICIENCY</i>	Dummy variable of internal control weaknesses. If there is internal control weakness including design and operating deficiency which is disclosed in the firm's internal control evaluation report, it is 1; otherwise, it is 0.
<i>OPINION</i>	Dummy variable of external audit opinion. There are five types of audit opinion on the firm's financial report including "standard unqualified opinion", "unqualified opinion with additional explanatory paragraph", "qualified opinion", "adverse opinion" and "disclaimer of opinion". If the auditor issues a "standard unqualified opinion" on the firm's financial report, it indicates the financial report is in high quality, so <i>OPINION</i> is 1; otherwise, it is 0.
<i>GENDER</i>	If the chairperson is a woman, it is 1; otherwise, it is 0.

<i>GROWTH</i>	Average annual growth in business revenue in the last 3 years
<i>ROA</i>	Return on asset, which is represented by a firm's net profit as a percentage of total asset
<i>TOPI</i>	Percentage of shares held by the largest shareholders
<i>IDSIZE</i>	Percentage of independent directors, which is calculated by the number of independent directors as a percentage of the total number of board members
<i>STATE</i>	Dummy variable representing the property nature of the actual controller; for state-owned controllers, it is 1; otherwise, it is 0.
<i>VOL</i>	Volatility of daily stock return for the year
<i>EXCH_LIQ</i>	Outstanding share turnover for the year (in%)
<i>ANALYST</i>	Analyst following, which indicates the number of follow-up analysis on the firm performed by the analyst (team) in one year
<i>YEAR</i>	Dummy variable of firms' year

Appendix B. Correlation test

	<i>VIO</i>	<i>GENDER</i>	<i>SIZE</i>	<i>GROWTH</i>	<i>ROA</i>	<i>TOPI</i>	<i>BOARD</i>	<i>IDSIZE</i>	<i>STATE</i>	<i>VOL</i>	<i>EXCH_LIQ</i>	<i>ANALYST</i>
<i>VIO</i>	1.000											
<i>GENDER</i>	-0.015*	1.000										
<i>SIZE</i>	-0.067*	-0.039*	1.000									
<i>GROWTH</i>	0.039*	-0.010	0.015*	1.000								
<i>ROA</i>	-0.057*	0.005	-0.015*	0.108*	1.000							
<i>TOPI</i>	-0.026*	-0.019*	0.225*	0.057*	0.114*	1.000						
<i>BOARD</i>	-0.011	-0.040*	0.302*	-0.025*	0.014*	0.017*	1.000					
<i>IDSIZE</i>	0.003	0.003	0.008	0.021*	-0.025*	0.032*	-0.470*	1.000				
<i>STATE</i>	-0.030*	-0.034*	0.347*	-0.067*	-0.120*	0.203*	0.264*	-0.062*	1.000			
<i>VOL</i>	-0.015*	0.001	-0.208*	0.039*	-0.060*	-0.048*	-0.110*	0.018*	-0.096*	1.000		
<i>EXCH_LIQ</i>	0.018*	0.016*	-0.319*	0.030*	-0.035*	-0.076*	-0.108*	0.000	-0.138*	0.426*	1.000	
<i>ANALYST</i>	-0.062*	-0.028*	0.381*	0.028*	0.346*	0.079*	0.176*	-0.003	0.004	-0.153*	-0.178*	1.000

This paper uses Pearson correlation coefficient test.

* denotes significance level of at least 10%.

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