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**Article**

## Is the quality of female auditors really better? Evidence based on the Chinese A-share market

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# Is the quality of female auditors really better? Evidence based on the Chinese A-share market<sup>☆</sup>



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## ABSTRACT

Unlike previous studies in which a single index was used to measure audit quality, this study establishes a new comprehensive index to measure audit quality via Discretionary Accrual, as estimated by Jones' basic model (1991) and Audit Opinions. The former is used to measure the quality of financial statements, and the latter is used to measure the auditors' independence in the mainstream international literature. We examine whether and how an auditor's gender affects the quality of his or her audits under the framework of empathy theory and gender role socialization theory. Using a large sample of 9861 auditor-firm-year observations from Chinese A-share-listed companies from 2011 to 2015, we find that the audit quality of signed auditors shows significant gender differences: these significant gender differences differ from the findings of previous studies that female auditors could provide a higher-quality audit than male auditors; that is, in our study the audit quality of the male auditors exceeds that of the female auditors. After distinguishing the positive and negative directions of the Discretionary Accrual, we find no significant gender differences in audit quality between male and female auditors when the earnings had been adjusted upward by the client; that is, female and male auditors had the same audit risk perception. However, when the client adjusted earnings downward, which indicates a lower audit risk for the

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auditor, the audit quality of female auditors was significantly lower than that of the male auditors. After controlling for the age and position of the auditors, we also find that the gender differences in the auditors' audit quality decreased significantly or even disappeared when the auditor's age exceeded 45 years and/or their position was manager or above. These results are consistent with the empathy theory and gender role socialization theory.

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## 1. Introduction

In recent decades, increasing numbers of women have become executives, entrepreneurs, and senior government officials, and researchers are paying increasing attention to gender differences in management decision-making. The differences in brain and physiological structures inherent in men and women result in significant differences in thinking, psychology, behavior patterns, emotional cognition, and expression; differences in the social gender roles between men and women (Eckel et al., 2008; Hardies et al., 2010; Walter, 2012; Zaki, 2014); and differences in management decisions and behaviors such as financing, investment, mergers, acquisitions, and financial fraud (Adams et al., 2009; Barua et al., 2010; Francis et al., 2013; Huang et al., 2013; Srinidhi et al., 2011; Francis et al., 2015; Fisher et al., 2017). These studies found that company decision-making by female executives differs significantly from that of male executives, but these conclusions were inconsistent. Some studies found that female executives can lower financing costs (Francis et al., 2013), improve corporate

governance (Adams et al., 2009), restrain overinvestment (Barua et al., 2010; He et al., 2011), reduce financial fraud, and promote accounting information conservatism (Peni et al., 2010; Srinidhi et al., 2011; Ittonen et al., 2013; Francis et al., 2015; Fisher et al., 2017). Other studies found no significant gender differences in the decision and risk preferences of tax avoidance and earning management (Schubert et al., 1999; Dyreng et al., 2010; Zang, 2012).

Previous studies of gender differences in the audit market had inconsistent conclusions. Some studies found that female auditors were more prudent and provided higher-quality audits than male auditors (Sun et al., 2011; Niskanen et al., 2011; Ittonen et al., 2013; Hardies et al., 2012, 2016), but other studies found no significant differences between female and male auditors (O'Donnell et al., 2001; Gul et al., 2013; Hotteginde et al., 2017). Some studies also found that the audit quality of male auditors was higher than that of female auditors (Chung et al., 2001; Gold et al., 2009; Hardies et al., 2010; Hossain et al., 2016; Ye et al., 2011; Zhang et al., 2014). For example, Chung et al. (2001) indicated that female audit partners processed information more efficiently than male audit partners in a complex audit task but also found that male audit partners showed more accurate audit judgement. O'Donnell et al. (2001) indicated that female auditors processed information more efficiently under a highly complex analytical procedure task and that male auditors processed information more efficiently under a less complex procedure task. Gold et al. (2009) analyzed whether the client's gender and the auditor's gender affected the auditor's judgement. They found that male auditors' judgements were more accurate than those of female auditors; compared with female clients, male and female auditors are more interested in male clients, but female auditors were more prominently affected by male clients. Male clients were more likely than female clients to persuade auditors to adjust their original accounting entries. Hardies et al. (2010) noted that female auditors can discover more misreporting and that male auditors show greater accuracy in judging misreporting. Niskanen et al. (2011) found that the income reports provided by female auditors were more prudent. Ittonen et al. (2013) found that the financial statements audited by female auditors had less absolute abnormal accrual and that female auditors could constrain the clients' earning management upward and downward. These findings indicate that female auditors may be the constraint mechanism for earning management. Hardies et al. (2016) found that female auditors were more likely than male auditors to publish Going Concern Opinions, and this significant gender difference exists even with important and high-risk clients. However, the findings of Hossain et al. (2016) were exactly the opposite; they found that female auditors were less likely to publish Going Concern Opinions for companies facing financial distress. Hotteginde et al. (2017) used factor analysis to explore the level of Professional Ethics of Certified Auditors in France; they found that male auditors were more likely to engage in behavior that undermines their professional image and that female auditors were mainly guilty of disciplinary violations related to audit quality and violations of professional peer review procedures. Most studies of auditor gender and audit quality in the Chinese audit market found that female auditors provided greater audit quality of financial reporting (Ding et al., 2012; Guo, 2014) and that their accounting information was more conservative (Luo et al., 2014) than that of male auditors. However, some studies found that male auditors provided greater audit quality than female auditors (Ye et al., 2011; Zhang et al., 2014); and no difference was found between female and male auditors (Li et al., 2012a, b; Wang et al., 2014).

After a review of the literature of gender differences in accounting and auditing, we find that it was deemed a hypothetical premise or a fact that women are more risk-averse and more prudent in behavior than men. Based on this hypothesis, scholars believed that female auditors' behavior was more prudent and that their audit quality was higher than that of male auditors. These conclusions have become a stereotype of scholars (Holt et al., 2002; Dinky, 2007; Säve-Söderbergh, 2012), and this stereotype was used as a premise hypothesis in various studies of gender differences (Gold et al., 2009; Hardies et al., 2010). There are fewer questions to this premise hypothesis and these stereotypical research conclusions, which leads to a lack of diversity in theoretical explanations of the gender differences in auditors' audit quality and greatly limits the innovation of theoretical research and the integration development of theory and practice. Based on this awkward situation of existing theory explanation on gender differences in auditors' audit quality, our explorative study finds that the theory explanation of empathy theory and gender role socialization theory on gender difference shows interesting differences from previous explanations of risk preference. The empathy theory and gender role socialization theory are simply our study's theoretical principle.

Empathy is the ability to experience another person's situation, to have a sense and understanding of other people's emotions, and to display the emotions and behavior that others expect or desire (Hogan, 1969;

Mehrabian et al., 1972; Davis, 1983; Chlopan et al., 1985; Blair, 2005; Walter, 2012; Zaki, 2014). Empathy theory holds that women have higher levels of emotional empathy and cognitive empathy than men. However, because of this high level of empathy, women are more easily disturbed by others' emotions and attitudes and are more likely to show the desired behavior (De et al., 2006; Singer et al., 2009; Walter, 2012; Zaki, 2014; Yue et al., 2016). A person with a high level of empathy may communicate more easily and get along better with others and thus have better customer relationships, but at the same time he or she may have weaknesses, such as being insufficiently firm on position, more easily influenced by other people's opinions, and greater likelihood of compromising with others. Gender role socialization holds that a person acquires a set of basic attitudes, emotions, and behavioral conventions that is compatible with his or her gender via imitative learning under a certain cultural cognition (Kazdin, 2000; Li et al., 2012a, b). The significant differences in the inherent brain and physiological structure and social gender roles between men and women are two main reasons for the significant differences in empathy seen between men and women (Karniol et al., 2003; Schulte-Rüther et al., 2008; Yang et al., 2009; Mercadillo et al., 2011; Woodruff et al., 2011). Gender role socialization theory holds that the gender role of social identity has a more profound and obvious effect on human social behavior than the physical gender role. Related studies found that men achieve the social expectations of the male role by paying more attention to tasks, goal requirements, and fair and just rule; the socialization path of the male role is thus task-oriented. Women achieve the social expectations of the female role by paying more attention to others and by maintaining interpersonal relationships; the socialization path of the female role is thus relationship-oriented (Ma, 2005; Liang et al., 2006; Liu et al., 2011; Li et al., 2012a, b; Jiang et al., 2012; Yang et al., 2014; Chen et al., 2016). The male task-oriented gender role leads men to display stronger behavior and an emphasis on power, rules, authority, and goal outcomes, but it can lead men to more easily ignore the feelings of others and to prefer centralized control, and it can weaken emotional relationships. The female relationship-oriented gender role leads women to be more quiet, democratic, and communicative, but it may also lead women to more easily surrender their positions and compromise their professional principles.

In summary, although female auditors may be more risk-averse, they are more likely to be influenced by their clients and more likely to compromise with them, because of the influence of their higher empathy level and relationship-oriented gender role. Female auditors are thus more likely to relax audit principles, which may lead to lower audit quality. The literature regarding auditor behavior shows that female auditors had a higher premium of audit fee because of their better client relationships and audit quality (Hardies et al., 2012; Ittonen et al., 2012). This conclusion, on the one hand, reflects the inherent advantages of female auditors. On the other hand, it shows the potential risk that a female auditor is more likely to compromise with her client or economic interests to maintain a better relationship. This potential risk is supported by psychological evidence (Ceci et al., 2011; Diekman et al., 2010; Hardies et al., 2010; Liang et al., 2015). With the support of empathy theory and gender role socialization theory, we use the personal characteristics of auditors (released by the China Institute of Certified Public Accountants [CICPA]) to establish an innovative comprehensive measure index of audit quality and research design and explore the influence of auditor gender on audit quality under the special circumstances of China's Capital Market. After controlling for the factors of audit clients and firms that could affect the audit quality frequently used in the literature, we report four findings.

**First**, the female auditors showed significantly lower audit quality than the male auditors, which is related to women's higher empathy and relationship-oriented social gender role. **Second**, after distinguishing the positive and negative directions of the Discretionary Accrual (DA), we find no significant gender differences in audit quality between male and female auditors. When the earnings had been adjusted upward by the clients, female and male auditors have the same audit risk perception and audit quality. However, when the clients adjusted earnings downward that faced lower audit risk for auditors, the audit quality of the female auditors is significantly lower than that of the male auditors. This finding indicates that female auditors are more likely to compromise with customers than male auditors when the auditors face a lower audit risk in which earnings had been adjusted downward. **Third**, age diminishes the significant gender difference in audit quality between female and male auditors after they reach 45 years of age. This result may be related to the trend of converging empathy levels between men and women when men's testosterone levels begin to decline sharply after they reach 40 years of age and women's estrogen levels begin to decline sharply after they reach 45 years of age. **Fourth**, no gender difference is seen in the audit quality of auditors who are senior executives in the accounting firm. This result may be related to undifferentiated social gender roles between female and male executives when they all are



senior executives; that is to say, the social gender roles of female senior executives are similar to those of male senior executives. After 35 robustness tests in four major categories and 7 endogenous tests in four major categories, our assumptions and findings of female auditors' significantly lower audit quality remain robust.

Our study contributes to the literature in several important ways. **First**, to the best of our knowledge, this study is the first to directly examine the different effects of an auditor's gender on his or her audit quality using the empathy theory and the gender role socialization theory. Distinguishing the theory of risk preference upon which the mainstream literature is based, the empathy theory and gender role socialization theory can help us more profoundly understand the internal mechanism of the effects of gender on audit quality. Our study extends the theoretical boundary of the effects of auditors' gender on audit quality. **Second**, two frequently used indexes of audit quality are used to creatively establish a new comprehensive measure index of audit quality that helps us measure audit quality in a more comprehensive and more accurate manner. **Third**, this study provides a decision reference for accounting firms to improve their audit quality and for regulators to improve the regulatory system design. The paper proceeds as follows. The next section includes the theoretical analysis and research hypothesis. The third section describes the research design. The fourth section presents our regression results and tests our hypothesis. The final section concludes the paper and discusses possible directions for future research.

## 2. Theoretical analysis and research hypothesis

Empathy theory is a comprehensive theory that integrates fields such as clinical psychology, cognitive neuroscience, sociology, and philosophy (Eisenberg et al., 2009; Singer et al., 2009; Fan et al., 2011; Miklikowska et al., 2011; Liu et al., 2009; Chen et al., 2014). Empathy is the ability to experience another person's situation, to have a sense and understanding of other people's emotions, and to display the desired emotions and behavior; it is a psychological phenomenon that occurs in the process of interpersonal interaction and is a form of thinking of standing on the other side (Hogan, 1969; Mehrabian et al., 1972; Davis, 1983; Chlopan et al., 1985; Blair, 2005; Walter, 2012; Zaki, 2014). Empathy generally includes emotional empathy and cognitive empathy. Emotional empathy comprises a person's emotional reactions to the emotions of others; that is, that a person has a similar emotional experience as others when in the same setting. This reaction can be the reaction of paying attention to others (i.e., empathy attention) or the reaction of paying attention to oneself (i.e., personal distress) (Chen et al., 2014). Cognitive empathy is an understanding of the causes of others' mood swings and appropriate responses to them in terms of emotional and behavioral tendencies.

Studies have shown no significant gender differences in empathy level during the preschool stage. As the body matures, girls' empathy levels generally exceed those of boys after they enter the school-age stage (Rueckert et al., 2011; Auyeung et al., 2012; Fields et al., 2011; Gouveia et al., 2012; Yuan et al., 2010). Male and female infants can only sense the emotions of others via sounds and expressions because their cognitive skills are not yet mature. Empathy at this stage is generally emotional empathy, and no significant gender difference exists. In the school-age stage, children have the ability to identify, receive, analyze, and process information about others' emotions. Cognitive empathy can thus be realized, and the gender differences in cognitive empathy and emotional empathy continue to expand with increasing age. Psychological studies have indicated that female subjects showed significantly greater cognitive empathy and emotional empathy than male subjects regardless of age category (i.e., school age, adolescent, or adult), and this difference is consistent across cultures (Wood et al., 2002; Marton et al., 2009; Auyeung et al., 2012). Studies in cognitive neuroscience have shown that women use the mirror nerve system more than men when they are sensing other people's emotions. The  $\mu$  rhythm<sup>1</sup> showed a significant positive correlation with empathy. The  $\mu$  rhythm of women was inhibited more significantly than that of men when they were sensing other people's emotions, which means that women show a significantly higher level of emotional empathy than men (Yang et al., 2009;

<sup>1</sup> Mu rhythm ( $\mu$  rhythm), also known as the central rolandic or sensorimotor rhythm, has been consistently observed over the primary sensorimotor cortex. Mu suppression and enhancement echo sensorimotor processing in frontoparietal networks. Mu rhythm recorded from electrodes at scalp location over sensorimotor cortex can be attenuated by self-initiated movements, imagined movements, as well as action observation. The mu suppression has also been reported to be closely linked to the mirror-neuron activity. Accordingly, the mu suppression can be a reliably indicator of sensorimotor involvement, supported by the mirror-neuron system, when participants perceive other people in painful situations (Yang et al., 2009).

Woodruff et al., 2011). At the same time, when processing emotional information about others, a significant increase was seen in the reaction of the mirror nervous system core region at the right side of the female brain, such as the inferior frontal, superior temporal sulcus, and amygdala. These are the three brain regions that are responsible for emotional responses and for matching perceptual information with outputted action information. This indicates that women make more use of mirror nerves than men when processing others' information, thus creating a higher level of cognitive empathy (Williams et al., 2005; Schulte-Rüther et al., 2008; Mercadillo et al., 2011).

Scholars tend to agree that the comprehensive impact of innate physiological characteristics and postnatal social and psychological development resulted in women having a higher level of empathy. In terms of innate physiological characteristics, neurobiological studies have found that the empathy level shows a significant negative correlation with the testosterone level (Van et al., 2011); a significant positive correlation with female hormones (Pascual-Sagastizabal et al., 2013); and a significant positive correlation with the oxytocin level (Dadds et al., 2011). Men's testosterone levels continue to decline after 40 years of age, and women commonly show a sharp decline in female hormones after 45 years of age. These changes may weaken or even negate the gender difference in empathy level (Feldman et al., 2002) and lessen the gender differences in management decisions and behavioral outcomes (Sundgren et al., 2014). Therefore, based on biological, medical, and physiologic evidence, we expect that gender differences in auditors' audit quality may narrow or even disappear with age.

From the perspective of social and psychological development, the socialization of gender roles is another important cause of gender differences in the level of individual empathy (Karniol et al., 2003; Ma, 2005; Liang et al., 2006; Liu et al., 2011; Li et al., 2012a, b; Chen et al., 2016) and is a direct reason for the gender convergence of individual behavior (Petersen et al., 2010; Jiang et al., 2012; Yang et al., 2014; Liang et al., 2015). Gender role socialization is a comprehensive theory based on the theories of cognitive neuroscience, cognitive psychology, social psychology, physiological science, and others. Gender role socialization is defined as the acquisition of a set of basic attitudinal, emotional, and behavioral conventions that is compatible with his or her gender via imitative learning under a certain cultural cognition (Kazdin, 2000; Li et al., 2012a, b). After humans developed patriarchal societies, especially after the industrial age, the social demands and expectations for women were to care for the family, care for others, and maintain harmonious relationships. Especially against the background of Chinese culture, women are often associated with tenderness, kindness, solicitude, and encouragement. Women are considered to be relationship-oriented and to focus on task coordination, interpersonal harmony, and democratic decision-making in the execution task process. In practice, women are usually more likely to engender mentality and behavior tendencies of empathic attention for others. Women usually pay more attention to democratic decision-making and interpersonal relationships, but they can show hesitance and are more susceptible to outside interference. These factors lead women to be less efficient in practice (Bass et al., 1990; Guido-Dibrito et al., 1996; Gardiner et al., 1999; Liang et al., 2006). In the process of socialization, men are often considered to be associated with traits such as power, majesty, independence, and reason, and they are primarily responsible for the family's financial resources. Men are considered to be task-oriented, focusing on the goals, results, and rules of the task process, emphasizing problem analysis and hands-on manipulation, working more efficiently, being more principled, taking a firmer stand, and making decisions more decisively. Men are not as good at expressing emotions, sympathy to the emotions of others, and sympathetic concern about others' plight (Karniol et al., 2003). As society becomes more open and tolerant, gender roles are no longer restricted to the two social genders of "male (masculine)" and "female (feminine)" gender (Gilbert, 1985). The fusion of "male" and "female" of the two genders engenders neuter social genders, such as the "tough girl" (i.e., a masculine woman) and the "pseudo-girl" (i.e., a feminine man). To adapt to male-dominated social rules, women may adjust their social gender roles with the promotion of their positions, which leads their gender roles to gradually converge with those of men. Relevant studies have shown that when women have a higher position in an organization, their masculinity, social gender role, and psychological and behavior characteristics are likely to be seen as more masculine (Jiang et al., 2009; Petersen et al., 2010; Li et al., 2011; Jiang et al., 2012; Yang et al., 2014; Liang et al., 2015). This possible change in the gender roles of female executives has also led to inconsistencies in the literature on the outcome of female executives' behavior. For example, Francis et al. (2013, 2015), Faccio et al. (2016) and Li et al. (2012a, b) found that female executives are more likely to avoid risk and less likely to com-

mit financial fraud, but [Du et al. \(2017\)](#) and [Zhou et al. \(2016\)](#) found that women were not always averse to financial fraud and reduce earnings management. [Hardies et al. \(2012\)](#) found that women were also more confident than men because of occupational socialization. Thus, we expect that women in a higher position were more similar to men in terms of psychological and behavioral characteristics, and the gender differences in management decisions and behavioral consequences between women and men are smaller.

In summary, because women generally have higher empathy levels and a relationship-oriented social gender role, women are affected greatly by physiological emotion, psychological disposition, and behavioral patterns, which leads women to be hesitant and more likely to show behavior tendencies such as compromise or altruism. Similar to the studies of [Ceci et al. \(2011\)](#), [Diekman et al. \(2010\)](#), and [Liang et al. \(2015\)](#), [Lyons \(1983\)](#) found that women may have higher moral standards, but they are more likely than men to compromise with another person, so that their actual consequences are no better than those of men. Thus, we believe that the quality of audit services provided by female auditors is not higher than that of male auditors. Therefore, we put forward the testable hypothesis.

**Hypothesis 1.** *Ceteris paribus*, female auditors may have significantly lower audit quality than male auditors.

### 3. Research design

#### 3.1. Empirical model and variables definition

##### 3.1.1. Empirical model structure

We follow the method developed by [Gul et al. \(2013\)](#), [DeFond et al. \(2014\)](#), [Zhang et al. \(2014\)](#), and [Hardies et al. \(2016\)](#) to construct an empirical model and estimate the impact of auditor gender on audit quality. The empirical model as below:

$$AudQuality_{it} = \beta_0 + \beta_1 Aud\_gender_{it} + \Sigma Controls_{it} + \Sigma Year + \Sigma Indu + \varepsilon_{it} \quad (1)$$

##### 3.1.2. Dependent variables

The dependent variable of empirical model (1) is audit quality. In reference to the method of [Gul et al. \(2013\)](#) and [Zhang et al. \(2014\)](#), we use the Jones basic model to estimate the Discretionary Accrual (DA), which measures the quality of a listed company's financial statement, and we then use DA and the actual Audit Opinion (AO), which measure the independence of the auditors, to match a proxy variable (DA\_AO) of audit quality. It measures as follows. If the absolute value of DA is higher than its median and AO is a modified audit opinion, or if the DA is lower than its median and AO is a standard audit opinion, the audit quality will be considered high, i.e., DA\_AO equals 1. If the absolute value of DA is lower than its median and AO is a modified audit opinion, or if the DA is higher than its median and AO is a standard audit opinion, the audit quality will be considered low, i.e., DA\_AO equals 0. Because the positive and negative directions of DA represent different management behaviors and consequences, we use positive DA and negative DA to match AO respectively, obtain two new proxy variables (DA\_AO2 and DA\_AO3) of audit quality, and investigate the effects of auditor gender on audit quality under different earnings manipulation directions. At the same time, we further use positive DA and negative DA to match standard AO (i.e., the situation of AO equals 0), obtain two new proxy variables (DA\_AO4 and DA\_AO5) of audit quality, and investigate the effects of auditor gender on audit quality if the attitude and independence of auditors are uncertain. Detailed audit quality measurement methods are shown in [Table 1](#).

According to [DeAngelo \(1981a\)](#), the definition of audit quality is the joint probability of market assessments in which auditors discover their customers' irregularities and report them. According this widely accepted definition, audit quality includes two connotations: that all illegal problems should be discovered by the auditors and that the auditors should report these illegal problems. These two connotations have logical and procedural order. DA reflects the quality of the financial statement; the greater the absolute value of the DA, the lower the quality of the customers' financial statement. The use of the DA as the measurement index of audit quality reflects only the first connotation of audit quality. AO reflects the quality of the auditors' audit report; it is generally considered that a modified AO reflects a higher-quality audit report. The use of the AO



Table 1  
Measurement method of audit quality.

Prerequisite	Discretionary Accrual (DA)	Audit Opinion (AO)	
		If it is modified AO, AO equals 1	If it is standard AO, AO equals 0
Absolute value of DA	If DA is higher than its median, DA equals 1 If DA is lower than its median, DA equals 0	DA_AO equals 1 DA_AO equals 0	DA_AO equals 0 DA_AO equals 1
DA is positive	If DA is higher than its median, DA equals 1 If DA is lower than its median, DA equals 0	DA_AO2 equals 1 DA_AO2 equals 0	DA_AO2 equals 0 DA_AO2 equals 1
DA is negative	If DA is higher than its median, DA equals 1 If DA is lower than its median, DA equals 0	DA_AO3 equals 1 DA_AO3 equals 0	DA_AO3 equals 0 DA_AO3 equals 1
DA is positive	If DA is higher than its median, DA equals 1 If DA is lower than its median, DA equals 0	DA_AO4 equals 1 DA_AO4 equals 0	DA_AO4 equals 0 DA_AO4 equals 1
DA is negative	If DA is higher than its median, DA equals 1 If DA is lower than its median, DA equals 0	DA_AO5 equals 1 DA_AO5 equals 0	DA_AO5 equals 0 DA_AO5 equals 1

as the measurement index of audit quality reflects only the second connotation of audit quality. On the one hand, the measurement indexes of audit quality in our study can fully absorb the advantages of DA for large samples to study and explore potential misstatements, and AO can uniquely capture the advantages of auditor independence and poor quality of audit reports. On the other hand, our new measurement indexes of audit quality can complement the defects of large deviations, high errors, inconsistent DA, small count, and poor validity of measurement of modified AO, and measurement of the audit quality is more accurate and clean (DeFond et al., 2014; Francis, 2011; Kaplan et al., 2013). Our measuring method of audit quality reflects perfectly the connotation of definition on audit quality by DeAngelo (1981a).

### 3.1.3. Independent variables

We introduce an independent variable, the gender of the auditor (Aud\_gender), which is a dummy variable that equals 1 if the auditor is male and 0 otherwise. According to the rules of treasury,<sup>2</sup> the audit report issued by the partnership accounting firm should be signed by a partner who is ultimately responsible for the audit project review and a Signed CPA who is responsible for the audit project; the audit report issued by a limited liability accounting firm should be signed by the chief accountant of the accounting firm or the deputy chief accountant authorized by the accountant firm and a Signed CPA who is responsible for the audit items. According to the institution arrangement of audit responsibility and the traditional Chinese culture of respecting leadership (partner), the first place for signatures on the audit report is most likely signed by the partner who is ultimately responsible for the audit project review, who is defined as the first signed auditor (i.e., Aud\_gender1); the second place for signatures on the audit report is signed by the CPA who is specifically responsible for the audit items, who is defined as the second signed auditor (i.e., Aud\_gender2). This signature order was confirmed by the partners of the accounting firm in our actual survey. The second signed auditor (aud\_gender2) participated directly in the scene audit work of the audit items, is the first gatekeeper of audit risk control, has the greatest and most direct effect on the quality of the audit report, and is directly responsible for the audit risk. Therefore, we choose the gender of the second signed auditor (aud\_gender2) as the main explanatory variable to explore the impact of the auditor's gender on his or her audit quality.

### 3.1.4. Control variables

According to the control variables of audit quality researched by DeFond et al. (2014), Wang et al. (2014), Yuan et al. (2012), and Zhang et al. (2014), we choose the control variables to include the two factors of company level and accounting firm level and distinguish the effect of year and industry. The influencing factors of the company level include the basic financial characteristics of size, financial leverage, return on assets, growth opportunity, financial distress, and listed ages and the corporate government characteristics of equity

<sup>2</sup> The notice of treasury on some problems concerning the signature and seal of the audit report by the CPA [OL]. 4 November 2012, [http://www.cicpa.org.cn/Professional\\_standards/otherfiles/201211/t20121104\\_39521.html](http://www.cicpa.org.cn/Professional_standards/otherfiles/201211/t20121104_39521.html).

concentration and the power of the CEO. The influencing factors of the accounting firm level include the brand and the audit opinion issued in the previous year of the accounting firm. Table 2 exhibits the definitions and measurement methods of other variables in regression models.

### 3.2. Data source and sample selection

**First**, we obtained the auditors' information from the annual audit report of China's A-share listed companies from the Wind database for the 2011–2015 period. **Second**, we eliminated firm-year observations for firms that belong to financial industries. **Third**, the industry information inquiry system on the official website of the Chinese Institute of Certified Public Accountants (CICPA) was used for manual collection of the signed auditor's gender, age, position, and other information and to match the auditor's information with that of the listed companies in the sample period and obtain a full sample of 12,306 firm-year-auditor observations. A small number of samples had three signed auditors. According to the regulations of treasury and practical experience, we used only the first two signed auditors as our object of investigation. **Finally**, after eliminating the samples of signed auditors with incomplete information and the companies with IPOs in the current year and the ST companies, we ultimately retained a sample of 9861 firm-year-auditor observations with two signed auditors. Table 3 shows the process of sample selection. The information regarding the names of the auditors and accounting firms, types of audit opinion, and the data on finance and corporate government of the listed companies were taken from the Wind database. The domestic ranking of the accounting firms that reflects the brand of the accounting firms was taken from the annual comprehensive ranking list issued by CICPA. To reduce the influence of outliers on the study results, we winsorized the top and bottom 1% of each continuous variable to control the influence of outliers and processed the data with stata12.

## 4. Empirical analysis

### 4.1. Descriptive statistics

Table 4 reports the descriptive statistics for the main study variables. The data show that the mean audit quality as measured by the five methods was about 0.5. These results indicate that the audit quality of more than 50% of listed companies is high. In the full sample, about 75% of the first signed auditors were men, and about 65% of the second signed auditors were women. In the subsample of auditor twosome combination, the

Table 2  
Definition and measurement of main variables.

#### Panel A: Independent variables

Aud_gender1	Equals 1 if the gender of the first signed auditor is male, otherwise 0
Aud_gender2	Equals 1 if the gender of the second signed auditor is male, otherwise 0
All_male	Equals 1 if the gender of two signed auditors is male, otherwise 0

#### Panel B: Control variables

Size	Size of company; equals the natural logarithm of total assets at the end of the year
Lev	Financial leverage; equals total liabilities divided by total assets at the end of the year
ROA	Return on assets; equals net profit divided by total assets at the end of the year
Growth	Growth opportunity; equals the sum of the value of floating stock's market value, book value of non-floating stock, and total debt divided by total assets at the end of the year
Dnetprof	Financial distress; equals 1 if net profit <0, otherwise 0
Lnage	Listed age; equals natural logarithm of the statistics year minus the listing year
Ownership_conc	Ownership concentration; equals the shareholding ratio of large shareholders
Doul	CEO power; equals 1 if the chairman and CEO are the same person, otherwise 0
Big_ten	Brand of accounting firm; equals 1 if the accounting firm is among the ten largest domestic firms, otherwise 0.
AO_lag	Audit opinion; equals 1 if auditor issues a modified audit opinion, otherwise 0
Year	Time effect
Indu	Industry effect

Table 3  
Sample selection process and distribution.

Year	Initial samples for non-financial industry	IPO samples in current year	ST samples	Samples of the first auditor missing data	Samples of the second auditor missing data	Samples of two auditor missing data	Final observations
2011	2249	278	118	138	243	31	1503
2012	2393	154	127	101	225	13	1799
2013	2397	2	104	73	176	8	2050
2014	2521	124	76	53	119	6	2155
2015	2746	219	76	33	66	2	2354
Total	12,306	777	501	398	829	60	9861

Table 4  
Descriptive statistics of variables.

Variable	N	Mean	Std. Dev.	Min	Med	Max
DA_AO	9861	0.5023	0.5	0	1	1
DA_AO2	5187	0.5003	0.5	0	1	1
DA_AO3	4674	0.5002	0.5001	0	1	1
DA_AO4	5057	0.5001	0.5	0	1	1
DA_AO5	4543	0.5001	0.5001	0	1	1
Aud_gender1	9861	0.7492	0.4335	0	1	1
Aud_gender2	9861	0.6468	0.478	0	1	1
All_male	5823	0.8353	0.3709	0	1	1
Size	9861	22.0227	1.2564	19.2256	21.8472	25.809
Lev	9861	43.7194	21.7405	4.6463	43.2736	97.7221
ROA	9861	4.0256	5.6284	-19.8679	3.6001	22.6216
Growth	9861	2.0453	1.7122	0.4032	1.5525	12.1028
Lnage	9861	1.9427	0.9157	0	2.1972	3.091
Ownership_conc	9861	35.62	15.1522	8.75	33.73	75
Dnetprof	9861	0.1002	0.3003	0	0	1
Doul	9861	0.2434	0.4291	0	0	1
AO_lag	9861	0.0226	0.1487	0	0	1
Big_ten	9861	0.5671	0.4955	0	1	1

combination of two male auditors comprised about 49% of all auditor twosome combinations and about 84% of the same-sex auditor combinations. Table 4 reports the detailed descriptive statistics of the control variables.

Studies have shown that a man's testosterone level decrease from 40 years of age and that a woman's estrogen level decreases from 45 years of age. This phenomenon indicates a significant negative correlation between age and sex hormones; in addition, a significant negative correlation has been shown between male sex hormones and empathy level, and a significant positive correlation has been shown between female sex hormones and empathy level. We thus divided the sample into two groups according to the age of the second signed auditor (younger than 45 years and older than 45 years). Studies have also shown that women with a higher position displayed more similar social gender roles to men and that their empathy level was similar to that of men. We thus divided the sample into two groups based on the position of the second signed auditor (the senior executive group, in which the auditors are above the manager, and the non-senior executive group, in which the auditors are below the manager). Table 5 reports the descriptive statistics on the age of various sample groups of the second signed auditors. In the full samples of the second auditors, female auditors comprise about 35%, and male auditors comprise about 65%. Like the mean of all auditors, the average ages of both female auditors and male auditors are about 38 years; the gender difference in age is small. In the younger group, the average age of female and male auditors is 36.18 years, and no gender difference is seen; in the older group, the average ages of female and male auditors are 49.16 and 49.6, respectively (i.e., a small gender

Table 5  
Age descriptive statistics of the second signed auditors.

Aud2_age		N	Mean	Std. Dev.	Mix	Max	Proportion of full samples
Full samples	Female	3483	38.2188	6.6307	23	70	35.32%
	Male	6378	38.2504	6.6954	24	73	64.68%
Group of low age	Female	2935	36.1754	4.6743	23	44	29.76%
	Male	5385	36.1833	4.5902	24	44	54.61%
Group of older age	Female	548	49.1624	4.5048	45	70	5.56%
	Male	993	49.6022	4.9835	45	73	10.07%
Group of senior executive	Female	372	39.3656	5.4566	29	61	3.77%
	Male	724	41.2735	7.7125	28	68	7.34%
Group of non-senior executive	Female	3111	38.0817	6.7451	23	70	31.55%
	Male	5654	37.8633	6.4530	24	73	57.34%

difference). The average age of the male auditors in the group of senior executives is significantly greater than that of female auditors, but no significant gender difference was found in the non-senior executive group.

Through practical investigation, the internal managerial hierarchy of an accounting firm generally includes partners (shareholders), senior executive, managers, item leaders, and general practitioners. The position information found in the CICA industry information system includes partner, senior executive, manager, item manager, and others, which is basically consistent with the position setting in the practical field. We refer to the partners (shareholders), senior executive, and managers as the executive stratum. Table 6 reports the descriptive statistics of the second signed auditors' positions. The proportion of the executive stratum is 11.12% in the full sample. The proportion of female auditors is 3.77%, and that of male auditors is 7.34% in the full sample. The proportion of non-senior executive stratum is 88.88%, which includes 31.55% women and 57.33% men.

Table 7 reports the descriptive statistics of audit quality (DA-AO) under various subsamples of second signed auditors. In the full sample, the audit quality of male auditors (mean, 0.51) is higher than that of female auditors (mean, 0.48). In the younger age group, the audit quality of male auditors is higher than that of female auditors, and this gap (0.038) is slightly larger than the gap of the full sample group (0.033) and significantly larger than the gap in the older age group (0.005; T-value is significant, i.e., above 10%). This indicates that male auditors provide higher audit quality than female auditors, and this gender difference in audit quality continues to diminish with age. Moreover, the audit quality of female auditors improves with age (by 6%), whereas the audit quality of male auditors declines slightly (0.7%). This change in audit quality with age may be related to the improvement in the men's empathy levels caused by a decline in testosterone level from 40 years of age and may also be related to the decline in the women's empathy levels caused by a decline in the levels of female hormones from 45 years of age.

The audit quality of male auditors is higher than that of female auditors in both the senior executive group and the non-senior executive group. This indicates that the gender difference in audit quality between male and female auditors is universal and that this gender gap in audit quality is widening with the promotion of position (i.e., the gap rises to 0.055 in the senior executive group from 0.033 in the non-senior executive

Table 6  
Position descriptive statistics of the second signed auditors.

Aud2_rank	Female		Male		Total proportion
	N	Proportion	N	Proportion	
Equals 1 if his (her) position is partner.	84	0.85%	217	2.20%	3.05%
Equals 2 if his (her) position is senior executive or manager.	288	2.92%	507	5.14%	8.06%
Group of senior executive	372	3.77%	724	7.34%	11.11%
Equals 3 if his (her) position is item manager	660	6.69%	1118	11.34%	18.03%
Equals 4 if his (her) position is others	2451	24.86%	4536	46.00%	70.85%
Group of non-senior executive	3111	31.55%	5654	57.34%	88.88%
Total	3483	35.32%	6378	64.68%	100.00%

Table 7  
Descriptive statistics of gender, age, and position difference on audit quality.

DA_AO		N	Mean	Std. Dev.	Min	Max	T-value
Full sample	Female	3483	0.4812	0.4997	0	1	−3.0961***
	Male	6378	0.5138	0.4998	0	1	
Group of low age	Female	2935	0.4767	0.4995	0	1	−3.2907***
	Male	5385	0.5144	0.4998	0	1	
Group of older age	Female	548	0.5055	0.5004	0	1	−0.1916
	Male	993	0.5106	0.5001	0	1	
Group of non-senior executive	Female	3111	0.4857	0.4999	0	1	−2.6928***
	Male	5654	0.5157	0.4998	0	1	
Group of senior executive	Female	372	0.4435	0.4975	0	1	−1.7287*
	Male	724	0.4986	0.5003	0	1	

Note: Robustness standard errors in parentheses.

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

group). However, the audit quality of both male and female auditors shows a downward trend with the promotion of position, and the audit quality of female auditors declined more significantly (i.e., the audit quality of male auditors declines by 3% to 0.017, and the audit quality of female auditors declines by 0.9% to 0.042). This downward trend may be associated with the fact that senior auditors are usually older, and the empathy levels of female auditors decline with age; it also may be associated with the fact that a senior auditor is often is overconfident and feels greater performance pressure. The partners and senior executives in an accounting firm are similar to the CEOs of a company. The literature shows that CEO overconfidence would encourage firms to increase investment and earnings management manipulation (He et al., 2011; Zhou et al., 2014; Zhou et al., 2016). When partners or senior executives face competitive pressure and performance pressure in audit market, the likelihood of audit collusion increases; as a result, senior executives or partners may have relaxed their tolerance for audit risk (Lei, 2004; Song et al., 2008; Dong et al., 2010; Chen, 2011).

#### 4.2. Correlation analysis and T-test of gender differences in audit quality

Table 8 reports the correlation coefficient matrix of the variables used in the regression model. It shows that the gender of both the first and second signed auditors and the gender of the two same-sex auditor combinations have significant positive correlations with audit quality, and it indicates that male auditors have a significantly higher audit quality than female auditors. Table 9 reports the *t*-test results of gender differences on audit quality. The results show that for either a single signed auditor or a combination of two same-sex auditors, male or male combination auditors have a higher mean audit quality than female or female combination auditors, and this gender difference in audit quality is significant to at least a significance level of 10%. This result gives preliminary support to Hypothesis 1.

#### 4.3. Empirical results

Table 10 reports the empirical results of regression model (1). Column 2 in Table 10 reports the influence of the regression results of auditor gender on audit quality without differentiating the DA direction. The result shows a significant positive correlation between auditor gender and audit quality, which indicates that male auditors have a significantly higher audit quality than female auditors; conversely, female auditors showed a significantly lower audit quality than male auditors. Therefore, this result supports Hypothesis 1 that female auditors show a significantly lower audit quality than male auditors.

The empirical results after distinguished DA direction show that the relationship between auditor gender and audit quality remains positive; however, the relationship between auditor gender and audit quality is not significant when DA is positive (column 3 in Table 10). This result indicates that although male auditors



Table 8  
Correlation coefficient matrix of variables in regression model.

	DAAO	Aud_ gender1	Aud_gender2	All_male	Size	Lev	ROA	Growth	Lnage	Ownership_cons	Dnetprof	Doul	AO_lag	Big_ten
DA AO	1													
Aud_gender1	0.018*	1												
Aud_genderZ	0.031***	0.042***	1											
All_male	0.039***		1	1										
Size	-0.107***	0.01	-0.019*	-0.006	1									
Lev	-0.157***	0.006	0.016	0.014	0.514***	1								
ROA	0.023**	-0.014	-0.019*	-0.008	0.004	-0.389***	1							
Growth	0.057***	-0.002	-0.013	-0.013	-0.413***	-0.253***	0.073***	1						
Lnage	-0.130***	0.011	-0.019*	-0.007	0.329***	0.449***	-0.195***	0.079***	1					
Ownership_cons	-0.047***	0.009	-0.012	0.002	0.270***	0.071***	0.090***	-0.171***	-0.068***	1				
Dnetprof	0.008	0.019*	0.025**	0.022*	-0.051***	0.208**	-0.612***	0.075***	0.128***	-0.057***	1			
Doul	0.056***	0.003	0.005	-0.004	-0.182***	-0.143***	0.045***	0.059***	-0.235***	-0.055***	-0.032***	1		
AO_lag	-0.003	0.017*	0.025**	0.019	-0.099***	0.105***	-0.136***	0.139***	0.095***	-0.063***	0.163***	-0.008	1	
Big_ten	-0.011	0.025**	-0.023**	0.017	0.119***	0.011	0.021**	-0.011	-0.024**	0.068***	-0.008	0.035***	-0.003	1

Note: Robustness standard errors in parentheses.

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

Table 9  
Gender difference *t*-test for audit quality.

Variables	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]		T-value	
Aud_gender1	0	2473	0.4865	0.0101	0.4999	0.4667	0.5062	-1.8189*
	1	7388	0.5076	0.0058	0.5000	0.4962	0.5190	
Aud_gender2	0	3483	0.4812	0.0085	0.4997	0.4646	0.4978	-3.0961***
	1	6378	0.5138	0.0063	0.4998	0.5015	0.5261	
All_male	0	959	0.4661	0.0161	0.4991	0.4345	0.4977	-2.9564***
	1	4864	0.5183	0.0072	0.4997	0.5043	0.5323	

Note: Robustness standard errors in parentheses.

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

Table 10  
Results of model regression analysis.

VARIABLES	DA_AO	DA_AO2	DA_AO3	DA_AO4	DA_AO5
Aud_gender2	0.131*** (0.0443)	0.0354 (0.0604)	0.173*** (0.0657)	0.0213 (0.0613)	0.182*** (0.0673)
Size	0.0134 (0.0258)	-0.0338 (0.0375)	0.0606* (0.0365)	-0.0331 (0.0383)	0.0857** (0.0374)
Lev	-0.00911*** (0.00142)	0.00208 (0.00192)	-0.0194*** (0.00225)	0.00196 (0.00200)	-0.0213*** (0.00236)
ROA	-0.00727 (0.00538)	0.00881 (0.00714)	-0.0275*** (0.00824)	0.00326 (0.00741)	-0.0318*** (0.00859)
Growth	0.0188 (0.0175)	0.0620*** (0.0231)	-0.0165 (0.0276)	0.0555** (0.0242)	-0.0142 (0.0304)
Lnage	-0.0938*** (0.0292)	-0.0708* (0.0404)	-0.104** (0.0437)	-0.0790* (0.0411)	-0.114** (0.0449)
Ownership_conc	-0.00388*** (0.00151)	0.000317 (0.00207)	-0.00684*** (0.00224)	-0.000316 (0.00210)	-0.00749*** (0.00229)
Dnetprof	0.0625 (0.0918)	-0.126 (0.122)	0.0526 (0.140)	-0.189 (0.125)	0.0495 (0.145)
Doul	0.0593 (0.0514)	-0.0366 (0.0669)	0.126 (0.0798)	-0.0441 (0.0680)	0.137* (0.0812)
AO_lag	0.143 (0.172)	-0.265 (0.218)	0.252 (0.282)	-0.383 (0.315)	-0.344 (0.387)
Big_ten	-0.0264 (0.0435)	-0.0123 (0.0591)	-0.0484 (0.0647)	-0.0181 (0.0598)	-0.0508 (0.0664)
Constant	0.637 (0.559)	1.155 (0.820)	0.142 (0.792)	1.284 (0.836)	-0.199 (0.810)
Year	Control	Control	Control	Control	Control
Indu	Control	Control	Control	Control	Control
Observations	9861	5187	4674	5057	4445
Pseudo R2	0.0771	0.0526	0.1062	0.0571	0.1031

Note: Robustness standard errors in parentheses.

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

show higher audit quality than female auditors, the gender difference in audit quality is not obvious. When DA is negative, a significant positive correlation can be seen between auditor gender and audit quality (column 4 in Table 10). This indicates a significant gender difference on audit quality, and the audit quality of the female auditors is significantly lower than that of the male auditors. This result further supports Hypothesis 1.

After further examination of the sample of modified audit opinions issued by auditors, we find a positive correlation between auditor gender and audit quality when DA is positive, but it is no longer significant

(column 5 in Table 10), which indicates that there is no significant gender difference in the audit quality. When DA is negative, a significant positive correlation exists between auditor gender and audit quality (column 6 in Table 10), which indicates a significant gender difference in audit quality; female auditors show a significantly lower audit quality than male auditors. This result further supports Hypothesis 1.

After the positive and negative directions of DA are distinguished, the empirical results show that client manipulation of the earning upward (i.e., DA is positive) adds audit risk for the auditors, which can have very bad consequences. Faced with this high-risk case, both female and male auditors showed the same degree of prudence and quality control and provided the same level of audit quality; the result is that the gender difference in audit quality is not significant. Client manipulation of the earning downward (i.e., DA is negative) has fewer negative consequences for the auditor (compared to adjusting the earning upward) because it would present a smaller audit risk. When faced with this low-risk case, female auditors are more likely to be affected by their high level of empathy and are more likely than male auditors to relax rules and compromise with their clients. The result is that female auditors show a significantly lower audit quality because of their higher empathy level. Against the background of an accounting firm strengthening its internal governance and quality control, this empirical evidence has positive significance for the rational arrangement of signed auditors in practice.

The regression results of control variables on the company level show a similar correlation between most control variables and audit quality when DA is negative or an absolute value, but the result is contrary when DA is positive. The relationships with Size, Dnetprof, Dou, AO\_lag, and audit quality are similar; there is a significant positive relationship when DA is negative, there is no significant negative relationship when DA is positive, and there is a significant positive relationship when DA is an absolute value. The relationship between Lev, ROA, Ownership\_conc, and audit quality is basically similar; there is a significant negative relationship when DA is negative or an absolute value, and there is no significant positive relationship when DA is positive. The relationship between Lnage and audit quality is always significant and negative. The relationship between Big\_ten and audit quality is always nonsignificant and negative. The relationship between growth and audit quality is nonsignificant and negative when DA is negative, significant and positive when DA is positive, and nonsignificant and positive when DA is an absolute value.

#### 4.4. Robustness test

##### 4.4.1. Replacement of dependent variables

The results of the robustness test, based on traditional measurement indices of audit quality as dependent variables, supports our research hypothesis as before. We use the traditional measure indices of audit quality, such as positive DA (DA+), negative DA (DA-), the absolute value of DA (ABS DA), the audit opinion issued by auditors (AO) and the probability of auditors issuing modified audit opinions (Maos) as the proxy variables of audit quality, to substitute in the regression model (1), respectively. Table 11 shows the regression results. In columns (1)–(3) in Table 11, when DA is negative and an absolute value, the DA of financial statements audited by male auditors is smaller than that of those audited by female auditors. This result means that the male auditors have higher audit quality. When DA is positive, there is a nonsignificant negative correlation between auditor gender (Aud\_gender2) and DA+, which means that there is a nonsignificant positive correlation between auditor gender (Aud\_gender2) and audit quality, but the relationship direction is consistent: DA is negative and an absolute value. Columns (4)–(5) show a significant positive correlation between auditor gender (Aud\_gender2) and AO and Maos and indicate that male auditors are more likely to issue a modified audit opinion, which represents greater independence of the auditor and higher audit quality. The empirical results in Table 11 confirm our hypothesis that male auditors show higher audit quality than female auditors.

##### 4.4.2. Replacement of independent variables

The robustness test results of replacement on independent variables from Aud\_gender2 to Aud\_gender1 and All\_male support our research hypothesis as before. We use the gender of the first signed auditor (Aud\_gender1) and the combination of two auditors (All\_male), respectively, as independent variables to substitute for the gender of the second auditor in regression model (1) to test the impact of auditor gender on audit quality. The empirical results reported in Panels A and B of Table 12 show a significant positive

Table 11  
Robustness test of proxy dependent variables.

VARIABLES	(1) DA-	(2) DA+	(3) ABSDA	(4) AO	(5) Maos
Aud_gender2	0.0287** (0.0136)	−0.00879 (0.00707)	−0.0165** (0.00838)	0.343* (0.185)	0.000823* (0.000449)
Size	0.0120 (0.00771)	−0.00759* (0.00451)	−0.0166*** (0.00509)	−0.131 (0.0969)	−0.0259*** (0.000304)
Lev	−0.00365*** (0.000492)	0.000483** (0.000238)	0.00250*** (0.000293)	0.0248*** (0.00463)	0.000588*** (1.93e−05)
ROA	−0.00771*** (0.00190)	0.00274*** (0.000962)	0.00730*** (0.00127)	−0.0927*** (0.0187)	0.000460*** (7.22e−05)
Growth	0.00147 (0.00558)	−0.00748*** (0.00261)	−0.00788** (0.00322)	0.190*** (0.0453)	0.000679** (0.000266)
Lnage	−0.0394*** (0.00924)	0.0214*** (0.00469)	0.0429*** (0.00582)	−0.0327 (0.143)	0.0173*** (0.000311)
Ownership_conc	−0.00208*** (0.000444)	0.000334 (0.000243)	0.00181*** (0.000289)	−0.00924 (0.00677)	−0.000105*** (1.43e−05)
Dnetprof	−0.0410 (0.0319)	0.0224 (0.0146)	0.0389** (0.0186)	0.693** (0.288)	0.130** (0.00103)
Doul	0.0274* (0.0165)	−0.00505 (0.00729)	−0.0139 (0.00926)	0.325* (0.188)	−0.00120** (0.000544)
AO_lag	−0.174*** (0.0610)	0.0639* (0.0327)	0.160*** (0.0459)	3.891*** (0.222)	0.0117*** (0.00253)
Big_ten	−0.00200 (0.0135)	−0.00568 (0.00688)	8.55e−05 (0.00824)	0.239 (0.173)	0.000289 (0.000441)
Constant	−0.421** (0.171)	0.348** (0.0980)	0.508*** (0.113)	−2.778 (2.075)	0.547*** (0.00668)
Year	Control	Control	Control	Control	Control
Indu	Control	Control	Control	Control	Control
Observations	4674	5187	9861	9776	9861
R-squared	0.147	0.249	0.162		0.868
Pseudo R2				0.4349	

Note: Robustness standard errors in parentheses.

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

correlation between auditor gender (Aud\_gender1 and All\_male) and audit quality (DA\_AO3 and DA\_AO5) when DA is negative. This finding indicates that the audit quality of female auditors (female auditor combination) was significantly lower than that of male auditors (male auditor combination) when the auditors faced “minor problems (i.e., client’s downward adjusted earning).” When DA is positive, a nonsignificant negative correlation was seen between auditor gender (Aud\_gender1 and All\_male) and audit quality (DA\_AO2 and DA\_AO4), which indicates that there is no longer a significant gender difference on audit quality between female auditors (female auditor combination) and male auditors (male auditor combination) when the auditors faced “relatively serious problems (i.e., client’s upward adjusted earning).” When DA does not distinguish positive and negative directions, a nonsignificant positive correlation is seen between Aud\_gender1 and audit quality (DA\_AO), but a significant positive correlation is also seen between All\_male and audit quality (DA\_AO). This indicates that a nonsignificant gender difference is seen in the audit quality of the first signed auditors, but a significant gender difference is seen in the audit quality of the same-sex gender signed auditor combinations, and the audit quality provided by the male auditor combinations exceeds that of the female auditor combinations. The hypothesis is thus further tested.

#### 4.4.3. Add independent variables

The robustness test results of replacement of independent variables from Aud\_gender2 to Aud\_gender1 and Aud\_gender2 support our research hypothesis as before. We use the genders of the first signed auditor

Table 12  
Robustness test of replaced independence.

Variables	DA_AO	DA_AO2	DA_AO3	DA_AO4	DA_AO5
<i>A: Robustness test of replacing the second signed auditor with the first signed auditor</i>					
Aud_gender1	0.0660 (0.0490)	−0.0676 (0.0660)	0.209*** (0.0745)	−0.0670 (0.0670)	0.230*** (0.0763)
Constant	0.696 (0.560)	1.244 (0.820)	0.105 (0.796)	1.358 (0.835)	−0.268 (0.815)
Year	Control	Control	Control	Control	Control
Indu	Control	Control	Control	Control	Control
Observations	9861	5187	4674	5057	4445
Pseudo R2	0.0766	0.0527	0.1064	0.0573	0.1034
<i>B: Robustness test of replacing the second signed auditor with the two same-sex signed auditor combinations</i>					
All_male	0.200*** (0.0742)	−0.0121 (0.101)	0.377*** (0.113)	−0.0166 (0.102)	0.409*** (0.116)
Constant	−0.330 (0.728)	0.0435 (1.064)	−0.732 (1.026)	0.262 (1.085)	−1.240 (1.062)
Year	Control	Control	Control	Control	Control
Indu	Control	Control	Control	Control	Control
Observations	5823	3056	2763	2973	2610
Pseudo R2	0.0783	0.0565	0.1104	0.0614	0.1117
<i>C: Robustness test of the first and second signed auditors together as independent variables</i>					
Aud_gender1	0.0601 (0.0491)	−0.0694 (0.0660)	0.203*** (0.0746)	−0.0681 (0.0670)	0.224*** (0.0765)
Aud_gender2	0.128*** (0.0444)	0.0381 (0.0605)	0.167** (0.0658)	0.0239 (0.0614)	0.176*** (0.0675)
Constant	0.589 (0.561)	1.207 (0.821)	−0.0358 (0.795)	1.335 (0.837)	−0.414 (0.814)
Year	Control	Control	Control	Control	Control
Indu	Control	Control	Control	Control	Control
Observations	9861	5187	4674	5057	4445
Pseudo R2	0.0772	0.0528	0.1073	0.0573	0.1045

Note: Robustness standard errors in parentheses.

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

(Aud\_gender1) and the second signed auditor (Aud\_gender2) as independent variables to simultaneously substitute the gender of the second signed auditor in regression model (1). Panel C of Table 12 displays the empirical results and shows a significant correlation between auditor gender (Aud\_gender1 and Aud\_gender2) and audit quality (DA\_AO3 and DA\_AO5) when DA is negative. This finding indicates that male auditors show a higher audit quality than female auditors. These empirical results further robustly confirm our research hypothesis.

#### 4.4.4. Simultaneous replacement of dependent variable and independent variable

In a combination of the previous three methods of robustness testing, we replaced the dependent and independent variables simultaneously. Table 13 shows the empirical results. For both a separate examination of the effect of the first signed auditor on audit quality (in Panel A of Table 13) and a joint study of the effect of the first and second signed auditors on audit quality (in Panel C of Table 13), nonsignificant correlations are seen between Aud\_gender1 and audit quality for each measurement method. This finding indicates that the effect of the first signed auditors' gender on the audit quality is not clear and that it was reasonable both in theory and in practice to choose the gender of the second signed auditor as an independent variable. At the same time, for both a separate examination of the effect of the second signed auditor on audit quality (Table 10) and a joint study of the effect of the first and second signed auditor on audit quality (in Panel C



Table 13  
Robustness test of dependent and independent variables replaced at the same time.

Variables	(1) DA+	(2) DA–	(3) ABSDA	(4) Maos	(5) AO
<i>A: First signed auditor and audit quality commonly used in mainstream literature</i>					
Aud_gender1	–0.00463 (0.00773)	0.0212 (0.0151)	–0.0103 (0.00918)	–3.58e–05 (0.000504)	0.253 (0.204)
Constant	0.343*** (0.0982)	–0.416** (0.171)	0.502*** (0.114)	0.548*** (0.00670)	–2.527 (2.067)
Year	Control	Control	Control	Control	Control
Indu	Control	Control	Control	Control	Control
Observations	5187	4674	9861	9861	9776
R-squared	0.249	0.146	0.162	0.868	
Pseudo R2					0.4340
<i>B: Two same-sex signed auditor combination and audit quality commonly used in mainstream literature</i>					
All_male	–0.0230* (0.0120)	0.0423* (0.0234)	–0.0283** (0.0138)	0.000985 (0.000758)	0.579* (0.331)
Constant	0.403*** (0.124)	–0.362* (0.214)	0.487*** (0.141)	0.548*** (0.00907)	–2.062 (2.525)
Year	Control	Control	Control	Control	Control
Indu	Control	Control	Control	Control	Control
Observations	3060	2763	5823	5823	5781
R-squared	0.262	0.175	0.185	0.874	
Pseudo R2					0.4381
<i>C: Two signed auditors and audit quality commonly used in mainstream literature</i>					
Aud_gender1	–0.00421 (0.00773)	0.0202 (0.0151)	–0.00955 (0.00919)	–7.43e–05 (0.000504)	0.213 (0.203)
Aud_gender2	–0.00861 (0.00708)	0.0281** (0.0137)	–0.0161* (0.00839)	0.000826* (0.000450)	0.321* (0.186)
Constant	0.351*** (0.0982)	–0.439** (0.172)	0.516*** (0.114)	0.547*** (0.00673)	–2.871 (2.084)
Year	Control	Control	Control	Control	Control
Indu	Control	Control	Control	Control	Control
Observations	5187	4674	9861	9861	9776
R-squared	0.249	0.147	0.162	0.868	
Pseudo R2					0.4354

Note: Robustness standard errors in parentheses.

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

of Table 13), significant positive correlations are seen between Aud\_gender2 and audit quality for each measurement method. This finding shows that male auditors have smaller DA and a greater likelihood of issuing a modified audit opinion, which indicates that the audit quality provided by male auditors is higher than that provided by female auditors. The relationships between the two same-sex auditor combinations and the four audit quality indices, except for Maos, are significant (in Panel B of Table 13). These empirical results show that male auditor combinations have a smaller DA in client's financial statements and are more likely to issue an actual modified audit opinion; it also indicates that the audit quality of male auditor combinations is higher than that of female auditor combinations. The above empirical evidence robustly confirms our research hypothesis.

#### 4.5. Endogenous discussion

In our regression model, we control the factors commonly used in the literature, such as the characteristics of corporate finance, corporate governance, and accounting firms, which may affect audit quality. However, some unobservable variables may distort our results. At the same time, auditor gender selection may be not

random, which may lead to self-selection bias in our empirical results. To alleviate these potential endogenous problems, based on the practice of Francis et al. (2015) and the changes in auditors' gender, we adopt the double differential (DID) method to alleviate the possible endogenous problems caused by missing variables and the propensity score matching (PSM) method to mitigate the endogenous problem in that the samples may not have a random distribution. In addition, different accounting firms have different brand reputations, different attractions for auditors of different abilities, and different audit quality objectives. These differences among accounting firms may affect the random distribution of auditors of different genders. Therefore, we control for the individual effect of the accounting firm to alleviate the possible impact of inherent differences between accounting firms on audit quality. At the same time, to alleviate this kind of endogenous problem, we examine the impact of auditor gender on audit quality according different brands of accounting firms (Big10 and Non-Big10).

#### 4.5.1. Use the DID method to alleviate endogenous problems caused by missing variables

We use the DID method to investigate the changes in audit quality after the interchangeability of male and female auditors. **First**, we introduce an indicative variable of auditor change, DUM\_aud2change, which equals 1 if the change is from female to male, otherwise 0. **Second**, with reference to Gul et al. (2013), we construct two proxy variables of audit quality that can better reflect the auditors' audit attitude and risk taking, the likelihood that auditors would issue modified audit opinions (DUM\_maos),<sup>3</sup> and the radicalization of audit report by auditors (DUM\_ARAgg),<sup>4</sup> which reflects the auditor's prudence. Columns 2 and 3 of Table 14 show the empirical results for the impact of auditor gender change on audit quality. A significant negative correlation was seen between DUM\_aud2change and DUM\_maos and DUM\_ARAgg separately. This finding indicates that when a female auditor is replaced with a male auditor, the probability that a listed company should be issued modified audit opinions has been reduced obviously, and the radicalization of audit reports also has been reduced obviously. This result illustrates that when a female auditor is replaced with a male auditor, the audit quality is obviously promoted, and the audit quality provided by male auditors is higher than that provided by female auditors.

#### 4.5.2. Use the PSM method to alleviate endogenous problems caused by sample non-random distribution

**First**, following the method of Francis et al. (2015), we estimate the probability of selecting male auditors in the sample of change of auditor gender. We used the indicative variable (DUMaud2change2) as the explained variable; used the main characteristics of companies, such as company size (Size), profitability (ROA), and financial leverage (Lev), as explanatory variables; performed logistic regression based on controlling the industry and year effects; and obtained a probability value of selecting a male auditor. **Second**, we use the probability value to match the 1:1 nearest neighbor sample. This process ensures that the sample of female auditors replaced with a male auditor was matched with a sample of male auditors replaced with a female auditor. **Last**, we integrate the experimental samples and paired samples and investigate the differences in audit quality between female and male auditors among the experimental and paired samples. Columns 4 and 5 of Table 14 show the empirical results. Significant negative correlations are seen between Aud\_gender2 and DUM\_maos and DUM\_ARAgg separately. This finding shows that when the auditor changed, the probability of male auditors issuing modified audit opinions to listed companies is obviously reduced, and the radicalization of

<sup>3</sup> Probability model:  $AO = \alpha_0 + \alpha_1 \text{Quickratio} + \alpha_2 \text{AR} + \alpha_3 \text{Other} + \alpha_4 \text{INV} + \alpha_5 \text{ROA} + \alpha_6 \text{Loss} + \alpha_7 \text{Lev} + \alpha_8 \text{Size} + \alpha_9 \text{Listage} + \alpha_{10} \text{Indu}$ . In the model, AO is the type of audit opinion; it equals 0 if it is standard audit opinion, and equals 1 if it is modified audit opinion; Quickratio is quick ratio; AR, Other and INV are Ratio of accounts receivable, other receivables and inventory to total assets, respectively; ROA is the return on assets; Loss is the indicate variable, equals 1 if the company was loss, otherwise equals 0; Lev is asset-liability ratio; Size is the company's size; Listage is the listing years of company; Indu is the industry. Maos is the prediction estimate value of probability Model OLS regression. the mean of Maos is 0.0331, the minimum value is -0.0696, the median is 0.019, the maximal value is 0.2488.

<sup>4</sup> ARAgg expresses the radicalization of audit reports, it equals MAOs minus AO; the higher the value of ARAgg, the more radical, the lower the audit quality. After winsorizing the ARAgg at the 1% level, we introduce an indicate variable, DUM\_ARAgg, which equals 1 if ARAgg greater than its median, expresses a lower radicalization of audit reports and a lower audit quality; which equals 0 if ARAgg smaller than its median, expresses a higher radicalization of audit reports and a higher audit quality. The mean of DUM\_ARAgg is 0.4999, the standard deviation of DUM\_ARAgg is 0.5, the median of DUM\_ARAgg is 0.

Table 14  
Regression results of DID and PSM method.

Variables	DUM_maos	DUM_ARAgg	DUM_maos	DUM_ARAgg
DUM_aud2change	−0.286* (0.168)	−0.257* (0.143)		
Aud_gender2			−0.286* (0.168)	−0.257* (0.143)
Size	−2.879*** (0.201)	−2.154*** (0.189)	−2.879*** (0.201)	−2.154*** (0.189)
Lev	0.0690*** (0.00687)	0.0442*** (0.00683)	0.0690*** (0.00687)	0.0442*** (0.00683)
ROA	0.0468** (0.0228)	0.0589*** (0.0219)	0.0468** (0.0228)	0.0589*** (0.0219)
Growth	0.0502 (0.0651)	−0.142** (0.0723)	0.0502 (0.0651)	−0.142** (0.0723)
Lnage	2.171*** (0.166)	1.773*** (0.156)	2.171*** (0.166)	1.773*** (0.156)
Ownership_conc	−0.0121* (0.00623)	−0.00522 (0.00505)	−0.0121* (0.00623)	−0.00522 (0.00505)
Dnetprof	−	4.052*** (0.656)	−	
Doul	−0.0697 (0.195)	−0.140 (0.169)	−0.0697 (0.195)	−0.140 (0.169)
AO_lag	−0.245 (0.890)	−4.866*** (1.763)	−0.245 (0.890)	−4.866*** (1.763)
Big_ten	0.132 (0.173)	0.140 (0.147)	0.132 (0.173)	0.140 (0.147)
Constant	57.19*** (4.173)	42.62*** (3.961)	57.19*** (4.173)	42.62*** (3.961)
Year	Control	Control	Control	Control
Indu	Control	Control	Control	Control
Observations	1207	1360	1207	1360
Pseudo R2	0.4585	0.4016	0.4585	0.4016

Note: Robustness standard errors in parentheses.

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

the audit reports of male auditors is also reduced. This illustrates that the change of auditor from female to male obviously increases the audit quality and that the audit quality provided by male auditors is higher than that provided by female auditors. This result further supports our hypothesis.

#### 4.5.3. Endogenous problems caused by individual difference of accounting firm

We assume that accounting firms may have a certain system or customary rule of auditor distribution, and this system or customary rule may lead to the allocation of male auditors to “good companies” (i.e., those with a better financial statement) and female auditors to “bad companies” (i.e., those with a worse financial statement), thereby leading to the endogenous problems of causality. This endogenous possibility is almost impossible from the perspective of logic and practice. For the sake of conservatism, we adopt the regression method of controlling the individual effect of accounting firms to alleviate this endogenous problem. Column 2 of Table 15 shows the empirical results. The audit quality of male auditors is also better than that of female auditors.

#### 4.5.4. Possible effects of the brand of accounting firm on auditor's gender selection

According to DeAngelo (1981b), a significant positive correlation exists between the size (brand) of the accounting firm and audit quality. From the perspective of sociology, it is considered that various brands

Table 15  
Robustness test of controlled individual effect and brand of accounting firm.

Variables	Full sample DA_AO	Big10 DA_AO	Non-Big10 DA_AO
Aud_gender2	0.125*** (0.0456)	0.134** (0.0593)	0.121* (0.0725)
Size	0.00121 (0.0276)	0.0222 (0.0351)	−0.0291 (0.0453)
Lev	−0.00927*** (0.00145)	−0.00846*** (0.00195)	−0.0108*** (0.00223)
ROA	−0.00734 (0.00550)	−0.00765 (0.00713)	−0.00615 (0.00876)
Growth	0.0146 (0.0178)	0.0315 (0.0238)	−0.00653 (0.0273)
Lnage	−0.0915*** (0.0296)	−0.119*** (0.0389)	−0.0331 (0.0468)
Ownership_conc	−0.00396*** (0.00153)	−0.00550*** (0.00198)	−0.00134 (0.00245)
Dnetprof	0.0517 (0.0927)	0.0171 (0.120)	0.114 (0.146)
Doul	0.0578 (0.0522)	0.125* (0.0677)	−0.0274 (0.0833)
AO_lag	0.162 (0.174)	0.164 (0.222)	0.0462 (0.273)
Big_ten	−0.0647 (0.110)		
Constant	1.089 (0.673)	0.773 (0.829)	1.713* (1.007)
Year	Control	Control	Control
Indu	Control	Control	Control
Individual effect	Control	Control	Control
Observations	9852	5539	4261
Pseudo R2	0.0847	0.0706	0.1064

Note: Robustness standard errors in parentheses.

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

or sizes of accounting firm have different attraction and employment requirements for auditors. The control quality is usually better in large accounting firms with a good brand, and they may then usually select male auditors. (Could it be that male auditors have better audit quality?) To alleviate the endogenous problem caused by auditor gender selection by accounting firms of various sizes and brands, we divide the sample into two groups (Big10 and Non-Big10) according to the brand ranking of the accounting firms hired by the sample companies and investigate the impact of auditor gender on audit quality. Table 15 shows the results. The gender difference in audit quality is also significant in various subsamples (i.e., the audit quality of male auditors remains significantly higher than that of female auditors).

#### 4.6. Further analysis

As described in the second part of the theoretical analysis, men's testosterone levels decline after 40 years of age, and women's ovaries begin to atrophy at around 45 years of age. The rapid decline in male androgen levels and female estrogen levels at a certain age will result in a decrease in the gender difference in the level of empathy (Feldman et al., 2002) and lead to a reduction of gender differences in management decisions and behavioral outcomes. Male and female sex hormone levels decline sharply at different points in time. At 40 years of age, men's male hormone levels begin to drop sharply, and their empathy levels began to rise;

women are also at a stage in which female hormone levels and empathy levels continue to increase, so the gender difference in empathy level may not change at this time. At 45 years of age, men's male hormone levels continue to decline, and their empathy levels continue to rise; however, women's female hormone levels and empathy levels begin to decline, so the gender difference in the empathy level will be significantly reduced at this time. Therefore, we can predict that the gender differences in auditors' empathy level and audit quality will be significantly reduced or even disappear after 45 years of age. To show this connection, we divided the sample into a low age group and a senior age group (divided at 45 years of age) and examined the influence of the auditor's age on gender and audit quality. Columns 2 and 3 of Table 16 show the regression results. The coefficient of the main independent variable, Aud\_gender2, is significantly positive in the low age group, which indicates that the male auditors showed better audit quality than the female auditors. The relationship direction and significant level of control variables are consistent with the results of the full sample. A nonsignificant positive correlation between Aud\_gender2 and audit quality is seen in the older age group; this indicates that after 45 years of age, the gender difference in audit quality narrowed or even disappeared.

To further test the corollary that the gender difference in audit quality should decrease significantly or even disappear with advancing position, we categorize the sample into two groups according to the position of the second signed auditor: a group of senior executives whose position is partner or senior executive and a group of non-senior executives whose position is below senior executive or manager. We then investigate in groups

Table 16

Regression results of gender difference of audit quality for auditors of different ages and positions.

Variables	Low age group	Older age group	Non-senior executive	Senior executive
	DA_AO	DA_AO	DA_AO	DA_AO
Aud_gender2	0.136*** (0.0483)	0.0876 (0.116)	0.118** (0.0471)	0.211 (0.140)
Size	0.00274 (0.0276)	0.0577 (0.0741)	0.0304 (0.0278)	-0.120 (0.0753)
Lev	-0.00720*** (0.00156)	-0.0183*** (0.00364)	-0.00997*** (0.00150)	-0.00154 (0.00479)
ROA	-0.00666 (0.00582)	-0.00687 (0.0146)	-0.0115** (0.00567)	0.0405** (0.0187)
Growth	0.00410 (0.0189)	0.0691 (0.0457)	0.0242 (0.0184)	-0.0516 (0.0641)
Lnage	-0.100*** (0.0315)	-0.0475 (0.0797)	-0.0849*** (0.0313)	-0.134 (0.0860)
Ownership_conc	-0.00335** (0.00164)	-0.00581 (0.00390)	-0.00235 (0.00161)	-0.0153*** (0.00455)
Dnetprof	0.0498 (0.101)	0.208 (0.232)	0.0494 (0.0974)	0.234 (0.286)
Doul	0.0476 (0.0560)	0.183 (0.134)	0.0434 (0.0546)	0.209 (0.158)
AO_lag	0.285 (0.196)	-0.415 (0.396)	0.155 (0.181)	0.135 (0.595)
Big_ten	-0.0368 (0.0475)	0.0160 (0.115)	-0.0191 (0.0460)	-0.0771 (0.142)
Constant	0.773 (0.602)	-0.0217 (1.576)	0.296 (0.601)	3.269** (1.667)
Year	Control	Control	Control	Control
Indu	Control	Control	Control	Control
Observations	8320	1528	8765	1069
Pseudo R2	0.0744	0.1058	0.0770	0.0844

Note: Robustness standard errors in parentheses.

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.



the effect of auditor position on the relationship between gender and audit quality. Columns 3 and 4 of Table 16 show the regression results. The coefficient of the main independent variable, Aud\_gender2, is significant and positive in the non-senior executive group, which indicates that the audit quality of male auditors is better than that of female auditors in low positions and that the audit quality of male auditors is better than that of female auditors overall. The relationship direction and significance level of the control variables are consistent with the results of the full sample. A nonsignificant positive correlation was seen between Aud\_gender2 and audit quality in the senior executive group. This indicates that the use of a position at or above manager allowed the gender difference in audit quality to narrow or even disappear. The empirical results above support our corollary about the influence of age and position on the auditor's gender difference of audit quality and further prove the main assumption of this study, that is, that the audit quality provided by male auditors is better than that provided by female auditors.

## 5. Discussion and conclusions

Following the framework of empathy theory and gender role socialization theory, this study investigates the influence of auditor gender on audit quality. Using large samples from Chinese A-share listed companies on both the Shanghai and Shenzhen Stock Exchanges from 2011 to 2015, we first find that the audit quality of female auditors is lower than that of male auditors. This phenomenon is related to women's higher empathy level and relationship-oriented social gender roles. **Second**, after the direction of DA is further distinguished, a positive DA indicates that the auditor may have a higher audit risk; under the circumstances, male and female auditors have the same audit attitude and quality control, which leads to a lack of a significant gender difference in their audit quality. A negative DA, however, indicates that the auditor may have a lower audit risk; under the circumstances, the audit quality shows a significant gender difference in that the audit quality of female auditors is lower than that of male auditors. This result indicates that when auditors face the problem of downward-adjusted earning and lower audit risk, female auditors are more likely to pardon and compromise with clients. **Third**, the significant gender difference in audit quality disappears with auditors older than 45 years. This is related to a convergence in the empathy level caused by the sharp reduction of male androgen levels after 40 years of age and the sharp reduction of female estrogen levels after 45 years of age; it is also related to the convergence of social gender roles between female and male auditors with age. The convergence path includes an increase in the empathy level of male auditors, which leads to a slight decline in their audit quality (0.7%); however, the empathy level of female auditors declines, which leads to a greater improvement in their audit quality (6%). These two factors lead to the reduction and disappearance of the gender difference in audit quality. **Fourth**, the gender difference in audit quality also narrows after a promotion in position, which is related to the fact that female executives tend to be more masculine (i.e., a "tough girl"). The study also finds that the audit quality shows an obvious increase when a female auditor is replaced with a male auditor and an obvious decline when a male auditor is replaced with a female auditor. This result further shows that the audit quality of male auditors is higher than that of female auditors.

The theoretical basis—logical reasoning and audit quality index construction—and conclusions of this study differ significantly from the extant research on auditors' gender differences in audit quality. We are very cautious about this, so we adopt four major categories including 35 methods for robustness tests and 4 categories including 7 methods for endogenous tests, and perform conscientious verification of our assumptions and inferences. Practice is the sole criterion for testing truth. If applied to practice, we find that our research conclusions are equally reasonable. The auditors and employees of accounting firms in the current accounting industry have higher levels of work intensity, more overtime, more legal and public opinion pressure, and greater requirements for physical strength and energy than ever before. Women may be at a disadvantage in physical strength and energy. A female auditor's performance may be affected by a lack of physical strength and energy in the actual work. Of course, it is also possible that significant gender differences in the division of labor in society and family have led to a significantly lower audit quality from female auditors than from male auditors. Therefore, our next study will consider the influence of cultural and social factors on the relationship between gender and audit quality.

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