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## Article

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# Adjustment costs of institutional tax changes from the audit pricing perspective: Empirical evidence from the VAT reform

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## ABSTRACT

Institutional changes inevitably impose adjustment costs on firms while also generating benefits. However, empirical evidence regarding the adjustment costs of institutional changes is limited, with much of the focus centered on benefits. Using data on China's A-share listed companies from 2010 to 2018 and the nation's staggered adoption of the “business tax to value-added tax reform” (hereafter, “VAT reform”) as a natural experiment, we examine the impact of this reform on a particular corporate cost: audit fees. We find audit fees to be 8.11% higher for VAT reform firms than for non-VAT reform firms. This difference does not exist before or after the reform year. That is, it is only observed in the year of VAT reform implementation. This indicates the existence of an adjustment cost specifically related to the VAT reform. Furthermore, we observe larger fee increases among firms audited by Big 4 international audit firms, firms that require more audit work, firms that are more complex, and firms with weak internal controls. From the audit pricing perspective, we provide evidence of the economic consequences of tax reform. The corporate adjustment costs that arise from institutional changes deserve more attention from decision-makers.

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## 1. Introduction

In recent years, China's ongoing market-oriented reforms have brought institutional changes and associated benefits. The pilot “business tax to value-added tax reform” (hereafter, “VAT reform”) launched during

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the 13th Five-Year Plan period is one of the most distinctive aspects of China's tax reform. Following the expansion of the scope of value-added tax in 2009, the Ministry of Finance and the State Administration of Taxation decided to implement institutional VAT reform with approval from the State Council. The aim was to further reduce corporate tax burdens and optimize the value-added tax system. Since first being piloted in Shanghai's transportation and modern service industries (hereafter, "1 + 6 industries") in 2012, the VAT reform has been gradually adopted by other provinces and industries. The VAT reform policy has been fully implemented nationwide since 2016. It represents the significant decision to reduce corporate tax burdens, stimulate market vitality, promote industrial and consumption upgrades, and extend supply-side structural reforms. It directly changes the tax calculation method and also profoundly affects companies' actual tax burdens (Wang and Li, 2014), investment in research and development (R&D; Li and Zhang, 2015), total factor productivity (Yuan et al., 2015), business scope (Chen and Wang, 2017), and various other business activities and governance behaviors.

The literature mainly highlights the various benefits of the VAT reform (Li and Zhang, 2015; Chen and Wang, 2017), with few studies focusing on its potential costs. Theoretical and practical evidence indicates that the adjustment costs induced by the VAT reform cannot be ignored. The VAT reform greatly affects a firm's accounting treatment, tax planning, and accounting procedures (Deng, 2016; Wang, 2019). After a firm adopts the VAT reform, the conversion from business tax accounting to value-added tax accounting causes changes in accounting confirmation, measurement, and recording, thereby affecting the firm's operating income, operating costs, total profits, income tax, urban construction tax, and accounting processes, such as bill processing and tax declaration (Yan, 2015). The special accounting treatment during the transition period after the VAT reform serves as an example. Firms encounter four specific difficulties during the transition period,<sup>1</sup> namely, the pilot taxpayer's differential taxation, the value-added tax deduction at the end of the period, the acquisition of transitional financial support, and special equipment for the value-added tax control system and technical maintenance costs to deduct the value-added tax. These issues give rise to a series of accounting changes after VAT reform implementation.

It is also difficult for auditors, with their existing knowledge, to resolve the changes in accounting treatments that arise from the VAT reform. Therefore, auditing firms that audit VAT reform pilot firms must learn the corresponding institutional details and spend more hours and effort on the audit process. In turn, their learning costs increase. Such hidden audit costs, which arise because of system changes, are eventually passed on to audit clients, thereby increasing audit fees. At the same time, because of the staggered adoption of the VAT reform, the risk of major misstatements in financial reports and the policy concerns of pilot firms may also be higher. Thus, audit firms face higher audit risk when auditing such firms, which may also increase audit fees.

The literature on audit pricing mainly focuses on two kinds of determinants, audit risk and audit effort (Simunic, 1980), which largely determine audit fees. Audit risk is influenced by corporate operating risks (Francis, 1984), financial risks (Bhaskar et al., 2019; Du and Lai, 2018), financial reporting risks (Houston et al., 1999; Houston et al., 2005), litigation risks (Abbott et al., 2017), and corporate governance structure (Larcker and Richardson, 2004). Audit effort is affected by company size (Francis, 1984; O'Keefe et al., 1994), audit firm size (Blokdiijk et al., 2006), reputation (DeFond et al., 2000), industry experience (Deis et al., 1996), audit hours (Gong et al., 2016), and audit inquiry (Ball et al., 2012). However, the literature only considers the effects of micro-factors on audit pricing and ignores the effect of macro-institutional changes. The effect of macro-institutional changes on audit pricing can be examined using the staggered adoption of a policy to establish a causal relationship (DeFond et al., 2020).

Some studies examine the impact of institutional changes on audit pricing, but most of these studies explore China's 2007 accounting standards reform (Luo et al., 2008; Lu and Zhang, 2009; He et al., 2012; Li et al., 2013; Tan et al., 2014; Dai et al., 2017). As discovered by international scholars, the introduction of these new accounting standards not only improved the quality of accounting information but also gave managers more discretionary powers, thereby increasing the severity of earnings manipulation. This "double-edged

<sup>1</sup> For details, please refer to the "Regulations on Accounting Treatment of Enterprises in the Pilot Program of Reforming Business Tax to Value-Added Tax" issued by the Ministry of Finance in 2012 and the "Regulations on Accounting Treatment of Value-Added Tax" issued in 2016.

sword” characteristic of the accounting standards reform makes it subject to an endogeneity problem when studying the reform’s impact on audit pricing. In contrast, the VAT reform reduces firms’ tax burden by merging related tax categories. The changes to tax accounting treatment resulting from the VAT reform are verifiable and simple. Therefore, the impact of the VAT reform on auditors is direct, relatively simple, and less affected by other factors. In addition, the staggered nationwide adoption of the VAT reform at the regional and industry levels can effectively exclude the impact of other institutional changes and macro-environmental changes. Hence, it can ensure the exogeneity of institutional change. In conclusion, the VAT reform is a suitable experimental context in which to explore the adjustment costs of institutional tax changes.

The difference in companies’ audit fees before and after their VAT reform adoption is plotted in Fig. 1. The horizontal axis is the time before and after companies are affected by the VAT reform, and the vertical axis is the proportion of audit fees in operating income. The figure shows significantly higher audit fees for the VAT reform firms in the year of VAT reform adoption than in the 2-year window (i.e., the first and second years before and after) around the reform adoption year. This indicates that the VAT reform significantly increases the audit fees of firms in the first year of the pilot program. This finding is consistent with the notion that the VAT reform imposes an adjustment cost on firms. The VAT reform not only changes the accounting methods of enterprises, but it also changes the working methods and scope of audit firms, prompting auditors to learn and practice new knowledge. The VAT reform may increase audit fees in the following three ways. First, the VAT reform changes a pilot firm’s accounting treatment. This requires the pilot firm’s auditor to upgrade its relevant accounting knowledge, increasing audit hours and costs. Second, as the VAT reform is implemented during the fiscal year, transition issues before and after the implementation are inevitable. As a result, the auditor’s workload during the audit also increases. Third, the VAT reform is an important part of extending the supply-side structural reform. The financial reports of pilot firms may be more prone to error, and they receive more attention and supervision from taxation authorities, local governments, the public, and investors, thereby increasing auditors’ litigation risk. In this case, whether accounting firms require more audit cost compensation and audit risk premiums by increasing audit fees becomes an important empirical problem that warrants academic investigation.

In this context, using the data of China’s A-share listed companies from 2010 to 2018 and the nation’s staggered adoption of the VAT reform as a natural experiment, we examine the impact of this reform on a particular corporate cost: audit fees. We find audit fees to be 8.11% higher in firms’ first year of VAT reform implementation, compared with firms not affected by the VAT reform. This effect does not exist before or after the reform year, indicating the existence of an adjustment cost specifically related to the VAT reform. This fee increase is greater among firms audited by the Big 4 international audit firms, firms that require more audit work, firms that are more complex, and firms with weak internal controls. Our findings remain unchanged under a series of robustness tests.

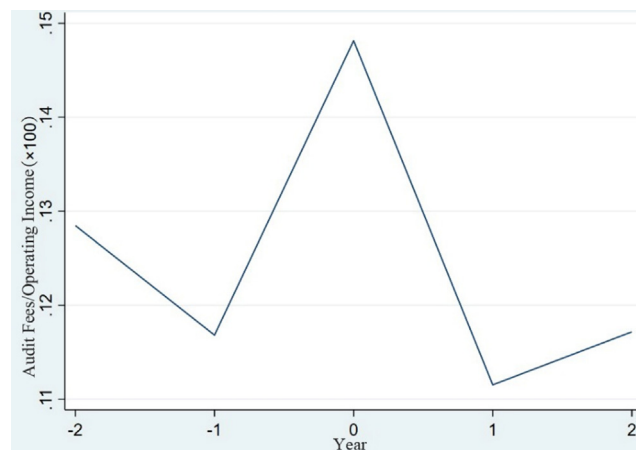


Fig. 1. The difference in companies’ audit fees before and after their VAT reform adoption, Sources: China Stock Market & Accounting Research database; Stata15.0 (for the calculation and illustration).

We make the following contributions. First, we add to the literature on the impacts of institutional changes on audit pricing and echo the future prospects proposed by DeFond et al. (2020). Audit research on Chinese issues in international journals is conducted from three main perspectives: unique disclosure, unique system characteristics, and unique regulatory changes (DeFond et al., 2020). From those three perspectives, the literature on unique regulatory changes mainly focuses on how changes in the audit system, such as the wave of mergers and acquisitions (Gong et al., 2016), the implementation of new audit standards in 1995 (DeFond et al., 1999), and the limited liability system reform in 1998 (Firth et al., 2012), affect auditing behavior. Few studies explore how institutional changes in non-audit factors affect corporate audit pricing. Only a few Chinese studies examine the impacts of institutional changes in the capital market and the reform of accounting standards on audit fees (Dai et al., 2017; Luo and Wu, 2018). No studies address how the changes in the taxation system represented by the VAT reform affect audit pricing. Nonetheless, as a key institutional reform involving taxation and accounting treatment, the VAT reform has a direct and significant impact on audit fees.

Second, we enrich the literature on the VAT reform policy, which mainly focuses on its general introduction (Cui, 2014). Research on the impact of the VAT reform on corporate behavior is mainly concentrated on tax avoidance (Fan and Peng, 2017), R&D investment (Li and Zhang, 2015), total factor productivity (Yuan et al., 2015), and business scope (Chen and Wang, 2017). We enrich the literature from the perspective of audit fees, thereby contributing to a comprehensive understanding of the economic consequences of the VAT reform policy.

Third, we use an appropriate experimental scenario in the empirical design and verify the existence of adjustment costs. In the literature, policy implementation tends to be unified, making it difficult to rule out interference from other events. We use the staggered adoption of VAT reform to better control potential endogeneity problems (e.g., missing variables) and thus reach a strong conclusion. Our findings also reveal the cost-passing phenomenon related to auditors' learning behaviors, adding to the classic audit pricing model (Simunic, 1980) in the growing literature related to audit behavior.

## 2. Institutional background and theoretical analysis

### 2.1. The VAT reform and audit pricing

As an important recent tax reform in China, the VAT reform is considered “an important part of the current promotion of structural reforms, especially supply-side structural reforms, and a major tax reduction measure to implement a proactive fiscal policy.”<sup>2</sup> After the value-added tax was fully implemented with the Provisional Regulation of the People's Republic of China on Value-Added Tax in 1994, China's tax system has included both a value-added tax and a business tax. At that time, the service industry was small and the reform was complicated, so the government kept the business tax to avoid contradictions and problems. However, the rapid development of China's economy has increasingly highlighted the drawbacks of having both the business tax and value-added tax. Problems such as double taxation, collection difficulties, and mixed sales have become increasingly serious. Following the 2009 expansion of the scope of the value-added tax, action was taken to further reduce corporate tax burdens and optimize China's value-added tax system. For example, firms from the 1 + 6 industries in Shanghai led the launch of the VAT reform on January 1, 2012. Beginning on August 1, 2012, the VAT reform was gradually expanded from Shanghai to other cities (e.g., Beijing and Tianjin) and provinces (e.g., Jiangsu, Zhejiang, Anhui, Fujian, Hubei, and Guangdong). The pilot industries were then expanded from the 1 + 6 industries to other service industries. On May 1, 2016, the VAT reform was adopted nationwide. A detailed reform timeline is shown in Table 1. Its staggered adoption allows the VAT reform to serve as an exogenous natural experimental context for the study of audit pricing.

<sup>2</sup> Chinese State Council: “Notice of the State Council on Doing a Good Job in Comprehensively Launching the Pilot Program of the VAT Reform.” Accessed October 19, 2019, at [http://www.mof.gov.cn/zhengwuxinxi/caizhengxinwen/201604/t20160430\\_1973069.html](http://www.mof.gov.cn/zhengwuxinxi/caizhengxinwen/201604/t20160430_1973069.html).

Table 1  
Timeline of the VAT reform.

Date	Reform Industry	Reform Province
January 1, 2012	Transportation industry; six modern service industries: R&D service, information technology service, cultural creativity service, logistics and supporting service, tangible movable property leasing, and authentication consulting	Shanghai
September 1, 2012	Transportation industry; six modern service industries: R&D service, information technology service, cultural creativity service, logistics and supporting service, tangible movable property leasing, and authentication consulting	Beijing
October 1, 2012	Transportation industry; six modern service industries: R&D service, information technology service, cultural creativity service, logistics and supporting service, tangible movable property leasing, and authentication consulting	Jiangsu, Anhui
November 1, 2012	Transportation industry; six modern service industries: R&D service, information technology service, cultural creativity service, logistics and supporting service, tangible movable property leasing, and authentication consulting	Fujian, Guangdong
December 1, 2012	Transportation industry; six modern service industries: R&D service, information technology service, cultural creativity service, logistics and supporting service, tangible movable property leasing, and authentication consulting	Tianjin, Hubei, Zhejiang
August 1, 2013	Transportation industry; six modern service industries: R&D service, information technology service, cultural creativity service, logistics and supporting service, tangible movable property leasing, and authentication consulting	Nationwide (except for the pilot areas above)
August 1, 2013	Radio and television service	Nationwide
January 1, 2014	Railway transportation, postal industry	Nationwide
June 1, 2014	Telecommunications	Nationwide
May 1, 2016	Construction industry, real estate industry, financial industry, life service industry	Nationwide

The literature on the VAT reform mainly focuses on the macro, meso, and micro levels. First, on the macro level, scholars examine the impact of the VAT reform on the economy, the energy consumption structure, consumer wealth, and the national income distribution. According to [Sun and Zhang \(2015\)](#), the VAT reform optimizes the distribution of the national income by increasing the income of residents and business sectors and by reducing the income of government departments. Second, on the meso level, scholars focus on the short-term effects of the VAT reform on the fiscal revenue of local governments and on its impact on industry transformation and upgrading. [Li et al. \(2015\)](#) find that fiscal revenue reduction during the reform process intensifies tax competition between local governments. Their results suggest that to improve the equalization of public services and the efficiency of public resource allocation, the value-added tax distribution should be reconstructed and the tax authority should be redivided. [Li and Yan \(2018\)](#) find that the tax reduction effect of the VAT reform in the service industry indeed leads to the transformation and upgrading of the manufacturing industry, marked by productivity improvement. [Fan and Peng \(2017\)](#) find that collaboration across regions improves after the VAT reform and that the technical abilities of firms significantly improve. Third, at the micro level, scholars examine the impact of the VAT reform on the actual tax burden, investment behavior, financing behavior, innovation behavior, corporate growth, and corporate performance. [Wang and Li \(2014\)](#) and [Li and Li \(2016\)](#) examine the impact of the VAT reform on the tax burden of listed companies in the transportation industry. They find that the tax burden of general value-added tax taxpayers in the transportation industry increases and that profitability decreases after the VAT reform. [Chen and Wang \(2017\)](#) find that listed companies' business scope and service outsourcing demand expand after the VAT reform. [Tong et al. \(2015\)](#) find that the less bargaining power a supplier has, the greater the increase in the nominal tax burden of the firm after the VAT reform, but the increased tax burden does not undermine the firm's performance. However, little research shows how the VAT reform affects the potential costs of companies. Research on the adjustment costs of the VAT reform from the audit pricing perspective is particularly lacking.

As intermediaries in the capital market, auditors provide important guarantees for the reliability and accuracy of corporate financial information, thereby playing a critical role in the implementation of the VAT reform. The VAT reform changes not only the accounting methods of enterprises but also the working methods and scope of audit firms, which are ultimately reflected in the changes in audit fees. The classic model of audit fees proposed by [Simunic \(1980\)](#) provides a logical and clear guide for the analysis of the adjustment



costs created by the VAT reform for firms. These costs can be analyzed from both the audit effort and audit risk perspectives.

From the audit effort perspective, after a firm adopts the VAT reform, the conversion from business tax accounting to value-added tax accounting causes changes in accounting confirmation, measurement, and recording. Consequently, the firm's operating income, operating costs, total profits, income tax, and urban construction tax are affected. Its accounting processes (e.g., bill processing and tax declaration) are also affected.<sup>3</sup> These changes can be summarized as changes in two aspects: accounting subject processing and accounting procedures. First, after implementing the VAT reform, firms must adopt special accounting treatments during the transition period, during which they encounter four specific difficulties: the pilot taxpayer's differential taxation, the value-added tax deduction at the end of the period, the acquisition of transitional financial support, and special equipment for the value-added tax control system and technical maintenance costs to deduct the value-added tax. These issues give rise to a series of accounting changes.<sup>4</sup>

Second, after VAT reform adoption, companies implement many adjustments in the accounting treatment of related businesses. One example is the financial leasing business (Xu et al., 2018). Before the VAT reform, lessors needed to account for the initial direct costs and the first lease payment received on the actual starting date of the lease, record the unguaranteed residual value, and distribute the unrealized financial lease income according to the lease term. After the VAT reform, when purchasing equipment, the leasing company must confirm and deduct the input value-added tax amount. When the equipment is leased as a financial lease and the rent is collected, the corresponding value-added output tax must be calculated. Furthermore, when the lessor's value-added tax liability is confirmed, firms can carry out many flexible treatments because the financial lease accounting standards are not sound. For example, firms can choose between confirming the value-added tax payable on the lease start date, deferring the output tax and transferring it out gradually, or confirming it once the rent is actually received.

Third, many changes occur in firms' invoice management and tax accounting processes after adoption of the VAT reform (Wang, 2019). Value-added tax is a national tax collection item. As such, firms must issue special value-added tax invoices. As business tax is a land tax collection item, firms must issue ordinary invoices for business tax services. The acquisition, authentication, issuance, and management of special value-added tax invoices are stricter than the processes for ordinary invoices, and dealing with many value-added tax return forms and their associated complex data items requires firm personnel to learn and recheck to avoid mistakes (Deng, 2016). Therefore, it is difficult for auditors to handle the changes in the accounting treatment brought about by the VAT reform using their existing knowledge. The annual audit project report must also be completed by an audit team comprised of auditors at various levels and with different experiences. Thus, the auditors of VAT reform firms must train their staff on the VAT reform, thereby increasing their costs. Auditors must also spend more time and effort on auditing firms under the VAT reform, as those accounting treatments are relatively new. This also increases audit firms' costs, audit investment, and audit pricing. In addition, the VAT reform is not carried out at the beginning or end of a certain fiscal year. The discontinuity between accounting and tax policies presents auditors with two sets of accounting treatments at the same time. Hence, the amount of work to be undertaken during voucher sampling and walk-through testing also increases.

From the audit risk perspective, the VAT reform may increase audit fees by increasing the audit risk of audit firms. First, a VAT reform firm may use the changes in accounting treatment caused by the reform to conduct tax planning, earnings management, or other manipulation behaviors (Li and Li, 2016), making its accounting treatment deviate from its economic substance and thereby increasing the risk of a material misstatement in its financial reports. Second, the changes in accounting treatment caused by the reform are new knowledge for audited companies. As such, companies are more prone to accounting errors, which may also increase the risk of major misstatements in their financial reports. Third, as VAT reform firms face more com-

<sup>3</sup> For example, the Sohu News report from February 28, 2017, "Review | Special Considerations for the 'VAT Reform' in the Audit of 2016 Financial Statements." For details, please refer to [https://www.sohu.com/a/127434317\\_395649](https://www.sohu.com/a/127434317_395649).

<sup>4</sup> For details, please refer to the "Regulations on Accounting Treatment of Enterprises in the Pilot Program of Reforming Business Tax to Value-Added Tax" issued by the Ministry of Finance in 2012 and the "Regulations on Accounting Treatment of Value-Added Tax" issued in 2016.

plicated invoice management and accounting procedures, they are more likely to manipulate earnings and implement tax avoidance (Tong et al., 2015). This makes them more susceptible to inspection by government tax authorities and the media. As a result, according to deep pocket theory, their auditors are more likely to charge a higher risk premium (Li and Wu, 2004).

The fierce competition in the Chinese audit market may make it difficult for auditors to translate higher audit costs into higher audit fees. To resolve this, the increase in labor and training costs during the VAT reform pilot period are indeed compensated by an audit fee premium. In some cases, increased audit fees can still be negotiated during the audit process, despite the audit contract being signed at the beginning of the fiscal year.<sup>5</sup> Although the VAT reform has a long-term sustainable impact on enterprises' operations and investments, it only affects corporate audit fees in the year of implementation due to the unique determinants of these fees. There are two reasons for this. First, the accounting treatment of the affected companies in the VAT reform year undergoes a sudden change. This makes the accounting treatment more complicated and error prone. Second, auditors have insufficient experience and learn relevant knowledge only when they are auditing firms with new accounting changes. Therefore, auditors put more effort into auditing VAT reform firms and face greater audit risk in the year of VAT reform implementation. In turn, they charge higher audit fees. In the years after the reform, the accounting treatment changes gradually become ordinary treatments, and the auditors become familiar with the new treatments. As such, audit effort and audit risk do not increase during these years. Furthermore, companies no longer bear secondary adjustment costs<sup>6</sup> in the years after VAT reform adoption. The logical framework of this study is illustrated in Fig. 2.

In summary, audit firms' audit effort and audit risk are higher in the year of VAT reform adoption than in the years before and after it. Accordingly, audit firms charge higher audit fees in the year of VAT reform adoption. We propose the following hypothesis:

**H1:** Audit fees are significantly higher for firms during their year of VAT reform adoption, particularly compared with non-VAT reform firms and with the years before and after their VAT reform implementation.

## 2.2. The VAT Reform, auditor competency, and audit pricing

International Big 4 audit firms tend to make much greater long-term investments than other audit firms in training high-quality auditors. They also establish complete quality control mechanisms and provide high-quality audit services, thereby fostering their good reputation in the audit market (DeAngelo, 1981; Pittman and Fortin, 2004). Because of the relatively high competency of their auditors and their complete training systems, Big 4 audit firms demonstrate stronger bargaining power in terms of translating increased audit costs into audit fees when they encounter changes arising from the VAT reform. They are also more likely to rip their customers off when they face such institutional changes. Thus, the increase in audit fees may be even greater in Big 4 audit firms than in non-Big 4 audit firms.<sup>7</sup> We propose the following hypothesis:

**H2:** The increase in audit fees as a result of VAT reform adoption is higher for firms audited by Big 4 audit firms than for those audited by non-Big 4 audit firms.

<sup>5</sup> The announcement of listed companies' appointment and re-appointment of audit firms demonstrate that the employment and renewal contracts of audit firms do not necessarily disclose the corresponding audit fees. They may clearly disclose the agreed on audit fees, not mention audit fees at all, or indicate audit fees that were determined through follow-up negotiation, among many other circumstances. For example, according to Hicomm's announcement on renewing its appointment of Zhongshen Zhonghuan as its audit agency in 2020, the relevant audit fees would be determined by the company and Zhongshen Zhonghuan through negotiation based on business conditions.

<sup>6</sup> Shentong Metro (600834) is one example. Registered in Shanghai, Shentong Metro is a local state-owned listed company engaged in rail transit investment and operations. It is mainly engaged in the operation of Shanghai Metro Line 1 and other financial leasing businesses. On January 1, 2012, Shentong Metro became a pilot enterprise of the VAT reform. At the end of 2012, the auditor of its financial report was Shanghai Shanghui Accounting Firm. From 2009 to 2011, the audit fee for Shentong Metro was 300,000 yuan, which suddenly increased to 350,000 yuan in 2012 when it became a VAT reform pilot firm.

<sup>7</sup> For example, refer to the Sina News report, "The Big Four Accounting Firms High Fees Swallowing the Domestic Auditing Market" at <http://finance.sina.com.cn/b/20041031/14091121345.shtml> for details.



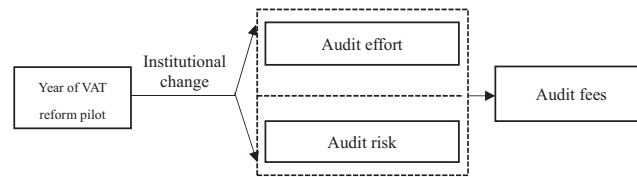


Fig. 2. The impact mechanism of the VAT reform on audit fees.

### 2.3. The VAT Reform, audit workload, and audit pricing

Auditor input is an important determinant of audit fees (Simunic and Stein, 1996; DeFond and Zhang, 2014). Auditors who audit VAT reform firms must invest more auditing effort as a result of increased learning costs, so they charge higher audit fees. Companies with higher operating income usually generate more business operations, produce more business vouchers that require auditing, and have a greater workload for auditors than companies with low operating income (Menon and Williams, 2001; Wu, 2003). Hence, in the first year of a company's participation in the VAT reform pilot program, audit institutions must spend more energy and time conducting audits, leading to higher audit fees. At the same time, the compulsory changes imposed by VAT reform regulations mean that businesses must change their audit processes more, thereby increasing audit risk. Consequently, companies with higher audit workloads and high operating income are also charged more due to the greater audit fee risk premium. That is, audit fees increase to a greater extent for high operating income companies than for low operating income companies under the VAT reform, as the latter have lower audit workloads. Accordingly, we propose the following hypothesis:

**H3:** The increase in audit fees as a result of VAT reform adoption is higher for firms with greater audit workloads than for those with smaller audit workloads.

### 2.4. The VAT Reform, business complexity, and audit pricing

The business complexity of audited firms determines the difficulty and workload of the audit process. The more complex the operations of an audited entity, the more effort an auditor must exert to obtain reasonable assurance of accurate financial statements. Among VAT reform companies, those with greater business complexity have more types of business affected by the reform. This requires their auditors to learn and update more audit processes and examine more accounting vouchers. Therefore, audit costs increase more than for VAT reform companies with low business complexity. High business complexity also triggers opportunistic behaviors by major shareholders and management (Bushman et al., 2004), which makes auditing risky. When a VAT reform firm under audit has higher business complexity, the opportunistic tendency of its managers increases the possibility of misstatement and hence its auditor's risk. Therefore, auditors charge such firms a higher risk premium. We propose the following hypothesis:

**H4:** The increase in audit fees as a result of VAT reform adoption is higher for firms with high business complexity than for those with low business complexity.

### 2.5. The VAT Reform, internal controls, and audit pricing

Finally, the internal-control quality of an audited firm may also moderate the relationship between the VAT reform and audit fees. Internal-control deficiencies may result in ineffective controls over the accurate and complete recording of business information, causing more mistakes in financial reports when facing the more complex accounting and taxation policy under the VAT reform. In addition, when audited firms have weak internal controls, auditors not only need to exert more effort but also face a relatively higher audit risk. Therefore, we propose the following hypothesis:

**H5:** The increase in audit fees as a result of VAT reform adoption is higher for firms with low internal-control quality than for those with high internal-control quality.

### 3. Research design and sample selection

#### 3.1. Data Sources and sample selection

To test our hypotheses, we obtain financial data on China's A-share listed companies from the China Stock Market & Accounting Research database for the 2010 to 2018 period. We manually collect and organize the data on the VAT reform pilot firms according to the industry category and year announced by the State Council. Stata15.0 is the statistical software used for this study. Following the literature, we exclude observations from the financial industry. We also exclude observations from special treatment (ST) companies, observations from newly listed companies, and observations with missing or abnormal data. Observations from ST companies are excluded because when audit firms audit ST companies, the profitability, debt status, continuing operations ability, regulatory risks, and other aspects of ST companies constitute important determinants of audit pricing. The performance pressures and regulatory requirements faced by ST companies in different years make their own audit pricing less comparable before and after. As such, ST firms have no suitable control group, making them an unsuitable sample for the examination of the impact of the VAT reform on audit fees. To control the extreme value problem, we winsorize the continuous variables at the 1st and 99th percentiles. The final sample consists of 20,204 firm-year observations.

#### 3.2. Models and variables

To examine the effect of the VAT reform on audit fees, we design model (1):

$$LN\text{FEE} = \beta_0 + \beta_1 YGZ + \beta_2 \text{CONTROLS} + \text{FIRM} + \text{YEAR} + \varepsilon \quad (1)$$

where the dependent variable is *LN*FEE, which is the natural logarithm of the audit fees of client firm *i* in year *t*. The independent variable is *YGZ*, which is a dummy variable that equals 1 in the first year of a firm's VAT reform adoption and 0 otherwise. Following the literature, such as Huang et al. (2014) and Gong et al. (2016), we control for company size, accounts receivable, inventory, the asset-liability ratio, cash flow from operating activities, accounting performance, company age, Big 4 status, audit opinions, CEO duality, the independent director ratio, managers' compensation, and firm- and year-fixed effects. Standard errors are clustered at the firm level. To test H2 to H4, we include the production of *YGZ* and the moderator in model (1). The definitions of these variables are provided in Table 2.

Table 2  
Variable definitions.

Variable	Definition
<i>LN</i> FEE	Natural logarithm of audit fees
<i>YGZ</i>	Dummy variable that equals 1 in the first year of a firm's VAT reform adoption and 0 otherwise
<i>SIZE</i>	Natural logarithm of total assets
<i>REC</i>	Accounts receivable/Total assets
<i>INV</i>	Inventory/Total assets
<i>LEV</i>	Total liabilities/Total assets
<i>ROA</i>	Net profit/Total assets
<i>OCF</i>	Net cash flow from operating activities/Total assets
<i>BIG4</i>	Dummy variable that equals 1 for Big 4 audit firms and 0 otherwise
<i>MAO</i>	Dummy variable that equals 1 if an auditor issues a modified auditing opinion and 0 otherwise
<i>COMPENSATION</i>	Natural logarithm of the sum of a company's top three executive salaries
<i>DUALITY</i>	Dummy variable that equals 1 if the chair of the board is also the CEO and 0 otherwise
<i>CASH</i>	(Cash at the end of the period + cash equivalents at the end of the period)/Total assets
<i>TOP1</i>	Largest shareholder's shareholding ratio
<i>GROWTH</i>	(Operating income of the implementation period – operating income of the previous period)/Operating income of the implementation period
<i>TURNOVER</i>	Total operating income/Total assets
<i>AGE</i>	Firm age
<i>BOARD</i>	Natural logarithm of the number of board members
<i>INDP</i>	Number of independent directors/Number of directors

### 3.3. Descriptive statistics

The descriptive statistics of the main variables are shown in Table 3. The average value of the audit fee (*LNFEET*) is 13.725 and the median is 13.592. These results indicate that the average annual audit fee paid by listed companies is approximately 908,900 yuan and that the sample is approximately normally distributed. The mean value of *YGZ* is 0.011, indicating that 1% of the observations in the sample implemented the VAT reform in the first year. The statistics of the control variables are consistent with the literature (Wu et al., 2012).

## 4. Empirical results and discussion

### 4.1. The VAT Reform and audit pricing

The regression results obtained for the testing of H1 are shown in Table 4. The results without the control variables are reported in columns (1) and (2). The control variables are included in columns (3) and (4) and firm- and year-fixed effects are included in columns (2) and (4). The coefficients of *YGZ* in columns (1) to (4) are significantly positive, indicating that audit fees increase significantly in the year of VAT reform implementation. These findings suggest the existence of adjustment costs due to institutional changes. For example, as shown in column (4), the economic significance of the coefficient is  $0.0811 (e^{0.078} - 1 = 0.0811)$ . This suggests that in the first year of VAT reform implementation, firms' audit fees increased by 8.11% on average, which indicates that the adjustment costs of institutional changes are considerable. Thus, H1 is supported.

### 4.2. The VAT Reform, auditor competency, and audit pricing

Next, we empirically test how auditor ability affects the relationship between the VAT reform and audit pricing. We use the interaction between the VAT reform (*YGZ*) and the international Big 4 audit firms (*BIG4*) to test the moderating effect. The results are shown in column (1) of Table 5. The coefficient of  $YGZ \times BIG4$  is significantly positive at the 5% level, indicating that the increase in audit fees for the companies audited by international Big 4 audit firms is significantly higher than that of the companies audited by non-Big 4 audit firms. Thus, H2 is supported. This result shows that the international Big 4 audit firms are afforded strong bargaining power through their comprehensive training mechanisms and auditor competency. This allows them to translate the higher costs that result from business changes due to VAT reform adoption

Table 3  
Descriptive statistics of the main variables.

Variable	Obs.	Mean	SD	Min.	P25	Median	P75	Max.
<i>LNFEET</i>	20,204	13.725	0.712	12.346	13.236	13.592	14.078	16.455
<i>YGZ</i>	20,204	0.011	0.105	0.000	0.000	0.000	0.000	1.000
<i>SIZE</i>	20,204	22.133	1.324	18.988	21.212	21.976	22.881	26.423
<i>REC</i>	20,204	0.111	0.102	0.000	0.028	0.086	0.165	0.466
<i>INV</i>	20,204	0.156	0.147	0.000	0.062	0.118	0.195	0.731
<i>LEV</i>	20,204	0.451	0.223	0.051	0.276	0.443	0.612	1.274
<i>ROA</i>	20,204	0.034	0.063	−0.320	0.012	0.033	0.062	0.209
<i>OCF</i>	20,204	0.039	0.074	−0.212	0.001	0.039	0.082	0.262
<i>BIG4</i>	20,204	0.055	0.227	0.000	0.000	0.000	0.000	1.000
<i>MAO</i>	20,204	0.043	0.202	0.000	0.000	0.000	0.000	1.000
<i>COMPENSATION</i>	20,204	14.328	0.712	11.983	13.882	14.310	14.752	16.326
<i>DUALITY</i>	20,204	0.247	0.431	0.000	0.000	0.000	0.000	1.000
<i>CASH</i>	20,204	0.155	0.125	0.000	0.068	0.120	0.203	0.675
<i>TOPI</i>	20,204	34.938	15.013	8.860	23.140	32.900	45.050	75.770
<i>GROWTH</i>	20,204	0.067	0.342	−2.143	−0.020	0.103	0.221	0.818
<i>TURNOVER</i>	20,204	0.620	0.449	0.041	0.328	0.515	0.768	2.610
<i>AGE</i>	20,204	16.221	5.549	3.000	12.000	16.000	20.000	29.000
<i>BOARD</i>	20,204	2.142	0.198	1.609	1.946	2.197	2.197	2.708
<i>INDP</i>	20,204	0.373	0.054	0.273	0.333	0.333	0.429	0.571

Table 4  
The VAT reform and audit pricing: Main results.

Variable	Dep. Var. = <i>LNFE</i>			
	(1)	(2)	(3)	(4)
<i>YGZ</i>	0.433*** (7.58)	0.114*** (5.00)	0.119*** (4.05)	0.078*** (4.38)
<i>SIZE</i>			0.361*** (44.19)	0.326*** (29.43)
<i>REC</i>			0.234*** (3.52)	0.013 (0.17)
<i>INV</i>			−0.280*** (−5.92)	−0.090* (−1.70)
<i>LEV</i>			0.004 (0.49)	0.015** (2.38)
<i>ROA</i>			−0.639*** (−7.77)	−0.206*** (−4.11)
<i>OCF</i>			0.093 (1.56)	0.061* (1.82)
<i>BIG4</i>			0.632*** (14.65)	0.233*** (4.80)
<i>MAO</i>			0.197*** (8.29)	0.114*** (6.96)
<i>COMPENSATION</i>			0.096*** (9.18)	0.046*** (4.60)
<i>DUALITY</i>			0.035*** (2.83)	0.002 (0.25)
<i>CASH</i>			−0.048 (−0.98)	−0.030 (−0.85)
<i>TOPI</i>			−0.001** (−2.06)	0.001 (1.41)
<i>GROWTH</i>			−0.056*** (−5.16)	−0.020** (−2.49)
<i>TURNOVER</i>			0.110*** (6.88)	0.077*** (4.14)
<i>AGE</i>			0.010*** (8.01)	−0.015 (−0.82)
<i>BOARD</i>			−0.106** (−2.56)	0.080*** (2.67)
<i>INDP</i>			0.134 (1.01)	0.091 (1.06)
<i>CONSTANT</i>	13.720*** (1,117.60)	13.226*** (1,523.90)	4.316*** (20.98)	5.463*** (15.07)
<i>FIRM</i>	No	Yes	No	Yes
<i>YEAR</i>	No	Yes	No	Yes
<i>N</i>	20,204	20,204	20,204	20,204
<i>Adj-R<sup>2</sup></i>	0.004	0.481	0.658	0.642

This table reports the effects of the VAT reform on audit fees. The dependent variable is *LNFE*. All of the variables are defined in Table 2. The analysis is based on an ordinary least squares model. The *t*-statistics are given in parentheses, and the coefficients are based on standard errors clustered at the firm level. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

into higher audit fees. Given the high reputation of the international Big 4 audit firms, the VAT reform increases audit risk for them even more than for other audit firms. As such, their audit fees increase more than those of other auditors for VAT reform firms.

#### 4.3. The VAT Reform, audit workload, and audit pricing

We conduct an empirical test of how audit workload affects the relationship between the VAT reform and audit pricing. According to the literature, the higher a company's operating income, the greater its business

Table 5

The VAT reform and audit pricing: Cross-sectional results.

Variable	Dep. Var. = <i>LNFEET</i>			
	(1)	(2)	(3)	(4)
<i>YGZ</i> × <i>BIG4</i>	0.099** (2.29)			
<i>YGZ</i> × <i>H_REV</i>		0.078** (2.33)		
<i>YGZ</i> × <i>H_TAXA</i>			0.072** (2.06)	
<i>YGZ</i> × <i>L_IC</i>				0.043 (1.63)
<i>YGZ</i>	0.058*** (2.91)	0.031 (1.40)	0.040 (1.52)	0.025*** (4.83)
<i>H_REV</i> / <i>H_TAXA</i> / <i>L_IC</i>		0.033*** (3.21)	−0.003 (−0.73)	0.070** (2.01)
<i>BIG4</i>	0.230*** (4.77)	0.234*** (4.85)	0.232*** (4.79)	0.326*** (29.53)
<i>SIZE</i>	0.326*** (29.47)	0.320*** (28.79)	0.326*** (29.41)	0.015 (0.19)
<i>REC</i>	0.013 (0.17)	0.012 (0.15)	0.013 (0.17)	−0.092* (−1.73)
<i>INV</i>	−0.090* (−1.69)	−0.087* (−1.65)	−0.091* (−1.71)	0.015** (2.40)
<i>LEV</i>	0.015** (2.38)	0.014** (2.40)	0.015** (2.38)	−0.204*** (−4.06)
<i>ROA</i>	−0.206*** (−4.10)	−0.217*** (−4.36)	−0.209*** (−4.12)	0.060* (1.79)
<i>OCF</i>	0.060* (1.79)	0.060* (1.80)	0.060* (1.82)	0.234*** (4.82)
<i>MAO</i>	0.114*** (6.97)	0.109*** (6.69)	0.114*** (6.98)	0.101*** (6.08)
<i>COMPENSATION</i>	0.046*** (4.61)	0.046*** (4.66)	0.046*** (4.61)	0.045*** (4.55)
<i>DUALITY</i>	0.002 (0.25)	0.003 (0.32)	0.002 (0.25)	0.002 (0.20)
<i>CASH</i>	−0.029 (−0.83)	−0.028 (−0.78)	−0.030 (−0.85)	−0.034 (−0.95)
<i>TOPI</i>	0.001 (1.40)	0.001 (1.49)	0.001 (1.41)	0.001 (1.40)
<i>GROWTH</i>	−0.019** (−2.48)	−0.020*** (−2.60)	−0.020** (−2.48)	−0.019** (−2.46)
<i>TURNOVER</i>	0.077*** (4.14)	0.068*** (3.59)	0.077*** (4.15)	0.077*** (4.13)
<i>AGE</i>	−0.015 (−0.82)	−0.016 (−0.86)	−0.015 (−0.82)	−0.015 (−0.82)
<i>BOARD</i>	0.080*** (2.68)	0.081*** (2.71)	0.080*** (2.67)	0.079*** (2.67)
<i>INDP</i>	0.090 (1.05)	0.093 (1.08)	0.091 (1.05)	0.085 (0.98)
<i>CONSTANT</i>	5.461*** (15.07)	5.577*** (15.45)	5.465*** (15.06)	5.460*** (15.06)
<i>FIRM</i>	Yes	Yes	Yes	Yes
<i>YEAR</i>	Yes	Yes	Yes	Yes
<i>N</i>	20,204	20,204	20,204	20,204
<i>Adj-R<sup>2</sup></i>	0.642	0.642	0.642	0.643

This table reports the results of the cross-sectional tests. The dependent variable is *LNFEET*. All of the variables are defined in Table 2. The analysis is based on an ordinary least squares model. The *t*-statistics are given in parentheses, and the coefficients are based on standard errors clustered at the firm level. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.



volume and the more vouchers and business operations involved in the implementation of substantive procedures by the auditor during the audit process, thereby increasing the audit workload (Menon and Williams, 2001; Wu, 2003). Therefore, we construct a dummy variable ( $H\_REV$ ) that equals 1 when a company's revenue is larger than the sample median. We include the interaction between  $YGZ$  and  $H\_REV$  in model (1). The results are shown in column (2) of Table 5. The coefficients of  $YGZ \times H\_REV$  are significantly positive at the 5% level, indicating that audit fees increase more for VAT reform firms with higher audit workloads. Thus, H3 is supported.

#### 4.4. The VAT Reform, business complexity, and audit pricing

We also conduct an empirical test of how business complexity affects the relationship between the VAT reform and audit pricing. The literature on corporate tax avoidance and accounting information quality points out that companies usually adopt a series of complex transaction behaviors to avoid tax, which negatively affects the transparency and quality of accounting information (Weber, 2009; Chen and Tang, 2012; Hanlon et al., 2012). In addition, firms that demonstrate a high degree of tax avoidance have more serious agency problems (Crocker and Slemrod, 2005). Such firms also exhibit more complicated transaction behaviors and more opaque accounting information. When auditing firms practice substantial tax avoidance, their auditors must undertake more complicated economic operations and may even encounter opportunistic behavior by management. Therefore, the degree of tax avoidance is a good measure of business complexity. As the VAT reform is a change in tax regulations, greater tax avoidance indicates more complicated tax treatment. This in turn largely increases auditors' difficulty in and risk of applying the new tax regulations to their client firms' business. To measure business complexity, we use the degree of tax avoidance, where tax avoidance is defined as the difference between the actual tax rate and the nominal tax rate.<sup>8</sup> We construct a dummy variable ( $H\_TAXA$ ) that equals 1 when a company's tax avoidance is greater than the sample median. We also include the interaction between  $YGZ$  and  $H\_TAXA$  in model (1). The results are shown in column (3) of Table 5. The coefficient of  $YGZ \times H\_TAXA$  is significantly positive at the 5% level, indicating that the VAT reform has a greater impact on audit fees when client firms' business complexity is high. Thus, H4 is supported.

#### 4.5. The VAT Reform, internal controls, and audit pricing

Finally, we conduct an empirical test of how internal-control quality affects the relationship between the VAT reform and audit pricing. Following Li et al. (2011), we deem non-standard audit opinions, administrative penalties by regulatory authorities, major internal-control defects, invalid internal controls, and companies' disclosure of major negative news in the media to be reflective of low internal-control quality. We construct a dummy variable ( $L\_IC$ ) that equals 1 for firms with low internal controls and 0 otherwise. To examine the internal-control adjustment, we include the interaction between  $YGZ$  and  $L\_IC$  in model (1). The results are shown in column (4) of Table 5. The coefficient of  $YGZ \times L\_IC$  is significantly positive at the 5% level, indicating that the VAT reform has a greater impact on audit fees when internal-control quality is low. Thus, H5 is supported.

### 5. Robustness tests

#### 5.1. Dynamic test

To better test the one-time characteristics of the impact of the VAT reform on audit fees, we construct the following dynamic model:

<sup>8</sup> The actual tax rate is the income tax expense divided by the total profit.

$$LNFEET = \beta_0 + \beta_1 YGZ_{-2} + \beta_2 YGZ_{-1} + \beta_3 YGZ_0 + \beta_4 YGZ_1 + \beta_5 YGZ_{\geq 2} + \beta_6 CONTROLS + FIRM + YEAR + \varepsilon \quad (2)$$

where  $YGZ_{-2}$ ,  $YGZ_{-1}$ ,  $YGZ_0$ ,  $YGZ_1$ , and  $YGZ_{\geq 2}$  indicate the second year before, the year before, the year of, the year after, and the second year after and beyond the VAT reform, respectively. The regression results are shown in columns (1) and (2) of Table 6. The coefficients of  $YGZ_{-2}$ ,  $YGZ_{-1}$ ,  $YGZ_1$ , and  $YGZ_{\geq 2}$  are not significant. The regression coefficient of  $YGZ_0$  is significantly positive at the 1% level. Thus, the impact of the VAT reform on audit fees is only evident in the implementation year. In column (2), we control for industry- and year-fixed effects. The results are consistent with those in column (1). Overall, the results confirm that the VAT reform can impose adjustment costs on firms. Therefore, our findings are robust.

### 5.2. Robustness tests of the variables and models

To alleviate the model setting problem and enhance the robustness of the research findings, we conduct the following five robustness tests.

First, we redefine the time dimension of the VAT reform by constructing two dummy variables:  $YGZ\_630$  and  $YGZ\_930$ . When the region and industry of a listed company implements the VAT reform before (after) June 30 of the implementation year,  $YGZ\_630$  equals 1 in the implementation year (the year after the implementation year). Similarly, when the region and industry of a listed company implements the VAT reform before (after) September 30 of the implementation year,  $YGZ\_930$  equals 1 in the implementation year (in the year after the implementation year). Then, we use  $YGZ\_630$  and  $YGZ\_930$  as the independent variables and additionally control for whether a change in accounting firm ( $AUDIT\_CHANGE$ ) occurs. The results are shown in columns (1) and (2) of Table 7. The coefficients of  $YGZ\_630$  and  $YGZ\_930$  in columns (1) and (2), respectively, are significantly positive at the 1% level, which indicates that the conclusions remain consistent after changing the definition of the time dimension of the VAT reform.

Second, we replace the variable for the spatial dimension of the VAT reform. Given that the VAT reform is affected by both industry and region, we select firms from the same industry as a control group and rerun our regressions. The coefficient of  $YGZ$  in column (3) of Table 7 is significantly positive at the 1% level. This further indicates that our findings remain consistent after changing the setting in the spatial dimension of the VAT reform.

Third, to alleviate the omitted variables problem, we additionally control for whether the client firm has an audit firm change ( $AUDIT\_CHANGE$ ), the degree of economic development of the province in which the client firm is located ( $GDP$ ), and the marketization index of the province in which the sample company is located ( $MARKET$ ). The results are shown in column (4) of Table 7. The coefficient of  $YGZ$  is significantly positive at the 1% level, which indicates that the results remain robust after alleviating the missing variable problem.

Fourth, to mitigate the effects of price changes on audit fees, we use the consumer price index (CPI) in the first year of the sample period as the base period to adjust the non-ratio corporate financial control variables, including audit fees, total assets, and management compensation. The regression results are shown in column (1) of Table 8. The coefficient of  $YGZ$  is significantly positive at the 1% level, indicating that the findings hold after accounting for the impact of price changes on audit fees and corporate financial variables.

Fifth, to alleviate the variable definition errors, we examine the impact of the VAT reform on changes in audit fees. Following Su and Wu (2017), we use the first difference of  $LNFEET$  to measure changes in audit fees ( $CH\_LNFEET$ ) and rerun our regression. The results are shown in column (2) of Table 8. The coefficient of  $YGZ$  is significantly positive at the 1% level. This indicates that the VAT reform can significantly increase the audit fee changes among the pilot firms, further suggesting the robustness of our findings.

### 5.3. Propensity score matching regression

Finally, given that the data distribution of firms under the VAT reform are biased, we adopt the propensity score matching (PSM) method to alleviate the interference caused by other control variables in the empirical results. Adopting 1:1, 1:2, and 1:3 matching, we sample without replacement. The 1:1 matching results are shown in Table 9. To conserve space, we do not report the 1:2 or 1:3 matching results. We observe a consid-

Table 6  
The VAT reform and audit pricing: Robustness test 1.

Variable	Dep. Var. = <i>LNFEET</i>	
	(1)	(2)
<i>YGZ</i> <sub>-2</sub>	0.003 (0.16)	0.053 (1.58)
<i>YGZ</i> <sub>-1</sub>	0.007 (0.34)	0.040 (1.22)
<i>YGZ</i> <sub>0</sub>	0.067*** (2.70)	0.097*** (3.09)
<i>YGZ</i> <sub>1</sub>	0.007 (0.31)	0.032 (1.20)
<i>YGZ</i> <sub>≥2</sub>	−0.033 (−1.44)	−0.002 (−0.05)
<i>SIZE</i>	0.326*** (29.42)	0.361*** (43.85)
<i>REC</i>	0.013 (0.17)	0.048 (0.66)
<i>INV</i>	−0.087 (−1.64)	−0.158*** (−2.82)
<i>LEV</i>	0.015** (2.38)	0.018** (2.42)
<i>ROA</i>	−0.206*** (−4.09)	−0.548*** (−6.93)
<i>OCF</i>	0.061* (1.82)	−0.037 (−0.65)
<i>BIG4</i>	0.231*** (4.75)	0.661*** (15.12)
<i>MAO</i>	0.114*** (6.95)	0.193*** (8.50)
<i>COMPENSATION</i>	0.045*** (4.58)	0.055*** (5.10)
<i>DUALITY</i>	0.003 (0.28)	0.018 (1.52)
<i>CASH</i>	−0.029 (−0.82)	−0.024 (−0.49)
<i>TOPI</i>	0.001 (1.40)	−0.001** (−2.28)
<i>GROWTH</i>	−0.020** (−2.51)	−0.052*** (−5.03)
<i>TURNOVER</i>	0.077*** (4.16)	0.154*** (8.83)
<i>AGE</i>	−0.016 (−0.84)	0.005*** (3.36)
<i>BOARD</i>	0.081*** (2.71)	−0.037 (−0.91)
<i>INDP</i>	0.091 (1.06)	0.096 (0.75)
<i>CONSTANT</i>	5.462*** (15.07)	4.720*** (22.43)
<i>FIRM</i>	Yes	No
<i>INDUSTRY</i>	No	Yes
<i>YEAR</i>	Yes	Yes
<i>N</i>	20,204	20,204
<i>Adj-R<sup>2</sup></i>	0.642	0.686

This table reports robustness test results. The dependent variable is *LNFEET*. All of the variables are defined in Table 2. The analysis is based on an ordinary least squares model. The *t*-statistics are given in parentheses, and the coefficients are based on standard errors clustered at the firm level. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 7

The VAT reform and audit pricing: Robustness tests 2 to 4.

Variable	Dep. Var. = LNFEET			
	(1)	(2)	(3)	(4)
YGZ_630	0.038*** (2.66)			
YGZ_930		0.076*** (4.79)		
YGZ			0.182*** (2.74)	0.077*** (4.30)
SIZE	0.327*** (29.41)	0.326*** (29.41)	0.304*** (3.34)	0.327*** (29.45)
REC	0.015 (0.19)	0.014 (0.18)	0.044 (0.05)	0.016 (0.20)
INV	−0.091* (−1.71)	−0.091* (−1.71)	0.026 (0.11)	−0.088* (−1.66)
LEV	0.015** (2.41)	0.015** (2.40)	0.055 (1.01)	0.015** (2.40)
ROA	−0.205*** (−4.08)	−0.206*** (−4.11)	0.527 (1.03)	−0.208*** (−4.14)
OCF	0.062* (1.84)	0.061* (1.82)	0.235 (1.40)	0.063* (1.88)
BIG4	0.235*** (4.85)	0.234*** (4.84)	—	0.233*** (4.81)
MAO	0.116*** (7.06)	0.115*** (6.99)	0.091 (1.22)	0.114*** (6.94)
COMPENSATION	0.046*** (4.60)	0.046*** (4.60)	0.011 (0.14)	0.046*** (4.64)
DUALITY	0.002 (0.26)	0.002 (0.26)	0.045 (0.48)	0.003 (0.27)
CASH	−0.030 (−0.83)	−0.030 (−0.85)	0.348* (1.67)	−0.031 (−0.87)
TOPI	0.001 (1.42)	0.001 (1.41)	0.001 (0.34)	0.001 (1.37)
GROWTH	−0.019** (−2.41)	−0.019** (−2.41)	−0.031 (−0.49)	−0.019** (−2.44)
TURNOVER	0.077*** (4.11)	0.077*** (4.12)	0.047 (0.22)	0.078*** (4.18)
AGE	−0.015 (−0.80)	−0.015 (−0.82)	0.284*** (3.51)	−0.017 (−0.91)
BOARD	0.078*** (2.62)	0.078*** (2.63)	−0.079 (−0.49)	0.078*** (2.62)
INDP	0.091 (1.06)	0.092 (1.07)	−0.482 (−1.21)	0.088 (1.02)
GDP				−0.000 (−0.48)
MARKET				−0.022** (−2.54)
AUDIT_CHANGE	−0.015*** (−2.70)	−0.015*** (−2.70)		−0.016*** (−2.80)
CONSTANT	5.451*** (15.04)	5.463*** (15.08)	3.010 (1.39)	5.627*** (15.19)
FIRM	Yes	Yes	Yes	Yes
YEAR	Yes	Yes	Yes	Yes
N	20,204	20,204	454	20,204
Adj-R <sup>2</sup>	0.641	0.642	0.757	0.642

This table reports robustness test results. The dependent variable is LNFEET. All of the variables are defined in Table 2. The analysis is based on an ordinary least squares model. The *t*-statistics are given in parentheses, and the coefficients are based on standard errors clustered at the firm level. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 8  
The VAT reform and audit pricing: Robustness tests 5 and 6.

Variable	Dep. Var. = <i>LN</i> FEE_CPI (1)	Dep. Var. = <i>CH_LN</i> FEE (2)
<i>YGZ</i>	0.069*** (4.32)	0.105*** (3.75)
<i>SIZE_CPI</i> / <i>SIZE</i>	0.330*** (30.35)	0.101*** (14.80)
<i>REC</i>	0.012 (0.18)	−0.064 (−1.18)
<i>INV</i>	−0.082* (−1.75)	−0.096** (−2.48)
<i>LEV</i>	0.015** (2.25)	0.011*** (3.18)
<i>ROA</i>	−0.167*** (−3.77)	0.060 (1.41)
<i>OCF</i>	0.057* (1.93)	−0.012 (−0.34)
<i>BIG4</i>	0.205*** (4.87)	0.105*** (2.95)
<i>MAO</i>	0.101*** (6.95)	0.021 (1.52)
<i>COMPENSATION_CPI</i> / <i>COMPENSATION</i>	0.045*** (4.69)	−0.026*** (−2.76)
<i>DUALITY</i>	0.000 (0.05)	−0.005 (−0.70)
<i>CASH</i>	−0.035 (−1.12)	−0.043 (−1.45)
<i>TOPI</i>	0.001 (1.26)	0.001 (1.50)
<i>GROWTH</i>	−0.019*** (−2.69)	0.085*** (9.89)
<i>TURNOVER</i>	0.072*** (4.37)	−0.010 (−0.78)
<i>AGE</i>	−0.008 (−0.51)	0.012 (1.43)
<i>BOARD</i>	0.070*** (2.62)	−0.037 (−1.51)
<i>INDP</i>	0.086 (1.11)	−0.051 (−0.75)
<i>CONSTANT</i>	5.346*** (15.91)	−1.780*** (−9.19)
<i>FIRM</i>	Yes	Yes
<i>YEAR</i>	Yes	Yes
<i>N</i>	20,204	17,039
<i>Adj-R<sup>2</sup></i>	0.849	0.068

This table reports robustness test results. All of the variables are defined in Table 2. The analysis is based on an ordinary least squares model. The *t*-statistics are given in parentheses, and the coefficients are based on standard errors clustered at the firm level. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

erable difference between the control variables of the treatment and control groups before PSM. After matching, the differences between the control variables of the treatment and control groups are no longer significant. The matched nuclear density curve is shown in Fig. 3. It does not show any significant difference between the treatment and control groups. We also examine the differences in the mean values of all of the control variables between the treatment and control groups in the 3-year window around (i.e., the first, second, and third year before and after) the VAT reform. After PSM, the differences between the mean values of the control variables in the treatment and control groups are almost not significant (unreported due to space limitations). Therefore, PSM diminishes the difference between the treatment and control groups in the years before



Table 9

Variable differences between propensity scores before and after matching (1:1 matching).

	Before PSM				After PSM			
	Treated	Control	Diff.	<i>t</i> -stat.	Treated	Control	Diff.	<i>t</i> -stat.
<i>SIZE</i>	22.707	22.126	0.581	6.58	22.707	22.767	−0.060	−0.41
<i>REC</i>	0.092	0.111	−0.020	−2.90	0.092	0.095	−0.004	−0.38
<i>INV</i>	0.117	0.156	−0.039	−3.97	0.117	0.103	0.015	1.22
<i>LEV</i>	0.484	0.465	0.019	0.45	0.484	0.489	−0.005	−0.22
<i>ROA</i>	0.038	0.034	0.003	0.75	0.038	0.034	0.003	0.61
<i>OCF</i>	0.046	0.039	0.007	1.36	0.046	0.048	−0.002	−0.33
<i>BIG4</i>	0.207	0.053	0.154	10.17	0.207	0.119	0.088	2.55
<i>MAO</i>	0.062	0.042	0.019	1.44	0.062	0.031	0.031	1.56
<i>COMPENSATION</i>	14.497	14.326	0.171	3.60	14.497	14.454	0.043	0.65
<i>DUALITY</i>	0.198	0.247	−0.049	−1.71	0.198	0.163	0.035	0.97
<i>CASH</i>	0.160	0.155	0.005	0.55	0.160	0.167	−0.007	−0.60
<i>TOPI</i>	36.829	34.916	1.913	1.91	36.829	38.413	−1.584	−1.05
<i>GROWTH</i>	0.076	0.067	0.009	0.38	0.076	0.039	0.036	1.05
<i>TURNOVER</i>	0.538	0.621	−0.083	−2.77	0.538	0.603	−0.065	−1.45
<i>AGE</i>	16.278	16.220	0.058	0.16	16.278	17.150	−0.872	−1.62
<i>BOARD</i>	2.192	2.142	0.050	3.75	2.192	2.187	0.005	0.27
<i>INDP</i>	0.373	0.373	0.000	0.05	0.373	0.375	−0.001	−0.22

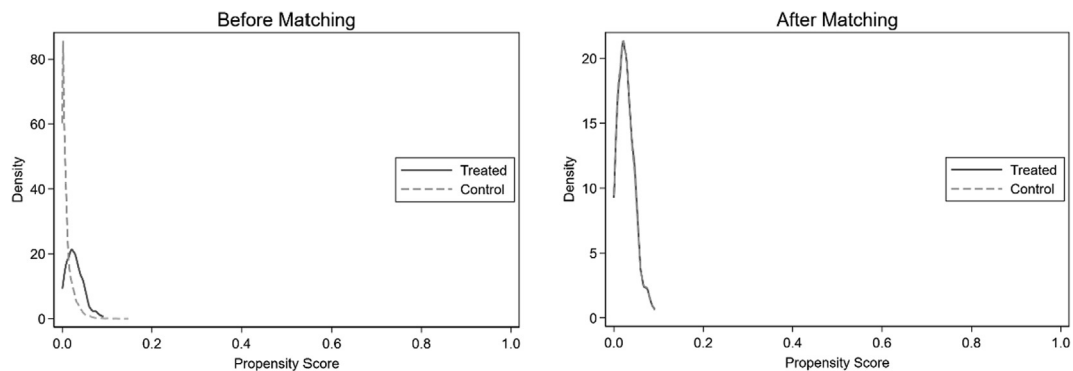


Fig. 3. The kernel density function graph before and after PSM (1:1 matching).

and after the VAT reform, suggesting the effectiveness of the PSM method. We rerun our regression using the PSM sample. The results are shown in Table 10. The coefficients of *YGZ* are significantly positive, supporting our baseline results. Overall, our findings remain unchanged after a series of robustness tests.

## 6. Conclusion

Using data on China's A-share listed companies from 2010 to 2018 and the nation's staggered adoption of the VAT reform as a natural experiment, we examine the impact of this reform on a particular corporate cost: audit fees. We find audit fees to be 8.11% higher for firms in their VAT reform implementation year than for firms that do not adopt the VAT reform. This effect does not exist before or after the reform year, which indicates the existence of an adjustment cost specifically related to the VAT reform. This fee increase is also greater for firms audited by the Big 4 international audit firms, firms that have a greater audit workload, firms that are more complex, and firms with weak internal controls. From the perspective of audit pricing, we provide evidence of the economic consequences of a tax reform. The corporate adjustment costs that arise from institutional changes warrant more attention from decision-making executives.

Table 10  
The VAT reform and audit pricing: Robustness test 7.

Variable	<i>Dep. Var. = LNFEET</i>					
	1:1 matching		1:2 matching		1:3 matching	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>YGZ</i>	0.158** (2.03)	0.092* (1.91)	0.135** (2.07)	0.127** (2.35)	0.129*** (2.62)	0.094** (2.27)
<i>SIZE</i>		0.279** (2.50)		0.344*** (3.90)		0.361*** (6.37)
<i>REC</i>		0.121 (0.15)		−0.074 (−0.07)		−0.178 (−0.24)
<i>INV</i>		−0.630 (−0.78)		−0.830* (−1.66)		−0.681 (−1.31)
<i>LEV</i>		−0.279 (−0.88)		−0.282 (−1.05)		−0.421** (−2.01)
<i>ROA</i>		−0.179 (−0.50)		−0.153 (−0.31)		−0.015 (−0.05)
<i>OCF</i>		0.666* (1.73)		0.411 (0.84)		0.034 (0.12)
<i>BIG4</i>		0.511*** (2.70)		0.475*** (3.28)		0.562*** (4.43)
<i>MAO</i>		−0.231* (−1.67)		−0.128 (−0.93)		−0.091 (−0.59)
<i>COMPENSATION</i>		0.015 (0.39)		0.051 (1.16)		0.067 (1.45)
<i>DUALITY</i>		−0.045 (−0.36)		0.103 (1.01)		0.142 (1.55)
<i>CASH</i>		−0.438 (−1.10)		−0.525 (−1.50)		−0.478** (−2.03)
<i>TOPI</i>		−0.005 (−0.97)		−0.002 (−0.42)		−0.001 (−0.30)
<i>GROWTH</i>		0.047 (0.59)		−0.087 (−0.92)		−0.045 (−0.66)
<i>TURNOVER</i>		−0.199 (−1.30)		−0.067 (−0.51)		0.024 (0.21)
<i>AGE</i>		0.003 (0.18)		0.076 (1.13)		0.036 (0.56)
<i>BOARD</i>		−0.189 (−0.70)		0.195 (0.79)		−0.073 (−0.47)
<i>INDP</i>		−1.337** (−2.10)		−0.460 (−0.83)		−0.316 (−0.67)
<i>CONSTANT</i>	13.881*** (108.46)	8.827*** (3.47)	13.563*** (117.39)	4.455** (2.25)	13.565*** (173.93)	4.794*** (3.00)
<i>FIRM</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>YEAR</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	434	434	652	652	863	863
<i>Adj-R<sup>2</sup></i>	0.309	0.724	0.380	0.628	0.375	0.589

This table reports robustness test results. All of the variables are defined in Table 2. The analysis is based on an ordinary least squares model. The *t*-statistics are given in parentheses, and the coefficients are based on standard errors clustered at the firm level. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

We offer practical suggestions to policy makers. Research on the VAT reform focuses on its benefits without considering its costs. Although a policy may be implemented with the goals of improving economic efficiency and reducing taxation, policy makers and administrators must not ignore the adjustment costs imposed on firms as a result of such institutional changes. We find that the implementation of the VAT reform increases audit fees by 8.11% in the implementation year. Furthermore, the more complex and detailed the policy formulation, the higher the adjustment costs imposed on the affected company are. Therefore, when

policy makers are implementing policies, it is necessary as much as possible to clarify the policy details, to hold briefings on relevant policies, and to introduce corresponding policy application guidelines to reduce the adjustment costs that firms face. Only in this way can the overall benefits of a policy be improved.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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