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Professional liability insurance contracts for auditors: differential pricing and the audit quality effect

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ABSTRACT

In recent years, the Chinese government and the public accounting profession have advocated the audit practitioners' use of professional liability insurance (PLI). As a tool to divert audit firms' business risk, PLI contracts could decrease auditors' diligence in conducting audits, which might harm audit quality. Insurance companies might perceive the transfer of audit risks, thus having an incentive to monitor risky audit firms to mitigate potential economic losses related to audit failures. We use proprietary PLI contract data and find that insurance companies charge smaller audit firms a significantly higher price and show a lower tendency to offer favourable indemnity clauses. The difference-in-differences analysis reveals that the magnitude of audit adjustments significantly increases after small audit firms purchase PLI and the effect is dominated by income-decreasing audit adjustments. Our evidence supports the notion that insurance contracts play a governance role for audit intermediaries with a higher risk profile.

1. Introduction

Professional Liability Insurance (PLI)[1] for auditors is designed to protect audit firms from bearing the cost of defending against a negligence claim made by investors and paying out damage awards from such civil lawsuits. It is considered an important mechanism for audit firms' internal risk management. In recent years, PLI has been highly focused and advocated by the Chinese government as well as the public accounting profession. Therefore, the pricing strategy and audit quality effect of PLI pose important and interesting research questions.

On one hand, some auditors might regard PLI as a guarantee of their practices and a shift in litigation risk, thereby reducing their degree of diligence and prudence in audit practices, further leading to a decline in audit quality. On the other hand, as a rational

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economic subject, insurance companies have an incentive to monitor risky audit firms to mitigate potential economic losses caused by audit failures, which might have a positive impact on audit quality. As these two theories work in opposite directions, the net effect of PLI on audit quality requires in-depth empirical examination.

In most countries, audit firms' purchase of PLI is not in the scope of mandatory information disclosure; therefore, empirical studies in this area are extremely inadequate due to data limitations. The proprietary PLI contract data filed with the Ministry of Finance of China (MOF) by audit firms licenced to audit Chinese listed companies provide us with a good opportunity to examine the two aforementioned competing theories.[2]

From audit firms' insurance information, we can observe that many small audit firms began purchasing PLI in recent years. Many prior studies have indicated that small audit firms have a higher level of practice risk and weaker internal quality control systems than large firms. Once small audit firms began purchasing PLI, auditors' shirking incentive was more likely to occur. Considering the indemnity risk of small audit firms, insurance companies have a strong incentive to implement supervision and governance on the insureds. Therefore, we focus mainly on the impact of purchasing PLI on the audit quality of small audit firms.

We find that insurance companies charge small audit firms a significantly higher price and show a significantly lower tendency to sign special indemnity clauses in PLI contracts than large firms. Based on a difference-in-differences (DID) analysis, we discover that the magnitude of audit adjustments significantly increases after small audit firms purchase PLI and the effect is dominated by income-decreasing audit adjustments. Our evidence supports the notion that insurance contracts play a governance role for audit intermediaries with a higher risk profile.

Our study contributes to the literature in several ways. First, using a set of proprietary data of Chinese audit firms' PLI contracts, we are among the first to examine the unit PLI premium pricing and the economic consequences of PLI in the largest developing audit market, which provides a better understanding of audit firms' internal risk management (Bedard et al., 2008). Second, most studies on PLI are about the Directors' and Officers' liability insurance (D&O insurance)[3] (Chalmers et al., 2002; Donelson & Yust, 2017; Lin et al., 2013; Yuan et al., 2016). Our research extends the insureds under analysis from company management to auditors. Third, little research exists on the role of other external parties in supervising audit firms. In this paper, we explore how a change in external supervision affects auditors' behaviours and discover PLI contracts' governance function, which develops studies on the determinants of audit quality (DeFond & Zhang, 2014).

The results are also of practical value. By evaluating the economic consequences of introducing PLI, we provide empirical evidence supporting the future implementation of PLI in China. Furthermore, with the formal implementation of the new securities law in China, the provision of audit firms engaging in securities auditing services is changed from administrative licencing system to a registration system. This means that a greater number of small audit firms that previously did not have the securities qualification will

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[2]All the 'audit firms' mentioned in the following paragraphs refer to audit firms that have the qualifications necessary to audit Chinese listed companies.
[3]D&O insurance is purchased by a firm to cover defence costs and potential damage awards when its directors and officers are sued.

gain an opportunity to undertake auditing services for listed companies. Our results have strong reference value for the securities audit market under the forthcoming new system.

The remainder of the paper is as follows. In Section 2, we introduce the institutional background of PLI in China and state our hypotheses. In Sections 3 and 4, we examine the differential pricing hypothesis and the audit quality effect hypothesis of PLI contracts, respectively. Section 5 concludes the study.

2. Institutional background and hypotheses development

2.1. Institutional background

Liability insurance is an important measure for assisting social administration with a market-oriented approach and a sign of the prosperity of a country's insurance industry. At the beginning of the 21st century, many cases of litigation against listed companies occurred in Western countries. The court decisions usually supported the idea that auditors should take the burden for certain part of liabilities and a large amount of compensation, which attracted public attention to auditors' liability. With this background, PLI developed quickly in mature economies (e.g. the United States (US) and the United Kingdom (UK)) and became a method used by audit firms to protect themselves from practice risk.

In China, the PLI industry started relatively late. For a long period, occupational risk fund has been commonly used to mitigate risk for the certified public accountant (CPA) profession, but it has some shortcomings such as the high cost of capital occupation, funds being easily misappropriated, etc. With an increase in the risk awareness of audit firms and improvements in the civil legal liability system, PLI has gradually been placed in the spotlight. The first PLI contract was signed in 2000. After that, the Supreme Court of China released several legal interpretations that provided the legal basis for courts to judge cases concerning false statements in the securities market. To accelerate the healthy development of the CPA profession, the MOF and the General Administration for Industry and Commerce jointly issued '*The Regulation on Promoting Large and Medium Audit firms to Transform into Limited Liability Partnerships (LLPs)*' in 2010. This change was expected to increase the legal liability of auditors. In 2015, the MOF promulgated '*Notice of the MOF and the China Insurance Regulatory Commission on Issuing the Interim Measures for Professional Liability Insurance for Audit firms*', further emphasising the importance of PLI and enhancing its development in China.

We manually collected proprietary PLI contract data filed with the MOF by audit firms (excluding the Big Four audit firms) between 2009 and 2015.[4] Table 1 shows that there are 28 (29–1) audit firms that purchased PLI before 2009. For every year between 2009 and 2015, at least one audit firm purchased PLI for the first time. In total, there were 17 newly insured audit firms during this period. Along with the promotion of PLI by the Chinese government and the public accounting profession, the rate of insurance coverage has increased from 58.0% in 2009 to 91.7% by the end of 2015. Through further observation, we find that most audit firms that were insured earlier are large audit firms with a higher ranking, while newly insured audit firms during our research period are mainly small audit firms.

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[4]The Big Four audit firms participate in the international network of unified insurance and apply different insurance systems from local audit firms and were thus excluded from our research sample.

Table 1. PLI purchase situation of Chinese audit firms.

	2009	2010	2011	2012	2013	2014	2015	Total (/Mean)
No. of audit firms [a]	50	49	44	41	36	36	36	292
No. of newly insured audit firms	1	3	1	3	4	1	4	17
No. of Insured audit firms [b]	29	31	26	26	27	29	33	201
Rate of insurance covering	58.0%	63.3%	59.1%	63.4%	75.0%	80.6%	91.7%	70.1%

a. Exclude the Big Four audit firms.
b. No. of Insured audit firms = No. of Insured audit firms last year + No. of newly insured audit firms – No. of audit firms lose their securities qualification (if any) – No. of audit firms stop insuring PLI (if any) + No. of audit firms restart insuring PLI (if any).

2.2. Hypotheses development

Two controversial opinions exist in previous literature on the consequences of insurance. Critics have argued that due to information asymmetry, insurance contracts are unable to effectively restrain insureds' high-risk behaviours, which might cause moral hazard and reduce market efficiency (Arrow, 1963; Pauly, 1968). For example, some studies on D&O insurance indicate that it damages the disciplinary effect of litigation and causes directors and officers to be less attentive to their duties to shareholders, which results in poorer accounting information quality (Chalmers et al., 2002; Gillan & Panasian, 2015; Lin et al., 2013). Proponents point out that insurance companies have an incentive to supervise the activities of their insureds, which might impose restrictions on opportunistic practices to some extent and play a positive governance role (Core, 2000; Donelson & Yust, 2017; Holderness, 1990; Mayers & Smith, 1982; Osullivan, 1997; Yuan et al., 2016).

The premium reflects the interest claims of insurance companies against insureds with different levels of risk (Cummins, 1991). Insurance companies need to measure the premium income and probability of claims to ensure profits. To reduce the losses caused by the moral hazard of insureds, they usually set a floating premium rate. Prior literature has demonstrated that compared to large audit firms, small audit firms have a weaker incentive to protect their reputation and a poorer internal quality control system, and are more likely to engage in activities that impair auditor independence (DeAngelo, 1981; Loeb, 1971; Shockley, 1981). This means that for insurance companies, small audit firms are insureds with a higher indemnity risk. We interviewed the principals in three leading Chinese insurance companies. They reported that insurance companies generally make a thorough risk assessment of audit firms using an *ex ante* survey and then determine a reasonable premium. The size, profitability, and credit status of audit firms are the most critical factors in calculating the premium.

Therefore, we expect insurance companies to be motivated to implement differential pricing on audit firms of different sizes to mitigate insureds' moral hazard and reduce economic losses due to potential audit failures. Given these arguments, we hypothesise a negative association between audit firm size and insurance premiums.

H1: Compared to large audit firms, insurance companies charge a significantly higher premium on PLI purchased by small audit firms.

However, there are several reasons why the results might not support this hypothesis. First, small audit firms have more difficulty paying a higher premium, so they have

a stronger motivation to strive for preferential policies with insurance companies. Second, although the premium is determined by insurance companies, it is possible that large audit firms voluntarily input more on PLI to protect their own wealth (Qiu & Wu, 2014).

According to previous discussions on the consequences of insurance, we also examine the impact of PLI on audit quality from two aspects, the moral hazard hypothesis and the external governance hypothesis. Litigation risk caused by audit failures might lead to explicit economic compensation and implicit reputational losses (Firth et al., 2012; Kaplan & Williams, 2013; Lennox & Li, 2012). This is expected to have significant incentive effects on auditors to engage in strategies, such as increasing audit efforts, to counter the threat of litigation (Simunic, 1980). However, PLI transfers part of the litigation risk from the audit firms to insurance companies, which greatly reduces the damages caused by audit failures. Therefore, auditors might regard this as a guarantee of their practices and reduce their degree of diligence and prudence during the auditing process, thus causing a decline in audit quality.

Insurance companies, as a rational economic subject, have a strong incentive to monitor risky audit firms to protect their own interests, which might have a positive impact on audit quality. From interviews with principals of insurance companies, we learned that besides detailed *ex ante* risk assessments on audit firms, insurance companies also conduct lectures to publicise risk awareness after underwriting. When a lawsuit occurs, insurance companies act as an independent external investigator to investigate audit firm's violations. We also interviewed several audit firm partners who mentioned that audit firms' senior management usually make decisions on PLI purchases based on their business development strategy and overall risk assessment. Then, the main content of PLI contracts and the practice guidelines are communicated to auditors via internal manuals and conferences. To obtain a more favourable premium rate, audit firms are motivated to establish a more comprehensive internal management system and a better practice reputation. These feedbacks support the external governance hypothesis of PLI contracts.

It should be noted that for both the moral hazard hypothesis and the external governance hypothesis, there might be significant differences in the impact on audit firms of different sizes. For small audit firms, they are more inclined to reduce risk awareness and the degree of diligence and prudence after purchasing PLI, and are more likely to be regarded as a high-risk insured and receive more attention from insurance companies. However, large audit firms can better resist the potential moral hazard problems caused by PLI, and insurance companies tend to reduce supervision on such audit firms to reduce costs. Therefore, we expect that the audit quality effect (both the positive and the negative effects) of PLI contracts is more detectable in small audit firms.[5] Given the abovementioned conflicting impacts, our hypothesis is stated in the null form:

H2: There is no change in audit quality after small audit firms purchase PLI.

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[5]Theoretically, both the negative impact of disqualification and the positive impact of governance is relatively weaker in large audit firms, making us less likely to observe the audit quality effect of PLI contracts. Therefore, we treat them as an alternative control group in the following research design.

3. The differential pricing of PLI contracts

3.1. Research design

We test H1 by estimating the following model of premium pricing:

$$LnUNITPREM = a_0 + a_1 SMALLAUD + FE_{YEAR} + FE_{AUDFIRM} + Controls + u \qquad (1)$$

The dependent variable, *LnUNITPREM*, captures the unit premium amount (= ln (Insurance premium amount/Annual revenue of audit firm)). It represents the premium required per unit of revenue of audit firms. The experimental variable, *SMALLAUD*, equal to one if the audit firm is a small audit firm, and zero otherwise. We perform a comprehensive cluster analysis for all 50 audit firms between 2009 and 2015 according to three indicators: average ranking, average annual revenue, and average number of CPAs during the sample period. The results show that audit firms are sorted into two clusters, eight of them classified as large audit firms and 42 classified as small audit firms (Calinski/Harabasz Pseudo-F = 67.12). The results of mean difference tests show that, compared to the eight large audit firms, the 42 small audit firms have significantly lower average ranking (ranked 37th vs. 8th, p < 0.01), lower average annual revenue (RMB 0.20 vs. 1.19 billion yuan, p < 0.01), and fewer average number of CPAs (269 vs. 1104 CPAs, p < 0.01). Under H1, we predict a positive relation between *SMALLAUD* and *LnUNITPREM* (a_1 > 0).

Equation (1) includes year fixed effects (FE_{YEAR}) and audit firm fixed effects ($FE_{AUDFIRM}$) to control for time-varying factors that affected premium pricing and heterogeneity across audit firms. We controlled for several specific insurance contract terms, including the unit aggregate limit of indemnity (*LnUNITINSUCEIL*, = ln (Aggregate limit of indemnity/Annual revenue of audit firm)), gross negligence indemnity clause (*MATMALCOV*, equal to one if the insurance company indemnifies for losses caused by unintentional gross negligence of audit firms, and zero otherwise), retroactive indemnity clause (*RETRO*, equal to one if the insurance company indemnifies for losses caused by claims on audit firms within a specific retrospective period, and zero otherwise). We also control for audit firm's characteristics that may influence premium pricing, such as credit status (*SANC*, equal to one if the audit firm has been subject to administrative penalties or industry disciplines in the past three years, and zero otherwise), previous audit quality (*LMODPCT*, = Number of modified opinions issued last year/Total number of client companies last year), professional risk fund amount (*LnUNITRISKFUND*, = ln (Aggregate amount of professional risk fund/Annual revenue of audit firm)), and organisational form (*LLP*, equal to one if the audit firm transformed into LLPs, and zero otherwise).

3.2. Sample and data

Table 1 shows that there are 201 audit firm-year observations insured between 2009 and 2015. Among them, 153 observations have complete insurance and audit information data, constituting the sample of Model (1).

The information regarding PLI contracts and the professional risk fund comes from the internal filing data of the MOF. The characteristics of audit firms such as their credit status and organisational form were manually collected from the Chinese Institute of Certified Public Accountants (CICPA) website. Other data were obtained from the China Stock Market Accounting Research (CSMAR) database.

3.3. Descriptive statistics

Table 2 presents the descriptive statistics for Model (1). The average premium amount (*PERM*) of large audit firms is significantly higher than small audit firms, but after taking audit revenue into consideration, the average unit premium amount (*UNITPERM* and *LnUNITPREM*) of large audit firms is significantly lower than small audit firms (p < 0.01). For the special indemnity clauses, insurance companies signed a gross negligence indemnity clause (*MATMALCOV*) with 28.5% of small audit firms and a retroactive indemnity clause (*RETRO*) with 94.3% of small audit firms. By contrast, the proportion of large audit firms that signed these two special indemnity clauses is 46.7% and 100%, respectively. This indicates that small audit firms do not get more favourable insurance terms but are charged significantly higher unit premium rates by insurance companies. This is consistent with the feedback from our survey, that is, insurance companies consider small audit firms as high-risk insureds and implement greater constrains through their insurance contracts.

3.4. Regression results

Column (1) of Table 3 presents the regression results for Model (1). The coefficient on *SMALLAUD* is significantly positive (t-stat. = 2.86). This indicates that after controlling for

Table 2. The descriptive statistics for the insurance premium pricing model.

	Small firms (N = 123)	Large firms (N = 30)	Small firms vs. Large firms
	Mean (Median)	Mean (Median)	t-stat. (z-stat.)
PREM	43.217 (38.355)	141.182 (120.000)	−11.89*** (−7.47***)
UNITPREM	19.833 (16.489)	11.804 (11.372)	3.67*** (3.65***)
LnUNITPREM	2.870 (2.862)	2.477 (2.515)	3.36*** (3.66***)
INSUCEIL	8766.980 (8000.000)	29076.670 (30000.000)	−6.79*** (−5.09***)
UNITINSUCEIL	4073.329 (2628.869)	2380.412 (2649.391)	1.15 (1.02)
LnUNITINSUCEIL	7.765 (7.875)	7.355 (7.882)	1.06 (1.02)
MATMALCOV	0.285 (0.000)	0.467 (0.000)	−1.93* (−1.91*)
RETRO	0.943 (1.000)	1.000 (1.000)	−1.34 (−1.33)
SANC	0.276 (0.000)	0.400 (0.000)	−1.32 (−1.32)
LMODPCT	0.057 (0.031)	0.043 (0.040)	0.91 (−0.77)
RISKFUND	1885.108 (1440.000)	3251.795 (2130.000)	−2.98*** (−1.60)
UNITRISKFUND	955.041 (694.355)	257.116 (177.561)	4.18*** (5.07***)
LnUNITRISKFUND	6.187 (6.544)	3.871 (5.184)	5.94*** (5.07***)
LLP	0.585 (1.000)	0.833 (1.000)	−2.57** (−2.52**)

The variables are defined in the Appendix A. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 3. The regression results for the insurance premium pricing model.

	(1)		(2)		(3)	
Dep. Var:	LnUNITPREM		MATMALCOV		RETRO	
	Coef.	t-stat.	Coef.	z-stat.	Coef.	z-stat.
SMALLAUD	0.400	2.86***	−4.651	−3.12***	−2.328	−1.88*
LnUNITINSUCEIL	0.315	5.27***				
MATMALCOV	0.049	0.49				
RETRO	0.037	0.19				
SANC	0.213	2.06**	−1.635	−1.85*	−0.991	−1.72*
LMODPCT	−1.232	−2.09**	9.683	2.32**	−1.373	−0.52
LnUNITRISKFUND	−0.045	−1.99**	0.149	0.85	0.060	0.38
LLP	−0.068	−0.42	−0.992	−0.69	0.711	0.73
LnUNITPREM			1.613	2.36**	−0.212	−0.59
FE_{YEAR}	Yes		Yes		Yes	
$FE_{AUDFIRM}$	Yes		Yes		Yes	
Observations	153		153		153	
R^2/Pseudo R^2	0.620		0.461		0.204	

The variables are defined in the Appendix A. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

various factors related to premium pricing, insurance companies still charge higher unit premium for small audit firms than large ones, supporting H1. Moreover, the unit aggregate limit of indemnity (*LnUNITINSUCEIL*) is significant and positively associated with unit premiums (t-stat. = 5.27). Previous administrative penalties and industry discipline of audit firms (*SANC*) significantly increase the unit premium (t-stat. = 2.06), while the proportion of modified opinions issued by audit firms last year (*LMODPCT*) significantly decreases the unit premium (t-stat. = −2.09). This means that insurance companies charge a significantly higher (lower) premium to audit firms with poorer (better) audit quality. The unit aggregate amount of the professional risk fund (*LnUNITRISKFUND*) is significant and negatively associated with the unit premium (t-stat. = −1.99).

In addition to premium pricing constrains, insurance companies also control their indemnity risk by refusing to sign special indemnity clauses with risky audit firms. We estimate a model with the gross negligence indemnity clause (*MATMALCOV*) and the retroactive indemnity clause (*RETRO*) as dependent variables. Independent variables include the characteristics of audit firms and unit premium amount. Columns (2) and (3) of Table 3 show that the coefficients on *SMALLAUD* are significantly negative (z-stat. = −3.12, −1.88), indicating that insurance companies are more reluctant to sign special indemnity clauses with small audit firms. Moreover, insurance companies are also less inclined to sign both the gross negligence indemnity clause and the retroactive indemnity clause with audit firms that received administrative penalties or industry discipline in previous years (*SANC*) (z-stat. = −1.85, −1.72) and are more likely to indemnify the gross negligence of audit firms that issued more modified opinions in the last year (*LMODPCT*) (z-stat. = 2.32).

4. The audit quality effect of PLI contracts

4.1. Research design

We test H2 by estimating the following DID model of audit quality:

$$LnADJMAG = \beta_0 + \beta_1 TREAT \times INSUR\_NONLLP + FE_{COM} + FE_{AUDFIRM} + FE_{YEAR} + Controls + \varepsilon$$

(2)

The dependent variable, *LnADJMAG*, captures the magnitude of audit adjustments, calculated by the natural log of (one plus) a percentage change in earnings moving from pre-audit accounts to audited accounts (= $\ln(1+ \lvert E_{PRE} - E_{AUD} \rvert / \lvert E_{PRE} \rvert)$). Audit adjustments reflect the extent to which auditors adjust earnings preferred by management. It has been considered a potentially more direct measure of audit quality in prior literature (Lennox et al. 2016, 2018).

The treatment group consists of observations audited by small audit firms that have newly insured PLI during the sample period (*TREAT* = 1). There are two control groups. One is the benchmark control group, comprised of observations by audit firms that have never purchased PLI during the sample period. The other is the alternative control group, comprised of observations by large audit firms that have newly insured PLI during the sample period (*ALTCTRL* = 1). As we discussed above, the audit quality effect of PLI contracts is relatively weaker in large audit firms. Therefore, we need to distinguish between audit firms of various sizes to prevent this from affecting the testing of H2.

To eliminate the potential interference of audit firm transformation during the sample period (Wang & Dou, 2015), we define *INSUR_NONLLP* as equal to one for the years after the audit firm purchased PLI but had not transformed into LLPs, and zero otherwise. In addition, there are three other situations: *INSUR_LLP* (equal to one for the years after the audit firm purchased PLI and transformed into LLPs, and zero otherwise), *NONINSUR_LLP* (equal to one for the years after the audit firm transformed into LLPs but had not purchased PLI, and zero otherwise), *NONINSUR_NONLLP* (equal to one for the years that the audit firm had not purchased PLI and had not transformed into LLPs, and zero otherwise). We use *NONINSUR_NONLLP* as a benchmark and interact the other three variables with *TREAT* and *ALTCTRL* to examine PLI contracts' audit quality effect on audit firms of different sizes under multiple situations.

The coefficient on *TREAT* × *INSUR_NONLLP* reflects the change in audit quality of the treatment group compared to the benchmark control group after purchasing PLI. If $\beta_1 < 0$, it means that the shirking motivation dominates; if $\beta_1 > 0$, it means that the governance function dominates; if β_1 is not significantly different from zero, it means that the above two factors have a similar impact on audit quality.

Equation (2) includes company fixed effects (*FE_{COM}*) and audit firm fixed effects (*FE_{AUDFIRM}*) to control for heterogeneity across companies and audit firms. It also includes year fixed effects (*FE_{YEAR}*) to control for time-varying factors that affect audit adjustments. We control for client size (*SIZE*, = ln (Total assets)), leverage (*LEV*, = Total liabilities/Total assets), profitability (*ROA*, = Net income/Total assets), loss situation (*LOSS*, equal to one for a current-period net loss, and zero otherwise), cash ratio (*CASH*, = Cash balance/Total assets), and annual stock returns (*RET*, = (Year-end closing price – Opening price at the beginning of the year)/Opening price at the beginning of the year). In addition, we control for several corporate governance characteristics such as board size (*BODSIZE*, = ln (The number of directors on the board), the duality of top management (*DUAL*, equal to one if the CEO is also the chairman of the board, and zero otherwise), and a number of basic characteristics of client companies such as complexity (*SQSUBS*, = Square root of the number of subsidiaries), state ownership (*SOE*, equal to

one if the company's ultimate owner is the government or a state-owned entity, and zero otherwise), and age (*AGE*, = Days from establishment to the end of the financial year/365). We also control for the signed accruals calculated from the pre-audit financial statements (*PREACC*, = (E_{PRE} − Net operating cash flows)/Total assets), because auditors are likely to require more audit adjustments when signed pre-audit accruals are larger. In terms of audit engagement attributes, we control for audit firm turnover (*AUDCHG*, equal to one for an initial audit engagement, and zero otherwise).

In addition, audit quality might also be affected by other simultaneous risk control measures during the first year of insurance. Prior studies have suggested that the most commonly used methods for controlling audit risk are to increase audit fee, increase the probability of issuing modified opinions and abandon risky clients (DeFond & Zhang, 2014). Therefore, we construct three variables correspondingly and include them as control variables, consisting of *ΔAUDFEE* (= Change of natural log of annual revenue of audit firm), *ΔMOD* (= Change of the ratio of the number of modified opinions issued/Total number of client companies), and *ΔRISKCLIENT* (= Change of the ratio of the number of risky clients/Total number of client companies). Formal definitions for each variable are provided in the Appendix A.

4.2. Sample and data

As the DID design required us to identify the first insured year of each audit firm and we were unable to discover early information for the 28 audit firms that purchased PLI before 2009, these audit firms were dropped from the following analysis. The remaining 22 audit firms constitute the research sample for Model (2). According to the cluster analysis mentioned above, there are 14 small audit firms and three large audit firms that were newly insured PLI during the 2009–2015 period. Their client companies take a value of one on the variables *TREAT* and *ALTCTRL*, respectively. There are five small audit firms that never purchased PLI by the end of 2015. Their client companies serve as the benchmark control group.

To ensure that each audit firm has at least one year's audit data before and after purchasing PLI and considering the availability of audit adjustment data, our research period for Model (2) is from 2007 to 2015.[6] During this period, we obtain 6,141 firm-year observations by the 22 audit firms in our research sample from the CSMAR database.

We dropped 968 observations missing audit adjustment data and 93 observations missing other control variables data. Consistent with prior literature (Lennox et al., 2016, 2018), we dropped 342 observations in which there were inconsistencies between the CSMAR and MOF databases in the reported value of audited earnings.[7] In addition, we dropped 735 observations for which the audit firms stopped purchasing PLI.[8] The final sample therefore consists of 3,990 observations.

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[6]The audit adjustment data is available in the MOF database up to 2015. Nevertheless, it does not affect us observing the audit adjustments made by audit firms that were first insured in 2015. In this case, the entire year of 2015 is covered by insurance while audit adjustment decisions for 2015 annual financial reports are made in early 2016. Therefore, the magnitude of audit adjustments could reflect behavioural changes in audit firms after purchasing PLI in the same year.

[7]After taking into account the rounding differences between the CSMAR and MOF databases, we define the two databases as being consistent when the reported difference in audited earnings is less than ±1%.

[8]The main reason for the large number of excluded observations is that a large audit firm that first purchased PLI in 2010 stopped insuring between 2013 and 2015.

4.3. Descriptive statistics

Table 4 presents the descriptive statistics for Model (2). All continuous variables were winsorised at the 1st and 99th percentiles to mitigate outlier problems in the raw values. Panel A shows the sample distribution. There are 1,511, 764, and 1,715 observations in the treatment group, the benchmark control group, and the alternative control group, respectively. Specifically, there are 187 observations that were audited by small audit firms in the years during which the audit firm purchased PLI but had not transformed into LLPs (*TREAT* × *INSUR_NONLLP* = 1), accounting for 12.4% of the total observations of the treatment group. There are 289 observations that were audited by large audit firms in the years during which the audit firm purchased PLI but had not transformed into LLPs (*ALTCTRL* × *INSUR_NONLLP* = 1), accounting for 16.9% of the total observations of the alternative control group.

Panel B shows the descriptive statistics for the other variables. From the statistics on the audit adjustment-related variables, 50.5% of the audits in our sample are subject to income-decreasing audit adjustments (*ADJ_DW*), 22.5% are subject to income-increasing audit adjustments (*ADJ_UP*), and 27.0% have no adjustment to earnings. Therefore, downward adjustments occur more than twice as often as upward adjustments. Moreover, downward adjustments are typically larger than upward adjustments according to the means of *LnADJMAG_DW* and *LnADJMAG_UP* (0.058 vs. 0.029). These statistics are consistent with prior research (Kinney & Martin, 1994; Lennox et al., 2016, 2018).

4.4. Regression results

Column (1) of Table 5 reports the regression results for Model (2). The coefficient on *TREAT* × *INSUR_NONLLP* is significantly positive (t-stat. = 2.21), indicating that the magnitude of audit adjustments significantly increases after small audit firms purchased PLI, supporting the governance function of PLI contracts. There is a significant difference between the coefficients on *ALTCTRL* × *INSUR_NONLLP* and *TREAT* × *INSUR_NONLLP* (F-stat. = 5.23, $p < 0.05$), which means that compared to small audit firms, the governance function of PLI contracts is significantly weaker in large audit firms.[9]

From the results of the other interactions, the coefficient on *ALTCTRL* × *INSUR_LLP* is significantly positive (t-stat. = 1.84) and is significantly different than *ALTCTRL* × *INSUR_NONLLP* (F-stat. = 8.58, $p < 0.01$), indicating that the magnitude of audit adjustments significantly increases after large audit firms transformed into LLPs, supporting that transformations improve audit quality for insured large audit firms. There is no significant difference between the coefficients on *TREAT* × *NONINSUR_LLP* and *TREAT* × *INSUR_LLP* (F-stat. = 0.44), indicating that the audit quality effect of PLI contracts is not that obvious for small audit firms that have transformed into LLPs, which is consistent with our previous consideration of related control variables. Specifically, from the perspective of audit firms, practice risk greatly increases after the transformation, which might weaken the marginal impact of PLI contracts on the improvement in audit quality. From the perspective of insurance companies, they

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[9]Given that most large audit firms purchased PLI in early years, the number of audit firms in the control group is limited, which might influence our findings on large audit firms and make it difficult to examine differences in the audit quality effect between insured and uninsured large audit firms before they transformed into LLPs.

Table 4. The descriptive statistics for the audit adjustment model.

Panel A: Sample distribution

	Treatment group: Newly insured small firms	Benchmark control group: Never insured small firms	Alternative control group: Newly insured large firms	Total
INSUR_NONLLP	187	0	289	476
NONINSUR_LLP	123	234	0	357
INSUR_LLP	481	0	1,034	1,515
NONINSUR_NONLLP	720	530	392	1,642
Total	1,511	764	1,715	3,990

Panel B: Descriptive statistics of other variables (N = 3,990)

	Mean	Sd	Min	P25	P50	P75	Max
ADJMAG	0.132	0.500	0.000	0.000	0.014	0.073	5.334
LnADJMAG	0.087	0.218	0.000	0.000	0.014	0.071	1.846
ADJ_DW	0.505	0.500	0.000	0.000	1.000	1.000	1.000
ADJ_UP	0.225	0.417	0.000	0.000	0.000	0.000	1.000
LnADJMAG_DW	0.058	0.161	0.000	0.000	0.000	0.042	1.846
LnADJMAG_UP	0.029	0.158	0.000	0.000	0.000	0.000	1.846
SIZE	21.593	1.149	18.865	20.791	21.480	22.224	25.135
LEV	0.461	0.244	0.047	0.270	0.454	0.627	1.448
ROA	0.039	0.063	−0.293	0.014	0.037	0.069	0.206
LOSS	0.096	0.295	0.000	0.000	0.000	0.000	1.000
CASH	0.205	0.153	0.004	0.097	0.160	0.274	0.729
RET	0.281	0.828	−0.759	−0.274	0.049	0.587	3.403
BODSIZE	2.161	0.200	1.386	2.079	2.197	2.197	2.890
DUAL	0.219	0.413	0.000	0.000	0.000	0.000	1.000
SQSUBS	2.878	1.674	0.000	1.732	2.646	3.606	9.592
SOE	0.208	0.406	0.000	0.000	0.000	0.000	1.000
AGE	14.341	5.387	0.836	10.619	14.097	17.863	34.044
PREACC	0.011	0.102	−0.341	−0.037	0.009	0.054	0.759
AUDCHG	0.080	0.271	0.000	0.000	0.000	0.000	1.000
ΔAUDFEE	1.258	1.187	−1.870	0.473	1.135	1.910	7.798
ΔMOD	−0.001	0.035	−0.125	−0.012	0.000	0.008	0.130
ΔRISKCLIENT	0.064	0.109	−0.125	0.000	0.063	0.108	0.556

The variables are defined in the Appendix A.

Table 5. The regression results for the audit adjustment model.

	(1)		(2)		(3)	
Dep. Var:	*LnADJMAG*		*LnADJMAG_DW*		*LnADJMAG_UP*	
	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
Experimental variable						
TREAT×INSUR_NONLLP	0.054	2.21**	0.047	2.62***	0.002	0.12
Control variables						
ALTCTRL×INSUR_NONLLP	−0.020	−0.91	0.007	0.41	−0.014	−0.75
TREAT×NONINSUR_LLP	−0.002	−0.08	−0.013	−0.65	−0.001	−0.03
TREAT×INSUR_LLP	−0.016	−0.65	−0.012	−0.58	−0.020	−0.92
ALTCTRL×INSUR_LLP	0.040	1.84*	0.037	2.39**	0.002	0.14
SIZE	−0.013	−1.08	−0.008	−0.91	−0.005	−0.56
LEV	0.068	1.74*	0.028	0.99	0.045	1.47
ROA	−0.059	−0.52	−0.292	−3.60***	0.241	2.75***
LOSS	0.082	4.41***	0.132	9.89***	−0.050	−3.47***
CASH	−0.127	−2.87***	−0.060	−1.88*	−0.061	−1.77*
RET	−0.004	−0.56	0.001	0.17	−0.008	−1.43
BODSIZE	0.068	1.72*	0.029	1.01	0.041	1.32
DUAL	−0.022	−1.37	−0.017	−1.47	−0.005	−0.40
SQSUBS	0.008	1.21	0.010	2.00**	−0.002	−0.42
SOE	−0.014	−0.90	−0.003	−0.23	−0.013	−1.09
AGE	−0.008	−1.91*	−0.003	−1.07	−0.005	−1.46
PREACC	0.007	0.14	0.210	6.21***	−0.203	−5.56***
AUDCHG	0.064	3.95***	0.037	3.20***	0.028	2.20**
ΔAUDFEE	−0.004	−0.92	0.001	0.31	−0.003	−0.94
ΔMOD	0.158	1.44	0.102	1.28	0.076	0.88
ΔRISKCLIENT	−0.011	−0.27	0.005	0.18	−0.009	−0.29
FE_{COM}	Yes		Yes		Yes	
$FE_{AUDFIRM}$	Yes		Yes		Yes	
FE_{YEAR}	Yes		Yes		Yes	
Observations	3,990		3,990		3,990	
Unique companies	1,157		1,157		1,157	
R^2	0.063		0.125		0.050	

The variables are defined in the Appendix A. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

tend to reduce supervision on transformed audit firms for cost savings, which might diminish the governance function of PLI contracts.

The results for the other control variables show that auditors make significantly more audit adjustments for companies that suffered an operating loss (*LOSS*), lacked sufficient cash (*CASH*), and experienced an audit firm turnover (*AUDCHG*).

4.5. Further analyses

We further distinguish audit adjustments of different directions into income-decreasing and income-increasing audit adjustments to explore the situation in which the audit quality effect of PLI contracts exists. We substitute the dependent variable with *LnADJMAG_DW* (*LnADJMAG_UP*), equal to the value of *LnADJMAG* if audited annual earnings (E_{AUD}) are lower (higher) than pre-audit annual earnings (E_{PRE}), and zero otherwise.

In Column (2) of Table 5, where the dependent variable is *LnADJMAG_DW*, the coefficient on *TREAT × INSUR_NONLLP* is significantly positive (t-stat. = 2.62), indicating that the magnitude of income-decreasing audit adjustments significantly increases after small audit firms purchased PLI. In Column (3) of Table 5, where the dependent variable is

Table 6. Placebo tests.

Dep. Var: _LnADJMAG_	(1) Pseudo-event year = t − 1	(2) Pseudo-event year = t − 2	(3) Pseudo-event year = t + 1	(4) Pseudo-event year = t + 2
	Coef. (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)
Experimental variable				
_TREAT×INSUR_NONLLP_	0.021	−0.017	0.029	0.018
	(1.02)	(−0.83)	(0.99)	(0.45)
Control variables	Yes	Yes	Yes	Yes
FE_{COM}	Yes	Yes	Yes	Yes
$FE_{AUDFIRM}$	Yes	Yes	Yes	Yes
FE_{YEAR}	Yes	Yes	Yes	Yes
Observations	3,990	3,990	3,990	3,990
Unique companies	1,157	1,157	1,157	1,157
R^2	0.061	0.061	0.061	0.061

The variables are defined in the Appendix A.

_LnADJMAG_UP_, the coefficient on _TREAT_ × _INSUR_NONLLP_ is not significantly different than zero (t-stat. = 0.12), indicating that there is no obvious change in the magnitude of income-increasing audit adjustments after small audit firms purchased PLI. The coefficients on _TREAT_ × _INSUR_NONLLP_ in Columns (2) and (3) show a significant difference (Chi-sq. = 4.38, p < 0.05), which means that the audit quality effect of PLI contracts is dominated by downward adjustments.

4.6. Placebo tests

To ensure that the impact on audit adjustments is attributed to PLI contracts and address the concern that our results are driven by other simultaneous risk control measures of audit firms, we conduct placebo tests. Specifically, rather than the first insured year of each audit firm, we define four pseudo-event years and repeat the regression analysis.

The simplified results of the placebo tests are reported in Table 6 in Columns (1) to (4) using one year before, two years before, one year after, and two years after the first insured year as the pseudo-event years, respectively. We find that none of the coefficients on _TREAT_ × _INSUR_NONLLP_ is significantly different than zero, which further strengthens the causality between PLI contracts and audit quality effect and supports our hypotheses.

5. Conclusions and implications

As a widely used and continuously developing type of insurance, PLI has been proven by various countries as an effective measure for protecting the CPA profession. However, it has always been a concern whether it would cause moral hazard and other negative effects. According to proprietary PLI contract data filed with the MOF by audit firms, we examined the differential pricing and audit quality effect of PLI contracts. We found that insurance companies charged a significantly higher price and showed a significantly lower tendency to sign special indemnity clause in PLI contracts with small audit firms than large ones, indicating that insurance companies use the insurance contracts to restrain the

insureds' high-risk behaviours. Further, we found that the magnitude of audit adjustments (especially income-decreasing audit adjustments) significantly increases after small audit firms purchased PLI, supporting the external governance hypothesis of PLI contracts.

The findings of our study are important given the recent intensive insuring activities that have occurred in China. This paper provides a better understanding of the internal risk management of audit firms from the perspective of PLI purchases. It also shows that a change in external supervision will affect auditors' behaviours and the responses of audit firms of different sizes differ when facing PLI contracts..

In practice, the Chinese government and the public accounting profession have been actively advocating PLI policies in recent years. Insurance companies and audit firms, as the supply and demand parties of PLI, have been exploring how to maximise the inherent value of PLI. This paper evaluates the consequences of introducing PLI and provides empirical evidence for PLI's future implementation in China. It also provides references for making more targeted regulatory policies regarding auditors' purchase of PLI services and possible mechanisms for small audit firms to improve their audit quality during the implementation of the new securities law.

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Appendix A Variable definitions

Variable	Definition
Variables in Equation (1)	
PREM	Insurance premium amount (Unit: RMB 10,000 yuan).
UNITPREM	Insurance premium amount/Annual revenue of audit firm.
LnUNITPREM	Natural log of *UNITPREM*.
SMALLAUD	Indicator variable equal to one if the audit firm is a small audit firm, and zero otherwise.
INSUCEIL	Aggregate limit of indemnity (Unit: RMB 10,000 yuan).
UNITINSUCEIL	Aggregate limit of indemnity/Annual revenue of audit firm.
LnUNITINSUCEIL	Natural log of *UNITINSUCEIL*.
MATMALCOV	Indicator variable equal to one if the insurance company indemnifies for losses caused by unintentional gross negligence of audit firms, and zero otherwise.
RETRO	Indicator variable equal to one if the insurance company indemnifies for losses caused by claims on audit firms within a specific retrospective period, and zero otherwise.
SANC	Indicator variable equal to one if the audit firm has been subject to administrative penalties or industry disciplines in the past three years, and zero otherwise.
LMODPCT	Number of modified opinions issued last year/Total number of client companies last year.
RISKFUND	Aggregate amount of professional risk fund (Unit: RMB 10,000 yuan).
UNITRISKFUND	Aggregate amount of professional risk fund/Annual revenue of audit firm.
LnUNITRISKFUND	Natural log of (one plus) *UNITRISKFUND*.
LLP	Indicator variable equal to one if the audit firm transformed into LLPs, and zero otherwise.
Variables in Equation (2)	
E_{PRE}	Pre-audit annual earnings.
E_{AUD}	Audited annual earnings.
ADJMAG	The absolute magnitude of the audit adjustment (i.e. $\mid E_{PRE} - E_{AUD} \mid / \mid E_{PRE} \mid$).
LnADJMAG	Natural log of (one plus) *ADJMAG*.
ADJ_DW	Indicator variable equal to one if the audit firm makes an income-decreasing audit adjustment ($E_{AUD} < E_{PRE}$), and zero otherwise.
ADJ_UP	Indicator variable equal to one if the audit firm makes an income-increasing audit adjustment ($E_{AUD} > E_{PRE}$), and zero otherwise.
LnADJMAG_DW	Equal to the value of *LnADJMAG* if $E_{AUD} < E_{PRE}$, and zero otherwise.
LnADJMAG_UP	Equal to the value of *LnADJMAG* if $E_{AUD} > E_{PRE}$, and zero otherwise.
TREAT	Indicator variable equal to one if the company is audited by a small audit firm that newly insured PLI during the sample period, and zero otherwise.
ALTCTRL	Indicator variable equal to one if the company is audited by a large audit firm that newly insured PLI during the sample period, and zero otherwise.
INSUR_NONLLP	Indicator variable equal to one for the years after the audit firm purchased PLI but had not transformed into LLPs, and zero otherwise.
INSUR_LLP	Indicator variable equal to one for the years after the audit firm purchased PLI and transformed into LLPs, and zero otherwise.
NONINSUR_LLP	Indicator variable equal to one for the years after the audit firm transformed into LLPs but had not purchased PLI, and zero otherwise.
SIZE	Natural log of total assets.
LEV	Total liabilities/Total assets.
ROA	Net income/Total assets.
LOSS	Indicator variable equal to one for a current-period net loss, and zero otherwise.
CASH	Cash balance/Total assets.
RET	(Year-end closing price – Opening price at the beginning of the year)/Opening price at the beginning of the year.
BODSIZE	Natural log of the number of directors on the board.

(Continued).

Variable	Definition
DUAL	Indicator variable equal to one if the CEO is also the chairman of the board, and zero otherwise.
SQSUBS	Square root of the number of subsidiaries.
SOE	Indicator variable equal to one if the company's ultimate owner is the government or a state-owned entity, and zero otherwise.
AGE	Days from establishment to the end of the financial year/365.
PREACC	Signed accruals calculated from the pre-audit financial statements; $= (E_{PRE} -$ Net operating cash flows)/Total assets.
AUDCHG	Indicator variable equal to one for an initial audit engagement, and zero otherwise.
ΔAUDFEE	Change of natural log of annual revenue of audit firm.
ΔMOD	Change of the ratio of the number of modified opinions issued/Total number of client companies.
ΔRISKCLIENT	Change of the ratio of the number of risky clients/Total number of client companies; A company is defined as a risky client if the Z-Score (Altman, 1983) is lower than the median value of all companies in the same industry and year.