Asia-Pacific Journal of Accounting & Economics

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/raae20

Does industry audit risk similarity affect auditor expertise? Evidence from China

Yu Liu, Julia Junxia Liu & Qingquan Xin

To cite this article: Yu Liu, Julia Junxia Liu & Qingquan Xin (2024) Does industry audit risk similarity affect auditor expertise? Evidence from China, Asia-Pacific Journal of Accounting & Economics, 31:3, 339-359, DOI: 10.1080/16081625.2022.2147964

To link to this article: https://doi.org/10.1080/16081625.2022.2147964

ASIA-PACIFIC JOURNAL OF ACCOUNTING & ECONOMICS
2024, VOL. 31, NO. 3, 339–359
https://doi.org/10.1080/16081625.2022.2147964

Routledge
Taylor & Francis Group

Does industry audit risk similarity affect auditor expertise? Evidence from China

Yu Liu[a], Julia Junxia Liu[b] and Qingquan Xin[a]*

[a]School of Economics and Business Administration, Chongqing University, Chongqing, China; [b]Department of Accountancy, The Hang Seng University of Hong Kong, Hong Kong, China

ABSTRACT

This study examines whether auditors develop expertise in audit risk homogenous industries. Using critical audit matters (CAMs) disclosed in audit reports of Chinese listed companies, we construct a homogeneity measure that captures the similarity of audit risks in a client industry. We find that individual partner expertise occurs in industries with high levels of CAM similarity. We also find that industry expert partners provide fee discounts in more homogenous industries, whereas audit quality is unchanged. These results suggest that auditors benefit from achieving economies of scale rather than providing quality-differentiated audits, by specializing in industries with similar audit risks.

ARTICLE HISTORY
Received 27 August 2021
Accepted 27 September 2022

KEYWORDS
Industry audit risk similarity; individual partner industry expertise; critical audit matters (CAMs); audit fee; audit quality

1. Introduction

Major audit firms in developed markets organize their assurance practices along industry lines, and industry expertise plays an important role in performing quality audits.[1] Such industry expert auditors receive more audit fees or obtain more market share than nonexperts by achieving economies of scale or providing quality-differentiated audits (DeFond and Zhang 2014). A vast literature examines the impact of industry expertise on audit quality and audit fees.[2] However, the reasons that auditors choose to specialize in certain industries and the factors affecting auditors' decision to specialize are less explored (DeFond and Zhang 2014). When deciding to develop industry expertise, auditors generally consider the characteristics of client industries (Eichenseher and Danos 1981; Hogan and Jeter 1999). For example, industry expertise is more likely to occur in homogenous industries that offer greater opportunities for knowledge transfer and economies of scale (DeFond and Zhang 2014). The literature shows the importance of industry homogeneity in operating expenses (Cairney and Young 2006), product offerings (Bills et al. 2020), and textual disclosures in annual reports (Brown and Knechel 2016). Expanding this line of research, we propose a new industry homogeneity factor, namely client-specific audit risk disclosed as critical audit matters (CAMs) in audit reports, to examine whether CAM risk similarity is related to auditor industry expertise in the context of an emerging market, China.

Risk assessment is a key practice in risk-based auditing. For example, Deloitte emphasizes that 'central to our (audit) approach is the determination of relevant risks through a careful assessment of the client's industry and the activities that distinguish it.'[3] Auditors of U.K. listed companies were required to discuss CAMs in expanded audit reports for the first time in 2013, and other markets followed.[4] CAM disclosure broadens auditors' opinions by providing more information about the

CONTACT Qingquan Xin xinqingquan@cqu.edu.cn School of Economics and Business Administration, Chongqing University, No. 174 Shazheng Street, Shapingba District, Chongqing 400030, China

*Accepted by Radhakrishnan, Suresh

areas of financial reporting that auditors consider most uncertain or significant. It reflects an auditor's assessment of the risks inherent in a client's business and audit. CAM disclosure is a new uncertainty measure deemed incrementally informative for investors in both developed and emerging markets (Klevak et al. 2020; Goh, Li, and Wang 2020). In this study, based on CAM disclosures, we construct a measure that captures the similarity of client-specific audit risk among member companies in a given industry. We expect that a higher level of audit risk similarity indicates a more homogenous industry, which facilitates knowledge transfer. In a more risk homogenous industry, auditors are more likely to seek additional clients to audit for two purposes. First, they can apply similar audit procedures to more clients, lower average audit costs, and thus achieve audit efficiency. Second, they can develop in-depth industry knowledge, enhance audit quality, and charge higher fees by providing quality-differentiated services to clients. Therefore, greater homogeneity of CAM risks in an industry incentivizes auditors to develop industry expertise, as auditors may generate cost-based or quality-differentiated competitive advantages in this industry.

However, in emerging markets such as China, achieving quality-differentiation competitive advantages may not motivate auditors to develop expertise in a more homogenous industry. First, China's stock market is generally perceived to have a weak institutional environment, characterized by low levels of investor protection, strong political influence, and poor corporate governance due to China's relationship-based culture (e.g. Allen, Qian, and Qian 2005; Ke, Lennox, and Xin 2015; Wong 2016). There is therefore a lack of demand for high-quality audits. Indeed, state-owned enterprises (SOEs) are more likely to hire small, local auditors than large, high-quality auditors (Wang, Wong, and Xia 2008). A differentiation strategy does not lead to higher returns if high-quality audits are not valued by clients. Second, unlike the developed markets dominated by the Big 4 audit firms, the Chinese audit market is highly competitive, especially since the emergence of large local audit firms after 2007 (Chen, Sun, and Wu 2010; Chang, Guo, and Mo 2019; Leung, Liu, and Wong 2019).[5] The active participation of local auditors has increased competition among auditors, which may discourage investment in quality improvement. Auditors may instead rely on a low-price, low-quality strategy to compete for clients in competitive audit markets (Newton, Wang, and Wilkins 2013; Newton et al. 2016). Therefore, the quality-differentiated audit services provided by industry experts may not be demanded by clients, which in turn disincentivizes auditors to specialize, even in risk homogenous industries. Given these facts, we expect that Chinese auditors are more likely to develop expertise in risk homogenous industries to pursue cost-based competitive advantages.

Industry expertise can arise at the levels of audit firms and individual engagement partners for a variety of reasons (Goodwin and Wu 2014; Chi and Chin 2011). Firm-level expertise provides more opportunities for industry knowledge sharing across all clients, whereas partner-level expertise captures client- and locality-specific knowledge that is difficult to transfer and provides stronger individual incentives (DeFond and Zhang 2014; DeFond et al. 2019). As individual engagement partners handle all aspects of the audit, industry expertise at the individual partner level is expected to have the most critical and direct effect on audit risk assessment and audit quality (Chi and Chin 2011; Chin and Chi 2009). Thus, we further predict that the effect of industry audit risk similarity on auditor expertise is more likely to exist at the individual partner level than at the audit firm level.

Using data from China, the world's largest emerging economy, we empirically examine whether audit risk similarity is related to auditor industry expertise measured at the audit firm and the individual partner levels. We measure audit risk similarity in an industry by comparing the number of CAM items shared by two peer companies with the number of unique CAM items reported by them and calculating the mean value of similarity for all pairs within the industry. The homogeneity of industry audit risk increases with the level of CAM similarity.

We test our hypothesis using a sample of 10,232 client-year observations during the 2017–2019 period. Controlling for an array of industry, auditor, and client characteristics affecting industry expertise, we find that industry audit risk similarity is significantly and positively

associated with auditor industry expertise at the individual partner level, but we find no evidence of the association between industry audit risk similarity and industry expertise at the audit firm level. To rule out the possibility of reverse causality and control for audit styles in disclosing certain CAM items, we delete the paired companies who share the same audit firms or engagement partners in the construction of similarity measure. We also re-estimate the main regression models using an alternative industry-level sample to draw reliable inferences regarding the relationship between industry risk homogeneity and auditor industry expertise. In additional analyses, we directly examine the impact of auditor industry expertise on audit pricing and audit quality in risk homogenous industries. We find evidence that expert partners provide audit fee discounts to clients in risk homogenous industries. However, we find no evidence of a difference in audit quality between expert and nonexpert partners in risk homogenous industries. Our findings suggest that Chinese auditors specialize in risk homogenous industries to achieve efficiency transfer and cost-based competitive advantages rather than quality differentiation, due to the absence of client demand for high-quality audits.

We contribute to the literature in two ways. First, our study extends the literature on the role of demand-side industry forces in auditors' decisions to specialize (DeFond and Zhang 2014; Eichenseher and Danos 1981; Hogan and Jeter 1999; Mayhew and Wilkins 2003). Prior studies, such as Cairney and Young (2006), Bills, Jeter, and Stein (2015), and Bae, Choi, and Lee (2019), are limited to the operational homogeneity of industries in the U.S., where auditor industry expertise is prevalent (De Beelde 1997). We explore the role of a new industry factor, audit risk homogeneity, in the context of emerging markets, which are typically characterized by a weak institutional environment for investor protection and low demand for high-quality audits. Our results suggest that Chinese auditors tend to develop partner-level industry expertise in industries with higher levels of audit risk similarity, which enables the engagement partners to gain a cost-saving competitive advantage. We advance this line of research by incorporating industry risk similarity into the determinants of auditors' expertise decisions and by providing evidence from emerging markets.

Second, we develop a new measure of industry homogeneity. Cairney and Young (2006) use the correlation of industry members' changes in year-to-year operating expenses to measure industry homogeneity. This measure focuses on operating expenses, and Bills, Jeter, and Stein (2015) describe it as an operational similarity. Using 'Cosine' similarity of CAM line items among industry peers, we construct a new measure of industry audit risk homogeneity, as CAMs reflect auditors' assessment of client-specific business and audit risks and are more relevant to auditors' decision to specialize.

The rest of this paper proceeds as follows. Section 2 discusses the related literature and develops our hypothesis. Section 3 describes the research design, variable construction, and sample selection process. Section 4 reports the main empirical results, and Section 5 presents the results of additional analyses. Finally, Section 6 concludes this paper.

2. Related literature and hypothesis development

2.1 Related literature

Auditors face high costs when developing and transferring industry- and client-specific knowledge, as it takes time for auditors to gain knowledge and develop expertise from on-the-job experience with specific types of engagement (Goodwin and Wu 2014). Therefore, they seek an environment that is more conducive to the development of industry expertise. The literature finds that one of the main considerations in auditors' decisions to develop expertise is the degree of economies of scale based on industry characteristics. For example, Eichenseher and Danos (1981) find that auditors in regulated industries can effectively apply learned audit procedures and reporting knowledge to similar clients in these industries and achieve industry concentration. Hogan and Jeter (1999) find

evidence in non-regulated industries showing that auditors are more likely to invest in expertise in rapidly growing industries.

Recent studies further investigate why auditors decide to develop expertise in industries that are considered homogenous. Cairney and Young (2006) show that the homogeneity of industry members, measured by changes in operating expenses, is positively associated with industry specialization, suggesting that auditors seek additional clients in industries in which industry members have similar operations. Using the operational homogeneity measure designed by Cairney and Young (2006), several studies find that auditors benefit from using similar audit procedures and generate competitive advantages in audit efficiency when auditing clients in industries with homogenous operations and comparable accounting practices (Cairney and Stewart 2015; Bills, Jeter, and Stein 2015; Bae, Choi, and Lee 2019).

The literature also explores the development of auditors' industry expertise from the perspective of a client's auditor choice. A client's decision to share an auditor with its industry peers involves weighing the protection of its proprietary information against the benefits of auditor expertise. On the one hand, Kwon (1996) finds that as the degree of concentration in an industry increases, clients in that industry become reluctant to engage the same auditor as other companies because they do not want to risk the transfer of proprietary information to their competitors. On the other hand, studies show that peer companies are more likely to engage the same auditors when their product offerings (Bills et al. 2020) and financial disclosures (Brown and Knechel 2016) are similar. Thus, the fact that similar clients are drawn to similar auditors (Brown and Knechel 2016) means that auditors are more likely to develop industry expertise in homogenous industries.

While the literature focuses on similarities in operations, accounting, and financial disclosures, little is known about the role of audit risk similarity in auditors' decisions regarding building expertise, especially in the context of emerging economies with a weak institutional environment for investor protection. Focusing on industry audit risk similarity, our study examines whether and how industry audit risk similarity affects auditors' decisions to develop expertise.

2.2 Hypothesis development

Auditors choose to specialize in certain industries if they see benefits in doing so, such as market share derived from economies of scale (DeFond and Zhang 2014). As auditors tend to seek additional clients in the same industry, the cost of developing expertise is thus spread over more clients and auditors benefit from economies of scale. Their increased market share enables auditors to gain competitive advantages in terms of cost efficiency (Cairney and Young 2006; Cairney and Stewart 2015; Bills, Jeter, and Stein 2015; Bae, Choi, and Lee 2019). Depending on the degree of competition in the audit market and clients' bargaining power, auditors may grant fee discounts and thereby pass some or all of their efficiency gains on to clients (Fung, Gul, and Krishnan 2012; Bills, Jeter, and Stein 2015; Dekeyser, Gaeremynck, and Willekens 2019). As risk assessment is essential in risk-based auditing, we propose that auditors consider risk homogeneity in their decision to specialize. Specialized auditors can apply their in-depth understanding of industry characteristics and audit procedures to respond to risk in industries with similar audit risks. Industry risk similarity reduces the time and cost involved in auditors' acquisition of industry risk knowledge through engagements, and thus it helps auditors to achieve cost-based competitive advantages through economies of scale.[6]

Studies suggest that extending the level of analysis from audit firms to partners could provide a better understanding of auditor behavior (Chi and Chin 2011; Goodwin and Wu 2014). Firm-level expertise provides more opportunities for industry knowledge sharing across all clients as it is assumed that industry knowledge is distributed across all engagement partners within an audit firm, whereas partner-level expertise captures industry knowledge residing in the human capital of individual engagement partners that is difficult to transfer across partners within the audit firm and provides stronger individual incentives (Goodwin and Wu 2014; DeFond and Zhang 2014). Auditor industry

expertise results in more industry-specific knowledge, which is important for increasing engagement partners' understanding of client-specific operating environments and accounting practices. Partners with industry expertise are expected to have the most critical and direct influence on audit procedures, as they have better professional judgment regarding the financial information of clients (Chi and Chin 2011). As audit risk is an important factor in audit procedures, industry audit risk similarity makes it possible for engagement partners to obtain more clients from more risk homogenous industries and transfer industry knowledge across engagements. Therefore, we propose the following hypothesis:

H1. Industry audit risk similarity is positively associated with auditor industry expertise at the individual partner level.

Nevertheless, there are also reasons to argue that industry audit risk similarity may not lead to the development of auditor industry expertise despite the benefit of economies of scale. As discussed in the auditor industry expertise literature, clients may avoid choosing the same auditor as their peers due to concerns about the transfer of proprietary information (Cahan et al. 2008). Furthermore, the Chinese market is generally perceived to have a weak institutional environment (Wong 2016), which makes the problem of intellectual property leakage prominent. As a result, client companies in industries with high levels of audit risk similarity may have significant proprietary concerns when hiring expert auditors who may potentially transfer their private information to other clients they audit. In conclusion, whether industry audit risk similarity leads to auditor industry expertise remains an empirical question.

3. Research design

3.1 Sample and data

Our sample consists of all publicly listed companies in mainland China (also referred to as A-share companies) during the 2017–2019 period. We start our sample in 2017 as auditors of all A-share companies are required to disclose CAMs in audit reports issued as of 1 January 2018, i.e. for clients' annual reports with a fiscal year-end on or after 31 December 2017. We manually collect all CAM items from each company's annual reports. Other data, including financial information, the identity of audit firms and engagement partners, and audit fees, are extracted from the China Stock Market and Accounting Research (CSMAR) database. Table 1, Panel A presents our sample selection procedure. From the initial sample, we first exclude companies in the financial industry. Following Cairney and Young (2006), we also exclude observations in any industry-year groups with fewer than 5 client companies to avoid potential bias when calculating industry expertise. After dropping observations with missing data for the regressions, we obtain a final sample of 10,232 client-year observations from 3,622 listed companies.

Our industry definition is based on the industry classifications of the China Securities Regulatory Commission (CSRC). Following Feng et al. (2021) and DeFond et al. (2019), we use 2-digit industry codes for the manufacturing industry and 1-digit industry codes for other industries. Table 1, Panel B presents the sample distribution by industry. Our sample is distributed unevenly across industry groups. The computer and communications equipment manufacturing industry has the most observations (9.96%), followed by information technology (7.11%) and chemical raw materials (6.85%), whereas the comprehensive utilization of waste resources accounts for only 0.15% of the observations.

3.2 Variable definitions

3.2.1 Industry audit risk similarity

Our industry audit risk similarity measure is based on CAMs disclosed in the audit reports of all A-share companies. To improve the information content of audit reports and meet the

Table 1. Sample selection and industry distribution.

Panel A: Sample selection	
All A-share companies listed on the Shanghai and Shenzhen stock exchanges from 2017 to 2019	10,884
Less:	
Observations in the financial industry	(284)
Observations in industries with fewer than 5 companies	(17)
Observations with missing data	(351)
Final client company-year observations	10,232

Panel B: Sample distribution by CSRC industry

Code	Industry	Obs.	Percentage	Code	Industry	Obs.	Percentage
A	Agriculture, forestry, livestock farming, and fishery	124	1.21%	C34	General equipment manufacturing	385	3.76%
B	Mining	224	2.19%	C35	Specialized equipment manufacturing	620	6.06%
C13	Agricultural and sideline food processing	134	1.31%	C36	Automotive manufacturing	375	3.66%
C14	Food manufacturing	137	1.34%	C37	Railroad, ship, aerospace, and other transportation equipment manufacturing	143	1.40%
C15	Wine, beverage, and tea manufacturing	126	1.23%	C38	Electrical machinery	676	6.61%
C17	Textile	114	1.11%	C39	Computer and communications equipment manufacturing	1,019	9.96%
C18	Clothing and apparel	111	1.08%	C40	Instrumentation	141	1.38%
C19	Leather, fur, feathers, and footwear	33	0.32%	C41	Other manufacturing	58	0.57%
C20	Wood products manufacturing	25	0.24%	C42	Comprehensive utilization of waste resources	15	0.15%
C21	Furniture manufacturing	71	0.69%	D	Electric power, gas production, and tap water	316	3.09%
C22	Paper products manufacturing	85	0.83%	E	Construction	282	2.76%
C23	Printing	38	0.37%	F	Wholesale and retail trade	481	4.70%
C24	Sports and recreational goods manufacturing	38	0.37%	G	Transportation	286	2.80%
C25	Oil processing	46	0.45%	H	Hotels and catering services	25	0.24%
C26	Chemical raw materials	701	6.85%	I	Information technology	728	7.11%
C27	Pharmaceutical manufacturing	643	6.28%	K	Real estate	349	3.41%
C28	Chemical fiber manufacturing	70	0.68%	L	Leasing and business services	124	1.21%
C29	Rubber and plastic	220	2.15%	M	Scientific research and integrated technological services	137	1.34%
C30	Non-metallic mineral products	246	2.40%	N	Public facilities and services	141	1.38%
C31	Ferrous metal smelting	91	0.89%	Q	Healthcare and social work	31	0.30%
C32	Non-ferrous metal smelting	202	1.97%	R	Cultural, sports, and entertainment	169	1.65%
C33	Metal products manufacturing	178	1.74%	S	Other	74	0.72%
					Total	10,232	100.00%

Panel A presents the sample selection procedure. Panel B presents the sample distribution by CSRC industry.

requirements of China's capital market reform for high-quality accounting information, the Ministry of Finance issued *Chinese Auditing Standards No. 1504 Communication on Critical Audit Matters in Audit Reports* in December 2016. Under the new standard, auditors are required to disclose the CAMs that, in their professional judgment, are most important when auditing clients' financial statements and how they address these matters in the audit. CAM disclosure expands traditional audit opinions by providing additional information on areas of financial reporting with high risks of material misstatement or with special risks resulting from the judgment of the client's management. As a result, when performing an audit engagement, auditors must consider the industry background and regulatory environment of the client to identify and disclose

client-specific risk points in the form of CAMs. We assume that client companies with similar audit risks tend to report similar CAMs. The more companies in the same industry that disclose the same CAM, the more audit risk homogenous the industry is.

To collect CAM data, we read the titles and content of all CAMs in every A-share company's audit report and classify them into categories (e.g. impairment, income). In each category, we count the reporting frequency of each CAM item (e.g. income from sales revenue, income from asset disposals). See Appendix A for the distribution of the CAM items by nature. The three most frequently reported CAMs are recognition of sales revenue (23.91%), impairment of loans and receivables (17.76%), and impairment of goodwill (13.06%).

Studies use various methods to measure the similarities of variables between two peer companies or between members of the same industry, such as textual similarity of CAM disclosure (Chen et al. 2020), management discussion and analysis (MD&A) (Brown and Tucker 2011; Brown and Knechel 2016), product offering (Hoberg and Phillips 2016), and financial reporting items (Johnston and Zhang 2021). Compared with textual disclosures, CAM disclosures can accurately locate client-specific audit risk items and avoid colloquial bias.[7] Therefore, following Hoberg and Phillips (2016) and Johnston and Zhang (2021), we calculate industry audit risk similarity as follows:

$$Cosine_{i,j} = \frac{CAM_{i,j}}{\sqrt{CAM_i * CAM_j}} \tag{1}$$

$$Similarity\_Co_{k,t} = mean_{k,t}\left(Cosine_{i,j}\right) \tag{2}$$

where $CAM_{i,j}$ is the number of CAM items shared by company i and company j, and CAM_i (CAM_j) is the number of unique items disclosed by company i (company j). We begin our full sample (10,232 observations) with pairs of companies in the same industry-year. All companies in an industry-year are exhaustively paired. For example, if there are companies A, B, and C in an industry-year, the company pairs are A–B, A–C, and B–C. $Cosine_{i,j}$ is the proportion of unique CAM items shared by two paired companies in the same industry-year group. In Eq. (2), $Similarity\_Co_{k,t}$ is the mean value of $Cosine_{i,j}$ in industry k in year t. $Similarity\_Co_{k,t}$ is higher when more member companies of an industry report similar CAM items. Industry audit risk similarity reflects the common nature of audit risks for client companies in that industry.

3.2.2 Auditor industry expertise

Studies adopt several alternative definitions to capture auditors' industry expertise (Reichelt and Wang 2010; Fung, Gul, and Krishnan 2012; Zerni 2012; Bae, Choi, and Lee 2019; Dekeyser, Gaeremynck, and Willekens 2019). Following these studies, we use an auditor's market share based on client domestic audit fees or total assets to measure industry expertise at the individual partner and audit firm levels.[8] Specifically, following Reichelt and Wang (2010) and Fung, Gul, and Krishnan (2012), we define *ExpertPartner1* (*ExpertPartner2*) as an indicator variable that equals one if the market share of a lead signing partner in terms of client domestic audit fees (total assets) is larger than 5% in an industry-year, and zero otherwise.[9] Following Zerni (2012) and Bae, Choi, and Lee (2019), we define *ExpertFirm1* (*ExpertFirm2*) as an indicator variable that equals one if the market share of an audit firm in terms of client domestic audit fees (total assets) is larger than 20% in an industry-year, and zero otherwise.

3.3 Regression models

To examine the association between industry risk similarity and industry expertise at the individual partner level, we estimate the logistic regression model in Eq. (3):

$$Ln\left(\frac{P(ExpertPartner_{i,t}=1)}{1-P(ExpertPartner_{i,t}=1)}\right)=\alpha+\beta Similarity\_Co_{k,t}+\gamma Controls_{i,t}+\Sigma\delta YEAR \quad (3)$$

where the dependent variable $ExpertPartner_{i,t}$ is whether the lead signing partner is an industry expert for company i in year t, and $Similarity\_Co_{k,t}$ is the level of CAM risk similarity for industry k in year t. $Controls_{i,t}$ is a vector of control variables. Following Cairney and Young (2006) and Cahan et al. (2008), we control for industry characteristics that may influence industry expertise: the four-client company industry concentration ratio (*Cr4*); the natural logarithm of the number of clients in an industry (*Number*); the average sales growth ratio of an industry (*Indgrowth*); and the proportion of clients that experience losses in an industry (*Indloss*). We also control for a wide range of auditor and client characteristics, including an indicator variable for international Big 4 auditors (*Big4*); the market share of an audit firm based on the number of clients in an industry-year (*Share*); accounts receivable divided by total assets (*Receivable*); inventory divided by total assets (*Inventory*); intangible assets divided by total assets (*Intangible*); the natural logarithm of total assets (*Size*); total liabilities divided by total assets (*Lev*); net income divided by total assets (*Roa*); the number of years that the company has been listed on a stock exchange (*Age*); an indicator variable for companies whose CEO and chairman of the board are the same person (*Dual*); the number of board directors (*Board*); and an indicator variable for companies that are ultimately controlled by the Chinese government (*Soe*). We include year fixed effects to capture variations in auditor industry expertise over time. Following Bills, Jeter, and Stein (2015), we do not include industry fixed effects in our primary model because the industry risk similarity measure (*Similarity_Co*) is created within a given industry and industry fixed effects exhibit significant multicollinearity with the variables measuring industry characteristics. We winsorize all continuous variables at the 1st and 99th percentiles to mitigate the influence of outliers. We use robust standard errors clustered at the client level to mitigate concerns about heteroscedasticity and serial correlation in the error term (Petersen 2009).

4. Main results

4.1 Descriptive statistics

Table 2, Panel A provides the summary statistics of the variables in our main tests. The mean value of *ExpertPartner1* (*ExpertPartner2*) is 0.048 (0.061), indicating that 4.8% (6.1%) of the client-year observations are audited by expert partners. The mean value of *ExpertFirm1* (*ExpertFirm2*) is 0.041 (0.052), indicating that 4.1% (5.2%) of the client-year observations in our sample engage an audit firm with industry expertise. The mean and median values of *Similarity_Co* are 0.336 and 0.347, respectively. The statistics of the control variables are consistent with previous studies of auditing in China (DeFond et al. 2019; Leung, Liu, and Wong 2019).[10]

Table 2, Panel B reports the number and percentage of observations audited by both expert audit firms and expert partners. When we measure industry expertise by audit fees, among the 415 observations audited by expert audit firms, 135 (32.53%) are audited by expert partners. When we measure industry expertise by client total assets, among the 532 observations audited by expert audit firms, 142 (26.69%) are audited by expert partners. This result indicates that a substantial portion of audit engagements conducted by expert firms are done by non-expert partners.

4.2 Main results

To test H1, we estimate the logistic regression model in Eq. (3). Table 3 reports our main results. In columns (1) and (2), we regress partner-level industry expertise (*ExpertPartner1* and *ExpertPartner2*) on industry audit risk similarity (*Similarity_Co*). The coefficients of *Similarity_Co* are 0.4722 and 0.5747, respectively, both positive and statistically significant.[11] The

Table 2. Descriptive statistics.

Variable	Obs.	Mean	S.D.	Q1	Median	Q3
Panel A: Main variables in the primary tests						
ExpertPartner1	10,232	0.048	0.213	0.000	0.000	0.000
ExpertPartner2	10,232	0.061	0.240	0.000	0.000	0.000
ExpertFirm1	10,232	0.041	0.197	0.000	0.000	0.000
ExpertFirm2	10,232	0.052	0.222	0.000	0.000	0.000
Similarity_Co	10,232	0.336	0.086	0.302	0.347	0.388
Cr4	10,232	0.152	0.096	0.074	0.136	0.197
Number	10,232	4.801	0.826	4.220	4.883	5.447
Indgrowth	10,232	0.257	0.171	0.128	0.226	0. 342
Indloss	10,232	0.114	0.057	0.073	0.114	0.145
Big4	10,232	0.056	0.230	0.000	0.000	0.000
Share	10,232	0.083	0.063	0.030	0.070	0.119
Receivable	10,232	0.156	0.120	0.059	0.136	0.229
Inventory	10,232	0.135	0.121	0.056	0.107	0.172
Intangible	10,232	0.046	0.050	0.017	0.033	0.056
Size	10,232	22.267	1.328	21.317	22.096	23.005
Lev	10,232	0.422	0.206	0.258	0.410	0.567
Roa	10,232	0.030	0.095	0.015	0.038	0.069
Age	10,232	11.289	7.980	4.000	9.000	19.000
Dual	10,232	0.305	0.460	0.000	0.000	1.000
Board	10,232	8.411	1.669	7.000	9.000	9.000
Soe	10,232	0.302	0.459	0.000	0.000	1.000

Panel B: Observations audited by both expert audit firms and expert partners

	Measurement basis	
	Audit fees	Client total assets
Obs. audited by expert audit firms and expert partners simultaneously	135	142
Obs. audited by expert audit firms	415	532
Percentage	32.53%	26.69%

Panel A reports the summary statistics of the main variables in the primary tests. Panel B reports the number and percentage of observations audited by expert audit firms and expert partners.

results indicate that engagement partners are more likely to develop audit expertise in more CAM risk homogenous industries, which facilitate efficiency transfer and economies of scale, supporting H1. For comparison, we also estimate the logistic regression model in Eq. (3) at the audit firm level. In columns (3) and (4), we regress audit firm-level industry expertise (*ExpertFirm1* and *ExpertFirm2*) on industry audit risk similarity (*Similarity_Co*). The coefficients of *Similarity_Co* are not statistically significant across the two columns, indicating that there is no evidence of industry expertise at the audit firm level taking place in more CAM risk homogenous industries.

In summary, our main results in Table 3 reveal that Chinese auditors have incentives to develop industry expertise in audit risk homogenous industries at the individual partner level rather than at the audit firm level.

Of significant interest is the fact that the coefficients of *Big4* are all positive and statistically significant at the 1% level in Tables 3, suggesting that Big 4 auditors are more likely to invest in specialization at both the partner and firm levels than local auditors. This finding is consistent with previous studies documenting various competition strategies adopted by Big 4 and non-Big 4 local auditors. International Big 4 auditors often compete for high-end clients that are generally large SOEs cross-listed on overseas stock exchanges and display strong demand for high-quality audits. The Big 4 tend to follow market-oriented contracting and their globally uniform standards for auditing procedures, staff training, and internal management in China, as they do in developed markets (Wong 2016; DeFond et al. 2019; Jiang, Wang, and Wang 2018). They are more likely to develop industry expertise and actively apply it in the Chinese audit market to provide differentiated services (De Beelde 1997; DeFond et al. 2019). In contrast, local Chinese auditors, originating from local accounting and audit bureaus or universities, have stronger ties to client business

Table 3. Industry audit risk similarity and industry expertise at the individual partner and audit firm levels.

Variable	*ExpertPartner1* (1)	*ExpertPartner2* (2)	*ExpertFirm1* (3)	*ExpertFirm2* (4)
Similarity_Co	0.4722***	0.5747**	−0.2042	−0.1703
	(2.665)	(2.445)	(−0.598)	(−0.685)
Cr4	−0.5817	0.8618	5.0304***	5.9516***
	(−0.694)	(0.973)	(4.350)	(7.466)
Number	−1.3433***	−2.7954***	−1.5312***	−1.4324***
	(−7.085)	(−13.204)	(−9.271)	(−12.655)
Indgrowth	−0.0751	0.0024	−0.2292**	−0.1382*
	(−1.068)	(0.025)	(−2.419)	(−1.954)
Indloss	2.1293***	2.4107***	−2.1652***	1.2185**
	(4.525)	(3.870)	(−2.850)	(2.380)
Share	1.4945***	0.8537*	24.9969***	12.3879***
	(3.347)	(1.695)	(13.272)	(17.446)
Big4	0.6866***	0.5430***	1.7718***	1.6028***
	(7.171)	(4.130)	(5.377)	(10.732)
Receivable	1.0801***	0.8329*	−0.1627	0.1170
	(3.216)	(1.649)	(−0.285)	(0.291)
Inventory	−0.6639***	0.8665***	−0.9522*	−0.8576**
	(−2.778)	(2.899)	(−1.689)	(−2.368)
Intangible	−2.1572***	−0.6742	0.4944	0.3890
	(−3.841)	(−1.004)	(0.522)	(0.600)
Size	0.9238***	0.9887***	0.2825***	0.2895***
	(17.340)	(16.685)	(4.479)	(6.414)
Lev	−0.4928**	−1.2316***	−0.0074	0.0642
	(−2.247)	(−4.579)	(−0.018)	(0.213)
Roa	−0.4022	−1.1635*	1.1954	1.0454
	(−0.881)	(−1.949)	(1.317)	(1.614)
Age	0.0026	−0.0140**	−0.0134	−0.0046
	(0.544)	(−2.409)	(−1.322)	(−0.679)
Dual	0.1763**	−0.0523	−0.1116	−0.1249
	(2.348)	(−0.529)	(−0.837)	(−1.168)
Board	−0.0270	−0.0118	0.0551*	0.0198
	(−1.549)	(−0.513)	(1.657)	(0.861)
Soe	−0.4771***	−0.3454***	−0.2299	0.0494
	(−5.968)	(−3.246)	(−1.490)	(0.438)
Intercept	−17.2179***	−13.0906***	−4.4004***	−2.6877**
	(−17.730)	(−10.705)	(−2.809)	(−2.534)
YEAR	Yes	Yes	Yes	Yes
Observations	10,232	10,232	10,232	10,232
Pseudo R^2	0.5871	0.7061	0.5617	0.4846

In the brackets below the coefficients, we report the *z*-statistics based on robust standard errors clustered at the client level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively (two-tailed).

communities, more political connections, and greater local relevance (DeFond et al. 2019). However, they face increased competition from peers for medium- or small-sized local clients with low demand for high-quality audits. As a result, they may prefer to attract clients by using relationship-based contracting or a cost-based strategy.

4.3 Mitigating the effect of audit style on the similarity measure

A potential concern in this study is reverse causality. As CAM disclosure reflects auditors' professional judgment regarding the most important matters in auditing their clients' financial statements, auditors may have unique styles in CAM reporting decisions (Rousseau and Zehms 2020). Chiu, Wu, and Yau (2021) show that each Big 4 firm exhibits its own preference for issuing certain CAMs and using certain audit procedures. When an audit firm has a large market share in an industry, the companies audited by this audit firm may disclose similar CAMs, thus resulting in high industry CAM similarity.

Table 4. Mitigating the effect of audit style on the similarity measure.

	ExpertPartner1	*ExpertPartner2*	*ExpertPartner1*	*ExpertPartner2*
	Delete the same engagement partners		*Delete the same audit firms*	
Variable	(1)	(2)	(3)	(4)
Similarity_Co	0.6331***	0.7170***	0.6318***	0.7237***
	(3.859)	(3.303)	(3.865)	(3.350)
Cr4	−0.7074	0.6559	−0.6981	0.6566
	(−0.846)	(0.736)	(−0.833)	(0.737)
Number	−1.3330***	−2.7746***	−1.3337***	−2.7745***
	(−7.040)	(−13.056)	(−7.041)	(−13.064)
Indgrowth	−0.0756	0.0023	−0.0758	0.0016
	(−1.065)	(0.024)	(−1.067)	(0.017)
Indloss	2.1670***	2.4943***	2.1611***	2.4971***
	(4.576)	(3.959)	(4.548)	(3.958)
Share	1.4635***	0.7946	1.4725***	0.8112
	(3.303)	(1.499)	(3.312)	(1.526)
Big4	0.6911***	0.5413***	0.6902***	0.5410***
	(7.198)	(4.103)	(7.190)	(4.102)
Receivable	1.0489***	0.8851*	1.0425***	0.8677*
	(3.139)	(1.757)	(3.121)	(1.727)
Inventory	−0.7060***	0.8435***	−0.7057***	0.8410***
	(−2.959)	(2.827)	(−2.960)	(2.819)
Intangible	−2.1214***	−0.6377	−2.1214***	−0.6331
	(−3.781)	(−0.943)	(−3.782)	(−0.938)
Size	0.9285***	0.9943***	0.9283***	0.9942***
	(17.347)	(16.672)	(17.355)	(16.669)
Lev	−0.4769**	−1.2235***	−0.4736**	−1.2192***
	(−2.179)	(−4.519)	(−2.161)	(−4.507)
Roa	−0.4471	−1.1708**	−0.4350	−1.1685*
	(−0.990)	(−1.969)	(−0.954)	(−1.960)
Age	0.0033	−0.0131**	0.0032	−0.0132**
	(0.690)	(−2.287)	(0.675)	(−2.299)
Dual	0.1773**	−0.0535	0.1779**	−0.0528
	(2.364)	(−0.542)	(2.372)	(−0.535)
Board	−0.0267	−0.0111	−0.0268	−0.0111
	(−1.526)	(−0.480)	(−1.529)	(−0.480)
Soe	−0.4766***	−0.3500***	−0.4763***	−0.3502***
	(−5.943)	(−3.271)	(−5.940)	(−3.274)
Intercept	−17.4537***	−13.4190***	−17.4441***	−13.4178***
	(−17.872)	(−10.852)	(−17.858)	(−10.845)
YEAR	Yes	Yes	Yes	Yes
Observations	10,232	10,232	10,232	10,232
Pseudo R^2	0.5882	0.7071	0.5883	0.7072

In the brackets below the coefficients, we report the *z*-statistics based on robust standard errors clustered at the client level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively (two-tailed).

In the primary analyses, we measure audit risk similarity in an industry by comparing the number of CAM items shared by paired companies with the number of unique CAM items reported by them and calculating the mean value of similarity for all pairs within the industry. If two companies are audited by the same auditor, their reported CAMs will be more similar to each other due to audit style. We adopt an alternative approach to deal with this concern embedded in the construction of similarity measure. We delete the paired companies who share the same engagement partners and same audit firms in Eq. (1) to measure *Cosine*. Then, we calculate *Similarity_Co* to proxy for industry audit risk similarity in Eq. (2). We re-estimate the model in Eq. (3) at the individual partner level. The results are presented in Table 4. Columns (1) and (2) report the results of deleting paired companies with the same engagement partners and columns (3) and (4) report the results of deleting paired companies with the same audit firms in the similarity measure. The coefficients of *Similarity_Co* are all significantly positive at the 1% level, suggesting that the measure

of industry audit risk similarity is effective and the association between industry audit risk similarity and auditor expertise is not purely driven by auditor style.

4.4 Results using an industry-level sample

To draw reliable inferences about the positive relationship between industry risk homogeneity and auditor industry expertise, following previous studies (Cairney and Young 2006; Cahan et al. 2008), we use an alternative sample consisting of industry-year observations. The sample size is thus reduced from 10,232 client-year observations to 132 industry-year observations. We then estimate the following logistic regression model in Eq. (4):

$$Ln\left(\frac{P(ExpertPartner\_Ind_{k,t}=1)}{1-P(ExpertPartner\_Ind_{k,t}=1)}\right)=\alpha+\beta Similarity\_Co_{k,t}+\gamma Controls_{k,t}+\Sigma\delta YEAR \quad (4)$$

where $ExpertPartner\_Ind_{k,t}$ is an indicator variable that equals one if at least one lead signing partner has industry expertise in industry k in year t, and zero otherwise. Industry expertise is defined as in Eq. (3). $Similarity\_Co_{k,t}$ is industry audit risk similarity. The control variables, calculated at the industry level, are *Cr4, Number, Indgrowth*, and *Indloss*, defined as above. We also include year fixed effects to capture variations in auditor industry expertise over time. Table 5 presents the logistic regression results. The coefficients of *Similarity_Co* are positive and statistically significant in columns (1) and (2). Our main results continue to hold for the industry-level sample.

4.5 Alternative measures of industry risk similarity and auditor industry expertise

We use alternative definitions to measure industry audit risk similarity and auditor industry expertise. First, following Johnston and Zhang (2021), we calculate the 'Jaccard' similarity of CAM items shared by two paired companies (i.e. $Jaccard_{i,j} = CAM_{i,j}/(CAM_i+CAM_j-CAM_{i,j})$) and take the mean value of the $Jaccard_{i,j}$ in industry k in year t (i.e. $Similarity\_Ja_{k,t} = mean_{k,t}(Jaccard_{i,j})$). Second, we calculate the proportion of the same CAM items to all CAM items of the paired companies (i.e. $Percent_{i,j} = CAM_{i,j}/(CAM_i+CAM_j)$) and take the mean value of the percent similarity score in industry k in year t (i.e. $Similarity\_Pe_{k,t} = mean_{k,t}(Percent_{i,j})$). In addition, following Dekeyser, Gaeremynck, and Willekens (2019), we use the square root of client total assets to

Table 5. Regression results using the industry-year sample.

Variable	*ExpertPartner1_Ind* (1)	*ExpertPartner2_Ind* (2)
Similarity_Co	5.2137***	5.2279*
	(2.888)	(1.741)
Cr4	5.6809*	58.6641***
	(1.750)	(3.274)
Number	0.1263	3.2153**
	(0.282)	(2.441)
Indgrowth	0.1103	2.8245*
	(0.404)	(1.860)
Indloss	2.4947	4.5292
	(1.332)	(1.406)
Intercept	−4.0384*	−25.9602***
	(−1.692)	(−2.986)
YEAR	Yes	Yes
Observations	132	132
Pseudo R^2	0.2549	0.6777

In the brackets below the coefficients, we report the *z*-statistics based on robust standard errors clustered at the industry level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively (two-tailed).

calculate market share and measure auditor industry expertise (*ExpertPartner3* and *ExpertFirm3*). Our untabulated results are all consistent with the main results, supporting our H1 that industry audit risk similarity is positively associated with auditor industry expertise at the engagement partner level.

5. Additional analyses

5.1 Auditor industry expertise and audit fees in risk homogenous industries

The positive relationship between industry audit risk similarity and partner-level industry expertise is consistent with the argument that auditors specialize in homogenous industries which facilitate efficiency transfer. If auditors seek cost-based advantages to compete with other auditors, their motivation to save on expenditure would be especially strong when they specialize in a risk homogenous industry and are able to apply similar audit procedures to more clients' audits. If economies of scale regarding the Chinese audit market holds true, we expect auditors to offer a fee discount when they specialize in industries with higher audit risk similarity. Thus, we explore the association between auditor industry expertise and audit fees in industries with similar audit risks by running the ordinary least squares (OLS) regression in Eq. (5):

$$Fee_{i,t} = \alpha + \beta Similarity\_Co_{k,t} + \gamma Similarity\_Co_{k,t} * ExpertPartner_{i,t} + \delta ExpertPartner_{i,t} + \zeta Controls_{i,t} + \Sigma \eta YEAR + \Sigma \theta INDUSTRY + \varepsilon_{i,t} \quad (5)$$

where audit fee (*Fee*) is the natural logarithm of a client's annual audit fees (Huang et al. 2017; Cho et al. 2019). In addition to all of the control variables used in our main model in Eq. (3), we include two variables to control for auditor characteristics, i.e. audit firm switch (*Switch*) and audit opinion (*Opinion*). Year and industry fixed effects are also included.

Table 6 reports the OLS regression results. In columns (1) to (4), the coefficients of *ExpertPartner1* and *ExpertPartner2* are positive and statistically significant, indicating that expert partners charge fee premiums relative to nonexpert partners. This finding is consistent with the literature (Zerni 2012; Bills et al. 2020). In columns (2) and (4), the coefficients of the interaction terms *ExpertPartner1*Similarity_Co* and *ExpertPartner2*Similarity_Co* are both negative and statistically significant. The results suggest that specialization in industries with greater audit risk similarity leads to engagement partners' fee discounts arising from economies of scale and

Table 6. Industry expertise and audit fees in industries with similar audit risks.

	DV = Fee			
Variable	(1)	(2)	(3)	(4)
ExpertPartner1	0.1553***	0.2281***		
	(3.382)	(3.028)		
*ExpertPartner1 * Similarity_Co*		−0.5440**		
		(−2.163)		
ExpertPartner2			0.0767**	0.2118***
			(2.009)	(2.703)
*ExpertPartner2 * Similarity_Co*				−0.4440*
				(−1.798)
Similarity_Co		−0.0506		−0.0550
		(−1.297)		(−1.423)
Controls	YES	YES	YES	YES
Intercept	5.7147***	5.7536***	5.8645***	5.8764***
	(24.661)	(24.588)	(25.087)	(25.011)
YEAR	YES	YES	YES	YES
INDUSTRY	YES	YES	YES	YES
Observations	10,121	10,121	10,121	10,121
Adj. R^2	0.5845	0.5859	0.5847	0.5859

In the brackets below the coefficients, we report the *t*-statistics based on robust standard errors clustered at the client level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively (two-tailed).

obtaining cost-based competitive advantages. Thus, engagement partners are more likely to develop expertise in industries with greater risk similarity.

5.2 Auditor industry expertise and audit quality in risk homogenous industries

Studies show that industry expertise is associated with proxies for high-quality audits (Reichelt and Wang 2010; Bills, Jeter, and Stein 2015; Duh, Knechel, and Lin 2019). As knowledge transfer is more likely to occur in homogenous industries, industry experts can effectively apply their in-depth understanding of industry risks and the corresponding audit procedures to address these risks in industries with similar audit risks, leading to improved audit quality. However, the lack of demand for high-quality audits in China results in auditors seeking a low-price competitive strategy rather than a high-quality strategy. Therefore, insufficient demand for high-quality audits may disincentivize engagement partners from improving audit quality when specializing in risk homogenous industries. Following prior studies (Minutti-Meza 2013; Leung, Liu, and Wong 2019; DeFond et al. 2019), we use absolute discretionary accruals ($|DA|$) and financial restatement (*Restatement*) to measure audit quality.[12] We run the following regressions in Eq. (6) to examine the effects of industry audit risk similarity and industry expertise on audit quality:

$$\begin{aligned} AuditQuality = {} & \alpha + \beta Similarity\_Co_{k,t} + \gamma Similarity\_Co_{k,t} * ExpertPartner_{i,t} + \delta ExpertPartner_{i,t} \\ & + \zeta Controls_{i,t} + \Sigma\eta YEAR + \Sigma\theta INDUSTRY + \varepsilon_{i,t} \end{aligned} \tag{6}$$

where the independent variable (*AuditQuality*) is measured by $|DA|$ and *Restatement*. $|DA|$ is absolute discretionary accruals based on the performance-matched Jones model (Kothari, Leone, and Wasley 2005); *Restatement* is an indicator variable that equals one if the client's financial statement in year t is restated in a subsequent year due to accounting irregularities, and zero otherwise. We also include the same control variables used in Eq. (5).

Table 7, Panel A presents the OLS results when the dependent variable is $|DA|$. In columns (1) to (4), the coefficients of *ExpertPartner1* (*ExpertPartner2*) are significantly negative, indicating that clients audited by expert partners have less aggressive earnings management and thus higher quality audits than those audited by nonexpert partners. However, in columns (2) and (4), the coefficients on the interaction terms, *ExpertPartner1*Similarity_Co* and *ExpertPartner2*Similarity_Co*, are not significant, indicating that industry expertise at the individual partner level does not reduce absolute discretionary accruals in industries with high levels of audit risk similarity. Panel B reports the logistic regression results when the dependent variable is *Restatement*. In columns (1) to (4), the coefficients of *ExpertPartner1* and *ExpertPartner2* are all negative and statistically insignificant. In columns (2) and (4), the coefficients on the interaction terms, *ExpertPartner1*Similarity_Co* and *ExpertPartner2*Similarity_Co*, are not significant. The results show that expert partners do not reduce their clients' likelihood of financial restatement, even for clients in risk homogenous industries.

In summary, we find that expert partners provide audit fee discounts to clients in risk homogenous industries and that the quality of financial statements audited by expert partners does not differ from that of financial statements audited by nonexpert partners. Our findings suggest that Chinese auditors are more likely to develop industry expertise to pursue cost-saving rather than quality-differentiated competitive advantages.

Table 7. Industry expertise and audit quality in industries with similar audit risks.

	DV = |*DA*|			
Variable	(1)	(2)	(3)	(4)
Panel A: Discretionary accruals				
ExpertPartner1	−0.0241***	−0.0308**		
	(−2.680)	(−2.477)		
*ExpertPartner1 * Similarity_Co*		0.0242		
		(0.844)		
ExpertPartner2			−0.0261**	−0.0331**
			(−2.488)	(−2.439)
*ExpertPartner2 * Similarity_Co*				0.0250
				(0.900)
Similarity_Co		−0.0180		−0.0182
		(−1.427)		(−1.420)
Controls	YES	YES	YES	YES
Intercept	−0.0681	−0.0666	−0.0857	−0.0851
	(−0.637)	(−0.624)	(−0.755)	(−0.750)
YEAR	YES	YES	YES	YES
INDUSTRY	YES	YES	YES	YES
Observations	9,454	9,454	9,454	9,454
Adj. R^2	0.2062	0.2066	0.2062	0.2064
	DV = Restatement			
Variable	(1)	(2)	(3)	(4)
Panel B: Restatements				
ExpertPartner1	−0.0613	−0.0717		
	(−0.280)	(−0.238)		
*ExpertPartner1 * Similarity_Co*		0.0841		
		(0.082)		
ExpertPartner2			−0.3040	−0.2095
			(−1.524)	(−0.730)
*ExpertPartner2 * Similarity_Co*				−0.4421
				(−0.420)
Similarity_Co		−0.5163		−0.4760
		(−1.619)		(−1.496)
Controls	YES	YES	YES	YES
Intercept	−3.0511**	−3.0364**	−3.5661**	−3.5703**
	(−2.231)	(−2.216)	(−2.560)	(−2.561)
YEAR	YES	YES	YES	YES
INDUSTRY	YES	YES	YES	YES
Observations	6,668	6,668	6,668	6,668
Pseudo R^2	0.0571	0.0576	0.0576	0.0581

In the brackets below the coefficients, we report the *t*-statistics in Panel A and *z*-statistics in Panel B based on robust standard errors clustered at the client level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively (two-tailed).

6. Conclusions

Auditor industry expertise is more likely to occur in homogenous industries with greater opportunities for knowledge transfer. Studies generally focus on the importance of industry homogeneity in operating expenses and textual disclosures in annual reports. In this study, we propose a new industry homogeneity factor, industry audit risk similarity, and examine the association between industry audit risk similarity and auditor industry expertise at the individual partner level in China, a typical emerging market with weak institutions for investor protection, low demand for high-quality audits, and intense competition among auditors.

We measure industry audit risk similarity based on the number of similar CAMs disclosed by auditors in expanded audit reports. This homogeneity measure captures the level of similarity of audit risks in a client industry. We find that industry audit risk similarity is positively

associated with industry expertise at the individual partner level. In additional analyses, we find that industry expert partners provide audit fee discounts to clients in industries with similar audit risks but find no effect of expertise on audit quality. Our findings suggest that Chinese auditors tend to achieve economies of scale in more risk homogenous industries strategically to minimize audit costs per client; however, they appear to have little incentive to improve audit quality through specialization in these industries due to a lack of client demand for high-quality audits.

Our study is not without limitations. Our audit risk homogeneity measure is calculated based on 'Cosine' similarity of CAM items shared by two peer companies within industries. It would be interesting to develop a measure to explore the textual similarity of CAM disclosures among industry peers. Moreover, as A-share companies began to disclose CAMs in 2017, our research may be limited by the sample size. Future research could explore whether auditors change their industry specialization decisions in response to changes in CAM risk similarity over a longer period.

Despite these limitations, our findings have policy implications for audit regulators in other emerging economies attempting to improve their domestic audit quality. In China, the government has adopted policies and measures to encourage auditors to develop industry expertise. However, high-quality audits cannot be achieved solely through auditors' investment in specialization; regulators must also increase clients' demand for high-quality audits.

Notes

1. For example, PwC and KPMG present their featured industries on their websites. For more details about PwC and KPMG, see https://www.pwc.com/gx/en/industries.html and https://home.kpmg/xx/en/home/industries.html, respectively.
2. For example, Bae, Choi, and Lee (2019); Bills, Jeter, and Stein (2015); Cairney and Stewart (2015); Cahan, Jeter, and Naiker (2011); Chi and Chin (2011); Fung, Gul, and Krishnan (2012); Goodwin and Wu (2014); Minutti-Meza (2013); Reichelt and Wang (2010); and Zerni (2012).
3. See Deloitte, Our Audit Approach, https://www2.deloitte.com/lu/en/pages/audit/articles/our-audit-approach.html.
4. For example, CAM reporting in Hong Kong became effective for companies with a fiscal year-end on or after 15 December 2016. In the U.S., the mandatory discussion of CAMs started in June 2019 for large companies. Mainland China implemented CAM reporting in two stages: first, for all the companies cross-listed in Hong Kong after 1 January 2017, and then for all the other companies listed only in mainland China after 1 January 2018.
5. In 2007, the Chinese Institute of Certified Public Accountants (CICPA) announced a comprehensive strategy to accelerate the development of the accounting profession. Since then, the government has implemented a series of measures designed to help local firms grow. Strong government support has helped local audit firms, particularly large firms, significantly increase their size and market share. The Big 4's market share, measured in terms of the number of clients listed in mainland China, remains around 7%.
6. Auditors are also expected to develop expertise in industries with similar audit risks to gain quality-differentiated competitive advantages. However, the prevalence of relationship-based transactions, clients' lack of demand for high quality audits, and intense competition in the Chinese audit market could disincentivize auditors to invest in industry expertise. Therefore, we argue that auditors are more likely to develop expertise in risk homogenous industries to achieve economies of scale rather than high-quality audits. This argument is substantiated by our additional analyses in Section 5. The results in Tables 6 and 7 show that expert partners benefit from economies of scale and grant audit fee discounts to clients in more risk homogenous industries, whereas audit quality is unaffected.
7. Textual similarity may be a result of boilerplate language that stems from regulatory requirements (Brown and Tucker 2011).
8. Dekeyser, Gaeremynck, and Willekens (2019) argue that market share calculated by audit fees could produce bias in regressions when the dependent variable is also audit fees. Therefore, we use two measurement bases, audit fees and client total assets, for industry market share and industry expertise.
9. An audit report in China contains the audit firm's name and the names of at least two auditors (occasionally three or more). The lead signing partner (i.e. the first signing auditor) typically directs the total effort, interprets audit evidence, and ultimately determines the appropriate audit report; the lead signing partner thus generally exhibits more hands-on experience on the audit engagement than the concurring signing

partner (i.e. the second signing auditor). Therefore, we use the lead signing partner's market share to proxy for the partner-level industry expertise.

10. We also calculate the Pearson correlation matrix (untabulated). *ExpertPartner1* and *ExpertPartner2* have significantly positive correlations with *Similarity_Co* (0.057 and 0.038, respectively), indicating that partner-level industry expertise increases as industry audit risk becomes more similar. In addition, we check the variance inflation factors (VIFs) of the variables in all empirical tests. All VIFs are lower than 5.0, well below the threshold of 10.0 suggested by Kennedy (1992), indicating that multicollinearity is not a serious concern.
11. We also include fixed effects at the audit firm and engagement partner levels in Eq. (3) to control for time-invariant audit firm and engagement partner characteristics. The untabulated results show that industry audit risk similarity is positively associated with industry expertise at the individual partner level, consistent with the main results.
12. As documented by DeFond et al. (2019) and DeFond and Zhang (2014), financial restatement is a relatively direct measure of audit quality. We manually collect the restatement data from company announcements and exclude restatements issued due to changes in accounting standards and other errors unrelated to accounting. To estimate Eq. (6), we exclude the observations in 2019, as it usually takes two or more years to observe whether a client company issues a financial restatement, thus the client-issued restatement announcements for 2019 annual reports are incomplete as of this study.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the National Natural Science Foundation of China (Grant No. 71872022) and the Fundamental Research Funds for the Central Universities (Grant No. 2017CDJSK02PT25). We thank an associate editor, an anonymous referee, Shiyang Hu, Lili Jiu, Suresh Radhakrishnan (editor), and Xi Wu, as well as participants at the 2020 Academy of International Business (AIB) Southeast Asia Regional Conference, and the Central University of Finance and Economics for their helpful comments and suggestion.

References

Allen, F., J. Qian, and M. Qian. 2005. "Law, Finance, and Economic Growth in China." *Journal of Financial Economics* 77 (1): 57–116. doi:10.1016/j.jfineco.2004.06.010.

Bae, G. S., S. U. Choi, and J. E. Lee. 2019. "Auditor Industry Specialization and Audit Pricing and Effort." *Auditing: A Journal of Practice & Theory* 38 (1): 51–75. doi:10.2308/ajpt-52039.

Bills, K. L., M. Cobabe, J. Pittman, and S. E. Stein. 2020. "To Share or Not to Share: The Importance of Peer Firm Similarity to Auditor Choice." *Accounting, Organizations and Society* 83: 101115. doi:10.1016/j.aos.2020.101115.

Bills, K. L., D. C. Jeter, and S. E. Stein. 2015. "Auditor Industry Specialization and Evidence of Cost Efficiencies in Homogenous Industries." *The Accounting Review* 90 (5): 1721–1754. doi:10.2308/accr-51003.

Brown, S. V., and W. R. Knechel. 2016. "Auditor–Client Compatibility and Audit Firm Selection." *Journal of Accounting Research* 54 (3): 725–775. doi:10.1111/1475-679X.12105.

Brown, S. V., and J. W. Tucker. 2011. "Large-Sample Evidence on Firms' Year-over-Year MD&A Modifications." *Journal of Accounting Research* 49 (2): 309–346. doi:10.1111/j.1475-679X.2010.00396.x.

Cahan, S. F., J. M. Godfrey, J. Hamilton, and D. C. Jeter. 2008. "Auditor Specialization, Auditor Dominance, and Audit Fees: The Role of Investment Opportunities." *The Accounting Review* 83 (6): 1393–1423. doi:10.2308/accr.2008.83.6.1393.

Cahan, S. F., D. C. Jeter, and V. Naiker. 2011. "Are All Industry Specialist Auditors the Same?" *Auditing: A Journal of Practice & Theory* 30 (4): 191–222. doi:10.2308/ajpt-10181.

Cairney, T. D., and E. G. Stewart. 2015. "Audit Fees and Client Industry Homogeneity." *Auditing: A Journal of Practice & Theory* 34 (4): 33–57. doi:10.2308/ajpt-51040.

Cairney, T. D., and G. R. Young. 2006. "Homogenous Industries and Auditor Specialization: An Indication of Production Economies." *Auditing: A Journal of Practice & Theory* 25 (1): 49–67. doi:10.2308/aud.2006.25.1.49.

Chang, H., Y. Guo, and P. L. L. Mo. 2019. "Market Competition, Audit Fee Stickiness, and Audit Quality: Evidence from China." *Auditing: A Journal of Practice & Theory* 38 (2): 79–99. doi:10.2308/ajpt-52173.

Chen, J. Z., K. K. Nelson, Y. Wang, and L. Yu. 2020. "Key Audit Matters and the Pricing of Audit Services: Evidence from Hong Kong." Working paper, Texas Christian University and Xiamen University.

Chen, S., S. Y. J. Sun, and D. Wu. 2010. "Client Importance, Institutional Improvements, and Audit Quality in China: An Office and Individual Auditor Level Analysis." *The Accounting Review* 85 (1): 127–158. doi:10.2308/accr.2010.85.1.127.

Chi, H., and C. Chin. 2011. "Firm versus Partner Measures of Auditor Industry Expertise and Effects on Auditor Quality." *Auditing: A Journal of Practice & Theory* 30 (2): 201–229. doi:10.2308/ajpt-50004.

Chin, C. L., and H. Y. Chi. 2009. "Reducing Restatements with Increased Industry Expertise." *Contemporary Accounting Research* 26 (3): 729–765. doi:10.1506/car.26.3.4.

Chiu, P., D. Wu, and L. N. B. Yau. 2021. "What Do Expanded Audit Reports Tell? Evidence from the UK." Working paper, Chinese University of Hong Kong (Shenzhen), Chinese University of Hong Kong, and The Hang Seng University of Hong Kong.

Cho, M., J. Hyeon, T. Jung, and W. J. Lee. 2019. "Audit Pricing of Hard-to-Read Annual Reports." *Asia-Pacific Journal of Accounting & Economics* 1–26.

De Beelde, I. 1997. "An Exploratory Investigation of Industry Specialization of Large Audit Firms." *International Journal of Accounting* 32 (3): 337–355. doi:10.1016/S0020-7063(97)90015-7.

DeFond, M., Z. Li, T. J. Wong, and K. Wu. 2019. "The Effects of Auditors' Locality-Specific Knowledge on Audit Quality: Evidence from China." Working paper, University of Southern California and Shanghai University of Finance and Economics.

DeFond, M., and J. Zhang. 2014. "A Review of Archival Auditing Research." *Journal of Accounting and Economics* 58 (2–3): 275–326.

Dekeyser, S., A. Gaeremynck, and M. Willekens. 2019. "Evidence of Industry Scale Effects on Audit Hours, Billing Rates, and Pricing." *Contemporary Accounting Research* 36 (2): 666–693. doi:10.1111/1911-3846.12460.

Duh, R., W. R. Knechel, and C. Lin. 2019. "The Effects of Audit Firms' Knowledge Sharing on Audit Quality and Efficiency." *Auditing: A Journal of Practice & Theory* 39 (2): 51–79. doi:10.2308/ajpt-52597.

Eichenseher, J. W., and P. Danos. 1981. "The Analysis of Industry-Specific Auditor Concentration: Towards an Explanatory Model." *The Accounting Review* 56 (3): 479–492.

Feng, H., A. Habib, H. J. Huang, and B. L. Qi. 2021. "Auditor Industry Specialization and Stock Price Crash Risk: Individual-Level Evidence." *Asia-Pacific Journal of Accounting & Economics* 28 (4): 427–453. doi:10.1080/16081625.2019.1584859.

Fung, S. Y. K., F. A. Gul, and J. Krishnan. 2012. "City-Level Auditor Industry Specialization, Economies of Scale, and Audit Pricing." *The Accounting Review* 87 (4): 1281–1307. doi:10.2308/accr-10275.

Goh, B. W., D. Li, and M. Wang. 2020. "Informativeness of the Expanded Audit Report: Evidence from China." Working paper, Singapore Management University, Tsinghua University, and Central University of Finance and Economics.

Goodwin, J., and D. Wu. 2014. "Is the Effect of Industry Expertise on Audit Pricing an Office-Level or a Partner-Level Phenomenon?" *Review of Accounting Studies* 19 (4): 1532–1578. doi:10.1007/s11142-014-9285-8.

Hoberg, G., and G. Phillips. 2016. "Text-based Network Industries and Endogenous Product Differentiation." *Journal of Political Economy* 124 (5): 1423–1465. doi:10.1086/688176.

Hogan, C. E., and D. C. Jeter. 1999. "Industry Specialization by Auditors." *Auditing: A Journal of Practice & Theory* 18 (1): 1–17. doi:10.2308/aud.1999.18.1.1.

Huang, M., A. Masli, F. Meschke, and J. P. Guthrie. 2017. "Clients' Workplace Environment and Corporate Audits." *Auditing: A Journal of Practice & Theory* 36 (4): 89–113. doi:10.2308/ajpt-51691.

Jiang, J. X., I. Y. Wang, and K. P. Wang. 2018. "Big N Auditors and Audit Quality: New Evidence from Quasi-Experiments." *The Accounting Review* 94 (1): 205–227. doi:10.2308/accr-52106.

Johnston, J. A., and J. H. Zhang. 2021. "Auditor Style and Financial Reporting Similarity." *Journal of Information Systems* 35 (1): 79–99. doi:10.2308/isys-18-046.

Ke, B., C. S. Lennox, and Q. Xin. 2015. "The Effect of China's Weak Institutional Environment on the Quality of Big 4 Audits." *The Accounting Review* 90 (4): 1591–1619. doi:10.2308/accr-50943.

Kennedy, P. 1992. *A Guide to Econometrics*. Cambridge: MIT Press.

Klevak, J., J. Livnat, D. Pei, and K. Suslava. 2020. "A New Uncertainty Measure – CAM." Working paper, New York University, Rutgers University, and Bucknell University.

Kothari, S. P., A. J. Leone, and C. E. Wasley. 2005. "Performance Matched Discretionary Accrual Measures." *Journal of Accounting and Economics* 39 (1): 163–197. doi:10.1016/j.jacceco.2004.11.002.

Kwon, S. Y. 1996. "The Impact of Competition within the Client's Industry on the Auditor Selection Decision." *Auditing: A Journal of Practice & Theory* 15 (1): 53–70.

Leung, N. W., J. Liu, and B. Wong. 2019. "The Emergence of Second-Tier Auditors in China: Analysis of Audit Fee Premium and Audit Quality." *Asia-Pacific Journal of Accounting & Economics* 26 (6): 684–708. doi:10.1080/16081625.2017.1404920.

Mayhew, B. W., and M. S. Wilkins. 2003. "Audit Firm Industry Specialization as a Differentiation Strategy: Evidence from Fees Charged to Firms Going Public." *Auditing: A Journal of Practice & Theory* 22 (2): 33–52. doi:10.2308/aud.2003.22.2.33.

Minutti-Meza, M. 2013. "Does Auditor Industry Specialization Improve Audit Quality?" *Journal of Accounting Research* 51 (4): 779–817. doi:10.1111/1475-679X.12017.

Newton, N. J., J. S. Persellin, D. Wang, and M. S. Wilkins. 2016. "Internal Control Opinion Shopping and Audit Market Competition." *The Accounting Review* 91 (2): 603–623. doi:10.2308/accr-51149.

Newton, N. J., D. Wang, and M. S. Wilkins. 2013. "Does a Lack of Choice Lead to Lower Quality? Evidence from Auditor Competition and Client Restatements." *Auditing: A Journal of Practice & Theory* 32 (3): 31–67. doi:10.2308/ajpt-50461.

Petersen, M. A. 2009. "Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches." *The Review of Financial Studies* 22 (1): 435–480. doi:10.1093/rfs/hhn053.

Reichelt, K. J., and D. Wang. 2010. "National and Office-Specific Measures of Auditor Industry Expertise and Effects on Audit Quality." *Journal of Accounting Research* 48 (3): 647–686. doi:10.1111/j.1475-679X.2009.00363.x.

Rousseau, L. M., and K. M. Zehms. 2020. "Audit Partner Style in Key Audit Matter Reporting Decisions." Working paper, University of Wisconsin.

Wang, Q., T. J. Wong, and L. Xia. 2008. "State Ownership, the Institutional Environment, and Auditor Choice: Evidence from China." *Journal of Accounting and Economics* 46 (1): 112–134. doi:10.1016/j.jacceco.2008.04.001.

Wong, T. J. 2016. "Corporate Governance Research on Listed Firms in China: Institutions, Governance and Accountability." *Foundations and Trends in Accounting* 9 (4): 259–326. doi:10.1561/1400000039.

Zerni, M. 2012. "Audit Partner Specialization and Audit Fees: Some Evidence from Sweden." *Contemporary Accounting Research* 29 (1): 312–340. doi:10.1111/j.1911-3846.2011.01098.x.

Appendix A. Distribution of CAM items by category

Items	Frequency	Percentage in category	Percentage in total
Impairment			
Impairment of loans and receivables	3,990	38.63%	17.76%
Impairment of goodwill	2,935	28.42%	13.06%
Impairment of inventories	1,868	18.09%	8.31%
Impairment of fixed assets	549	5.32%	2.44%
Impairment of equity investment	143	1.38%	0.64%
Impairment of marketable financial assets	115	1.11%	0.51%
Impairment of intangible assets	95	0.92%	0.42%
Other	634	6.14%	2.82%
Total in category	10,329	100.00%	45.96%
Income			
Income from sale of goods	5,374	68.49%	23.91%
Income from provision of services	1,369	17.45%	6.09%
Income from construction contracts	593	7.56%	2.64%
Income from real estate business	316	4.03%	1.41%
Income from asset disposals	87	1.11%	0.39%
Income from debt restructuring	38	0.48%	0.17%
Other	69	0.88%	0.31%
Total in category	7,846	100.00%	34.91%
Equity			
Disposal of subsidiaries	291	50.96%	1.29%
Mergers and acquisitions	225	39.40%	1.00%
Other	55	9.63%	0.24%
Total in category	571	100.00%	2.54%
Fair value			
Fair value of financial instruments	175	54.35%	0.78%
Fair value of investment properties	106	32.92%	0.47%
Fair value of consumptive biological assets	11	3.42%	0.05%
Fair value of productive biological assets	10	3.11%	0.04%
Other	20	6.21%	0.09%
Total in category	322	100.00%	1.43%
Other items			
Related-party transactions	375	11.02%	1.67%
Provisions and contingent liabilities	203	5.96%	0.90%
Government subsidies	166	4.88%	0.74%
Capitalization of R&D expenditures	162	4.76%	0.72%
Recognition of deferred tax assets	160	4.70%	0.71%
Consolidated financial statements	157	4.61%	0.70%
Land appreciation tax	74	2.17%	0.33%
Selling expenses	71	2.09%	0.32%
Other	2,036	59.81%	9.06%
Total in category	3,404	100.00%	15.15%
Total	22,472		100.00%

Appendix B. Variable definitions

Variable	Definition
Dependent variables	
ExpertPartner1	An indicator variable equal to 1 if the market share of a lead signing partner is larger than 5% in an industry-year group, and 0 otherwise. Market share is calculated by clients' domestic audit fees.
ExpertPartner2	An indicator variable equal to 1 if the market share of a lead signing partner is larger than 5% in an industry-year group, and 0 otherwise. Market share is calculated by clients' total assets.
ExpertFirm1	An indicator variable equal to 1 if the market share of an audit firm is larger than 20% in an industry-year group, and 0 otherwise. Market share is calculated by clients' domestic audit fees.
ExpertFirm2	An indicator variable equal to 1 if the market share of an audit firm is larger than 20% in an industry-year group, and 0 otherwise. Market share is calculated by clients' total assets.

(*Continued*)

Variable	Definition
ExpertPartner1_Ind	An indicator variable equal to 1 if there is at least one lead signing partner with industry expertise whose market share is larger than 5% in an industry-year group, and 0 otherwise. Market share is calculated by clients' domestic audit fees.
ExpertPartner2_Ind	An indicator variable equal to 1 if there is at least one lead signing partner with industry expertise whose market share is larger than 5% in an industry-year group, and 0 otherwise. Market share is calculated by clients' total assets.
Fee	The natural logarithm of the client's annual domestic audit fees in year *t*.
|DA|	Absolute value of performance-adjusted discretionary accruals as defined in Kothari, Leone, and Wasley (2005), estimated by industry and year.
Restatement	An indicator variable equal to 1 if the client's financial statement in year *t* is restated in a subsequent year due to accounting irregularities, and 0 otherwise.
Independent variables	
Similarity_Co	Industry risk similarity using CAMs reported in the audit reports of publicly listed companies in China, based on the mean value of Cosine similarity between firm *i* and firm *j*'s CAMs in an industry-year group. Refer to Section 3.2.1 for details.
Controls for industry characteristics	
Cr4	The proportion of the square root of assets owned by the four largest clients in an industry-year group.
Number	The natural logarithm of the number of clients in an industry-year group.
Indgrowth	The ratio of the mean industry sales in year *t* to the mean industry sales in year *t-1*.
Indloss	The percentage of companies that experience losses in an industry-year group.
Controls for auditor and client characteristics	
Big4	An indicator variable equal to 1 if the audit firm is an international Big 4, and 0 otherwise.
Share	A continuous market share of audit firm based on the number of clients in an industry-year group.
Receivable	Accounts receivable divided by total assets at the end of year *t*.
Inventory	Inventory divided by total assets at the end of year *t*.
Intangible	Intangible assets divided by total assets at the end of year *t*.
Size	The natural logarithm of the company's total assets.
Lev	Total liabilities divided by total assets.
Roa	Net income divided by total assets.
Age	The number of years that the company has been listed on a stock exchange.
Dual	An indicator variable equal to 1 if a company's CEO and chairman of the board are the same person, and 0 otherwise.
Board	The number of board directors.
Soe	An indicator variable equal to 1 if the client company is ultimately controlled by the Chinese government, and 0 otherwise.
Switch	An indicator variable equal to 1 if the client company changes its audit firm in year *t*, and 0 otherwise.
Opinion	An indicator variable equal to 1 if the client company receives a modified audit opinion in year *t*, and 0 when the client receives a clean audit opinion.