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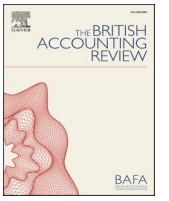

Common auditors and internal control similarity: Evidence from China

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ABSTRACT

This study investigates how important common auditors are to internal control similarity between two firms. Based on a less concentrated audit market in China, we find that firm-pairs with common auditors enforce a similar internal control system. This inference holds after accounting for other social connections, examining internal control components, using alternative measures of internal control, adopting finer industry classifications, constructing alternative internal control similarity, running auditor switch tests, and addressing endogeneity problems. Additional analyses indicate that auditor style and information sharing serve two underlying mechanisms to undergird the documented relationship. Finally, our evidence suggests that high-centrality firms in auditor networks are associated with better financial reporting.

"*According to a survey we commissioned of more than 1,100 C-level executives and finance professionals, 71% of C-level executives completely trust the accuracy of their financial data. However, only 38% of finance professionals - the people preparing the statements and reports - share that opinion.*" CFO.com, March 21, 2019.

1. Introduction

Following a wave of accounting scandals in 2001, the integrity of financial information has been questioned persistently. A surprising lack of confidence exposes the weakness of a firm's internal control. The bulk of earlier work is accomplished to explore the determinants or economic consequences of internal control for individual companies (e.g., Doyle et al., 2007). However, little attention is drawn to this research question if being extended to the two-firm dimension. Until recently, Cheng et al. (2019) investigate the spillover effect of internal control between two firms, parallel to the theoretical prediction that the improvement in a firm's internal control generates an externality to its peers (Gao & Zhang, 2019). Along the same vein, we further fill this literature void by ascertaining why internal control similarity[1] arises. More specifically, this study examines whether firm-pairs with common auditors establish a similar internal control system.

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[1] We define internal control similarity as the extent to which the quality of internal control resembles between two firms. In our setting, similar (dissimilar) internal control indicates two firms have analogous (distinct) internal control performance, which is captured by the internal control index. Concretely, such an index represents the overall evaluation of an internal control system based on five key aspects: internal environment, risk assessment, control activity, information and communication, and internal monitoring. Thus, two firms are more (less) similar in internal control as long as their internal control indices are close to (far away from) each other.

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According to previous research, common auditors play two pivotal roles in influencing clients' economic behavior. The first one is relevant to auditor style,[2] which Francis et al. (2014) define as a unique set of internal working rules used to perform audit services consistently within clients. These auditor-specific guidelines later translate into individual styles, ultimately leading to financial statement comparability (Ege et al., 2020) and common disclosure deficiency (Baugh & Schmardebeck, 2021). If auditor style guarantees strict adherence to auditing standards and coherent implementation, we expect that common auditors are prone to inducing internal control similarity among a pair of firms.

The second role emanates from information sharing in that audit firms accumulate a substantial amount of private information from their clients after carrying out routine jobs, such as evidence collection, risk assessments, procedural analyses, substantive tests, and communication with managers (Knechel et al., 2009). Given the privileged position, common auditors are able to disseminate information when serving acquirers and target firms (Cai et al., 2016), suppliers and customers (Dhaliwal et al., 2017), analysts and public firms (Fang et al., 2020), banks and borrowers (Francis & Wang, 2021), and mutual funds and public firms (Hope et al., 2022). If one client sets up a strong internal control system, common auditors may learn the valuable experience and assist another client in overcoming analogous internal control deficiencies. It follows that information sharing of common auditors prompts two client firms to exhibit greater internal control similarity.

As predicted earlier, we conduct an empirical investigation in China. We concentrate on the Chinese setting for four reasons. First, China follows IFRS (International Financial Reporting Standards) to design its principle-based accounting regime, where auditors have more flexibility to execute auditing standards (Kothari et al., 2010). Under this circumstance, it entails more concrete internal working rules in audit firms, therefore leading auditor style to be more observable. Second, due to severe "guanxi" cultures in Chinese society, various parties prefer to build a social network in pursuit of reciprocity (Park & Luo, 2001). By the same token, auditors can leverage information sharing to cultivate their relationships with clients. This unique cultural context enables the easy detection of information sharing by common auditors. Third, as an emerging economy, the Chinese market is characterized by poor investor protection and loose law enforcement (Liu & Lu, 2007). Hence, internal control quality may vary considerably within public firms. The presence of heterogeneous internal control creates an ideal backdrop against which we can better quantify internal control similarity. Fourth, the effectiveness of internal control is usually captured by a weakness dummy in prior studies (Doyle et al., 2007). Nonetheless, the dichotomous measure fails to distinguish internal control quality for each firm in the same group. The availability of continuous internal control index in China allows us to circumvent such an information-loss problem.

Using a Chinese sample during the period from 2007 to 2017, we discover that common auditors are positively associated with internal control similarity. This conclusion remains robust to accounting for other social ties, using components of internal control, adopting alternative measures of internal control, applying finer industry classifications, constructing alternative proxies for internal control similarity, performing auditor switch tests, and considering the endogeneity contamination. Overall, our findings demonstrate that common auditors are conducive to promoting convergence of internal control among client firms.

To rationalize the observed association, we continue to verify two potential mechanisms through which common auditors affect internal control similarity. On one hand, the common-auditor impact exacerbates when a firm-pair appoints the same signing CPA, employs auditors with industry expertise, and hires big audit firms. These results elucidate that common auditors follow own in-house working guidance to enable the coherent enforcement of audit standards and thus drive internal control similarity, echoing the auditor style mechanism. On the other hand, the common-auditor role is more pronounced given a higher level of information uncertainty. As extra analyses show, common auditors help improve internal control systems for weak-control clients, while weak-control clients pay higher audit fees in return. Taken together, we document evidence consistent with the information sharing mechanism.

Finally, we shed light on the value implication of common auditors by unravelling how a firm's position in auditor networks affects corporate reporting. We find that high-centrality firms are inclined to disclose quality earnings, obtain clean audit opinions, commit fewer financial violations, incur lower audit costs, and face shorter audit report lags. In other words, a client's financial reporting quality relies on auditor network centrality.

Despite bearing a resemblance to Cheng et al. (2019), our study manifests its distinction in two regards. First, unlike Cheng et al. (2019) who examine the lead-lag correlation between firms' internal control, we place emphasis on the cross-sectional internal control similarity. Second, Cheng et al. (2019) ascribe the spillover effect of internal control to social connections of audit committee members, whereas we associate internal control similarity with external auditors.

We make two contributions to the extant literature. First, earlier work indicates that common auditors exert an influence on earnings comparability (Francis et al., 2014), M&A transactions (Cai et al., 2016), supplier-customer relationships (Dhaliwal et al., 2017), common disclosure deficiencies (Baugh & Schmardebeck, 2021), analyst forecast accuracy (Fang et al., 2020), bank loan pricing (Francis & Wang, 2021), and mutual fund performance (Hope et al., 2022). We complement this research by corroborating that common auditors encourage clients' internal control similarity, a hitherto untapped research question.

Second, we add to the literature that disentangles the determinants of internal control. In accordance with previous studies, firm-

[2] Auditor style differentiates itself from several interrelated concepts, including audit capability, auditor industry expertise, and auditor size. Audit capability pertains to auditor educational background, professional development, employment history, work load, community standing, and features of the audit team (Deis & Giroux, 1992). By contrast, auditor style focuses on the compliance with own audit testing approaches when applying accounting standards. Unlike auditor industry expertise extracted from professional understanding of client knowledge (Ferguson et al., 2003), auditor style derives from deep comprehension about accounting principles and auditing standards. Auditor size, measured by the number of clients, reflects the level of audit quality to external users (DeAngelo, 1981), whereas auditor style underscores the design of working guidelines for internal staffs.

level internal control hinges on corporate governance (Lin et al., 2014), ownership structure (Weiss, 2014), auditor features (De Simone et al., 2015), and institutional characteristics (Kanagaretnam et al., 2016). Nevertheless, our findings highlight a novel and nuanced perspective from which to identify another new decisive factor. In other words, an internal control system relies on whether a firm hires the same audit firm as others.

Our results may offer some practical implications to audit firms and policymakers. When providing audit services, auditors should realize that in-house working rules generate a standardization effect among clienteles. Such unintended consequences remind auditors of ensuring the flawlessness of internal policies and audit methodologies. Otherwise, client firms are likely to suffer a systematic deficiency in their internal control systems. Besides, regulators can shrug off financial statement comparability because auditors help enforce accounting standards consistently, whereas more scrutiny should divert to information sharing by auditors.

The remainder of this study proceeds as follows. Section 2 briefs institutional background and audit market in China. Section 3 develops testable hypotheses. Section 4 elaborates on the research design. Section 5 presents empirical findings and Section 6 concludes.

2. Institutional background in China

2.1. Internal control regulation

To promote modern corporate management, Chinese authority is increasingly aware of the important role of internal control in risk management. Nearly all public firms in China are governed by a weak internal control framework because they originate from state-owned enterprises. In 2008, the regulator (i.e., Ministry of Finance, China Securities Regulatory Commission, China Banking Regulatory Commission, China Insurance Regulatory Commission, National Auditing Office) enacts the *Basic Standard of Enterprise Internal Control*, dubbed the China SOX (Sarbanes-Oxley Act). Following the guideline of COSO (Committee of Sponsoring Organizations of the Treadway Commission), the China SOX aims to enhance firms' operational efficiency, legal compliance, asset preservation, and information disclosure. To meet these objectives, managers need make a continuous improvement in five areas: internal environment, risk assessment, control activity, information and communication, and internal monitoring.

Given an identical nature, the China SOX is different from the US counterpart in several aspects. First, the China SOX defines a broader purview to encompass diverse non-financial components. Apart from financial reporting, Chinese firms are required to identify internal control weaknesses in other areas, involving organization structure, strategy development, human resource management, corporate social responsibility, organizational culture, budgeting, finance and investment, procurement, asset management, sales, research and development, construction projects, guarantee, outsourcing, contract management, internal reporting system, and IT system. From this perspective, the China SOX recognizes the importance of business management and operation to internal control.

Second, the China SOX compels corporate managers to classify the severity of internal control weaknesses into three categories: material, major, and minor. The material level denotes one or more deficiencies leading firms to miss internal control objectives. The major level represents one or more deficiencies hindering the realization of control goals, but has less profound economic impact relative to the material one. The minor level depicts internal control weaknesses without satisfying the material or major criterion.

Finally, following the China SOX, audit firms need certify clients' internal control by fulfilling two tasks. On one hand, auditors make a comprehensive assessment of internal control effectiveness for the client. On the other hand, auditors provide audit opinions in response to every weakness ranging from financial reporting to business risks.

2.2. Audit market

The booming Chinese economy fuels the rapid growth of auditing industry in the past three decades. Based on audit-fee revenues, China is deemed one of the major audit markets (Gul et al., 2013), which has several unique features.

First, unlike the mature economy with high Big-Four oligopolistic dominance, Chinese audit market is more diverse and less concentrated (Jiu et al., 2020). The existence of fierce competition piles pressure on auditors when it comes to customer acquisition and retention (Chen et al., 2010). In response, auditors are tempted to offer extra services to increase their market share. Thus, such a market structure makes it feasible for auditors to share information among clients.

Second, because of weak investor protection in China, auditors undertake low litigation risks for financial malfeasance (Chan & Wu, 2011). Although the authority spares no effort to improve the regulation, the legal infrastructure remains vulnerable to safeguarding investors as vigorously as that in developed countries (Chan et al., 2006). Against this backdrop, auditors may breach the conflict-of-interest rule by divulging client's confidential information.

Third, compared to GAAP, the adoption of IFRS in China creates a more principle-based environment, where auditors exercise personal judgement in a concrete economic context (Kothari et al., 2010). Given the discrepancy in cognitive ability, educational attainment, and working experiences, auditors may shape dissimilar opinions on a firm's internal control despite following the same auditing standard (Nelson & Tan, 2005). Hence, internal working guidelines are desirable in China to help standardize the execution of auditing standards.

3. Hypothesis development

3.1. Literature on common auditors

One line of relevant literature focuses on common auditors, which probes the economic behavior of client firms using the same auditors. These studies can be partitioned into two categories depending on the specific role of common auditors.

The first one pertains to auditor style, originating from Francis et al. (2014), who treat the unique set of specific policies and procedures to standardize audit services as a style. In other words, in-house working rules should be formulated so that each auditor can implement auditing standards in a consistent way (Kothari et al., 2010). This practice is widely adopted in audit firms, which gives rise to own auditor style. Along this line of logic, Francis et al. (2014) find that firm-pairs subject to common auditors have a high comparability of financial statements in the U.S., while Jiu et al. (2020) detect a similar phenomenon using the Chinese sample. Ege et al. (2020) substantiate the presence of comparable accruals among clients served by the same global auditor. Baugh and Schmardebeck (2021) reveal that auditor style drives common disclosure deficiencies.

The second group relates to the information sharing role of common auditors. This is because auditors easily obtain a considerable amount of client-specific private information by collecting audit evidence, performing risk assessments, running analytical procedures, conducting substantive tests, and liaising with managers (Knechel et al., 2009). Thus, it is likely that auditors transfer such information within clients. Earlier work shows that common auditors act an information intermediary between acquirers and acquirees (Cai et al., 2016), between suppliers and customers (Dhaliwal et al., 2017), between analysts and firms (Fang et al., 2020), between banks and borrowers (Francis & Wang, 2021), and between funds and firms (Hope et al., 2022).

3.2. Literature on internal control

Another pertinent research is about internal control. We review this literature from two angles, namely, the determinants and the consequences. First, how internal control is determined is extensively studied in earlier work. Aside from general firm-level characteristics (size, age, growth, profitability, and risk), internal control hinges on corporate governance, ownership structure, auditor features, and institutional factors.

In terms of corporate governance, internal control is associated with CEO entrenchment and age (Lin et al., 2014), CEO inside debt holdings (He, 2015), internal audit quality (Mazza & Azzali, 2015), occupational community of top executives (Campbell et al., 2016), audit committee expertise (Lisic et al., 2016), board independence (Chen et al., 2017), and audit committee members' gender (Parker et al., 2017).

With regard to ownership structure, Deumes and Knechel (2008) show that managerial shareholding and blockholder ownership matter to internal control, while Weiss (2014) documents the significant impact of family ownership on internal control weaknesses. Besides, Ji et al. (2015) report that institutional ownership concentration exerts an influence on internal control quality.

When it comes to auditor features, internal control can be enhanced by Big-4 auditors (Zhang et al., 2007), increased auditor-provided tax services (De Simone et al., 2015), longer auditor tenure (Chen et al., 2016), auditors with IT expertise (Haislip et al., 2016), and lower unexpected audit fees (Albring et al., 2018).

Macro-level determinants include a wide range of institutional factors (e.g., national culture, market regulation, and product competition). For example, Kanagaretnam et al. (2016) discover the positive (negative) effect of individualism and power distance (uncertainty avoidance) on internal control deficiencies. Sarens and Christopher (2010) uncover that the compliance with corporate governance guidelines leads to an effective internal control system. Zhang and Chen (2016) unveil a positive association between product market competition and internal control.

On the other hand, the consequences are summarized into two steams of research. One group looks into the spillover effect of internal control. Gao and Zhang (2019) build a theoretical model where a firm's investment in internal control leads others to underinvest in internal control, while Cheng et al. (2019) report that a firm ameliorates internal control when sharing a director with another weak-control firm. Hence, either peer pressure for manipulation or shared directors result in less similar internal control between two firms. On the contrary, Ashraf (2022) articulates that peer data breaches spur a lower chance of weaker internal control for non-breached firms, equivalent to more similar internal control among non-breached firms.

The second one indirectly investigates internal control similarity, which concentrates on corporate governance spillover and earnings management contagion. Governance practices propagate across firms through overlapping directors (Bouwman, 2011), M&As (Albuquerque et al., 2019), and common funds (Nguyen, 2021). Given internal control lays a groundwork for governance quality (Ashraf, 2022), convergence of corporate governance implies an increase in internal control similarity. Besides, earnings management contagion arises from weaker internal control among firms (Donelson et al., 2017). In other words, these firms share similar weak internal control. For example, while Chiu et al. (2013) find that board interlocks promote the firm-level transmission of earnings management, Kedia et al. (2015) argue that a firm's earning management relies on peer's misreporting.

3.3. Testable hypotheses

According to the above discussion, we take advantage of auditor style and information sharing to develop our testable hypotheses. Referring to the judgment literature (Alavi & Leidner, 2001), decision-making centralization in an organization encourages high-quality decisions by overcoming information barriers. With the access to the requisite information, power should rest with one person who can make an informed decision on behalf of all individuals. Since audit involves a judgement process, accounting firms

should execute centralized decision-making.

Given full audits of internal control are required in China, the regulator stipulates general auditing standards and technical guidance. Akin to the audit of financial statements, these guidelines offer flexibility to auditors when designing audit procedures, performing risk assessments, and conducting control tests. Moreover, the identification of control deficiencies is more ambiguous and subjective relative to the detection of actual errors in financial statement audits (Gunn et al., 2022).

Under this circumstance, audit firms need exercise professional autonomy in devising internal working rules for their staffs. Such firm-specific policies subsequently evolve into respective unique auditor style, which helps homogenize the application of auditing standards and technical guidance (Ege et al., 2020; Francis et al., 2014). To some extent that the style effect matters, we expect the internal control system to be more similar for firm-pairs with common auditors.

On the other hand, auditors can accumulate valuable information after performing myriad audit procedures on clients. For example, auditors need to verify first-hand financial materials, check board-meeting minutes, and interact with senior managers. These audit engagements lead to the accessibility of client-specific information. As a result, this unique position lays a foundation for auditors to serve credible information sources for managers.

In addition to informational advantages, auditors have two incentives to share information with client management on various occasions, such as formal meetings and informal talks. First, audit services have the commodity nature because listed companies routinely get their financial statements audited. When facing the tough competition, auditors feel compelled to offer value-added information to clients with the aim of retaining yearly audit contracts (Ettredge et al., 2014). Second, despite operational homogeneity within the audit industry, auditors with specialization may demand a fee premium by providing quality-differentiated services (Cahan et al., 2008). Consequently, clients are willing to pay for auditors' informational advantage, which represents high-quality insights to be leveraged by managers (Bae et al., 2017).

Under our context, when a strength emerges from one client's internal control, auditors yield insights into this practice. Later, they would diffuse such useful information and catalyze internal control improvement for other firms, which engenders internal control similarity among clients. Therefore, both auditor style and information sharing predict the following hypothesis.

H1. Common auditors are associated with more similar internal control between two clients.

4. Research design

4.1. Data

The data used in this study comes from several sources. We begin to collect internal control index from the DIB dataset, which sets a points-based system to evaluate internal control quality. Based on the dataset description, public firms are graded using information from their financial statements and internal control assessment reports. To compute the index, DIB follows the COSO guideline to partition an internal control system into five components (internal environment, risk assessment, control activity, information and communication, and internal monitoring). Next, DIB determines the point for each component after assessing the firm's performance on that particular area. Internal environment, risk assessment, control activity, information and communication, and internal monitoring carry a maximum score of 19, 11, 14, 6, and 16, respectively. Lastly, the points are aggregated across five items, which helps construct internal control index with a range from 0 to 66. Due to the popularity, a vast literature uses the DIB dataset to study internal control (Lennox & Wu, 2022; Liu et al., 2022). Appendix 1 details the points-based system.

Next, we gather the audit firm and signing auditors from the WIND database. We also retrieve the financial and market data from the CSMAR database. After merging three datasets, we remove the samples that: (i) belong to financial industries; (ii) subject to "special treatment" for losses over two consecutive years; (iii) report negative total assets; and (iv) have missing financial information. We compile a final sample of 18,482 observations for 3160 unique firms spanning from 2007 to 2017. The sample selection procedure is detailed in Table 1.

The examination of our hypothesis requires the paring of internal control observations. Following Francis et al. (2014), we construct a pairwise sample, where all firms are paired exhaustively within a year and industry. According to CSMAR, we assign firms to one of six industries: financials, utilities, commercials, industrials, real estate, and conglomerates. Taking four companies (A, B, C,

Table 1
Sample selection.

	Firm-Year Observation
Initial Sample	25,747
Minus:	
Observations in Financial Industries	(799)
Observations with Losses over Two Consecutive Years	(1968)
Observations with Negative Total Assets	(12)
Observations with Missing Financial Information	(4486)
Final Sample	18,482

Note: This table reports the sample selection procedure.

and D) in an industry-year as an example, we are able to form six resultant firm-pairs: A-B, A-C, A-D, B–C, B-D, and C-D. After repeating this exercise for every industry-year, we expand our firm-year sample to a pairwise panel covering 8,057,209 observations.

4.2. Measures of internal control similarity

To gauge internal control similarity, we capitalize on an empirical approach proposed by Fracassi (2017). The rationale behind is to compare the residual for firm-pairs after regressing internal control onto its determinants identified in previous research. Concretely, we start to estimate the internal-control regression below using the firm-year sample.

$$IntCon_{i,t} = \beta_0 + \sum_{j=1}^{n} \beta_j X_{i,t}^{j} + \varepsilon_{i,t} \quad (1)$$

where for firm i in year t, $IntCon_{i,t}$ is the logarithm of internal control index plus one, and $X_{i,t}^{j}$ denotes a series of determinants. Following Doyle et al. (2007), we account for firm size by market capitalization (*Size*), firm age by the number of years after the IPO (*Age*), financial health by a loss dummy (*Loss*) and bankruptcy risk (*Zscore*), business complexity by the number of subsidiaries (*Subsidiary*) and a foreign-transaction dummy (*Foreign*), growth prospect by sales growth (*SalGrow*) and inventory growth (*InvGrow*), and corporate governance by board size (*BrdSize*), supervisory board size (*SuperSize*), and the number of committees (*Committee*). In Table 2, the coefficients of explanatory variables have the identical signs expected by earlier studies.

Next, the residual in Eq. (1) enables us to obtain the idiosyncratic portion of internal control for every firm. When pairing up two firms (i and j), we quantify internal control similarity (*IntConSim*) as follows:

$$IntConSim_{i,j,t} = -\left|IC\_Res_{i,t} - IC\_Res_{j,t}\right| \quad (2)$$

where $IC\_Res_{i,t}$ is firm i's internal-control residual. By construction, the larger value *IntConSim* has, the more similar internal control system firm-pairs share. Likewise, we compute the similarity measure for five internal control components separately (*IntEnvSim*, *RiskAssSim*, *ContActSim*, *InfComSim*, and *IntMonSim*).

To validate our measure, we use the above method to construct firm-pair similarity in term of the internal control weakness dummy, the restatement dummy, and the absolute value of discretionary accruals. Unreported results show that *IntConSim* is positively and significantly correlated with respective similarity measures. Such correlation analyses indicate that *IntConSim* can capture information content reflected in other populous proxies for internal control quality.

4.3. Baseline models

To investigate the impact of common auditors on internal control similarity, we set up the ensuing baseline regression, which is estimated using the pairwise sample.

$$IntConSim_{i,j,t} = \alpha_0 + \alpha_1 Auditor_{i,j,t} + \sum Controls + \varepsilon_{i,j,t} \quad (3)$$

where $IntConSim_{i,j,t}$ is the measure of internal control similarity between firm i and j in year t, and $Auditor_{i,j,t}$ is an indicator taking the value of one if firm i and j share the same audit firm in year t, and zero otherwise. In line with this setting, our hypothesis implies a positive and significant coefficient on *Auditor*.

In the spirit of Francis et al. (2014), we add several controls taking the difference and minimum versions. The prefix *Dif_* (*Min_*) in a variable's notation symbolizes the absolute difference (minimum) of that variable for a firm-pair. One group of controls includes firm-specific characteristics, such as firm size (*Dif_Size* and *Min_Size*), firm age (*Dif_Age* and *Min_Age*), return volatility (*Dif_RetVol* and *Min_RetVol*), return on assets (*Dif_ROA* and *Min_ROA*), cash holdings (*Dif_Cash* and *Min_Cash*), accounts receivable turnover (*Dif_ARTurn* and *Min_ARTurn*), and inventory turnover (*Dif_InvTurn* and *Min_InvTurn*). Another group of controls relates to corporate governance, consisting of the proportion of independent directors (*Dif_BrdInd* and *Min_BrdInd*), the percentage of unpaid supervisors (*Dif_SuperInd* and *Min_SuperInd*), and CEO duality dummy (*Dif_CEODuality* and *Min_CEODuality*). Fixed effects of year and industry are considered in Eq. (3). We cluster standard errors at firm-pairs. All variables are defined in Appendix 2.

5. Empirical findings

5.1. Descriptive statistics

Table 3 Panel A begins to tabulate summary statistics using the firm-year sample. The mean (median) of internal control, *IntCon*, is 3.354 (3.503) with a standard deviation of 0.478. Our sample firms have an average age of 13.93 ($e^{2.634}$) years, while 13.6 percent of them make losses. On average, each firm runs 10.54 ($e^{2.355}$) subsidiaries and sees annual sales grow at 12.4 percent. Panel A next presents descriptive statistics for the pairwise sample. Noticeably, there is around 6.1 percent of the firm-pairs audited by common

Table 2
Internal control regression.

	IntCon (1)		Internal Control Components									
			IntEnv (2)		*RiskAss* (3)		*ContAct* (4)		*InfCom* (5)		*IntMon* (6)	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Size	0.017***	7.12	0.023***	6.21	0.037***	11.56	0.003	0.68	−0.005	−1.47	0.027***	7.50
Age	−0.071***	−10.36	−0.083***	−8.07	−0.077***	−8.42	−0.097***	−8.32	−0.127***	−14.19	0.008	0.79
Loss	−0.102***	−14.44	−0.147***	−13.80	−0.057***	−6.06	−0.130***	−10.87	−0.071***	−7.63	−0.106***	−10.24
Zscore	−0.038	−0.83	−0.061	−0.88	0.008	0.13	−0.016	−0.21	−0.044	−0.73	0.011	0.16
Subsidiary	−0.012	−0.40	−0.151***	−3.23	−0.062	−1.50	−0.085	−1.62	0.235***	5.77	0.051	1.13
Foreign	0.030***	5.59	0.035***	4.32	0.034***	4.72	0.034***	3.71	0.058***	8.14	0.007	0.86
SalGrow	0.058	1.05	−0.024	−0.29	−0.065	−0.88	0.126	1.33	−0.033	−0.45	−0.035	−0.43
InvGrow	−0.042	−0.94	−0.023	−0.34	−0.003	−0.05	−0.010	−0.13	−0.006	−0.10	−0.009	−0.14
BrdSize	0.027**	2.17	0.023	1.20	0.019	1.11	0.002	0.09	−0.019	−1.16	0.057***	3.04
SuperSize	0.003	0.35	0.074***	5.32	0.000	0.02	−0.034**	−2.15	−0.057***	−4.70	0.015	1.10
Committee	0.078***	4.66	0.063**	2.49	0.017	0.76	0.051*	1.80	0.072***	3.26	0.013	0.55
Year FE	Included		Included		Included		Included		Included		Included	
Industry FE	Included		Included		Included		Included		Included		Included	
Adjusted R^2	0.563		0.296		0.729		0.140		0.194		0.606	
Observations	18,482		18,482		18,482		18,482		18,482		18,482	

Note: This table regresses internal control (internal control components) over a set of control variables. All variables are defined in Appendix 2. *** **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table 3
Summary statistics, correlations, and univariate tests.

Panel A: Summary Statistics

	Observation	Mean	Standard Deviation	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile
Firm-Year Sample								
IntCon	18,482	3.354	0.478	2.708	3.216	3.503	3.664	3.761
IntEnv	18,482	2.118	0.571	1.518	1.792	2.229	2.485	2.708
RiskAss	18,482	1.355	0.809	0.000	0.693	1.732	1.995	2.134
ContAct	18,482	2.014	0.576	1.386	1.816	2.197	2.372	2.485
InfCom	18,482	1.054	0.468	0.255	0.737	1.099	1.386	1.609
IntMon	18,482	2.000	0.737	1.099	1.609	2.079	2.666	2.733
Size	18,482	21.942	1.518	20.376	20.942	21.740	22.674	23.770
Age	18,482	2.634	0.449	2.079	2.398	2.708	2.944	3.135
Loss	18,482	0.136	0.343	0.000	0.000	0.000	0.000	1.000
Zscore	18,482	11.537	45.787	1.169	2.058	3.942	8.142	17.580
Subsidiary	18,482	2.355	1.066	1.099	1.609	2.398	3.045	3.689
Foreign	18,482	0.392	0.488	0.000	0.000	0.000	1.000	1.000
SalGrow	18,482	0.124	1.096	−0.239	−0.008	0.248	0.613	1.257
InvGrow	18,482	0.123	0.647	−0.333	−0.064	0.233	0.699	1.572
BrdSize	18,482	2.158	0.209	1.946	2.079	2.197	2.197	2.398
SuperSize	18,482	1.268	0.284	1.099	1.099	1.099	1.609	1.609
Committee	18,482	1.583	0.153	1.386	1.609	1.609	1.609	1.609
Pairwise Sample								
IntConSim	8,057,209	−0.269	0.289	−0.031	−0.080	−0.179	−0.351	−0.614
IntEnvSim	8,057,209	−0.445	0.528	−0.046	−0.118	−0.269	−0.547	−0.950
RiskAssSim	8,057,209	−0.341	0.396	−0.032	−0.085	−0.201	−0.418	−0.874
ContActSim	8,057,209	−0.473	0.627	−0.040	−0.106	−0.240	−0.505	−1.278
InfComSim	8,057,209	−0.417	0.361	−0.052	−0.140	−0.321	−0.590	−0.930
IntMonSim	8,057,209	−0.402	0.502	−0.028	−0.074	−0.190	−0.565	−1.044
Auditor	8,057,209	0.061	0.240	0.000	0.000	0.000	0.000	0.000
Dif_Size	8,057,209	1.363	1.122	0.198	0.505	1.087	1.935	2.915
Min_Size	8,057,209	21.452	0.889	20.417	20.864	21.401	21.971	22.570
Dif_Age	8,057,209	0.375	0.316	0.054	0.134	0.302	0.531	0.811
Min_Age	8,057,209	2.516	0.367	2.079	2.303	2.565	2.773	2.944
Dif_RetVol	8,057,209	0.060	0.099	0.007	0.019	0.042	0.078	0.122
Min_RetVol	8,057,209	0.116	0.048	0.063	0.081	0.107	0.143	0.181
Dif_ROA	8,057,209	0.518	1.033	0.006	0.017	0.040	0.077	0.132
Min_ROA	8,057,209	0.002	0.225	−0.048	0.003	0.015	0.033	0.054
Dif_Cash	8,057,209	0.121	0.112	0.016	0.040	0.088	0.169	0.275
Min_Cash	8,057,209	0.105	0.066	0.035	0.059	0.093	0.136	0.189
Dif_ARTurn	8,057,209	0.232	1.263	0.024	0.067	0.155	0.302	0.514
Min_ARTurn	8,057,209	0.125	0.122	0.009	0.032	0.093	0.180	0.280
Dif_InvTurn	8,057,209	0.337	1.054	0.026	0.067	0.153	0.327	0.630
Min_InvTurn	8,057,209	0.164	0.693	0.041	0.080	0.135	0.207	0.299
Dif_BrdInd	8,057,209	0.053	0.055	0.000	0.000	0.042	0.095	0.111
Min_BrdInd	8,057,209	0.345	0.030	0.333	0.333	0.333	0.333	0.375
Dif_SuperInd	8,057,209	0.301	0.253	0.000	0.000	0.333	0.500	0.667
Min_SuperInd	8,057,209	0.125	0.201	0.000	0.000	0.000	0.333	0.400
Dif_CEODuality	8,057,209	0.355	0.478	0.000	0.000	0.000	1.000	1.000
Min_CEODuality	8,057,209	0.060	0.237	0.000	0.000	0.000	0.000	0.000

Auditor-Year Sample	Number of Auditing Firms	Herfindahl Index	Top 10 Auditor Market Share	Largest Auditor Market Share
2007	61	0.094	0.351	0.109
2008	61	0.103	0.374	0.121
2009	53	0.091	0.380	0.110
2010	53	0.087	0.380	0.104
2011	51	0.087	0.384	0.104
2012	50	0.093	0.399	0.107
2013	40	0.086	0.411	0.075
2014	41	0.083	0.408	0.072
2015	40	0.082	0.410	0.070
2016	40	0.076	0.404	0.057
2017	40	0.074	0.400	0.060

Panel B: Correlation Coefficients

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
IntConSim	(1)											
Auditor	(2)	−0.029***										
Dif_Size	(3)	0.014***	−0.025***									
Min_Size	(4)	−0.131***	0.011*	−0.264***								
Dif_Age	(5)	0.010*	0.004	0.001	−0.061***							
Min_Age	(6)	−0.142***	0.000	0.033***	0.150***	−0.698***						
Dif_RetVol	(7)	0.014**	0.003	0.022***	−0.051***	0.006	−0.005					
Min_RetVol	(8)	0.117***	−0.001	−0.089***	−0.151***	0.015**	−0.112***	0.059***				
Dif_ROA	(9)	0.002	0.001	0.036***	−0.053***	−0.001	−0.003	0.003	0.007			
Min_ROA	(10)	−0.034***	0.006	−0.041***	0.094***	0.006	−0.009*	0.000	−0.031***	−0.002		
Dif_Cash	(11)	0.003	−0.002	0.044***	−0.122***	0.043***	−0.059***	0.006	−0.018***	0.028***	−0.003	
Min_Cash	(12)	−0.028***	0.008	−0.079***	−0.082***	0.044***	−0.078***	0.002	0.011*	0.003	0.062***	−0.071***
Dif_ARTurn	(13)	−0.007	0.001	0.003	−0.017***	0.006	−0.005	0.009*	0.012**	0.000	−0.003	0.001
Min_ARTurn	(14)	−0.107***	0.023***	−0.123***	−0.080***	0.030***	−0.049***	0.022***	0.070***	−0.005	0.012**	−0.048***
Dif_InvTurn	(15)	0.032***	−0.009*	0.012**	−0.020***	0.011*	0.028***	0.043***	0.019***	0.000	−0.006	0.000
Min_InvTurn	(16)	−0.011*	0.003	−0.016**	0.018***	−0.014**	0.004	−0.047***	−0.006	−0.001	0.006	−0.015**
Dif_BrdInd	(17)	−0.012**	0.001	0.042***	−0.004	0.021***	−0.007	0.009*	0.003	0.000	−0.002	0.007
Min_BrdInd	(18)	−0.057***	0.006	0.028***	−0.019***	0.015**	0.007	0.014**	0.005	0.001	−0.004	0.005
Dif_SuperInd	(19)	0.020***	−0.011*	0.067***	0.011*	0.002	0.015**	0.004	−0.010*	0.000	−0.005	0.008
Min_SuperInd	(20)	0.091***	−0.015**	0.061***	0.084***	−0.056***	0.041***	−0.009*	−0.010*	0.006	−0.008	0.005
Dif_CEODuality	(21)	−0.046***	0.013**	−0.021***	−0.073***	0.047***	−0.035***	0.011*	0.006	−0.003	−0.005	0.024***
Min_CEODuality	(22)	−0.035***	0.015**	−0.045***	−0.055***	0.026***	−0.030***	0.008	0.016**	−0.001	−0.002	0.012**

		(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
IntConSim	(1)											
Auditor	(2)											
Dif_Size	(3)											
Min_Size	(4)											
Dif_Age	(5)											
Min_Age	(6)											
Dif_RetVol	(7)											
Min_RetVol	(8)											
Dif_ROA	(9)											
Min_ROA	(10)											

(*continued on next page*)

Table 3 (*continued*)

		(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Dif_Cash	(11)											
Min_Cash	(12)											
Dif_ARTurn	(13)	−0.010										
Min_ARTurn	(14)	0.044***	0.007									
Dif_InvTurn	(15)	−0.066***	0.031***	−0.032***								
Min_InvTurn	(16)	0.014**	0.002	0.030***	−0.543***							
Dif_BrdInd	(17)	0.009*	0.007	0.020***	0.001	0.009*						
Min_BrdInd	(18)	0.021***	0.010*	0.047***	0.005	0.010*	−0.101***					
Dif_SuperInd	(19)	−0.009*	−0.003	−0.043***	0.009*	−0.005	−0.005	−0.029***				
Min_SuperInd	(20)	−0.027***	−0.008	−0.121***	0.019***	−0.011*	−0.050***	−0.069***	−0.308***			
Dif_CEODuality	(21)	0.043***	0.005	0.073***	−0.006	0.009*	0.043***	0.054***	−0.008	−0.138***		
Min_CEODuality	(22)	0.043***	0.003	0.069***	−0.005	0.008	0.028***	0.071***	−0.058***	−0.091***	−0.181***	

Panel C: Univariate Tests

	Mean Equality Test			Median Equality Test		
	Auditor = 0	*Auditor* = 1	t-stat	*Auditor* = 0	*Auditor* = 1	z-stat
IntConSim	−0.271	−0.236	84.22***	−0.180	−0.164	67.45***
IntEnvSim	−0.445	−0.440	6.32***	−0.270	−0.257	24.73***
RiskAssSim	−0.343	−0.301	74.46***	−0.202	−0.190	47.98***
ContActSim	−0.473	−0.473	0.35	−0.241	−0.223	36.02***
InfcomSim	−0.419	−0.388	59.05***	−0.322	−0.300	48.09***
IntMonSim	−0.403	−0.381	29.70***	−0.191	−0.176	34.30***

Note: This table reports summary statistics for the firm-year (pairwise, auditor-year) sample in Panel A, correlation coefficients for baseline variables in Panel B, and results for univariate tests in Panel C. All variables are defined in Appendix 2.***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

auditor. Internal control similarity has a large variation, as evidenced by the range between 10th and 90th percentiles. We also find that internal control component similarity varies drastically. Lastly, Panel A reports summary statistics of the auditor-year sample, including the number of auditing firms, Herfindahl index,[3] top 10 auditor market share, and largest auditor market share. As shown, the market competition in China auditing industry is fierce given more than 40 auditors provide services and top 10 auditors rake in around 40% audit fees. Thus, Chinese audit market is diverse and competitive (Jiu et al., 2020).

We continue to calculate the Pearson correlation coefficients among baseline variables in Table 3 Panel B. We discern that *IntConSim* is negatively correlated with *Auditor*, suggesting that firm-pairs exhibit similar internal control under the influence of common auditors. Additionally, *IntConSim* have a correlation with almost all control variables.

We finally perform the univariate test in Table 3 Panel C after dividing the pairwise sample into two groups based on *Auditor*. We observe a larger mean of *IntConSim* in the subsample with common auditors (*Auditor* = 1). Comparably, we detect a similar pattern if conducting the same analysis on the median. Combined, this preliminary evidence suggests that common auditors contribute to the harmonization of internal control between two firms, thus lending support to H1.

5.2. Baseline results

Table 4 Panel A presents the results of the baseline model with three dissimilar specifications. We initially estimate the regression in Column (1), in which only *Auditor* is treated as the independent variable. Econometrically, the inclusion of controls in Eq. (3) seems redundant because various determinants are considered in Eq. (1) to construct *IntConSim*. Using the simplest version, we find that the coefficient on *Auditor* is 0.046 with a t-statistic of 12.76. The positive and significant relation suggests that common auditors make clients' internal control more similar.

Aside from the univariate setting, we include several pairwise firm-level characteristics in Column (2). Despite incorporating these variables, we still witness a positive effect of *Auditor* on *IntConSim*. In Column (3), we further augment the regression by adding corporate-governance controls. Once again, the estimate for *Auditor* remains significantly positive. Economically, the coefficient of interest (0.033) has no intuitive interpretation, but indicates a 12.27 percent (0.033/0.269) increase in *IntConSim* with reference to its mean (−0.269 in Table 3 Panel A). Altogether, these findings corroborate that common auditors promote internal control similarity.

One potential suspicion is that the documented relationship simply reflects the impact of other social ties. Parallel to the network literature, firms behave similarly due to board interlocks (Cai et al., 2014), geographical peer effects (Dougal et al., 2015), and common analysts (Huang et al., 2020). To allay the concern, we create three dummies to capture these social connections, including *Manager* (equals one if a firm's manager holds a position in other firms), *City* (equals one if firm-pairs are located in the same city), and *Analyst* (equals one if firm-pairs are covered by the same analyst). In Table 4 Panel B, we repeat the baseline analysis after introducing these social-tie proxies individually. Columns (4)–(6) show that *City* (*Analyst*) exerts a positive impact on *IntConSim*, indicating that firm-pairs located in the same city (having the same analyst) have more similar internal control. Importantly, the positive estimate for *Auditor*, which now gauges the incremental contribution of common auditors, retains its significance. Relative to *City* (*Analyst*), *Auditor* has a bigger magnitude, confirming the dominant role of common auditors.

As another robustness check, we verify whether the observed impact persists when breaking down internal control index into five components. We re-run Eq. (3) but view internal control sub-index similarity as the dependent variable. The results in Table 5 demonstrate that the coefficients concerned are constantly positive across internal control components. Hence, the common-auditor effect is stable because it matters to every facet of an internal control system.

To ensure the reliability, we ultimately perform four additional checks. First, given the subjective nature of the DIB index, our measure of internal control may be disputable, which challenges the impact of common auditors. To eradicate the bias, we follow Doyle et al. (2007) to code a weakness dummy (*IC_Dummy*), which equals one if a firm reports internal control weakness, and zero otherwise. After recomputing *IntConSim* with *IC_Dummy*, we duplicate the baseline analysis in Table 6 Panel A. Obviously, the positive and significant coefficient on *Auditor* maintains, illustrating that the documented association is immune to internal control mismeasurement.

The second test is grounded in the apprehension that our baseline findings are ascribed to the oversimplified CSMAR industry classification. Thus, we resort to the 2012 CSRC industry classification, where all firms are classified into nineteen sectors. We replicate the same analysis by forming the pairwise sample with a finer classification. As Table 6 Panel B suggests, industry classification has virtually no impact on our inference.

Third, our construction of *IntConSim* hinges on the estimation of internal-control models. It may be disputable to acquire the internal-control residual by running a pooled regression. Thus, we re-run Eq. (1) based on the industry (firm) level and repeat the baseline regression in Column (1) [(2)] of Table 6 Panel C. The coefficient on *Auditor* remains significant and positive. Besides, our internal-control model possibly suffers from misspecification. To ease this concern, we re-compute *IntConSim* using the raw internal control index. The estimation results in Panel C Column (3) support that the common-auditor effect persists.

Fourth, we conduct the auditor switch test by focusing on firm-pairs with an auditor change. To start with, we compile a subsample (*Subsample 1*), where firm-pairs shift from having uncommon auditors to having common auditors. Next, we refer to Francis et al. (2014) and establish the regression below.

[3] The measure of audit market competition, which is calculated by the sum of the squared audit fee market shares of all auditors in our sample (Newton et al., 2016).

Table 4
Common auditors and internal control similarity.

	Panel A: Baseline Regression						Panel B: Control for Other Social Ties					
	IntConSim (1)		*IntConSim* (2)		*IntConSim* (3)		*IntConSim* (4)		*IntConSim* (5)		*IntConSim* (6)	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Auditor	0.046***	12.76	0.035***	9.58	0.033***	8.95	0.033***	8.94	0.029***	7.96	0.033***	8.88
Dif_Size			0.004***	5.26	0.005***	5.84	0.005***	5.84	0.005***	5.35	−0.002**	−2.38
Min_Size			0.084***	74.27	0.082***	70.97	0.082***	70.96	0.082***	70.58	0.058***	47.88
Dif_Age			−0.222***	−54.07	−0.222***	−53.85	−0.222***	−53.85	−0.221***	−53.68	−0.204***	−49.28
Min_Age			−0.310***	−79.43	−0.302***	−76.75	−0.302***	−76.75	−0.301***	−76.47	−0.275***	−69.58
Dif_RetVol			−0.360***	−39.96	−0.385***	−42.63	−0.039***	−42.63	−0.385***	−42.59	−0.038***	−42.62
Min_RetVol			−0.475***	−17.74	−0.505***	−18.69	−0.505***	−18.69	−0.507***	−18.77	−0.561***	−20.79
Dif_ROA			0.001***	12.52	0.001***	12.93	0.001***	12.93	0.000***	12.95	0.001***	12.38
Min_ROA			0.179***	45.51	0.176***	42.75	0.176***	42.75	0.176***	42.79	0.163***	39.70
Dif_Cash			0.175***	21.84	0.165***	20.53	0.165***	20.53	0.163***	20.22	0.140***	17.39
Min_Cash			0.742***	54.67	0.779***	57.12	0.779***	57.12	0.774***	56.71	0.683***	49.84
Dif_ARTurn			0.005***	6.68	0.004***	5.95	0.004***	5.95	0.004***	5.97	0.004***	5.98
Min_ARTurn			0.253***	32.37	0.243***	30.91	0.243***	30.90	0.239***	30.40	0.238***	30.27
Dif_InvTurn			−0.041***	−36.43	−0.043***	−38.25	−0.043***	−38.25	−0.043***	−38.23	−0.041***	−36.22
Min_InvTurn			−0.051***	−31.04	−0.054***	−32.40	−0.054***	−32.40	−0.054***	−32.39	−0.052***	−31.40
Dif_BrdInd					−0.572***	−35.29	−0.572***	−35.29	−0.573***	−35.38	−0.559***	−34.52
Min_BrdInd					0.354***	11.72	0.354***	11.72	0.349***	11.55	0.385***	12.76
Dif_SuperInd					0.033***	8.81	0.033***	8.81	0.033***	8.79	0.041***	11.03
Min_SuperInd					0.014***	2.81	0.014***	2.81	0.013**	2.56	0.034***	6.83
Dif_CEODuality					0.009***	4.79	0.009***	4.79	0.009***	4.69	0.005***	2.57
Min_CEODuality					0.061***	15.28	0.061***	15.28	0.060***	15.01	0.053***	13.19
Manager							0.023	0.78				
City									0.010***	16.41		
Analyst											0.014***	68.64
Year FE	Included		Included		Included		Included		Included		Included	
Industry FE	Included		Included		Included		Included		Included		Included	
Adjusted R^2	0.244		0.246		0.244		0.244		0.244		0.245	
Observations	8,057,209		8,057,209		8,057,209		8,057,209		8,057,209		8,057,209	

Note: This table examines whether common auditors impact internal control similarity. Panel A estimates the baseline regression. Panel B accounts for other social ties in the baseline model. All variables are defined in Appendix 2.***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table 5
Analyses on internal control sub-index similarity.

	IntEnvSim		*RiskAssSim*		*ContActSim*		*InfComSim*		*IntMonSim*	
	(1)		(2)		(3)		(4)		(5)	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Auditor	0.049***	6.47	0.061***	12.53	0.028***	3.03	0.114***	22.46	0.011*	1.70
Controls	Included		Included		Included		Included		Included	
Year FE	Included		Included		Included		Included		Included	
Industry FE	Included		Included		Included		Included		Included	
Adjusted R^2	0.042		0.293		0.026		0.080		0.058	
Observations	8,057,209		8,057,209		8,057,209		8,057,209		8,057,209	

Note: This table examines whether common auditors impact internal control component similarity. All variables are defined in Appendix 2.***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

$$IntConSim_{i,j,t} = \alpha_0 + \alpha_1 C\_Switch_{i,j,t} + \sum Controls + \varepsilon_{i,j,t} \quad (4)$$

where *C_Switch* is a dummy equal to one (zero) for the post-switch (pre-switch) period with (without) common auditors. *Controls* resemble those used in Eq. (3). Following Francis et al. (2014), we estimate Eq. (4) using three windows: [*t*-2, *t*+2], [*t*-3, *t*+3], and [*t*-4, *t*+4], where *t* denotes the switch year. In Table 6 Panel D, we document the positive and significant coefficient on *C_Switch* regardless of estimation windows. In economic terms, switching into common auditors increases similarity of internal control among clients, compatible with our core findings.

For completeness, we continue to extract another subsample (*Subsample 2*) that include firm-pairs switching out of common auditors. We repeat the identical analysis but swap *C_Switch* with *U_Switch*, which is defined as a dummy equal to one (zero) for the post-switch (pre-switch) period without (with) common auditors. As indicated in Panel D, a switch to uncommon auditors leads to less similar internal control. State differently, common auditors help converge clients' internal control.

5.3. Endogeneity mitigation

The observed association appears fragile to endogeneity for three reasons. First, firms with comparable internal control systems may prescribe an analogous criteria to hire auditors, which produces reverse causality. Second, the baseline model may fail to include all controls, equivalent to the omitted-variable problem. Third, the relation between common auditors and internal control similarity may be specified improperly, leading to functional form misspecification. Thus, this subsection harnesses three empirical methodologies to address these concerns.

5.3.1. Exogenous shocks

We start to handle reverse causality by the quasi-natural experiment, which helps estimate the causal effect in a way similar to randomized studies (Lennox & Pittman, 2011). Meanwhile, such a research design allows our estimation to circumvent unobservable biases (Peel, 2014). Specifically, we focus on an exogenous event, where common auditors confront a horizontal merger of audit firms (Gong et al., 2016). When a merger unfolds, audit firms involved cease operation, which exogenously disconnects the linkage between auditors and public firms. On this occasion, we can calibrate the genuine effect of auditor ties by contrasting mergers of common auditors with those of uncommon auditors.

We first identify 47 auditor merger events during the sample period using the official website of individual audit firms, Chinese Institute of Certified Public Accountants (CICPA), and China Securities Regulatory Commission (CSRC). It might be argued that such events are not random because the clients of acquiring auditors have similar internal control to those of acquired auditors during the merger. To assuage this worry, Appendix 3 Panel A compares clients' internal control measures (*IntCon* and *IC_Res*) between acquirers and acquirees in the merger year. From the statistical viewpoint, client firms between acquiring and target auditors differ in their internal control system, which ensures the randomness of our merger events.

The staggering nature of mergers offers an ideal setting to execute the DiD (Difference-in-Differences) procedure. In line with the DiD research design (Fauver et al., 2017; Jiang et al., 2019), we construct treatment firm-pairs (*Treatment Sample*) that initially have uncommon auditors but subsequently share common auditors due to the merger. For robustness, we compile two control samples. One group (*Control Sample 1*) involves firm-pairs without common auditors before and after the merger, while the other (*Control Sample 2*) includes firm-pairs with common auditors before and after the merger. The number of treatment (control) samples is reported in Appendix 3 Panel B. Considering that our DiD estimation may be biased by firms with auditor switches, we drop these observations to avoid the unbalanced sample distribution before and after the merger. Using our treatment sample and one control sample, we estimate the DiD model below.

$$IntConSim_{i,j,t} = \alpha_0 + \alpha_1 Post\_Merger_{i,j,t} + \sum Controls + \varepsilon_{i,j,t} \quad (5)$$

Regarding the treatment sample, *Post_Merger* equals one (zero) for the years after (before) the merger. In terms of the control

Table 6
Additional checks.

Panel A: Alternative Measures of Internal Control		
	IntConSim (1)	
	Coef	t-stat
Auditor	0.026***	4.57
Controls	Included	
Year FE	Included	
Industry FE	Included	
Adjusted R^2	0.118	
Observations	8,064,150	

Panel B: Using 2012 CSRC Industry Classification		
	IntConSim (1)	
	Coef	t-stat
Auditor	0.016***	3.98
Controls	Included	
Year FE	Included	
Industry FE	Included	
Adjusted R^2	0.247	
Observations	6,291,590	

Panel C: Alternative Construction of Internal Control Similarity						
	Estimating the Internal-Control Regression on the Industry Level		Estimating the Internal-Control Regression on the Firm Level		Using the Raw Internal Control Index	
	IntConSim (1)		*IntConSim* (2)		*IntConSim* (3)	
	Coef	t-stat	Coef	t-stat	Coef	t-stat
Auditor	0.033***	8.25	0.033***	8.91	0.044***	11.77
Controls	Included		Included		Included	
Year FE	Included		Included		Included	
Industry FE	Included		Included		Included	
Adjusted R^2	0.202		0.244		0.247	
Observations	8,057,209		8,057,209		8,057,209	

Panel D: Auditor Switch Tests						
	Estimation Window [t-2, t+2]		Estimation Window [t-3, t+3]		Estimation Window [t-4, t+4]	
	IntConSim (1)		*IntConSim* (2)		*IntConSim* (3)	
	Coef	t-stat	Coef	t-stat	Coef	t-stat
Subsample 1: Firm-Pairs Switch into Common Auditors						
C_Switch	0.008***	2.88	0.003***	3.35	0.003***	3.31
Controls	Included		Included		Included	
Year FE	Included		Included		Included	
Industry FE	Included		Included		Included	
Adjusted R^2	0.187		0.200		0.211	
Observations	338,846		435,239		510,860	
Subsample 2: Firm-Pairs Switch out of Common Auditors						
U_Switch	−0.003***	−2.60	−0.003***	−3.03	−0.002**	−2.55
Controls	Included		Included		Included	
Year FE	Included		Included		Included	
Industry FE	Included		Included		Included	
Adjusted R^2	0.174		0.181		0.191	
Observations	278,944		353,578		412,551	

Note: This table performs four robustness checks. Panel A uses alternative measures of internal control (*IC_Dummy*). Panel B adopts the 2012 CSRC industry classification. Panel C constructs alternative internal control similarity. Panel D performs the auditor switch tests following Francis et al. (2014). All variables are defined in Appendix 2.***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

sample, *Post_Merger* is always equal to zero. As the auditor mergers occur at the firm level, we further consider firm-pair fixed effects in Eq. (5). The coefficient on *Post_Merger* (α_1) reflects the difference in the change in internal control similarity surrounding the merger between treatment firms and control firms. If common auditors propel internal control similarity, we expect α_1 to be positive and significant.

We tabulate the regression result in Table 7 Panel A. Irrespective of control samples, our variable of interest, *Post_*Merger, has a positive and significant estimate. We explain these findings as that, compared to the control group, treatment firm-pairs implement a more similar internal control system after the merger event. Thus, our DiD results substantiate that common auditors have a causal impact on internal control similarity.

5.3.2. Two-stage regression

Next, we exploit Heckman's (1979) two-stage model to tackle the omitted-variable problem in the main regression. Following Srinidhi et al. (2011), the Heckman model can be effective in controlling for selection bias, which enables us to endogenize firms' selection of auditors. In this set-up, we download the annual number of CPAs for every auditor (*Sum_CPA*) from CICPA as an instrument. Instinctively, auditing firms with more CPAs have a higher chance of being common auditors, thus suiting the relevancy criteria. The exclusion requirement can be met if considering the unrelatedness between the number of CPAs and internal control similarity.

Table 7 Panel B presents the two-stage estimation results. In Column (3), we perform the first-stage regression of *Auditor* on *Sum_CPA*. The positive relation between *Auditor* and *Sum_CPA* verifies our hunch. After incorporating the first-stage inverse Mills ratio (*IMR*), our second-stage results in Column (4) show that the key coefficient is significantly positive, suggesting that the omitted-variable bias poses little threat to our core findings.

5.3.3. Propensity-score matched (PSM) sample

Third, we take advantage of the PSM technique to alleviate endogeneity arising from functional form misspecification. The strength of this approach is to relax the assumption regarding the functional form of variable relations by forming treatment and control groups with similar features (Shipman et al., 2017). Thus, we construct a PSM sample by matching each pair of firms with common auditors (*Auditor* = 1) to a similar pair of firms without common auditors (*Auditor* = 0). Concretely, we run a Probit model, in which *Auditor* is regressed on baseline controls in Eq. (3). Using the propensity score for individual firm-pairs, we carry out one-to-one matching without replacement. This procedure winnows down our pairwise sample to 969,336 observations. To rest assured, we assess the covariate balance in Appendix 4, where we detect significant (insignificant) differences in baseline controls before (after) the PSM procedure.

Table 7 Panel C replicates the baseline analysis using our PSM sample that involves pairwise observations with analogous characteristics. Strikingly, we discern a positive and significant coefficient on *Auditor* in Column (5), reinforcing the view that the impact of *Auditor* holds despite contemplating the bias from functional form misspecification. Taken together, evidence in Table 7 supports that

Table 7
Endogeneity mitigation.

	Panel A: Auditor Mergers as Exogenous Shocks				Panel B: Heckman Two-Stage Regression				Panel C: Using a PSM Sample	
	Using Control Sample 1: *IntConSim* (1)		Using Control Sample 2: *IntConSim* (2)		First-Stage: *Auditor* (3)		Second-Stage: *IntConSim* (4)		*IntConSim* (5)	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Post_Merger	0.004***	5.41	0.007***	8.22						
Auditor							0.022***	15.89	0.027***	5.79
Sum_CPA					0.925***	481.32				
IMR							−0.010***	−13.61		
Controls	Included		Included		Included		Included		Included	
Year FE	Included		Included		Included		Included		Included	
Industry FE	Included		Included		Included		Included		Included	
Firm-Pair FE	Included		Included							
Adjusted R^2	0.263		0.269		0.088		0.238		0.221	
Observations	5,924,488		633,767		8,057,209		8,057,209		969,336	

Note: This table addresses the endogenous relationship between common auditors and internal control similarity. Panel A re-investigates the impact of common auditors based on auditor mergers as an exogenous shock. Panel B runs Heckman's two-stage regression after considering the annual number of CPAs for each audit firm (*Sum_CPA*) as an instrument. Panel C re-estimates the baseline model using a PSM sample. All variables are defined in Appendix 2.***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

common auditors induce similar internal control among clients.

5.4. Auditor style mechanisms

To justify our findings, this subsection probes whether auditor style serves an underlying mechanism. We concentrate on three dimensions, in which auditor style possibly has a role to play.

5.4.1. Signing CPAs

Our first dimension hinges on the signing CPAs, who are primarily responsible for executing auditing standards and making subjective assessments. Although audit firms lay out the same internal working rule, individual auditors have discretion in the audit process due to disparate risk preferences and educational attainment (Chen et al., 2020). Accordingly, engaging CPAs are the solo agent in enforcing auditor style across clients. If these arguments make sense, we predict a stronger common-auditor impact when firm-pairs are audited by the same CPA.

To test the conjecture, we collect the name of signing CPAs for each firm-year. Next, we code an indicator (*SignCPA*) taking the value of one if a firm-pair is certified by the same CPA, and zero otherwise. Eventually, we interact *SignCPA* with *Auditor* in Eq. (3). Two findings emerge after analyzing the regression results in Table 8 Panel A. First, despite controlling for the same-CPA engagement, the significance of common-auditor effects (*Auditor*) prevails. Second, the coefficient on *Auditor*SignCPA* is 0.061 with a t-statistic of 7.18, suggesting that the same CPA magnifies the positive impact of common auditors. Therefore, our evidence demonstrates that common auditors promote internal control similarity by employing the same engaging CPAs.

5.4.2. Industry expertise

Second, we focus on industry expertise that determines the way how audit firms elaborate on their internal working rules. With extensive industry knowledge and effective audit planning (Low, 2004), industry specialist auditors can particularize in-house guidelines for a certain sector. Such detailed working rules ensures strict compliance with auditing procedures, resulting in the manifestation of auditor style. Hence, we expect that common auditors with industry specialization strengthen their impacts on internal control similarity.

The examination of this idea demands a proper proxy for industry specialists. Following Reichelt and Wang (2010), we capture industry expertise by an indicator, *IndSpecial*, which equals one if common auditors belong to the top 5 audit firm based on audit fees in one industry, and zero otherwise.[4] Then we amend Eq. (3) by introducing *Auditor*IndSpecial* and *IndSpecial* and repeat the regression in Table 8 Panel B. Overall, the estimate of interest (*Auditor*IndSpecial*) is positive from the statistical perspective, suggesting that industry expertise facilitates common auditors to detail internal working rules that drive the resemblance of clients' internal control.

5.4.3. Auditor size

In the last regard, auditor style may be tied to audit firm size. As Jiang et al. (2019) articulate, big auditors provide quality services due to overinvestment in human capital. Put differently, big audit firms expend more resources on organizing routine training programs, which help new recruits and existing workers enhance accounting skills. By the same token, on-the-job training aids individual auditors in grasping how to better execute internal working rules. Hence, the auditor style can be applied to different clients, which induces internal control similarity. Along this line of reasoning, we anticipate a more prominent common-auditor impact for big audit firms.

To proceed, we measure auditor size by defining a dummy (*Big10*) equal to one (zero) for the Big 10 (non-Big 10) audit firms. Following Lennox et al. (2016), we identify the Big 10 based on an annual ranking of clients' total assets. Next, we re-estimate the baseline model after including *Auditor*Big10* and *Big10*. In Table 8 Panel C, the positive coefficient for the interaction is highly significant. Collectively, these results indicate that common auditors impel the realization of common-auditor effects by enhancing staffs' professional competence.

5.5. Information sharing mechanisms

As deduced earlier, information sharing is another mechanism to connect common auditors with internal control similarity. To validate this view, we conduct three tests aimed at unravelling the information sharing role of common auditors.

5.5.1. Information uncertainty

Our first examination originates from the presumption that auditors acquire a large amount of private information by implementing audit procedures and socializing with managers (Knechel et al., 2009). This proprietary information delivers more value to the firm with greater information uncertainty (Aobdia, 2015). If common auditors act an information intermediary, we conjecture that the observed impact intensifies for firm-pairs operating in more uncertain environments.

We test this idea by interacting *Auditor* with information uncertainty measures in Eq. (3). To capture information uncertainty, we pull three proxies from earlier work, auditor tenure (Johnson et al., 2002), analyst coverage (Li, 2020), and R&D intensity (Aboody &

[4] To gain a better understanding of industry expertise, Appendix 5 reports the percentage of clients by audit firms in each industry.

Table 8
Auditor style mechanisms.

	Panel A: Signing CPAs		Panel B: Industry Expertise		Panel C: Auditor Size	
	IntConSim (1)		*IntConSim* (2)		*IntConSim* (3)	
	Coef	t-stat	Coef	t-stat	Coef	t-stat
Auditor	0.033***	8.79	0.019***	2.78	0.031***	8.29
*Auditor*SignCPA*	0.061***	7.18				
SignCPA	−0.060***	−7.39				
*Auditor*IndSpecial*			0.019**	2.40		
IndSpecial			−0.012***	−5.68		
*Auditor*Big10*					0.064***	3.09
Big10					−0.011***	−21.07
Controls	Included		Included		Included	
Year FE	Included		Included		Included	
Industry FE	Included		Included		Included	
Adjusted R^2	0.244		0.244		0.244	
Observations	8,057,209		8,057,209		8,057,209	

Note: This table examines whether auditor style explains the association between common auditors and internal control similarity. All variables are defined in Appendix 2.***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Lev, 2000). We next code three dummies: *Tenure* (equals one if firm-pairs are audited by the same accounting firm for more than five years), *Coverage* (equals one if the number of analysts covering firm-pairs is above the sample median), and *R&D* (equals one if firm-pair R&D expenses[5] are below the sample median). A lower value of *Tenure* (*Coverage*, *R&D*) denotes more severe information uncertainty.

We report the results in Table 9 Panel A, where Columns (1), (2), and (3) quantify information uncertainty with *Tenure*, *Coverage*, and *R&D*, respectively. We find that the estimate concerned is negative and significant across all specifications. Economically, common auditors have a greater impact on internal control similarity when information uncertainty for clients worsens. Hence, these findings support the existence of information sharing by common auditors.

5.5.2. Benefits for client firms

Second, we go one step forward to directly examine whether common auditors transmit private information of internal control among clients. As contended previously, common auditors convey successful experiences of one client to the other with internal control deficiency. To put it another way, common auditors are conducive to ameliorating internal control for weak-control clients, whereas such an improvement vanishes for strong-control clients.

To make it testable, we begin to identify the client with weak (strong) internal control using the residual from Eq. (1). For each firm pair (*i* and *j*), we characterize firm *i* as the client with weak/strong internal control when Res_IC_i is smaller/larger than Res_IC_j. We next harness *Res_IC* to measure internal control of weak-control (strong-control) clients, which is denoted by *Res_IC_Weak* (*Res_IC_Strong*). We lastly swap *IntConSim* with *Res_IC_Weak* (*Res_IC_Strong*) in Eq. (3) and perform the regression in Table 9 Panel B. The coefficient on *Auditor* is positive and significant at the 1% level in Column (4), demonstrating that common auditors assist weak-control clients in improving internal control quality. However, the significant effect is absent if extending the same test to strong-control counterparts in Column (5).

To be robust, we further evaluate the impact of common auditors on reporting quality. Specifically, we expect weak-control clients to have higher earnings quality with the help of common auditors. Nonetheless, strong-control clients unbenefit from common auditors. We capture reporting quality by two proxies: the absolute value of discretionary accruals (*AbsDA*) and the standard deviation of abnormal working capital accruals (*SDWCA*). Likewise, we compute these measures for weak-control clients (*AbsDA_Weak*, *SDWCA_Weak*) and strong-control clients (*AbsDA_Strong*, *SDWCA_Strong*). Next, we regress these accruals on *Auditor* and baseline controls separately in Appendix 6. We find negative (no) impact of common auditors on the accruals of weak-control (strong-control) clients. Thus, we render direct evidence favoring that common auditors spur information spillover from strong-control clients to weak-control clients.

5.5.3. Incentives for common auditors

Third, we explore why common auditors have an incentive to transfer information to clients with internal control weakness. As argued before, auditors engage in such activities to retain client firms or charge fee premiums. Despite both explanations can rationalize information sharing behaviors, we expect to generate distinct impact on audit fees. If the former serves a driver, auditors may vie for weak-control clients by reducing audit fees. By contrast, the latter predicts that weak-control firms pay higher fees to auditors in return for valuable information. To ascertain which one is suitable, we probe the relation between common auditors and audit fees.

[5] The impact of missing R&D expenses on our estimation is limited because the number of observations only reduces from 8,057,209 to 7,922,335.

Table 9
Information sharing mechanisms.

	Panel A: Uncertain Environments						Panel B: Benefits for Firms			
	IntConSim (1)		*IntConSim* (2)		*IntConSim* (3)		*Res_IC_Weak* (4)		*Res_IC_Strong* (5)	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Auditor	0.039***	9.26	0.044***	8.32	0.034***	8.44	0.035***	8.86	0.025	0.90
*Auditor*Tenure*	−0.034***	−4.04								
Tenure	0.046***	19.24								
*Auditor*Coverage*			−0.076***	−7.90						
Coverage			0.047***	18.04						
*Auditor*R&D*					−0.015***	−2.65				
R&D					−0.085***	−36.6				
Controls	Included		Included		Included		Included		Included	
Year FE	Included		Included		Included		Included		Included	
Industry FE	Included		Included		Included		Included		Included	
Adjusted R^2	0.244		0.244		0.241		0.067		0.067	
Observations	8,057,209		4,894,444		7,922,335		8,057,209		8,057,209	

Note: This table examines whether information sharing explains the association between common auditors and internal control similarity. All variables are defined in Appendix 2. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

We first use *Res_IC* to isolate weak-control clients from strong-control clients within a firm-pair. Subsequently, we duplicate the main regression, but treat audit fees of weak-control clients (*AuditFee_Weak*) as the dependent variable. The results are reported in Table 10 Panel A. The coefficient of interest is 0.055 with a t-statistic of 3.45, implying that common auditors receive higher fees from weak-control clients. Hence, our results agree with the fee premium explanation.

Given that a misstatement is more likely to occur in weak-control clients, auditors may charge a fee premium to offset higher audit risks. To alleviate this selection bias, we capitalize on the merger setting to revisit the above relationship. Concretely, we re-estimate Eq. (5) in Table 10 Panel B after substituting *IntConSim* with *AuditFee_Weak*. Using control sample 1 in Column (2), we find that the estimate for *Post_Merger* is significantly positive. This inference holds in Column (3), where we adopt control sample 2. Our findings show that common auditors obtain higher fees from a treatment group of weak-control firms relative to a control group of weak-control firms after an exogenous merger.

As a supplementary test, we investigate whether the common-auditor impact varies with the level of audit fees from weak-control clients. We begin to estimate the abnormal audit fee, which is the residual after regressing audit fees on all controls in Eq. (1). We next define an indicator (*HighAuditFee*) taking the value of one if the abnormal audit fee from weak-control firms is above the sample median, and zero otherwise. We finally add *Auditor*HighAuditFee* and *HighAuditFee* to the baseline model. In Table 10 Panel C, the coefficient on the interaction is significantly positive, suggesting that audit fees magnify the common-auditor effect. Collectively, this evidence indicates that charging fee premiums is considered an economic incentive for common auditors to convey information.

Table 10
Information sharing mechanisms: Further analyses.

	Panel A: OLS Analysis		Panel B: DiD Analysis				Panel C: Cross-Sectional Analysis	
	AuditFee_Weak (1)		Using Control Sample 1: *AuditFee_Weak* (2)		Using Control Sample 2: *AuditFee_Weak* (3)		*IntConSim* (4)	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Auditor	0.055***	3.45					0.031***	7.36
Post_Merger			0.005***	4.58	0.004***	5.04		
*Auditor*HighAuditFee*							0.021***	9.47
HighAuditFee							−0.008	−0.94
Controls	Included		Included		Included		Included	
Year FE	Included		Included		Included		Included	
Industry FE	Included		Included		Included		Included	
Firm-Pair FE			Included		Included			
Adjusted R^2	0.450		0.450		0.467		0.244	
Observations	8,057,209		5,924,488		633,767		8,057,209	

Note: This table explores the incentive for information sharing by common auditors. All variables are defined in Appendix 2.***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table 11
Auditor network centrality and financial reporting.

	AbsDA (1)		*SDWCA* (2)		*MAO* (3)		*Violation* (4)		*AuditFee* (5)		*ARL* (6)	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Degree	−0.243***	−5.28	−0.227***	−3.24	−0.104***	−2.58	−0.290***	−3.50	−0.114***	−6.41	−0.414**	−2.52
Size	−0.050***	−3.32	0.045***	19.90	−0.019***	−9.66	−0.018***	−6.85	0.014***	15.27	−0.035***	−2.90
Age	0.093**	2.33	−0.048	−0.79	0.024***	6.85	0.024***	3.30	0.055***	23.14	−0.024	−1.29
AggLoss	0.022***	5.01	0.090***	13.49	0.012***	30.06	0.095***	12.05	0.023***	8.64	0.014**	2.21
Zscore	0.014	0.51	0.021***	5.15	0.011***	4.68	0.010**	2.09	0.016	1.00	−0.008	−1.07
Subsidiary	0.093	0.49	0.018***	6.22	0.035**	2.13	0.014***	4.14	0.036***	3.20	0.062	0.12
Foreign	−0.098***	−2.98	−0.041***	−8.28	−0.062	−0.22	0.041	0.07	0.025	1.28	0.080	0.92
SalGrow	0.039***	11.74	0.076	1.49	0.061**	2.08	0.020	0.33	0.015	0.07	−0.054	−0.60
InvGrow	0.025***	9.20	−0.043	−1.05	0.015	0.64	−0.036	−0.76	−0.010	−0.64	−0.030	−0.42
BrdSize	−0.036***	−4.62	0.079***	6.58	0.030***	4.34	0.018	1.26	−0.068	−1.44	−0.021	−1.00
SuperSize	−0.086	−1.50	0.034***	3.87	0.070	1.39	−0.032***	−3.06	0.013***	3.92	−0.022	−1.41
Committee	0.095	0.91	0.041***	2.58	0.012	1.28	0.077***	4.12	0.032***	5.21	0.012	0.44
Year FE	Included		Included		Included		Included		Included		Included	
Industry FE	Included		Included		Included		Included		Included		Included	
Adjusted R^2	0.021		0.100		0.077		0.016		0.082		0.011	
Observations	16,480		16,596		16,599		16,599		16,599		16,599	

Note: This table examines the impact of auditor network centrality on financial reporting. All variables are defined in Appendix 2.***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

5.6. Impacts of auditor networks

The preceding pairwise analysis dissects how two firms with common auditors relate to their internal control similarity. Given that firms are tied by auditors in a network, their global positions should follow an informal hierarchical order. Generally, firms with a high hierarchy gain faster access to information and thus meet more opportunities and fewer constraints (He, 2022). Echoing this view, we shed light on whether firms' position in an auditor network affects their financial reporting, the key outcome of audit quality.

Among four populous centrality metrics in the sociology literature, we leverage *Degree* centrality to capture a firm's network position. By definition, *Degree* centrality denotes the number of peers with whom a firm has a common-auditor connection. Specifically, we construct the auditor network for each industry-year and then compute *Degree*. We gauge financial reporting by six measures: the absolute value of discretionary accruals (*AbsDA*) following Francis and Michas (2013), the standard deviation of abnormal working capital accruals (*SDWCA*) proposed by McNichols (2002), the modified auditor opinion dummy (*MAO*), the violation dummy (*Violation*), audit fees (*AuditFee*), and audit report lags (*ARL*). After including controls in Eq. (1), we regress reporting quality metrics on *Degree* to disentangle the value implication of auditor networks.

Table 11 summarizes the estimation results. Regardless of proxies for financial reporting, we constantly find a negative and significant coefficient on *Degree*, suggesting that high-centrality firms are less likely to manipulate reported earnings, receive modified audit opinions, commit financial violations, pay hefty audit fees, and face protracted audit report lags. In other words, firms residing more centrally in an auditor network are linked with better financial reporting. From this angle, auditor network centrality serves an important element to evaluate reporting quality.

6. Conclusion

In this study, we examine whether common auditors impact internal control similarity among clients. We find that two firms with common auditors tend to set up a similar internal control system. We also investigate the robustness of this finding by several checks, such as considering other social ties, assessing internal control components, using alternative internal control measures, adopting finer industry classifications, constructing alternative internal control similarity, running auditor switch tests, and tackling the endogeneity problem. Overall, our results imply that common auditors promote the convergence of clients' internal control.

Next, we explore two underlying mechanisms. First, echoing the auditor style mechanism, we show that the same signing CPA, industry expertise, and big audit firms facilitate the consistent enforcement of auditing procedures, thus homogenizing client-pair internal control. Second, the observed impact magnifies given greater information uncertainty. Meanwhile, common auditors help weak-control clients enhance internal control by transferring information. In return, these weak-control clients pay higher audit fees. Combined, this evidence conforms to the information sharing mechanism.

Finally, we ascertain whether a firm's network position affects financial reporting. We reveal that high-centrality firms in an auditor network are associated with smaller abnormal accruals, fewer chances of receiving modified audit opinions, less fraudulent financial activities, lower audit fees, and shorter audit report lags. In other words, auditor network centrality matters to client's reporting quality.

Data availability

Data will be made available on request.

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Appendix 1. Points-Based System for Internal Control Index

Index	Definitions
Internal Environment Sub-Index	The sub-index is constructed based on 22 internal control areas with a range from 0 to 19 points. These internal control areas involve corporate governance, internal control duty, audit committee, internal audit department, human resource policy, corporate culture, corporate social responsibility, and legal compliance.
Risk Assessment Sub-Index	The sub-index is constructed based on 11 internal control areas with a range from 0 to 11 points. These internal control areas cover goal setting, risk identification, risk analysis, risk tracking, and risk response.
Control Activity Sub-Index	The sub-index is constructed based on 18 internal control areas with a range from 0 to 14 points. These internal control areas include crosscheck activity, approval system, accounting control system, asset protection control, budget control, operational control, performance evaluation control, and early warning system.

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Index	Definitions
Information and Communication Sub-Index	The sub-index is constructed based on 10 internal control areas with a range from 0 to 6 points. These internal control areas pertain to internal information and communication, external information and communication, information system application, anti-corruption mechanism, complaint channel, and whistleblower protection.
Internal Monitoring Sub-Index	The sub-index is constructed based on 26 internal control areas with a range from 0 to 16 points. These internal control areas relate to general and specific monitoring system, identification of internal control weakness, disclosure of internal control weakness, remedy of internal control weakness, internal control assessment, internal control report, and internal control audit report.
Internal Control Index	The sum of five sub-indexes with a range from 0 to 66.

Source: http://www.dibdata.cn/

Appendix 2. Variable Definitions

	Definition	Source
IntCon	The log of internal control index plus one	DIB
IntEnv	The log of internal environment sub-index plus one	DIB
RiskAss	The log of risk assessment sub-index plus one	DIB
ContAct	The log of control activity sub-index plus one	DIB
InfCom	The log of information and communication sub-index plus one	DIB
IntMon	The log of internal monitoring sub-index plus one	DIB
Size	The log of market capitalization	CSMAR
Age	The log of the number of years after the IPO	CSMAR
Loss	An indicator taking the value of one if a firm suffers from losses, and zero otherwise	CSMAR
Zscore	The probability of bankruptcy measured by Altman's (1968) Z-score	CSMAR
Subsidiary	The log of the number of subsidiaries	CSMAR
Foreign	An indicator taking the value of one if a firm has foreign transactions, and zero otherwise	CSMAR
SalGrow	The ratio of sales growth	CSMAR
InvGrow	The ratio of inventory growth	CSMAR
BrdSize	The log of the number of directors on the board	CSMAR
SuperSize	The log of the number of supervisors on the supervisory board	CSMAR
Committee	The log of the number of committees set up by the firm	CSMAR
IntConSim	The internal control similarity measured by the negative absolute difference of residuals after performing the regression of internal control	Estimation
IntEnvSim	The internal environment similarity measured by the negative absolute difference of residuals after performing the regression of internal environment	Estimation
RiskAssSim	The risk assessment similarity measured by the negative absolute difference of residuals after performing the regression of risk assessment	Estimation
ContActSim	The control activity similarity measured by the negative absolute difference of residuals after performing the regression of control activity	Estimation
InfComSim	The information and communication similarity measured by the negative absolute difference of residuals after performing the regression of information and communication	Estimation
IntMonSim	The internal monitoring similarity measured by the negative absolute difference of residuals after performing the regression of internal monitoring	Estimation
Auditor	An indicator taking the value of one if firm-pairs share the same audit firm, and zero otherwise	WIND
RetVol	The standard deviation of monthly returns over the past twelve months	CSMAR
ROA	The ratio of return on assets	CSMAR
Cash	The ratio of cash balance over total assets	CSMAR
ARTurn	The ratio of accounts receivable turnover	CSMAR
InvTurn	The ratio of inventory turnover	CSMAR
BrdInd	The percentage of independent directors on the board	CSMAR
SuperInd	The percentage of unpaid supervisors on the supervisory board	CSMAR
CEODuality	An indicator taking the value of one if a CEO serves as the chairperson on the board, and zero otherwise	CSMAR
Manager	An indicator taking the value of one if a firm's manager holds a position in other firms, and zero otherwise	CSMAR
City	An indicator taking the value of one if firm-pairs are located in the same city, and zero otherwise	CSMAR
Analyst	An indicator taking the value of one if firm-pairs are covered by the same analyst, and zero otherwise	CSMAR
IC_Dummy	An indicator taking the value of one if a firm reports internal control weakness, and zero otherwise	CSMAR
S_Switch	A dummy equal to one (zero) for the post-switch (pre-switch) period with (without) common auditors	WIND
D_Switch	A dummy equal to one (zero) for the post-switch (pre-switch) period without (with) common auditors	WIND
Sum_CPA	The log of the annual number of CPAs for each audit firm	CICPA
IMR	The inverse Mills ratio estimated from the Probit regression of *Auditor*	Estimation
SignCPA	An indicator taking the value of one if a firm-pair is certified by the same CPA, and zero otherwise	WIND

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	Definition	Source
IndSpecial	An indicator taking the value of one if common auditors belong to the top 5 audit firm based on audit fees in one industry, and zero otherwise	CSMAR
Big10	An indicator taking the value of one if common auditors are the top 10 audit firm according to the annual ranking of clients' total assets, and zero otherwise	CSMAR
Tenure	An indicator taking the value of one if firm-pairs are audited by the same accounting firm for more than five years, and zero otherwise	CSMAR
Coverage	An indicator taking the value of one if the number of analysts covering firm-pairs is above the sample median, and zero otherwise	CSMAR
R&D	An indicator taking the value of one if firm-pair R&D expenditure is below the sample median, and zero otherwise	CSMAR
Res_IC_Weak	The internal-control residual for the weak-control client within a firm-pair	Estimation
Res_IC_Strong	The internal-control residual for the strong-control client within a firm-pair	Estimation
AbsDA_Weak	The absolute value of discretionary accruals (Francis & Michas, 2013) for the weak-control client within a firm-pair	Estimation
AbsDA_Strong	The absolute value of discretionary accruals (Francis & Michas, 2013) for the strong-control client within a firm-pair	Estimation
SDWCA_Weak	The standard deviation of abnormal working capital accruals (McNichols, 2002) for the weak-control client within a firm-pair	Estimation
SDWCA_Strong	The standard deviation of abnormal working capital accruals (McNichols, 2002) for the strong-control client within a firm-pair	Estimation
AuditFee_Weak	The log of audit fees paid by the weak-control client within a firm-pair	CSMAR
HighAuditFee	An indicator taking the value of one if the abnormal audit fee from weak-control clients is above the sample median, and zero otherwise	Estimation
AbsDA	The absolute value of discretionary accruals (Francis & Michas, 2013)	CSMAR
SDWCA	The standard deviation of abnormal working capital accruals (McNichols, 2002)	CSMAR
MAO	An indicator taking the value of one if the firm receives the modified auditor opinion, and zero otherwise	CSMAR
Violation	An indicator taking the value of one if the firm is caught by CSRC for financial violations, and zero otherwise	CSMAR
AuditFee	The log of audit fees	CSMAR
ARL	The number of days between the financial year-end and the time when the audit report is signed	CSMAR
Degree	The degree centrality measured by the number of firms with whom a company has a common-auditor connection	Estimation

Appendix 3. Additional Analyses on Auditor Mergers

Panel A: Tests for Randomness of the Merger Event

	Mean Equality Test			Median Equality Test		
	Acquiree	Acquirer	t-stat	Acquiree	Acquirer	z-stat
IntCon	3.287	3.428	9.84***	3.466	3.526	8.92***
IC_Res	−0.003	0.005	2.54**	0.040	0.043	4.32***

Panel B: Sample Distribution following the Merger Event

	Post-Merger	
	Common Auditors	Uncommon Auditors
Pre-Merger		
Common Auditors	605,685 (Control Sample 2)	405,019
Uncommon Auditors	28,082 (Treatment Sample)	5,896,406 (Control Sample 1)

Appendix 4. Covariate Balance Before and After PSM

	Pre-PSM			Post-PSM		
	Auditor = 1	*Auditor* = 0	t-stat	*Auditor* = 1	*Auditor* = 0	t-stat
Dif_Size	1.254	1.370	71.71***	1.248	1.246	0.93
Min_Size	21.490	21.449	31.74***	21.488	21.490	1.30
Dif_Age	0.380	0.375	10.32***	0.381	0.381	0.40
Min_Age	2.516	2.516	0.56	2.514	2.514	0.52
Dif_RetVol	0.061	0.060	7.79***	0.061	0.061	0.82
Min_RetVol	0.116	0.116	2.88***	0.116	0.116	0.81
Dif_ROA	0.751	0.503	1.66	0.722	0.507	0.92
Min_ROA	0.007	0.002	17.77***	0.008	0.008	0.67
Dif_Cash	0.121	0.121	4.51***	0.121	0.121	0.02
Min_Cash	0.107	0.105	23.66***	0.107	0.107	0.05
Dif_ARTurn	0.236	0.232	2.58***	0.235	0.232	1.59
Min_ARTurn	0.136	0.124	67.32***	0.136	0.134	1.34
Dif_InvTurn	0.302	0.340	24.96***	0.300	0.301	0.31
Min_InvTurn	0.171	0.163	7.87***	0.171	0.170	1.37
Dif_BrdInd	0.053	0.053	1.63	0.053	0.053	0.53

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	Pre-PSM			Post-PSM		
	Auditor = 1	*Auditor* = 0	t-stat	*Auditor* = 1	*Auditor* = 0	t-stat
Min_BrdInd	0.346	0.345	16.98***	0.346	0.346	1.57
Dif_SuperInd	0.290	0.302	32.51***	0.290	0.291	1.38
Min_SuperInd	0.113	0.126	44.07***	0.112	0.113	1.22
Dif_CEODuality	0.380	0.353	37.98***	0.380	0.381	0.89
Min_CEODuality	0.073	0.059	42.40***	0.070	0.067	0.97

Appendix 5. Client Distribution by Auditor and Industry

	Utilities	Commercials	Industrials	Real Estate	Conglomerates
An Yong Da Hua Accounting Firm	0.08%	0.00%	0.06%	0.12%	0.00%
An Yong Hua Ming Accounting Firm	1.35%	0.79%	1.62%	2.11%	0.36%
Anhui Hua Pu Accounting Firm	0.10%	0.00%	0.15%	0.12%	0.18%
Beijing Jing Du Accounting Firm	0.28%	0.51%	0.13%	0.19%	0.00%
Beijing Da Gong Tian Hua Accounting Firm	0.00%	0.00%	0.01%	0.00%	0.00%
Beijing Tian Yuan Quan Accounting Firm	1.02%	0.51%	0.14%	0.00%	0.00%
Beijing Wu Lian Fang Yuan Accounting Firm	0.08%	0.14%	0.16%	0.25%	0.72%
Beijing Xin Hua Accounting Firm	1.97%	0.22%	1.34%	2.42%	0.00%
Beijing Yong Tuo Accounting Firm	0.59%	0.07%	0.48%	0.00%	0.00%
Beijing Zhong Zheng Tian Tong Accounting Firm	0.31%	0.36%	0.39%	0.31%	0.18%
Bi Ma Wei Hua Zhen Accounting Firm	0.56%	0.51%	0.75%	0.68%	0.00%
Da Hua Accounting Firm	4.17%	5.20%	4.83%	4.16%	3.98%
Da Lian Hua Lian Accounting Firm	0.08%	0.22%	0.03%	0.12%	0.00%
Da Xin Accounting Firm	3.78%	1.52%	3.67%	3.48%	3.07%
De Qin Hua Yong Accounting Firm	1.02%	0.87%	1.28%	3.29%	0.18%
Fujian Hua Xing Accounting Firm	0.43%	2.38%	1.33%	0.81%	0.00%
Fujian Li Xin Min Du Accounting Firm	0.00%	0.14%	0.01%	0.25%	0.00%
Guangdong Da Hua De Lv Accounting Firm	0.15%	0.07%	0.17%	0.43%	0.36%
Guangdong Heng Xin De Lv Accounting Firm	0.05%	0.00%	0.08%	0.06%	0.00%
Guangdong Yang Cheng Accounting Firm	0.00%	0.00%	0.01%	0.00%	0.00%
Guangdong Zheng Zhong Zhu Jiang Accounting Firm	3.02%	0.72%	2.10%	1.55%	1.45%
Guo Fu Hao Hua Accounting Firm	0.56%	0.51%	1.11%	0.87%	3.25%
Hebei Guang Hua Accounting Firm	0.00%	0.00%	0.01%	0.00%	0.00%
Hua Pu Tian Jian Accounting Firm	2.81%	1.08%	2.60%	1.99%	3.44%
Hua Pu Tian Jian Gao Shang Accounting Firm	0.15%	0.14%	0.17%	0.31%	0.18%
Hua Yan Accounting Firm	0.00%	0.00%	0.03%	0.00%	0.00%
Hua Yan Wu Zhou Accounting Firm	0.03%	0.07%	0.05%	0.00%	0.18%
Jiangsu Gong Zheng Accounting Firm	0.03%	0.14%	0.09%	0.06%	0.18%
Jiangsu Gong Zheng Tian Ye Accounting Firm	0.82%	1.52%	1.80%	0.62%	1.81%
Jiangsu Su Ya Jin Cheng Accounting Firm	0.15%	0.94%	0.53%	0.00%	0.36%
Jiangsu Tian Hua Da Peng Accounting Firm	0.00%	0.00%	0.05%	0.00%	0.00%
Jing Du Tian Hua Accounting Firm	1.41%	2.10%	0.65%	0.99%	0.00%
Kai Yuan Xin De Accounting Firm	0.23%	0.65%	0.15%	0.19%	0.72%
Li An Da Accounting Firm	1.35%	0.51%	0.99%	1.43%	1.99%
Li An Da Xin Long Accounting Firm	0.15%	0.14%	0.12%	0.12%	0.18%
Li Xin Accounting Firm	13.88%	12.36%	13.07%	13.11%	11.75%
Li Xin Da Hua Accounting Firm	0.41%	0.22%	0.62%	0.87%	0.72%
Li Xin Yang Cheng Accounting Firm	0.31%	0.58%	0.27%	0.00%	0.00%
Li Xin Zhong Lian Accounting Firm	0.00%	0.00%	0.06%	0.62%	0.00%
Li Xin Zhong Lian Min Du Accounting Firm	0.00%	0.00%	0.03%	0.50%	0.00%
Nanjing Li Xin Yong Hua Accounting Firm	0.05%	0.87%	0.17%	0.50%	0.00%
Nanjing Yong Hua Accounting Firm	0.00%	0.00%	0.01%	0.00%	0.00%
Pu Hua Yong Dao Zhong Tian Accounting Firm	2.86%	3.61%	1.60%	4.47%	0.00%
Rui Hua Accounting Firm	6.08%	4.05%	7.09%	7.27%	12.48%
Shandong He Xin Accounting Firm	0.33%	0.22%	0.81%	0.31%	2.71%
Shang Kuai Accounting Firm	1.66%	2.24%	1.07%	1.37%	0.00%
Shangdong Hui De Accounting Firm	0.31%	0.00%	0.62%	0.19%	1.08%
Shangdong Tian Heng Xin Accounting Firm	0.00%	0.43%	0.19%	0.25%	1.81%
Shangdong Zheng Yuan He Xin Accounting Firm	0.15%	0.65%	0.17%	0.00%	0.00%
Shanghai Dong Hua Accounting Firm	0.13%	0.00%	0.21%	0.00%	0.90%
Shanghai Zhong Hua Hu Yin Accounting Firm	0.56%	1.01%	0.54%	2.24%	0.00%
Shenzhen Da Hua Tian Cheng Accounting Firm	0.05%	0.07%	0.11%	0.43%	0.36%
Shenzhen Nan Fang Min He Accounting Firm	0.41%	0.43%	0.29%	1.12%	0.54%
Shenzhen Peng Cheng Accounting Firm	0.77%	2.17%	1.28%	1.68%	1.27%
Sichuan Hua Xin Accounting Firm	0.79%	0.65%	1.42%	0.75%	0.00%
Sichuan Jun He Accounting Firm	0.15%	0.00%	0.17%	0.19%	0.00%

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	Utilities	Commercials	Industrials	Real Estate	Conglomerates
Tian Heng Accounting Firm	1.43%	3.83%	2.20%	0.62%	0.00%
Tian Hua Zhong Xing Accounting Firm	0.00%	0.07%	0.05%	0.06%	0.00%
Tian Jian Accounting Firm	10.04%	11.20%	10.28%	5.84%	4.70%
Tian Jian Guang Hua Accounting Firm	0.20%	0.36%	0.21%	0.06%	0.36%
Tian Jian Hua Zheng Zhong Zhou Accounting Firm	0.20%	0.36%	0.21%	0.06%	0.36%
Tian Jian Zheng Xin Accounting Firm	1.41%	1.52%	1.23%	0.93%	2.17%
Tian Zhi Guo Ji Accounting Firm	4.04%	1.16%	3.07%	1.74%	1.08%
Wang Long Accounting Firm	0.05%	0.14%	0.16%	0.25%	0.00%
Wu Zhou Song De Lian He Accounting Firm	0.31%	1.30%	0.33%	0.06%	0.90%
Wuhan Zhong Huan Accounting Firm	0.77%	1.88%	0.26%	1.30%	0.72%
Xi Ge Ma Accounting Firm	1.43%	0.79%	0.59%	1.99%	1.63%
Xin Yong Zhong He Accounting Firm	5.24%	5.35%	6.10%	4.78%	3.98%
Ya Tai Accounting Firm	0.28%	0.00%	0.64%	0.25%	0.00%
Zhengjiang Dong Fang Accounting Firm	0.00%	0.07%	0.04%	0.00%	0.00%
Zhengjiang Tian Jian Dong Fang Accounting Firm	0.38%	0.58%	0.29%	0.31%	0.00%
Zhi Tong Accounting Firm	5.32%	5.78%	2.59%	1.93%	3.98%
Zhong He Zheng Xin Accounting Firm	0.03%	0.07%	0.39%	0.12%	0.00%
Zhong Hua Accounting Firm	1.25%	0.94%	1.10%	1.80%	0.54%
Zhong Huan Hai Hua Accounting Firm	1.05%	2.38%	0.58%	1.43%	1.63%
Zhong Hui Accounting Firm	1.48%	0.00%	0.84%	1.43%	0.18%
Zhong Lei Accounting Firm	0.97%	0.65%	0.74%	0.68%	1.27%
Zhong Qin Wan Xin Accounting Firm	0.59%	0.72%	1.32%	0.12%	0.00%
Zhong Rui Yue Hua Accounting Firm	1.79%	2.10%	3.14%	3.29%	2.53%
Zhong Shen Guo Ji Accounting Firm	0.43%	1.01%	0.42%	0.87%	0.90%
Zhong Shen Hua Accounting Firm	0.13%	0.51%	0.26%	0.00%	0.36%
Zhong Shen Hua Yan Wu Zhou Accounting Firm	0.33%	1.01%	0.43%	0.00%	0.18%
Zhong Shen Ya Tai Accounting Firm	0.77%	0.43%	0.85%	1.74%	6.51%
Zhong Shen Zhong Huan Accounting Firm	1.12%	2.38%	1.08%	1.74%	4.16%
Zhong Tian Yun Accounting Firm	0.74%	0.43%	0.68%	0.99%	0.90%
Zhong XI Accounting Firm	0.69%	0.07%	1.10%	1.68%	0.00%
Zhong Xing Cai Guang Hua Accounting Firm	0.31%	0.07%	0.32%	0.62%	0.00%
Zhong Xing Hua Accounting Firm	0.69%	0.29%	0.59%	0.00%	1.99%
Zhong Xing Hua Fu Hua Accounting Firm	0.20%	0.14%	0.08%	0.00%	0.72%
Zhong Zhun Accounting Firm	0.69%	0.79%	0.97%	0.50%	1.81%

Appendix 6. Common Auditors and Reporting Quality

	AbsDA_Weak (1)		*AbsDA_Strong* (2)		*SDWCA_Weak* (3)		*SDWCA_Strong* (4)	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Auditor	−0.013***	−5.00	0.007	1.41	−0.067***	−3.93	0.065	1.37
Controls	Included		Included		Included		Included	
Year FE	Included		Included		Included		Included	
Industry FE	Included		Included		Included		Included	
Adjusted R^2	0.016		0.019		0.503		0.497	
Observations	8,057,209		8,057,209		8,057,209		8,057,209	

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