Small firm PCAOB de-registrations, structural changes, and client effects

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Abstract

The availability of small audit firms to audit small public entities is a global concern. From 2003-2018 approximately 60% of small U.S. audit firms de-registered from the PCAOB. Critics asserted the cost of complying with PCAOB requirements contributed to the shrinkage. We provide initial evidence on the overall effects of de-registration by identifying the determinants of de-registration, the structural changes firms made around the time of de-registration (e.g., provide services other than public company audits, merge, cease operations), and the effects of de-registrations on the prices paid and audit quality received by clients of de-registering firms. We develop a theory of small firm competitive viability and use publicly available data to estimate a logistic regression model of the determinants of de-registration. We find that firms that de-register are more likely to receive negative PCAOB audit quality signals and to be involved in lawsuits; firms that maintain registration have more resources, higher client retention and growth, and a risk-mitigating form of governance. Estimation of a multinomial logit model shows that consistent with efficient sorting, firms receiving the most negative audit quality signals are likely to cease operations while those receiving the least are likely to merge. Former clients of de-registering firms pay higher fees to PCAOB-registered successor firms but do not experience significant changes in audit quality. Our results show that small audit firms consider indicators of competitive viability, including PCAOB quality signals, in determining whether to de-register and how to re-deploy their resources.

Key terms: Small audit firms; PCAOB de-registration; public company audit market; private company audit market; audit firm mergers; audit fees; audit quality; efficient sorting

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"The essence of strategy is choosing what not to do" (Porter 1996, 90).

1.   Introduction

Small public companies (non-accelerated filers) often are audited by small audit firms. Because only firms registered with the Public Company Accounting Oversight Board (PCAOB) can audit public companies, the number of firms available to audit small public companies decreases whenever the number of small audit firm de-registrations exceeds the number of small audit firm registrations. The challenges facing small public companies and their auditors are global as acknowledged by the Canadian Public Accountability Board (CPAB) (2024, 8), by the Financial Reporting Council (FRC) of the United Kingdom (FRC 2025), and by other policymakers. As shown in Figure 1, in the U.S. the number of audit firms de-registering from the PCAOB has exceeded the number of firms registering in every sample year since 2011.[1]

Many observers of the U.S. public company audit market believe the effects of de-registrations on the audit market are significant and adverse. Sue Coffey, AICPA CEO – Public Accounting (Coffey 2024, 1), for example, asserts that exits of small and medium-sized audit firms from the public market will result in client firms experiencing "greater challenges and higher costs in meeting necessary audit requirements to access the U.S. capital markets." Such outcomes would be counter to the U.S. Securities and Exchange Commission (SEC)'s concern for the health and functioning of the capital markets (Aguilar 2014), and to PCAOB board member statements that a

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[1] The annual numbers of de-registrations equaled or exceeded the annual numbers of new registrations in most years subsequent 2003, when public company auditors were first required to register with the PCAOB. A notable exception occurs in2009 when auditors of SEC-registered broker-dealers were required to register with the PCAOB. A small spike in *de-registrations* is visible in 2010 when the PCAOB Form 2/3 disclosure requirement became effective. In 2010 there were 156 de-registrations compared to 45 in the previous year. We defer conclusions about the associations of de-registrations with occurrences of new PCAOB rules and requirements pending estimations of multi-variate models.

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robust and active population of smaller [audit] firms is critical to public companies and to protect investors (e.g., Botic 2024, 1).

Dan Goelzer, an original member of the PCAOB and later its chair, speculates on what may be happening as follows (Cohn 2025, 1): "people say that smaller firms are reconsidering whether they want to be engaged in public company auditing …. If you have only a handful of public company clients, you look at these (PCAOB) penalties and the cost of complying with new auditing standards and regulations, firms may well conclude they'll simply leave this space and concentrate on private company auditing or other kinds of services for clients…" Goelzer's comments suggest that the "penalties and the cost of complying with new auditing standards and regulations" may be related to small firms' decisions to de-register, and that the costs of maintaining registration may be considered by firm leaders when assessing whether continuing to compete in the public company audit market is economically rational. Goelzer's comments also suggest that perhaps the PCAOB's standard-setting and rule-making processes should be modified to make compliance less onerous for small audit firms.[2]

Goelzer's account of why small audit firms have been exiting the PCAOB audit market aligns with Porter's (1979, 1996) theory of competitive viability, which posits that managers periodically reassess the costs and benefits of operating in different lines of business and then redeploy assets from those lines in which management concludes their companies are not competitive. Thinking of audit firm de-registrations from this perspective suggests that insights into the impact of de-registrations on the total audit market can be obtained by examining the structural changes associated with de-registrations. Prior studies of small firm exits from the public

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[2] Although Goezler (quoted in Cohn 2025) speculates on why small audit firms leave the public company audit market, Goezler (2025) argues that merging the PCAOB into the SEC, as recently proposed by the House Financial Services Committee "will jeopardize audit quality and do nothing to reduce the deficit."

company audit market (DeFond and Lennox 2011; Fargher, Jiang, and Yu 2018) do not study these changes. It is important to do so because the effect of de-registration on the public and private company audit markets depends on whether a departing firm merges with another PCAOB-registered firm; continues to exist and provide services other than public company audits; or ceases operations (i.e. disappears from the public record).[3]

The goals of our research are to empirically address three interrelated questions: RQ1: "What are the determinants of small audit firm de-registration decisions?" RQ2: "What structural changes do small audit firms make around the time they de-register?" RQ3: "What are the effects of de-registration on the audit quality received and the audit fees paid by the former public clients of de-registering firms?" Answering these questions will provide evidence useful to the SEC, PCAOB, and other policymakers about the roles that PCAOB penalties, new PCAOB rules and regulations, and other business considerations play in small firms' decisions to de-register.

Figure 2, which is an adaptation of Porter's (1979, 1996) theory of competitive viability in the context of the U.S. audit market, provides the conceptual framework for much of our study. The theory predicts that firms continue in the lines of business in which they are competitive and exit those in which they are not. In the auditing context, a small audit firm's leaders will periodically assess their firm's viability in the various markets it serves. The leaders of a PCAOB registered firm would ask whether the firm is competitively viable in the *public* company audit market. If the leaders conclude that it is viable (Scenario 0 in Figure 2), the firm likely will maintain its registration and will continue auditing public clients. If the leaders conclude the firm is not

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[3] We use publicly available data sources to distinguish between de-registering firms that merge versus ones that continue to provide accounting services as stand-alone entities. However, after searching all publicly available sources, contacting the AICPA, and working with the business librarians at our universities, we were unable to find post-de-registration information for 19 percent of the de-registering firms. We label these firms as having 'disappeared from the public record.'

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viable as a stand-alone entity (Scenario 1), they will assess available alternative strategies that involve de-registration from the PCAOB. We posit that a de-registering small audit firm typically chooses one of three *structural changes* to accompany its de-registration. A firm that audits several public companies and receives few or no negative PCAOB inspection findings but is too small to compete effectively as a stand-alone entity, might seek to merge with another PCAOB registered firm (Scenario 2). The acquired firm would de-register around the time of the merger. A firm of similar or somewhat lower quality, with fewer or a declining number of public clients, might decide to de-register and to provide services other than public company audits. Rather than merging, the firm will *continue* as a stand-alone entity, but any audits will be restricted to *private* company clients (Scenario 3). Alternatively, a firm with fewer or a declining number of public clients, and lower audit quality, might decide to de-register and to cease U.S. operations. Its name would disappear from the public record (Scenario 4).

Previous research (DeFond and Lennox 2011; Bushee and Leuz 2005, respectively) suggests that PCAOB requirements and SEC regulations tend to impose greater cost burdens on small audit firms and that requiring disclosure of previously private information affects firm behavior. Our study contributes to this research by providing evidence on the effects of PCAOB penalties, evidence on previously unstudied audit-related rules and requirements (PCAOB Form 2/3, PCAOB Form AP, required registration of broker-dealer auditors), evidence on audit firm characteristics that should impact competitive viability, and therefore affect the likelihood of small audit firm de-registrations.

We collect information on small U.S. audit firms' registrations and de-registrations, and on PCAOB penalties and inspection findings, from the PCAOB website, for the sample period of 2003-2018. The sample we use in our initial multivariate analysis spans a subset of these years and

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differs from those of earlier studies (e.g, DeFond and Lennox 2011; Fargher et al. 2018), because it includes only firms that registered and de-registered during the sample period and were inspected by the PCAOB at least once.[4] Because our model specifications require small audit firms (inspected triennially) to have at least one inspection report in the three years from year t-2 to year t, our final sample in the determinant analysis drops those audit firms without any inspection report in year t-2 to year t and thus starts in 2006. This ensures that all the firms we study experienced the benefits of PCAOB registration (e, g., being paid to audit a public company) as well as the costs of maintaining registration (e.g., filing required reports, maintaining staff who are competent to conduct audits following PCAOB standards, and being inspected by the PCAOB). Our sample period ends in 2018 to enable investigation of structural changes in a post de-registration period that ends prior to the on-set of COVID-19 in the U.S.

Our initial sample of auditor years and unique audit firms comes from the audit opinion file of the Audit Analytics database. Elimination of non-U.S. firms, annually inspected firms, triennially inspected firms not inspected during our test period, and firms with missing data results in a final sample of 1,208 firm-reporting years related to de-registering firms and 2,248 firm-reporting years related to firms still registered at the end of 2018. As explained below, we use a variety of publicly available resources to identify the structural changes made by de-registering firms.

We use logistic regression to identify the variables associated with audit firms' de-registrations. Consistent with the expectation that de-registrations are associated with structural

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[4] Past PCAOB Chair Erica Williams' (2024) observation that over the years there have been too many instances of firms touting their PCAOB registration as a 'seal of approval' suggests that some firms may maintain registration because of the perceived positive reputational effect. We increase the likelihood that at the time of registration, partners in our sample firms made informed viability decisions, by requiring each firm to have had at least one public client and to have been inspected at least once during the test period.

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changes, we use multinomial logistic regression to test whether these variables can be used to explain the structural changes made by de-registering firms. As shown in Figure 3, our models include proxies for issuance of PCAOB penalties and for the initiation of new rules and requirements affecting audit firms *as well as* proxies for other firm viability constructs that audit firm leaders likely would consider *even absent* PCAOB penalties *and* new PCAOB rules and standards (e.g., ability to retain and grow the public audit business, audit firm size, liability risk, adoption of a risk mitigating form of business organization),

Our research is relevant to the SEC, the PCAOB, and small audit firms. It contributes to audit research in several ways. It begins by providing context for understanding PCAOB Board members' (Botic 2024; Ho 2025) concern for maintaining a robust and active population of smaller audit firms by documenting the annual numbers of small firms registering and de-registering with the PCAOB during the period 2003-2018.

Our logit regression results show no significant evidence that the PCAOB's enactments of new requirements and rules are associated with the likelihood of de-registration. We interpret our results as suggesting these disclosure requirements did not impose incremental costs significant enough to incentivize small audit firms with public clients to de-register. The signs of association of de-registration with proxies for PCAOB inspection findings and with PCAOB penalties suggest that PCAOB regulatory scrutiny can incentivize lower quality and less competitive audit firms to focus their resources elsewhere. Further support for this conclusion is provided when the model is re-estimated excluding merging firms from the sample. The signs of the business consideration variables are consistent with de-registering firms being less competitively viable than continuing small firms (more clients going private, negative changes in the numbers of public company

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clients, relatively smaller firm sizes, involved in more lawsuits, and employing forms of business organization that do not mitigate liability risk).

Our multinomial logit models provide some evidence of efficient sorting in managers' choices among structural changes (Kuminoff, Smith, and Timmins 2010). De-registering firms that are the most competitively viable merge; those that are less viable in the public market continue to provide services other than public company audits; and the names of those with the lowest audit quality disappear from the public record. In our consequences analyses, we find that public clients paid lower audit fees to de-registering firms than they pay to their PCAOB-registered successor firms without deterioration in audit quality. More importantly, we document that de-registering firms that merge into other registered audit firms provide higher quality audits and obtain higher fees, prior to de-registration, compared to other types of de-registering firms.

The remainder of the paper is organized as follows. We devote a separate section to each of the three research questions previously stated. Section 2 addresses RQ1. Section 3 addresses RQ2. Section 4 addresses RQ3. Each section contains discussion of the research question including related theory; brief coverage of the most relevant prior or concurrent studies; specification of the empirical model including explanatory constructs and variables, and a report of the results and their implications. Section 5 concludes the study with a discussion of key *take-aways* from the results presented in Sections 2, 3 and 4.

2. In-depth analysis of Research Question 1: What are the determinants of small audit firms' de-registration decisions?

We characterize the decision of a small audit firm to de-register from the SEC rather than continue its status quo as the culmination of firm leaders' assessment of the firm's ability to compete in the public company audit market as a stand-alone entity. This section organizes our ideas for PCAOB-

related events and audit firm characteristics into five constructs that we posit influence a small audit firm's decision to de-register rather than continue as a stand-alone entity in the public company audit market (RQ1). We identify proxy variables for each construct. Most explanatory variables used to investigate RQ1 also are used to test RQ2. Figure 3 presents the explanatory constructs and their empirical proxies. Variables used in various models are listed and defined in Appendix A.

2.1 New PCAOB rules and requirements

   Previous studies (Read, Rama and Raghunandan 2004; DeFond and Lennox 2011; Fargher et al. 2018) provide evidence that requiring auditors to comply with the requirements of PCAOB Form 1, Application for Registration, is associated with firm exits from the public market.[5] Complying with these PCAOB requirements may have disproportionately increased small audit firm costs relative to incremental revenues (DeFond and Lennox 2011) and prompted small firms to re-evaluate their viability in that market. We propose that *subsequent* new PCAOB disclosure initiatives (i.e., Forms 2&3 and Form AP)[6] likewise may have motivated leaders of small audit firms to reassess the costs and benefits of remaining in the public audit market. The same is true of the rule requiring auditors of SEC-registered broker-dealers (BDs) to follow PCAOB standards. These rules were enacted during the latter part of our sample period, i.e., 2006-2018; their effects on de-registrations have not previously been studied. We specify three years in which the PCAOB initiated major new requirements for auditors of public clients and/or BDs. The years in which the new requirements became effective are captured by dichotomous variables *FORM_2&3* (2010);

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[5] The referenced studies include sample audit firms that did not register with the PCAOB before exiting the public company market.
[6] Form 2 requires PCAOB registered firms to file annual reports disclosing affiliations with other audit firms, audit clients, fees billed to issuer audit clients and other previously private information. Form 3 requires disclosure of firms and/or key persons involved in disciplinary proceedings. Form AP requires disclosure of the name of engagement partner signing the audit report and other accounting firms that participated in the audit.

BD_REG (2014); and *FORM_AP* (2017). Based on prior research cited above, the estimated coefficients of these variables should be positive (if significant) when explaining small firm de-registrations.

2.2 PCAOB low audit quality signals

The PCAOB protects investors by ensuring public company audits are consistently of high quality and reliable. Small audit firms that provide low audit quality to public clients are subject to various PCAOB actions that may harm their reputations and result in monetary penalties. Small audit firms that offer low audit quality, and for which increases in audit quality would be costly to obtain in relation to any revenue gains, are less viable competitors in the public company audit market. We expect small audit firms therefore are more likely to de-register if they offer lower quality audit services.[7]

A variety of indicators of low audit quality are employed in the literature, such as the absolute value of discretionary accruals or clients' ability to meet-or-beat analysts' earnings forecasts. Both of these and other frequently used audit quality proxies are subject to the criticism that they proxy for constructs other than audit quality (DeFond and Zhang 2014). We mitigate such problems by employing test variables that are closely tied to audit firms' adherence to professional auditing standards, that are less likely to reflect client reporting problems *per se*, and that are costly. Our proxies for low audit quality include the number of disciplinary orders the audit firm or its members received in the preceding three years (*PENALTIES*), and the average number of engagement weaknesses disclosed by PCAOB inspection reports for the firm in the three prior

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[7] Although it is difficult to envision a scenario in which there exists widespread demand for low-quality audits, Francis (2011) acknowledges there is a demand for differential audit quality. Evidence of demand for low-quality audits by firms with low financial reporting quality and/or weak internal controls is provided by Eutsler, Holderness, and Jones (2020) and by Carlisle, Yu, and Church (2022). These studies prompt us to caution that although our study provides evidence that de-registering firms providing the lowest quality audits are the most likely to disappear from the public record, our results should not be interpreted as suggesting PCAOB regulation causes all low-quality audit firms to exit the public company audit market.

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years (*PCAOB_WEAK*). Inspection findings for triennially inspected firms are associated with lower quality when deficiencies are serious (Gunny and Zhang 2013). We believe that use of PCAOB-related audit quality measures is particularly appropriate in a study of determinants of audit firm de-registrations from the PCAOB.

2.3 Public client retention and growth

The benefits of PCAOB registration largely derive from the opportunity to audit public clients. These benefits are realized only if a small audit firm is able to retain or increase its public client base. Hence, increases in the number of public clients audited could be major reasons why a firm would continue to compete in the public company audit market. Conceptually, the ability to retain and gain public clients results from the entire range of an audit firm's characteristics. It also results from the characteristics of the alternative small audit firms from which clients are willing and able to choose. The available alternatives considered can differ for each client, making it infeasible for researchers to control fully for such alternatives. However, the *results* of client evaluations of alternative providers are observable. The relevant results are increases or decreases in public clients, a reflection of the firm's ability to retain or grow its existing market share.

One proxy for this construct is the proportion of the firm's public clients that de-register with the SEC (*PROP_CLIENT_DEREG*) which captures one cause of public client loss. This audit-firm-specific metric captures an exogenous decrease in demand for the firm's services and is a reverse proxy for client retention. Another proxy is the net year-to-year change in the number of the firm's public clients, (*CHG_PUBCLIENTS)*. A positive value for the latter variable captures a firm's gains in clients for whatever reasons. We expect the first variable to be positively associated with de-registration as firms with more client losses are also more likely to exit the

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public audit market. We expect the second to be negatively associated as firms with more increases (smaller decreases) in number of public clients are less likely to de-register.[8]

2.4 Audit firm size

Among small audit firms, relatively larger ones arguably are better able to afford the fixed cost components of remaining registered with the PCAOB. Such firms are likely to have more skilled personnel and diverse geographic locations, better enabling them to respond to market threats and challenges. Further, among small public audit firms, larger ones likely benefit from a competitive advantage.[9]

We employ a firm size measure that equals the natural log of the average number of public company audits performed by an audit firm in the past three years (*LN_AUDITOR_SIZE*). This variable arguably also is positively correlated with the extent of audit firms' expertise in auditing public clients (SEC expertise). We employ an additional accounting firm characteristic proxying for other size-related resources: the natural log of the number of audit offices (*LN_NUM_AUDITOR_OFFICE*). This number is obtained from the PCAOB inspection report closest to the current auditor-year. The number of offices captures geographic diversity, which better enables a firm to meet setbacks and challenges, and to take advantage of opportunities. The number of firm offices also likely is associated with total firm revenues, and therefore proxies for revenues from other service lines that are not captured with *LN_AUDITOR_SIZE*, which is based only on audits of public clients.[10] A third proxy consists of the natural log of a firm's number of

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[8] Variable *CHG_PUBCLIENTS* can be negatively associated with de-registrations as firms experiencing small decreases in the number of public clients are less likely to de-register than firms experiencing large decreases in the number of public clients.

[9] Covarrubias, Guiterrez, and Philippon (2019) discuss size-related reasons why it is difficult for small firms to compete in established markets, and Ghosh and Lustgarten (2006) discuss the intense rivalry and price competition among small audit firms.

[10] We searched publicly available data on websites of the AICPA, *Accounting Today*, and *Inside Public Accounting* but were unable to find data on firm revenue for firms smaller than the Top 100. Lack of publicly available data is one reason few studies address questions related to small audit firms (Carrera and Trombetta, 2018).

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broker-dealer clients (*LN_AUDITOR_SIZE_BD*).[11] Broker-dealers are required to obtain audits from PCAOB-registered auditors. These clients should provide small auditors with benefits of size somewhat similar to benefits provided by public company clients. For firms with a given number of public clients, those having more BD clients are less likely to de-register because registration is required to audit BD clients. Therefore, we expect all three size proxies to be negatively associated with the de-registration decision.

2.5 Litigation risk and risk mitigation

Our fifth construct is audit firm *liability risk* and risk mitigation. Firms that face adverse risk-reward tradeoffs in markets are likely to exit those markets if they have better alternatives. Auditors subject to more lawsuits should be more at hazard and more likely to de-register and to exit the public audit market. Audit firm risk mitigation via organizational form should reduce hazard.

We employ the number of auditor lawsuits the auditor has been involved in during the past three years (*AUDITOR_LAWSUITS*) as a proxy for litigation risk.[12] This variable should be positively associated with de-registrations. An audit firm's governance structure determines who is involved in decision-making, what factors are given greatest weight, and how resource allocation decisions are made. For accounting and other professional service firms, governance structure also can mitigate the liability risk of individual partners. Proxies for audit firm governance structure include dichotomous variables indicating whether the firm is a limited liability partnership (*AUDITOR_LLP*) or is a corporation or company (*AUDITOR_CORP*). The contrast group consists

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[11] Our sample includes firms that audit public company clients and BDs. It does not include firms that audit only BDs.
[12] Lennox and Li (2020) provide evidence that the likelihood of litigation is related to the size of the firm and the type of its accounting deficiencies. Christensen, Lundstrom, and Newton (2021, 191) find PCAOB inspection reports are associated with the initiation of lawsuits but only "once events such as restatement announcements or bankruptcies create the potential for legal action against the auditor."

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of audit firms that are not organized as LLPs or corporations, such as firms that are sole proprietorships. We expect both risk-mitigating variables to be negatively associated with de-registrations.

2.6 Sample derivation

Table 1 derives the samples used to address RQ1 and RQ2. RQ1 is investigated using data measured in *audit firm-years*. RQ2 is investigated using a sample of unique audit firms that de-registered. Table 1 thus reports numbers of *audit firm-years*. (left-most column) and of unique audit firms (right-most column). The sample period begins in 2003, the year PCAOB registration was first required. The selection process begins with 10,031 registered audit firm-years in 2003 identified from the Audit Analytics Audit Opinion dataset. Because the focus is on small U.S. audit firms, we remove 3,044 non-U.S. audit firm-years and 189 firm-years for U.S. audit firms that were annually inspected during our sample period.[13] We delete 249 firm-years because the firms' de-registrations were pending or occurred in 2019 when we collected the data. Because our test variables include PCAOB inspection findings and penalties, we delete 2,898 audit firm-years for which no inspection report was issued in the three years prior to de-registration. These deleted observations occurred almost entirely in 2003-2005 for audit firms that had not yet been inspected. As a result, audit firm-years available for use in our determinant model (1) are for years 2006-2018. After deletion of 117 additional audit firm-year observations for which data are lacking, and six auditor-year observations discussed in the note below Table 1, the available sample consists of 3,528 audit firm-years used in examining RQ1. These data cover 1,280 firm-years for 295 audit firms that deregistered by the end of the sample period, and 2,248 firm-years for 285 audit firms

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[13] Based on information collected from the PCAOB website, the following audit firms were once or have been annually inspected during 2003 to 2018: Deloitte & Touche LLP, Ernst & Young LLP, Grant Thornton LLP, KPMG LLP, BDO USA, LLP, MaloneBailey LLP, PricewaterhouseCoopers LLP, ParenteBeard LLC, Marcum LLP, RSM US LLP, Cohen & Company Ltd, and Crowe LLP.

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that remain registered at the end of the sample period. The 295 unique audit firms that de-registered are used to examine RQ2. The number of auditor-years for continuing firms is greater than that for de-registered firms because continuing firms exist for more years.

2.7 The RQ1 logit model

Our empirical logistic regression model is as follows. Audit firm and year subscripts are suppressed for simplicity:

$$DEREG\_YR = b_1 + b_2\,PCAOB\_PENALTIES + b_3\,PCAOB\_WEAK + b_4\,FORM\_2\&3$$
$$+ b_5\,BD\_REG + b_6\,FORM\_AP + b_7\,PROP\_CLIENT\_DEREG + b_8$$
$$CHG\_PUBCLIENTS + b_9\,LN\_AUDITOR\_SIZE + b_{10}\,LN\_AUDITOR\_SIZE\_BD$$
$$+ b_{11}\,LN\_NUM\_AUDITOR\_OFFICE + b_{12}\,AUDITOR\_LAWSUITS$$
$$+ b_{13}\,AUDITOR\_CORP + b_{14}\,AUDITOR\_LLP + \text{error term.} \qquad (1)$$

DEREG_YR is coded as one for the last year that a small audit firm audits a public client before its de-registration. It is coded as zero for prior years of the de-registering firm, and for all years of non-de-registering firms.[14] The explanatory variables were introduced in a prior subsection and are defined in the Appendix.

Descriptive statistics in the right-most column of Table 2, Panel A show that for twelve of the sixteen comparisons, the mean values of explanatory variables differ significantly between *DEREG* and non-*DEREG* years in the directions predicted in previous sub-sections. Compared to non-*DEREG* years, audit firms in *DEREG* years are characterized by lower audit quality proxied by more PCAOB penalties and inspection weaknesses (*PCAOB_PENALTIES*, *PCAOB_WEAK*). However, except for *BD_REG (2014)* which is only marginally significant, we do not observe a higher proportion of *DEREGS* than non-*DEREGS* in years in which new PCAOB requirements

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[14] We do not employ annual fixed effects because we wish to contrast three specific individual years (*FORM_2&3*, etc.) against each other and all other years. When we estimate model (1) using annual fixed effects, none of the coefficients of the annual fixed effects is individually significant.

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became effective. As expected, *DEREG* year auditors have greater proportions of public clients that de-registered with the SEC (*PROP_CLIENT_DEREG*) and experience greater preceding decreases in number of public clients (*CHG_PUBCLIENTS*). *DEREG* year auditors are characterized by smaller numbers of public clients and fewer offices (e.g., *LN_AUDITOR_SIZE*, *LN_AUDITOR_SIZE_BD*, and *LN_NUM_AUDITOR_OFFICE*). *DEREG* year auditors are less likely to enjoy liability protection offered by the LLP organizational form. Two exceptions to expected directional differences are the insignificant differences in the means for *AUDITOR_LAWSUITS* and for *AUDITOR_CORP*. In summary, directional differences in means of explanatory variables are largely consistent with our expectations.

To summarize, evidence from variable means and untabulated correlations suggests that firms are more likely to de-register if they have lower audit quality, have fewer public audit clients, and have difficulty retaining and attracting public clients. The evidence supporting a positive correlation between firm litigation risk and the likelihood of de-registration is weak, as two out of three relevant means and correlations are not significant.[15] However, we suspend judgment regarding how those factors affect firm de-registration pending estimation results for multivariate models.

2.8 Multivariate results for RQ1

Estimation results for model (1) are presented in Table 2 Panel B. We estimate model (1) using two subsamples. The left-most result columns report results when the model is estimated using all available sample firms. The right-most columns provide results from estimating the

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[15] Means of variables *AUDITOR_LAWSUITS* and *AUDITOR_CORP* do not differ significantly between *DEREG_YR* = 0 and *DEREG_YR* = 1 subsamples. Likewise, neither explanatory variable is significantly correlated with *DEREG_YR*. Only the mean and correlation evidence for *AUDITOR_LLP* suggests that a risk-mitigating legal form is negatively associated with de-registrations.

model excluding firms that merged.[16] We provide separate results because firms that receive invitations to merge are described by audit practitioners as being of higher quality (Sinkin and Putney 2017), suggesting that determinants of de-registrations associated with mergers could differ from determinants of de-registrations in conjunction with other structural change types. Firms that merge do not fully exit the public audit market. Such firms cease operations as stand-alone suppliers of audits to public companies. However, the former partners of the merged firm often become partners in the surviving firm, and some might even continue to be in charge of auditing their former (pre-merger) public clients. Furthermore, small audit firms that merge are likely to compare favorably in size and audit quality to small firms that make other structural changes.[17] We expect model (1) variables will have greater explanatory power for other de-registrations if mergers are excluded from the estimation sample.

When model (1) is estimated using the full sample (left-most result columns), the area under the Receiver Operating Curve (ROC) is 0.785, suggesting the model has good explanatory power and ability to correctly classify which sample firm-years are exit years. When model (1) is estimated using a sub-sample that does not include de-registrations associated with mergers (right-most results columns), the Receiver Operating Curve (ROC) value is 0.864. We next discuss variable coefficient signs and significance levels that are similar for both sets of results in Panel B of Table 2, and we note any differences in coefficient signs and significance levels between the two sets of results.

The model's evidence in Panel B of Table 2 regarding the construct *PCAOB low audit quality signals* is quite clear. The coefficients of both the number of PCAOB disciplinary orders

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[16] For small firms that merge, we remove all observations, both pre- and post-merger.
[17] Further discussion of the differences between firms that merge and those that continue to provide services to non-public clients or cease operations is provided in a subsequent section.

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the firm received, *PCAOB_PENALTIES*, and the number of engagement weaknesses disclosed by PCAOB inspection reports, *PCAOB_WEAK*, are positive and highly significant in both regressions. Small audit firms are more likely to de-register if the PCAOB identifies them as lower-quality providers. These two variables capture the views of PCAOB staff regarding an audit firm's adherence to accepted auditing standards and are unlikely to represent clients' financial reporting quality. Nor should they represent other aspects of audit firms that are controlled for in the model.

The model's evidence regarding the construct *New PCAOB rules and standards* is mixed. As noted previously, the model is estimated using data for 2006-2018. During this sample period, *FORM_2&3* (2010) and *FORM_AP* (2017) require registered audit firms to increase their disclosures to the PCAOB and, in turn, to the public.[18] A third rule, *BD_REG* (2014), requires auditors of broker-dealers to perform audits in accordance with PCAOB standards. In the two sets of results presented in Table 2 Panel B, these variables have a total of six coefficients. Only one of the six coefficients of PCAOB regulatory initiatives is significant. See the coefficient for *FORM_AP* (2017) in the right-most results columns. That coefficient (with marginal significance) indicates that in the year when the PCAOB issued new Form AP disclosure requirements (2017), de-registrations were *less* likely than usual. This evidence is contrary to our expectation but is consistent with the univariate evidence in Figure 1.[19] The result is only observed if merging firms are excluded from the estimation sample. Overall, the results for the three major changes to PCAOB rules and requirements suggest that the costs to small audit firms of complying with new PCAOB rules and standards enacted during our sample period have not been great enough to sway the de-registration decisions of firms *with public company clients and SEC-registered broker-*

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[18] These disclosures are publicly available in the Firm Summary of each registered firm https://pcaobus.org/oversight/registration/registered-firms or https://pcaobus.org/resources/auditorsearch.

[19] Specifically, in 2016, we have about 133 de-registrations but in 2017 we only have about 103 de-registrations.

dealer clients.[20] Alternatively, and less likely in our view, owners of small audit firms perceive benefits from the new rules that roughly equal the costs.

We emphasize that our *New PCAOB rules and requirements* results differ from previous studies whose authors conclude that new PCAOB rules motivated many small audit firms to exit the public audit market.[21] Because the sample periods of prior studies begin before PCAOB registration was required, their samples include audit firms that never registered with the PCAOB prior to exiting the public audit market. In contrast, all our sample firms were registered with the PCAOB and experienced the cost of maintaining registration. Comment letters archived with Docket No. 019 (*Form_2 & 3*), Docket No. 029 (*Form_AP*), and Docket 032 (*BD_Reg*) assert the costs of compliance would exceed the benefits and prompt firms to leave the public company market. However, the magnitude of the expected negative effect detailed in these letters is far less than those submitted prior to the enactment of SOX (SEC S7-40-02). Given the difference in client and auditor expectations expressed in comment letters, it is not surprising that PCAOB requirements enacted during our sample period resulted in fewer exits than the initial implementations of SOX provisions studied in prior literature.

The model's first non-PCAOB-related audit firm viability construct is client retention and growth. The model's evidence with respect to that construct is quite strong. The estimated coefficients of both proxy variables are highly significant with the expected signs. The proportion

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[20] This does not mean that small audit firms do not consider the costs of participating in the PCAOB-regulated public audit market when making de-registration decisions. It only means that new PCAOB requirements do not appear to have motivated surges in de-registration of firms *with public clients*, as the benefits of registration may outweigh the costs. We do not observe de-registration spikes for audit firms *with public clients*, but we do observe (un-tabulated) spikes for firms *without public clients* around some PCAOB initiatives. Costs of new requirements, such as PCAOB annual reporting requirements (Form 2), may motivate owners of some small public audit firms to re-assess their firms' registration benefits versus costs.

[21] Unlike this paper, DeFond and Lennox did not test the effects of new PCAOB requirements using a multivariate model. They conclude that PCAOB disclosures and inspections incentivize audit firm exits, based on the coefficient of *PCAOB_WEAK*, and the number of exits around implementation of SOX. We also find that *PCAOB_WEAK* has a significant coefficient. So, to some extent, we do not provide conflicting results due to differences in test procedures.

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of a firm's public clients that de-register with the SEC, *PROP_CLIENT_DEREG,* has a positive and highly significant coefficient. Loss of public clients due to those clients' de-registrations with the SEC is associated with subsequent de-registration of the clients' auditor. This factor motivating audit firm de-registration is beyond the audit firm's control. Another proxy variable that we employ is the net year-to-year change in the number of a small audit firm's public clients, *CHG_PUBCLIENTS.* This variable captures a firm's recent losses or gains in public clients. The variable's coefficient is negative and highly significant, indicating that small audit firms able to gain public clients (or that lose fewer net clients) are less likely to de-register.

Results for the construct *Audit firm size* are consistent and not surprising. The coefficients of all three proxies for audit firm size have highly significant and negative coefficients, suggesting that the larger the size of the small audit firm, the lower is the likelihood of de-registration.

The results for our final construct, *Litigation risk and risk mitigation*, also are strong and consistent. The estimated coefficients for *AUDITOR_LAWSUITS* are positive and highly significant. We find that two possible risk mitigation measures, audit firm adoption of LLP and corporate organizational forms (*AUDITOR_LLP* and *AUDITOR_CORP*) are negatively associated with de-registrations.

Overall, the results reported in Table 2 Panel B provide strong evidence that receipt of *PCAOB low audit quality signals* increases the likelihood of de-registration and that during our sample period the enactment of *new PCAOB rules* and requirements is not associated with increases in de-registrations. It appears the PCAOB's effect on small audit firm de-registration occurs through its monitoring of audit quality. Panel B also provides clear evidence regarding the importance of three non-PCAOB-related audit firm viability constructs in relation to small audit

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firms' de-registration decisions (*client retention and growth*, *audit firm size*, *litigation risk and risk mitigation*).

The section that follows provides the first academic documentation of structural changes made by firms that de-register. The section also states research expectations, provides evidence relevant to addressing these expectations, and discusses the implications for the overall audit market.

3. In-depth analysis of Research Question 2: What structural changes do small audit firms make around the time they de-register?

Small firms' structural changes that occur around the time of de-registration provide an opportunity to study the choices made by firms that voluntarily withdraw from a major line of business, i.e. public company audits. This topic, which is the subject of RQ2, has not previously been studied,[22] but is important from a "total audit market" perspective. The "total audit market" consists of the public audit market served by PCAOB registered firms, plus the private audit market which can be served by either registered or non-registered audit firms. As can be calculated from the untabulated data supporting Figure 1, an average of 99 firms de-register each year from 2006 to 2018 and no longer are stand-alone providers of public company audits. This phenomenon has very different implications for the private market if exiting firms continue to offer audits to private firms rather than ceasing operations. The differing structural changes of de-registering firms also potentially affect the markets for non-audit services that small un-registered accounting firms can offer.

3.1 Identification of de-registering firms' structural changes

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[22] Prior and concurrent research has investigated professional service firm mergers (e.g., Empson 2000; Sullivan 2002; Wootoon, Walk, and Normand 2003; Baskerville and Hay 2006; Sinkin and Putney 2017; Christensen, Smith, Wang, and Williams 2023; Kitto 2021; He, Kothari, Xiao, and Zuo 2022). However, those studies have not considered mergers in the context of de-registrations.

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Lack of accessible and reliable data is one reason there are few studies of small audit firms (Carrera and Trombetta 2018). We access a variety of sources to identify the structural changes of de-registering firms. We begin with each firm's summary page on the website of Audit Analytics, which indicates whether a firm merged or changed its name. We check these findings against those of an on-line search for accounting firm mergers. For firms that did not merge, we check for a firm website reported on Audit Analytics or accessible by on-line search. If we find no website, we check whether Google Map directions show the location of the firm. If the firm no longer exists, Google Map indicates the firm no longer exists or the location is permanently closed. We search for the remaining firms using the website opencorporates.com, an open database for companies registered in each state.

These sources provide information for the 295 de-registered small sample firms employed to estimate results reported in Table 2. Table 3 reports our findings on structural changes. It shows that 40 percent of the de-registering firms *merge*, 41 percent *continue* as stand-alone entities, and only 19 percent appear to *cease* operations as indicated by their firm name disappearing from the public record. The next section develops expectations for the relationship between structural changes and our competitive viability proxies.

3.2 Competitive viability and the structural changes *of de-registering firms*

Our expectations of firms' structural changes follow from the assumption that audit firm leaders make choices that do not waste valuable resources. The most important resources of professional service firms are the value of their existing customers and the likelihood that those customers will be retained by the acquiring firm (Binder 2017). A firm's reputation likewise is

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valuable, as are the continuing services of key staff members.[23] We expect that these resources will be directed to their best use among the three observed structural changes.

3.2.1 Merge (40 percent of sample)

Small public audit firms that merge with PCAOB registered firms must enable the combined (merged) entities to compete and survive in the public audit market. A small audit firm that is competitive on dimensions other than scale therefore might find that merging with another PCAOB-regulated firm is a sensible strategy. Such mergers would increase the scale of the *acquiring* audit firm and potentially enhance its ability to compete successfully in the public company audit market. As noted previously, Table 2 Panel B results indicate that small firms that continue in the public audit market are characterized by higher audit quality, ability to retain and grow clients, greater size and size-related resources, and lower liability risk. Maintaining these characteristics after a merger requires that acquired firms have acceptably high audit quality, proxied by low numbers of PCAOB penalties and PCAOB-assessed weaknesses. Such firms likely will have reputations for quality that are similar to those of the acquiring firms, and many of the merged firms' public clients may be retained.[24]

3.2.2 Continue as a stand-alone entity providing services other than public company audits (41 percent of sample)

In relation to resource requirements, we expect this outcome will constitute a "middle ground" between mergers and ceasing operations. Small audit firms that de-register and then

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[23] Binder (2017) bases these generalizations on a study of the acquisitions of 18 accounting and law firms in the U.S., U.K., and Australia. The acquisitions occurred in 2000-2016 and were made by public companies that subsequently reported the terms in their financial statements.

[24] Evidence provided in Doidge, Karolyi, Shen and Stulz (2025) suggests that the size and complexity of SEC-registered companies are increasing. Hence, audit firm mergers could benefit the public company audit market because although they *reduce the number* of small stand-alone audit firms in the public audit market, they *increase the resources* of the acquiring audit firms available to audit small public companies. We view mergers as "quasi-exits" because they do not shrink the public company audit market in the same way as structural changes that involve complete exits.

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continue to exist as stand-alone entities must possess sufficient resources to compete and survive in the private audit market. Such firms can provide audit as well as accounting, tax, and consulting services to private companies and other entities that do not require PCAOB-registered auditors. As such, their resources need not be as substantial as those of firms acquired by public audit firms. However, they are likely to be greater than resources of firms that disappear from the public record.

3.2.3 Disappear (cease operations: 19 percent of sample)

Audit firm resources that we expect merged or continuing firms to possess could be wasted if the de-registering firm ceases to provide any professional services. Firms that disappear from the public record are more likely to have received unfavorable scrutiny from the PCAOB and to have relatively poor audit quality reputations. They are likely to have had only one or two public clients and perhaps to have lost those clients. The partners in firms that cease operations may not have kept up with recent developments in SEC regulations and PCAOB rules and standards and might intend to retire. Such firms are likely to have characteristics that are opposite to those of merged firms: lower audit quality, inability to retain and grow public clients, smaller size and size-related resources, and higher liability risk per public client.

3.3 Empirical results for RQ2

Table 4 Panel A categorizes firms by type of structural change (merge, continue to serve private clients, or cease to operate, i.e. name disappears from the public record). It also provides tests of differences in means across these outcomes. The strongest support for our expectations is provided by the two proxies for audit quality. The lowest means for the two (reverse) audit quality proxies occur among merged firms; the highest means occur among firms ceasing operations; intermediate means occur among firms that continue to exist as legal entities but no longer audit public companies. We note that five of the six paired differences in means (83.3 percent) are

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significant in the expected directions. In contrast, for regulatory initiative variables, only two out of nine (22.2 percent) are significant. The significant differences occur in 2010 when Forms 2&3 disclosure requirements became effective. In 2010, de-registering firms tended to merge with a PCAOB registered firm or to cease existence rather than to continue as stand-alone entities providing services other than public company audits. For the growth and client retention proxies, only two out of six differences in means (33.3 percent) are significant; both are in the expected directions. For the audit firm size and resources proxies, six out of nine differences in means (66.7 percent) are significant. Five out of the six significant differences in means are in the expected directions. For the liability risk and risk mitigation proxies, only four out of nine differences in means (44.4 percent) are significant. Three out of the four significant differences in means are in the expected directions.

To summarize, the tests of differences in means reported in the right-most columns of Table 4 Panel A generally support our expectations. The two proxies for firm audit quality provide the strongest support. De-registering firms that merge offer higher audit quality (fewer PCAOB penalties and disclosed weaknesses) compared to firms that continue as separate legal entities. Continuing firms offer higher quality than firms ceasing operations. An important implication is that audit firm resources generally are put to their best use after de-registration. Resources of small firms having the highest public audit quality typically merge into other PCAOB registered audit firms and therefore are retained in the public audit market. Firms having the lowest audit quality tend to cease operations. Perhaps some of those resources find better uses. Most firms in the middle tier of audit quality continue to exist and may offer audits to private entities that present fewer audit challenges than SEC registrants.

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The multivariate logistic regression results presented in Panel B of Table 4 are obtained using a multinomial logistic regression and the sample of 295 de-registering small audit firm-years. The dependent variable *STRUCTURAL_CHANGE* equals one for firms that merge around the time of de-registration. The merging firms provide the contrast group for the regression. *STRUCTURAL_CHANGE* equals two for firms that continue to operate as stand-alone entities but no longer provide public audits. *STRUCTURAL_CHANGE* equals three for firms that cease operations (disappear from the public record).

The estimation results reported in Table 4 Panel B indicate that firms with lower audit quality (more PCAOB penalties and PCAOB disclosed weaknesses) are more likely either to de-register and cease operations, or to de-register and continue to offer audits only to private clients, rather than to merge with other audit firms. Firms having higher audit quality (fewer PCAOB penalties and weakness disclosures) are more likely to merge with registered audit firms rather than to take the other two routes. These results are indicated by the positive and highly significant coefficients for the two (reverse) audit quality metrics in both the left-most and right-most result columns in Panel B. This is consistent with the univariate audit quality results in Panel A.

Neither of the two proxies for the construct *Client retention and growth* have significant coefficients in Panel B. Thus, firms that merge do not differ in these dimensions from firms that continue or cease operations.

Several significant differences are evident in the empirical results for the three variables proxying for *Audit firm size*. The negative and significant coefficients for *LN_AUDITOR_SIZE* and *LN_AUDITOR_SIZE_BD* in the left-most result columns of Panel B suggest that firms having greater numbers of audit clients that are SEC registrants or that are SEC-registered BDs are more likely to merge. In the right-most results columns, the negative and significant coefficient for

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LN_AUDITOR_SIZE_BD suggests that firms having greater numbers of audit clients that are BDs are more likely to merge. Neither of the two coefficients for the number of audit offices is significant in Panel B. Thus, firms that merge do not differ significantly in this dimension from firms that continue or cease operations.

We employ three variables proxying for *Litigation risk and risk mitigation*. We find that audit firms that merge do not differ significantly from firms that continue or cease operations, in the number of lawsuits against the auditor over a preceding three-year period. Small audit firms organized as corporations or LLPs are less likely to cease operations and are more likely to merge in conjunction with de-registrations. Audit firms organized as LLPs also are less likely to continue as stand-alone entities, and are more likely to merge, around the time of de-registering.

Finally, we identify one significant coefficient among our proxies for *PCAOB regulatory initiatives*. Small audit firms de-registering in the year that the PCAOB initiated *FORM_2&3* reporting (i.e., in 2010) are less likely to continue as stand-alone entities.

Overall, our significant results in Table 4, Panels A and B, are consistent with our view that owners of de-registering audit firms (managing partners) make structural changes that do not waste valuable resources.

4.   In-depth analysis of Research Question 3: What are the effects of de-registration on the audit quality received and audit fees paid by the public clients of de-registering auditors?

4.1 Background

When an audit firm de-registers, its public clients must find a replacement PCAOB-registered auditor. As stated at the beginning of this paper, AICPA executive Sue Coffey (2024) predicts that small public companies face "greater challenges and higher costs" when their audit firms de-register. DeFond and Lennox (2011) find that exiting auditors provide lower quality audits (measured as auditors' likelihood of issuing concern opinions to clients) than successor

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auditors during the period 2001-2008. Fargher et al. (2018) confirm these results for a similar sample and time period but not for 2004-2008 or for a longer period. They find no evidence exiting auditors provide lower quality when audit quality is proxied by the absolute value of discretionary accruals or misstatements. In our research question 3, we extend this stream of research by examining both de-registering firms' *audit pricing* and *audit quality*, with the latter measured by their clients' likelihood of having misstatements relative to their successor registered firms using a more recent period when the PCAOB implements new regulations. More importantly, we investigate whether the consequences experienced by clients are associated with the structural changes made by the de-registering auditor (i.e., merge with other firms; continue to provide services other than public company audits; or cease to operate/disappear from public records).

4.2 Consequences of de-registration on audit quality: Evidence

Results reported in section 3.3 suggest that the audit quality received by pre-de-registration clients is associated with the structural changes made by the de-registering firm. The model written below includes proxies for structural changes along with controls used by Fargher et al. (2018).

$$MISSTATE = \beta_0 + \beta_1 \, DE\text{-}REG + \beta_2 \, PRE\_DE\text{-}REG + \beta_3 \, PRE\_DE\text{-}REG * MERGE$$
$$+ \, \beta_4 \, PRE\_DE\text{-}REG * CEASE + \text{controls} + \text{error term.} \qquad (2)$$

Dependent variable *MISSTATE* is a proxy for audit quality employed in many studies and is defined as in Fargher et al. (2018). The coefficient of *PRE_DE-REG*, β_2, captures the difference in likelihood of misstatements between the de-registering and successor audit firms by clients of de-registering audit firms that continue to exist as stand-alone entities. Coefficients β_3 and β_4 represent shifts in the likelihood of misstatements, relative to de-registered firms that continue to provide services other than public company audits, and for de-registered firms that merge or cease to exist respectively. Information used to code *DE-REG*, *PRE_DE_REG*, *MERGE*, and *CEASE* is

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based on information collected to test RQ1 and RQ2. Differences in audit quality across structural changes should manifest as a significant non-zero value for the cross-sectional coefficients β_3 and/or β_4. Control variables are consistent with Fargher et al. (2018). We estimate model (2) separately for the full sample period, 2003-2018, for a sub-period examined in prior studies, 2003-2008, and for a more recent sub-period, 2009-2018. The estimation period begins in 2003 rather than in 2006 because the model does not require that sample audit firms previously have been subject to PCAOB inspections.

The sample used to assess the consequences of de-registration for clients of de-registering firms is based on *client-years*. To obtain the sample, we start with 70,156 unique *client-years* audited by small U.S. audit firms as of September of 2019. We remove 11,862 client-years that precede 2003 or follow 2018, 8,234 client-years for firms that had their licenses to practice revoked, and 1,288 client-years of service provided by audit firms prior to the first de-registered firms (so that we can compare de-reg firms and their successors). We are left with 48,772 client-years for potential analyses. Elimination of client-years with missing audit quality model variables results in a final sample of 20,191 *client-year* observations.

Prior to estimating model (2) as written we estimate a comparison model in which all de-registration firms share a single coefficient of association with occurrences of client misstatements. Results are presented in the left-most columns of Table 5. The coefficient of interest, that of *PRE_DE-REG,* does not differ significantly from zero for any of the three time periods. Like Fargher et al. (2018), we find that de-registering audit firms are no more likely than successor audit firms to have clients that disclose misstatements. This suggests that clients of de-registering firms *on average* do not experience changes in audit quality (measured as misstatements) when they are audited by successor registered firms.

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The right-most columns of Table 5 present results for model (2) as written. The baseline sample consists of de-registering firms that continue to exist but that no longer audit public clients. The positive and significant coefficients of *PRE_DE_REG* indicate that clients of de-registering firms that continue as stand-alone entities are less likely to disclose misstatements when audited by successor auditors. The result holds in the full sample period, and in 2009-2018. The coefficient of *PRE_DE_REG* is positive but not conventionally significant in the 2003-2008 period. Overall, the results provide some evidence that former clients of firms that continue as separate entities after de-registration experience increases in audit quality after transitioning to registered successor auditors.

In contrast, the coefficient shifts for exiting firms that merge (*PRE_DE_REG*MERGE*) are negative and significant for each time period. The negative and significant coefficients indicate that clients of de-registering firms that subsequently merge are less likely to experience improved audit quality, under successor auditors, compared to former clients of continuing auditors. This is consistent with our previously discussed finding that, prior to de-registration, firms that merge have higher audit quality. For two of the time periods the merge-interaction coefficients are approximately equal but opposite in sign to the stand-alone entity coefficients for continuing de-registering firms. The sums of the two coefficients are approximately zero, implying that clients of de-registering firms that merge are no more likely to disclose misstatements when audited by successor firms. In essence, former clients received similar quality audits from exiting merged audit firms as they do from registered successor auditors.

The estimated interaction coefficients for exiting firms that cease to exist (*PRE_DE_REG*CEASE*) do not differ significantly from zero. The insignificant coefficients indicate that clients of de-registering firms that cease to exist (disappear from the public record)

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experience similar audit quality changes, under successor public auditors, as did former clients of continuing auditors. For the full sample period, and for 2003-2008, the sums of the two coefficients are negative, and are similar in magnitude to the coefficients of *PRE_DE_REG* for continuing audit firms in the same periods. The former public clients of firms that cease to exist after de-registration tend to experience increases in audit quality under successor registered audit firms.

4.3 Consequences of de-registration for audit Fees: Evidence

To investigate whether clients of small de-registering firms pay higher or lower audit fees to successor audit firms, we employ a variation of model (2) that examines cross-sectional differences in the relevant coefficients of audit fee models that include test variables capturing the various structural changes. The general form of the model is:

$$LNAUDITFEE = \beta_0 + \beta_1\ DE\text{-}REG + \beta_2\ PRE\_DE\text{-}REG + \beta_3\ PRE\_DE\text{-}REG * MERGE$$
$$+ \beta_4\ PRE\_DE\text{-}REG * CEASE + \text{controls} + \text{error term}. \qquad (3)$$

The dependent variable *LNAUDITFEE* is the natural log of audit fees. The coefficient of *PRE_DE-REG*, β_2, captures the difference in audit fees between de-registering and successor audit firms paid by clients of exiting audit firms that continue to exist as independent entities. Coefficients β_3 and β_4 represent shifts in the audit fee, relative to continuing de-registered firms, for clients of de-registered firms that merge or cease to exist respectively. Differences in audit fees across de-registration outcomes should manifest as a significant non-zero value for the cross-sectional coefficients β_3 and/or β_4. Control variables are similar to those of model (2) with additional variables that are included in many audit fee models. We estimate model (3) separately for the full sample period, 2003-2018, for a sub-period examined in prior studies, 2003-2008, and for a more recent sub-period, 2009-2018.

We present estimation results in Table 6. Prior to estimating model (3) as written we estimate a comparison model in which all de-registration firms share a single coefficient of

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association with logged audit fees. Results are presented in the left-most columns of Table 6. The coefficient of interest, that of *PRE_DE-REG*, is negative and significant for the entire sample period 2003-2018. The estimated coefficients of *PRE_DE-REG* in the left-most columns indicate that, as a whole, public clients of PCAOB-registered audit firms that exit paid lower audit fees to those firms than they pay to PCAOB-registered successor firms. This significance appears to exist primarily in the sub-period 2009-2018. The right-most columns provide estimated coefficients for test variables (*PRE_DE-REG*, etc.) when exiting audit firms are disaggregated by type of structural change. The estimated coefficients of *PRE_DE-REG* are negative and significant for the full sample period and for both sub-periods. This indicates that clients of de-registering firms that continue to exist but no longer audit public companies paid lower audit fees to those firms than they pay to PCAOB-registered successor firms. The estimated coefficients of *PRE_DE-REG*MERGE* are positive and significant for the full sample period and for both sub-periods. This indicates that clients of exiting firms that merge are less likely to have paid smaller fees to the exiting auditors than to the registered successors.[25] These results are consistent with a scenario in which, among all the exiting audit firms, those that merge into other PCAOB registered firms charge higher audit fees.

5. Conclusion: Key results, implications, suggestions for future research

Small audit firms are a crucial component of the capital market ecosystem (Ho 2025). However, from 2011-2018 the number of small audit firms de-registering from the PCAOB exceeded the number of new registrants, thereby decreasing the number of small firms available to perform

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[25] Consider for example the full sample results for 2003-2018. The estimated coefficient for clients of exiting auditors that continue to survive, *PRE_DE-REG*, is -0.324 (Table 6). The incremental coefficient shift for clients of exiting auditors that merge is 0.209. The net of the two coefficients is -0.324 plus 0.209 which equals -0.115. The fee "discount" that clients previously received from exiting audit firms that continue to survive (-0.324) is about twice as large as the fee discount that clients previously received from exiting audit firms that merge (-0.115).

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audits of small publicly listed clients. Three important research questions arise: (1) What are the factors associated with small audit firm de-registrations? (2) What are the structural changes made by de-registering firms? (3) What are the effects on the audit quality received and the audit fees paid by the public clients of de-registering firms? Our research addresses these questions.

In turn, it provides evidence relevant to assessing former PCAOB chair Dan Goezler's speculation (Cohn 2025) that PCAOB penalties and the cost of complying with new standards and regulations may be linked to de-registrations. We find that de-registrations in the period 2006-2018 are positively associated with small firms' receipt of low audit quality signals (PCAOB penalties, negative inspection findings) but that de-registrations are not associated with the issuance of major new PCAOB rules and requirements. These findings suggests that auditors' difficulty in understanding and applying PCAOB-specified auditing procedures may lead to small firm exits from the public market more than do costs arising from new PCAOB rules and requirements.

Other significant explanators of the de-registration decision include proxies for a firm's ability to retain public clients, for its size relative to other small audit firms, and for its litigation risk and risk-mitigating legal structure. These findings suggest that de-registration is a strategic decision, made to better align the audit services that a small firm offers with its resources and capabilities, and is intended to improve (or at least to better reflect) the firm's competitive viability.

The effect of de-registration on the overall audit market depends on the structural changes made by de-registering firms. We find that 40% of the de-registering firms merge with another PCAOB registered firm; 41% no longer audit public companies but continue to provide other professional services; and the names of 19% of those firms disappear from the public record. Of the de-registering firms, the firms with the highest audit quality (e.g., fewer PCAOB penalties and

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negative inspection findings) are the ones most likely to merge. Merged firms cease to exist as stand-alone entities; however, the acquiring firms increase in size and resources. The quality of de-registering firms that exit the public company audit market but continue providing other services is intermediate suggesting that these firms might provide competitive services to clients in the private company audit market. Notably, the de-registering firms whose names disappear from the public record are the smallest and have the lowest audit quality. These findings suggest that de-registering small audit firms sort themselves into outcomes that are appropriate for their relative sizes and audit quality levels.

Our examination of the consequences of de-registration for the clients of de-registering firms provides evidence that such companies pay higher fees to PCAOB-registered successor firms but on-average audit quality appears to be unchanged.

There are two data-related limitations to our study. The first is that although we used all publicly available information to identify the outcomes experienced by firms around the time of de-registration, the names of 19% of de-registering firms disappeared from the public record. The second is a problem common to studies of small audit firms: there is no publicly available source of information on the lines of service in which small audit firms compete and the relative profitability of those lines of services.

When such data becomes available, further insight into small firm growth strategies can be provided. Future research also could provide insights into the effects of initiatives by the PCAOB, the CPAB, FRC, and other policymakers to provide resources to increase the number of small audit firms able to provide quality audits to small public clients. One recent example of such an effort is the PCAOB's launch of a new resource page for smaller audit firms with a goal of helping small firms succeed (PCAOB 2025). Another example is the CPAB's inclusion of an objective of

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"fostering an environment that supports improved audit quality at smaller firms" in its 2025-2017 strategic plan (2024, 8). A third example is the FRC's launch of "a year-long campaign to help small and medium-sized enterprises (SMEs) access audit services and reduce supporting burdens whenever possible" (FRC 2025, 1). Future research could contribute to the efforts of the PCAOB, CPAB, FRC and other policymakers by providing evidence on whether their initiatives are associated with increases in the number of small audit firms capable of providing high quality audits to small clients and which initiatives are the most effective.

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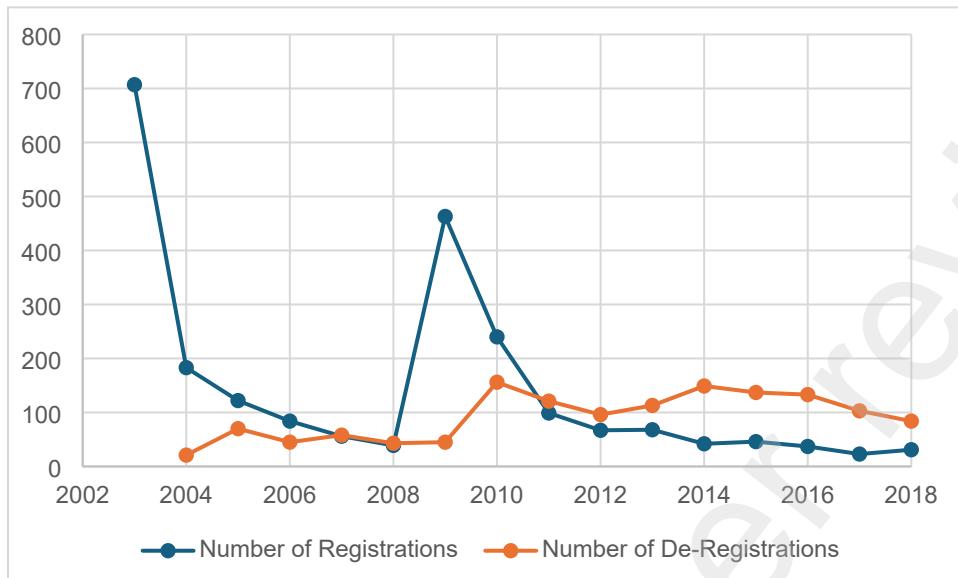
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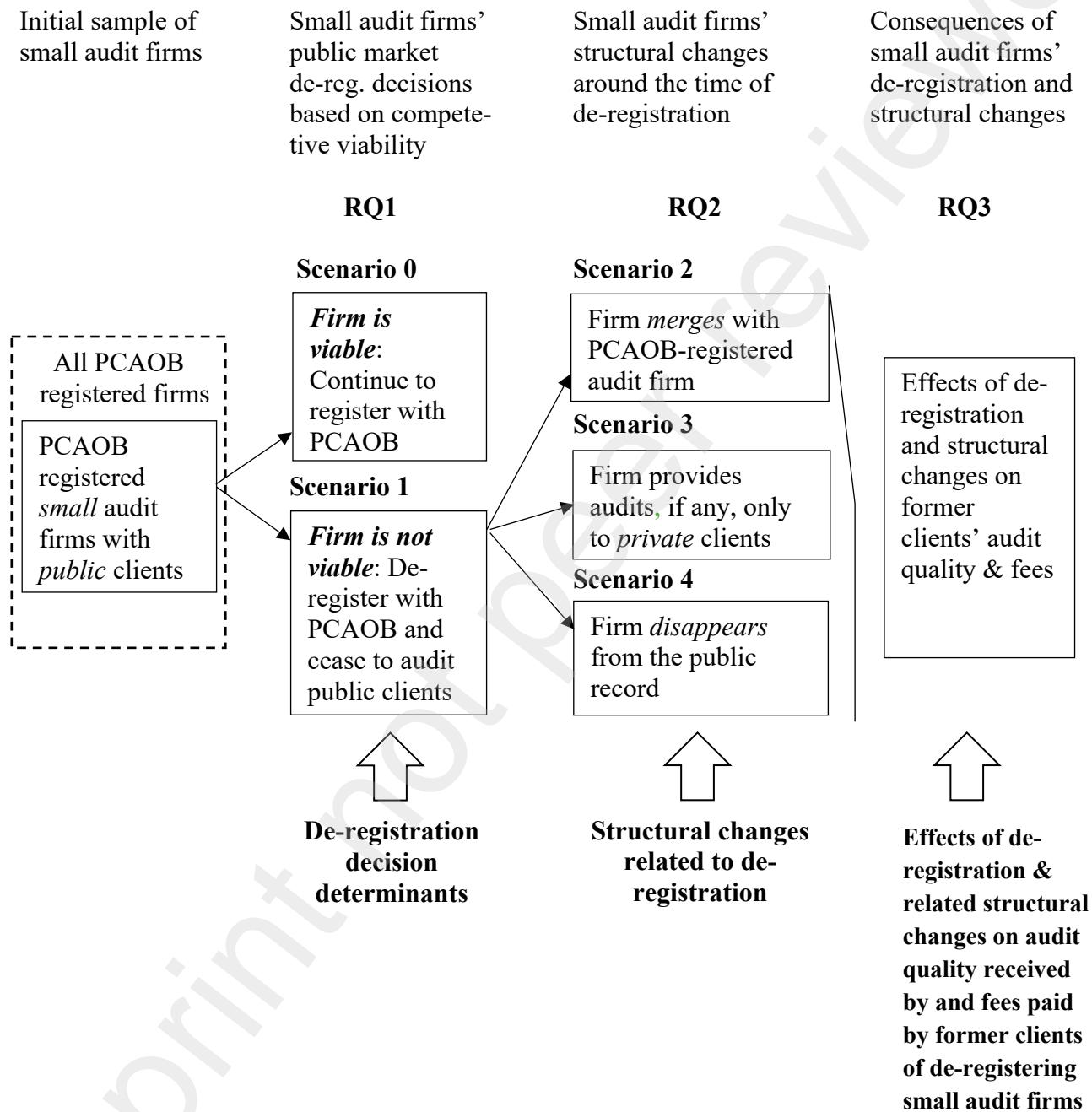
Figure 1

Numbers of new U.S. audit firm PCAOB registrations versus de-registrations by year from 2003 to 2018

Figure 2

Overview of small audit firms' de-registration decisions, structural changes, and consequences for former public clients of de-registering firms**.**

| Initial sample of small audit firms | Small audit firms' public market de-reg. decisions based on compete-tive viability | Small audit firms' structural changes around the time of de-registration | Consequences of small audit firms' de-registration and structural changes |

RQ1   **RQ2**   **RQ3**

Scenario 0   **Scenario 2**

All PCAOB registered firms

PCAOB registered *small* audit firms with *public* clients

Firm is viable: Continue to register with PCAOB

Scenario 1

Firm is not viable: De-register with PCAOB and cease to audit public clients

Firm *merges* with PCAOB-registered audit firm

Scenario 3

Firm provides audits, if any, only to *private* clients

Scenario 4

Firm *disappears* from the public record

Effects of de-registration and structural changes on former clients' audit quality & fees

De-registration decision determinants

Structural changes related to de-registration

Effects of de-registration & related structural changes on audit quality received by and fees paid by former clients of de-registering small audit firms

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Figure 3

Determinants of small audit firms' decisions to remain in or to de-register from the PCAOB public audit market**.**

Constructs and expected outcomes	Proxies
PCAOB-related viability constructs	
New PCAOB rules and requirements: Advent of specific PCAOB regulatory initiatives increases costs to small audit firms and decreases their viability in the public audit market.	We employ three dichotomous variables representing the years in which important new PCAOB rules or disclosure requirements became effective: *FORM_2&3* (2010); *BD_REG* (2014); *FORM_AP* (2017).
PCAOB low audit quality signals: Small audit firms' receipt of adverse audit quality signals from the PCAOB decreases viability in the public audit market.	Audit quality variables include the number of PCAOB disciplinary orders an audit firm receives, *PCAOB_PENALTIES*, and the number of engagement weaknesses assessed by the PCAOB and disclosed on the PCAOB website, *PCAOB_WEAK*.
Other viability constructs	
Public client retention and growth: Inability to retain and increase number of SEC registered audit clients suggests decreasing viability in the public audit market.	Variables include the proportion of the firm's audit clients that de-register with SEC, *PROP_CLIENT_DEREG,* and the net year-to-year change in the number of the firm's public clients following PCAOB inspections *CHG_PUBCLIENTS*.
Audit firm size: The smallest audit firms are most likely to experience decreasing viability in the public audit market.	Variables include *LN_AUDITOR_SIZE*, *LN_AUDITOR_SIZE_BD*, *LN_NUM_AUDITOR_OFFICE*.
Litigation risk and risk mitigation: Exposure to litigation risk, and lack of risk mitigation, decrease viability in the public audit market.	Variables include *AUDITOR_LAWSUITS*, *AUDITOR_LLP*, *AUDITOR_CORP*.

Table 1 Sample used to analyze small auditor PCAOB de-registration decisions (RQ1).

Determinants of audit firm de-registration	Number of Auditor-Years	Number of Unique Auditors
Unique PCAOB firm-reporting year between 2003 and 2018 summarized from Audit Analytics (U.S and non-U.S.)	10,031	1,358
Minus: non-U.S. audit firms	-3,044	-410
Minus: audit firms that are annually inspected from 2003 to 2018	-189	-12
Minus: audit firms whose withdrawal was pending or whose registration and withdrawal occurred in 2019	-249	-27
Potential sample for the determinant analyses	<u>6,549</u>	<u>909</u>
Minus: no inspection report issued in the past three years (year t-2 to year t)	-2,898	-303
Minus: those with missing control variables	-117	-25
Minus: PCAOB firm-reporting years related to one exiting firm*	-6	-1
Final sample for the determinant analyses (2006-2018)**	**<u>3,528</u>**	**<u>580</u>**
PCAOB firm-reporting years related to audit firms de-registered	1,280	295
PCAOB firm-reporting years related to audit firms currently registered	2,248	285

*One firm with PCAOB number=193 deregistered on 2015/7/19 (reporting year 2016) but the last reporting year in the final sample is 2013 due to missing control variables for subsequent years. Therefore, although a de-registering firm, we do not have the last de-registration year so when using de-registration year as the dependent variable we do not have $DEREG\_YR$=1 for this firm and only have the $DEREG\_YR$=0 for this exiting firm.

**Our final sample in the determinant analysis starts in 2006 because our model specification requires small audit firms in our sample to have at least one inspection report from year t-2 to year t.

Table 2 Determinants of the decision to de-register

Panel A: Descriptive statistics

Variables	Full Sample (N=3,528)				DEREG_YR =1 (N=295)	DEREG_YR =0 (N=3,233)	
	Mean	Std	Min	Max	Mean	Mean	Mean Diff
DEREG_YR	0.084	0.277	0.000	1.000	1.000	0.000	***
PCAOB_PENALTIES	0.015	0.122	0.000	1.000	0.095	0.008	***
PCAOB_WEAK	1.459	2.231	0.000	12.000	2.468	1.367	***
FORM_2&3 (2010)	0.092	0.289	0.000	1.000	0.075	0.093	ns
BD_REG (2014)	0.081	0.273	0.000	1.000	0.112	0.078	*
FORM_AP (2017)	0.061	0.239	0.000	1.000	0.044	0.062	ns
PROP_CLIENT_DEREG	0.111	0.123	0.000	1.000	0.164	0.106	***
CHG_PUBCLIENTS	-0.105	0.690	-1.886	1.386	-0.560	-0.063	***
AUDITOR_SIZE	10.601	16.503	1.000	209.000	8.192	10.821	***
LN_AUDITOR_SIZE	1.863	1.002	0.693	5.268	1.675	1.880	***
AUDITOR_SIZE_BD	3.439	8.540	0.000	100.667	1.946	3.575	***
LN_AUDITOR_SIZE_BD	0.864	0.945	0.000	4.083	0.536	0.894	***
NUM_AUDITOR_OFFICE	3.229	6.251	1.000	113.000	1.759	3.363	***
LN_NUM_AUDITOR_OFFICE	1.121	0.638	0.693	4.344	0.908	1.141	***
AUDITOR_LAWSUITS	0.185	0.632	0.000	8.000	0.200	0.183	ns
AUDITOR_CORP	0.565	0.496	0.000	1.000	0.580	0.564	ns
AUDITOR_LLP	0.359	0.480	0.000	1.000	0.275	0.367	***

Note: *DEREG_YR* is 1 for the last year the audit firm audits a public client before de-registration and 0 otherwise. Please see Appendix A for all other variable definitions. The middle columns are the full sample descriptive statistics. The rightmost columns compare characteristics of the de-registration year of all de-registering firms (N=295) with other years (including the non-de-registering year of the de-registering firms and all years of non-de-registering firms, N=3,233= (1,280-295) +2,248 in Table 1). *, **, *** significant at 0.10, 0.05, and 0.01, respectively.

Table 2 Determinants of the decision to de-register (continued)

Panel B. Logistic regression explaining de-registration (*DEREG_YR*).

Variables	All sample firms			Excluding firms that merged around time of de-registration		
	Coeff.	t	p value	Coeff.	t	p value
Intercept	-0.976	-3.800	0.000	-0.232	-0.620	0.539
PCAOB_PENALTIES	2.146	5.980	<.0001	2.919	6.890	<.0001
PCAOB_WEAK	0.119	4.350	<.0001	0.166	4.870	<.0001
FORM_2&3 (2010)	-0.198	-0.790	0.431	-0.354	-0.990	0.324
BD_REG (2014)	0.269	1.180	0.240	0.244	0.770	0.441
FORM_AP (2017)	-0.448	-1.410	0.158	-0.858	-1.920	0.055
PROP_CLIENT_DEREG	1.796	4.270	<.0001	2.067	4.090	<.0001
CHG_PUBCLIENTS	-0.959	-7.560	<.0001	-0.974	-5.700	<.0001
LN_AUDITOR_SIZE	-0.598	-6.150	<.0001	-0.974	-5.700	<.0001
LN_AUDITOR_SIZE_BD	-0.241	-2.400	0.017	-0.669	-3.660	0.000
LN_NUM_AUDITOR_OFFICE	-0.575	-3.390	0.001	-0.881	-3.320	0.001
AUDITOR_LAWSUITS	0.358	3.200	0.001	0.408	2.690	0.007
AUDITOR_CORP	-0.545	-2.700	0.007	-0.862	-3.620	0.000
AUDITOR_LLP	-0.569	-2.520	0.012	-1.137	-3.910	<.0001
N	3,528			2,957		
DEREG_YR=1 De-registration Yr of De-reg Audit Firms	295			176		
DEREG_YR=0 Non-de-registration Yrs of De-reg Firms & All Years of Continuing Firms	3,233			2,781		
Pseudo R-Square	0.090			0.113		
ROC	0.785			0.864		

Note: This is an *auditor-year* logistic regression analysis clustered by audit firm and reporting year, using auditors who issue audit opinions to SEC-registered clients identified and inspected in the past three years, identified from the Audit Analytics database. *Each audit firm has multiple years of observations.* The dependent variable *DEREG_YR* is coded as 1 for the last year when a small audit firm audits a public client before de-registration. It is coded as 0 for non-de-registration years of de-registering firms, and for all years of non-de-registering firms. Please see Appendix A for all other variable definitions.

Table 3: What structural changes do small audit firms make around the time they de-register?

STRUCTURAL CHANGE	Audit services provided	Frequency	%
Merge with another registered firm	Merged firm can provide audits to public and private clients	119	40
Continue as a stand-alone entity	De-registered firm can audit private clients and provide other services	120	41
Cease to operate (name disappears from public record)	Does not provide audits or other services to public or private clients	56	19
	Totals	295	100

Note: Information is collected from various sources. Out of the 119 de-registered firms that merged, 115 (97%) were merged into other PCAOB-registered firms.

Table 4: Determinants of structural changes accompanying de-registrations

Panel A: Descriptive statistics

	STRUCTURAL_CHANGE			Tests of differences in means		
	= 1	= 2	= 3	(1 vs. 2)	(2 vs. 3)	(1 vs. 3)
	merges (N=119)	**continues** (N=120)	**ceases** (N=56)			
Strategy variables	**Mean**	**Mean**	**Mean**	**Mean Diff**	**Mean Diff**	**Mean Diff**
PCAOB_PENALTIES	0.017	0.125	0.196	***	ns	***
PCAOB_WEAK	1.895	2.513	3.589	*	**	***
FORM_2&3 (2010)	0.101	0.025	0.125	**	**	ns
BD_REG (2014)	0.101	0.117	0.125	ns	ns	ns
FORM_AP (2017)	0.050	0.033	0.054	ns	ns	ns
CHG_PUBCLIENTS	-0.560	-0.502	-0.688	ns	ns	ns
PROP_CLIENT_DEREG	0.139	0.176	0.190	*	ns	**
LN_AUDITOR_SIZE	1.907	1.315	1.955	***	***	ns
LN_AUDITOR_SIZE_BD	0.876	0.315	0.286	***	ns	***
LN_NUM_AUDITOR_OFFICE	1.010	0.851	0.815	***	ns	***
AUDITOR_LAWSUITS	0.286	0.133	0.161	ns	ns	ns
AUDITOR_CORP	0.538	0.658	0.500	*	**	ns
AUDITOR_LLP	0.420	0.183	0.161	***	ns	***

Note: This table presents mean levels (and tests of differences in means) for PCAOB model variables measured in the year a firm de-registers from the public audit market. *, **, *** significant at 0.10, 0.05, and 0.01, respectively.

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Panel B: Multinomial logistic regressions explaining decisions to continue versus merge, and to liquidate versus merge

	STRUCTURAL_CHANGE					
	=2 continue			=3 ceases		
Variables	**Coeff.**	**t**	**p value**	**Coeff.**	**t**	**p value**
Intercept	3.229	3.510	0.001	2.033	1.980	0.048
PCAOB_PENALTIES	2.512	3.490	0.001	2.427	3.060	0.002
PCAOB_WEAK	0.208	2.630	0.009	0.174	2.030	0.043
FORM_2&3 (2010)	-1.535	-1.770	0.078	0.045	0.060	0.950
BD_REG (2014)	0.071	0.140	0.890	-0.267	-0.410	0.684
FORM_AP (2017)	-1.317	-1.550	0.123	-0.887	-0.940	0.349
CHG_PUBCLIENT	-0.197	-0.860	0.390	-0.156	-0.610	0.544
PROP_CLIENT_DEREG	1.143	1.080	0.283	1.599	1.200	0.231
LN_AUDITOR_SIZE	-1.327	-5.360	<.0001	-0.382	-1.280	0.203
LN_AUDITOR_SIZE_BD	-0.703	-2.780	0.006	-0.712	-1.910	0.058
LN_NUM_AUDITOR_OFFICE	-0.393	-0.870	0.383	-0.710	-1.310	0.192
AUDITOR_LAWSUITS	0.284	1.020	0.308	0.106	0.400	0.687
AUDITOR_CORP	-1.017	-1.440	0.151	-2.153	-3.230	0.001
AUDITOR_LLP	-1.893	-2.480	0.014	-2.716	-3.480	0.001
N	295					
STRUCTURAL_CHANGE =1	119					
STRUCTURAL_CHANGE =2	120					
STRUCTURAL_CHANGE =3	56					
Pseudo R-Square	0.382					
AIC	Intercept Only 622.047. Intercept and Covariates 532.054					

Note: this is a multinomial logistic regression based on a sample of auditor-years when a firm de-registers. The dependent variable is *STRUCTURAL_CHANGE*, equal to 1 if the audit firm merges with another audit firm after de-registration, 2 if the audit firm continues to exist as a stand-alone entity after de-registration, 3 if the audit firm ceases to exists after de-registration. The baseline comparison group is *STRUCTURAL_CHANGE* =1 (i.e., merger).

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Table 5: Are clients of de-registering audit firms more likely to report misstatements under successor audit firms?

	2003-2018		2003-2008		2009-2018		2003-2018		2003-2008		2009-2018	
Variables	Coeff.	p value	Coeff.	p value	Coeff.	p value	Coeff.	p value	Coeff.	p value	Coeff.	p value
Intercept	-2.359	<.0001	-2.000	<.0001	-3.638	<.0001	-2.471	<.0001	-2.127	<.0001	-3.741	<.0001
DE-REG	0.287	<.0001	0.485	<.0001	0.207	0.008	0.294	<.0001	0.491	<.0001	0.212	0.006
PRE_DE-REG	0.066	0.296	-0.077	0.419	0.100	0.276	0.347	0.001	0.144	0.332	0.540	0.001
PRE_DE-REG*MERGE							-0.358	0.001	-0.282	0.031	-0.556	0.001
PRE_DE-REG*CEASE							-0.097	0.504	0.008	0.966	-0.350	0.139
ENTRY	0.422	<.0001	0.297	0.013	0.479	<.0001	0.404	<.0001	0.287	0.018	0.456	<.0001
POST_ENTRY	-0.135	0.228	0.634	0.042	-0.244	0.065	-0.102	0.368	0.674	0.030	-0.211	0.115
LN_AVG_SEC_REGIS2	-0.020	0.326	-0.010	0.716	-0.021	0.457	-0.005	0.812	0.010	0.731	-0.012	0.676
OLD	0.318	<.0001	0.121	0.103	0.523	<.0001	0.310	<.0001	0.113	0.127	0.517	<.0001
NEW	0.398	<.0001	0.224	0.003	0.576	<.0001	0.394	<.0001	0.220	0.003	0.571	<.0001
LNASSET	0.162	<.0001	0.171	<.0001	0.162	<.0001	0.166	<.0001	0.175	<.0001	0.167	<.0001
LEVERAGE	0.021	0.248	0.026	0.361	0.018	0.475	0.020	0.269	0.024	0.410	0.018	0.455
ROA	-0.031	0.000	-0.031	0.015	-0.030	0.010	-0.031	0.000	-0.031	0.014	-0.031	0.008
LOSS	0.369	<.0001	0.334	<.0001	0.383	<.0001	0.373	<.0001	0.339	<.0001	0.387	<.0001
BTM	-0.015	0.163	-0.014	0.357	-0.016	0.285	-0.016	0.150	-0.015	0.321	-0.016	0.290
CREC	0.019	0.000	0.024	0.001	0.009	0.299	0.019	0.000	0.024	0.001	0.010	0.258
CINV	0.016	0.202	0.011	0.512	0.017	0.378	0.016	0.218	0.011	0.520	0.016	0.423
MA	0.494	<.0001	0.584	<.0001	0.388	0.005	0.499	<.0001	0.593	<.0001	0.392	0.004
RESTRUCTURE	-0.126	0.198	-0.168	0.247	-0.057	0.672	-0.122	0.214	-0.164	0.259	-0.053	0.691
LOC_USA	-0.160	0.042	-0.214	0.073	-0.094	0.387	-0.133	0.093	-0.182	0.130	-0.064	0.554
Year/ Industry Dummies	Yes		Yes		Yes		Yes		Yes		Yes	
N	20,191		8,349		11,842		20,191		8,349		11,842	
Pseudo R-Square	0.049		0.064		0.038		0.050		0.064		0.039	
ROC	0.686		0.683		0.680		0.688		0.694		0.682	

Note: The dependent variable is *MISSTATE*, coded as 1 if the client's financial statements were subsequently restated and 0 otherwise. *MERGE* is coded as 1 if the de-registered audit firm merged with another audit firm around the time of de-registration and 0 otherwise. *LIQUIDATE* is coded as 1 if the de-registered firm liquidated and 0 otherwise. Please see Appendix A for variable definitions.

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Table 6: Do clients of de-registering audit firms pay successor firms higher audit fees?

Variables	2003-2018 Coeff.	p value	2003-2008 Coeff.	p value	2009-2018 Coeff.	p value	2003-2018 Coeff.	p value	2003-2008 Coeff.	p value	2009-2018 Coeff.	p value
Intercept	10.347	<.0001	10.015	<.0001	10.441	<.0001	10.395	<.0001	10.066	<.0001	10.476	<.0001
DE-REG	-0.100	<.0001	-0.161	0.000	-0.089	<.0001	-0.102	<.0001	-0.163	0.000	-0.091	<.0001
PRE_DE-REG	-0.156	<.0001	-0.047	0.265	-0.182	<.0001	-0.324	<.0001	-0.258	0.001	-0.326	<.0001
PRE_DE-REG*MERGE							0.209	<.0001	0.217	0.003	0.201	<.0001
PRE_DE-REG*CEASE							0.056	0.375	0.467	<.0001	-0.094	0.197
ENTRY	-0.149	<.0001	-0.144	0.016	-0.137	<.0001	-0.143	<.0001	-0.134	0.026	-0.126	<.0001
POST_ENTRY	-0.138	<.0001	-0.042	0.718	-0.148	<.0001	-0.149	<.0001	-0.053	0.649	-0.164	<.0001
LN_AVG_SEC_REGIS	0.028	<.0001	0.080	<.0001	0.017	0.002	0.025	<.0001	0.078	<.0001	0.015	0.007
CLIENT_DEREG	-0.019	0.502	0.029	0.603	-0.034	0.280	-0.020	0.479	0.039	0.485	-0.038	0.235
OLD	0.034	0.102	0.015	0.740	0.042	0.067	0.036	0.076	0.007	0.873	0.048	0.037
NEW	-0.014	0.471	0.048	0.280	-0.029	0.170	-0.010	0.599	0.050	0.253	-0.023	0.268
LNASSET	0.340	<.0001	0.379	<.0001	0.327	<.0001	0.339	<.0001	0.380	<.0001	0.325	<.0001
LOSS	0.145	<.0001	0.212	<.0001	0.132	<.0001	0.144	<.0001	0.210	<.0001	0.131	<.0001
LEVERAGE	0.050	<.0001	0.066	<.0001	0.047	<.0001	0.050	<.0001	0.066	<.0001	0.048	<.0001
LNBUSSEGNUM	0.132	<.0001	0.140	0.000	0.132	<.0001	0.129	<.0001	0.142	0.000	0.130	<.0001
LNGEOSEGNUM	0.139	<.0001	0.153	<.0001	0.132	<.0001	0.138	<.0001	0.155	<.0001	0.132	<.0001
ISSUE	0.085	<.0001	0.063	0.091	0.094	<.0001	0.087	<.0001	0.066	0.075	0.096	<.0001
SPECIAL_ITEM	0.108	<.0001	0.100	0.001	0.111	<.0001	0.106	<.0001	0.101	0.000	0.110	<.0001
AO_UQ	-0.065	<.0001	-0.164	<.0001	-0.020	0.243	-0.066	<.0001	-0.158	<.0001	-0.022	0.191
QUICKRATIO	-0.019	<.0001	-0.021	<.0001	-0.018	<.0001	-0.018	<.0001	-0.021	<.0001	-0.018	<.0001
BTM	-0.015	<.0001	-0.007	0.301	-0.017	<.0001	-0.015	<.0001	-0.008	0.252	-0.017	<.0001
MA	-0.003	0.909	0.102	0.078	-0.043	0.113	-0.001	0.976	0.110	0.056	-0.042	0.122
INVREC_AT	0.136	<.0001	0.032	0.654	0.155	<.0001	0.134	<.0001	0.025	0.720	0.155	<.0001
BUSY	0.070	<.0001	-0.028	0.396	0.095	<.0001	0.069	<.0001	-0.030	0.364	0.094	<.0001
FRGN	0.245	<.0001	0.201	<.0001	0.262	<.0001	0.246	<.0001	0.195	<.0001	0.263	<.0001
|DA|	0.036	<.0001	0.048	0.013	0.035	<.0001	0.036	<.0001	0.048	0.013	0.035	<.0001
ICMW	0.018	0.248	0.193	<.0001	-0.028	0.098	0.019	0.209	0.195	<.0001	-0.027	0.105
LOC_USA	0.011	0.635	-0.011	0.853	0.002	0.940	0.000	0.994	-0.039	0.539	-0.003	0.915
Year/Industry Dummies	Yes		Yes		Yes		Yes		Yes		Yes	
N	9,652		1,952		7,700		9,652		1,952		7,700	
R-Square	0.710		0.695		0.719		0.711		0.688		0.721	

Note: the dependent variable is *LNAUDITFEE*, the audit fees that client pays the audit firm in year t. *MERGE* is coded as 1 if the de-register audit firm merged with another audit firm around de-registration and 0 otherwise. *CEASE* is coded as 1 if the de-reg firm ceased to exist as a separate legal entity and 0 otherwise.

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Appendix A: Variable definitions

Determinants of small audit firm de-registration	
Variables	**Definitions**
Dependent variable	
DEREG_YR	1 if the reporting year t is the last year that a small audit firm independently audits a public client before de-registration, 0 for non-exit years of the exiting firm, and for all years of non-exiting firms.
STRUCTURAL_CHANGE	1 if the audit firm merges with another audit firm after de-registration, 2 if the audit firm continues to exist as a separate entity but without public audit clients, 3 if the audit firm ceases operations and disappears from the public record.
Independent variable	
PCAOB_PENALTIES	The total number of PCAOB disciplinary penalties the audit firm received from reporting year t-2 to year t.
PCAOB_WEAK	The total number of engagement weaknesses disclosed in the PCAOB inspection report, averaged if the audit firm has several reports from reporting year t-2 to year t.
FORM_2&3 (2010)	1 in the year when PCAOB registered firms were first required to file PCAOB Forms 2 and 3, 0 otherwise.
BD_REG (2014)	1 in the year when PCAOB registered firms were first required to follow PCAOB rather than AICPA standards, if they have broker-dealer clients, 0 otherwise.
FORM_AP (2017)	1 in the year when PCAOB registered firms were first required to file PCAOB Form AP, 0 otherwise.
PROP_CLIENT_DEREG	The percentage of the audit firm's public clients that de-register from the SEC from reporting year t-2 to year t.
CHG_PUBCLIENTS	The change in the audit firm's number of public clients during the 12 months following the issuance of its PCAOB inspection report, averaged if the audit firm has several reports from reporting year t-2 to year t. The change in public clients is calculated as the natural log of the number of public clients gained plus 1 minus the natural log of the number of clients lost plus 1.
LN_AUDITOR_SIZE	Natural log of *AUDITOR_SIZE* plus 1. *AUDITOR_SIZE* is measured as the average number of SEC registrants audited by the audit firm from reporting year t-2 to year t.
LN_AUDITOR_SIZE_BD	Natural log of *AUDITOR_SIZE_BD* plus 1. *AUDITOR_SIZE_BD* is measured as the average number of broker-dealers audited by the audit firm from reporting year t-2 to year t.
LN_NUM_AUDITOR_OFFICE	Natural log of *NUM_AUDITOR_OFFICE*, the number of offices disclosed in the audit firm's most recent PCAOB inspection reports prior to reporting year t.
AUDITOR_LAWSUITS	Number of total auditor lawsuits from reporting year t-2 to year t (Source: Audit Analytics).
AUDITOR_CORP	1 if the audit firm is organized as a corporation or a company, 0 otherwise. We consider the audit firm is organized as a corporation or a company if the ownership structure disclosed in the audit firm's most recent PCAOB inspection reports prior to reporting year t has the key words "Corporation" or "Company".
AUDITOR_LLP	1 if the audit firm is organized as a limited liability partnership, as disclosed in the audit firm's most recent PCAOB inspection reports prior to reporting year t. We consider the audit firm is organized as a limited liability partnership if the ownership structure disclosed in the audit firm's most recent PCAOB inspection reports prior to reporting year t has the key words "Partnership" and "Limited".

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APPENDIX A. Variable definitions (continued).

Consequences of audit firm de-registration	
Dependent variable	
MISSTATE	1 if the client's fiscal year t financial statements are subsequently restated, 0 otherwise.
LNAUDITFEE	The natural log of total audit fees paid to the auditor in fiscal year t.
Variables of interest	
PRE_DE-REG	1 if the client is audited in fiscal year t by an audit firm that de-registers from the PCAOB and exits the public audit market, 0 otherwise.
PRE_DE-REG*MERGE	The interaction term of *PRE_DE-REG* and *MERGE*. *MERGE* is 1 if the client is audited in fiscal year t by a de-registering firm that merges with another audit firm around its de-registration in fiscal year t, 0 otherwise.
PRE_DE-REG*CEASE	The interaction term of *PRE_DE-REG* and CEASE. CEASE is 1 if the client is audited in fiscal year t by a de-registering firm that likely cease to operate (i.e., disappear from public records) after its de-registration, 0 otherwise.
DE-REG	1 if the client is audited in fiscal year t by an audit firm that de-registers from the PCAOB and exits the public audit market or by the successor firm, 0 otherwise.
ENTRY	1 if the client has been audited by any audit firm that enters the market after the year 2004 and remains registered with PCAOB as of 2019, 0 otherwise. Note the effective date for PCAOB registration for US audit firms is November of 2003 and is July 2004 for foreign audit firms. Therefore, we chose the year 2004 as the cutoff for new entries. Clients of audit firms that exit the market are also coded 0.
POST_ENTRY	1 if the client is currently audited by an audit firm that enters the market in fiscal year t, 0 otherwise.
LN_AVG_SEC_REGIS2	The natural log of the total number of public audits performed by the audit firm in fiscal year t.
CLIENT_DEREG	1 if the client receives its last audit opinion before de-registering from the SEC in fiscal year t, 0 otherwise.
OLD	1 if the audit is performed by an outgoing audit firm (i.e., it is the incumbent audit firm's last audit of this client) and 0 if the audit is done by an audit firm that will be retained in the following year.
NEW	1 if the client is audited by a newly engaged audit firm (i.e., it is the incumbent audit firm's first audit of this client) and 0 if the audit is by a retained incumbent audit firm.
LNASSET	Natural log of the client's total assets in fiscal year t.
LEVERAGE	The ratio of total debt to total assets.
ROA	Ratio of income before extraordinary items to total assets in year t.
LOSS	1 if the client's net income in fiscal year t is less than 0, 0 otherwise.
BTM	The ratio of book value of common equity divided by the market value of common equity in fiscal year t.
CREC	The percentage change in accounts receivable from year t-1 to year t.
CINV	The percentage change in inventories from year t-1 to year t.
MA	1 if the client has any merger activity in fiscal year t, 0 otherwise.
RESTRUCTURE	1 if the client has any restructuring activity in fiscal year t, 0 otherwise.
LOC_USA	1 if the client is headquartered in the U.S.in fiscal year t, 0 otherwise.