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ARTICLE

Economic demand for auditing services in the "registered" investment management industry

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Abstract

We hypothesize that the demand for auditing in the registered investment management industry arises from the auditor's ability to act as a solvent indemnifier when outside parties incur losses because of financial misrepresentations. Consistent with this insurance demand, we find that, relative to financial companies, registered investment companies are more likely to retain Big 4 auditors. Restricting the sample to the registered investment management industry, we construct three direct tests of the insurance demand hypothesis. We find that (a) the market share of a Big 4 firm is positively associated with the firm's wealth, (b) changes in audit fees are positively associated with changes in the audit firms' wealth, and (c) net fund flows increase when clients switch from non-Big 4 to Big 4 auditors. Our results highlight an unusually high demand for Big 4 auditors in the registered investment industry, which we attribute to the insurance demand for auditing services.

KEYWORDS
Audit Quality, Big 4, Insurance Demand, Registered Investment Management Companies, Reporting Quality

1 | INTRODUCTION

The value of the assurance demand for auditing arises from the auditors' ability to provide assurance that the financial statements faithfully reflect the client's underlying economics (DeAngelo, 1981; Jensen & Meckling, 1976; Watts & Zimmerman, 1986). The value of the insurance demand for auditing arises from the auditor acting as a solvent indemnifier when outside parties incur losses because of financial misrepresentations (Dye, 1993; Simunic, 1980). Although the assurance demand for auditing services has been researched extensively (see DeFond & Zhang, 2014; Knechel et al., 2013), relatively few studies analyze the insurance demand for auditing services (e.g., Brown et al., 2013; Menon & William, 1994; O'Reilly et al., 2006; Willenborg, 1999). In this study, we provide empirical evidence on the insurance demand for auditing services within a highly specialized financial sector—the "registered" investment management industry.[1]

The registered investment management industry provides valuable capital market benefits including efficient allocation of scarce resources, better information about investment opportunities, and liquidity (O'Reilly, 2014).[2] Investors are willing to commit more of their savings to the investment management industry when they can trust the investment industry and its managers. To the extent auditing services can advance investors' trust, a rigorous academic study providing evidence on the sources of the demand for auditing services within this dedicated financial sector is likely to be of interest to academics, investors, practitioners, and regulators.

Because of the institutional, organizational, and operational structure of this industry, we hypothesize that the demand for auditors in the registered investment management industry arises because of the auditors' ability to provide insurance in case of financial misrepresentations. Evidence suggests that investment companies are susceptible to fraud, theft, and embezzlement (e.g., 2008 Madoff scandal; Davis et al., 2007; Houge & Wellman, 2005). Holding other factors constant, investors would be willing to invest more of their savings when the auditor can provide a higher level of insurance in case of losses arising from financial reporting misrepresentations ("insurance quality" demand). Registered investment companies, who need to raise public funds frequently, benefit more from retaining a Big 4 firm because the investors' option value on insurance protection is higher with a Big 4 than with a non-Big 4 firm (Menon & Williams, 1994).[3] Hence, relative to other comparable companies, registered investment management companies are more likely to retain a Big 4 firm, than a non-Big 4 firm, because larger auditors provide higher insurance quality than smaller auditors.

In contrast, the assurance, or the "audit quality," demand for Big 4 firms in the registered investment management industry is expected to be low for several key reasons. First, because investment companies rely on external financing, they are expected to voluntarily bond themselves to high-quality reporting which reduces the audit quality demand. Second, institutional factors such as reliance on third-party administrators for financial reporting also decrease the audit quality demand. Third, the institutional structure and regulatory monitoring potentially lowers information asymmetry and agency problems, thereby lowering the demand for audit quality. Fourth, registered investment companies rarely issue debt (IMF, 2015), which reduces the borrower-based contracting demand for audit quality (Fortin & Pittman, 2007; Pittman & Fortin, 2004). Fifth, Big 4 firms charge substantially more than non-Big 4 firms (Craswell et al., 1995; Ghosh & Siriviriyakul, 2018). Therefore, the net benefits of retaining a Big 4 firm for its assurance services are relatively low in the registered investment management industry.

[1] An investment company, defined as "an issuer which is or holds itself out as being engaged primarily, or proposes to engage primarily, in the business of investing, reinvesting or trading in securities" (SEC, 2004), is required to register with the Securities and Exchange Commission (SEC) if (a) its outstanding securities are beneficially owned by more than 100 persons and (b) it offers, or proposes to offer, securities to the public. Our analysis is limited to investment companies "registered" with the SEC under the 1940 Act consisting mostly of open-end and closed-end mutual funds, trust funds, and exchange-traded funds.

[2] Between 1998 and 2017, assets under management of U.S. registered mutual funds grew more than three times from $5.53 trillion to $18.76 trillion (www.statista.com). Countries with highly developed equity capital markets, e.g., the United States and members of the European Union, tend to hold a larger share of their household financial wealth in regulated funds (IMF, 2015).

[3] Larger auditors carry professional liability insurance, and considering that they also have more partner-wealth at-risk, Big 4 firms can potentially provide a higher level of insurance than non-Big 4 firms (Dye, 1993; Liao & Radhakrishnan, 2016; Simunic, 1980; Willenborg, 1999).

To identify registered investment management companies, we depend on (1) Audit Analytics' classification to designate a company as a fund, trust, or special fund, and (2) the SEC's annual shareholder report filing requirement for registered investment management companies using Form N-CSR.[4] Our control group is the financial industry because researchers often cluster financial firms into a single cohort given their similarity in core business operations (Kahle & Walkling, 1996).[5]

Consistent with the insurance demand hypothesis, we find that, compared with financial firms, registered investment companies are more likely to retain a Big 4 firm than a non-Big 4 firm. The difference in the Big 4 retention rates between the two industries is stark. Controlling for the other factors, our estimates suggest that registered investment companies are 16 times as likely to engage a Big 4 firm as other financial companies. Similarly, when we concentrate on a sample associated with auditor turnovers, we find that the demand for a successor Big 4 auditor is higher in the registered investment management industry than in the financial industry. Our estimates suggest that, holding other factors constant, a registered investment management company is five times as likely to retain a Big 4 auditor subsequent to an auditor turnover as a financial company.

Although we include several control variables, covariate imbalances between treatment and control groups could increase Type I errors in the presence of model misspecification or selection biases. To address these concerns, we conduct two additional tests. First, entropy balancing is widely used to address covariate imbalance across treatment and control groups because it increases the confidence that the causal effects are the outcome of the treatment and not the result of covariate differences (e.g., Chapman et al., 2019; Francis & Wang, 2021; McMullin & Schonberger, 2020). Therefore, we replicate our results using entropy balancing. Second, using the Madoff Ponzi scandal in 2008 as a quasi-natural experiment, we examine whether the retention of Big 4 auditors *within* the registered investment management industry changed around this time. For the sample of auditor turnovers in this industry, the pre-scandal retention of Big 4 as successor auditor is around 92% and this number jumps to 100% for the three years subsequent to the scandal, which provides evidence consistent with the insurance demand for auditing services within the registered investment management industry.

To provide direct evidence on the insurance demand hypothesis, we design three cross-sectional tests that explain variations *within* the registered investment management industry. First, as the insurance option value to investors is higher when the auditor is wealthier, holding audit quality constant (i.e., relying only on the Big 4 sample within the registered investment management industry), we expect more (less) affluent audit firms to have a larger (smaller) market share in the industry because of the higher demand for wealthier audit firms. The test results are consistent with the insurance demand hypothesis. Second, holding audit quality constant (registered investment management companies with Big 4 auditors only), audit fee changes are expected to be positively associated with changes in audit firms' wealth. This is because more (less) wealthy firms with more (less) wealth-at-risk are expected to charge higher (lower) fee premium for their exposure to lawsuits. Controlling for audit quality and audit complexity, we provide evidence consistent with the insurance hypothesis. Third, the insurance demand hypothesis suggests that the flow of funds increases when registered investment companies switch from a non-Big 4 to a Big 4 firm. Using hand-collected data on fund performance and flows, we again render evidence consistent with our expectations.

Contrary to the emphasis on the assurance demand for auditing services in prior research, we underscore the prominence of the Big 4 firms within the registered investment management industry. In a related study, Goldie et al. (2018) find that, for a small cohort of U.S. domiciled taxable bond mutual funds, the performance–fund flow relationship is stronger for funds with industry specialist auditors and for those with long-tenure auditors. In sharp contrast, we attribute the insurance demand for auditing services as the leading explanation for the Big 4 firms in the mutual fund industry.

[4] Under Rule 30a-2 of the 1940 Act, registered investment companies must file their annual shareholder reports using Form N-CSR. This form includes certifications of the principal officers and other disclosures related to code of ethics, audit committee financial expertise, internal control over financial reporting effectiveness, evaluation of disclosure controls and procedures, and proxy voting policies. The form also includes a schedule of investments.

[5] Financial firms can also operate as agents playing a custodial role, investing the funds of savers on their behalf in segregated accounts (CRS Report 2020). The industry includes banks, non-depository institutions, security and commodity brokers, insurance carriers, insurance agents, brokers, and service, real estate, other investment offices.

We organize the remainder of the paper as follows. Section 2 provides a background on registered investment companies and develops our hypotheses. Section 3 describes research methodologies, and Section 4 describes the data selection procedure. Section 5 presents empirical test results, and Section 6 concludes the paper.

2 | BACKGROUND AND HYPOTHESIS DEVELOPMENT

2.1 | Prior research

Although the demand for audit quality is extensively researched in academia, there is limited empirical evidence on the insurance demand for auditing services.[6] In this subsection, we provide a brief review of the evidence on the insurance demand for auditing services. For instance, Menon and Williams (1994) provide evidence on the insurance demand for auditing by examining the stock price reaction to the clients of the audit firm Laventhol and Howarth (L&H) around (1) the announcement of the bankruptcy of L&H and (2) the appointment of the successor auditor following the demise of L&H. Menon and Williams (1994) conclude that, consistent with the insurance demand hypothesis, investors view auditors as guarantors of financial statements and investments.

Using the initial public offering setting, Willenborg (1999) hypothesizes and finds that the insurance demand for auditing dominates the audit quality demand for auditing. Similarly, Brown et al. (2013) examine the Department of Justice's investigation of the aggressive promotion and sale of tax shelters by KPMG as a natural experimental setting for the insurance demand hypothesis. Concentrating on KPMG clients, Brown et al. (2013) examine how stock prices respond to the news of KPMG's investigation by, and the settlement with, the Department of Justice. Consistent with the insurance demand hypothesis, they find negative abnormal stock returns when it appeared that KPMG would face criminal charges, but abnormal stock returns are positive following the news of an impending settlement.

In a related study, Mansi et al. (2004) examine whether audit quality and audit tenure matter to bond market investors. They find that both the insurance demand and the audit quality demand are economically significant determinants of the cost of debt. Finally, in an experimental setting, O'Reilly et al. (2006) examine how the insurance demand and the audit quality demand interact while controlling for agency costs. They find that the negative effect of the auditor's going-concern opinion on analysts' estimates of stock price is reduced by the auditor's insurance function.

In contrast to the prior studies that provide evidence on the insurance demand by underscoring stock market reactions around key auditing and/or regulatory events, or by analyzing bond market reactions to auditor tenure, we provide evidence on the insurance demand using the registered investment management industry as a natural setting for our empirical investigation. Because of regulatory and institutional reasons (as explained in the ensuing subsections), the assurance demand for auditing services is expected to be low in this industry. However, the insurance demand for auditing services is expected to be high. Therefore, we test whether the demand for Big 4 firms is unusually high in the registered investment management industry and whether this demand for the Big 4 is the outcome of the insurance demand for auditing services.

2.2 | Registered investment management companies

2.2.1 | Brief history

The first mutual fund organized in the United States was in 1924 under the name "Massachusetts Investment Trust." Since its inception, the industry has attracted insurance companies, brokerage firms, conglomerates, and banks to perform advisory or distribution services. The industry has also become more sophisticated over time. In the 1970s,

[6] DeAngelo (1981, 1986) defines audit quality as "the market assessed joint probability that a given auditor will both discover a breach in a client's accounting system and report the breach." DeFong and Zhang (2014), Knechel et al. (2013), and Francis (2011), among others, provide a review of the literature on the audit quality demand. The insurance demand for auditing services arises when users of financial statements can rely on auditors to recover their damages resulting from audit failures (Weber et al., 2008).

money market funds and tax-exempt funds became popular classes of investment companies. In the 1980s, the industry ventured into foreign markets. During the 1990s, the industry began actively investing in derivatives securities markets. Within the broader financial sector, the registered investment company industry is highly specialized, intensely competitive, subject to industry-specific regulation, entitled to special tax treatment, and generally under constant public scrutiny.

2.2.2 | Definition of investment companies

"Pending Content" in FASB ASC 946-10-15-2 defines an entity as an investment company for accounting purposes if a company has the following fundamental attributes:

a. The company's primary business activity involves raising funds from the public, investing the proceeds raised from the public in securities solely to generate investment income and/or returns from capital appreciation;
b. Ownership in the company is typically represented by units of investments to which proportionate shares of net assets can be attributed;
c. The owners of the company pool their financial resources to benefit from professional investment management;
d. The company is the primary reporting entity.

An investment company is required to register with the SEC under the Investment Management Company Act of 1940 if its outstanding securities are beneficially owned by more than 100 persons or if it is offering or proposing to offer its securities to the public. Some prominent examples of investment management companies include open-end funds (commonly known as mutual funds) and closed-end funds (including small business investment companies and business development companies). Unit investment trusts and trust funds are also registered under the 1940 Act.[7]

2.2.3 | Reporting requirements

The 1940 Act mandates that registered investment companies must submit the following financial statements to shareholders and the SEC: (a) a statement of assets and liabilities and a detailed schedule of investments or a statement of net assets,[8] (b) a statement of operations, and (c) a statement of changes in net assets. In addition to the basic financial statements, registered investment companies must also present financial highlights either as a separate schedule or within the notes to the financial statements. Under the 1940 Act, registered investment management companies must file their annual reports, which are audited, and semiannual reports using Form N-SAR. They must also file their annual and semiannual shareholder reports along with certifications of principal executive and financial officers using Form N-CSR.

2.3 | Hypothesis

The value of auditing arises from its ability to ensure that the financial statements faithfully reflect the client's underlying economics (DeFond & Zhang, 2014). Higher agency conflicts increase the demand for a higher quality third-party

[7] Registered investment companies are required to have (1) a chief compliance officer, (2) an investment adviser, (3) a transfer agent, (4) an administrator, (5) a recordkeeping agent, (6) a principal underwriter, and (7) a custodian. Registered investment companies are governed by board of directors or trustees.

[8] Regulation S-X permits a registered investment company to include in its reports to shareholders a summary portfolio schedule of investments, provided that the complete portfolio schedule is filed with the SEC on Form N-CSR semiannually and provided to shareholders free of charge.

assurance (audit quality demand). Because registered investment companies are expected to exhibit higher financial reporting quality, fewer agency conflicts, and lower information asymmetry problems, they derive fewer audit quality benefits from retaining Big 4 firms. Further, Big 4 firms charge more than non-Big 4 firms (Choi et al., 2008; Craswell et al., 1995; Ghosh & Siriviryakul, 2018; Palmrose, 1986). Therefore, the audit quality demand for Big 4 firms is low in the registered investment industry because the benefits of retaining a Big 4 firm are low while the costs are high.

Another economic demand for auditing arises from the auditors' ability to insure outside parties in the event of securities fraud (insurance demand). In most cases, a third party (or a client) who can support a claim that damages were incurred based on misleading financial statements can bring a lawsuit against an audit firm under common-law liability. To win a claim against an audit firm, the third party suing under common-law liability must prove that: (1) they suffered a loss, (2) the loss was due to reliance on misleading financial statements, and (3) the auditor knew or should have known that financial statements were misleading (Johnstone & Bedard, 2004).

Because the Big 4 carry malpractice or professional liability insurance (e.g., Lys & Watts, 1994), they can potentially indemnify losses incurred by outside stakeholders more than smaller auditors. Therefore, the insurance demand is higher for a Big 4 firm than for a non-Big 4 firm.

The registered investment management industry has drawn the attention of regulators and media because of fraud and illegal trading activity (e.g., Davis et al., 2007; Houge & Wellman, 2005). The frequency and severity of losses from fraud can be large in the registered investment management industry. Between 2000 and 2016, the SEC successfully prosecuted 981 cases of fraud perpetrated by investment managers of mutual and hedge funds, which caused losses exceeding $40 billion (Dimmock et al., 2018).[9] Similarly, according to Claims Trends (ICI Mutual, 2020), for mutual funds encountering civil litigation and/or regulatory investigations and proceedings, legal defense costs can be substantially large in magnitude. Defense costs can quickly reach seven figures for affected fund groups and, in significant shareholder litigation, can in some cases climb into eight figures. These statistics suggest that the incidence and severity of legal and regulatory violations by the registered investment management industry can be non-trivial.

Another cost of fraud is that investors are more likely to withdraw assets following a fraud because of a lack of trust (Gurun et al., 2018). Given that registered investment companies like open-end mutual funds are heavily reliant on external capital, they benefit from retaining a Big 4 firm. This is because, other factors remaining constant, investors are more likely to invest in mutual funds when they have added financial recourse in case of fraud.

Therefore, we hypothesize that the demand for a Big 4 firm is higher in the registered investment industry than in a comparable industry (e.g., financial industry) because the Big 4 can provide a higher level of insurance to investors in case of fraud or other illegal activities than non-Big 4 firms. More formally, our hypothesis states as follows:

HYPOTHESIS: The demand for Big 4 firms is higher in the registered investment industry than in a comparable industry because, relative to the non-Big 4 firms, the Big 4 firms can provide a higher level of insurance.

3 | RESEARCH DESIGN

3.1 | Economic demand for auditing services

We use Big 4 as a proxy to measure the strength of the economic demand for auditing services. Our auditor selection model (Big 4 versus non-Big 4) is based on Lawrence et al. (2011) and Chaney et al. (2004). Specifically, we estimate

[9] There are two types of frauds perpetrated by fund managers: (1) falsifying books and records by altering a fund's books and records to cover losses or create performance that does not exist and (2) misappropriating assets, which involves theft of the fund's assets often accomplished by causing the fund to pay for a fictitious investment or diverting a payment to an investor (see https://www.eisneramper.com/fund-manager-fraud-risk-ami-0217).

the following logistic regression model:

$$AUDITOR = \beta_0 + \beta_1 RIMC + \beta_2 LNASSET + \beta_3 CASH + \beta_4 ROA + \beta_5 LOSS + Yearfixed - effects + " \quad (1)$$

The dependent variable *AUDITOR* is an indicator variable, which equals one when the auditor is a Big 4 firm. If registered investment companies (*RIMC*s) are more likely to engage a Big 4 firm because of the insurance demand, we expect the coefficient on *RIMC* (β_1) to be positive. The control variables are defined as follows. *LNASSET* is the logarithm of total assets. *CASH* is the ratio of cash and cash equivalents to total assets. *ROA* is the ratio of net income to total assets. *LOSS* equals one for firms with negative net income and 0 otherwise.[10] We include Year fixed-effects to capture the common (to all clients) impact of annual economic conditions and other annual differences on the demand for auditors. Equation (1) is estimated using client-year observations.

To study the *relative* economic demand for auditing services in registered investment management companies, we select other financial firms (SIC 6000–6999 excluding RIMCs) as our control group. To mitigate possible functional form misspecification and/or selection biases because of covariate imbalances between treatment (*RIMC*) and control (*FINANCIAL*) groups, we also estimate Equation (1) using entropy balancing. Entropy balancing allocates nonnegative weights to each control observation such that the specific moments (e.g., mean and variance) of the covariate distributions of the weighted control sample are nearly identical to those of the treated sample.

3.2 | Direct tests of the insurance demand hypothesis

To provide direct evidence on the insurance demand hypothesis, we construct three distinct tests that are limited to the registered investment management industry.

3.2.1 | Wealth and market share

First, we examine whether an audit firm's market share in the registered investment management industry is positively associated with the firm's wealth. In Dye's (1993) model, the insurance demand is based on "auditor's wealth, prevailing liability rules, and auditing standards," which is "an option value of the claim financial statement users have on their firm's auditor in the event of an audit failure." Relative to smaller audit firms, larger audit firms are expected to have more audit partners who contribute more capital, which adds to the firm's wealth (capital). Also, larger audit firms are expected to have greater insurance coverage, which provides higher insurance protection for investors. If insurance demand motivates the choice of an auditor in the registered investment management industry, we expect the demand for audit services to depend on the audit firms' wealth. Therefore, a firm's wealth is expected to be positively associated with its market share in the industry.

One parsimonious measure of a firm's wealth is equity (assets minus liabilities). However, as privately owned organizations, audit firms' equity is not publicly disclosed in the United States. We circumvent this challenge by relying on the reporting requirements for audit firms in other countries comparable to the United States.. One prominent example is the UK, where some audit firms elect to disclose their annual financial reports.

To compute the wealth (equity) of U.S. audit firms, we assume that the equity-to-sales ratio is constant across UK and U.S. firms. Therefore, we first hand collected: (1) annual sales and annual equity data for the Big 4 audit firms from the UK and (2) U.S. audit firms' annual sales data (from *Accounting Today*). For a given year, the wealth proxy (*WEALTH*)

[10] Because *Compustat* does not cover investment management companies, we are limited to the data provided by *Audit Analytics*. We are unable to include current assets, leverage, and quick ratio because most investment management companies do not report current assets, accounts receivable, or debt. We replace quick ratio with cash (*CASH*), which is a direct proxy for liquidity.

for an audit firm in the United States.is the natural logarithm of the product of annual sales of a U.S. audit firm and the corresponding UK-based audit firm's equity-to-sales ratio for that year. For instance, to compute PWC's *WEALTH* for 2015, we take the natural logarithm of the product of PWC's annual U.S. sales and UK-PWC's equity-to-sales ratio for 2015.

One data constraint is that the UK-Big 4 firms do not disclose their annual reports with regularity. As a result, we are able to collect UK-PWC's annual reports from 2004 to 2019, and UK-KPMG's annual reports from 2013 to 2019.[11] Given this data limitation, we can only compute *WEALTH* of PWC between 2004 and 2019 and of KPMG between 2013 and 2019.

Drawing on Aobdia and Shroff (2017), we estimate the following market share model using OLS regressions.

$$\begin{aligned} MARKETSHARE = \beta_0 + \beta_1 WEALTH + \beta_2 LNCLIENTS + \beta_3 AVGROA + \beta_4 AVGCASH \\ + \beta_5 AVGACCRUAL + \beta_6 AVGGROWTH + \beta_7 AVGLOSS + \varepsilon \end{aligned} \quad (2)$$

The dependent variable *MARKETSHARE* is the market share of an audit firm in the RIMC industry (ratio of audit fees paid to an audit firm by its clients from the *RIMC* industry to audit fees paid by all RIMC clients to all audit firms). The key independent variable is *WEALTH*. According to the insurance demand hypothesis, the coefficient on *WEALTH* (β_1) is positive. Equation (2) is estimated using audit firm-year observations (*MARKETSHARE* and *WEALTH* are computed for an audit firm in a given year).

As explained earlier, within the Big 4 firms, we could collect the necessary information to compute *WEALTH* for PWC and KPMG only. Therefore, our sample is limited to the clients of PWC and KPMG for the years with available data on *WEALTH*. As in prior studies, we assume that the audit quality is constant within the Big 4 (see DeFond & Zhang, 2014). Therefore, wealth variations within PWC and KPMG are likely to explain the insurance demand for auditing services and not the audit quality demand for auditing services.

Following Aobdia and Shroff (2017), we control for the logarithm of the number of clients of a Big-4 audit firm in the RIMC industry (*LNCIENTS*). We also control for differences in audit complexity using client characteristics as a proxy for audit complexity. As in Aobdia and Shroff (2017), we use the average values of all the clients of an audit firm in a given year. *AVGROA* is the average value of *ROA*, *AVGCASH* is the average value of *CASH*, *AVGACCRUAL* is the average accruals to total assets, *AVGGROWTH* is the average revenue growth, and *AVGLOSS* is the percentage of clients with *LOSS*.[12] Because the sample size is relatively small ($N = 23$), including fixed effects would create "degrees of freedom problems," i.e., lacking sufficient observations to do a meaningful statistical analysis. Therefore, we do not include fixed effects when estimating Equation (2).

3.2.2 | Changes in wealth and changes in audit fees

Second, we examine whether auditors charge more from their clients as audit firms' wealth increases over time. If wealthier audit firms provide a higher level of insurance, they are expected to charge a higher risk premium as compensation for providing the added protection to investors. Therefore, we expect a positive association between changes in audit firm's wealth and changes in audit fees. Drawing on Ghosh and Lustgarten (2006) and Kuo et al. (2022), we estimate the following OLS regression:

$$\begin{aligned} \Delta AUDITFEE = \beta_0 + \beta_1 \Delta WEALTH + \beta_2 \Delta LNASSET + \beta_3 \Delta ROA + \beta_4 \Delta CASH \\ + \beta_5 \Delta LOSS + \beta_6 FIRST - YEAR + \text{Yearfixed} - \text{effect} + \varepsilon \end{aligned} \quad (3)$$

[11] We also searched for annual reports of Big 4 firms in other developed nations within Europe (e.g., Finland, Switzerland, Demark, and the Netherland). However, compared with these other nations, the data are more readily available for audit firms in the UK.

[12] As stated previously, we exclude leverage and inventory because RIMCs do not report inventory or debt. Also, we exclude going-concern opinions because of lack of variation in the data.

The dependent variable $\Delta AUDITFEE$ is the difference in *AUDITFEE* between the current and prior fiscal years, where *AUDITFEE* is the natural logarithm of fees paid to the external auditor for audit services. The key independent variable $\Delta WEALTH$ is the difference in *WEALTH* between the current and prior fiscal years where *WEALTH* is as computed previously. According to the insurance demand hypothesis, the coefficient on $\Delta WEALTH$ (β_1) is positive. Equation (3) is estimated using client-year observations restricted to the RIMC industry.

We use a first-difference specification, instead of a levels specification, for several reasons. First, the correlated omitted variables problem is less of a concern in a changes specification if the omitted variables are time-invariant. Second, variation in fees arising from cross-sectional differences in audit complexity is less of a concern because a company is used as its own benchmark.

The control variables are defined as follows. $\Delta LNASSET$ is the change in *LNASSET* between the current and prior fiscal years, where *LNASSET* is the logarithm of total assets. ΔROA is the change in ROA between the current and prior fiscal years. $\Delta CASH$ is the change of *CASH* between the current and prior fiscal years. $\Delta LOSS$ is the change of *LOSS* between the current and prior fiscal years. *FIRST-YEAR* equals one for firm-years with auditor turnover and zero otherwise.[13] As in Ghosh and Lustgarten (2006), we also include Year fixed-effect to capture temporal variations in changes in audit fees that are common across all clients.

3.2.3 | Auditor switches and changes in fund flows

Finally, similar to Goldie et al. (2018), we examine whether investment fund flows are affected by registered investment companies switching between Big 4 and non-Big 4 auditors. Because Big 4 provide a higher level of insurance than non-Big 4, the insurance demand hypothesis suggests that the flow of funds increases (decreases) when registered investment companies switch from a non-Big 4 (Big 4) to a Big 4 (non-Big 4) audit firm.

As hand-collecting data on fund flows is labor intensive, we concentrate on RIMCs switching between Big 4 and non-Big 4, which limits the data collection requirement and also yields predictions on fund flows that are stark. As a base comparison case, we also include RIMCs that do not switch auditors. Because the sample without auditor turnover is considerably larger than that with auditor turnover, we find a matched RIMC without auditor turnover for every RIMC with auditor turnover, where matching is based on year and total assets. For example, for a RIMC switching from a Big 4 to a non-Big 4 in a given year, we find an asset-matched RIMC with a non-Big 4 auditor from the corresponding year.

To examine the relationship between net fund flows and the type of auditor switches, we estimate the following OLS regression:

$$\begin{aligned}\Delta AMOUNT/SHARES = {} & \beta_0 + \beta_1 NB4B4 + \beta_2 B4NB4 + \beta_3 \Delta FSIZE + \beta_4 \Delta LNASSET \\ & + \beta_5 GROWTH + \beta_6 \Delta NONAUDIT + \beta_7 RETURN \\ & + \beta_8 EXPENSE + \beta_9 FUNDAGE + \beta_{10} LOAD + \varepsilon\end{aligned} \tag{4}$$

The dependent variable $\Delta AMOUNT$ ($\Delta SHARES$) is defined as the percentage change in *AMOUNT* (*SHARES*) between year 1 and year 0, where year 0 is the year of the auditor turnover year. *AMOUNT* (*SHARES*) is the dollar amount (number) of shares issued in a given year net of any redemptions in that year obtained from annual reports (N-CSR). The key independent variables are *NB4B4* and *B4NB4*. *NB4B4* (*B4NB4*) equals one when a client switches from a non-Big 4 (Big 4) to a Big 4 (non-Big 4) auditor. According to the insurance demand hypothesis, the coefficient on *NB4B4* (*B4NB4*) is positive (negative).

[13] Ghosh and Lustgarten (2006) additionally include current ratio, inventory ratio, leverage, segments, and foreign operations. Because this type of financial information is not provided by RIMCs, we cannot include these control variables in our fee regressions.

We include several control variables that might be associated with investment fund flows. *ΔFSIZE* is the change of *FSIZE* between the current and prior fiscal years, where *FSIZE* is the logarithm of a company's annual report (N-CSR) file size (in KB). *ΔLNASSET* is the change in *LNASSET* between the current and prior fiscal years, where *LNASSET* is the logarithm of total assets. *GROWTH* is the percentage change in sales revenue between the current and the prior year. *ΔNONAUDIT* is the change in *NONAUDIT* between the current and prior fiscal years, where *NONAUDIT* is the logarithm of non-audit fees.

ΔFSIZE, *ΔLNASSET*, *GROWTH*, and *ΔNONAUDIT* are computed using data from Audit Analytics. Similar to Goldie et al. (2018), we also hand collect data on the remaining control variables from N-CSR reports filed with the SEC and publicly available through the EDGAR database. *RETURN* is the weighted average return of a fund family computed from the returns of the individual mutual funds within the fund family, where total net assets of the individual mutual funds are used as weights. Similarly, *EXPENSE* is the weighted average expense ratio (sum of operating expenses and management fees as a percentage of total net assets) of the fund family computed using the expense ratio of the individual mutual funds within the fund family, where total net assets of the individual mutual funds are used as weights. *FUNDAGE* is the number of years since the fund first filed its N-CSR with the SEC. *LOAD* equals one if the fund charges either a front or backend load and zero otherwise.

Because we examine changes in investment fund flows resulting from changes in the auditor, our estimation is analogous to a one-period changes specification around a specific economic event (auditor change). Therefore, the OLS estimation of Equation (4) is analogous to a within or fixed-effects estimator.

4 | SAMPLE SELECTION AND DESCRIPTIVE STATISTICS

4.1 | Sample selection

Our sample is compiled from the *Audit Analytics* database between the fiscal years 2004 and 2019. We identify RIMCs using two criteria. First, we rely on the variable *CO_IS_FT* in *Audit Analytics* to assess whether a company is a mutual fund (open-end) or trust (e.g., REIT, mortgage-REIT, estate, agency account, collateralized mortgage obligations), or other fund (e.g., pension fund, closed-end fund, exchange-traded fund, business development company, unit investment trust). There are 50,287 observations with the variable *CO_IS_FT* equal to one. For this group of companies, there is considerable variation in the annual shareholder report filing requirements. The prominent examples include (a) Form 10-K (public offerings, businesses with more than $10 million in assets held by 2,000 or more people, companies with 500 or more shareholders, and securities listed on a U.S. stock exchange), Form 10-KSB (small businesses), Form 20-F (foreign private issuers with equity shares listed on a U.S. stock exchange), Form 40-F (companies domiciled in Canada with securities listed on a U.S. stock exchange), and Form N-CSR (investment companies registered under Section 30 of the Investment Company Act of 1940).

Second, to identify RIMCs within this cluster of firms identified as a fund or trust by *Audit Analytics*, we rely on the requirement that investment management companies registered with the SEC must file their annual reports using Form N-CSR. Therefore, we additionally require that companies identified as a generic fund or trust by *Audit Analytics* also file their annual shareholder reports using Form N-CSR, which consist of mutual (open-end) funds, closed-end funds, exchange-traded funds, money market funds, and mortgage real estate investment trusts (mREITs).[14]

Using this search criterion, we identify 1,751 RIMCs with 11,893 client-year observations with the required data. To establish that registered investment companies have a relatively high demand for Big 4 firms, we must identify an appropriate control group of companies. We choose financial companies (*FINANCIAL*) with SIC codes between 6000 and 6999 (excluding RIMCs) as our benchmark companies with a total of 20,704 client-year observations.

[14] Some trusts (e.g., REITs or unit investment trusts) and others such as small business investment companies and business development companies (SDC) are not required to file their annual reports under Form N-CSR. Hence, we exclude them from our analyses.

One inherent data constraint is that COMPUSTAT, which is the primary source of information for financial accounting variables, does not provide financial data for investment management companies. Therefore, we rely on *Audit Analytics* for financial accounting data, which is not as comprehensive as the coverage in COMPUSTAT.

For the first two direct tests of the insurance demand hypothesis, we hand collect information about the audit firm wealth as indicated in Section 2 by collecting annual reports of UK-based audit firms and total revenues of U.S.-based audit firms from *Accounting Today*. For the third test of the insurance demand hypothesis, we hand collect data on investment fund flows from annual shareholder reports (N-CSR) filed by RIMCs with the SEC using the EDGAR database. To limit our hand collection of data, which is time-consuming, we concentrate on the auditor switches between large and small audit firms, i.e., a switch from a non-Big 4 (Big 4) to a Big 4 (non-Big4). We also collect fund flow data for matched RIMCs without any auditor turnover. Specifically, for an RIMC switching from a Big 4 (non-Big 4) to a non-Big 4 (Big 4) auditor in any given year, we find an asset-matched RIMC with a non-Big 4 (Big 4) auditor from the corresponding year.

We collect annual fund inflows (outflows) data, based on dollar amount and number of shares, for each registered investment company from issuance (redemption) of shares. Because registered investment company data are required to be reported at the fund share class level, we aggregate the inflow and outflow annual numbers across all fund share classes. In addition, we collect the funds' annual performance, expenses charged for operating expenses and management fees, fund age, and whether there is a front or backend load. We collect these data for three years around the auditor turnover date from the EDGAR database.

4.2 | Descriptive statistics

Table 1 presents the summary statistics for our sample. In Panel A, we report the mean and variance of the control variables included in Equation (1) for *RIMCs* and financial companies (*FINANCIAL*). We also report the difference in the mean values between the two groups. We find the average firm size (*LNASSET*) is larger for RIMCs than for financial companies. The mean cash to total asset (*CASH*) is 0.06% for *RIMCs* and that for *FINANCIALs* is 8.52%, which shows that registered investment companies tend to keep less cash balance, which is understandable given that *RIMCs* must invest their cash into profitable investments with little working capital needs. The univariate results also indicate that *RIMCs* are more profitable (*ROA*) and are less likely to report a loss (*LOSS*) compared with *FINANCIALs*. All the differences are statistically significant at less than 1% level.

We adopt entropy balancing to control for the differences in the covariates between *RIMC* and *FINANCIAL* groups. Panel B reports the mean and variance for *RIMC* and *FINANCIAL* groups after entropy balancing. By construction, under entropy balancing, the mean and variance differences between the two groups of firms are statistically insignificant. In Panel C, we also report the mean and variance of the additional control variables included in Equations (2) to (4).

5 | EMPIRICAL RESULTS

5.1 | Economic demand for auditing services

5.1.1 | Big 4 retention

In Table 2, we provide evidence on the economic demand for auditing services by analyzing the retention of Big 4 audit firms in the registered investment management industry. Panel A reports the univariate results. The percentage of *RIMCs* with a Big 4 auditor is 98%, whereas the corresponding number for *FINANCIALs* is 56%. The difference in Big

TABLE 1 Summary statistics.

	RIMC		Financial		Difference test	
	Mean	Variance	Mean	Variance	Difference	t-value
Panel A: Without entropy balancing						
LNASSET	21.680	3.705	21.100	7.091	0.58	20.92
CASH	0.0006	0.0001	0.0852	0.0207	−0.08	−64.03
ROA	0.0160	0.0039	−0.0211	0.0407	0.04	19.14
LOSS	0.1152	0.1019	0.2807	0.2019	−0.17	−32.93
Panel B: With entropy balancing						
LNASSET	21.680	3.705	21.680	3.705	0.00	−0.00
CASH	0.0006	0.0001	0.0006	0.0001	0.00	−0.00
ROA	0.0160	0.0039	0.0160	0.0039	0.00	0.00
LOSS	0.1152	0.1019	0.1152	0.1019	0.00	0.00
Panel C: Other control variables in the RIMC industry						
ACCRUAL			−0.0008			0.0010
GROWTH			0.6722			8.9396
FIRST_YEAR			0.0211			0.0207

This table reports the descriptive statistics for investment management companies registered with the SEC and regulated by the Investment Company Act of 1940 (RIMC) and for all other financial firms with SIC codes between 6000 and 6999 (FINANCIAL, excluding RIMCs). *LNASSET* is the logarithm of total assets. *CASH* is the ratio of cash and cash equivalents to total assets. *ROA* is the ratio of net income to total assets. *LOSS* equals 1 for firms with negative net income and 0 otherwise. Panel A (B) reports the descriptive statistics without (with) entropy balancing. Panel C reports the descriptive statistics for additional control variables that are restricted to the RIMC sample. *ACCRUAL* is earnings before interest, taxes, depreciation, and amortization less cash flow from operations deflated by total assets. *GROWTH* is the percentage change in sales revenue between the current and the prior year. *FIRST-YEAR* equals 1 for firm-years with auditor turnover.

4 retention rates between the two groups of firms is statistically significant at the 1% level. A registered investment management company is 75% more likely to retain a Big 4 auditor than a financial company. Based on these numbers, the odds ratio is 32 ([97.54%/2.46%]/[55.65%/44.35%] = 31.72), i.e., the odds of a registered investment management company retaining a Big 4 firm (the ratio of Big 4 to non-Big 4 probability) is 32 times the odds of a financial company retaining a Big 4 firm.

In Panel B, we report the logistic regression results using *AUDITOR* as the dependent variable and controlling for other factors associated with the likelihood of a company engaging a Big 4 firm. The coefficient on *RIMC* in the first regression (without entropy balancing) is positive and significant at the 1% level (3.869, z-stat = 57.12). The coefficient estimates indicate that the odds ratio is 48 ($e^{3.869} = 47.89$). The results of the control variables are consistent with the findings from prior studies. The retention of a Big 4 auditor increases with firm size (*LNASSET*), profitability (*ROA*), and cash holding (*CASH*).

When we apply entropy balancing, the coefficient on *RIMC* in the second regression is smaller in magnitude (*RIMC* = 2.99; z-stat = 30.88), but it continues to be significant at the 1% level. The coefficient estimates indicate that the odds ratio is 20 ($e^{2.99} = 19.88$), i.e., controlling for other factors, a registered investment management company is 20 times as likely to retain a Big 4 firm as a financial company retaining a Big 4 firm.

Our results from Table 2 are consistent with the hypothesis that registered investment companies are considerably more likely to retain Big 4 firms than other financial companies. Given that financial reporting quality is less relevant for the investment management industry RIMCs, we attribute the greater demand for the Big 4 firms to their ability to provide a higher level of insurance.

TABLE 2 Demand for auditing services.

Panel A: Univariate Analyses		
	RIMC	*FINANCIAL*
Observation	11,893	20,704
AUDITOR	97.54%	55.65%
RIMC–FINANCIAL	41.89% (89.48)***	
Panel B: Multivariate logistic regression analyses		
	Entropy Balancing	
	Without	**With**
RIMC	3.869***	2.990***
	(57.12)	(30.88)
LNASSET	0.686***	0.681***
	(63.90)	(28.64)
CASH	1.173***	−1.420
	(9.21)	(−1.56)
ROA	3.322***	2.948***
	(14.29)	(5.83)
LOSS	0.995***	0.889***
	(19.92)	(6.67)
Constant	−13.86***	−12.99***
	(−59.41)	(−24.09)
Year fixed-effects	Included	Included
Observations	32 597	32 597
Pseudo R^2	0.405	0.333

This table reports the logistic regression results where the dependent variable is *AUDITOR*, which equals 1 when the auditor is a Big 4 firm and 0 otherwise. *RIMC* equals 1 for investment management companies registered with the SEC and regulated by the Investment Company Act of 1940. The control firms are all financial companies (*FINANCIAL*) with SIC codes between 6000 and 6999 (excluding RIMCs). The control variables are defined as follows. *LNASSET* is the logarithm of total assets. *CASH* is the ratio of cash and cash equivalents to total assets. *ROA* is the ratio of net income to total assets. *LOSS* equals 1 for firms with negative net income and 0 otherwise. We report the estimated coefficients and the z-statistics in parentheses.
*** (**) indicates the level of significance at 1% (5%) for a one-tailed test.

5.1.2 | Big 4 demand following auditor turnover

We also provide evidence on our hypothesis using a changes setting, i.e., when clients switch between auditors. Focusing on auditor changes to examine the demand for audit services is a more powerful setting to directly understand the demand differences between the two sets of industries (*RIMC* and *FINANCIAL*). Therefore, we construct *BIG4_S*, which equals one when, conditional on auditor turnover, the successor auditor is a Big 4 firm and zero otherwise.

In Panel A of Table 3, we report the logistic regression results using *BIG4_S* as the dependent variable and relying on *FINANCIAL* as the control group. The coefficient on *RIMC* is positive and significant without entropy balancing (3.037, z-stat = 12.88). The coefficient estimates suggest that, conditional on an auditor turnover and holding other factors constant, the odds of a registered investment management company retaining a Big 4 firm is 20.8 times the odds of

TABLE 3 Demand for auditing services conditional on turnover.

Panel A: Big 4 Demand Subsequent to Auditor Turnover		
	Entropy Balancing	
	Without	With
RIMC	3.037***	1.693***
	(12.88)	(4.27)
LNASSET	0.673***	0.642***
	(13.51)	(6.33)
CASH	2.596***	0.930
	(5.02)	(0.69)
ROA	1.265	1.368
	(1.28)	(0.63)
LOSS	0.930***	0.826
	(4.40)	(1.60)
Constant	−15.19***	−13.66***
	(−14.11)	(−6.09)
Year fixed-effects	Included	Included
Observations	1258	1258
Pseudo R^2	0.356	0.276

Panel B: Auditor Turnover and Big 4 Demand Around Madoff Scandal		
	Successor Auditor: *BIG4-S*	
YEAR	*RIMC*	*FINANCIAL*
2005	92.68%	37.78%
2006	91.67%	35.58%
2007	91.67%	34.72%
2008	*Madoff Scandal*	
2009	100.00%	40.74%
2010	100.00%	36.84%
2011	100.00%	38.89%

Panel A reports the logistic regression results where the dependent variable is *BIG4_S*, which equals 1 when, conditional on auditor turnover, the successor auditor is a Big 4 firm and 0 otherwise. *RIMC* equals 1 for registered investment management companies registered with the SEC and regulated by the Investment Company Act of 1940. The control firms are *FINANCIAL* with SIC codes between 6000 and 6999 (excluding RIMCs). The control variables are defined as follows. *LNASSET* is the logarithm of total assets. *CASH* is the ratio of cash and cash equivalents to total assets. *ROA* is the ratio of net income to total assets. *LOSS* equals 1 for firms with negative net income and 0 otherwise. The test is restricted to the sample with auditor turnovers. We report the estimated coefficients and the z-statistics in parentheses. Panel B reports the retention of Big 4 firms following auditor turnover around the Madoff Scandal in 2008 for *RIMC* and *FINANCIAL* firms.
*** (**) indicates the level of significance at 1% (5%) for a one-tailed test.

a financial company retaining a Big 4 firm. This coefficient remains positive and significant but becomes smaller in magnitude with entropy balancing (1.693, z-stat = 4.27). Our estimates suggest that, conditional on an auditor turnover and holding other factors constant, the odds of a registered investment management company retaining a Big 4 firm is 5.4 times the odds of a financial company retaining a Big 4 firm.

5.1.3 | Madoff scandal: exogenous shock

A stronger test of the insurance demand for Big 4 auditors is to examine whether there is any change in the demand for audit services in the registered investment management industry following an exogenous negative shock. We focus on Bernie Madoff's Ponzi scheme as one such negative shock. Structured as a hedge fund (unregistered investment partnership) and via his investment brokerage company, Bernard L. Madoff Investments Securities LLC, Madoff embezzled almost $65 billion, which affected 8,000 investors worldwide, including individuals, charitable organizations, banks, professional investment firms, feeder funds, and superannuation/pension funds. Although the exogenous shock was in the non-registered (with the SEC) investment management industry, we expect the spillovers of the shock to permeate into the registered investment management industry and thereby influence the demand for Big 4 firms.

We report the results of the examination of the retention of a Big 4 firm (*BIG4-S*) following a turnover for *RIMCs* around the Madoff scandal (2008) in Panel B. For the pre-scandal years (2005–2007), the *BIG4-S* value is around 92% for each of the three years. However, this number jumps to 100% for each of the three post-scandal years (2009–2011). Our results indicate a marked shift in the retention of a Big 4 following a turnover, which is consistent with the insurance demand for the Big 4 firms in the registered investment management industry.

5.2 | Direct tests of the insurance demand hypothesis

We attribute the high demand for Big 4 firms in the registered investment management industry to the Big 4 firms' ability to indemnify investors, at least partially, for potential losses from fraudulent reporting. To provide more direct evidence on the insurance demand hypothesis, we rely on three distinctive tests based on various samples drawn *within* the registered investment management industry.

5.2.1 | Wealth and market share

First, we test whether audit firms' market share in the registered investment management industry is positively associated with audit firms' wealth. Table 4 reports the results from estimating Equation (2) using the restricted sample of registered investment companies with available data on the *WEALTH* for PWC and KPMG only. We restrict the sample to the registered investment industry to avoid model misspecification because of omitted variables that also explain variations in market share between industries. We limit the sample to clients with Big 4 audit firms to control for differences in audit quality between Big 4 and non-Big 4 auditors.

As explained in Section 3, because of data limitations to compute audit firms' wealth, we focus only on two of the Big 4 auditors—PWC (2004–2019) and KPMG (2013–2019). Because *MARKETSHARE* and *WEALTH* are measured at the audit firm level, the sample consists of 23 audit firm-year observations. Consistent with our expectation that wealthier audit firms acquire a larger market share in the *RIMC* industry, in Regression (1) of Table 4, the coefficient on *WEALTH* is positive and significant (0.182, *t*-stat = 2.67). Regression (2) is estimated after additionally including client characteristics, and the coefficient on *WEALTH* remains positive and significant (0.148, *t*-stat = 1.98). These results are consistent with our hypothesis that the unusually high demand for Big 4 firms in the registered investment management industry arises because wealthier audit firms can provide a higher level of insurance than less wealthy audit firms.

TABLE 4 Audit firm wealth and audit firm market share association for the registered investment management industry.

	PWC+KPMG	PWC+KPMG
WEALTH	0.1816***	0.1480**
	(2.67)	(1.98)
LNCLIENTS	0.0663***	0.0514
	(2.58)	(1.22)
AVGROA		−6.7550
		(−0.77)
AVGCASH		0.0116
		(0.13)
AVGACCRUAL		−0.2203
		(−0.93)
AVGGROWTH		−0.1327*
		(−1.83)
AVGLOSS		−0.6664
		(−0.64)
Constant	−3.8347***	−2.8029
	(−2.63)	(−1.66)
Observations	23	23
Adjusted R^2	0.304	0.309

This table reports the OLS regression results where the dependent variable is *MARKETSHARE* (ratio of audit fees paid to an audit firm by its clients from the *RIMC* industry to audit fees paid by all RIMC clients to all audit firms). The key independent variable is *WEALTH* (see Section 3 for the computation of *WEALTH*). The control variables are defined as follows. *LNCLIENTS* is the logarithm of the client number of the corresponding auditor in a given year. *AVGROA* is the average value of *ROA* of all the clients of an audit firm in a given year, *AVGCASH* is the average value of *CASH* of all the clients of an audit firm in a given year, *AVGACCRUAL* is the average accruals to total assets of all the clients of an audit firm in a given year, *AVGGROWTH* is the average revenue growth of all the clients of an audit firm in a given year, and *AVGLOSS* is the percentage of clients with LOSS for an audit firm in a given year. We report the estimated coefficients and the *t*-statistics in parentheses.
*** (**) indicates the level of significance at 1% (5%) for a one-tailed test.

5.2.2 | Changes in wealth and changes in audit fees

Second, we test whether changes in audit fees are positively associated with audit firms' wealth by estimating Equation (3) using the restricted sample of RIMCs with available data on *WEALTH* (PWC and KPMG). The OLS regression results are reported in Table 5.

In Regression (1), which only includes *ΔWEALTH* and Year fixed-effects, the coefficient on *ΔWEALTH* is positive and significant (0.187, *t*-stat = 4.54). When we additionally include the control variables in Regression (2), the coefficient on *ΔWEALTH* continues to remain positive and significant (0.191, *t*-stat = 4.69). Prior to first-differencing, since both *AUDITFEE* and *WEALTH* are log-transformed in Equation (3), the results indicate that, controlling for other factors associated with changes in audit fees, a 1% increase in the Big 4 firm's wealth leads to a 0.19% increase in audit fees.

One concern with a first-difference specification is that, even if the error term in the original audit fee model prior to first-differencing is not autocorrelated, the transformed error term in Equation (3) is autocorrelated. Therefore, a first-difference specification is also subject to estimation problems (e.g., the estimates are no longer efficient).

TABLE 5 Changes in audit firm wealth and changes in audit fees association for the registered investment management industry.

	PWC+KPMG	PWC+KPMG
ΔWEALTH	0.187***	0.191***
	(4.54)	(4.69)
ΔLNASSET		0.183***
		(13.13)
ΔROA		0.211
		(1.30)
ΔCASH		0.166
		(0.11)
ΔLOSS		0.0161
		(0.55)
FIRST_YEAR		−0.0310
		(−0.54)
Constant	0.250***	0.234***
	(5.61)	(5.31)
Year fixed-effects	Included	Included
Observations	4746	4746
Adjusted R^2	0.009	0.043

This table reports the OLS regression results where the dependent variable is *ΔAUDITFEE*, defined as the difference in *AUDITFEE* between the current and prior fiscal years where *AUDITFEE* is the natural logarithm of fees paid to the external auditor for audit services. The key independent variable *ΔWEALTH* is the difference in *WEALTH* between the current and prior fiscal years (see Section 3 for the computation of *WEALTH*). The control variables are defined as follows. *ΔLNASSET* is the change in *LNASSET* between the current and prior fiscal years where *LNASSET* is the logarithm of total assets. *Δ*ROA is the change of ROA between the current and prior fiscal year where ROA is the ratio of net income to total assets. *ΔCASH* is the change of *CASH* between the current and prior fiscal years where *CASH* is the ratio of cash and cash equivalents to total assets. *ΔLOSS* is the change of *LOSS* between the current and prior fiscal years where *LOSS* equals 1 for firms with negative net income and 0 otherwise. *FIRST-YEAR* equals 1 for firm-years with auditor turnover. We report the estimated coefficients and the *t*-statistics in parentheses.

*** (**) indicates the level of significance at 1% (5%) for a two-tailed test.

An alternative to the first-difference specification is a levels specification with "client" fixed effects to control for correlated omitted variables that are also time-invariant. Therefore, as a sensitivity test, we also estimate a levels-based audit fee specification as follows:

$$AUDITFEE = \beta_0 + \beta_1 WEALTH + \beta_2 LNASSET + \beta_3 ROA + \beta_4 CASH + \beta_5 LOSS + \beta_6 FIRST - YEAR + \text{Clientfixed} - \text{effect} + " \quad (5)$$

All the variables are as defined previously. The expected coefficient on *WEALTH* is positive (clients pay more in audit fees when their auditors are wealthier). Because we include client fixed-effects, Equation (5) estimates the effect of within-client variations in wealth on audit fees. In untabulated results, and consistent with the results from Table 5, we find that the coefficient on *WEALTH* remains significant (0.16, *t*-stat = 9.45). The results suggest that, controlling for other factors associated with audit fees, a 1% increase in the audit firm's wealth increases audit fees by 0.16%, which is economically very similar to the result from the changes specification.

5.2.3 | Auditor switches and changes in fund flows

Finally, Table 6 reports the OLS regression results of estimating Equation (4) using a restricted sample of registered investment companies switching between Big 4 and non-Big 4 audit firms and an equal number of matched registered investment companies that did not switch auditors. Specifically, for each observation in our sample where a client switched from a non-Big4 (Big 4) to a Big 4 (non-Big 4) firm, we find another matched RIMC from the same year with Big 4 (non-Big 4) firm that did not switch auditors that year. Matching is based on total assets.

We use two dependent variables: (1) the percentage change in fund flows from issuance of shares net of any redemptions based on the dollar amount (*ΔAMOUNT*) between years 1 and 0, where year 0 is the year of the auditor turnover year, and (2) the percentage change in the number of shares (*ΔSHARES*) also between years 1 and 0. Information about the dollar amount and number of shares issued including net redemptions are hand-collected data from RIMCs' annual reports (N-CSR).

The key independent variables are *NB4B4* and *B4NB4*. The coefficient on *NB4B4* is positive, as expected, and statistically significant (0.994, *t*-stat = 2.38) when we use *ΔAMOUNT* as the dependent variable. When we use *ΔSHARES* as the dependent variable, the coefficient on *NB4B4* remains positive and significant (1.404, *t*-stat = 2.21). These results indicate that net fund flows increase when registered investment companies switch from a non-Big 4 to a Big 4. However, the coefficient on *NB4B4* is not statistically significant in either regression. Our results do not show any reliable evidence that there is a significant change in the net fund flows when registered investment companies switch from a Big 4 to a non-Big 4 auditor.

Overall, the three added tests provide compelling empirical evidence consistent with the assertion that the registered investment management industry's high demand for Big 4 audit firms is the outcome of the Big 4 firms' ability to provide investors with added insurance protection in case of fraudulent reporting.

5.3 | Sensitivity tests

5.3.1 | Litigation in the mutual fund industry

The value of the insurance demand arises when (1) there is a nontrivial threat of litigation because shareholders incur losses from theft, fraud, or securities laws violations; (2) the settlement amounts are large in magnitude; and (3) audit firms can be held accountable for the losses incurred by shareholders. Although prior studies suggest that the threat of lawsuits in the mutual fund industry is nontrivial, to provide direct evidence, we collect data on the frequency of lawsuits in the mutual fund industry from ICI Mutual Insurance Company (ICI Mutual) website (https://www.icimutual.com). ICI Mutual is a predominant provider of D&O/E&O liability insurance and fidelity bonding for the U.S. mutual fund industry. Its insureds represent more than 60% of the mutual fund industry's assets. The *Litigation Notebook* of ICI Mutual provides detailed information about federal and state lawsuits and regulatory enforcement proceedings involving mutual funds, fund directors and officers, and fund advisers.[15]

We collect information on the frequency of lawsuits filed in federal and state courts and regulatory enforcement proceedings involving the mutual fund industry between 2004 and 2019 from the ICI Mutual *Litigation Notebook* database and report those results in Figure 1. We find that the number of lawsuits and regulatory enforcement proceedings varies between 12, in 2019, and 49, in 2016. The number of lawsuits and regulatory proceedings exceeds 10 in each of the 16 years for our sample period. In 9 years, the frequency exceeds 30 and in 4 years, the frequency exceeds 40.[16] One limitation of the ICI Mutual *Litigation Notebook* database is that the claims activity is restricted to

[15] See https://www.icimutual.com/litigation/notebook.php

[16] We do not collect information on the settlement amounts involving lawsuits and enforcements because civil lawsuits and regulatory proceedings take years to establish the magnitude of losses (in the form of defense costs, settlements, and judgments).

TABLE 6 Changes in fund flows around auditor turnover for registered investment management companies.

	ΔAMOUNT	*ΔSHARES*
NB4B4	0.994**	1.404**
	(2.38)	(2.21)
B4NB4	0.070	0.179
	(0.23)	(0.46)
ΔFSIZE	0.225	0.252
	(1.37)	(1.31)
ΔLNASSET	−0.028	0.364
	(−0.12)	(1.02)
GROWTH	0.360	−0.007
	(0.91)	(−0.01)
ΔNONAUDIT	−0.044	−0.085
	(−0.43)	(−0.69)
RETURN	2.613*	0.549
	(1.99)	(0.33)
EXPENSE	22.012**	23.229
	(2.37)	(1.53)
FUNDAGE	0.035	0.016
	(1.12)	(0.40)
LOAD	0.104	−0.061
	(0.37)	(−0.16)
Constant	−0.972***	−1.117**
	(−2.69)	(−2.41)
Observations	62	51
Adjusted R^2	0.286	0.228

This table reports the OLS regression results where the dependent variables are the percentage change in fund flows from issuance of shares net of any redemptions based on the dollar amount (*ΔAMOUNT*) and the number of shares (*ΔSHARES*) issued net of any shares redeemed between year 1 and year 0, where year 0 is the auditor turnover year. The sample consists of RIMCs switching auditors from a non-Big 4 to a Big 4 (NB4B4) audit firm or from a Big 4 to a non-Big 4 (B4NB4) audit firm. For every switching client, we find a matched non-switching client from the same year where matching is based on firm size (*LNASSET*). The key independent variable *NB4B4* equals 1 if the client changes a non-Big 4 auditor to a Big 4 auditor. *B4NB4* equals 1 if the client changes a Big 4 auditor to a non-Big 4 auditor. The control variables are defined as follows. *FSIZE* is the logarithm of a company's annual (N-CSR) file size (in KB). *LNASSET* is the logarithm of total assets. *GROWTH* is the percentage change in sales revenue between the current and the prior year. *NONAUDIT* is the logarithm of a non-audit fee. *RETURN* is the weighted average return of a fund family computed from the returns of the individual mutual funds within the fund family where total net assets of the individual mutual funds are used as weights. *EXPENSE* is the weighted average expense ratio (sum of operating expenses and management fees as a percentage of total net assets) of the fund family computed using the expense ratio of the individual mutual funds within the fund family, where the total net assets of the individual mutual funds are used as weights. *FUNDAGE* is the number of years since the fund first filed its N-CSR with the SEC. *LOAD* equals 1 if the fund charges either a front or backend load and 0 otherwise. Δ operator represents the change between the current and prior fiscal years. We report the estimated coefficients and the *t*-statistics in parentheses.

*** (**) indicates the level of significance at 1% (5%) for a two-tailed test.

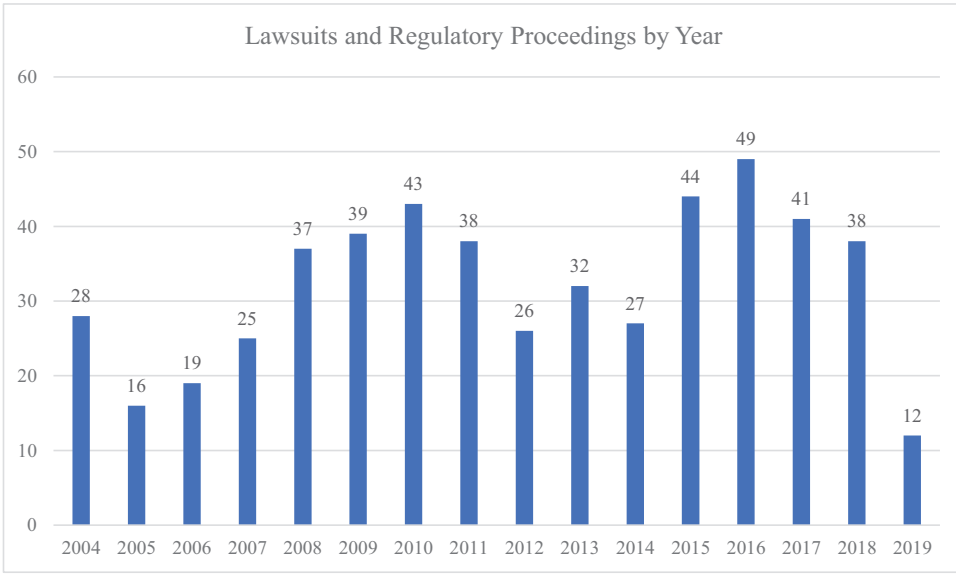

FIGURE 1 Civil lawsuits and regulatory enforcement proceedings in the mutual fund industry. This figure tabulates the number of civil lawsuits (filed in both federal and state levels) and regulatory enforcement proceedings involving fund advisers, mutual funds, and their directors/officers by each year between 2004 and 2019. This information is collected from the ICI Mutual Insurance Company (ICI Mutual) database (https://www.icimutual.com/litigation/notebook.php). ICI Mutual is the predominant provider of D&O/E&O liability insurance and fidelity bonding for the U.S. mutual fund industry. Its insureds represent more than 60% of the mutual fund industry's assets. Entities and individuals insured by ICI Mutual include: (1) investment companies, including mutual funds, closed-end funds, exchange-traded funds, and unit investment trusts; (2) fund directors and officers; (3) fund advisers, for their services to investment companies and other investment advisory clients; and (4) affiliated service entities, including transfer agents and principal underwriters.

ICI Mutual's insured fund groups (i.e., they only keep records of claims reported by their clients). Therefore, Figure 1 captures a subset of lawsuits and regulatory proceedings involving all mutual funds.

To understand the total number of regulatory proceedings in the mutual fund industry, we also track the 2019 SEC enforcement proceedings. According to the SEC's 2019 annual report on enforcement actions, there were a total of 526 stand-alone enforcement actions undertaken by the SEC, of which 36% were against the mutual fund industry (i.e., 189 enforcement proceedings against mutual funds).[17] Although the SEC is the primary regulator of the investment management industry, other regulators including Financial Industry Regulatory Authority (FINRA), U.S. Commodity Futures Trading Commission (CFTC), U.S. Department of Labor, and state securities regulators also institute enforcement actions that may involve registered investment management funds.

Overall, the data related to lawsuits and regulatory enforcement actions suggest that the likelihood of lawsuits and regulatory sanctions is not abnormally low or unusual in the mutual fund industry.

5.3.2 | Relative importance of insurance demand

Our maintained assumption is that the insurance demand dominates the audit quality demand in the registered investment management industry. Our insurance test results are consistent with this premise. To demonstrate the *relative* prominence of the insurance demand in the registered investment management industry, we directly

[17] See https://www.sec.gov/files/enforcement-annual-report-2019.pdf (p. 15).

compare the significance of the insurance demand across the registered investment management and financial industries. The expectation is that our estimation of the insurance demand is larger in magnitude in the registered investment management industry than in the financial industry.

Accordingly, we augment Equation (2) by additionally including *RIMC* (an indicator variable that equals one for registered investment management companies and zero otherwise) and an interaction term between *RIMC* with *WEALTH* as follows:

$$MARKETSHARE = \beta_0 + \beta_1 RIMC \times WEALTH + \beta_2 RIMC + \beta_3 WEALTH + \beta_4 LNCLIENTS + \beta_5 AVGROA + \beta_6 AVGCASH + \beta_7 AVGACCRUAL + \beta_8 AVGGROWTH + \beta_9 AVGLOSS + \varepsilon \quad (6)$$

The key independent variable is *RIMC*×*WEALTH*. Because the relative importance of the insurance demand is stronger in the registered investment management industry than in the financial industry, the coefficient on *RIMC*×*WEALTH* (β_1) is expected to be positive. The sample consists of 46 audit firm-year observations drawn from RIMCs and FINANCIALs with PWC as the auditor for the years 2004–2019 and KPMG as the auditor for the years 2013–2019.

In untabulated results, and consistent with our expectations, we find that the coefficient on *RIMC*×*WEALTH* is positive and significant (0.13, *t*-stat = 1.76). The coefficient on *WEALTH* is also positive but insignificant (0.03, *t*-stat = 0.58). These results provide direct evidence on the relative importance of the insurance demand in the registered investment management industry.

Similarly, we modify Equation (3) by additionally including *RIMC* and an interaction term between *RIMC* with *ΔWEALTH* as follows:

$$\Delta AUDITFEE = \beta_0 + \beta_1 RIMC \times \Delta WEALTH + \beta_2 RIMC + \beta_3 \Delta WEALTH + \beta_4 \Delta LNASSET + \beta_5 \Delta ROA + \beta_6 \Delta CASH + \beta_7 \Delta LOSS + \beta_8 FIRST - YEAR + \text{Yearfixed} - \text{effects} + \varepsilon \quad (7)$$

Because the relative importance of the insurance demand is stronger in the registered investment management industry than in the financial industry, the coefficient on *RIMC*×*ΔWEALTH* (β_1) is expected to be positive. The sample consists of 8,287 client-year observations from *RIMC*s and *FINANCIAL*s with PWC (2004–2019) and KPMG (2013–2019) as the auditor. We include Year fixed-effects, as in Equation (3), and additionally apply entropy balancing because the sample now includes *RIMC*s and *FINANCIAL*s.

In untabulated results, we find that the coefficient on *ΔWEALTH* is insignificant (0.0177, *t*-stat = 0.66), suggesting that changes in the audit firms' wealth do not influence changes in audit fees within the financial industry. More importantly, the coefficient on *RIMC*×*ΔWEALTH* is positive and significant (0.0776, *t*-stat = 3.79). Our results indicate that the influence of changes in audit firms' wealth on audit fees is restricted to the investment management industry, thereby providing direct evidence on the relative importance of the insurance demand in the registered investment management industry.

Because the issuance of shares is relatively rare in the financial industry, i.e., secondary public offerings are infrequent and unusual in the financial industry, we are unable to compare the effect of auditor switches on the issuance of shares between companies from the registered investment management industry and the financial industry.

6 | CONCLUSION

Our fundamental objective is to provide empirical evidence on insurance demand for auditing services drawing on the registered investment management industry. Unlike most other industries, the registered investment management industry is heavily dependent on external funding for growth. Holding other factors constant, mutual fund managers can expect to raise more external funds if Big 4 firms can serve as third-party insurers in case investors incur losses because of financial misrepresentations or fraud, i.e., the insurance demand is high in this industry. Further, because

of institutional, governance, and regulatory factors, the registered investment management industry confronts lower agency conflicts and information asymmetry problems, which results in high financial reporting quality. Consequently, the assurance demand for auditing services is expected to be low in this industry. Because of these factors, the insurance demand for auditing services is expected to dominate the assurance demand for auditing services in the registered investment management industry.

Using financial firms as a control group, we first show that the demand for the Big 4 firms is unusually high in the registered investment management industry. Further, subsequent to an auditor turnover, and compared with other financial companies, RIMCs are also more likely to retain a Big 4 firm than a non-Big 4 firm. Although these results are consistent with the insurance demand hypothesis, we directly test this hypothesis by designing three tests based on the registered investment management industry. First, if the insurance demand motivates the choice of a Big 4 audit firm in the registered investment management industry, we expect a Big 4 firm's wealth to be positively associated with the firm's market share in this industry. Second, the insurance demand suggests that changes in audit fees (proxy for risk premium charged by audit firms) are positively associated with the audit firm's wealth for registered investment companies with Big 4 firms. Finally, the insurance demand hypothesis also suggests that the flow of funds increases when registered investment companies switch from a non-Big 4 to a Big 4 audit firm. We find evidence consistent with the insurance demand thesis from all three tests.

Extending prior literature in this area (e.g., Goldie et al., 2018; Hope et al., 2022), we underscore the relevance of the insurance demand for auditing services within the mutual fund industry. Additionally, we provide key insights into the demand for auditing services in a highly specialized financial industry that tends to be ignored in accounting/auditing research despite its growing importance within the U.S. capital markets (see mutual funds statistics on www.statista.com).

However, our study is also subject to potential caveats. The small sample size associated with some tests reduces the power and the generalizability of some of our results. Also, we presume that variations in the wealth of UK audit firms mimic those of U.S. audit firms, which may be overly restrictive. Similarly, our control group consists of other financial firms, which may serve as an imperfect surrogate for mutual funds due to differences within the financial sector. Nonetheless, we find it reassuring that a disparate set of tests consistently provide evidence in favor of the insurance demand as the leading explanation for the Big 4 retention within the mutual fund industry.

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DATA AVAILABILITY STATEMENT

All data used in our study are publicly available. Some data are acquired by purchasing database vendors, whereas some other data are hand collected, but all data are publicly available.

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