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Foreign institutional ownership and auditor choice: Evidence from worldwide institutional ownership

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Abstract

We investigate the influence of foreign institutional investors on firms' auditor choices in an international setting. Foreign institutional investors are likely to demand high-quality audits to mitigate the information asymmetry they face and facilitate their external monitoring when they invest overseas. On the other hand, foreign institutional investors not only face difficulties in monitoring overseas firms in general but also have the limited ability to influence their auditor choices in particular. Using a large sample of 111,078 firm-year observations from 40 non-US countries for the period of 2001–2011, we find that firms with higher foreign institutional ownership are more likely to hire Big 4 auditors. To address the endogeneity concern, we show that our findings are robust to the use of identification strategies exploiting the exogenous variation in foreign institutional ownership following MSCI index additions, two-stage least squares regressions, and change-on-change regressions. More importantly, we further explore cross-sectional/cross-country variations in the relation between foreign institutional investors and auditor choice and find that this relation is stronger (a) when foreign institutional investors are from countries with stronger governance institutions and (b) when the investee firms are located in countries with higher information asymmetries. Overall, our findings suggest that cross-border institutional investment plays an important role in influencing firms' auditor choices and improving the information environment of firms across different countries around the world.

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INTRODUCTION

Foreign institutional investment has increased dramatically over the past few decades, following substantial reductions in barriers to international investment. Particularly in the emerging markets, more and more countries are seeking to boost their economic growth by attracting investment from foreign institutional investors (hereafter, FIIs) (Lohade, 2016; Cui, 2016). Equally, FIIs are looking to expand their investment overseas and exploit more profitable investment opportunities that may not be available in

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their domestic market. However, compared to domestic institutional investors (hereafter, DIIs), FIIs are often informationally disadvantaged, due to geographic distance, unfamiliarity with local industry, economic and regulatory environments, and language and cultural barriers (Baik et al., 2013; Kang & Stulz, 1997; Gao et al., 2018; Buchner et al., 2018; Liu et al., 2018).[1] It is therefore interesting to explore how FIIs overcome their information disadvantages and influence the information environment of the overseas firms once they have invested in. Moreover, prior studies in this area focus mainly on US institutional investment in non-US firms, or the impact of foreign ownership in one specific country (Fang et al., 2015; He et al., 2014). The generalizability of the impact of FIIs in the international setting and the mechanisms through which they influence the information environment of investee firms are largely understudied in the literature. In this study, we examine whether and how the level of foreign institutional ownership (FIO) affects a firm's auditor choice in the international setting.

It is well established in the auditing literature that, first, high-quality audits reduce information asymmetry between firm insiders and outside information users by allowing outsiders to verify the validity of financial statements, and, second, a need for external monitoring engenders a demand for high-quality audits (Jensen & Meckling, 1976; Watts & Zimmerman, 1980; Francis & Wilson, 1988; Knechel et al., 2012; DeFond & Zhang, 2014). The role of high-quality audits in assuring earnings quality is even more salient in the international setting, given cross-country variations in disclosure, governance, and investor protection standards (Skinner & Srinivasan, 2012; Weber et al., 2008; Fung et al., 2016). Therefore, we expect that FIIs will demand high-quality audits to reduce the information asymmetry they face and facilitate their external monitoring when they invest overseas. Moreover, since US institutional investors play a dominant role in monitoring the domestic US firms and there is only limited evidence on the monitoring role of institutional investors outside of the USA, our study focuses on the impact of FIIs on Big 4 auditor choices of non-US firms.[2,3]

Using a large sample of 111,078 observations from 40 countries for the period of 2001–2011, we find that foreign institutional ownership (FIO) in non-US firms is positively associated with the likelihood of a Big 4 auditor choice, suggesting that FIIs demand higher-quality audits to reduce the information asymmetry they face when they invest overseas. We further remove US institutional investors from all foreign institutional investors and continue to find a positive and significant effect of non-US foreign institutional ownership (FIO_NUS) on Big 4 auditor choice, suggesting that our main findings are not completely driven by US institutional investors.

A major concern with our empirical findings is about the potential endogeneity that may affect the observed relation between auditor choice and the level of FIO. This is of particular concern given the findings of prior research suggesting that institutional investors are more likely to invest in more transparent countries or less opaque firms in such countries (Bushee & Noe, 2000; Chou et al., 2014; Leuz et al., 2010; Yu & Wahid, 2014). As the first approach to address this concern, we utilize a quasi-natural experimental setting of firms being added to the MSCI All Country World (MSCI) index, which is likely to be exogenous to a firm's decision to appoint one of the Big 4 auditors.[4] Specifically, we conduct a difference-in-differences analysis to examine the effect of index additions on firms' foreign and domestic institutional ownership and auditor choices. We find that the level of FIO and the likelihood of Big 4 auditor choice increase significantly after a firm is added to the MSCI index, while there is no significant change in DIO, suggesting that the increase in Big 4 auditor choice is likely to be triggered by the increase in FIO. As the second approach, we address the endogeneity concern by employing two-stage least squares (2SLS) regressions in which the FIO level is instrumented by the variable, Proximity, which is measured as the *negative* value of the weighted average geographic distance between the capital of a firm's home country and the capitals of all the other countries around the world. We find that the predicted FIO based on this instrumental variable continues to have a positive and significant effect on Big 4 auditor choice. In the third approach, we model the likelihood of a firm's change from a non-Big 4 auditor to a Big 4 auditor choice as a function of a lagged change of FIO. We continue to find that an increase in FIO leads to an increase in the likelihood of switching to a Big 4 auditor. Moreover, we repeat the regressions in these three approaches using non-US institutional investors and find similar results. Overall, the results from all three different approaches, taken together, buttress the view that the effect of FIO on auditor choice is unlikely driven by potential endogeneity.

We further explore the heterogeneity among FIIs and its impact on auditor choice by splitting FIIs in our sample into two groups: FIIs originating from countries with strong governance institutions and FIIs originating from countries with weak governance institutions. We expect FIIs from countries with strong governance institutions to have stronger incentives to monitor the firms in which they invest, because they tend to be more independent and have more expertise to monitor the firms (Aggarwal et al., 2011). Consistent with this conjecture, we find that FIIs from countries with strong governance institutions, compared to FIIs from countries with weak governance institutions, are more likely to demand Big 4 auditors. Similar results emerge if we replace FIIs with non-US foreign institutional investors in the regressions. The heterogeneity among FIIs further suggests that FIIs from countries with strong governance institutions are more likely to play a monitoring role and spread the good governance practices (e.g., high-quality audits) to the countries in which they invest.

We then investigate whether the effect of FIO on auditor choice varies with the characteristics of the countries where the investee firms are located, or, simply, the country locations of the investee firms. We expect that FIIs' demand for high-quality audits increases with the level of information asymmetry of the countries in which they invest, since the opaque information environment exacerbates the information disadvantage faced by FIIs. FIIs also have stronger incentives to demand high-quality audits to facilitate their monitoring because the potential for opportunistic behavior by managers is greater in countries with higher information asymmetries. Consistent with our expectations, we find that the FIO–Big 4 auditor choice relation is more pronounced for investee firms located in countries with more severe information asymmetries, as measured by higher earnings management index or pre-IFRS adoption periods. Further, when we focus only on non-US FIO (FIO_NUS), we continue to find that the effect of non-US FIO on Big 4 auditor choice is more pronounced in countries with higher information asymmetries. These findings suggest that the country locations of investee firms matter and FIIs are more likely to play a monitoring role when they invest in countries with higher information asymmetries.

Furthermore, we check the robustness of our findings to alternative measures of audit quality. Prior studies find a positive association between audit quality and audit fees paid by audit clients (Eshleman & Guo, 2014; Lobo & Zhao, 2013), and a stream of the literature shows that auditor industry specialization is associated with high-quality audits (Carson, 2009). Using these two alternative measures of audit quality, we continue to find positive and significant relations between FIO and audit quality. We also take advantage of the Public Company Accounting Oversight Board (PCAOB) global inspection setting to examine whether FIIs are more likely to demand PCAOB-inspected auditors, as prior studies find that PCAOB inspection can increase audit quality (Fung et al., 2017; Krishnan et al., 2017; Shroff, 2015). We find supportive evidence that firms with higher FIO are more likely to hire PCAOB-inspected auditors. In additional tests, we continue to find a positive effect of non-US institutional ownership on these three alternative measures of audit quality.

Lastly, we conduct a variety of additional tests to corroborate the robustness of our findings. First, because it is harder to define institutions as foreign if they are multinational companies, we remove the top 50 institutions from our sample in each year and recalculate the FIO measure. We find that our main inference on the effect of FIO on Big 4 auditor choice remains unchanged. Second, we remove the countries where the Big 4 auditors' market share is over 90%, since in these countries, there may be no meaningful variations in firms' auditor choices. We continue to find a positive and significant effect of FIO on Big 4 auditor choice in this reduced sample. Lastly, we find that our results are not sensitive to removing several major countries which are over-represented in our sample (i.e., the UK, Canada, and Japan). We further repeat these robustness tests using non-US foreign institutional ownership (FIO_NUS) and find similar results.

Our study contributes to the literature in several ways. First, our study is among the few, if not the first, to investigate the relation between FIIs and firm auditor choice in the *non-US* setting. Prior studies in this area focus mainly on US institutional investors or the impact of foreign ownership in one specific country. Specifically, Han et al. (2013) document that US institutional ownership is more likely to be associated with firms' Big 4 auditor choices in the US setting. Fang et al. (2015) find that US institutional investors affect the global convergence of financial reporting practices through influencing investee firms' auditor choices. He et al. (2014) show that foreign ownership is associated with a stronger demand for Big 4

auditors in the China setting. Guedhami et al. (2009) focus on a small sample of privatized firms across the world and find that foreign investors are more likely to demand Big 4 auditors.[5] It is unclear, however, from these existing studies, whether FIIs can influence firms' auditor choices in most countries around the world. In this study, we provide strong empirical evidence that FIIs play an important role in influencing firms' auditor choices in the non-US setting. We further find that non-US foreign institutional investors continue to have a positive and significant effect on firms' Big 4 auditor choice, suggesting that our findings are not driven mainly by US institutional investors.

Second, and perhaps more importantly, we also explore cross-sectional/cross-country variations in the relation between FIIs and auditor choice. We find that FIIs from countries with stronger governance institutions tend to play a more effective role in influencing firms' auditor choices, suggesting that the country origin of FIIs matters. We also find that the effect of FIO on auditor choice is more pronounced for investee firms located in countries with more severe information asymmetries, suggesting the monitoring role of FIIs varies with the country locations of investee firms. We further find that the cross-sectional variations in the relation between foreign institutional ownership and auditor choice continue to hold among non-US foreign institutional investors. Collectively, these results shed light on the underlying mechanisms through which FIIs influence investee firms' auditor choices. These findings also suggest that high-quality audit practices travel around the world through the cross-border portfolio investment of foreign institutional investors, broadly consistent with the other aspects of global diffusion of corporate governance practices around the world (e.g., Khanna & Palepu, 2004; Aguilera et al., 2017; Cumming et al., 2017; Miletkov et al., 2017).

Third, our study provides new insights into the relation between FIIs and corporate transparency around the world. Most prior studies show that FIIs tend to invest in firms or countries with better disclosure practices or a higher level of corporate transparency (Chou et al., 2014; DeFond et al., 2011; Leuz et al., 2010). Our study, on the other hand, highlights the monitoring role of FIIs and investigates whether they can increase the transparency of local firms once they have invested in. The findings from our study can, therefore, give rise to a deeper understanding of the interactions between FIIs and corporate transparency.

Finally, we provide new evidence on the monitoring role of FIIs by showing that FIIs can affect firms' auditor choices. Specifically, prior studies document that international portfolio investment by institutional investors promotes good corporate governance practices around the world (Aggarwal et al., 2011; Ferreira & Matos, 2008; Gillan & Starks, 2003). However, the effective oversight of firm management by outsiders depends critically on the information available to them (e.g., Bushman & Smith, 2001; Bushman & Piotroski, 2006). Our study extends this strand of the literature by examining the impact of FIIs on auditor choice and finds that FIIs can generally improve a firm's information environment by demanding their investee firms to appoint high-quality auditors.

The remainder of the article is structured as follows. In following section, we review the related literature and develop our hypotheses. The next section describes the data, key variables, and research design. The fourth section presents the empirical analysis. We conclude in the final section.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Prior Research on Auditor Choice

High-quality audits reduce the information asymmetry between firm insiders and external information users by allowing outsiders to verify the validity of financial statements (Jensen and Meckling, 1976; Watts & Zimmerman, 1980). Consistent with auditors' roles of information verification, certification, or attestation, prior research shows that higher-quality auditors are associated with higher earnings quality (Becker et al., 1998), greater credibility of earnings news (Teoh & Wong, 1993), higher audit fees (Choi et al., 2008), more informative voluntary disclosure policies (Ball et al., 2012; DeFond & Zhang, 2014), and lower cost of debt and equity capital (Chang et al., 2009; El Ghoul et al., 2016; Gul et al., 2013; Mansi et al., 2004; Pittman & Fortin, 2004; Kim et al., 2011).

Given the role of high-quality audits in reducing the information asymmetry, the demand for such audits commonly arises from the need for external monitoring on behalf of outside shareholders and debtholders (Francis & Wilson, 1988). For example, prior studies show that high-quality auditors are demanded by East Asian firms with high agency conflicts between controlling shareholders and

minority shareholders (Fan & Wong, 2005), by French companies with less family control and more diversified ownership (Francis et al., 2009), by Canadian companies with large differences between cash flow rights and control rights (Khalil et al., 2008), and by UK unlisted firms with either low or high managerial ownership (Lennox, 2005). Consistent with these findings, in a cross-country study, Choi & Wong (2007) further find that auditors serve as a more significant governance function in countries with weaker legal systems.

Prior Research on Foreign Institutional Investors

From the standpoint of institutional investors, the *ex ante* level of information asymmetry is lower for local firms in the domestic market than for overseas firms in the foreign markets because they are more familiar with legal, cultural, and disclosure aspects of the domestic market. Foreign institutional investors (FIIs) thus face a conundrum: On the one hand, they want to seek out more profitable investment opportunities abroad that may not be available in the domestic market, thus requiring greater risk taking; on the other hand, they could be concerned with losing their investment in the foreign markets in which they are informationally disadvantaged.

Consistent with the latter notion, prior research on foreign institutional ownership (FIO) suggests that foreign institutions prefer to invest in larger, more well-recognized firms which are also cross-listed in the USA (Ferreira & Matos, 2008); US mutual funds prefer to invest in "emerging markets with stronger accounting standards, shareholder rights, and legal standards" (Aggarwal et al., 2005). Dahlquist & Robertsson (2001) show that foreign investors prefer to invest in larger, more cash-rich Swedish firms which are not dominated by a single individual; this inclination is even more pronounced among US institutions. Leuz et al. (2010) show that foreign investors are less likely to invest in firms which have more concentrated ownership structures or in firms located in countries with weaker shareholder protections and lesser disclosure requirements, as such firms make minority shareholders more vulnerable to "tunneling" by controlling insiders. DeFond et al. (2011) show that greater comparability of accounting standards caused by the adoption of IFRS is associated with increases in foreign mutual fund ownership. Similarly, Covrig et al. (2007) find that foreign mutual fund holdings are higher in countries that followed the International Accounting Standards (IAS), especially among firms in poorer information environments and with lower visibility. Massa & Zhang (2018) find that foreign institutional investors are more likely to be attracted to firms with more hedging activities. Overall, the literature suggests that, all else being equal, foreign institutions prefer to invest in lower-risk and better-governed foreign markets with more informative disclosures and less opaque accounting practices.

However, some evidence exists that FIIs do not completely shy away from investing in countries with weaker governance regimes. On the contrary, once invested in foreign firms, institutional investors have strong incentives to monitor the firms in order to maximize the value of their investment. For example, Ferreira et al. (2010) show that firms with higher FIO experience more positive target or acquirer announcement returns, since foreign institutions act as "bridge builders" between domestic and foreign markets by facilitating cross-border mergers. Aggarwal et al. (2011) further provide evidence that changes in FIO positively affect subsequent changes in firm-level internal governance. More specifically, they find that firms with higher institutional ownership are more likely to terminate poorly performing CEOs. Fang et al. (2015) show that US-based institutional investors drive firms to adopt accounting practices more comparable to those of US firms.[6] Tsang et al. (2015) show that FIIs are associated with stronger demand for more frequent, more specific, disaggregated, and more informative management forecasts. Luong et al. (2017) find that FIIs can enhance firm innovation through active monitoring.[8] Bena et al. (2017) find that FIIs encourage investee firms to engage in long-term investments. Taken together, prior research on FIIs suggests that, while they prefer lower levels of information risk, FIIs also play an active role in fostering the efficacy of corporate governance and, in this process, improve shareholder value, once they have invested in foreign firms.

Testable Hypotheses

As reviewed earlier, high-quality audits reduce the information asymmetry between firm insiders and outside information users by increasing the credibility of financial reporting, and, thus, outside information users demand high-quality audits for better monitoring. On the other hand, FIIs can face severe information asymmetry when they invest overseas if it is difficult or costly for them to understand and interpret accounting information

of investee firms domiciled in foreign countries. Thus, we posit that FIIs, compared with DIIs, have stronger incentives to demand high-quality audits in order to facilitate their monitoring once they have invested in the overseas firms.

However, it is also possible that FIIs may play a less influential role in external monitoring. Prior research has shown that institutional investors located closer to their investee firms are more effective monitors, due to their relationship-based access to the firms' private information, and thus have lower costs for external monitoring (Ayers et al., 2011). In contrast, FIIs face higher monitoring costs than DIIs and encounter more difficulty in monitoring firm managers abroad because of their geographic and cultural distances and informational disadvantages (Leuz et al., 2010; Liu et al., 2018). Therefore, it is also conceivable that FIIs may have a weakened ability to influence investee firms' auditor choices. Given the above two competing arguments, the directional effect of FIO on the likelihood of Big 4 auditor choice is ultimately an empirical question. We, therefore, propose the following non-directional hypothesis:

Hypothesis 1: Foreign institutional ownership is associated with the probability of appointing a Big 4 auditor.

Prior studies suggest that institutional investors originating from countries with strong governance institutions have stronger incentives and better ability to monitor the firms in which they invest, compared to those originating from countries with weak governance institutions (e.g., Aggarwal et al., 2011). Specifically, Aggarwal et al. (2011) find that foreign institutional investors from countries with strong shareholder protection play a more significant role in promoting governance efficacy outside of the USA. Bena et al. (2017) show that FIIs from common law countries play a more important role in fostering long-term investments of investee firms. Luong et al. (2017) find that FIIs from countries with strong governance institutions play a more effective role in influencing firms' innovation activities.

The common argument in these studies is that FIIs from strong governance countries are more likely to pressure firms to improve their governance mechanisms because these investors are more independent and accustomed to high governance standards in their home countries. Conversely, FIIs from weak governance countries may be less willing to influence firms to improve their governance mechanisms. Following Aggarwal et al. (2011), we use one example to further illustrate how the country origins of FIIs matter. Suppose that both US institutional investors and German institutional investors invest in French firms. Since Germany has relatively weak governance institutions and similar legal origins as France, the German institutional investors may have less incentives to pressure the French firms to improve their information environment in general and to appoint a Big 4 auditor in particular. In contrast, US institutional investors may have stronger incentives to pressure French firms to improve their information environment and influence their auditor choice, since US institutional investors are accustomed to high governance standards in their home country.

Based on the above arguments, we expect that FIIs exhibit a greater demand for higher-quality audits when the FIIs are from countries with stronger governance institutions. This leads us to the following prediction:

Hypothesis 2: The association between FIO and the probability of firms appointing a Big 4 auditor is stronger for FIIs from countries with stronger governance institutions.

Prior studies provide evidence that the role of high-quality audits is more salient when *ex ante* information asymmetry is higher (Choi & Wong, 2007; Guedhami et al., 2009, 2014). We therefore expect that FIIs exhibit a greater demand for higher-quality audits when the information asymmetry between controlling insiders and outside investors such as FIIs is higher. In a cross-country setting, the information asymmetry faced by FIIs would be more severe when the investee firms are located in countries with a more opaque information environment, because FIIs are less familiar with local accounting standards, local business practices, and other aspects of local environment. The country-level information asymmetry could be caused by poor investor protection, weak disclosure requirements, and lax enforcement mechanisms, which may be eventually reflected in lower earnings quality (Leuz et al., 2003). Moreover, Maffett (2012) shows that DIIs have an advantage over FIIs in executing informed trades, especially in countries with a more opaque information environment. Consequently, FIIs may face even more

severe information disadvantage in countries with opaque information environment, compared to DIIs with their local information advantage in general and relationship-based access to private information in particular.

In addition, foreign institutional investors are also expected to play a more important role in monitoring in countries with higher information asymmetries, as the potential for opportunistic behavior by managers is greater in these countries. Prior studies have shown that the monitoring role of FIIs is more pronounced in weaker legal institutions and in less developed markets, i.e., countries featured by higher information asymmetries (Ferreira et al., 2010). Therefore, we expect that FIIs are more likely to demand high-quality audits to facilitate their monitoring in countries with higher information asymmetries.

Based on the above discussions, we expect foreign institutions to exhibit a greater demand for high-quality audits, especially when their investee firms are located in countries with higher information asymmetries. This leads us to the following prediction:

Hypothesis 3: The association between FIO and the probability of firms appointing a Big 4 auditor is stronger for firms located in countries with higher information asymmetries.

SAMPLE SELECTION AND RESEARCH DESIGN

Sample Selection

To construct our sample, we begin with 409,919 firm-year observations for non-US countries listed in Thomson Reuters' Worldscope database for the period 2001–2011. Our sample period begins in 2001 because we require lagged institutional ownership data, and institutional ownership data in FactSet/LionShares (discussed below) start in 2000.[7] We then extract auditor choice data from Worldscope and end up with 356,897 observations. Out of these observations, we drop observations with missing values for the necessary control variables (e.g., firm size, leverage, industry information) and obtain a sample of 226,593 observations.

We then merge the Worldscope data with the FactSet institutional ownership data. FactSet covers a comprehensive sample of international firms and provides detailed information on share ownership of each firm by funds or institutions. These institutional share ownership data are compiled from public filings by investors (e.g., Form 13F filings in the USA), company annual reports, stock exchanges, and regulatory agencies around the world. There are two main databases in FactSet: the aggregate institutional filings and the mutual fund database. The institutional database is used as the primary database, while ownership information from the mutual fund database is added if a parent institution's holdings are not in the institutional ownership database (Bartram et al., 2015). As institutions from different countries have different reporting frequencies, we follow prior studies (e.g., Ferreira & Matos, 2008) and use the latest holding update at each year end. We also obtain information on the country origin of institutional investors from FactSet.

After we merge the institutional ownership data into our sample, we obtain 121,528 observations. We then drop observations without the necessary country-level variables, such as earnings management and opacity scores, based on Leuz et al. (2003), the disclosure requirement index (La Porta et al., 2006), the anti-director index (Djankov et al., 2008), the legal origins data (La Porta et al., 1999), and the security regulation index (La Porta et al., 2006), as well as the country-level GDP, GDP per capita, and inflation rate data from the World Bank Web site. Our final sample consists of 111,078 observations in 40 countries for the period 2001–2011.

Main Variables

Auditor choice

Following the prior literature, Big4 is defined as an indicator variable which equals 1 if a firm employs a Big 4 auditor as identified by Worldscope's "Translation Taxonomy" of the Big 4/Big 5 auditor names and 0 otherwise.[8] Because Big 4 auditor names vary widely around the world, Worldscope's auditor taxonomy can be used to identify which audit firms are associated with Big 4 audit names (or with Big 5 auditor names, prior to the dissolution of Arthur Andersen in 2002). The large majority of auditor names in the taxonomy partially contain traditional Big 4 (i.e., Deloitte, Ernst & Young, KPMG, or PwC) or Big 5 (adding Arthur Andersen to the preceding list) auditor names; however, in some cases, the auditor type is not

obvious from reading the auditor name (e.g., Kesselman and Kesselman is a PwC-affiliated firm in Israel).

Foreign institutional ownership

A firm's total institutional ownership is measured as the percentage of shares (end of year) held by all types of institutional investors. Total institutional ownership is further broken down into foreign and domestic institutional ownership according to the country of origin of each institutional investor. Foreign institutional ownership (FIO) is the percentage of a firm's shares held by all institutions domiciled in a country that is different from the country in which the firm is located. We further remove US institutional investors from the overall sample of FIIs and define non-US foreign institutional ownership (FIO_NUS) as the percentage of shares (end of year) held by non-US FIIs. Domestic institutional ownership (DIO) is the percentage of a firm's shares held by all institutions domiciled in the same country where the firm is located.

We also consider the heterogeneity of FIIs and divided FIO into two subgroups, based on the median of the strength of country-level governance institutions in our sample: (1) FIO from countries with stronger governance institutions (FIO_HighGov) and (2) FIO from countries with weaker governance institutions (FIO_LowGov). FIO_HighGov (FIO_LowGov) is the percentage of shares (end of year) held by FIIs from countries with higher-(lower-) quality corporate governance provisions. We first use legal origins (common law or code law) as an overall measure of country-level governance institutions. La Porta et al. (1999) argue that investor protection and therefore corporate governance are stronger in common law countries, compared to code law countries. We also try to capture the strength of country-level governance institutions from three other dimensions based on prior studies: (1) the investor protection index or anti-director rights index from Djankov et al. (2008); (2) the disclosure requirement index from La Porta et al. (2006); and (3) the securities regulation index as defined by Hail and Leuz (2006).

Control variables

We draw on the extant literature to identify and control for a wide range of firm, industry, and country characteristics that may influence firms' auditor choices (Choi & Wong, 2007; Francis et al., 1999; Guedhami et al., 2014). Detailed definitions of all variables are provided in "Appendix." Specifically, we control for firm size (Size), capital intensity (Capex), inventory and receivables (InvRec), and business segments (Segs). These four variables are used in prior studies to measure the scale and complexity of a firm, which affects the level of efforts that an auditor expends to produce a desired level of audit quality. More specifically, firm size (Size) is defined as the log of year-end total assets in thousands of US dollars; capital intensity (Capex) is defined as the long-term assets scaled by total assets at the beginning of each year; inventory and receivables (InvRec) is defined as year-end inventory and accounts receivable scaled by total assets at the beginning of each year; and segments (Segs) is measured as the number of business segments of the firm. We also control for leverage (Leverage) and profitability (ROA). These two variables are associated with the probability of a client's financial distress, which is related to the auditor's litigation risk. More specifically, leverage (Leverage) is measured as year-end total debts over total assets at the beginning of the year; profitability (ROA) is measured as net income divided by total assets at the beginning of the year.

We further control for several other variables that are deemed to influence a firm's auditor choice: foreign sales (Fsale), measured as a ratio of foreign sales to total sales; assets growth (Growth), measured as the percentage change in assets as compared to the prior year; and financing activity (Finance), an indicator variable that equals 1 if long-term debt increased by 20% or more, or the number of shares outstanding increased by 10% or more, and 0 otherwise. Prior studies suggest that firms with more foreign sales, higher growth, and with debt or equity issuance are more likely to hire Big 4 auditors (e.g., Choi & Wong, 2007; Guedhami et al., 2014).

In addition, we include in our regressions several country-level control variables, including log of GDP per capita (LGDP), GDP growth (GDPGrw), and inflation rate (Inflation), to control for country-level factors that vary over time. Finally, we control for year, industry, and country fixed effects in our main regressions, where industry is based on two-digit SIC code.

Research Design

To test Hypothesis 1 regarding the effect of foreign institutional ownership (FIO) on firms' auditor choices, we estimate the following logit regression model (firm subscripts are omitted for parsimony).

$$\begin{aligned}\text{Big4}_t = {} & \alpha_0 + \alpha_1\text{FIO}_{t-1} + \alpha_2\text{DIO}_{t-1} + \alpha_3\text{Size}_t \\ & + \alpha_4\text{InvRec}_t + \alpha_5\text{Capex}_t + \alpha_6\text{Segs}_t + \alpha_7\text{ROA}_t \\ & + \alpha_8\text{Leverage}_t + \alpha_9\text{Fsale}_t + \alpha_{10}\text{Growth}_t \\ & + \alpha_{11}\text{Finance}_t + \alpha_{12}\text{LGDP}_t + \alpha_{13}\text{GDPGrw}_t \\ & + \alpha_{14}\text{Inflation}_t + \text{fixed effects} + \varepsilon \end{aligned} \quad (1)$$

In Eq. (1) above, FIO and DIO are one year lagged, while all other variables are contemporaneous. If FIIs demand high-quality audits (as predicted in Hypothesis 1), we expect α_1 to be positive and significant (i.e., $\alpha_1 > 0$).

To test Hypothesis 2, we examine whether the impact of FIIs on firms' auditor choices varies with the strength of FIIs' home-country governance institutions. To this end, we divided FIO into FIO_HighGov and FIO_LowGov and then estimated the following regression model.

$$\begin{aligned}\text{Big4}_t = {} & \alpha_0 + \alpha_1\text{FIO\_HighGov}_{t-1} + \alpha_2\text{FIO\_LowGov}_{t-1} \\ & + \alpha_3\text{DIO}_{t-1} + \alpha_4\text{Size}_t + \alpha_5\text{InvRec}_t \\ & + \alpha_6\text{Capex}_t + \alpha_7\text{Segs}_t + \alpha_8\text{ROA}_t + \alpha_9\text{Leverage}_t \\ & + \alpha_{10}\text{Fsale}_t + \alpha_{11}\text{Growth}_t \\ & + \alpha_{12}\text{Finance}_t + \alpha_{13}\text{LGDP}_t + \alpha_{14}\text{GDPGrw}_t \\ & + \alpha_{15}\text{Inflation}_t + \text{fixed effects} + \varepsilon \end{aligned} \quad (2)$$

Hypothesis 2 predicts that the monitoring role of FIIs concentrates on FIIs from countries with strong governance institutions (FIO_HighGov). We view that Hypothesis 2 is supported if we observe $\alpha_1 > 0$ and $\alpha_1 > \alpha_2$.

Hypothesis 3 predicts that the coefficient α_1 in Eq. (1) is higher and more positive in firms located in countries with greater information asymmetries. To test this, we create another indicator variable representing the information asymmetry at the country level, denoted by IA. This indicator variable (IA) equals 1 if a firm is located in countries with country-level earnings management index developed by Leuz et al. (2003) being greater than the sample median or in country-years without adoption of IFRS, and 0 otherwise. We then interact this information asymmetry indicator (IA) with FIO. Specifically, we estimate the following regression model.

$$\begin{aligned}\text{Big4}_t = {} & \alpha_0 + \alpha_1\text{FIO}_{t-1} \times \text{IA} + \alpha_2\text{IA} + \alpha_3\text{FIO}_{t-1} \\ & + \alpha_4\text{DIO}_{t-1} + \alpha_5\text{Size}_t + \alpha_6\text{InvRec}_t + \alpha_7\text{Capex}_t \\ & + \alpha_8\text{Segs}_t + \alpha_9\text{ROA}_t + \alpha_{10}\text{Leverage}_t + \alpha_{11}\text{Fsale}_t \\ & + \alpha_{12}\text{Growth}_t + \alpha_{13}\text{Finance}_t + \alpha_{14}\text{LGDP}_t \\ & + \alpha_{15}\text{GDPGrw}_t + \alpha_{16}\text{Inflation}_t + \text{fixed effects} + \varepsilon \end{aligned} \quad (3)$$

Our Hypothesis 3 is supported if we observe $\alpha_1 > 0$.

In estimating our main regressions in Eqs. (1) to (3), we winsorized all continuous variables at their 1st and 99th percentiles to mitigate the influence of outliers. Throughout all regressions, we reported *t*-statistics for the estimated coefficients on an adjusted basis using the standard errors corrected for heteroskedasticity and country-level clustering (Petersen, 2009).[9]

EMPIRICAL RESULTS

Summary Statistics

Table 1 reports the country distribution of observations and country means of foreign and domestic ownership and Big 4 concentration for each of the 40 non-US countries in our sample. The total number of observations in a given country ranges from 63 for Jordan to 24,586 for Japan. The percentage of firms hiring a Big 4 auditor ranges from 19% in India to 98% in Chile. The country mean of FIO also exhibits significant variation across our sample countries: Jordan has the lowest FIO (0.5%), while the Netherlands has the highest FIO (14.1%). The country mean of FIO is higher than that of DIO in most countries in our sample, suggesting that FIO may generally have comparable or even stronger influence over firms' financial reporting decisions and auditor choice in our sample. The last two columns of Table 1 present the value-weighted average of FIO and DIO in each country, that is, the value of shareholdings by FIIs in a country divided by stock market value in that country. We again find that FIO is generally higher than DIO in most countries. Moreover, we find a greater value of FIO in the value-weighted form, reflecting the fact that FIIs tend to invest more in larger firms or firms with larger market capitalization (Dahlquist & Robertsson, 2001; Kang & Stulz, 1997). The descriptive statistics of FIO and DIO in our paper are in line with those reported in prior studies using FactSet/LionShares institutional ownership data (e.g., Aggarwal et al., 2011).

Table 1 Sample characteristics by country

	Country	# of Obs	# of Firms	Big4 (%)	FIO (%)	DIO (%)	FIO_V (%)	DIO_V (%)
1	Argentina	296	50	80.4	1.5	1.9	0.9	3.6
2	Australia	5,688	1,249	69.4	3.8	1.4	9.0	2.0
3	Austria	614	96	72.3	9.1	1.4	15.4	0.9
4	Belgium	914	140	64.6	6.7	3.3	13.1	2.5
5	Brazil	1,318	296	82.1	7.0	1.7	8.9	1.0
6	Canada	10,160	2,184	73.3	6.6	14.2	23.6	26.1
7	Chile	616	111	97.9	1.3	0.5	1.5	0.4
8	Denmark	913	134	86.7	5.3	11.4	17.2	8.5
9	Egypt	290	69	52.4	3.1	0.0	5.3	0.0
10	Finland	1,061	136	91.7	10.2	8.9	23.2	5.1
11	France	4,736	799	60.3	5.6	4.4	15.7	7.4
12	Germany	4,858	790	56.7	6.9	5.3	16.5	7.7
13	Greece	1,435	244	34.7	2.9	1.6	10.2	1.5
14	Hong Kong	5,565	836	80.5	4.4	1.6	9.4	2.4
15	India	4,697	1,054	19.1	4.0	3.6	7.9	2.5
16	Indonesia	1,119	194	43.5	4.4	0.0	11.3	0.0
17	Ireland	388	73	85.6	12.5	2.1	21.7	1.9
18	Israel	1,471	406	56.8	2.2	8.2	6.2	9.0
19	Italy	1,755	276	90.9	5.6	1.6	12.7	1.3
20	Japan	24,586	3,406	57.7	3.0	1.1	8.2	1.2
21	Jordan	63	17	52.4	0.5	0.0	0.3	0.0
22	Korea (South)	5,352	989	65.6	5.0	0.2	13.7	0.1
23	Malaysia	3,828	712	71.1	2.2	0.7	5.9	0.6
24	Mexico	631	98	84.6	6.2	0.6	7.0	0.6
25	Netherlands	1,158	180	90.7	14.1	7.3	25.5	3.1
26	New Zealand	653	110	93.3	3.3	1.2	8.1	1.4
27	Norway	1,162	228	94.1	7.3	9.9	14.4	8.7
28	Pakistan	545	164	78.0	0.9	1.6	1.7	1.2
29	Peru	155	31	88.4	2.1	0.1	2.5	0.0
30	Philippines	695	108	89.1	4.3	0.1	8.8	0.1
31	Portugal	395	56	63.3	4.3	3.4	12.0	1.5
32	Singapore	2,679	468	82.6	3.8	1.4	9.5	5.7
33	South Africa	1,632	308	75.2	3.6	6.2	10.2	4.2
34	Spain	1,138	158	89.6	6.1	4.2	13.7	2.7
35	Sri Lanka	104	27	95.2	5.0	0.0	6.1	0.0
36	Sweden	2,381	398	90.0	6.7	14.3	14.6	20.3
37	Switzerland	1,675	226	93.9	9.6	6.9	19.0	4.2
38	Thailand	1,772	305	68.4	4.0	1.0	6.4	1.2
39	Turkey	1,271	208	64.9	4.2	0.1	8.4	0.1
40	UK	11,309	2,033	65.7	4.1	15.2	12.8	10.5

This table presents the country distribution of firm-year observations in our sample. FIO (DIO) is the mean of firm-level foreign (domestic) institutional ownership. FIO_V (DIO_V) is country-level market value of foreign (domestic) institutional ownership as a percentage of market value of all listed firms. All variables are defined in "Appendix".

Table 2 provides overall summary statistics for firm-year observations in our sample. The mean of Big4 is 66.5%, which is largely consistent with prior work (e.g., Kim et al., 2012). The mean of FIO (DIO) is 4.8% (5.2%). This further underscores the importance of FIO, in that, in our non-US international sample, FIO is comparable to DIO. With respect to firm-level controls, the average (median) firm in our sample has a logarithm of total assets (Size) of 19.403 (19.334), an inventory and receivables ratio (InvRec) of 0.302 (0.289), a capital intensity ratio (Capex) of 0.323 (0.282), a ROA of −0.003 (0.030), a leverage ratio (Leverage) of 0.125 (0.074), an annual assets growth rate (Growth) of 0.232 (0.089), and a foreign sale ratio (Fsale) of 0.196 (0.000). Moreover, an average firm has 1.301 segments (Segs) and 38.4% of the observations in our sample have significant financing activities (Finance). These summary statistics are largely consistent with prior studies in the literature.

Table 2 Summary statistics

	N	Mean	SD	p10	p25	p50	p75	p90
Big4	111,078	0.665	0.472	0.000	0.000	1.000	1.000	1.000
FIO	111,078	0.048	0.074	0.000	0.002	0.015	0.062	0.144
FIO_NUS	111,078	0.026	0.044	0.000	0.000	0.005	0.032	0.081
DIO	111,078	0.052	0.093	0.000	0.000	0.011	0.060	0.166
Size	111,078	19.403	1.871	17.054	18.187	19.334	20.567	21.862
InvRec	111,078	0.302	0.202	0.040	0.131	0.289	0.440	0.581
Capex	111,078	0.323	0.245	0.033	0.116	0.282	0.478	0.691
Segs	111,078	1.301	1.762	0.000	0.000	1.000	2.000	4.000
ROA	111,078	−0.003	0.189	−0.126	−0.005	0.030	0.069	0.120
Leverage	111,078	0.125	0.147	0.000	0.001	0.074	0.202	0.337
Fsale	111,078	0.196	0.307	0.000	0.000	0.000	0.329	0.756
Growth	111,078	0.232	0.732	−0.161	−0.037	0.089	0.245	0.582
Finance	111,078	0.384	0.486	0.000	0.000	0.000	1.000	1.000

This table presents the summary statistics of main variables in our sample. All variables are defined in "Appendix".

Baseline Regression

Table 3 provides the results of the estimation of our baseline logit regression in Eq. (1) on the effect of foreign institutional ownership (FIO) on Big 4 auditor choice. The first two columns present the results for all foreign institutional ownership (FIO), while last two columns present the results for non-US foreign institutional ownership (FIO_NUS). We control for year, industry, and country fixed effects in columns 1 and 3 and include year and firm fixed effects in the regressions in columns 2 and 4.[10] As shown in column 1, the coefficient on FIO is positive and significant (1.124 with *t*-stat = 2.95). The finding is consistent with the prediction of Hypothesis 1, that is, foreign institutional investors (FIIs) demand high-quality audits to facilitate their monitoring once they have invested in overseas firms.[11] Moreover, the area under the receiver operating characteristic (ROC) curve is 0.79, suggesting that our logistics model is reasonably successful in predicting firms' auditor choices.[12] In column 2, we continue to find a positive and significant effect of FIO on auditor choice when we control for firm fixed effects. Moreover, we continue to find that FIO has a positive and significant coefficient in columns 3 and 4, where FIO is measured as non-US foreign institutional ownership (FIO_NUS).

Further, we compare the effect of FIO with that of DIO on auditor choice. In column 1, we find that the coefficient on FIO is about twice the magnitude of that on DIO (1.127 versus 0.692), suggesting that the effect of FIO on Big 4 auditor choice is stronger than that of DIO. The Chi-square statistic reveals that the difference between the FIO and DIO coefficients is significant (6.59, significant at the 5% level).[13] In column 2 and column 4, we also find that the coefficient on FIO is about twice the magnitude of that on DIO.[14] Overall, these results suggest that FIIs play a relatively more important role than DIIs in influencing firms' auditor choices in the non-US international setting.

We focus on column 1 in interpreting our control variables.[15] We find that large firms and firms with complex transactions tend to hire Big 4 auditors. Specifically, we find that the coefficients on firm size (Size), inventory and receivables ratio (InvRec), capital investment intensity (Capex), number of segments (Segs), and foreign sales (Fsale) are all positive, and the coefficients on Size and InvRec are statistically significant. We also find that more profitable firms (ROA) are more likely to hire Big 4 auditors. Furthermore, consistent with Guedhami et al. (2014), high-growth firms (Growth) are less likely to hire Big 4 auditors, and the relation between financing activities (Finance) and auditor choice is not significant in our sample. The country-level control variables are insignificant after we control for country fixed effects in our regressions.

Mitigating Endogeneity Concerns

A major concern with our empirical investigation is potential endogeneity with respect to the relation between FIO and auditor choice. More specifically, FIO is not distributed randomly across countries and across firms. The prior literature suggests institutional investors are more likely to invest in more transparent countries or firms (Bushee & Noe, 2000; Chou et al., 2014; Leuz et al., 2010; Yu & Wahid, 2014). Failure to adequately control for these factors would introduce the correlated omitted variable bias into our analysis, making it difficult to draw reliable inferences regarding the

Table 3 The effect of foreign institutional ownership on auditor choice

	All FIIs		Non-US FIIs	
	(1)	(2)	(3)	(4)
FIO_{t-1}	1.124***	0.197**	0.737***	0.170*
	(2.95)	(2.02)	(2.70)	(1.95)
DIO_{t-1}	0.692	0.102*	0.737**	0.096*
	(1.21)	(1.80)	(2.33)	(1.94)
$Size_t$	0.312***	0.010	0.327***	0.029**
	(5.15)	(1.24)	(5.01)	(2.11)
$InvRec_t$	0.162*	0.026	0.144***	0.037
	(1.74)	(0.74)	(2.80)	(1.22)
$Capex_t$	0.158	0.065	0.141**	0.054
	(0.95)	(1.55)	(2.00)	(1.17)
$Segs_t$	0.013	0.010	0.016	0.008
	(0.19)	(1.07)	(0.58)	(0.99)
ROA_t	0.313	−0.003	0.314***	−0.006
	(1.31)	(−0.15)	(3.14)	(−0.32)
$Leverage_t$	−0.320*	−0.019	−0.342***	−0.048
	(−1.91)	(−0.34)	(−3.89)	(−1.05)
$Fsale_t$	0.095	0.010	0.108*	0.003
	(0.63)	(1.02)	(1.75)	(0.29)
$Growth_t$	−0.080***	−0.007**	−0.080***	−0.007**
	(−4.01)	(−2.16)	(−2.72)	(−2.51)
$Finance_t$	−0.021	0.004	−0.020	0.005
	(−0.39)	(0.59)	(−0.54)	(0.75)
$LGDP_t$	−0.237	0.007	−0.237***	0.006
	(−1.49)	(0.97)	(−3.71)	(0.78)
$GDPGrw_t$	0.068	−0.003	0.068	−0.002
	(1.39)	(−0.88)	(1.26)	(−0.56)
$Inflation_t$	0.030	−0.001	0.030	−0.001
	(1.34)	(−0.50)	(1.21)	(−0.29)
Constant	−3.474*	0.192	−3.725***	−0.128
	(−1.69)	(1.31)	(−4.12)	(−1.07)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	No	Yes	No
Country fixed effects	Yes	No	Yes	No
Firm fixed effects	No	Yes	No	Yes
Observations	111,078	111,078	111,078	111,078
Adj./Pseudo-R^2	0.21	0.73	0.21	0.73

This table presents the estimation results of Eq. (1). The dependent variable is Big 4 auditor choice ($Big4_t$). FIO is the percentage of shares (end of year) held by all FIIs. FIO_NUS is the percentage of shares (end of year) held by non-US FIIs. Columns 1 and 2 report the results for all FIIs (FIO), while columns 3 and 4 report the results for non-US FIIs (FIO_NUS). In the parentheses below coefficient estimates, we report the robust *t*-statistics based on standard errors adjusted for heteroskedasticity and country-level clustering. All continuous variables are winsorized at the 1st and 99th percentile. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 level, respectively. All variables are defined in "Appendix".

relation between FIO and auditor choice. In this section, we conduct three tests to address the identification challenge and bolster our confidence in a causal interpretation that FIO leads to high-quality auditor choice.

Quasi-natural experiment based on MSCI index additions

Our first identification strategy is to exploit a quasi-natural experiment[16] created by firms being added to the MSCI All Country World (MSCI) index.[17] According to the MSCI's methodology, firms are selected for inclusion in the index based on a number of criteria, including float-adjusted market capitalization, trading frequency, trading volume, and the percentage of shares open to purchase by foreign investors (MSCI, 2015). Therefore, a firm's inclusion in the index is largely exogenous to its auditor choice. However, addition to the MSCI index is generally followed by large increases in FIO, either because of the greater visibility of firms included in the index to foreign investors or

because many international portfolio managers tend to closely track the MSCI index. Taking advantage of these attractive features, we perform a difference-in-differences (DiD) analysis to examine the effect of a firm's addition to the MSCI index on its FIO and DIO and on its auditor choice (i.e., Big4).

Specifically, we employ a five-year window around MSCI index additions; when an index addition occurs in year t, we have the pre-period of two years before the event of index addition (i.e., years $t-1$ and $t-2$) and the post-period of three years after the event of index addition (i.e., years t to $t+2$). We obtain a sample of index additions in the 2002–2009 period, during which time there were 366 additions to the MSCI index. These 366 firms with index additions are our treated firms. Post is coded as 1 for years after the addition event and 0 otherwise. Control firms are the neighbor firms that are from the same country and year but not added to the MSCI index. These neighbor firms have the same auditor choices and are similar in FIO and firm size with the treated firms in year $t-1$. We then formally test the difference between treatment and control groups during the pre-treatment period (two years before addition to MSCI) and report the results in Panel A of Table 4. We find that FIO, DIO, and Big4 in the pre-period are not significantly different between these two distinct samples of treated and control firms.

The results of our DiD analysis are presented in Panel B (Table 4).[18] As shown in column 1, we find that compared to the control group, FIO in the treated sample increases, on average, by 2% from the pre-period to the post-period, which is both statistically and economically significant. Similarly, in column 2, we continue to find that FIO_NUS significantly increases after a firm is added to MSCI. In sharp contrast, the coefficient on Treated × Post in column 3 is insignificant, suggesting that there is no corresponding change in DIO. Therefore, a firm's addition to the MSCI index is indeed an exogenous shock to FIO, but not to DIO. Further, in column 4, we find a significant increase in Big 4 auditor choice (Big4) after a firm is added to the MSCI index. In all four columns, the coefficient on the stand-alone variable, Treated, is insignificant, suggesting there is no significant difference between treated firms and control firms during the pre-period. Since MSCI index addition is exogenous to a firm's auditor choices, the increase in Big 4 auditor choice (Big4) around the MSCI index addition event can mainly be attributed to the increase in FIO. Moreover, it is also less likely that the increases in both FIO and Big4 are driven by some omitted variables related to the MSCI index additions (e.g., market capitalization, profitability), since such variables would drive all institutional investors (foreign and domestic) to increase their stock holdings. Overall, the results from the MSCI index addition setting suggest that the positive relation between FIO and Big4 is unlikely to be driven by reverse causality or correlated omitted variables.

Instrumental variable approach

We further address the endogeneity concern by employing two-stage least squares (2SLS) regressions in which we introduce an instrument variable for FIO. The instrument, Proximity, is a geographic proximity measure based on the intuition that institutional investors prefer to invest in firms located in geographically proximate countries when they invest abroad, as prior studies have shown that institutional investors prefer to invest in near firms (e.g., Ayers et al., 2011). The variable is measured as the *negative* value of the weighted average geographic distance between the capital of a firm's home country and the capitals of all the other countries around the world. The weight for each of the other countries is the institutional investment outflow from that country in a given year, divided by the aggregate institutional investment outflows from all countries in the same year.[19] As the weights vary from year to year, so does the instrument. Our instrument appears to satisfy the exclusion restriction, as geographic distance does not present any direct, economic link to firms' reporting and auditing practices.

We report the 2SLS regression results in Table 5. The results for all FIIs and non-US FIIs are separately reported in the first two columns and the last two columns, respectively. Column 1 shows the first-stage results. We find that our instrument variable has a positive and significant coefficient, consistent with our expectation that FIO is higher for firms located in countries with a shorter weighted average distance from the other countries. Moreover, the partial F-statistic of the instrument variable is 12.85, well above the conventional threshold of 10 for weak instruments, suggesting that Proximity is a valid instrument variable. Column 2 reports the second-stage regression results, where the dependent variable is auditor choice (Big4). We find that the instrumented version of FIO (FIO_Predicted) still has a significantly positive coefficient, suggesting that our

Table 4 Effects around stock additions to MSCI index

	Treated	Control	*T* test	
Panel A. Summary statistics (pre-treatment)				
FIO	0.062	0.054	1.22	
FIO_NUS	0.027	0.023	1.21	
DIO	0.031	0.037	0.95	
Big4	0.684	0.674	0.23	
Size	21.270	21.078	1.49	
InvRec	0.234	0.294	3.92***	
Capex	0.429	0.381	2.27**	
Segs	0.624	0.707	1.28	
ROA	0.027	0.036	1.24	
Leverage	0.174	0.186	0.97	
Fsale	0.287	0.308	0.69	
Growth	0.151	0.080	1.89*	
Finance	0.385	0.300	2.02**	
Dep. Var.	(1) FIO	(2) FIO_NUS	(3) DIO	(4) Big4
Panel B. Difference-in-differences analysis				
Treated × $Post_{t-1}$	0.020***	0.010***	0.001	0.342***
	(6.26)	(4.24)	(0.31)	(3.54)
Treated	0.003	0.000	0.001	−0.159
	(0.79)	(0.15)	(0.23)	(−0.76)
$Post_{t-1}$	0.002	0.002	0.008	0.373
	(0.25)	(0.51)	(1.67)	(1.48)
$Size_t$	0.017***	0.008***	−0.002	0.126
	(9.05)	(6.29)	(−0.59)	(1.03)
$InvRec_t$	0.006	0.013*	−0.006	0.737
	(0.43)	(1.70)	(−0.30)	(0.98)
$Capex_t$	−0.004	0.001	−0.023*	0.773
	(−0.49)	(0.11)	(−1.70)	(1.14)
$Segs_t$	−0.002	−0.002	−0.002	−0.004
	(−0.47)	(−0.56)	(−0.54)	(−0.02)
ROA_t	0.043**	0.007	0.072***	1.654
	(2.05)	(0.47)	(3.37)	(1.29)
$Leverage_t$	−0.027	−0.008	0.015	−0.594
	(−1.21)	(−0.57)	(1.29)	(−0.96)
$Fsale_t$	0.025**	0.018**	−0.000	0.218
	(2.52)	(2.71)	(−0.04)	(0.26)
$Growth_t$	−0.005*	−0.002	−0.003**	−0.034
	(−1.86)	(−1.42)	(−2.20)	(−0.19)
$Finance_t$	0.003	0.004**	0.000	0.113
	(1.26)	(2.13)	(0.04)	(0.73)
$LGDP_t$	0.003**	0.001*	−0.001	0.001
	(2.13)	(1.85)	(−1.65)	(0.01)
$GDPGrw_t$	−0.001	−0.000	0.001***	−0.104*
	(−1.56)	(−0.31)	(3.09)	(−1.79)
$Inflation_t$	−0.002**	−0.000	0.000	−0.123*
	(−2.15)	(−1.02)	(0.93)	(−1.71)
Constant	−0.402***	−0.158***	0.105	−3.295
	(−7.87)	(−5.53)	(1.17)	(−1.32)

Table 4 (*Continued*)

Dep. Var.	(1) FIO	(2) FIO_NUS	(3) DIO	(4) Big4
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Observations	3,660	3,660	3,660	3,660
Adj. R^2	0.45	0.40	0.58	0.48

This table presents the effects of addition to MSCI on foreign institutional ownership (FIO), non-US foreign institutional ownership (FIO_NUS), domestic institutional ownership (DIO), and Big 4 auditor choice (Big4). Panel A shows pre-treatment (two years before addition to MSCI) means of treated and control groups and tests of the difference in mean between these two groups. Treated firms consist of 366 firms added to the MSCI index during our sample period. Control firms are firms that are matched to treated firms based on auditor choice and FIO before addition to MSCI. Panel B shows the regression results of difference-in-difference analysis. The dependent variable is FIO_t in column 1, FIO_NUS_t in column 2, DIO_t in column 3, and $Big4_t$ in column 4. Treated is a dummy variable that equals 1 if a firm is added to the MSCI and 0 otherwise. Post is a dummy variable that equals 1 in the year a firm is added to the MSCI and thereafter and 0 otherwise. In the parentheses below coefficient estimates, we report the robust *t*-statistics based on standard errors adjusted for heteroskedasticity and country-level clustering. All continuous variables are winsorized at the 1st and 99th percentile. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 level, respectively. All variables are defined in "Appendix".

earlier findings still hold even after we correct potential endogeneity with respect to FIO. We find similar results in column 3 and column 4, where we focus on non-US foreign institutional ownership. Overall, these results from 2SLS further suggest that the observed effect of FIO on auditor choice is unlikely to be driven by potential endogeneity.

Switch to Big 4 auditors as a function of lagged increases in FIO

We next perform a change analysis, in an effort to alleviate concerns about correlated omitted variables and reverse causality with respect to the positive relation observed between FIO and Big 4 auditor choice. To this end, we investigate the effect of lagged changes in FIO on the likelihood that a firm switches its auditor to one of the Big 4. Specifically, we model the likelihood of a firm's decision to switch to a Big 4 auditor as a function of lagged change in FIO. If FIO causes the demand for a high-quality auditor to increase, we should observe that an increase in FIO from year $t-2$ to in year $t-1$ leads to a higher likelihood of switching to a Big 4 auditor from year $t-1$ to year t. To test this, we take the change form of each variable in our baseline regression in Eq. (1). Specifically, we define each right-hand side variable as its annual change and define our dependent variable, denoted by SwitchtoBig4, as a dummy variable that equals 1 if a firm switches its auditor from a non-Big 4 auditor in year $t-1$ to a Big 4 auditor in year t and 0 otherwise.

The regression results are presented in Table 6. The dependent variable is the auditor switch dummy (i.e., SwitchtoBig4) in both columns 1 and 2. The results for all FIIs are reported in column 1, while the results for non-US FIIs are reported in column 2. As shown, we find that the change of FIO (ΔFIO) has a positive and significant coefficient in both columns, suggesting that an increase in FIO leads to a switch to a Big 4 auditor. These findings buttress and further confirm the view that FIO leads to high-quality auditor choice, not vice versa.

The Role of Country Origin of FIIs in Shaping the FIO–Big 4 Relation

Our analysis thus far supports a positive effect of FIO on the likelihood of Big 4 auditor choice. In this section, we explore the heterogeneity among FIIs. Specifically, we are interested in examining whether the institutional investors' originating country matters in relation to their demand for high-quality audits. Hypothesis 2 predicts that FIIs from countries with stronger governance institutions would be more likely to demand high-quality auditors (i.e., Big 4 auditors). To test Hypothesis 2, we decompose FIO into two components: (i) FIO from countries with stronger governance institutions (FIO_HighGov) and (ii) FIO from countries with weaker governance institutions (FIO_LowGov). We then estimate our logit model in Eq. (2) and report the results in Table 7. Column 1 of Panel A and columns 1 to 3 of Panel B report the results for all FIIs, while column 2 of Panel A and columns 4 to 6 of Panel B present the results for non-US FIIs. In Panel A, foreign institutional ownership (FIO) is split into FIO_HighGov and FIO_LowGov based on a country's legal origin (common law versus code law). In Panel B, foreign institutional ownership (FIO) is split into FIO_HighGov and FIO_LowGov based on the sample median of each of three specific country-level scores of institutional

Table 5 2SLS regressions of the FIO–auditor relation

Dep. Var.	All FIIs		Non-US FIIs	
	(1) FIO	(2) Big4	(3) FIO_NUS	(4) Big4
$Proximity_{t-1}$	2.113***		1.528**	
	(2.96)		(2.42)	
$FIO\_Predicted_{t-1}$		1.559**		1.423*
		(2.17)		(1.74)
DIO_{t-1}	0.100*	0.047	0.001	0.042
	(1.77)	(0.30)	(0.06)	(0.43)
$Size_t$	0.020***	0.033	0.009***	0.042***
	(10.94)	(1.61)	(10.51)	(4.48)
$InvRec_t$	−0.035***	0.050*	−0.009**	0.060**
	(−5.59)	(1.76)	(−2.33)	(2.53)
$Capex_t$	−0.024***	0.048*	−0.013***	0.052
	(−4.56)	(1.98)	(−5.14)	(1.51)
$Segs_t$	0.001	0.017	0.002	0.001
	(0.27)	(1.23)	(1.31)	(0.05)
ROA_t	−0.003	0.092*	0.001	0.078
	(−0.41)	(1.93)	(0.17)	(1.67)
$Leverage_t$	−0.034***	−0.020	−0.005	−0.049
	(−2.93)	(−0.47)	(−1.16)	(−1.46)
$Fsale_t$	0.031***	−0.018	0.018***	−0.005
	(4.96)	(−0.60)	(4.86)	(−0.13)
$Growth_t$	0.000	−0.024***	0.001	−0.017***
	(0.73)	(−5.22)	(1.57)	(−4.14)
$Finance_t$	0.002**	−0.009	0.002***	−0.005
	(2.57)	(−0.94)	(3.17)	(−0.52)
$LGDP_t$	0.000*	−0.003	0.000	−0.036
	(1.84)	(−0.47)	(1.40)	(−1.64)
$GDPGrw_t$	0.001	−0.002	0.001	0.009
	(1.03)	(−0.45)	(1.43)	(1.05)
$Inflation_t$	0.005**	−0.007	0.001**	0.003
	(2.13)	(−1.59)	(2.12)	(0.84)
Constant	−0.351***	0.201	−0.154***	0.117
	(−8.62)	(0.50)	(−7.88)	(0.48)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Observations	111,078	111,078	111,078	111,078
Adj./Pseudo-R^2	0.23	0.19	0.21	0.25

This table presents the results of 2SLS regressions, where we estimate a fitted value of foreign institutional ownership (FIO_Predicted) in the first stage and then estimate Eq. (1) in the second stage with the fitted value of FIO as the key independent variable. Columns 1 and 3 present the first-stage results with FIO or FIO_NUS as the dependent variable, respectively. Columns 2 and 4 present the second-stage results with the dependent variable as $Big4_t$. The instrument variable is Proximity, which is defined as the weighted average distance between the capital of a firm's home country and the capitals of all the other countries around the world, multiplied by negative one. The weight is the institutional investment outflow from each country divided by the aggregate institutional investment outflows from all countries. In the parentheses below coefficient estimates, we report the robust *t*-statistics based on standard errors adjusted for heteroskedasticity and country-level clustering. All continuous variables are winsorized at the 1st and 99th percentile. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 level, respectively. All variables are defined in "Appendix".

strengths (i.e., investor protection index, disclosure requirement index, and security regulation index).

As shown in column 1 of Panel A, we find that the coefficient on FIO_HighGov is positive and significant, while the coefficient on FIO_LowGov is negative but insignificant. The difference between the coefficients on FIO_HighGov and FIO_LowGov is significant at less than the 1% level (Chi-square test for difference: 17.45). We observe similar results in column 2, where FIO is measured as non-US foreign institutional ownership (FIO_NUS). The coefficient on FIO_HighGov is significantly positive, and it is significantly different from the coefficient on FIO_LowGov at less than the 1% level (Chi-square test for

Table 6 The effect of change in FIO on subsequent switch to Big 4 auditors

	All FIIs (1)	Non-US FIIs (2)
ΔFIO_{t-1}	1.176*	1.017*
	(1.77)	(1.68)
ΔDIO_{t-1}	−0.013	0.848
	(−0.01)	(1.53)
$\Delta Size_t$	−0.297	−0.067
	(−0.66)	(−0.24)
$\Delta InvRec_t$	1.336	0.619**
	(1.40)	(2.11)
$\Delta Capex_t$	0.629*	0.538**
	(1.66)	(2.37)
$\Delta Segs_t$	0.289	0.121
	(0.70)	(0.47)
ΔROA_t	−0.582**	0.087
	(−2.39)	(0.71)
$\Delta Leverage_t$	0.037	0.239
	(0.17)	(1.10)
$\Delta Fsale_t$	0.388	−0.140
	(1.49)	(−1.24)
$\Delta Growth_t$	0.030	−0.003
	(0.24)	(−0.06)
$\Delta Finance_t$	0.024	−0.002
	(0.70)	(−0.07)
$\Delta LGDP_t$	0.042	−0.054
	(0.64)	(−0.75)
$\Delta GDPGrw_t$	−0.110	0.006
	(−1.49)	(0.20)
$\Delta Inflation_t$	−0.019	−0.015
	(−0.50)	(−0.68)
Constant	3.388***	3.346***
	(8.78)	(5.21)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Country fixed effects	Yes	Yes
Observations	88,987	88,987
Pseudo-R^2	0.07	0.12

This table presents the results of change-on-change regression. The dependent variable is change of Big4 ($SwitchtoBig4_t$). All independent variables are in change form. Column 1 reports the results for all FIIs (FIO), while column 2 reports the results for non-US FIIs (FIO_NUS). In the parentheses below coefficient estimates, we report the robust *t*-statistics based on standard errors adjusted for heteroskedasticity and country-level clustering. All continuous variables are winsorized at the 1st and 99th percentile. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 level, respectively. All variables are defined in "Appendix".

difference: 11.13). Therefore, the results in Panel A provide strong support to our Hypothesis 2, that is, FIIs from countries with stronger governance institutions are more likely to demand high-quality auditors. We then try to capture the strength of country-level governance institutions from three specific dimensions in Panel B. We continue to find that the coefficients on FIO_HighGov are positive and significant in all the six columns, while the coefficients on FIO_LowGov are insignificant in all regressions. The differences between the coefficients on FIO_HighGov and those on FIO_LowGov are significant in columns 1 and 6. In the remaining four columns, the coefficients on FIO_HighGov are about twice the magnitude of those on FIO_LowGov, though the differences between them are not statistically significant. These results are generally consistent with those in Panel A. Taken together, our findings in Table 7 suggest that FIIs originating from countries with stronger governance institutions are more likely to play a governance role and therefore influence a firm's auditor choice. The implication of these findings is that FIIs from countries with stronger governance institutions can spread good governance practices (e.g., high-quality audits) to other foreign countries through their cross-border investment.

Country-Level Information Asymmetry and the FIO–Big 4 Relation

To test Hypothesis 3, we examine whether the positive relation between FIO and Big 4 auditor choice varies systematically with country-level information asymmetry of investee firms. We use two measures to capture country-level information asymmetry. The first measure is based on country-level earnings management index, which is developed by Leuz et al. (2003) and used to measure the level of a country's financial reporting opacity. A higher value of this index means a higher information asymmetry at the country level. We create an indicator variable (EM) which equals 1 if country-level earnings management index value is higher than sample median and 0 otherwise. Our second measure of country-level information asymmetry takes advantage of IFRS adoption during our sample period. Prior studies have documented that IFRS adoption generally improves earnings quality and therefore reduces information asymmetry (e.g., Barth et al., 2008; Kim and Shi, 2012). To capture the country-level information asymmetry, we create an indicator variable (IFRS_Pre) which equals 1 if a country has not adopted IFRS in a given year and 0 otherwise. We then interact either of these two information asymmetry (IA) variables with FIO and estimate Eq. (3). We expect to find that the coefficients on the interaction term between FIO and IA are positive and significant.

The regression results are presented in Table 8.[20] The first two columns present results for all FIIs, while the last two columns present the results for non-US FIIs. Country-level information asymmetry (IA) is measured as country-level earnings

Table 7 The heterogeneity among FIIs and the FIO–auditor relation

	All FIIs (1)	Non-US FIIs (2)
Panel A: FIIs from common law countries Vs. FIIs from code law countries		
$FIO\_HighGov_{t-1}$	2.088***	1.794**
	(2.79)	(2.54)
FIO_LowGov_{t-1}	−1.800	−0.646
	(−1.30)	(−0.77)
DIO_{t-1}	0.727	0.755
	(1.30)	(1.31)
$Size_t$	0.312***	0.328***
	(5.15)	(5.69)
$InvRec_t$	0.163*	0.143*
	(1.76)	(1.65)
$Capex_t$	0.163	0.142
	(0.97)	(0.86)
$Segs_t$	0.015	0.017
	(0.21)	(0.25)
ROA_t	0.305	0.312
	(1.30)	(1.29)
$Leverage_t$	−0.312*	−0.340**
	(−1.87)	(−2.02)
$Fsale_t$	0.095	0.107
	(0.63)	(0.69)
$Growth_t$	−0.080***	−0.081***
	(−4.01)	(−4.10)
$Finance_t$	−0.020	−0.021
	(−0.38)	(−0.38)
$LGDP_t$	−0.235	−0.237
	(−1.49)	(−1.49)
$GDPGrw_t$	0.068	0.068
	(1.39)	(1.39)
$Inflation_t$	0.029	0.030
	(1.33)	(1.33)
Constant	−3.505*	−3.766*
	(−1.71)	(−1.89)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Country fixed effects	Yes	Yes
Observations	111,078	111,078
Pseudo-R^2	0.21	0.21

	All FIIs			Non-US FIIs		
	(1) Gov = investor protection	(2) Gov = disclosure requirement	(3) Gov = security regulations	(4) Gov = investor protection	(5) Gov = disclosure requirement	(6) Gov = security regulations
Panel B: Alternative measures of country-level governance institutions						
$FIO\_HighGov_{t-1}$	1.728***	1.233**	1.161**	0.779*	0.969**	1.065**
	(2.61)	(2.29)	(2.26)	(1.80)	(1.99)	(2.04)
FIO_LowGov_{t-1}	0.559	0.902	0.687	0.320	0.396	−0.078
	(1.03)	(1.39)	(0.99)	(0.64)	(1.05)	(−0.19)
DIO_{t-1}	0.677	0.693	0.699	0.745**	0.735**	0.739**
	(1.19)	(1.21)	(1.22)	(2.37)	(2.33)	(2.35)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 7 (*Continued*)

	All FIIs			Non-US FIIs		
	(1) Gov = investor protection	(2) Gov = disclosure requirement	(3) Gov = security regulations	(4) Gov = investor protection	(5) Gov = disclosure requirement	(6) Gov = security regulations
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	111,078	111,078	111,078	111,078	111,078	111,078
Pseudo-R^2	0.21	0.21	0.21	0.21	0.21	0.21

This table presents the estimation results of Eq. (2). The dependent variable is Big 4 auditor choice ($Big4_t$). In Panel A, FIO is split into FIO from common law countries and FIO from code law countries. Column 1 reports the results for all FIIs (FIO), while column 2 reports the results for non-US FIIs (FIO_NUS). In Panel B, FIO is split into FIO_HighGov and FIO_LowGov based on sample median of three country-level governance institution (Gov) measures, investor protection index, disclosure requirement index, and security regulation index. Columns 1 to 3 report the results for all FIIs (FIO), while columns 4 to 6 report the results for non-US FIIs (FIO_NUS). In the parentheses below coefficient estimates, we report the robust *t*-statistics based on standard errors adjusted for heteroskedasticity and country-level clustering. All continuous variables are winsorized at the 1st and 99th percentile. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 level, respectively. All variables are defined in "Appendix".

management (EM) in columns 1 and 3 and pre-IFRS adoption (IFRS_Pre) in columns 2 and 4. In all four columns, we find that after including the interaction term between FIO and IA in the regression, the coefficients on FIO become insignificant. More importantly, we find the coefficients on the interaction term (FIO × IA) are significantly positive, suggesting that the effect of FIO on auditor choice is stronger in countries with higher information asymmetries. Collectively, these results provide strong support to our Hypothesis 3, that is, FIIs' demand for Big 4 auditors is stronger when investee firms are located in countries with higher information asymmetries.

Alternative Measures of Audit Quality

For additional robustness checks, we use three alternative measures of auditor quality and report the results in Table 9. The results for all FIO are reported in columns 1 to 3 and the results for FIO_NUS in columns 4 to 6. First, we use audit fees that auditors charge for financial statement audits to measure audit quality, as theory and evidence show that high-quality audit is positively related to audit fee (Choi et al., 2008, 2009; Kim et al., 2012; Eshleman and Guo, 2014). We use the natural log of audit fee as the dependent variable in lieu of Big4 in Eq. (1) and then estimate it using the ordinary least squares procedure. As shown in columns 1 and 4 of Table 9, the coefficient on FIO is positive and highly significant at less than the 1% level. Second, we use auditor industry specialization to measure audit quality, following Carson (2009) and Kim et al. (2015). As shown in columns 2 and 5, we continue to find that the positive effect of FIO on auditor quality still holds.

Lastly, we take advantage of the PCAOB global inspection setting to examine whether FIIs are more likely to demand PCAOB-inspected auditors, as prior studies find that PCAOB inspection can increase audit quality (Fung et al., 2017; Krishnan et al., 2017; Lamoreaux, 2016; Shroff, 2015).[21] We first define an indicator variable, PCAOB-inspected auditors, which equals 1 for audit firms that have been inspected by PCAOB and 0 otherwise.[22] We then replace Big 4 auditor choice in our baseline regression in Eq. (1) with PCAOB-inspected auditors. We expect to find a positive and significant coefficient on FIO. The regression results are reported in columns 3 and 6 of Table 9. Consistent with our expectations, we find that the coefficient on FIO is positive and significant at the 5% level, further suggesting that FIIs demand high-quality auditors.

We further perform robustness tests for Hypotheses 2 and 3 using these alternative measures of auditor quality. Though not tabulated (for brevity), we find that the effect of FIO on high-quality auditor choice is stronger when FIIs are from countries with stronger governance institutions or when investee firms are located in countries with higher information asymmetries, which is consistent with our main results reported in Tables 7 and 8.

Robustness Tests

In Table 10, we summarize the results of several other robustness tests we perform. Columns 1 to 3 report the results for all foreign institutional ownership (FIO), while columns 4 to 6 report the results for non-US foreign institutional ownership (FIO_NUS). First, one potential problem with our FIO measure is that some institutions, especially very large institutions, are multinational companies,

Table 8 The effect of information asymmetry on FIO–auditor relation

	All FIIs		Non-US FIIs	
	(1)	(2)	(3)	(4)
$FIO_{t-1} \times IA$	5.836***	1.274**	8.428***	3.865***
	(4.37)	(2.16)	(4.02)	(3.88)
IA	2.981**	2.542	2.619**	2.826
	(2.47)	(1.31)	(2.21)	(1.46)
FIO_{t-1}	0.426	0.504	−1.176	0.114
	(0.68)	(1.11)	(−1.07)	(0.19)
DIO_{t-1}	1.107	0.971	1.141	0.965
	(1.42)	(1.53)	(1.43)	(1.58)
$Size_t$	0.282***	0.342***	0.302***	0.351***
	(5.09)	(6.05)	(5.39)	(6.60)
$InvRec_t$	0.106	0.061	0.072	0.059
	(0.44)	(0.80)	(0.31)	(0.76)
$Capex_t$	0.473**	0.084	0.442**	0.082
	(2.39)	(0.64)	(2.27)	(0.62)
$Segs_t$	0.056	0.064	0.062	0.062
	(0.72)	(1.12)	(0.80)	(1.09)
ROA_t	0.086	0.364	0.085	0.355
	(0.52)	(1.47)	(0.48)	(1.46)
$Leverage_t$	−0.422	−0.196	−0.467	−0.191
	(−1.47)	(−1.17)	(−1.63)	(−1.15)
$Fsale_t$	0.126	0.035	0.146	0.041
	(0.61)	(0.28)	(0.70)	(0.33)
$Growth_t$	−0.095***	−0.056	−0.095***	−0.056
	(−3.81)	(−1.50)	(−3.75)	(−1.48)
$Finance_t$	−0.000	−0.036	0.003	−0.035
	(−0.00)	(−0.73)	(0.05)	(−0.72)
$LGDP_t$	0.046***	−0.186	0.046***	−0.186
	(2.81)	(−1.43)	(2.80)	(−1.44)
$GDPGrw_t$	−0.050	0.050	−0.052	0.049
	(−1.00)	(1.19)	(−1.03)	(1.18)
$Inflation_t$	0.030	0.022	0.029	0.022
	(0.63)	(1.16)	(0.61)	(1.16)
Constant	−5.811***	−6.261***	−6.152***	−6.460***
	(−4.30)	(−3.51)	(−4.45)	(−3.76)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	No	Yes	No	Yes
Observations	100,732	111,078	100,732	111,078
Pseudo-R^2	0.13	0.22	0.13	0.22

This table presents the estimation results of Eq. (3). The dependent variable is Big 4 auditor choice ($Big4_t$). Information asymmetry (IA) is measured as country-level earnings management (EM) in columns 1 and 3, and pre-IFRS adoption (IFRS_Pre) in columns 2 and 4. Earning management (EM) is an indicator variable which equals 1 if country-level earnings management index is higher than sample median and 0 otherwise. Pre-IFRS adoption (IFRS_Pre) is an indicator variable which equals 1 if a country has not adopted IFRS in a given year and 0 otherwise. Columns 1 and 2 report the results for all FIIs (FIO), while columns 3 and 4 report the results for non-US FIIs (FIO_NUS). In the parentheses below coefficient estimates, we report the robust *t*-statistics based on standard errors adjusted for heteroskedasticity and country-level clustering. All continuous variables are winsorized at the 1st and 99th percentile. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 level, respectively. All variables are defined in "Appendix".

which makes it difficult to identify their country origins and define whether they are FIIs. To mitigate this problem, we removed the top 50 institutions from our sample in each sample year and recalculate the FIO measure. We then re-estimate our baseline regression in Eq. (1). As shown in columns 1 and 4, the coefficient on this measure of FIO is positive and significant in column 1, while it is positive but marginally insignificant in column 4. Thus, the main inference on the effect of FIO on Big4 generally continues to hold, suggesting that our main results are unlikely to be driven by potential measure errors associated with our measure of FIO.

Table 9 Alternative measures of auditor quality

Dep. Var.	All FIIs			Non-US FIIs		
	(1) Audit fee	(2) Industry-specialized auditors	(3) PCAOB-inspected auditors	(4) Audit fee	(5) Industry-specialized auditors	(6) PCAOB-inspected auditors
FIO_{t-1}	0.910***	0.568*	0.069**	1.403***	1.378***	0.110**
	(5.75)	(1.72)	(2.35)	(6.07)	(6.09)	(2.22)
DIO_{t-1}	0.207**	−0.398*	0.095**	0.218**	−0.403*	0.097**
	(2.21)	(−1.66)	(2.14)	(2.64)	(−1.67)	(2.21)
$Size_t$	0.617***	0.378***	0.038***	0.622***	0.377***	0.039***
	(33.48)	(11.53)	(11.42)	(34.93)	(11.63)	(11.98)
$InvRec_t$	0.428***	−0.069	0.001	0.423***	−0.065	0.001
	(4.17)	(−0.53)	(0.16)	(4.10)	(−0.52)	(0.12)
$Capex_t$	−0.542***	−0.181*	0.025**	−0.546***	−0.178*	0.024**
	(−8.03)	(−1.84)	(2.59)	(−8.06)	(−1.84)	(2.58)
$Segs_t$	0.127***	−0.045	0.007*	0.127***	−0.046	0.007*
	(3.50)	(−1.17)	(1.84)	(3.50)	(−1.21)	(1.86)
ROA_t	−0.394***	−0.190	0.025	−0.391***	−0.185	0.025
	(−5.99)	(−1.16)	(1.43)	(−6.02)	(−1.14)	(1.45)
$Leverage_t$	0.112	−0.197*	−0.071***	0.109	−0.196*	−0.072***
	(1.44)	(−1.75)	(−4.35)	(1.40)	(−1.79)	(−4.34)
$Fsale_t$	0.004***	0.002*	0.035***	0.004***	0.002*	0.035***
	(7.21)	(1.88)	(3.41)	(7.32)	(1.79)	(3.36)
$Growth_t$	−0.020***	−0.048***	−0.007*	−0.022***	−0.049***	−0.007**
	(−2.74)	(−4.74)	(−1.95)	(−3.01)	(−4.93)	(−1.98)
$Finance_t$	0.016	0.023	0.004	0.014	0.022	0.004
	(1.16)	(1.02)	(0.77)	(1.04)	(0.97)	(0.75)
$LGDP_t$	−0.026	−0.032	−0.022***	−0.026	−0.032	−0.022***
	(−1.09)	(−1.21)	(−4.04)	(−1.08)	(−1.21)	(−4.03)
$GDPGrw_t$	0.013	0.008	0.010*	0.013	0.008	0.010*
	(1.58)	(0.58)	(1.84)	(1.55)	(0.58)	(1.84)
$Inflation_t$	0.031***	0.013**	0.003	0.031***	0.013**	0.003
	(2.73)	(2.52)	(1.23)	(2.73)	(2.54)	(1.24)
Constant	−10.468***	−6.057***	0.537***	−10.563***	−6.023***	0.531***
	(−32.71)	(−7.70)	(3.28)	(−33.39)	(−7.79)	(3.28)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	35,049	111,078	84,701	35,049	111,078	84,701
Adj./Pseudo-R^2	0.92	0.12	0.23	0.92	0.12	0.23

This table presents the estimation results of Eq. (1). The dependent variables are audit fee in columns 1 and 4, industry-specialized auditors in columns 2 and 5, and PCAOB-inspected auditors in columns 3 and 6. The dependent variables are in year *t*. Columns 1 to 3 report the results for all FIIs (FIO), while columns 4 to 6 report the results for non-US FIIs (FIO_NUS). In the parentheses below coefficient estimates, we report the robust *t*-statistics based on standard errors adjusted for heteroskedasticity and country-level clustering. All continuous variables are winsorized at the 1st and 99th percentile. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 level, respectively. All variables are defined in "Appendix".

Second, if the Big 4 auditors' market share is overly large in a country, there may be no meaningful variations in firms' auditor choices in that country. To address this concern, we remove the countries where the Big 4 auditors' market share exceeded 90% and re-estimate our regression using this reduced sample. As shown in columns 2 and 5, we continue to find a positive and significant effect of FIO on Big 4 auditor choice. Lastly, as shown in columns 3 and 6, we find that our results are not sensitive to removing major countries that are overrepresented in our sample (i.e., the UK, Canada, and Japan), suggesting our findings are not driven by one or a few dominant countries in our sample.

Table 10 Robustness tests

	All FIIs			Non-US FIIs		
	(1) Remove top 50 institutional investors	(2) Remove countries with over 90% Big4 market share	(3) Remove major countries (UK, CAN, JPN)	(4) Remove top 50 institutional investors	(5) Remove countries with over 90% Big4 market share	(6) Remove major countries (UK, CAN, JPN)
FIO_{t-1}	0.792**	1.169***	0.823***	0.703	1.220*	1.388***
	(2.43)	(2.70)	(3.33)	(1.58)	(1.69)	(2.70)
DIO_{t-1}	0.719	0.904	−0.781	0.739	0.946	−0.824
	(1.26)	(1.57)	(−1.39)	(1.28)	(1.60)	(−1.46)
$Size_t$	0.320***	0.322***	0.331***	0.327***	0.334***	0.333***
	(5.37)	(5.05)	(10.86)	(5.72)	(5.52)	(10.75)
$InvRec_t$	0.156*	0.189*	0.049	0.144	0.174*	0.048
	(1.71)	(1.93)	(0.37)	(1.64)	(1.92)	(0.36)
$Capex_t$	0.150	0.205	0.020	0.140	0.191	0.018
	(0.91)	(1.15)	(0.20)	(0.85)	(1.07)	(0.18)
$Segs_t$	0.015	0.026	0.111*	0.016	0.029	0.110*
	(0.21)	(0.33)	(1.76)	(0.23)	(0.36)	(1.75)
ROA_t	0.313	0.342	0.244	0.314	0.343	0.244
	(1.30)	(1.22)	(1.26)	(1.29)	(1.21)	(1.26)
$Leverage_t$	−0.332**	−0.314*	−0.395**	−0.343**	−0.332*	−0.398**
	(−1.97)	(−1.71)	(−2.07)	(−2.03)	(−1.82)	(−2.09)
$Fsale_t$	0.001	0.001	0.001	0.108	0.146	0.067
	(0.66)	(0.78)	(0.53)	(0.69)	(0.81)	(0.52)
$Growth_t$	−0.080***	−0.085***	−0.093***	−0.080***	−0.085***	−0.095***
	(−4.04)	(−4.43)	(−3.66)	(−4.02)	(−4.42)	(−3.68)
$Finance_t$	−0.020	−0.034	−0.072**	−0.020	−0.034	−0.073**
	(−0.38)	(−0.62)	(−2.20)	(−0.37)	(−0.60)	(−2.21)
$LGDP_t$	−0.237	−0.227	−0.049	−0.237	−0.227	−0.049
	(−1.49)	(−1.41)	(−1.12)	(−1.49)	(−1.41)	(−1.12)
$GDPGrw_t$	0.068	0.063	0.004	0.068	0.063	0.004
	(1.39)	(1.27)	(0.16)	(1.39)	(1.28)	(0.16)
$Inflation_t$	0.030	0.014	0.009	0.030	0.014	0.009
	(1.34)	(0.65)	(1.12)	(1.34)	(0.64)	(1.13)
Constant	−3.606*	−3.545	−4.594***	−3.737*	−3.754*	−4.616***
	(−1.77)	(−1.61)	(−6.62)	(−1.88)	(−1.75)	(−6.49)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	111,078	99,375	65,023	111,078	99,375	65,023
Pseudo-R^2	0.21	0.20	0.23	0.21	0.20	0.23

This table presents the estimation results of Eq. (1). The dependent variable is Big 4 auditor choice ($Big4_t$). We remove top 50 institutional investors from measurement of FIO in column 1 and column 4, countries with over 90% Big4 market shares from our sample in column 2 and column 5, and three major countries from our sample in column 3 and column 6. Columns 1 to 3 report the results for all FIIs (FIO), while columns 4 to 6 report the results for non-US FIIs (FIO_NUS). In the parentheses below coefficient estimates, we report the robust *t*-statistics based on standard errors adjusted for heteroskedasticity and country-level clustering. All continuous variables are winsorized at the 1st and 99th percentile. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 level, respectively. All variables are defined in "Appendix".

Though not tabulated (for brevity), we further perform these robustness tests for our Hypotheses 2 and 3 as well. We continue to find that the effect of FIO on high-quality auditor choice is stronger when FIIs are from countries with higher governance institutions or when investee firms are located in countries with higher information asymmetries, which is consistent with the predictions of Hypotheses 2 and 3.

CONCLUSION

Our study investigates whether and how demand for higher-quality audits outside of the USA is affected by FIIs. Consistent with the notion that FIIs are informationally disadvantaged and use high-quality audits as a means to overcome their informational disadvantage, we find that FIIs demand high-quality audits in order to reduce the information asymmetry they face with respect to local firms in foreign countries. This effect is stronger when the FIIs are from countries with stronger governance institutions or when the investee firms are located in countries with more severe information asymmetries.

Our findings highlight the monitoring role of FIIs in the non-US setting. By demanding high-quality audits, these FIIs are better able to monitor their investee firms in order to reduce information asymmetry, especially when the FIIs originate from countries with stronger governance institutions. Consequently, FIIs spread high-quality disclosure practices from countries with stronger governance institutions to those with weaker governance institutions. Our findings also underscore the role of Big 4 auditors as important information intermediaries and protectors of public trust, especially in countries or jurisdictions where other monitoring mechanisms (e.g., investor protection, disclosure requirements) are either weak or difficult to enforce.

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NOTES

[1]The information disadvantages of FIIs could further be amplified by informational advantages possessed by DIIs who are likely to have preferential access to firms' private information (Choe et al., 2005; Maffett, 2012).

[2]US firms are predominantly held by DIIs, while, in most countries around the world, the holdings of foreign institutions may exceed those of domestic institutions (Aggarwal et al., 2011).

[3]Another reason we exclude US firms from our sample is that they are largely audited by Big 4 audit firms. For example, in 2013, Big 4 audit firms audited approximately 93% of the US large accelerated filers (Audit Analytics, 2014). Therefore, there may be little covariation between institutional ownership and auditor choice in US firms.

[4]According to the MSCI's methodology, firms are selected for inclusion based on a number of criteria, including float-adjusted market capitalization, trading frequency, trading volume, and percentage of shares open to purchase by foreign investors (MSCI, 2015).

[5]He et al. (2014) and Guedhami et al. (2009) do not consider the nature and type of foreign investors in their paper – namely whether the foreign investors are institutional investors or not.

[6]Fang et al. (2015) focus on US institutional investors and find that US institutional investors are associated with Big 4 auditor choice in non-US firms. Specifically, Fang et al. (2015) show that the choice of Big 4 auditors is one mechanism through which US institutional investors can influence reporting convergence. Our study differs from Fang et al. (2015) in at least two respects. First, we focus on the universe of FIIs rather than US institutional investors. Second, we further investigate the heterogeneity among FIIs. Specifically, we find that FIIs from countries with strong governance institutions, compared to FIIs from countries with weak governance institutions, play a more important role in influencing firms' auditor choices.

[7]FactSet provides very limited institutional ownership data for the year 1999.

[8]We obtain time-series auditor information from Excel Addin of Worldscope.

[9]We correct standard errors for country-level clustering following Aggarwal et al. (2011). In unreported results, we find stronger results if we adjust standard errors for country-year-level

clustering or firm-level clustering. We thus have reported the more conservative results in this study.

[10]We run linear probability regression when firm fixed effects are included in the regressions.

[11]In unreported results, we find that the positive effect of FIO on Big4 still exists even if we use two-year lagged or three-year lagged FIO (though it becomes weak), further providing supportive evidence that FIO leads to Big 4 auditor choice.

[12]The area under the ROC curve is used to diagnose the accuracy of model specification in predicting auditor choice. An area of 1.0 represents a perfect test, while an area of 0.7 (0.8) represents fair (good).

[13]The marginal fixed effects of FIO and DIO on auditor choice are 0.278 versus 0.171, suggesting that the probability of hiring Big 4 auditors is about 10% higher for an instantaneous increase in FIO compared to the same increase in DIO.

[14]However, the coefficient on DIO becomes comparable to that on FIO when US institutional investors are removed from total FIIs in the logit model in column 3, suggesting that US institutional investors play an important role among all FIIs in influencing firms' auditor choices.

[15]The firm fixed effect model in columns 2 and 4 may absorb the significance of firm-level variables, especially the variables that are stable over time.

[16]Many prior studies use exogenous legal or transparency shocks to control for endogeneity and establish causal inference (e.g., Aier et al., 2014; Armstrong et al., 2012).

[17]A similar approach is employed in Bena et al. (2017) and Boone and White (2014).

[18]The Big4 measure is one year ahead of FIO to allow FIIs to exert influence on firms' auditor choices.

[19]Consider four countries in the world, A, B, C, and D. Suppose we have a firm in country A that is the potential recipient of cross-border investment by institutional investors from countries B, C, and D. Further suppose that, in a particular year, the total institutional investment outflows from countries B, C, and D to the rest of the world are \$200, \$300, and \$400, respectively. The weighted average distance between our firm's home country A and the other three countries is computed as [distance (A, B) $\times$ 200/(200 + 300 + 400) + distance (A, C) $\times$ 300/(200 + 300 + 400) + distance (A, D) $\times$ 400/(200 + 300 + 400)]. The reason we give the distance between A and D the largest weight is that D represents the largest source of cross-border institutional investment in the world (e.g., the US).

[20]Country fixed effects are not included in columns 1 and 3 as the information asymmetry measure (IA) is time invariant. Nevertheless, we find similar results if we control for country fixed effects while excluding the stand-alone variable, IA, in the regression.

[21]We thank a reviewer for suggesting this alternative way of testing the demand for high-quality audits.

[22]We obtain the data on PCAOB-inspected auditors from https://pcaobus.org/International.

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APPENDIX: VARIABLE DEFINITIONS

Variable	Definition
Firm-level variables	
Big4	An indicator variable equal to 1 if a firm's auditor is a Big4 auditor, and 0 otherwise
SwitchtoBig4	An indicator variable equal to 1 if a firm has a Big 4 auditor in year *t* and non-Big 4 auditor in year *t*−1, and 0 otherwise
Audit fee	The log of audit fee paid by a firm to the auditors
Industry-specialized auditors	An indicator variable equal to 1 if a firm's auditor is an industry-specialized auditor and 0 otherwise. An auditor is industry specialized if the auditor is the national industry leader, based on the percentage of total assets audited within an industry
PCAOB-inspected auditors	An indicator variable equal to 1 for audit firms that have been inspected by PCAOB, and 0 otherwise
FIO	Percentage of shares (end of year) held by all FIIs
FIO_NUS	Percentage of shares (end of year) held by non-US FIIs
FIO_HighGov	Percentage of shares (end of year) held by FIIs originating from countries with stronger governance institutions. Strength of governance institutions is measured according to (a) legal origins, (b) investor protection, (c) disclosure requirement, and (d) security regulations
FIO_LowGov	Percentage of shares (end of year) held by FIIs originating from countries with weaker governance institutions. Strength of governance institutions is measured according to (a) legal origins, (b) investor protection, (c) disclosure requirement, and (d) security regulations
DIO	Percentage of shares (end of year) held by all DIIs
Size	The log of a firm's total assets in US dollars
InvRec	The sum of inventories and receivables divided by total assets
Capex	Capital intensity measured by long-term assets divided by total assets
Segs	Total number of business segments reported by a firm
ROA	Net income divided by total assets
Leverage	Ratio of total debt to total assets
Fsale	Foreign sales as percentage of total sales
Growth	Asset growth, measured as total assets minus total assets of last year divided by total assets last year
Finance	An indicator variable equal to 1 if long-term debt increased by 20% or more or the number of shares outstanding increased by 10% or more, and 0 otherwise
Country-Level Variables	
LGDP	The log of GDP per capita in US dollars
GDPGrw	GDP growth, calculated as GDP in year *t* minus GDP in year *t*−1, divided by GDP in year *t*−1
Inflation	Inflation rate, measured as the consumer price index which reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services
Earning management	The earnings management and opacity score developed by Leuz et al. (2003)
Legal origin	An indicator variable equal to 1 if the origins of the laws of a country are common law, and 0 otherwise
Investor protection	The anti-director rights index from Djankov et al. (2008)
Disclosure requirement	The disclosure requirement index from La Porta et al. (2006)
Security regulation	The composite average of the disclosure requirement index, the liability standard index, and the public enforcement index from La Porta et al. (2006)

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