



Auditor certification and long-run performance of IPO stocks[☆]

Sudip Datta^{a,*}, Mark Gruskin^{b,1}, Mai Iskandar-Datta^c

^a Department of Finance, Robert J. Trulaske, Sr. College of Business, University of Missouri – Columbia, 402 Cornell Hall, Columbia, MO 65211, USA

^b Penn State University Lehigh Valley, 2809 Saucon Valley Road, Center Valley, PA 18034, USA

^c Department of Finance, Mike Ilitch School of Business, Wayne State University, 2771 Woodward Avenue, Detroit, MI 48201, USA

ARTICLE INFO

JEL classification:

M49

G32

Keywords:

Auditor certification

Underwriter certification

Venture capital backing

Long-run post-IPO returns

Information asymmetry

ABSTRACT

This study establishes a significant positive relation between high quality auditors and long-run post-IPO equity performance. IPOs associated with high-ranked auditors benefit from superior information quality irrespective of underwriter rank, manifesting in significantly better post-IPO equity performance. The auditor certification effect is robust and persists longer than the underwriter certification effect. IPOs, regardless of the underwriter rank, benefit significantly from the auditor reputation effect. Further, the auditor certification effect is more pronounced: (a) when underwriter certification is weak ('substitution effect'), and (b) in the presence of greater information asymmetry. VC backed IPOs perform significantly better; however, VC reputation has no effect, after controlling for auditor rank and underwriter certification. Our conclusions are reinforced by a battery of robustness checks, including the use of alternative methodologies to address endogeneity, audit quality proxies, performance metrics, model specifications, and validity tests.

1. Introduction

Financial intermediaries, such as underwriters and auditors, play an essential role in offering external certification. They help investors evaluate a firm's true value in the face of information asymmetry. Initial public offerings (IPOs) present a compelling setting to examine the certification effects associated with the quality of these financial intermediaries. While the effect of underwriter certification for IPOs has been well established in the literature with previous studies highlighting the positive association between underwriter reputation and long-run performance (Carter, Dark and Singh, 1998; Chan et al., 2008; Dong, Michel and Pandes, 2011), the corresponding influence of auditor certification effect remains inconclusive.

Past research examining the influence of auditor reputation on long-run post-IPO performance is sparse and provides ambiguous findings. Only one prior study by Michaely and Shaw (1995) has examined the long-run impact of auditor prestigiousness on initial public offerings. While their univariate analysis suggests a positive and significant association between auditor quality and post-IPO stock performance, their multivariate analysis fails to support this conclusion, possibly due to

methodological drawbacks. For example, their choice to compute two-year returns using a reference portfolio has been shown to lead to mis-specified t-statistics by Barber and Lyon (1997). The conflicting evidence in their paper as well as the econometric foundation of their study presents certain limitations, which we attempt to resolve.

Based on the findings from Michaely and Shaw's (1995) study, our current knowledge is that there is no auditor certification effect on post-IPO equity performance. Our evidence substantially changes this understanding in the literature. In other words, we document an analogous certification effect for auditor quality on IPO performance, akin to the well-documented underwriter certification effect. To the best of our knowledge, this is the first study to definitively establish the impact of auditor certification on long-run post-IPO stock price performance.

To address the issues associated with the previous study and to provide a more robust analytical framework, we introduce several enhancements in research design. First, we address endogeneity issues by employing several methodologies. Our utilization of the propensity-score matching technique and Heckman's two-stage approach offer significant and necessary improvements over Michaely and Shaw's (1995) use of a reference portfolio approach. Our multivariate analysis

[☆] We are grateful to two referees and Iftekhhar Hasan (editor) for insightful comments. We also thank Sudarshan Jayaraman (Rochester), S.P. Kothari (MIT) and participants at the American Accounting Association's annual meeting for comments on earlier drafts.

* Corresponding author.

E-mail address: sdatta@missouri.edu (S. Datta).

¹ We want to especially acknowledge the work of our co-author and former doctoral student, Mark Gruskin, who passed away in May 2023.

incorporates and expands upon the two control variables used by Michaely and Shaw, accounting for key factors like firm age, return's standard deviation, secondary IPO offerings, and VC participation effect.

Another key distinction between our study and many prior IPO studies, including that of Michaely and Shaw, is that they commingle true IPOs and reverse leveraged buyouts (RLBOs) into a single sample. Given the significant differences between these offerings, combining them could introduce bias (see [Datta, Gruskin, and Iskandar-Datta, 2015](#)). This study seeks to address the limited and inconclusive evidence surrounding the existence of a distinct certification effect by auditors on long-run post IPO stock return performance. Our research on the impact of auditor reputation on long-run stock price performance post-IPO is the first to conclusively establish a link. We highlight the potential broader implications for the role of auditor reputation in capital markets.

In addition to the well-established underwriter certification effect, much of the IPO literature has primarily examined the impact of auditor reputation on initial-day IPO returns. The prevailing evidence in the literature indicates that the choice of the audit firm affects the underpricing at the offering, (i.e., initial day returns), where more prestigious audit firms are found to be associated with less underpricing ([Balvers, McDonald, and Miller, 1988](#); [Beatty, 1989](#)). This finding is attributed to the notion that the quality of the auditor provides valuable information about the true value of the firm, thus reducing uncertainty about its future cash flows ([Balvers et al., 1988](#); [Simunic and Stein, 1987](#); [Datar et al., 1991](#); and [Titman and Trueman, 1986](#)). However, it should be noted that due to the significant information asymmetry, first-day returns do not accurately reflect the intrinsic value of the firm ([Levis, 1993](#); [Ritter, 1991](#)). [Ritter \(1991\)](#) argues that long-run stock returns are more meaningful, as the cost of external equity capital for firms going public encompasses the returns investors earn in the aftermarket. Hence, our evidence on the long run effect of auditor certification on IPO performance controls for and parallels the well-established underwriter certification effect, as well as the effect due to venture-capital backing.

Arguing that firms undergoing IPOs are characterized by pronounced information asymmetry, [Menon and Williams \(1991\)](#) underscore the importance of auditor credibility in the IPO process. Their findings highlight the role of prestigious auditors in reducing underpricing and the influence of auditor reputation on offering size. Auditors provide crucial information not just around the IPO but also in the long run due to their continued monitoring role through the audit relationship with the firm post-IPO. Against this backdrop, IPOs present a unique setting to examine the influence of auditor certification and monitoring on post-IPO stock price performance.

Our analysis examines the influence of both the auditor and underwriter certification effects, in conjunction, on subsequent stock price performance, drawing contrasts between their respective influences. Furthermore, we explore how these third-party certifications might serve as potential partial substitutes for each other. One key aspect of our investigation focuses on the comparative persistence of these certification effects on the long-term performance in the post-IPO period.

Further, we investigate the influence of the information environment of the IPO firm on the impact of financial intermediary certification effects. We posit that firms characterized by high information asymmetry, particularly those with high growth opportunities, stand to gain the most from intermediary certification. This leads us to examine whether the auditor certification effect is more valuable for firms with high information opacity.

This study makes several contributions to the existing literature. We provide compelling empirical evidence documenting the profound impact of auditor reputation on the trajectory of stock returns after the IPO. This finding substantially alters our current knowledge regarding the certification effect of auditor reputation on post-IPO performance and stands alongside the well-established underwriter certification effect and the influence of venture capital backing. Further, our evidence reveals that the long-run impact of auditor quality on post-IPO stock

returns not only persists but also surpasses the underwriter certification effect in terms of longevity. Moreover, our analytical approach isolates the unique impact of auditor quality from the underwriter certification effect, revealing the former as a distinct and stronger influence on post-IPO performance.

Our analysis further demonstrates the pivotal role of auditor quality regardless of the rank of the underwriter except in the first year post-IPO. Overall, our results provide robust empirical support for theoretical models, such as that presented by [Titman and Trueman \(1986\)](#), which postulates that premium auditor quality signals information to investors regarding the intrinsic value of the IPO firm.

Lastly, our research substantiates that firms associated with heightened growth potential experience amplified benefits in post-IPO stock return outcomes when they enlist prestigious auditors compared to their peers. Our conclusions are robust across different stock return benchmarks and time horizons, alternative empirical methodologies, different model specifications, and alternative audit quality proxies.

2. Intermediary functions and hypothesis development

2.1. Auditor and underwriter functions at the IPO

Both auditors and underwriters serve distinct roles in the IPO process, although their functions may be interrelated and complementary. The primary role of the auditing firm is to conduct a comprehensive audit of the company's financial statements to ensure they are prepared in accordance with the relevant accounting standards and provide a true and fair view of the company's financial position. Auditors also evaluate the effectiveness of a company's internal control over financial reporting, ensuring that the company has robust systems in place to prevent financial misstatements. In contrast, underwriters offer a different menu of services, that include producing information during the book-building period, conducting due diligence, pricing of the issue based on demand and supply factors, managing the distribution and sale of the offered shares, and engaging in stabilization of the share price in the period immediately following the listing.

Moreover, while both intermediaries play a role in risk management, their roles are also complementary and distinct in nature, with auditors assessing financial reporting risks and underwriters assessing market risks. Both auditors and underwriters ensure that the company meets all regulatory requirements for the IPO with the auditing firm ensuring financial statements compliance with accounting standards, while underwriters ensure that the offering complies with securities regulations. Clearly, the auditor's verification of the company's financial statements provides underwriters with confidence in the accuracy of the information they use for due diligence and pricing decisions. In fact, [Menon and Williams \(1997\)](#) show that certain IPO offerings which engage prestigious auditors appear to get a "discount" from underwriters, showing that underwriters value the engagement of prestigious auditors. Given the complementarity and distinct functions, each intermediary uniquely contributes to the IPO certification process, underscoring the importance of examining both the role of prestigious auditors in addition to that of the underwriter on firm's post IPO performance.

2.2. Hypotheses development

Engaging a prestigious auditor for an IPO is a strategic decision firms undertake with broad implications to the firm. Such auditors boost the credibility of financial statements, serving as a quality signal to the market. By certifying the quality of financial information disclosed during the offering, such auditors play a pivotal role in the IPO process. This often translates into reduced capital costs ([Khurana and Raman, 2004](#); [Mansi, Maxwell, and Miller, 2004](#); [Pittman and Fortin, 2004](#)), increased IPO proceeds and lower underpricing at the IPO ([Titman and Trueman, 1986](#); [Beatty, 1989](#); [Balvers et al., 1988](#)). Moreover, their ongoing association with the issuing firm extends this certification

post-IPO assuring investors of the reliability of financial reports and fostering transparency and informed investment decisions (Jiang, Wang and Wang, 2019; Becker, DeFond, Jiambalvo, and Subramanyam, 1998; Dopuch and Simunic, 1982; Francis, Maydew, and Sparks, 1999; Jensen and Meckling, 1976).

Theoretical perspectives from researchers, such as DeAngelo (1981) and Dye (1993), posit that larger and more prestigious auditors, mindful of their reputation due to potential litigation risks, are less likely to indulge in opportunistic behaviors, and are thus, motivated to provide higher quality audits.² This notion is further cemented by Datar, Feltham, and Hughes (1991), who argue that prestigious auditors convey more accurate and pertinent insights regarding an entrepreneur's confidential information to investors. Consequently, prestigious auditors can diminish informational gaps and bolster transparency, potentially elevating firm valuations.

Historically, research has underscored the multifaceted advantages of auditor reputation, such as high-quality financial reporting, reduced earnings management, enhanced firm disclosures (Dopuch and Simunic, 1982; Francis, LaFond, Olsson, and Schipper, 2004; Becker, DeFond, Jiambalvo, and Subramanyam, 1998; Mansi, Maxwell, and Miller, 2004; Legoria, Reichelt, and Soileau, 2018), and even strategic long-term impacts like dissuading managerial opportunism, promoting good corporate governance (Fan and Wong, 2005), and decreasing potential litigation risks. Studies have also shown that beyond the informational role, prestigious auditors also provide an insurance role assuring investors in the event of an audit failure (Willenborg, 1999; Palmrose, 1988).

Furthermore, in the realm of IPOs, where information about the firm is relatively scarce prior to the offering, prestigious auditors become invaluable. Theoretical and empirical research has suggested that these high-quality auditors certify the inherent quality and value of the IPO firm more reliably (Titman and Trueman, 1986; Menon and Williams, 1991). Their superior audit quality, often associated with Big N auditors, paves the way for precise information dissemination, influencing market participants, including analysts and potential investors.

Building on this foundation, we emphasize that auditors' contributions are not limited to merely verifying financial statements. They offer consistent guidance to corporate managers on an array of decisions including internal controls, corporate governance, financial decisions, and regulatory oversight.³ Drawing a parallel, the auditor's role in certification mirrors the underwriter certification effect, where top-tier underwriters are linked with enhanced post-IPO returns (Carter, Dark and Singh, 1998; Dong, Michel and Pandes, 2011). Given the breadth of their role, auditors could arguably be deemed at least as influential as underwriters, underscoring the importance of their quality in the certification process. As such, the quality of the auditor should matter to

² It is also argued that Big N firms are able to support more robust training programs and standardized audit methodologies, leading to better audit quality (Lawrence, Minutti-Meza, and Zhang, 2011).

³ However, these benefits come with associated costs. Thus, the demand side for prestigious auditors from issuing firms involves considerations of the tradeoffs. Engaging prestigious auditors comes with premium fees, reflecting their brand and the assurance they bring to the table (Simunic, 1980). Hogan (1997) underscores this trade-off, illustrating that firms often select auditors by minimizing the combined costs of underpricing and auditor compensation. From the perspective of the supply side—prestigious auditors possessing the expertise and resources to conduct rigorous audits—the IPO setting presents heightened risks due to the significant information asymmetry. This increased uncertainty exposes them to greater litigation risks, since they are fully liable for any omissions in the financial statements (Beatty and Welch, 1996; Palmrose, 1988), potentially making them more selective in their client acquisition and favoring certain firms. While IPO firms carefully evaluate the substantial benefits that prestigious auditors offer in terms of certification and reduced information asymmetry against the associated financial costs, some issuing firms may face limited accessibility to prestigious auditors.

post-IPO firm performance. Based on the preceding discussion, we propose the following hypothesis:

Hypothesis 1. (H1) (Auditor certification effect): Firms that engage prestigious auditors will exhibit superior long-run post-IPO stock performance relative to firms that engage less prestigious auditors.

As discussed earlier, both auditors and underwriters serve in their different and unique ways as certifiers of the financial health of the issuer. If there is an auditor certification effect on IPO returns, then the effect of high audit quality should be even more valuable to issuers with a low underwriter rank as IPO investors will now be more reliant on the auditor certification. In other words, if the underwriter certification is weak due to the low rank of the underwriter, then the more reliable certification of the high-ranked auditor will substitute for the weak underwriter certification of the IPO.⁴ Hence, the certification effects from the two intermediaries certifying the financial prospects of the issuer can be substitutes. Further, the theoretical literature suggests that there should be some degree of (partial) substitution between the underwriter certification effect and auditor quality effect (see Balvers, McDonald, and Miller, 1988). Hence, we propose the following hypothesis:

Hypothesis 2. (H2) (Substitution effect between auditor and underwriter certifications): The impact of auditor certification on long-run post-IPO stock returns will be more prominent for issuances linked to low quality underwriters.

It is important to acknowledge that while the relationship between an IPO firm and its auditor is an ongoing one that continues beyond the IPO event, the relationship with the underwriter is typically associated with the IPO event and is expected to be episodic post-IPO, depending on future capital needs of the firm. As time passes after the IPO event, we posit that the underwriter certification effect will weaken while the auditor quality effect on the post-IPO stock return performance will persist, given the longer lasting and regularly recurring auditor-firm relationship. Hence, we propose hypothesis H3:

Hypothesis 3. (H3) (Persistence of auditor quality effect): The influence of prestigious auditors on long-run post-IPO stock returns is expected to persist beyond the IPO, while the underwriter certification effect is expected to weaken over time following the IPO.

Prior literature argues that greater information asymmetry introduces potential for opportunistic behavior by management. Firms associated with higher growth opportunities exhibit greater information disparity between investors and the firm (Myers, 1977). The attendant agency costs derived from information asymmetry increase the relative importance of the monitoring function and the expertise of the auditors (DeFond, 1992; Francis and Wilson, 1988). Francis, Maydew and Sparks (1999) argue that firms with a greater likelihood for opportunistic behavior are more in need of prestigious auditors to provide assurance to investors that reported earnings are credible.

Given that investment opportunities are comprised of growth options and assets-in-place (Myers, 1977), firms with a relatively higher proportion of growth options require greater managerial discretion. This in turn leads to greater information disparity between managers and

⁴ While high-quality underwriters and auditors both bring credibility, they come at a cost. A firm may place greater value on the credibility gained from the prestige of the auditing firm and may opt to save on underwriter fees. This may be even more true when market conditions are favorable, for smaller firms, or when the management team has high credibility with strong corporate governance structure. Beyond cost considerations, a lower-tier underwriter might dedicate more attention and resources to a particular IPO than a larger underwriter that handles multiple big-ticket listings simultaneously. Additionally, some lower-tier underwriters might have specific expertise or strong networks in a particular industry or geographic region.

investors, which renders valuing the firm more challenging. Such firms require greater judgment from auditors whose discernment of firms' expenditures and detection of risk reduce agency costs (Smith and Warner, 1979; Godfrey and Hamilton, 2005). Focusing on the choice of auditors, prior studies find that prestigious auditors reduce information uncertainty at equity issuances (Feltham, Hughes and Simunic, 1991; Slovin, Sushka and Hudson, 1990). Arguably, the impact of the financial intermediary certification effect is expected to be influenced by the information environment of the IPO firm. Hence, firms with high growth opportunities, and therefore with greater information asymmetry, can benefit more from intermediary certification.

Based on the above reasoning, we argue that auditor quality and credibility are expected to be more valuable to certain IPO firms than others. Hence, we posit that firms with higher growth prospects that retain highly ranked auditors will exhibit superior post-IPO performance than similar firms associated with lower ranked auditors. With this backdrop, we propose the following hypothesis:

Hypothesis 4. (H4) (Growth opportunities and effect of auditor quality): Firms characterized by higher growth opportunities, that retain prestigious auditors, are expected to demonstrate superior performance relative to comparable firms associated with less prestigious auditors.

3. Sample formation process and research methodology

3.1. Sample formation process and data sources

We start by obtaining a list of all IPOs from Jay Ritter's website,⁵ which follows the selection criteria in Loughran and Ritter (2004), by excluding best efforts offers and IPOs with an offer price below \$5.00 per share. Our initial list of IPOs includes 3666 IPOs spanning 1986 to 2006.

Our source of information on the offering (proceeds, primary and secondary shares, offer price) and the lead underwriter is the SDC New Issues Database. Carter and Manaster's (1990) underwriter rankings and firm age are obtained from Jay Ritter's website. We rely on Standard and Poor's Compustat database for firm fundamentals and the auditor rank, while stock returns are obtained from the Center for Research in Security Prices (CRSP) monthly stock files. In our research design we exclude RLBOs to accurately measure the auditor certification benefit on long-run stock returns for firms who go public for the first time. As SDC stopped tracking RLBOs in 1998, we supplemented our list by first manually checking *Gale Business Insights Essentials* to identify additional RLBOs, followed by examination of proxy statements from *Thompson Research* and microfiche.

We eliminate RLBOs from the sample because they differ from first IPOs in several ways that may result in biased results (see Datta et al., 2015). First, they display distinctive financial characteristics (eg., larger, older firms, greater visibility and lower information asymmetry, higher leverage with proceeds often used to reduce debt (DeGeorge and Zeckhauser, 1993; Cao, 2011)). These inherent differences mean that the factors affecting their buy-and-hold returns post-IPO may be vastly different from those of first-time IPO firms. Including them in the sample could confound the results by introducing variations that are not present in first-time IPOs. Further, RLBOs might have different motivations and historical reasons for their auditor choices compared to first-time IPOs. These disparities could again introduce bias. For instance, an RLBO's more complex financial history and larger size are two important demand side factors that influence the choice of auditor, making them more likely to engage a high-reputation auditor, irrespective of the expected post-IPO performance. In fact, our (unreported) examination indicates a pronounced inclination towards high-quality auditors in comparison to true IPOs (96.56% vs. 88.9%). By excluding RLBOs, the

results of the study are not confounded by two heterogeneous groups.

3.2. Research methodology

We compute unadjusted raw returns and adjusted returns in line with Barber and Lyon's (1997) methodology defined as the buy-and-hold return of a sample IPO firm less the buy-and-hold return of a corresponding control over the same time-window ($t = 1$ to τ).

$$BHR_i = \prod_{t=1}^{\tau} [1 + R_{i,t}] - \prod_{t=1}^{\tau} [1 + E(R_{i,t})] \quad (1)$$

We calculate long-run buy-and-hold returns over different post-IPO time horizons: 12-months, 24-months, and 36-months. To reduce the influence of skewness and kurtosis, we winsorize the buy-and-hold returns at the third standard deviation (Cowan and Sargeant, 2001).

Next, we construct control-firm-adjusted returns, to take into account the fact that new public offerings generally differ in attributes from the population of firms at large. In line with Lawrence, Minutti-Meza, and Zhang (2011), to compute control-adjusted returns, we select control firms at the offering using the propensity score method (Villalonga, 2004). Control firms are required to have returns for at least the same time interval as the IPO firm with which it is matched. The propensity score matching technique utilizes information from the pool of firms to select controls with similar characteristics. This approach allows multiple firm characteristics to be distilled down to a single score and allows us to ameliorate sample selection bias (see Imbens and Wooldridge, 2009).

To obtain control firms, we first estimate a logistic model using all Compustat firms for the same year where the dependent variable, *IPO Dummy*, assumes a value of one for IPO firms and zero for all remaining firms. We select explanatory variables to obtain control firms of similar salient characteristics and quality to our sample firms. These include book value of assets as a proxy for firm size, return on assets (ROA), as a measure of operating performance, proxies for firm growth options (*Tobin's Q*), payout policy (*Div /TA*), and capital structure (*Leverage*), as well as investment policy, proxied by research and development expenditures to sales (*R&D Intensity*) and capital expenditure to sales (*Capex Intensity*). *Tobin's Q* and *R&D Intensity* are particularly important as firms with high levels of R&D intensity and *Tobin's Q* could experience greater levels of information asymmetry. The research on auditors supports the proposition that Big N auditors are associated with high-quality auditing (see Francis, 2004 among other). As a result, we categorize firms that engage a Big N auditor firm to belong in the prestigious auditor group where *High Auditor* takes a value of 1 and non-Big N take a value of 0.

Please see Appendix A for details regarding the definition and construction of all variables. Finally, year fixed effect and industry dummy variables based on the Fama and French (1997) 49 industry groupings (*FF49*) are included.

$$IPO\ Dummy = f(\text{Log}(\text{Assets}), ROA, \text{Tobin's } Q, \text{Div /TA}, R\&D\ Intensity, \text{Capex Intensity}, \text{Leverage}, \text{High Auditor}, \text{Year Dummies}, \text{FF49 Dummies}) \quad (2)$$

To arrive at a control sample that is closest to our IPO sample in terms of characteristics, we use Rosenbaum and Rubin's (1984) methodology to sub-group our IPOs by propensity score quintiles.⁶ Control firms with a predicted IPO probability below (above) the lowest

⁵ IPOs from Jay Ritter's website are retrieved from <http://bear.warrington.ufl.edu/ritter/ipodata.htm>

⁶ We use the method of sub-groups developed by Rosenbaum and Rubin (1984) to match control firms with sample firms. They show that five sub-groups lead to a 90% reduction in sample selection bias. In this approach, the caliper is determined as the difference between the highest and lowest sample firm propensity score in a sub-group. Any control firm where the propensity score is below (above) the minimum (maximum) for the sub-group is excluded from consideration as a match for the sample firms in that group.

(highest) IPO propensity are excluded. We then assign the control firms (without replacement) into IPO quintiles based on the smallest absolute difference of propensity score with the corresponding sample firms. We limit the initial pool of potential control firms to no more than the five closest in propensity score. Using the propensity score methodology reduces our sample of IPOs to 2468 observations.

3.2.1. Additional methodology addressing endogeneity

In addition to the propensity score technique, we utilize Heckman's (1979) two-step process as an additional test to address endogeneity concerns. This method has been employed to control for potential selection bias in studies of IPOs (Rajan and Servaes, 1997), audit quality (Lawrence, Minutti-Meza, and Zhang, 2011), and reverse leveraged buyouts (Cao, 2011; Datta, Gruskin, and Iskandar-Datta, 2015). Moreover, the Heckman approach allows us to use Carter, et al.'s (1998) regression model which employs variables that are unobservable for control firms (such as *Log (Proceeds)* and *Secondary*). The first step probit regression of the Heckman procedure is used to compute the inverse Mills ratio (*Mills*), which becomes an instrument in the second step regression and controls for the unobservable factors in the Carter et al. (1998) model. The first stage equation of Heckman's procedure includes the same variables in Eq. (2) above.

3.3. Sample description

Table 1 cross-tabulates auditors and underwriters partitioned by low and high ranking for our sample of IPOs. Table 1 shows that 11.10% of the offerings use a low-ranked auditor. The analysis reveals that 9.82% of the sample firms utilize a non-Big N auditor with a low-ranked underwriter, while only 1.28% of IPO firms enlist a non-Big N auditor with a high-ranked investment banking firm. In contrast, the proportion of IPOs utilizing prestigious auditors is around 89%. Our sample split between prestigious (Big N) and less prestigious (non-Big N) audit groups is similar to previous studies. For example, Lawrence, Minutti-Meza, and Zhang (2011) report that their sample split between Big 4 and non-Big 4 audit groups is 94.3% and 5.7%, respectively. In previous studies on the underwriter certification effect, the sample split for high and low ranked underwriters is also similarly skewed towards prestigious underwriters. Further, almost 50% of the sample combine a Big N auditor with a low-ranked underwriter.

4. Empirical results

4.1. Univariate analysis of auditor quality on post-IPO long-run stock returns

In Table 2 Panel A, we present means and medians for our IPO sample firms and the propensity score matched control firms chosen from all non-IPO firms. We report statistics on firm size (*Assets*) and the gross proceeds from the offering (*Proceeds*) both measured in constant dollar terms (based on 2006 dollars). We also report return on assets (*ROA*), *Tobin's Q*, firm leverage (*Leverage*), *R&D Intensity*, *Capex Intensity*, and the age of the firm in years (*Age*). Underwriter reputation is defined using the reputation-based modified Carter and Manaster (1990) system (*CM*) to define underwriter reputation, which is shown by Carter et al. (1998) to provide the strongest relationship between underwriter reputation and stock returns. These rankings are compiled from the listing position of underwriter names in the "tombstone" announcements of stock offerings. We define a *High UW* as any IPO with a *CM* score of 9, and a highly prestigious auditor group (*High Auditor*) as firms which belong to the Big N group in the year of the offering.

Table 2 reports descriptive statistics for salient variables in three columns: for all IPOs in column 1, for the subset of IPO sample firms (2468 firms) with a matched control firm in column 2, and for control firms in column 3. The fourth column presents univariate tests of the differences between columns 2 and 3. Both the IPOs and control firms

are similar on several dimensions; both groups have similar growth options and dividend yields; further, both groups invest similarly in R&D and capital expenditures and are moderately levered. One key point of interest from column 4 is that control firms employ a qualitatively similar fraction of highly ranked auditors. Overall, the matched firms are similar to the IPO firms on several key dimensions.⁷

Table 3 presents univariate results of long-run post-IPO buy-and-hold stock returns (BHRs) for the IPO sample and the propensity score matched-adjusted returns. We examine various post-IPO time horizons ranging from 12 months to 36 months. Test statistics are computed using firm level paired means and medians, as well as unpaired differences between groups.

For IPOs associated with less prestigious auditors, post-IPO buy-and-hold returns and control firm adjusted returns are consistently negative and significant over all three time horizons following the IPO. In contrast, IPOs with high-ranked auditors exhibit significantly superior post-IPO stock price performance at 24 and 36 months, regardless of whether performance is measured using unadjusted or control firm adjusted buy-and-hold returns. The (High – Low) rows in Table 3 indicate that the differences are consistently significant at 24 and 36 months for both measures. We also explore whether firms using low quality auditors tend to occur during peaks of IPO waves but find no consistent pattern to suggest that IPOs by non-Big N auditors have a higher likelihood of taking place in hot IPO markets.

Next, we conduct a matching process that relies exclusively on IPO firms. Such matching allows us to conclude that any post-IPO performance is not contaminated by unobservable differences in firm traits. Moreover, in this matching process we control for investment banker quality (or the underwriter certification effect). Table 4 present statistics for firm characteristics of IPOs associated with low-ranked auditors and IPOs associated with high-ranked auditors, employing the propensity-score matched method exclusively utilizing the pool of IPO firms. Thus, each IPO in our sample associated with less prestigious auditor is matched with an IPO issuer associated with a prestigious auditor.⁸ The third column (High-Low Auditor) confirms that the two types of firms are very tightly matched with respect to the salient characteristics as the differences are insignificant between the two subsamples, except for R&D intensity.⁹

In Table 5, we present the results using propensity score matched control firms that are drawn exclusively from a pool of IPOs. The results validate those obtained in Table 3. Specifically, we find that IPOs associated with prestigious auditors experience significantly superior performance than those associated with their low-ranked counterparts, except for the first year following the IPO.¹⁰ Fig. 1 graphically depicts the post-IPO return performances over different holding periods and

⁷ Our analysis uses various methodologies, and therefore, the number of observations reported varies. Based on Loughran and Ritter (2004) selection criteria, the initial IPO sample is 3666, which is reduced to 2468 after matching IPOs to control firms. For the analysis controlling for auditor rank, we use a one-to-one propensity score matching, resulting in a sample of 176 prestigious auditor IPOs and 176 IPOs with less prestigious auditors. In the multivariate logit models, we use a one-to-many match procedure to maximize the number of observations.

⁸ We adjust the variables utilized in the propensity score logit regression to reflect that the controls are IPO firms (by deleting the dividend yield variable from Equation (2) and adding the underwriter quality variable).

⁹ The results are qualitatively similar even when we construct a larger sample of propensity score matched control firms with more than one match for each sample firm, while maintaining the closest match in terms of the absolute difference in propensity score. For brevity, we do not report these results.

¹⁰ The observations reported for control-adjusted returns reflect a one-for-one match between sample and control firms. Therefore, 176 sample firms and control firms with low-ranked auditors are reported as 352 observations.

Table 1

Distribution of auditor and underwriter rankings for IPOs. This table reports the distribution for IPOs by auditor and underwriter rankings.

Auditor Ranking	Underwriter Ranking					
	Low Underwriter Ranking		High Underwriter Ranking		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
IPOs						
Low auditor ranking	360	9.82	47	1.28	407	11.10
High auditor ranking	1820	49.65	1439	39.25	3259	88.90
Total	2180	59.47	1486	40.53	3666	100.00

Table 2

Descriptive statistics for IPOs and their matched control firms. This table summarizes the descriptive statistics for salient characteristics for firms going public between 1986 and 2006. Columns two and three report statistics on all IPOs and IPOs with propensity-score-matched controls, column four reports a one-for-one Big N and non-Big N matched sample based on propensity scores obtained exclusively from a pool of IPOs, and column five the difference between IPOs with a match and the matched control firms. Test statistics are computed using the paired differences. a, b, c represents significance levels at 99%, 95%, and 90% respectively.

Panel A	All IPOs	IPOs Which Had a Matched Control	Matched Control Firms	IPO – Controls
Proceeds (\$ millions)	77.95	82.98		
Age (years)	14.59	14.97		
Assets (\$ millions)	238.36	285.75	990.83	-705.07 ^a
ROA (%)	-3.00	-3.35	-1.17	-2.18 ^a
Tobin's Q	3.46	3.10	2.95	0.15
Div /TA (%)	2.33	1.79	1.59	0.21
R&D Intensity (%)	62.42	58.64	53.88	4.75
Capex Intensity (%)	28.12	29.53	28.20	1.34
Leverage (%)	16.12	15.55	14.00	1.55 ^a
High Auditor (%)	0.89	0.88	0.90	-0.02 ^a
Observations	3666	2468	2468	

Table 3

Stock price performance following IPO by auditor ranking. This table summarizes long-run buy-and-hold stock returns (BHR) and control-adjusted BHRs for IPOs by auditor ranking. The control-adjusted buy-and-hold returns are benchmarked by propensity score matched control firms. BHRs are winsorized using the methodology of Cowan and Sergeant (2001). Test statistics are based on paired and unpaired differences. Median test statistics are based on the Wilcoxon Signed-Rank test. Significant p-values are in bold.

	Obs.		12-Month		24-Month		36-Month	
			Return	P-value	Return	P-value	Return	P-value
Buy-and-hold returns (BHR)								
Low Auditor	407	Mean	-3.37	0.33	-10.74	0.02	-14.55	0.01
		Median	-16.67	0.00	-35.74	0.00	-49.65	0.00
High Auditor	3259	Mean	5.24	0.00	9.97	0.00	13.65	0.00
		Median	-8.63	0.01	-20.25	0.00	-27.29	0.00
High - Low	3666	Mean	8.58	0.02	20.71	0.00	28.19	0.00
		Median	8.04	0.01	15.46	0.00	21.96	0.00
Control firm-adjusted BHRs (using propensity score matching)								
Low Auditor	614	Mean	-11.68	0.02	-31.32	0.00	-43.56	0.00
		Median	-17.59	0.00	-27.07	0.00	-38.18	0.00
High Auditor	4322	Mean	-9.41	0.00	-9.84	0.00	-14.48	0.00
		Median	-10.63	0.00	-14.34	0.00	-17.74	0.00
High - Low	4936	Mean	2.27	0.23	21.48	0.00	29.08	0.00
		Median	6.95	0.00	12.73	0.00	20.44	0.00

control firm matching procedures.¹¹

To ensure that our findings are not impacted by cross-sectional correlation, we also utilize Brav and Gomper's (1997) calendar-time

¹¹ The outcomes remain consistent even when we employ buy-and-hold returns adjusted to value-weighted market returns.

Table 4

Descriptive statistics for high and low auditor IPOs groups matched with propensity-score method. This table summarizes the descriptive statistics for salient characteristics for IPO firms based on a one-for-one Big N and non-Big N matched sample based on propensity scores obtained exclusively from a pool of IPOs. Test statistics are computed using the paired differences. a, b, c represents significance levels at 99%, 95%, and 90% respectively.

	High Auditor	Low Auditor	High – Low Auditor
Proceeds (\$ millions)	45.92	58.98	-13.07
Age (years)	4.10	3.70	0.40
Assets (\$ millions)	173.70	170.44	3.25
ROA (%)	-3.48	-0.96	-2.52
Tobin's Q	3.07	2.88	0.19
R&D Intensity (%)	61.32	21.13	40.19 ^c
Leverage (%)	15.60	15.72	-0.12
High Underwriter (%)	21.02	19.77	1.25
Observations	176	176	

approach and Carhart's (1997) model. The *High Auditor* dummy variable continues to be positive and significant at 24 and 36 months.

In sum, the main conclusion that can be drawn from the univariate analyses is that the difference in post-IPO stock price performance for offerings associated with low-ranked and high-ranked auditors is statistically significant, in support of hypothesis H1.

4.2. Effect of auditor quality on post-IPO returns with weak underwriter certification

certification

A plausible interpretation of our observed results is the potential confluence between top-tier auditors and underwriters. Specifically, the disparities we have noted might be attributed to the well-established certification effect associated with premier underwriters. In our examination in Table 5, we have accounted for the quality of investment

Table 5

Stock price performance for high and low auditor IPOs groups matched with propensity-score method. This table summarizes long-run buy-and-hold stock returns for high and low auditor IPOs matched by propensity scores method where all firms are exclusively IPO firms. Buy-and-hold returns are winsorized using the methodology of Cowan and Sergeant (2001). Test statistics are based on paired and unpaired differences. Median test statistics are based on the Wilcoxon Signed-Rank test. Significant p-values are in bold.

	Obs.	Statistics	12-Month		24-Month		36-Month	
			Return	P-value	Return	P-value	Return	P-value
Low Auditor	176	Mean	0.86		-14.53		-22.55	
		Median	-10.64		-31.75		-47.70	
High Auditor	176	Mean	-0.68		30.42		9.69	
		Median	-9.52		-22.22		-29.29	
High – Low	352	Mean	-1.54	0.82	44.95	0.01	32.23	0.01
		Median	1.11	0.81	9.52	0.06	18.41	0.08

bankers during the matching procedure. To enhance the robustness of our findings, we execute analysis that aims to isolate the impacts of auditor caliber from the underwriter certification influence. We revisit the analysis delineated in Table 3, narrowing our focus to the subset of IPOs affiliated with lower-tier underwriters. Considering that this subset doesn't derive any advantages from underwriter certification, the inference is clear: should auditor certification indeed play a pivotal role in stock performance, a heightened effect of auditor quality on post-IPO long-term stock returns should manifest within this particular subset.

The results of this univariate analysis are presented in Table 6. Comparing the findings from Table 3 with Table 6, we find that IPO firms associated with low-tier underwriters generally tend to accrue larger benefits than the overall sample when employing prestigious auditors. This evidence supports hypothesis H2 that auditor certification takes a more prominent role when underwriter certification is weak. This finding suggests that firms that do not choose a highly ranked underwriter should consider selecting a prestigious auditor to compensate for lack of underwriter certification. Thus, the empirical evidence supports the notion that auditor certification and underwriter certification are substitutes to some extent, consistent with the theoretical prediction of Balvers, McDonald, and Miller (1988).

Our findings in Table 6 also enable us to test the persistence of auditor certification, proposed in H3. If H3 is valid, then as the post-IPO time horizon lengthens from 12 to 36 months, the benefits from auditor certification should continue to be statistically significant. In support of H3, the analysis shows that the difference in stock returns between prestigious and less prestigious auditors are positive, increasing in magnitude, and highly significant as the time horizon lengthens.

In combination, the univariate results presented in Tables 3, 5, and 6 provide evidence of a significant auditor certification effect on post-IPO stock returns. Disentangling the auditor certification effect from the underwriter certification effect, we document for the first time that there is a significant auditor certification effect on long-run post-IPO stock returns, which is in addition to the previously documented underwriter certification effect.

4.3. Multivariate analyses

4.3.1. Auditor rank and post-IPO stock return performance

To examine the link between auditor rank and post-IPO stock return performance in a multivariate framework, we use an expanded Carter et al. (1998) regression model as shown in Eq. 3.

$$BHR_i = \alpha_i + \beta_1 * High Auditor_i + \beta_2 * Accruals_i + \beta_3 * High UW_i + \beta_4 * High Auditor/Low UW_i + \beta_5 * High Auditor/High UW_i + \beta_6 * High Auditor_i * High Q_i + \beta_7 * Log(Proceeds)_i + \beta_8 * Log(Age)_i + \beta_9 * Secondary_i + \beta_{10} * RetStdDev_i + \beta_{11} * Venture Capital_i + \beta_{12} * Mills_i \quad (3)$$

The model includes the standard variables employed in the literature: (i) *Log(Proceeds)*, the natural logarithm of the offering's proceeds (ii) *Log(Age)*, the natural logarithm of firm age, (iii) *Secondary* (the fraction of total shares that are secondary shares), and (iv) *RetStdDev* is

the daily stock return standard deviation computed for the period from offer date + 6 through + 260).

Two additional variables are also included. First, we employ a second indicator of audit quality, namely, *Accruals*, since accounting accruals can serve as a more nuanced output-based measure for each year's audit quality (Aobdia, 2019; Khurana and Raman, 2004). This variable accounts for potential variability in audit quality from year to year. It is measured as the absolute value of earnings before extraordinary items minus net cash flow from operations excluding extraordinary items and discontinued operations normalized by total assets at the end of the prior year.¹²

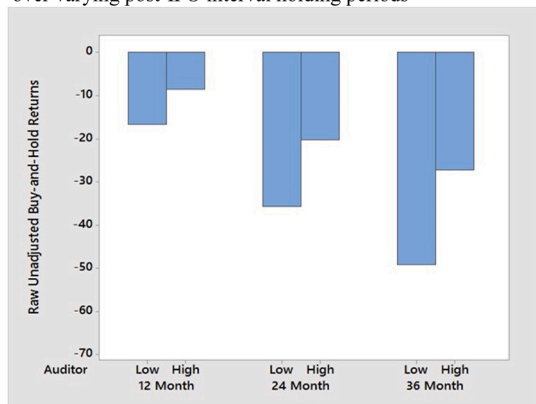
Additionally, the literature on venture capital (VC) generally finds that VC-backed IPOs tend to perform better after the IPO compared to non-venture-backed firms (Gompers and Lerner, 2003) and are less likely to go bankrupt or be delisted (Ljungqvist and Richardson, 2003). To ensure that our results are not driven by venture capital backed firms, we include a variable, *Venture Capital*, which is a dummy variable representing the presence or absence of venture capital participation at the IPO (Krishnan, Ivanov, Masulis, and Singh, 2011). This variable is extracted from the Securities Data Company's (SDC) New Issues database.

Because IPO models explaining future performance usually control for *Log(Proceeds)* and the fraction of total issued shares that are secondary shares, which are not observable for non-IPO firms, we utilize Heckman's (1979) two-step approach (described earlier) to ameliorate the impact of sample selection bias. The inverse Mills ratio (*Mills*) computed in the first step probit regression serves as an instrumental variable in the second step OLS regression to control for any sample selection bias.

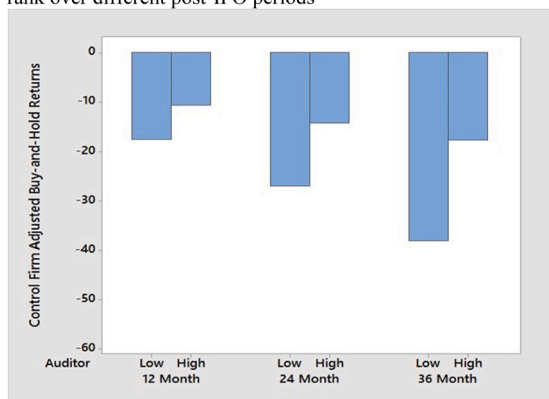
The results from estimating Eq. (3) are reported in Table 7. The table shows that the coefficients for *High Auditor* are positive and highly significant at 24 and 36-months, while the coefficients for high-quality underwriter, *High UW*, are also positive and significant. These results support hypothesis H1. Closer inspection shows that the underwriter certification effect is most pronounced at shorter horizons and diminishes with time, which is expected given the episodic post-IPO firm-underwriter relationship. In contrast, the auditor reputation effect is more pronounced in the long-run, likely due to the auditors' on-going relationship with the firm, where high-quality audits which provides

¹² We also employ an alternative proxy for audit quality, namely the bid-ask spread. Prior studies have documented the link between accounting information quality and bid-ask spreads (see e.g., Greenstein and Sami, 1994; Callahan, Lee, and Yohn, 1997). In unreported multivariate analysis replicating Table 7 while utilizing the bid-ask spread, we find that this alternative audit quality variable is negative and highly significant.

A: Unadjusted buy-and-hold returns by auditor rank over varying post-IPO interval holding periods



B: Control firm-adjusted buy-and-hold returns by auditor rank over different post-IPO periods



C: Post-IPO returns over varying holding periods by auditor rank matched on propensity scores

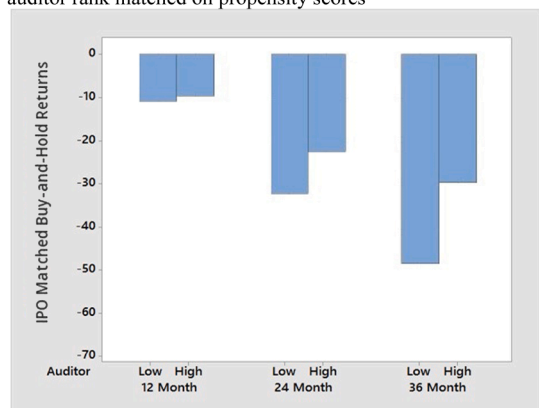


Fig. 1. Median buy-and-hold returns of IPOs by auditor ranking. Panels A reports raw buy-and-hold returns for 12, 24, and 36-month intervals post-IPO, Panel B presents the control firm-adjusted returns (using propensity score technique), and Panel C reports returns adjusted by auditor matched on propensity scores. Auditors are categorized in the *High* group if they belong to the Big N group, otherwise they are in the *Low* group. Returns are winsorized using Cowan and Sergeant’s (2001) methodology. **Panel A:** Unadjusted buy-and-hold returns by auditor rank over varying post-IPO interval holding periods. **Panel B:** Control firm-adjusted buy-and-hold returns by auditor rank over different post-IPO periods. **Panel C:** Post-IPO returns over varying holding periods by auditor rank matched on propensity scores.

more reliable information to investors.¹³ Next, we test whether the coefficients for *High Auditor* and *High UW* increase with return horizon. Our results indicate that the increase in the *High Auditor* coefficient is statistically significant, while the change in the *High UW* coefficient is insignificant, in support of hypothesis H3.

We also estimate the models in Table 7 utilizing the propensity score matching approach, substituting the log of market capitalization for the offering proceeds (which is not observable for non-IPO firms). The *High Auditor* coefficients continue to be positive and significant.

Table 8 presents the outcomes of our analysis when we divide the *High Auditor* variable into two categories based on underwriter rank: i) *High Auditor/Low UW* and ii) *High Auditor/High UW*. The findings reveal that both variables are positive and significant at 24 and 36-month time horizons. In addition, the magnitude of the coefficients increases with time horizon. Notably, in the first year, IPOs associated with high quality underwriters do not benefit from prestigious auditors as the coefficient of *High Auditor/High U*, is insignificant for that year. However, the variable is highly significant for the 24, 36-month holding periods. Further, the magnitude of the coefficient for *High Auditor/High UW* compared to that for *High Auditor/Low UW* suggests that the bulk of the benefits accrue from auditor certification. Both *High Auditor/Low UW* and *High Auditor/High UW* increase significantly when the return horizon lengthens. These findings show that while prestigious underwriters confer certification benefits, the auditor’s certification effect is relatively larger. The analysis also shows that *High Auditor/Low UW* is positive and significant at 12 months, suggesting that auditor certification is serving as a substitute for underwriter reputation. These findings are consistent with hypothesis H2.

Table 9 examines the auditor certification effect for firms with growth options, which typically have high information asymmetry. To isolate the impact of auditor certification on these firms, we include the cross-product term *High Auditor x High Q*. The first key observation of this analysis is that the coefficients on this interaction term are positive and significant over all post-IPO horizons (12, 24 and 36 months). Our findings suggest that when information asymmetry is highest, auditor reputation contributes value to the firm even after controlling for earnings management. Taken together, the results lend strong support to hypothesis H4.¹⁴

In all three Tables (7, 8, & 9), the coefficients on *Accruals* are negative and highly significant across all time horizons providing additional evidence that even though auditor reputation and accruals may be related, both audit quality proxies have significant incremental effect on post-IPO long-run stock returns.

Moreover, we observe that *Venture Capital*, representing VC participation at the time of the IPO, is highly significant at 24 and 36 months in all three tables, indicating that VC backing has a significant effect on post-IPO performance and consistent with prior research. Importantly, our analysis highlights the crucial role of auditors, as evidenced by their positive and significant impact on post-IPO performance across all panels, which is over and above the venture-backed certification. In a supplementary analysis, we also include venture capital reputation, calculated based on the cumulative amount invested in all firms the year preceding the IPO for the first-round lead VC investor in the firm (unreported). The amount of VC funding is extracted from SDC’s

¹³ In a supplementary robustness check, we utilize instrumental variable approach, employing a dummy variable based on industry groups as an instrument. Using both generalized method of moments and two-stage least squares estimation procedures, we obtain qualitatively similar results to those reported in Table 7.

¹⁴ To examine if firms with high information asymmetry tend to use more high-quality auditors, we analyze Big N versus non-Big N associated firms within quartiles of Tobin’s Q. We find that 91.7% of the firms in the highest quartile employ Big N auditors. At the same time, the fraction of firms in the other three quartiles that employ Big N auditors is marginally smaller at 88.0%.

Table 6

Long-run post-IPO performance by auditor ranking for IPOs associated with low-ranked underwriters. This table summarizes long-run buy-and-hold stock returns for IPOs associated with a low-ranked underwriter. We report buy-and-hold returns and propensity score-based control firm adjusted returns. Buy-and-hold returns are winsorized using the [Cowan and Sergeant \(2001\)](#) methodology. Test statistics (p-values) are based on paired and unpaired differences. Median test statistics are based on the Wilcoxon Signed-Rank test. Significant p-values are in bold.

	Obs.	Statistics	12-Month		24-Month		36-Month	
			Return	P-value	Return	P-value	Return	P-value
Buy-and-hold returns (BHRs)								
Low Auditor	360	Mean	-3.70	0.32	-13.05	0.01	-15.80	0.01
		Median	-17.17	0.00	-36.94	0.00	-49.30	0.00
High Auditor	1843	Mean	5.37	0.00	11.53	0.00	15.12	0.00
		Median	-8.54	0.15	-17.74	0.00	-24.29	0.00
High - Low	2203	Mean	9.07	0.02	24.58	0.00	30.92	0.00
		Median	8.64	0.00	19.19	0.00	25.02	0.00
Control-adjusted BHRs								
Low Auditor	540	Mean	-15.26	0.01	-37.21	0.00	-49.96	0.00
		Median	-21.45	0.00	-33.15	0.00	-45.41	0.00
High Auditor	2394	Mean	-9.34	0.00	-14.85	0.00	-21.20	0.00
		Median	-11.68	0.00	-17.96	0.00	-19.31	0.00
High - Low	2934	Mean	5.92	0.33	22.35	0.00	28.77	0.01
		Median	9.77	0.04	15.19	0.00	26.10	0.00

Table 7

Regressions relating auditor rank and post-IPO stock return performance. This table reports the results of [Heckman's \(1979\)](#) OLS second-stage regressions explaining 12, 24 and 36-month buy-and-hold returns (BHR) of IPO firms using an augmented [Carter, Dark, and Singh \(1998\)](#) model. The dependent variable is the logarithm of (10 + BHR). The table presents results that separate the effects of auditor and underwriter certification. Standard errors are computed using [White's \(1980\)](#) correction for heteroskedasticity. Significant p-values are in bold.

Independent Variables	12-Month		24-Month		36-Month	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
High Auditor	-0.01	0.16	0.02	0.00	0.02	0.00
High UW	0.01	0.00	0.01	0.00	0.01	0.01
Venture Capital	0.00	0.25	0.01	0.03	0.01	0.01
Accruals	-0.00	0.01	-0.00	0.00	-0.01	0.00
Log (Proceeds)	-0.01	0.00	-0.01	0.00	-0.01	0.00
Log (Age)	-0.00	0.53	-0.00	0.97	0.00	0.83
Secondary	0.01	0.38	0.01	0.08	0.04	0.00
RetStdDev	-1.21	0.00	-1.56	0.00	-1.63	0.00
Mills	-0.03	0.00	-0.01	0.04	-0.01	0.11
Intercept	2.44	0.00	2.41	0.00	2.41	0.00
Observations	2401		2401		2401	
Adjusted R ²	0.134		0.111		0.101	

VentureXPert database. While venture capital backing remains highly significant, the VC reputation variable emerged insignificant in all models, suggesting that venture capital reputation has no incremental explanatory value after controlling for venture capital participation.

Overall, our findings are robust to utilization of two different methods that control for selection bias—the [Heckman's \(1979\)](#) two-step method and the propensity score matching approach. The findings in this study contribute to the literature on IPOs and, analogous to the underwriter certification effect, underscores the importance of auditor quality in shaping the post-IPO performance of firms. The analysis provides strong evidence of significant and persistent long-term effect of auditor reputation, even after controlling for underwriter certification and VC participation at the IPO.

4.4. Additional validation tests

4.4.1. Alternative performance measures

In additional analysis (unreported), we re-estimate [Table 7](#) utilizing two operating performance measures, return on assets and free cash flows to total assets applying a difference-in-differences regression

Table 8

Regressions relating auditor and underwriter rankings to post-IPO stock return performance. This table reports the results of [Heckman's \(1979\)](#) OLS second-stage regressions explaining 12, 24 and 36-month buy-and-hold returns (BHR) of IPO firms using an augmented [Carter, Dark, and Singh \(1998\)](#) model. The dependent variable is the logarithm of (10 + BHR). The table examines the effect of combination of auditor and underwriter rankings on post-IPO performance. Standard errors are computed using [White's \(1980\)](#) correction for heteroskedasticity.

Independent Variables	12-Month		24-Month		36-Month	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
High Auditor/Low UW	0.01	0.08	0.01	0.03	0.02	0.01
High Auditor/High UW	0.00	0.39	0.03	0.00	0.04	0.00
Venture Capital	0.00	0.23	0.01	0.02	0.01	0.01
Accruals	-0.00	0.01	-0.00	0.00	-0.00	0.00
Log (Proceeds)	-0.01	0.00	-0.01	0.00	-0.01	0.00
Log (Age)	-0.00	0.53	0.00	0.96	0.00	0.82
Secondary	0.01	0.38	0.01	0.08	0.04	0.00
RetStdDev	-1.21	0.00	-1.56	0.00	-1.63	0.00
Mills	-0.03	0.00	-0.01	0.04	-0.01	0.13
Intercept	2.44	0.00	2.41	0.00	2.41	0.00
Observations	2401		2401		2401	
Adjusted R ²	0.134		0.111		0.101	

approach employing IPO and control firms in the analysis. Our findings are robust to the use of these two alternative performance proxies, showing that IPOs associated with high-ranked auditors outperform those associated with low ranked auditors—significant for all time horizons at the 1% level.

4.4.2. Change in investment banker and survivorship bias

To ensure that our findings are not driven by any change in sample firms' association with their original (IPO) underwriter, we identify the firms that changed their underwriter through a post-IPO seasoned equity offering. We find that our results are robust to limiting the analyses to the sample of firms with *no change in underwriter* for any post-IPO

Table 9

Regression assessing the impact of auditor ranking and growth opportunities on post-IPO stock return performance. This table reports the results of Heckman's (1979) OLS second-stage regressions explaining 12, 24, and 36-month buy-and-hold returns (BHR) of IPO firms using an augmented Carter, Dark, and Singh (1998) model. The dependent variable is the logarithm of $(10 + \text{BHR})$. The table examines whether the auditor certification effect is greater at firms with high growth opportunities. Standard errors are computed using White's (1980) correction for heteroskedasticity.

Independent Variables	12-Month		24-Month		36-Month	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
<i>High Auditor</i>	0.01	0.08	0.02	0.02	0.02	0.00
<i>High Auditor x High Q</i>	0.05	0.00	0.03	0.00	0.02	0.02
<i>High UW</i>	0.01	0.00	0.01	0.00	0.01	0.01
<i>Venture Capital</i>	0.00	0.97	0.01	0.00	0.01	0.01
<i>Accruals</i>	-0.00	0.04	-0.00	0.00	-0.00	0.00
<i>Log (Proceeds)</i>	-0.01	0.00	-0.01	0.00	-0.01	0.00
<i>Log (Age)</i>	-0.00	0.53	-0.00	0.97	0.00	0.83
<i>Secondary</i>	0.01	0.38	0.01	0.08	0.04	0.00
<i>RetStdDev</i>	-1.21	0.00	-1.56	0.00	-1.63	0.00
<i>Mills</i>	-0.01	0.00	-0.00	0.53	-0.01	0.45
Intercept	2.42	0.00	2.40	0.00	2.40	0.00
Observations	2401		2401		2401	
Adjusted R ²	0.199		0.121		0.103	

investment banking transactions.¹⁵ Furthermore, we investigate whether our results are influenced by a difference in survivorship between Big N and non-Big N firms. We find that 63.14% of non-Big N firms and 63.76% of Big N firms still exist in third year post the IPO, indicating that our findings are not an artifact of survivorship bias.

4.4.3. Change in auditor rank

To minimize potential bias from auditor changes, we conducted additional analyses by excluding firms that change auditor class. Our sample includes a limited number of firms that experienced such changes, which occurred primarily in years 4 and 5, with the change typically being from less to more prestigious auditors, analogous to findings by Menon and Williams (1991). We could identify the auditor just prior to the IPO for approximately 80% of the sample. After excluding these observations, we find that all our conclusions continue to hold, and the significance and magnitude of our results are maintained.¹⁶

4.4.4. Impact of Sarbanes-Oxley Act

We investigate whether the Sarbanes-Oxley Act of 2002 (SOX) dampens auditor certification effect since the Act aimed to improve internal controls and accounting oversight. We re-estimate Table 7 including an interaction term between a SOX dummy variable and *High Auditor*. The interaction variable is insignificant at all time horizons, which suggests that the auditor certification effect is not eliminated by the passage of SOX.

5. Conclusions

This study substantially alters our current knowledge regarding the impact of auditor reputation on long-run, post-IPO stock price

¹⁵ It is important to note that the lead underwriter's identity in the SDC New Issues database is available episodically—since it can only be identified if a subsequent seasoned equity offering occurred.

¹⁶ Examining *unqualified* versus *qualified audit opinions* received by our IPO sample firms partitioned by Big N and non-Big N categories, we find that firms associated with prestigious auditors received significantly greater proportion of *unqualified audit opinions* (83.4%) relative to their counterparts with less prestigious auditors (74.9%). This difference is significant at the 1% level.

performance. Specifically, this is the first study to document a significant effect of auditor reputation on long-run post-IPO equity performance, beyond the well-established underwriter certification effect. We show that the auditor reputation effect is significant after controlling for the underwriter certification effect. Furthermore, the underwriter's role in this dynamic is somewhat transient, peaking at the initial stages post-IPO, whereas the impact of the auditor is enduring and becomes more pronounced over time, reflecting the continuous firm-auditor relationship.

Moreover, our findings highlight the importance of auditor quality regardless of the underwriter's rank, except for the first year for firms engaging a high ranked underwriter. Furthermore, we reveal that high-growth firms, characterized by high information asymmetry, experience even greater benefits from engaging high-quality auditors in terms of post-IPO stock return performance.

Our results align with theoretical models (e.g., Titman and Trueman, 1986) which posit that auditor quality serves as a signal to investors regarding the value of the IPO firm. Significantly, we demonstrate the robustness of the auditor reputation effect by accounting not only for underwriter certification, but also for venture capital participation, which also significantly influences post-IPO performance.

Our findings of long-run outperformance by IPOs associated with prestigious auditor parallel those of Brav and Gompers (1997) for IPOs backed by venture capital and those of Dong et al. (2011) for IPOs associated with highly reputable underwriters. While the exact reasons for this persistent performance effect remain speculative, potential factors might encompass superior and continuous monitoring by prestigious auditors, the presence of robust corporate governance structures, selectivity in client acquisition by prestigious auditors, and/or the presence of consistent high-quality earnings, among others. Delving into these or other potential reasons could be a fruitful avenue for future research.

Furthermore, our conclusions are robust to several alternative empirical techniques, including propensity score matching and Heckman's two-stage method, different model specifications, alternative stock return benchmarks and time horizons, and alternative audit quality proxy. Our evidence demonstrates that auditor quality as well as accounting accruals (proxying for year-to-year variability in audit quality) play a role in shaping post-IPO stock performance. Additionally, we ascertain that our results are not driven by post-IPO change in auditor (rank) or changes in lead investment banker for post-IPO services, due to follow-on security offerings.

Overall, our study provides compelling evidence that auditor reputation is an important determinant of long-term post-IPO performance. Our findings hold practical implications for firms contemplating going public. Remarkably, the academic finance and accounting literature until now, has not addressed the ramifications of auditor reputation on the sustained stock performance of mature firms. This discernible void in the literature accentuates the novelty of our contribution, suggesting that the role of auditor reputation may have even broader implications than previously realized. As such, our study not only informs the present but also paves the way for further inquiry into the multifaceted dynamics of auditor reputation in the capital market ecosystem.

CRedit authorship contribution statement

Iskandar-Datta Mai: Writing – review & editing, Supervision, Methodology, Investigation, Conceptualization. **Gruskin Mark:** Formal analysis, Data curation. **Datta Sudip:** Writing – review & editing, Writing – original draft, Conceptualization.

Data Availability

All data are available from public sources cited in the text.

Appendix A. Variable Construction

Compustat Firm Variables

Accruals Absolute value of earnings before extraordinary items (item #18) minus net cash flow from operations excluding extraordinary items and discontinued operations (*CFOper* - item #24) normalized by total assets at the end of the prior year.

Assets Book value of total assets (item #6) in real 2006 dollars.

Auditor Formerly part of auditor/auditor's Opinion (item #199); now part of audit table.

CA The change in current assets minus cash (item #4 - item #1) less the change in current liabilities minus debt due in one year (item #5 - item #44).

Capex Intensity Capital expenditures (item #128) divided by sales (item #12).

CFOper Cash flow from operations (item #308) beginning in 1988. Prior to 1988, the measure reflects funds flow from operations (item #110) minus CA.

FF49 Industry dummies based on Fama and French's (1997) 49 industries using the historical SIC code (item #324) if available otherwise the current SIC code.

Leverage Long-term debt (items #9 + #44) divided by total assets (item #6).

Market Cap Fiscal closing share price (item #199) * common shares outstanding (item #25).

ROA Earnings before interest (items #172 + #15) divided by total assets (item #6).

R&D Intensity Research and development expenses (item #46) divided by sales (item #12).

Tobin's Q Total Assets (item #6) less common equity (item #60) plus market value of equity (items #199 * #25) divided by total assets (item #6).

Turnover Common shares traded (item #28) divided by equity shares outstanding (item #25).

IPO Variable Definitions

Age Firm age at the time of the offering.

BHR Geometric monthly stock returns over 12, 24, and 36 months.

High Auditor Set to one if auditor is one of the Big 8 through Big 4 depending on time period.

High UW Dummy set to one if the underwriter ranking is 9.0.

HML Fama and French's (1993) high minus low book-to-market portfolio.

Mills Inverse Mills Ratio from Heckman's (1979) two-step model.

Proceeds The proceeds from the offering in real 2006 dollars.

Propensity The predicted probability of an IPO at the time of the offering.

RetStdDev Standard deviation of daily stock returns from offer date + 6 through + 260.

Secondary Secondary shares in the offering as a fraction of total shares offered.

Venture Capital Dummy variable set to one if venture capital participation is present at the IPO and zero otherwise.

References

- Aobdia, D., 2019. Do practitioner assessments agree with academic proxies for audit quality? Evidence from PCAOB and internal inspections. *J. Account. Econ.* 67, 144–174.
- Balvers, R., McDonald, B., Miller, R., 1988. Underpricing of new issues and the choice of auditor as a signal of investment banker reputation. *Account. Rev.* 63, 605–622.
- Barber, B., Lyon, J., 1997. Detecting long-run abnormal stock returns: The empirical power and specifications of test statistics. *J. Financ. Econ.* 43, 341–372.
- Beatty, R., 1989. Auditor reputation and the pricing of initial public offerings. *Account. Rev.* 64, 693–709.
- Beatty, R., Welch, I., 1996. Issuer expenses and legal liability in initial public offerings. *J. Law Econ.* 39, 545–602.
- Becker, C., DeFond, M., Jiambalvo, J., Subramanyam, K., 1998. The effect of audit quality on earnings management. *Contemp. Account. Res.* 15, 1–24.
- Brav, A., Gompers, P., 1997. Myth or reality? The long-run underperformance of initial public offerings: evidence from venture and non-venture capital-backed companies. *J. Financ.* 52, 1791–1821.
- Callahan, C.M., Lee, C.M.C., Yohn, T.L., 1997. Accounting information and bid-ask spreads. *Account. Horiz.* 11 (4), 50–60.
- Cao, J., 2011. IPO timing, buyout sponsors' exit strategies and firm performance of RLBs. *J. Financ. Quant. Anal.* 46, 1001–1024.
- Carhart, M., 1997. On persistence in mutual fund performance. *J. Financ.* 52, 57–82.
- Carter, R., Manaster, S., 1990. Initial public offerings and underwriter reputation. *J. Financ.* 45, 1045–1067.
- Carter, R., Dark, F., Singh, A., 1998. Underwriter reputation, initial returns, and the long-run performance of IPO stocks. *J. Financ.* 53, 285–311.
- Chan, K., Cooney, J.W., Kim, J., Singh, A.K., 2008. The IPO derby: are there consistent losers and winners on this track? *Financ. Manag.* 37, 45–79.
- Cowan, A., Sergeant, A., 2001. Interacting biases, non-normal return distributions and the performance of tests for long-horizon event studies. *J. Bank. Financ.* 25, 741–765.
- Datar, S., Feltham, G., Hughes, J., 1991. The role of audits and audit quality in valuing new issues. *J. Account. Econ.* 14, 3–49.
- Datta, S., Gruskin, M., Iskandar-Datta, M., 2015. On post-IPO stock price performance: a comparative analysis of RLBs and IPOs. *J. Bank. Financ.* 55, 187–203.
- DeAngelo, L., 1981. Auditor size and audit quality. *J. Account. Econ.* 3, 183–199.
- DeFond, M., 1992. The association between changes in client firm agency costs and auditor switching. *Audit.: A J. Pract. Theory* 11, 16–31.
- DeGeorge, F., Zeckhauser, R., 1993. The reverse LBO decision and firm performance: theory and evidence. *J. Financ.* 48, 1323–1348.
- Dong, M., Michel, J.-S., Paudyal, J.A., 2011. Underwriter quality and long-run IPO performance. *Financ. Manag.* Spring 219–251.
- Dopuch, N., Simunic, D., 1982. Competition in auditing: an assessment. Symposium on Auditing Research IV. Urbana. University of Illinois.
- Dye, R., 1993. Auditing standards, legal liability, and auditor wealth. *J. Political Econ.* 101, 887–914.
- Fama, E., French, K., 1993. Common risk factors in the returns on stocks and bonds. *J. Financ. Econ.* 33, 3–56.
- Fama, E., French, K., 1997. Industry costs of equity. *J. Financ. Econ.* 43, 153–193.
- Fan, J.P.H., Wong, T.J., 2005. Do external auditors perform a corporate governance role in emerging markets? Evidence from East Asia. *J. Account. Res.* 43 (1), 35–72.
- Feltham, G., Hughes, J., Simunic, D., 1991. Empirical assessment of the impact of auditor quality on the valuation of new issues. *J. Account. Econ.* 14, 375–399.
- Francis, J., 2004. What do we know about audit quality? *Br. Account. Rev.* 36, 345–368.
- Francis, J., Wilson, E., 1988. Auditor changes: a joint test of theories relating to agency costs and auditor differentiation. *Account. Rev.* 63, 663–682.
- Francis, J., Maydew, E., Sparks, H., 1999. The role of big 6 auditors in the credible reporting of accruals. *Audit.: A J. Pract. Theory* 18, 17–34.
- Francis, J., LaFond, R., Olsson, P., Schipper, K., 2004. Costs of equity and earnings attributes. *Account. Rev.* 74, 967–1010.
- Godfrey, J., Hamilton, J., 2005. The impact of R&D intensity on demand for specialist auditor services. *Contemp. Account. Res.* 22, 55–93.
- Gompers, P.A., Lerner, J., 2003. The really long-run performance of initial public offerings: the pre-NASDAQ evidence. *J. Financ.* 58 (4), 1355–1392.
- Greenstein, M., Sami, H., 1994. The impact of SEC's segment disclosure requirement on bid-ask spread. *Account. Rev.* 69, 179–199.
- Heckman, J., 1979. Sample selection bias as a specification error. *Econometrica* 47, 153–161.
- Hogan, C., 1997. Costs and benefits of audit quality in the IPO market: a self-selection analysis. *Account. Rev.* 72 (1), 67–86.
- Imbens, G., Wooldridge, J., 2009. Recent developments in the econometrics of program evaluation. *J. Econ. Lit.* 47, 5–86.
- Jensen, M., Meckling, M., 1976. Theory of the firm: managerial behavior, agency costs and ownership structure. *J. Financ. Econ.* 3, 305–360.
- Jiang, J., Wang, I., Wang, K., 2019. Big N auditors and audit quality: new evidence from quasi-experiments. *Account. Rev.* 94, 205–227.
- Khurana, I., Raman, K., 2004. Litigation risk and the financial reporting credibility of big 4 versus non-big 4 audits: evidence from Anglo-American countries. *Account. Rev.* 79, 473–495.
- Krishnan, C.N.V., Ivanov, V., Masulis, R., Singh, A., 2011. Venture capital reputation, post-IPO performance, and corporate governance. *J. Financ. Quant. Anal.* 46 (5), 1295–1333.
- Lawrence, A., Minutti-Meza, M., Zhang, P., 2011. Can big 4 versus non-big 4 differences in audit-quality proxies be attributed to client characteristics? *Account. Rev.* 86, 259–286.
- Legoria, J., Reichelt, K.J., Soileau, J.S., 2018. Auditors and disclosure quality: the case of major customer disclosures. *Audit.: A J. Pract. Theory* 37 (3), 163–189.
- Levis, M., 1993. The long-run performance of initial public offerings: the UK experience 1980–1988. *Financ. Manag.* 22, 28–41.
- Ljungqvist, A., Richardson, M., 2003. The cash flow, return and risk characteristics of private equity. *J. Financ. Econ.* 67 (3), 309–346.
- Loughran, T., Ritter, J., 2004. Why has IPO underpricing changed over time? *Financ. Manag.* 33, 5–37.
- Mansi, S., Maxwell, W., Miller, D., 2004. Does auditor quality and tenure matter to investors? Evidence from the bond market. *J. Account.* 42, 755–793.

- Menon, K., Williams, D., 1991. Auditor credibility and initial public offerings. *Account. Rev.* 66, 313–332.
- Michaely, R., Shaw, W., 1995. Does the choice of auditor convey quality in an initial public offering? *Financ. Manag.* 24, 15–30.
- Myers, S., 1977. Determinants of corporate borrowing. *J. Financ. Econ.* 5, 147–176.
- Palmrose, Z.V., 1988. An analysis of auditor litigation and audit service quality. *Account. Rev.* 63, 55–73.
- Pittman, J., Fortin, S., 2004. Auditor choice and the cost of debt capital for newly public firms. *J. Account. Econ.* 37, 113–136.
- Rajan, R., Servaes, H., 1997. Analyst following of initial public offerings. *J. Financ.* 52, 507–529.
- Ritter, J., 1991. The long-run performance of initial public offerings. *J. Financ.* 46, 3–27.
- Rosenbaum, P., Rubin, D., 1984. Reducing bias in observational studies using subclassification on the propensity score. *J. Am. Stat. Assoc.* 79, 519–524.
- Simunic, D., Stein, M. (1987). Product differentiation in auditing: Auditor choice in the market for unseasoned new issues. The Canadian Certified General Accountants' Research Foundation Research Monograph Number 13. British Columbia, Canada: The Canadian Certified General Accountants' Research Foundation.
- Simunic, D.A., 1980. The pricing of audit services: theory and evidence. *J. Account. Res.* 161–190.
- Slovin, M., Sushka, M., Hudson, C., 1990. External monitoring and its effect on seasoned common stock issues. *J. Account. Econ.* 12, 397–417.
- Smith, C., Warner, J., 1979. On financial contracting: an analysis of bond covenants. *J. Financ. Econ.* 7, 117–161.
- Titman, S., Trueman, B., 1986. Information quality and the valuation of new issues. *J. Account. Econ.* 8, 159–172.
- Villalonga, B., 2004. Does diversification cause the 'diversification discount'. *Financ. Manag.* 33, 5–27.
- White, H., 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* 48, 817–838.
- Willenborg, M., 1999. Empirical analysis of the economic demand for auditing in the initial public offerings market. *J. Account. Res.* 37, 225–238.