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ORIGINAL RESEARCH

Managerial overconfidence, ability, firm-governance and audit fees

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Abstract Prior studies document that managerial overconfidence potentially increases the risk of financial misstatements, and that overconfident managers purchase lower quality audits and pay lower audit fees. As a part of the research that evaluates the information value of managerial characteristics to auditors, our study examines how the relationship between managerial overconfidence and audit fees is impacted by managerial ability, and board and audit committee effectiveness in the post-Sarbanes–Oxley (post-SOX) environment. In general, we find a significantly positive relationship between managerial overconfidence and audit fees consistent with the supply-side risk based perspective of audit pricing. However, this relationship is significantly attenuated in higher managerial ability firms where overconfident managers are better able to make proper accounting estimates and judgements required for producing reliable financial statements, and synthesize firm-specific information into appropriate forward looking projections. We find that on an average, the overconfident firms with higher managerial ability pay 6.3% lower audit fees than the overconfident firms with lower managerial ability. Our analyses further show that board characteristics positively impact the relationship between managerial

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overconfidence and audit fees, suggesting that stronger board monitoring increases the demand for higher quality audits to mitigate the reporting risk of the overconfident firms. On an average, the firms with managerial overconfidence pay additional 9.3% higher audit fees when they are subject to stronger and more effective board oversight. However, we find weaker evidence on the effect of audit committee characteristics on audit fees of the overconfident firms. Our primary results hold for a battery of supplemental tests including the tests using propensity-score matched sample. The study contributes to audit fee and corporate governance literature, and has useful implications for regulators, accounting practitioners, and auditors.

Keywords Audit fees · Audit risk · Board and audit committee characteristics · Managerial ability · Managerial overconfidence

JEL Classification M40 · M41 · M42

1 Introduction

Extant audit fee literature investigates the effect of various economic and firm-specific factors on the determination of audit fees. Among others, studies examine the impact of material internal control weakness and its remediation, late 10-K filings, managerial characteristics, regulatory changes (e.g., PCAOB's AS No. 5) on audit fees. Other studies examine the impact of corporate governance in the form of board and audit committee characteristics, auditor's industry expertise and auditor's independence on audit fees (e.g., Simunic 1980; Craswell et al. 1995, 2002; Carcello et al. 2002; Abbott et al. 2003; Mitra et al. 2007; Vafeas and Waegelein 2007; Krishnan et al. 2011; Munsif et al. 2011; Hammersley et al. 2012; Wang et al. 2013).

Among earlier studies, Carcello et al. (2002) document a positive association between audit fees and board independence, diligence and expertise but they also show that audit committee characteristics are not significant when board variables are included in the analyses. Abbott et al. (2003), however, find that audit committee independence and financial expertise are positively associated with audit fees when board variables are not included. More recent studies investigate the association between certain managerial attributes and audit fees, such as CEO turnover and audit fees (Huang et al. 2014), CFO and audit committee power and audit fees (Beck and Mauldin 2014), and managerial ability and audit fees (Krishnan and Wang 2015) and document results indicating that managerial attributes impact auditor's fee decision.

Focusing on the managerial attributes, Krishnan and Wang (2015) document a negative relationship between managerial ability and audit fees, which is consistent with the risk-side perspective that suggests that more capable managers are associated with higher earnings quality and reduced audit risk resulting in lower audit fees. Their findings corroborate those of Demerjian et al. (2013) that earnings quality is positively associated with managerial ability, and that more able managers could better estimate accounting accruals, resulting in more precise measure of earnings. Focusing on managerial overconfidence, Duellman et al. (2015) find evidence of a negative relationship between managerial overconfidence and audit fees in companies that lack a strong audit committee oversight, consistent with demand-side perspective that overconfident managers seek less auditor's scrutiny and thus, lower-quality audit service; a strong audit committee mitigates this managerial propensity to interfere with audit process and demand more audit services to offset the risk associated with managerial overconfidence. These prior observations give

rise to two interesting empirical questions. First, how is audit pricing impacted in firms having overconfident managers when overconfident managers are also knowledgeable about the firm and industry, and are better able to synthesize firm-specific information in order to make proper accounting estimates and judgements? Second, how a strong board and audit committee governance will impact audit pricing in firms having overconfident managers?[1]

To find answers to these questions, our study integrates managerial overconfidence, managerial ability and corporate governance factors in the context of audit pricing, and examines the effect of managerial ability, and board and audit committee characteristics on the relationship between managerial overconfidence and audit fees. By demonstrating the incremental effect of managerial ability and corporate governance in terms of board and audit committee attributes on audit pricing in a high-risk situation caused by managerial overconfidence, our study incrementally extends managerial characteristics, firm governance and audit fee research.

Our motivation to conduct this research stems from previous studies on managerial overconfidence and financial reporting quality where overconfident managerial action is viewed as a factor that creates additional reporting risk. Schrand and Zechman (2012) show that managerial overconfidence increases the risk of misstatements because of optimistic bias in accounting judgement or estimates. Ahmed and Duellman (2013) further show that overconfidence reduces accounting conservatism potentially indicating more aggressive reporting strategies adopted by overconfident managers. Presley and Abbott (2013) document that CEOs' overconfidence is associated with higher likelihood of earnings restatements. Furthermore, Hsieh et al. (2014) demonstrate that managerial overconfidence works against regulators' attempt to improve financial reporting practice in the post-Sarbanes (SOX) period, and that overconfident CEOs feel less constrained in their post-SOX earnings management decision and continue to exploit opportunities for certain types of earnings management.

These research findings indicate that overconfident managerial action is associated with higher risk of financial misstatements as overconfident managers have power to make certain decisions that might exacerbate risk in operating and financial reporting process. However, we conjecture that when managers are more knowledgeable about their firms and have better ability to make proper accounting estimates and judgements, and synthesize information into appropriate forward looking projections, operational and financial reporting risk is likely to diminish even in firms with overconfident managers. Higher managerial ability reduces optimistic bias in accounting estimates, and the perceived risk of financial misstatements.[2] From risk-based perspective, reduced reporting risk leads to lower audit efforts resulting in audit fees.

Extant literature further contends that board of directors and audit committee members play crucial role in ensuring financial reporting quality (e.g., DeFond and Jiambalvo 1993; Beasley 1996; Dechow et al. 1996; Cohen et al. 2002; Farber 2005). They demonstrate that

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[1] Prior studies indicate that characteristics of senior managers are often evaluated in client screening, acceptance and audit planning decisions (Kiziria et al. 2005; Johnson et al. 2013; Krishnan and Wang 2015). Kiziria et al. (2005) even suggest that without management integrity or 'tone at the top', the most proficient internal controls may not be effective in reducing financial misstatements. In a quasi-experimental setting, Johnson et al. (2013) find that narcissistic client behavior and fraud motivation are positively related to auditors' fraud risk assessments.

[2] More able managers are expected to be more knowledgeable about the firm and the industry, and are better able to synthesize information into forward-looking estimates with which to report higher quality earnings (Demerjian et al. 2013; Libby and Luft 1993).

stronger governance is associated with higher information quality. Klein (2002) and Xie et al. (2003) specifically find that corporate board and audit committee independence, and their financial and business expertise are positively associated with reported earnings quality, which will reduce the risk of financial misreporting. Consistent with this line of research, previous audit fee studies show that audit effort and auditor's fee adjustments are impacted by the quality and effectiveness of corporate governance (e.g., Cohen and Hanno 2000; Tsui et al. 2001; Carcello et al. 2002; Abbott et al. 2003; Bedard and Johnstone 2004). Carcello et al. (2002) and Abbott et al. (2003) find that more effective corporate board and audit committee demands higher audit efforts to minimize the risk of financial misstatements that leads to higher audit fees. Studies also find that audit firms increase audit efforts and include risk premium in audit fees to cover any potential incremental costs caused by heightened corporate governance risk (Bedard and Johnstone 2004); but stronger governance reduces financial reporting and audit risk resulting in reduced audit effort and risk premium in audit fees (Tsui et al. 2001). It transpires, therefore, that the directional impact of corporate governance on audit fees is inconclusive and is, thus, difficult to predict in an empirical setting.

On one hand, if stronger governance in terms of board and audit committee oversight demands higher quality audits to mitigate the adverse effect of overconfidence managerial action, this leads to higher audit fees. On the other hand, if stronger board and audit committee oversight offsets the negative effect of overconfident managerial action, and improves the financial reporting process, auditors' assessed audit and business risk becomes lower that translates into lower audit fees.

Based on prior studies, (e.g., Schrand and Zechman 2012; Ahmed and Duellman 2013; Duellman et al. 2015), we employ three measures to identify firm-observations associated with managerial overconfidence (i.e., two investment-based, CAPEX and Over-Invest, and one compensation-based, Holder67). For both our full sample of 12,942 observations for all three overconfidence measures and for propensity score-matched sample of 6908 observations for CAPEX, 5676 observations for Over-Invest and 4910 observations for Holder67, of a post-SOX period from 2003 to 2011, our multivariate regression analyses show that after controlling for the effect of firm-specific characteristics, audit fees are, in general, positively associated with managerial overconfidence, suggesting that overconfident managers increase the risk of financial misstatements which increases audit risk and audit fees. Our finding of the positive relationship between managerial overconfidence and audit fees complements. Hsieh et al. (2014) who demonstrate that overconfident CEOs are less constrained in their earnings management in the post-SOX years, and their individual characteristics work against regulators' effort in this respect. So, the reporting risk continues even in an enhanced regulatory regime under SOX.

Our results further show that the positive relationship between managerial overconfidence and audit fees is significantly moderated in the firms with higher managerial ability, suggesting that more able managers reduce the reporting risk associated with overconfidence resulting in relatively lower assessed audit risk and audit fees. The results' economic implication is that the overconfident firms with higher managerial ability pay, on an average, 6.3% lower audit fees (i.e., average fee reduction by $123,165) than the overconfident firms with lower managerial ability. Finally, we document that board governance strengthens the positive relationship between managerial overconfidence and audit fees suggesting that stronger board monitoring increases the demand for higher-quality audits to mitigate the likelihood of financial misstatements associated with overconfident managerial action. As a result, audit investments tend to be higher for these firms leading to a higher audit fees. The economic implication is that the overconfident firms subject to

stronger board oversight pay, on an average, additional 9.3% higher audit fees (i.e., average fee increase by \$181,815) compared with the overconfident firms with weaker board oversight. We, however, find much weaker result for the effect of audit committee governance on the managerial overconfidence and audit fee relationship.

Our analyses produce specific evidence that the negative effect of managerial overconfidence on auditor's risk assessment is significantly moderated when overconfident managers are more knowledgeable about firm operations, better able to utilize corporate resources to generate revenues and produce reliable earnings information by properly synthesizing available firm and industry-specific information and making correct accounting judgement and estimate. Higher managerial ability offsets the adverse effect of managerial overconfidence and reduces auditor's assessed risk and audit fees. Furthermore, stronger board seeks higher-quality audits to offset the adverse effect of overconfident managerial action and reduce financial reporting risk that results in higher audit fees. The results support the contention of prior research that characteristics of senior managers are often evaluated in client screening, acceptance and audit planning decisions. Our study contributes to both audit fee and corporate governance literature by documenting the effect of managerial ability and board characteristics on the relationship between managerial overconfidence and audit fees, and has useful implications for regulators, accounting practitioners and auditors.

The paper proceeds as follows. Section 2 contains background discussion and hypotheses followed by research design and sample in Sect. 3 and descriptive data and correlation statistics in Sect. 4. Section 5 discusses major findings and their implications, and Sect. 6 contains discussion on supplemental test results. Section 7 includes concluding remarks.

2 Background and hypotheses

Previous studies evaluate the effect of managerial characteristics on financial reporting quality and document that managers have significant effect on firms' disclosure policies (Bamber et al. 2010), on various financial reporting attributes such as off-balance sheet financing, discretionary accruals and accounting conservatism (Ge et al. 2011), and on firms' tax avoidance strategies (Dyreng et al. 2010). Malmendier et al. (2011) further argue that managerial overconfidence leads to a distortion in corporate financial policies. Overconfident managers increase optimistic bias in accounting estimates leading to financial misstatement and those misreporting firms choose to misstate earnings in greater amounts in subsequent period to cover reversals and meet optimistic expectations previously created (Schrand and Zechman 2012). Consistent with these observations, Hribar and Yang (2016) find that overconfident managers are more likely to issue optimistic earnings forecasts that they subsequently miss. Ahmed and Duellman (2013) further show that CEO overconfidence changes financial reporting behavior, and are associated with a decline in both conditional and unconditional conservatism that leads to more aggressive reporting strategies adopted by overconfident managers. Presley and Abbott (2013) document a significant positive relationship between CEO overconfidence and likelihood of financial restatements. Hsieh et al. (2014) further show that overconfident CEOs feel less constrained by SOX, and this individual characteristic works against regulators' attempt to constrain corporate earnings management. The authors observe that optimistic bias of

overconfident CEOs induces them to engage in greater earnings management in the post-SOX environment which has negative long-term implications for corporate value.

Managerial characteristics and associated risk are also found to have profound effect on audit pricing decision. Prior studies show that audit fees tend to be higher in response to an increase in client-specific risk of misstatements (e.g., Houston et al. 2005; Lyon and Maher 2005; Hay et al. 2006; Hogan and Wilkins 2008; Hoitash et al. 2008; Hammersley et al. 2012; Wang et al. 2013). Johnson et al. (2013) find that managerial narcissism is positively associated with auditors' risk assessment in an experimental setting. If auditors recognize the downside risk associated with personality traits of overconfident managers, they may associate managerial overconfidence with higher financial reporting risk. In that case, auditors are likely to increase the scope of audit work leading to higher audit efforts to minimize audit risk at an acceptable level and also include a risk premium in audit fees to cover any future litigation loss liability.[3] Therefore, audit fees are likely to become higher in firms with overconfident managers.

From the perspective of managerial hubris, Duellman et al. (2015), however, suggest that overconfident managers make aggressive accounting estimates in generating financial information, and negotiate with their auditors to reduce audit scope and lower audit fees. They may not want high level auditor's scrutiny over their accounting policy choice, and seek lower quality audits and pay lower audit fees. Duellman et al. (2015) find evidence of a negative association between managerial overconfidence and audit fees for companies lacking a strong audit committee oversight. However, the presence of a strong audit committee mitigates the negative relationship.

Prior studies also investigate the effect of higher versus lower ability managers on firms' financial reporting process. Demerjian et al. (2013) specifically observe that higher managerial ability is associated with fewer subsequent financial restatements, higher earnings persistence, lower errors in bad debt provisions and higher quality accruals. They contend that more capable managers are better able to estimate accruals resulting in more precise measure of earnings. Recently, Huang and Sun (2017) find that higher-ability managers engage in less real activity management (REM) and that managers with superior ability reduce the negative impact of REM on future firm performance. Prior audit fee studies investigate the role of managerial ability in auditor's fee decision process and find that higher managerial ability decreases both the probability of issuing going-concern audit opinion and audit fees (Krishnan and Wang 2015), which corroborate the results documented by Demerjian et al. (2013). These findings lead us to conjecture that higher-ability managers are more likely to mitigate auditors' assessed audit risk and reputational concern even in the firms that are associated with managerial overconfidence. Auditors evaluate audit and business risk at a lower level when overconfident managers have greater ability to make correct accounting judgements and estimates required in financial reporting and are more capable of synthesizing firm and industry information to develop accurate forward-looking projections. These managerial attributes are expected to reduce both financial reporting and audit risk in overconfident firms. Since characteristics of senior managers are

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[3] Simunic and Stein (1996) suggest that total audit costs include a "resource cost and an expected liability loss component." Resource cost increases with an increase in audit effort to minimize audit risk, and the proportion of liability loss component (ex-ante risk premium) increases with an increase in probable ex-post litigation loss liability (i.e., increased business risk). Auditors respond to higher audit and business risk by increasing audit investment and by charging higher risk premium. Reynolds and Francis (2001) suggest that reputation protection and litigation risk dominate auditor's reporting behavior. Wang et al. (2013) further argue that an indication of client's inability to file reliable information on a timely basis constitutes a risk factor inducing auditor to make upward fee adjustments.

often considered in client screening, acceptance and audit planning decisions by auditors (Kiziria et al. 2005; Johnson et al. 2013), higher managerial ability is also likely to be factored by auditors in their fee decision that may result in relatively lower audit pricing because of reduced risk than in case of firms with lower managerial ability. For over-confident firms, higher managerial ability reduces audit fees if higher-ability managers reduce audit risk posed by overconfident managerial action. In this case, we can anticipate that managerial ability moderates the positive relationship between managerial overconfidence and audit fees. However, if overconfident managers settle for lower quality audits in order to avoid higher auditor's scrutiny and pay lower audit fees that results in a negative relationship between managerial overconfidence and audit fees, higher managerial ability probably mitigates this inclination to purchase lower quality audit service. In that case, it is likely that managerial ability moderates the negative relationship between managerial overconfidence and audit fees. Given these conflicting possibilities, we express our first hypotheses in the alternative non-directional form as follows.

H1$_a$ *Ceteris paribus*, higher managerial ability has an incremental effect on the relationship between managerial overconfidence and audit fees.

Extant literature examines the association between certain governance characteristics and incidence of financial reporting irregularities and fraud (e.g., Beasley 1996; Dechow et al. 1996; Klein 2002; Xie et al. 2003; Farber 2005; Chao and Horng 2013) and demonstrates that stronger governance ensures higher financial reporting quality. Auditor's effort and audit fee adjustments are also impacted by the quality and effectiveness of corporate governance (e.g., Cohen and Hanno 2000; Tsui et al. 2001; Carcello et al. 2002; Abbott et al. 2003; Bedard and Johnstone 2004; Hay et al. 2006). Cassell et al. (2012) further show that Big N auditors consider certain board and audit committee-related governance attributes when making their client portfolio decisions. From a risk-based supply side perspective, stronger governance could potentially reduce financial reporting and audit risk, and thus audit fees. From a demand-based perspective, stronger governance may lead to a demand for higher-quality audit services to mitigate reporting risk that results in higher audit fees. So, stronger board and audit committees could be associated with either audit fee decreases due to lower auditor's risk assessments and lower audit investments or audit fee increases due to their demand for higher auditor's scrutiny and audit efforts.

Prior studies mostly find inconclusive evidence on governance effect on managerial overconfidence. Using blockholders' percentage ownership, board composition and characteristics, Schrand and Zechman (2012) find an insignificant difference in monitoring across the misreporting overconfident firms and matched control firms in their sample. They have indicated their reluctance to draw any definite conclusion about the role of monitoring on the basis of "no-results" from a small sample test. Similarly, Ahmed and Duellman (2013) do not find evidence that the relationship between conservatism and overconfidence is impacted by firms' monitoring system. They argue that external monitors probably value certain attributes of overconfident managers and choose them to avoid potential costs of conservative accounting. However, Duellman et al. (2015) show that the presence of strong audit committee mitigates overconfident managers' tendency to purchase lower quality audits; thus, strong audit committee attenuates the negative relationship between managerial overconfidence and audit fees.

From competing research evidence, we infer that if strong monitoring system improves governance effectiveness, and reduces the risk of financial misstatements caused by overconfident managerial action, it mitigates auditor's assessed audit and business risk and

thus, audit fees for the overconfident firms compared with the overconfident firms having weaker governance. Effective board and audit committee may be viewed by auditors as an improvement to the control environment that reduces auditor's assessed risk and required audit work (Abbott et al. 2003; Tsui et al. 2001) resulting in lower audit fees. Alternatively, if internal monitors (i.e., board and audit committee members) become overly concerned about overconfident managerial action and its adverse effect on firms' financial reporting process, they are more likely to seek higher quality audits to mitigate the risk of financial misstatements, and protect their reputation, avoid legal liability and promote shareholder interests. In response to high demand, auditors increase audit investment by expanding the scope of their audit work and engaging more professional and expert staff, which translates into higher audit fees. Given these conflicting possibilities for the effect of corporate board and audit committee effectiveness, we express our second and third hypotheses in the alternative non-directional form as follows.

H2$_a$ *Ceteris paribus*, board characteristics have an incremental effect on audit fees of firms associated with managerial overconfidence.

H3$_a$ *Ceteris paribus*, audit committee characteristics have an incremental effect on audit fees of firms associated with managerial overconfidence.

3 Research design and sample

3.1 Research design

On the basis of prior audit fee studies (e.g., Huang et al. 2014; Krishnan et al. 2011; Hammersley et al. 2012; Munsif et al. 2011; Hoitash et al. 2008; Raghunandan and Rama 2006; Ashbaugh et al. 2003; Whisenant et al. 2003), we use the following audit fee regression equation to examine the effect of managerial ability on the relationship between managerial overconfidence and audit fees as embodied in the first hypothesis.

$$
\begin{aligned}
\text{LAFEE} = {} & \beta_0 + \beta_1\text{LTA} + \beta_2\text{RECINV} + \beta_3\text{FOREIGN} + \beta_4\text{SEG} + \beta_5\text{MB} \\
& + \beta_6\text{LEV} + \beta_7\text{ROA} + \beta_8\text{LOSS} + \beta_9\text{GC} + \beta_{10}\text{RESTATE} + \beta_{11}\text{EX\_DOPS} \\
& + \beta_{12}\text{BIG4} + \beta_{13}\text{ATENURE} + \beta_{14}\text{Litigation} + \beta_{15}\text{INITIAL} + \beta_{16}\text{ARL} \\
& + \beta_{17}\text{ICW} + \beta_{18}\text{AGROWTH} + \beta_{19}\text{M\&A} + \beta_{20}\text{OverCon} + \beta_{21}\text{ABILITY} \\
& + \beta_{22}\text{OverCon} * \text{ABILITY} + \text{Industry fixed effect} + \text{Year fixed effect} + \varepsilon
\end{aligned}
$$

(1)

The dependent variable is the natural log of audit fees (LAFEE). We use three proxies for OverCon based on Schrand and Zechman (2012) and Ahmed and Duellman (2013). The first two are investment-based proxy and the third one is based on CEO's option holding behavior. The first investment-based proxy is known as CAPEX which equals 1 (overconfidence) if the capital expenditure scaled by lagged assets is greater than the median level of capital expenditure scaled by lagged assets for the firm's Fama–French industry in that year, 0 otherwise. This proxy is supported by Malmendier and Tate (2005) who document that overconfident managers tend to overinvest in capital projects (also see, Ahmed and Duellman 2013). The second investment-based proxy is Over-Invest which equals 1 if the residual from the regression of total assets growth on sales growth run by industry-year is greater than zero, 0 otherwise (Ahmed and Duellman 2013). If assets grow at a faster rate than sales, it suggests that managers are overinvesting in their companies

relative to their peers.[4] The third overconfidence proxy is based on CEO's option holding behavior, Holder67, which equals 1 if the ratio of options in the money (calculated as average value per option divided by average exercise price per option) exceeds 0.67 at least twice during sample period, 0 otherwise. Malmendier and Tate (2005, 2008) use the timing of CEO option exercise to identify overconfidence. Overconfident CEOs are more likely to believe that their companies would outperform a hedged portfolio and postpone their option exercise.[5] The variable, ABILITY based on MA-score as developed by Demerjian et al. (2012) is the proxy for managerial ability. Demerjian et al. (2012) note that managerial ability score is for the management team as a whole. ABILITY is set at 1 if the MA-score is greater than median score and 0 otherwise.[6] We conduct three separate regression analyses for three overconfidence proxies and their interactions with ABILITY. The variable of interest is the interaction between ABILITY and OverCon. In terms of the first hypothesis, the coefficient, β_{18} is expected to be either significantly positive or negative depending on the relationship between managerial overconfidence and audit fees.

We include several control variables that prior studies have identified as important determinants of audit fees. The variables LTA, RECINV, FOREIGN, SEG, AGROWTH and EX_DOPS control for the effect of size and business complexity on audit fees. We control for the effect of firm's financial condition, growth and operating results on audit fees by including MB, LEV, ROA, LOSS and M&A variables. Furthermore, GC controls for the effect of unfavorable reporting issues, ICW controls for the presence of material internal control weaknesses, RESTATE controls for the effect of financial restatements, and ARL controls for the effect of audit report lags on audit fees. INITIAL accounts for the effect of new auditor, and BIG4 controls for the brand and specialist premium charged by Big 4 auditors. Litigation variable controls for the risk associated with firm's operation in a high-litigation industry. ATENURE is the log of audit firm tenure that controls for the effect of auditor–client consecutive years of relationship on audit fees. All variables are defined in Table 1. Industry effects are controlled by including industry dummy variables based on Fama–French (1997) industry classification, and year effects are controlled by including year dummy variables.

To test the second and third hypotheses, we expand Eq. (1) by including two governance variables, one for board of directors and the other for audit committee in place of ABILITY variable to capture the effect of board and audit committee attributes on the relationship between managerial overconfidence and audit fees.

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[4] Biddle et al. (2009) demonstrate that the firms with higher reporting quality tend to deviate less from predicted investment levels. The higher reporting quality is associated with both lower under and over-investments. Therefore, the over-investment, which is viewed as a product of more aggressive and overconfident managerial decision, is more likely be associated with lower reporting quality.

[5] For discussion on this issue, please refer to Schrand and Zechman (2012) and Ahmed and Duellman (2013).

[6] MA-scores are obtained from https://community.bus.emory.edu/personal/PDEMERJ/Pages/Home.aspx. Demerjian et al. (2012) used a two-step process to estimate managerial ability. First, they employ data envelopment analysis to estimate overall firm efficiency. Second, they estimate managerial ability from firm efficiency measure by industry by regressing firm efficiency on six firm characteristics such as firm size, firm's market share, free cash flows, firm age, business segment concentration, and foreign operations. The residuals from the regressions are the managerial ability scores. For detailed discussion of the process, please refer to Demerjian et al. (2012, 2013) and Krishnan and Wang (2015).

Table 1 Variable definition

LAFEE	Log of audit fees
LTA	Log of total assets
RECINV	Proportion of accounts receivables and inventory in total assets
FOREIGN	A dummy variable of 1 if the firms has foreign operation in year t, 0 otherwise
SEG	Square root of the number of business segments
MB	Market to book ratio
LEV	Leverage ratio computed as total debt divided by total assets
ROA	Return on total assets computed as net income before extraordinary items divided by total assets
LOSS	A dummy variable of 1 if the firm has a loss for the year, 0 otherwise
BIG4	Equals 1 if the firm is audited by Big 4 auditor in year t, 0 otherwise
GC	Equals 1 if the firm receives a going-concern audit opinion in year t, 0 otherwise
RESTATE	Equals 1 if the firm has restated its current financial statement in year t, 0 otherwise
EX_DOPS	Equals 1 if the firm has reported extraordinary items and discontinued operations in year t, 0 otherwise
INITIAL	Equals 1 for the first year of audit in year t, 0 otherwise
ATUENURE	Audit firm tenure in years (i.e., number of consecutive years of auditor–client relationship)
Litigation	Equals to 1 if the firm operates in high litigation industry (SIC codes 2833-2836; 3570-3577; 3600-3674; 5200-5961 and 7370-7374) in year t and 0 otherwise
AGROWTH	Change in total assets in year t divided by the beginning of year total assets
M&A	Equals 1 if the firm has engaged in merger and acquisitions in year t, 0 otherwise
ARL	Audit report lag computed as the number of days from the fiscal-year end to the date of auditor's report
ICW	Equals 1 if the firm has material internal control weaknesses in year t, 0 otherwise
OverCon	Overconfidence measures:
	CAPEX = Equals 1 (overconfidence) if the capital expenditure scaled by lagged assets is greater than the median level of capital expenditure scaled by lagged assets for the firm's two-digit SIC industry in that year, 0 otherwise
	Over-Invest = Equals 1 (overconfidence) if the residual from the regression of total assets growth on sales growth is greater than zero, 0 otherwise
	Holder67: Equals 1 (overconfidence) if the ratio of options in the money calculated as average value per option divided by average exercise price per option exceeds 0.67 at least twice during sample period, 0 otherwise
ABILITY	Equals 1 if the MA-score (managerial ability scores) is greater than median score, 0 otherwise
Board governance attributes (BD_GSCORE)—the sum of the following	
BD_IND	Equals 1 if the proportion of non-management outside directors on the board is greater than median proportion, 0 otherwise
BD_Diligence	Equals 1 if no. of board meetings is greater than median frequency, 0 otherwise
DUALITY	Equals 1 if the CEO and chairman are not the same person, 0 otherwise
BD_EXP	Equals 1 if the number of outside directorships held by non-management board members is greater than median, 0 otherwise
ATTEND	Equals 1 if all board members attended at least 75% of the board meetings, 0 otherwise
Not-Staggered	Equals 1 of the board is not staggered in year t, 0 otherwise
Audit committee governance attributes (AC_GSCORE)—the sum of the following	
AC_SIZE	Equals 1 if the number of audit committee members is greater than median, 0 otherwise
AC_EXP	Equals 1 if the number of members with financial expertise is greater than median, 0 otherwise
AC_IND	Equals 1 if the proportion of independent members to total members is greater than median proportion, 0 otherwise

$$\begin{aligned}
\text{LAFEE} = {} & \beta_0 + \beta_1 \text{LTA} + \beta_2 \text{RECINV} + \beta_3 \text{FOREIGN} + \beta_4 \text{SEG} + \beta_5 \text{MB} \\
& + \beta_6 \text{LEV} + \beta_7 \text{ROA} + \beta_8 \text{LOSS} + \beta_9 \text{GC} + \beta_{10} \text{RESTATE} \\
& + \beta_{11} \text{EX\_DOPS} + \beta_{12} \text{BIG4} + \beta_{13} \text{ATENURE} + \beta_{14} \text{Litigation} \\
& + \beta_{15} \text{INITIAL} + \beta_{16} \text{ARL} + \beta_{17} \text{ICW} + \beta_{18} \text{AGROWTH} + \beta_{19} \text{M\&A} \\
& + \beta_{20} \text{OverCon} + \beta_{21} \text{BD\_GSCORE} + \beta_{22} \text{AC\_GSCORE} + \beta_{23} \text{OverCon} \\
& * \text{BD\_GSCORE} + \beta_{24} \text{OverCon} * \text{AC\_GSCORE} + \text{Industry fixed effects} \\
& + \text{Year fixed effects} + \varepsilon
\end{aligned}$$

$$(2)$$

The variables of interest are the interactions between OverCon and BD_GSCORE and OverCon and AC_GSCORE. In terms of the second and third hypotheses, we have no directional prediction for the coefficients, β_{19} and β_{20}. The variables, BD_GSCORE and AC_GSCORE represent board governance and audit committee governance scores respectively. Higher score indicates stronger governance. BD_GSCORE is a composite score of the following six board characteristics (which is consistent with the process adopted in Cassell et al. 2012).

$$\text{BD\_GSCORE} = \sum (\text{BD\_IND, BD\_DIL, DUALITY, BD\_EXP, ATTEND, NOTSTAGGERED}).$$

where, BD_IND = Equals 1 if the proportion of non-management outside directors on the board is greater than median proportion, 0 otherwise; BD_DIL = Equals 1 if number of board meetings is greater than median frequency; 0 otherwise; DUALITY = Equals 1 if the CEO and chairman are not the same person, 0 otherwise; BD_EXP = Equals 1 if the number of outside directorships held by non-management board members is greater than median, 0 otherwise; ATTEND = Equals 1 if all board members attended at least 75% of the board meetings, 0 otherwise; NOTSTAGGERED = Equals 1 of the board is not staggered, 0 otherwise.

AC_GSCORE is a composite score of the following three audit committee characteristics.

$$\text{AC\_GSCORE} = \sum (\text{AC\_SIZE, AC\_EXP, AC\_IND}).$$

AC_SIZE = Equals 1 if the number of audit committee members is greater than median, 0 otherwise; AC_EXP = Equals 1 if the number of members with financial expertise is greater than median, 0 otherwise; AC_IND = Equals 1 if the proportion of independent members to total members is greater than median proportion, 0 otherwise.

3.2 Sample

Panel A of Table 2 reports the sample selection process. We consider a sample period (2003–2011) that comprises only post-SOX years, to control for the effect of new regulatory environment that has been created with the enactment of Sarbanes–Oxley Act of 2002. Hsieh et al. (2014) find that overconfident CEOs feel less constrained by SOX in their earnings management decision. They suggest that individual characteristic works against regulators' attempts to constrain earnings management by corporate executives. So, the reporting risk associated with managerial overconfidence is likely to persist in the enhanced regulatory regime. This situation provides an appropriate setting to test our hypotheses in a post-SOX period. From the Audit Analytics database, we initially obtain

Table 2 Sample selection

Panel A: Sample selection	
Initial firm-observations from 2003 to 2011 in audit analytics (with available audit fee information)	71,126
Less: foreign firms	(11,906)
Less: financial firms (SIC 60-69)	(13,822)
Less: missing matched data in Compustat and MA-scores in Demerjian et al. (2013) web-link	(16,554)
Less: missing data in Corporate Library, ExecuComp and DEF-14A proxy statements	(15,922)
Final sample of firm-observations over 9-year period	12,942
Number of firms in the final sample	2515

Firm-observations	Number	Percentage (%)
Panel B: Yearly distribution of sample firm-observations		
2003	1368	10.57
2004	1462	11.30
2005	1619	12.51
2006	1575	12.17
2007	1550	11.98
2008	1451	11.21
2009	1534	11.85
2010	1273	9.84
2011	1110	8.58
Total	12,942	100.00

71,126 firm observations with appropriate audit fee data for the period from 2003 to 2011.[7] Next, we eliminate 11,906 observations relating to foreign firms and 13,822 observations relating to financial companies (SIC 60-69) because of their unique characteristics. We further exclude another 16,554 observations to match data in the Compustat database and managerial ability measure (MA scores) from Demerjian et al. (2012) database in https://community.bus.emory.edu/personal/PDEMERJ/Pages/Home.aspx. Finally, 15,922 firm observations are excluded due to missing information in the Corporate Library and ExecuComp databases and DEF-14A proxy statements. Our final sample thus comprises 12,942 observations from 2515 firms for our main analyses. To avoid outlier problem, we winsorize all continuous variables at the 1 and 99% levels. Panel B of Table 2 presents yearly distribution of sample firm-observations. The observations range between 8.58 and 12.51% of the sample that does not exhibit any significant annual concentration of observations in any particular year.

4 Descriptive data and correlation statistics

Table 3, Panel A presents the descriptive data for the sample. The investment based proxies for overconfidence show that 52.5% of the firm observations have capital expenditures greater than industry median, and 46.6% of the observations are associated with

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[7] We restrict the sample period up to 2011 because of non-availability of managerial ability data beyond 2011 at the site: https://community.bus.emory.edu/personal/PDEMERJ/Pages/Home.aspx.

overinvestment in assets relative to sales growth. The option holding measure of over-confidence shows that 37.4% of the firm observations are classified as having overconfident CEOs. These are comparable to those reported in Ahmed and Duellman (2013). The mean and median managerial ability scores are − 0.008 and − 0.015 respectively with the values ranging between − 0.397 and 0.545. This statistics are comparable with those of Demerjian et al. (2012) and Krishnan and Wang (2015). The mean and median composite board governance scores are 3.416 and 3.000 respectively whereas the mean and median composite audit committee governance scores are 2.157 and 3.000 respectively.

The mean and median audit fees are $1,955,000 and $832,000 respectively. The mean and median total assets are $4367 million and $654 million respectively. The sample firms have, on an average, market to book ratio of 4.033, leverage ratio of 0.411 and return on assets of − 0.005; 19.5% report negative earnings; 22.8% of total assets comprise receivables and inventory, and 17.3% reported extraordinary items and discontinued operations in income statements. Financial statements are restated in 12.1% of the firm-years in the sample. 68.9% of the firm-observations are associated with foreign operations, and a typical firm has 2.82 business segments. Most firms are audited by Big 4 auditors (81%), and a smaller percentage of firm-observations (10.2%) have first year of new auditor. The average audit firm tenure is more than 9 years (with median of 11 years). 6.6% of the sample observations are associated with going-concern audit opinion, and 7.8% of the sample observations relate to material internal control weaknesses. 26.5% observations belong to high-litigation risk industries and 14.9% firm-years experience merger/acquisitions. Finally, the average audit report lag for the sample is more than 56 days.

Panel B presents Pearson correlation statistics for the variables used in the regression analyses. Some correlations are noteworthy. LAFEE is positively related to OverCon consistent with the premise that managerial overconfidence increases financial reporting risk (Schrand and Zechman 2012), and negatively related to ABILITY consistent with the premise that managerial ability improves earnings quality and reduces audit risk (Demerjian et al. 2013). LAFEE is also positively related to both BD_GSORE and AC_G-SCORE which is consistent with prior studies (Carcello et al. 2002; Abbott et al. 2003; Hay et al. 2006). LAFEE is also positively correlated to several firm-specific factors such as LTA, MB, LEV, FOREIGN, RECINV, SEG, and EX_DOPS that proxy for client risk, and business and audit complexity. The correlation statistics also suggest that Big 4 auditors charge higher audit fees than non-Big 4 auditors; the firms with longer auditor tenure pay relatively lower audit fees; and the firms with material internal control weaknesses and the firms with higher audit report lags, pay relatively higher audit fees.

5 Main results

Table 4 reports the results from estimating audit fee regression Eq. (1) separately for the three overconfidence measures. The coefficients of OverCon for all three measures, CAPEX, Over-Invest and Holder67 are 0.048, 0.053 and 0.043 respectively that are significantly positive at 5 and 10% level suggesting that the firms with overconfident managers pay higher audit fees. The results are consistent with supply-side argument that managerial overconfidence poses higher financial reporting and audit risk, and induces auditors to engage higher-quality audit resources to mitigate the risk of audit failure and/or include risk-premium in quoted fees to cover any ex-post litigation loss, resulting in higher

Table 3 Descriptive data and correlation statistics

Variables	Mean	Median	SD	Minimum	Maximum
Panel A: Descriptive statistics (N = 12,942)					
Overconfidence measures					
CAPX	0.525	0.000	0.499	0.000	1.000
Over-Invest	0.466	1.000	0.498	0.000	1.000
Holder67	0.374	0.000	0.484	0.000	1.000
Board governance					
BD_IND	0.427	0.000	0.495	0.000	1.000
BD_DIL	0.712	1.000	0.453	0.000	1.000
DUALITY	0.661	1.000	0.473	0.000	1.000
BD_EXP	0.441	0.000	0.496	0.000	1.000
ATTEND	0.787	1.000	0.409	0.000	1.000
NOT_Staggered	0.388	0.000	0.487	0.000	1.000
Composite score (BD_GSCORE)	3.416	3.000	1.719	0.000	6.000
Audit committee governance					
AC_SIZE	0.554	1.000	0.497	0.000	1.000
AC_EXP	0.654	1.000	0.478	0.000	1.000
AC_IND	0.949	1.000	0.223	0.000	1.000
Composite score (AC_GSCORE)	2.157	3.000	0.784	0.000	3.000
Managerial ability score (Demerjian et al. 2012)	− 0.008	− 0.015	0.149	− 0.397	0.545
Firm characteristic variables					
Total assets (in Mil. US$)	4367	654	16,951	1.521	289,336
Audit fees (in 000 US$)	1955	832	4008	176	29,472
MB	4.033	2.921	3.347	0.415	16.934
RESTATE	0.121	0.000	0.326	0.000	1.000
BIG 4	0.810	1.000	0.392	0.000	1.000
No. of business segments	2.822	4.000	3.385	1.000	12.000

Table 3 continued

Variables	Mean	Median	SD	Minimum	Maximum
FOREIGN	0.689	1.000	0.463	0.000	1.000
LEV	0.411	0.495	0.253	0.029	0.916
RECINV	0.228	0.206	0.194	0.011	0.842
GC	0.066	0.000	0.311	0.000	1.000
ROA	− 0.005	0.071	0.284	− 0.759	0.313
LOSS	0.195	0.000	0.396	0.000	1.000
EX_DOPS	0.173	0.000	0.378	0.000	1.000
INITIAL	0.102	0.000	0.303	0.000	1.000
ATENURE	9.726	11.000	4.085	1.000	18.000
Litigation	0.265	0.000	0.441	0.000	1.000
AGROWTH	0.141	0.085	0.369	− 0.015	0.216
M&A	0.149	0.000	0.356	0.000	1.000
ARL	56.442	63.000	31.281	24.000	172.000
ICW	0.078	0.000	0.267	0.000	1.000

Variables	V1	V2	V3	V4	V5	V6
Panel B: Correlation statistics (N = 12,942)						
V1. CAPX	1.000					
V2. Over-Invest	0.089**	1.000				
V3. Holder67	0.062**	0.072**	1.000			
V4. LAFEE	0.109***	0.097***	0.060**	1.000		
V5. LTA	− 0.062**	− 0.049*	− 0.052	0.316***	1.000	
V6. RECINV	0.041*	0.025	0.057**	0.192***	0.103***	1.000
V7. FOREIGN	− 0.074**	− 0.083**	− 0.065**	0.088**	0.119***	0.056**
V8. SEG	− 0.041*	− 0.055**	− 0.091**	0.106***	0.082**	0.081**
V9. MB	0.109***	0.092***	0.124***	0.069**	0.110***	0.017

Table 3 continued

Variables	V1	V2	V3	V4	V5	V6
V10. LEV	− 0.088**	− 0.106***	− 0.093**	0.048*	0.030	0.006
V11. ROA	0.141***	0.163***	0.128***	− 0.055	0.015	0.024
V12. LOSS	− 0.066**	− 0.041*	− 0.075**	0.038	− 0.070	− 0.011
V13. GC	0.008	0.025	0.020	0.069**	− 0.047	0.050**
V14. RESTATE	0.116***	0.142***	0.132***	0.050**	− 0.028	− 0.029
V15. EX_DOPS	0.070**	0.095***	0.083**	0.056**	0.090**	0.013
V16. BIG4	0.129***	0.152***	0.144***	0.249***	0.119***	0.049*
V17. ATENURE	0.028*	0.017	0.015	− 0.065**	0.082**	0.022
V18. Litigation	− 0.005	− 0.020	− 0.011	0.029	0.055**	− 0.004
V19. AGROWTH	0.098***	0.116***	0.090**	0.086**	0.149***	0.102***
V20. M&A	0.122***	0.135***	0.112***	0.049*	0.077**	0.052**
V21. INITIAL	− 0.055**	− 0.068**	− 0.044**	− 0.066	− 0.020	0.003
V22. ARL	0.114***	0.101***	0.133***	0.077***	0.101**	0.095**
V23. ICW	0.122***	0.147***	0.163***	0.123***	0.131***	0.039*
V24. ABILITY	0.071***	0.088***	0.109***	− 0.118	0.071**	0.008
V25. BD_GSCORE	0.038*	0.044**	0.027	0.146***	0.201***	0.019
V26. AC_GSCORE	0.059**	0.030*	0.041*	0.088***	0.139***	0.030

Variables	V7	V8	V9	V10	V11	V12	V13

Panel B: Correlation statistics (N = 12,942)

V1. CAPX

V2. Over-Invest

V3. Holder67

V4. LAFEE

V5. LTA

V6. RECINV

Table 3 continued

Variables	V7	V8	V9	V10	V11	V12	V13
V7. FOREIGN	1.000						
V8. SEG	0.053**	1.000					
V9. MB	0.016	0.022	1.000				
V10. LEV	− 0.005	0.003	0.003	1.000			
V11. ROA	− 0.035	0.011	0.069**	0.018	1.000		
V12. LOSS	− 0.006	0.030	0.010	0.004	− 0.030	1.000	
V13. GC	0.019	0.056**	0.028	0.028	0.011	0.018	1.000
V14. RESTATE	0.018	0.015	0.049*	0.067**	− 0.052	0.033	0.020
V15. EX_DOPS	0.040*	0.024	0.002	0.009	0.014	0.004	0.006
V16. BIG4	0.077**	0.060**	0.021	0.038	0.039*	0.019	0.010
V17. ATENURE	0.018	− 0.019	0.011	− 0.020	0.055**	− 0.016	0.049*
V18. Litigation	0.048*	0.002	− 0.025	0.039*	− 0.040	0.066**	0.095**
V19. AGROWTH	0.065**	0.070**	0.126***	0.021	0.033*	0.012	− 0.008
V20. M&A	0.014	0.045*	0.143***	0.061**	0.091**	− 0.006	− 0.011
V21. INITIAL	0.014	0.002	0.015	0.001	0.005	0.023	0.033
V22. ARL	0.040*	0.058**	0.009	0.019	0.019	0.020	0.004
V23. ICW	0.063**	0.044*	0.023	0.071**	0.030	0.015	0.009
V24. ABILITY	0.019	0.030	0.035	0.007	0.109***	− 0.080	− 0.045
V25. BD_GSCORE	0.039	0.022	0.005	0.029	0.011	0.019	− 0.035
V26. AC_GSCORE	0.004	0.010	0.016	0.033	0.018	0.015	− 0.051

Variables	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26
V1. CAPX													
V2. Over-Invest													
V3. Holder67													
V4. LAFEE													

Table 3 continued

Variables	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26
V5. LTA													
V6. RECINV													
V7. FOREIGN													
V8. SEG													
V9. MB													
V10. LEV													
V11. ROA													
V12. LOSS													
V13. GC													
V14. RESTATE	1.000												
V15. EX_DOPS	0.018	1.000											
V16. BIG4	0.038*	0.018	1.000										
V17. ATENURE	0.065**	− 0.014	0.148***	1.000									
V18. Litigation	0.039*	− 0.002	− 0.018	− 0.011	1.000								
V19. AGROWTH	− 0.005	0.044*	0.034*	0.024	0.020	1.000							
V20. M&A	0.070**	0.012	0.026	0.022	0.047*	0.139***	1.000						
V21. INITIAL	0.008	− 0.003	− 0.010	0.003	− 0.010	− 0.005	0.001	1.000					
V22. ARL	0.010	0.030	0.052**	− 0.029	0.069	0.058	0.078	− 0.015	1.000				
V23. ICW	0.049*	0.022	0.020	− 0.045	0.119	0.022	0.051	0.009	0.077**	1.000			
V24. ABILITY	− 0.059	0.039	− 0.005	0.062	− 0.030	0.041	0.069	0.010	− 0.030	0.003	1.000		
V25. BD_GSCORE	− 0.043	0.029	0.093**	0.105	− 0.015	0.030	0.045	0.030	0.025	− 0.054	− 0.029	1.000	
V26. AC_GSCORE	− 0.058	0.006	0.060**	0.073	− 0.025	0.038	0.025	0.039*	0.008	− 0.010	− 0.020	0.096**	1.000

***, ** and * indicate significance at 1, 5 and 10% levels respectively. The variables are defined in Table 1

Table 4 Effect of managerial ability on overconfidence and audit fee relationship (Test of H1$_a$)

Overconfidence measures	CAPX		Over-Invest		Holder67	
Variables	Coefficient	*p* value	Coefficient	*p* value	Coefficient	*p* value
Intercept	6.418	0.000***	6.209	0.000***	6.102	0.000***
LTA	0.481	0.000***	0.492	0.000***	0.504	0.000***
RECINV	0.197	0.000***	0.202	0.000***	0.168	0.000***
FOREIGN	0.062	0.039**	0.089	0.020**	0.074	0.031**
SEG	0.255	0.000***	0.241	0.000***	0.229	0.000***
MB	0.053	0.049**	0.043	0.066*	0.048	0.062*
LEV	0.141	0.000***	0.116	0.000***	0.132	0.000***
ROA	− 0.045	0.067*	− 0.038	0.079*	− 0.056	0.045**
LOSS	0.005	0.394	0.012	0.214	0.019	0.158
GC	0.038	0.085*	0.030	0.093*	0.024	0.116
RESTATE	0.010	0.201	0.016	0.173	0.009	0.272
EX_DOPS	0.045	0.060*	0.033	0.081*	0.046	0.052*
BIG4	0.181	0.000***	0.195	0.000***	0.186	0.000***
ATENURE	− 0.040	0.068*	− 0.034	0.085*	− 0.046	0.059*
Litigation	0.018	0.175	0.010	0.229	0.023	0.145
INITIAL	− 0.025	0.129	− 0.036	0.075*	− 0.030	0.089*
ARL	0.105	0.000***	0.098	0.008***	0.101	0.000***
ICW	0.163	0.000***	0.151	0.000***	0.169	0.000***
AGROWTH	0.080	0.024**	0.071	0.036**	0.088	0.018**
M&A	0.042	0.070*	0.035	0.077*	0.040	0.066*
OverCon	0.048	0.055*	0.053	0.046**	0.043	0.061*
ABILITY	− 0.059	0.045**	− 0.046	0.060*	− 0.052	0.048**
OverCon*ABILITY	− 0.070	0.034**	− 0.065	0.039**	− 0.062	0.045**
Industry fixed effect	Included		Included		Included	
Year fixed effect	Included		Included		Included	
Adjusted R^2	0.819		0.806		0.811	
N	12,942		12,942		12,942	

Model: LAFEE $= \beta_0 + \beta_1$LTA $+ \beta_2$RECINV $+ \beta_3$FOREIGN $+ \beta_4$SEG $+ \beta_5$MB $+ \beta_6$LEV $+ \beta_7$ROA $+ \beta_8$LOSS $+ \beta_9$GC $+ \beta_{10}$RESTATE $+ \beta_{11}$EX_DOPS $+ \beta_{12}$BIG4 $+ \beta_{13}$ATENURE $+ \beta_{14}$Litigation $+ \beta_{15}$INITIAL $+ \beta_{16}$ARL $+ \beta_{17}$ICW $+ \beta_{18}$AGROWTH $+ \beta_{19}$M&A $+ \beta_{20}$OverCon $+ \beta_{21}$ABILITY $+ \beta_{22}$OverCon $* $ABILITY $+$ Industry fixed effect $+$ Year fixed effect $+ \varepsilon$

***, ** and * indicate significance at 1, 5 and 10% respectively based on two-tailed tests. The reported *p* values are based on standard errors clustered by firms. All variables are defined in Table 1

audit fees.[8] The coefficient of the variable ABILITY is significantly negative respectively (coefficients: − 0.059, − 0.046 and − 0.052 respectively), the result being consistent with

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[8] This risk-based explanation is also consistent with the fact that, on an average, 81% of our total observations are subject to high-quality Big 4 audits. Large Big 4 auditors with national and international clientele are deemed to have higher reputational capital to preserve. So, when they deal with overconfident clients and associated reporting risk that may result from overconfident managerial actions, they are likely to incorporate the higher risk of audit failure in their audit pricing decisions. As a result, they increase their engagement efforts (with more professional staff and more audit hours) to mitigate the risk at an acceptable level and/or add a risk premium in their quoted fees to cover any ex-post litigation loss liability, the effect of which is reflected in higher audit fees.

Krishnan and Wang (2015) that higher managerial ability reduces audit risk that translates into lower audit fees. More importantly, the interaction variable, OverCon*ABILITY is significantly negative at 5% levels (− 0.070, − 0.065 and − 0.062 respectively) in all three regressions, and supports our prediction in the first hypothesis that managerial ability incrementally affects the relationship between managerial overconfidence and audit fees. In this case, ABILITY significantly attenuates the positive relationship between OverCon and Audit fees. The economic implication of the results is that by mitigating financial reporting and audit risk, higher managerial ability reduces audit fees for the firms associated with managerial overconfidence by 6.7, 6.3 and 6.0% respectively as revealed by the three regression analyses.[9] Considering the average of the three percentages of 6.3% and applying it on average audit fees for the sample firms of $1,955,000, the average dollar impact of higher managerial ability is a reduction of audit fees by $123,165 for the overconfident firms. Our results suggest that when managers have higher ability to synthesize financial information, make correct accounting judgments and estimates required for producing reliable financial statements, they considerably reduce both the financial reporting and audit risk even when the firms are associated with overconfident managerial action.

Table 5 reports the results from estimating regression Eq. (2) separately for the three overconfidence measures. The coefficients of OverCon are again moderately positive at 10% level. The coefficients of BD_GSCORE are significantly positive at 5% levels for all three measures of overconfidence whereas the coefficients of AC_GSCORE are insignificant in all three regressions. The results are consistent with the assertion that stronger board oversight results in increased demand for higher-quality audits (Carcello et al. 2002). The interaction between OverCon and BD_GSCORE is also significantly positive at 1% level (for CAPX) and 5% levels (Over-Invest and Holder67) in the regressions (coefficients: 0.096, 0.088 and 0.083 respectively) suggesting that in the managerial overconfidence firms, effective board monitoring increases demand for higher quality audits to reduce the risk of financial misstatements associated with overconfident managerial action, which translates into higher audit fees. The economic implication is that stronger board governance leads to an increase in audit fees by 10.1, 9.2 and 8.6% respectively for the overconfident firms.[10] Considering the average of the three percentages of 9.3% and applying it on average audit fees for the sample firms of $1,955,000, the average dollar impact of higher board monitoring is an additional audit fee of $181,815 for the overconfident firms. Our results suggest that corporate boards may feel that overconfident managerial action potentially increases the risk of financial misstatements that are likely to diminish the quality of reported financial information; therefore, they seek more intensive, high quality audits to ensure higher reporting quality. The result supports our second hypothesis that board characteristics have an incremental effect on audit fees of the

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[9] The dependent variable, LAFEE is a log-transformed variable. So, the effect of ABILITY on audit fees and overconfidence is given by $e^{-0.070} = 0.933$ for CAPEX, $e^{-0.065} = 0.937$ for Over-Invest and $e^{-0.062} = 0.940$ for Holder67. This translates into 6.7, 6.3 and 6.0% respectively lower fees for the higher managerial ability, overconfident firms relative to the lower managerial ability, overconfident firms.

[10] The dependent variable, LAFEE is a log-transformed variable. So, the effect of BD_GSCORE on audit fees and overconfidence is given by $e^{0.096} = 1.101$ for CAPEX, $e^{0.088} = 1.092$ for Over-Invest and $e^{0.083} = 1.086$ for Holder 67. This translates into 10.1, 9.2 and 8.6% high audit fees for the higher board governance, overconfident firms relative to the lower board governance, overconfident firms.

Table 5 Effect of board and audit committee effectiveness on overconfidence and audit fee relationship (Test of H2$_a$ and H3$_a$)

Overconfidence measures	CAPX		Over-Invest		Holder67	
Variables	Coefficient	p value	Coefficient	p value	Coefficient	p value
Intercept	5.008	0.000***	5.747	0.000***	6.129	0.000***
LTA	0.446	0.000***	0.469	0.000***	0.421	0.000***
RECINV	0.206	0.000***	0.218	0.000***	0.183	0.000***
FOREIGN	0.070	0.033**	0.061	0.040**	0.055	0.048**
SEG	0.249	0.000***	0.260	0.000***	0.253	0.000***
MB	0.049	0.055*	0.060	0.037**	0.053	0.050**
LEV	0.125	0.000***	0.110	0.000***	0.118	0.000***
ROA	− 0.058	0.045**	− 0.051	0.044**	− 0.063	0.038**
LOSS	0.018	0.161	0.011	0.239	0.022	0.119
GC	0.007	0.419	0.004	0.535	0.017	0.205
RESTATE	0.021	0.128	0.011	0.226	0.005	0.328
EX_DOPS	0.053	0.049**	0.047	0.068**	0.041	0.072*
BIG4	0.175	0.000***	0.183	0.000***	0.198	0.000***
ATENURE	− 0.042	0.060*	− 0.045	0.069*	− 0.040	0.066**
Litigation	0.026	0.131	0.019	0.157	0.022	0.145
INITIAL	− 0.032	0.079*	− 0.041	0.070*	− 0.035	0.083*
ARL	0.095	0.011**	0.088	0.015**	0.106	0.000***
ICW	0.185	0.000***	0.165	0.000***	0.177	0.000***
AGROWTH	0.077	0.028**	0.069	0.040**	0.083	0.024**
M&A	0.046	0.058*	0.041	0.062*	0.050	0.048**
OverCon	0.044	0.065*	0.049	0.055*	0.036	0.079*
BD_GSCORE	0.060	0.038*	0.051	0.048**	0.056	0.044**
AC_GSCORE	0.017	0.211	0.015	0.242	0.022	0.125
OverCon*BD_GSCORE	0.096	0.005***	0.088	0.014**	0.083	0.021**
OverCon*AC_GSCORE	0.025	0.105	0.029	0.094*	0.034	0.080*
Industry fixed effects	Included		Included		Included	
Year fixed effects	Included		Included		Included	
Adjusted R^2	0.822		0.817		0.826	
N	12,942		12,942		12,942	

Model: LAFEE = β_0 + β_1LTA + β_2RECINV + β_3FOREIGN + β_4SEG + β_5MB + β_6LEV + β_7ROA + β_8LOSS + β_9GC + β_{10}RESTATE + β_{11}EX_DOPS + β_{12}BIG4 + β_{13}ATENURE + β_{14}Litigation + β_{15}INITIAL + β_{16}ARL + β_{17}ICW + β_{18}AGROWTH + β_{19}M&A + β_{20}OverCon + β_{21}BD_GSCORE + β_{22}AC_GSCORE + β_{23}OverCon ∗ BD_GSCORE + β_{24}OverCon ∗ AC_GSCORE + Industry fixed effects + Year fixed effects + ε

***, ** and * indicate significance at 1, 5 and 10% respectively based on two-tailed tests. The reported p values are based on standard errors clustered by firms. All variables are defined in Table 1

overconfident firms.[11] In this case, the board monitoring has an incremental positive effect. We, however, find much weaker evidence that audit committee characteristics incrementally impact audit fees of the overconfident firms as the interaction variable, Over-Con*AC_GSCORE is significant at 10% level only for Over-Invest and Holder67.[12]

In summary, our results suggest that the firms with overconfident managers pay higher audit fees, and that audit fees are substantially reduced when managers of those firms have greater ability to transform resources to revenues, properly synthesize firm and industry information to develop forward-looking predictions, and are more capable of making correct accounting judgments and estimates that are required to prepare reliable and accurate financial statements. Furthermore, stronger board monitoring and to some extent, audit committee oversight increases the demand for higher-quality audits to mitigate financial reporting risk associated with overconfidence managerial action, which results in higher audit fees.[13]

6 Additional analyses

6.1 Supplemental tests with individual board and audit committee variables

In the main analyses, we apply composite scores of board and audit committee variables where we find significant results for board governance score but not so significant results for audit committee governance score. Previous studies (e.g., Abbott et al. 2003; Carcello et al. 2002) use individual board and audit committee variables in their analysis of the effect of board and audit committee governance on audit fees. In order to make our study's

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[11] The results complement prior studies (Schrand and Zechman 2012; Ahmed and Duellman 2013) that do not find significant governance effect on managerial overconfidence. Our findings suggest that corporate boards seek higher-quality audits from incumbent auditors to monitor financial reporting process and minimize reporting risks that are potentially associated with overconfident managerial action.

[12] Our results are consistent with Carcello et al. (2002) where they find positive association between board variables and audit fees. But in their analyses, audit committee variables are insignificant in presence of board variables. Even, Abbott et al. (2003) find limited results for audit committee characteristics in their audit fee study; for example, they find highly significant effect of AC independence, weakly significant effect of AC expertise and insignificant effect of AC meeting in presence of board variables in analyses, where two of the three board variables, namely, board independence and board diligence are positively significant. The reason for relatively weaker results for audit committee variables is the likely increase of audit committee independence and expertise among most US corporations under the enhanced regulatory focus of SEC on audit committee effectiveness. Increased regulatory focus on audit committee strengthens the motivation and effectiveness of audit committees in performing their oversight role in financial reporting and accounting compliance process, resulting in reduction of cross-sectional variation of its quality across firms. The reduced variability across observations partly explains insignificant audit committee effect on audit fees. Please refer to the descriptive data in Table 3, Panel A which reports the standard deviation of BD_GSCORE as 1.719 and that of AC_GSCORE as 0.784.

[13] Several variables used in the regression analyses are significantly correlated to each other. Our regression diagnostics, however, show that the variance inflation factors (VIF) and condition indices do not provide any evidence that multicollinearity is a problem. Chatterjee and Hadi (2012) indicate that the VIF in excess of 10 is an indication that collinearity may be causing problems in estimation. Belsley et al. (1980) suggest that a condition index greater than 15 indicates a possible problem and an index in excess of 30 suggests a serious multicollinearity problem among the explanatory variables in the regression. In this respect, the regression models employed in this study are well specified. The influence statistics, DEFFITS and Cook's D, do not indicate the presence of any influential data-points that might bias the results of the study. Finally, the normal probability plots indicate that errors are normally distributed; the residual plots do not exhibit any systematic pattern of error distribution; and our auto-correlation tests indicate that errors are uncorrelated with each other.

Table 6 Effect of individual board and audit committee characteristics

Overconfidence measures	CAPX		Over-Invest		Holder67	
Variables	Coefficient	p value	Coefficient	p value	Coefficient	p value
Intercept	5.542	0.000***	5.946	0.000***	5.311	0.000***
LTA	0.418	0.000***	0.427	0.000***	0.469	0.000***
RECINV	0.261	0.000***	0.255	0.000***	0.239	0.000***
FOREIGN	0.077	0.031**	0.084	0.015**	0.080	0.024**
SEG	0.223	0.000***	0.234	0.000***	0.239	0.000***
MB	0.070	0.029**	0.065	0.039**	0.069	0.033**
LEV	0.161	0.000***	0.169	0.000***	0.158	0.000***
ROA	− 0.059	0.044**	− 0.048	0.061*	− 0.055	0.049**
LOSS	0.028	0.094*	0.034	0.083*	0.030	0.088*
GC	0.007	0.319	0.016	0.169	0.012	0.246
RESTATE	0.011	0.295	0.008	0.404	0.014	0.122
EX_DOPS	0.069	0.035**	0.060	0.042**	0.055	0.047**
BIG4	0.162	0.000***	0.179	0.000***	0.185	0.000***
ATENURE	− 0.032	0.080*	− 0.039	0.071*	− 0.043	0.062*
Litigation	0.016	0.179	0.012	0.246	0.020	0.118
INITIAL	− 0.038	0.085*	− 0.032	0.094*	− 0.041	0.071*
ARL	0.132	0.000***	0.124	0.000***	0.128	0.000***
ICW	0.155	0.000***	0.141	0.000***	0.147	0.000***
AGROWTH	0.082	0.026**	0.073	0.029**	0.090	0.015**
M&A	0.033	0.089*	0.045	0.055*	0.056	0.048**
OverCon	0.040	0.070*	0.036	0.075*	0.033	0.087*
BD_IND	0.046	0.062*	0.029	0.094*	0.035	0.080*
BD_DIL	0.060	0.035**	0.055	0.044**	0.069	0.031**
BD_EXP	0.022	0.114	0.035	0.085*	0.030	0.092*
DUALITY	0.030	0.089*	0.011	0.242	0.020	0.127
ATTEND	0.010	0.249	0.019	0.133	0.017	0.156
NOTSTAGGERED	0.022	0.141	0.014	0.190	0.006	0.411
AC_IND	0.018	0.275	0.039	0.075*	0.026	0.120
AC_SIZE	0.005	0.602	0.015	0.331	0.019	0.184
AC_EXP	0.044	0.073*	0.063	0.035**	0.048	0.058*
OverCon*BD_IND	0.059	0.040**	0.052	0.044**	0.066	0.030**
OverCon*BD_DIL	0.072	0.026**	0.060	0.039**	0.051	0.048**
OverCon*BD_EXP	0.012	0.218	0.008	0.409	0.014	0.195
OverCon*DUALITY	0.077	0.025**	0.070	0.033**	0.064	0.039**
Overcon*ATTEND	0.004	0.370	0.015	0.124	0.011	0.209
OverCon*NOTSTAGGERED	0.030	0.091*	0.025	0.114	0.020	0.158
OverCon*AC_IND	0.028	0.096*	0.032	0.088*	0.039	0.075*
OverCon*AC_SIZE	0.020	0.316	0.016	0.179	0.013	0.189
OverCon*AC_EXP	0.035	0.084*	0.025	0.115	0.028	0.095*
Industry fixed effects	Included		Included		Included	
Year fixed effects	Included		Included		Included	
Adjusted R^2	0.804		0.798		0.810	

Table 6 continued

Overconfidence measures	CAPX		Over-Invest		Holder67	
Variables	Coefficient	*p* value	Coefficient	*p* value	Coefficient	*p* value
N	12,942		12,942		12,942	

***, ** and * indicate significance at 1, 5 and 10% respectively based on two-tailed tests. The reported *p* values are based on standard errors clustered by firms. BD_GSCORE and AC_GSCORE in regression Eq. (2) are replaced with six board and three audit committee variables

results comparable with them, we re-estimate regression Eq. (2) by including six individual board variables, e.g., board independence, diligence, expertise, duality, attendance and not staggered board, and three individual audit committee variables e.g., audit committee independence, diligence and expertise, in place of composite board and audit committee governance scores. Our variables of interest are the interaction variables between OverCon and each of the six board and three audit committee variables that we use to construct composite scores for the main analyses. Table 6 reports the regression results separately for the three overconfidence measures. OverCon is significantly positive at 10% levels. The interaction variables, OverCon*BD_IND and OverCon*DIL and OverCon*DUALITY are all positively significant at 5% level for the three overconfidence measures indicating that the board independence, diligence and duality positively impact the relationship between managerial overconfidence and audit fees, which is consistent with the demand side perspective of audit pricing. But we find weaker results for audit committee variables. The interaction variable, OverCon*AC_IND is positively significant at 10% for all three overconfidence measures but OverCon*AC_EXP is significant at 10% only for the first overconfidence measure (CAPEX) and the effect of audit committee size (AC_SIZE) is not significant at all. These finding corroborate our primary results using board and audit committee composite scores where board scores are significantly positive and audit committee scores are weakly significant. The results are also consistent with Abbott et al. (2003) and Carcello et al. (2002) that in presence of board related variables, audit committee variables are either mostly insignificant or weakly significant in audit fee regressions.

6.2 Results for propensity-score matched sample

The firms with overconfident managers may have characteristics that are correlated with audit risk. This is likely to introduce a selection bias in our analysis as the financial reporting and audit risk could be jointly impacted by both firm-specific situation and managerial attributes. In order to disentangle the effect of these two factors, we apply a propensity score matching process to select a set of control firms (non-overconfident firms) that are similar to the test firms with respect to other firm characteristics but are not classified as overconfident firms. We apply the following logistic regression model to estimate propensity scores for the overconfident and non-overconfident firms with respect to each of the three overconfidence measures and arrive at a propensity-score matched control sample for each measure.

$$
\begin{aligned}
\text{OverCon} = {} & \beta_0 + \beta_1\text{LTA} + \beta_2\text{CEO\_Own} + \beta_3\text{CEO\_Tenure} + \beta_4\text{FOREIGN} \\
& + \beta_5\text{SEG} + \beta_6\text{MB} + \beta_7\text{LEV} + \beta_8\text{ROA} + \beta_9\text{LOSS} + \beta_{10}\text{GC} \\
& + \beta_{11}\text{RESTATE} + \beta_{13}\text{EX\_DOPS} + \beta_{14}\text{Specialist} + \beta_{15}\text{INITIAL} \\
& + \beta_{16}\text{ARL} + \beta_{17}\text{ICW} + \beta_{20}\text{Cash} + \beta_{21}\text{Finance} + \beta_{22}\text{Operating Cycle} \\
& + \beta_{23}\text{Other Fees} + \text{Industry and year fixed effects} + \varepsilon
\end{aligned}
$$

$$(3)$$

The untabulated results show that Pseudo R^2s of the model are 0.248, 0.256 and 0.252 respectively using three overconfidence measures. We match each firm-year of overconfident firms with firm-year of non-overconfident firms on the basis of propensity scores allowing the absolute difference between the propensity scores not exceeding 0.03. The data requirement and matching criteria result in a final sample comprising both overconfident and non-overconfident firms of 6908 firm-years for CAPEX, 5676 firm-years for Over-Invest and 4910 firm-years for Holder67 measures. We re-estimate the regression Eqs. (1) and (2) for the propensity-score matched samples and report the results in Panels A and B of Table 7 for the three overconfidence measures. The results are qualitatively similar to those reported in Tables 4 and 5 indicating that our primary results are not influenced by observable firm characteristics. We find that the interaction variable, OverCon*ABILITY is significantly negative at 5% level and OverCon*BD_GSCORE is significantly positive at 5% levels for all three overconfidence measures, which is mostly consistent with our primary results. The only exception here is that the interaction variable, OverCon*AC_GSCORE is significantly positive at 10% for all three overconfidence measures. Consistent with our full sample analysis, the results suggest that the audit committee governance effect still remains much weaker in presence of board governance effect in the analysis.

6.3 Yearly regression results

We conduct the pooled time-series, cross-sectional regressions for the 9-year sample period using firm-level clustering to derive standard errors. Despite this procedure, it is possible that the results are affected by potential dependence among regression residuals. In order to mitigate this possibility, we estimate the Eqs. (1) and (2) on yearly basis and obtain 9 slope coefficients, and then calculate across-year mean coefficients, standard errors and t-statistics for each variable (Bernard 1987; Lev and Thiagarajan 1993). The untabulated results are not materially different from those of our main analyses.

6.4 Control for CEO attributes

Prior studies (e.g., Ali and Zhang 2015; Krishnan and Wang 2015; Huang et al. 2014) indicate that CEO attributes influence financial reporting and auditor's pricing decision in varying degrees. Feng et al. (2011) find that CEOs who pressure their CFOs to engage in earnings manipulations exhibit higher pay-for-performance sensitivities and power (proxied by CEO duality) than CEOs of non-manipulating firms. Furthermore, the earnings manipulation and CEO power is stronger for the firms having high equity incentives. Following prior studies, we repeat our analyses by including CEO attribute variables such as CEO tenure (the number of years of continuous service by the current CEO), CEO age (the age of the CEO at the end of the fiscal year), CEO stock ownership, and CEO turnover as additional control variables in Eqs. (1) and (2) that are expected to have differential

Table 7 Tests using propensity score matched sample

Overconfidence measures	CAPX		Over-Invest		Holder67	
Variables	Coefficient	*p* value	Coefficient	*p* value	Coefficient	*p* value
Panel A: Regression results from estimating Eq. (1)						
Intercept	6.142	0.000***	6.448	0.000***	5.841	0.000***
LTA	0.428	0.000***	0.459	0.000***	0.483	0.000***
RECINV	0.310	0.000***	0.292	0.000***	0.276	0.000***
FOREIGN	0.084	0.025**	0.090	0.015**	0.096	0.011**
SEG	0.175	0.000***	0.162	0.000***	0.169	0.000***
MB	0.078	0.029**	0.070	0.033**	0.055	0.047**
LEV	0.180	0.000***	0.186	0.000***	0.161	0.000***
ROA	− 0.059	0.044**	− 0.048	0.059*	− 0.040	0.062*
LOSS	0.006	0.552	0.018	0.146	0.011	0.247
GC	0.039	0.082*	0.029	0.110	0.033	0.091*
RESTATE	0.002	0.808	0.013	0.216	0.016	0.175
EX_DOPS	0.027	0.124	0.030	0.089*	0.022	0.139
BIG4	0.166	0.000***	0.151	0.000***	0.174	0.000***
ATENURE	− 0.059	0.044**	− 0.045	0.061*	− 0.055	0.048**
Litigation	0.020	0.119	0.014	0.177	0.028	0.105
INITIAL	− 0.026	0.116	− 0.034	0.079*	− 0.041	0.069*
ARL	0.095	0.010***	0.088	0.014**	0.106	0.000***
ICW	0.202	0.000***	0.184	0.000***	0.195	0.000***
AGROWTH	0.074	0.030**	0.065	0.036**	0.079	0.029**
M&A	0.058	0.046**	0.044	0.072**	0.048	0.055*
OverCon	0.039	0.080*	0.042	0.069*	0.030	0.088*
ABILITY	− 0.050	0.049**	− 0.061	0.039**	− 0.046	0.067*
OverCon*ABILITY	− 0.078	0.028**	− 0.074	0.033**	− 0.069	0.040**
Industry fixed effect	Included		Included		Included	
Year fixed effect	Included		Included		Included	
Adjusted R^2	0.797		0.790		0.805	
N	6908		5676		4910	
Panel B: Regression results from estimating Eq. (2)						
Intercept	5.802	0.000***	5.986	0.000***	5.435	0.000***
LTA	0.392	0.000***	0.419	0.000***	0.404	0.000***
RECINV	0.248	0.000***	0.231	0.000***	0.22	0.000***
FOREIGN	0.075	0.026**	0.07	0.041**	0.082	0.015**
SEG	0.202	0.000***	0.211	0.000***	0.191	0.000***
MB	0.092	0.012**	0.086	0.019**	0.076	0.032**
LEV	0.142	0.000***	0.129	0.000***	0.133	0.000***
ROA	− 0.05	0.048**	− 0.044	0.065*	− 0.056	0.045**
LOSS	0.025	0.118	0.033	0.085*	0.019	0.163
GC	0.015	0.241	0.01	0.319	0.026	0.128
RESTATE	0.002	0.911	0.008	0.410	0.017	0.206
EX_DOPS	0.041	0.069*	0.052	0.050*	0.036	0.081*
BIG4	0.204	0.000***	0.189	0.000***	0.168	0.000***

Table 7 continued

Overconfidence measures	CAPX		Over-Invest		Holder67	
Variables	Coefficient	p value	Coefficient	p value	Coefficient	p value
ATENURE	− 0.036	0.081*	− 0.041	0.062*	− 0.033	0.089*
Litigation	0.017	0.241	0.011	0.279	0.026	0.121
INITIAL	− 0.021	0.125	− 0.03	0.082*	− 0.024	0.146
ARL	0.115	0.000***	0.109	0.000***	0.098	0.000***
ICW	0.196	0.000***	0.204	0.000***	0.185	0.000***
AGROWTH	0.089	0.022**	0.071	0.034**	0.079	0.028**
M&A	0.048	0.059*	0.044	0.065*	0.054	0.049**
OverCon	0.039	0.076*	0.044	0.060*	0.032	0.084*
BD_GSCORE	0.050	0.044**	0.061	0.041**	0.047	0.055*
AC_GSCORE	0.019	0.139	0.025	0.112	0.011	0.260
OverCon*BD_GSCORE	0.068	0.038**	0.072	0.032**	0.062	0.043**
OverCon*AC_GSCORE	0.029	0.091*	0.038	0.079*	0.043	0.058*
Industry fixed effects	Included		Included		Included	
Year fixed effects	Included		Included		Included	
Adjusted R^2	0.805		0.798		0.814	
N	6908		5676		4910	

***, ** and * indicate significance at 1, 5 and 10% respectively based on two-tailed tests. The reported p values are based on standard errors clustered by firms. The use of test and matched control firm-years for the three tests are as follows: For CAPEX, 3454 overconfident and 3454 Ono-overconfident firm observations (total 6908 observations); for Over-Invest, 2838 overconfident and 2838 non-overconfident firm observations (total 5676 observations); for Holder67, 2455 overconfident and 2455 non-overconfident firm observations (total 4910 observations)

impact of audit fees. CEO data requirements reduce the sample size to 8184 firm observations over 9-year period (2003–2011). The results (not tabulated) show that CEO tenure and CEO stock ownership variables are significantly negative but CEO age and CEO turnover are insignificant. However, the results for managerial overconfidence and its interactions with managerial ability, and board and audit committee characteristics are qualitatively similar to our primary results.

7 Conclusion

Our study contributes to the audit fee literature by demonstrating that audit fees are positively, significantly associated with managerial overconfidence that potentially increases the risk of financial misstatements. Our investigation further shows that the relationship between audit fees and managerial overconfidence is moderated when managers have higher ability to transform resources into revenues, and make better accounting judgments and estimates required for preparing reliable financial statements. Collectively, our results show that both managerial characteristics, i.e., managerial overconfidence and managerial ability, have information value to auditors. Our tests on the impact of corporate board and audit committee effectiveness on the relationship between audit fees and managerial overconfidence provide mixed results. The test results on the board

effectiveness suggest that corporate boards demand higher quality audits to minimize the reporting risk in the firms with overconfident managers, which results in higher audit efforts and audit fees for the overconfident firms. But we find much weaker effect of audit committee characteristics on managerial overconfidence and audit fee relationship.

Our main results hold for various supplemental tests and the tests using propensity score matched sample, and have useful implications for regulators, accounting professionals and auditors. This study complements Hsieh et al. (2014) who find that managerial characteristics work against regulators' effort to improve financial reporting quality in the post-SOX regime. Overconfident CEOs feel less constrained by SOX regulations and continue to manage earnings through income-increasing accruals and real activities. It also extends Demerjian et al. (2013), Krishnan and Wang (2015), Carcello et al. (2002) and Abbott et al. (2003) by demonstrating the effect of managerial ability and board characteristics on auditors' pricing decision for overconfident firms.

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