

The Effect of Financial Constraints on Audit Fees

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Abstract: Research Question: From a supply-side and demand-side standpoint, it is conjectured that financial constraints elevate client-specific risk and lead to higher audit effort and fees. It is further posited that the effects of financial constraints on audit fees can be mediated by three possible channels: corporate cash holdings, discretionary accruals and corporate tax avoidance strategies. **Motivation:** Explicit evidence on how auditors react, in terms of audit fees to firms' financial constraints is not available in the audit or finance literature. **Idea:** Financial constraints are defined as the frictions stemming from reasons such as credit constraints, inability to borrow, inability to issue equity, reliance on bank loans and illiquidity of assets that inhibit firms from funding desired investments (Lamont *et al.*, 2001). This paper examines the effects of financial constraints faced by firms on audit fees, and the mediating effects of corporate cash holdings, discretionary accruals and corporate tax avoidance activities. **Data:** This study is based a large sample of U.S. listed firms from 2000 to 2016. **Method/Tools:** This study use the conventional audit-fee model, with an emphasis on controlling for fee determinants associated with firm risk, client characteristics, and audit and auditor characteristics. **Findings:** The results reveal that there is a positive and significant effect of financial constraints on audit fees. The finding is robust to alternative proxies of financial constraints and regression specifications. Moreover, the effects of financial constraints on audit fees are mediated positively by corporate cash holdings, discretionary accruals and corporate tax avoidance. **Contributions:** This study extends our understanding of how auditors incorporate an increase in client risk emanating from financial constraints, a hitherto untested audit-fee determinant. This study also contributes to the capital market literature that examines audit fees and financial constraints as well as to other studies that consider the implications of corporate cash holdings, financial reporting quality and corporate tax avoidance. This study also contributes to the emerging research that enriches our understanding of certain economic consequences of firms' financial constraints.

Keywords: Financial constraints, audit fees, corporate cash holdings, financial reporting quality, tax avoidance.

JEL classification: M42, B26, M41

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1. Introduction

This paper examines the effects of financial constraints faced by firms on audit fees, and the mediating effects of corporate cash holdings, discretionary accruals and corporate tax avoidance activities. Financial constraints are defined as the frictions stemming from reasons such as credit constraints, inability to borrow, inability to issue equity, reliance on bank loans and illiquidity of assets that inhibit firms from funding desired investments (Lamont *et al.*, 2001). Financial constraints, thus, restrict the amount of capital under managers' discretion and could impair their ability to undertake positive net-present-value (NPV) projects (Hovakimian, 2011).

In this paper a positive association between financial constraints and audit fees is posited for the following reasons. The inability to undertake positive NPV projects owing to financial constraints could likely exert pressure on the earnings generating capabilities of constrained firms (Bates *et al.*, 2009). Firms with negative net income have also been more likely to be financially more constrained than firms with positive net income (Bates *et al.*, 2009) and in general, firms with lower profitability increases audit risk (Hay *et al.*, 2006)¹. In their attempt to attract external funding, financially more constrained firms that have valuable projects have in the past been more subject to accounting enforcements actions by the SEC (Linck *et al.*, 2013). Thus, holding other factors constant, clients with increased levels of financial constraints could in general elevate auditors' assessment of audit risks. The objective of this paper is conceptualized from the perspective of auditor's assessment of client risk, in particular, the auditor-perceived business risk of clients (Public Company Accounting Oversight Board, 2010) and its effects on audit fees. As is well known, auditors adjust the audit process, including audit fees, to provide the desired level of assurance conditional on the nature of the audit risks associated with the individual client (Kim and Fukukawa, 2013; Hay *et al.*, 2006). This view, therefore, suggests a positive association between financial constraints and audit fees. Next, financial constraints exist because of information asymmetry, moral hazard problems and agency costs (Campbell *et al.*, 2012). Auditing, in general, reduces information asymmetries and agency costs between managers and firm stakeholders by verifying financial statements (Cuadrado-Ballesteros *et al.*, 2017; Becker *et al.*, 1998; Watts and Zimmerman, 1986). Audits provide third party verification that gives financial information its usefulness in reducing financing constraints by allowing lenders to put more faith in reported numbers (Hope *et al.*, 2011). This line of argument suggests a positive effect of financial constraints on audit fees, as higher audit fees also implies higher audit quality, *ceteris paribus* (Francis, 2004). Explicit evidence on how auditors react, in terms of audit fees to firms' financial constraints is not available in the audit or finance literature.

In this paper, it is further posited that the effects of financial constraints on audit fees can be mediated by three possible channels: corporate cash holdings, discretionary accruals and corporate tax avoidance strategies. Firms facing financial constraints generally hold higher levels of cash to minimize transaction costs and for precautionary purposes (Bates *et al.*, 2009; Denis and Sibilkov, 2010). If auditors perceive such cash holdings as value-enhancing, cash holdings would mediate the positive association between financial constraints and audit fees. ² On the flipside, the existing literature has also documented ample evidence of agency costs associated with holding too much cash. For example, cash holdings could be used to devise antitakeover tools (Faleye, 2004), pursue empire building through acquisitions, or execute other inefficient investments that are opaque to shareholders (Harford *et al.*, 2008; Dittmar

¹ Findings from anecdotal evidence (Benjamin *et al.*, 2015) show that financially constrained firms generally generate lower profitability than their unconstrained counterparts.

² Kim *et al.* (2015) document a positive market valuation of cash holdings for firms audited by industry specialist auditors.

and Mahrt-Smith, 2007). Importantly, recent audit evidence documents a positive association between cash holdings and audit fees, thus, suggesting that holding too much cash increases audit risk through accentuating agency conflicts (Gleason *et al.*, 2015; Benjamin *et al.*, 2015).

Regarding the second channel, this paper conjectures that discretionary accruals could mediate the association between financial constraints and audit fees. The limited literature on financial constraints and accounting accruals generally suggests that firms can use discretionary accruals to convey private information and maximize value. Financially more constrained firms with valuable investment projects may use discretionary accruals to signal positive prospects (Linck *et al.*, 2013). Constrained firms have been reported to have greater incentive than unconstrained firms to use earnings management to boost their stock price and raise external capital at a favourable price. Auditing research documents an increase in audit fees for clients with higher levels of discretionary accruals (Gul *et al.*, 2003). This, suggests that discretionary accruals could mediate the positive relation between financial constraints and audit fees.

Finally, this paper includes corporate tax avoidance as another possible mediation channel. Firms with an increase in the level of financial constraints have been found to engage in higher levels of corporate tax avoidance (Edwards *et al.*, 2016). Cash flow savings achieved through corporate tax avoidance strategies is a potential source of financing when traditional financing sources become more costly or less accessible. However, tax avoidance renders firms' financial statements opaquer and could have negative consequences such as future stock price crash (Kim *et al.*, 2011). Because any information about risky tax transactions tends to be hidden in accounts like valuation allowances, tax contingency reserves, accrued taxes, and reinvested earnings, auditors have to exert additional audit efforts in unearthing such tax transactions, thus, increasing audit fees. As such corporate tax avoidance could mediate the association between financial constraints and audit fees.

Using a large US sample from 2000 to 2016, this paper finds a significantly positive effect of the various measures of financial constraints on audit fees. In terms of economic significance, this indicates that a one standard deviation increase in financial constraints is related to a 4.85% increase in the natural logarithm of audit fees from the mean, which is economically highly significant. This paper also conducts the propensity score matching analysis to mitigate issues that might arise from omitted variables or model misspecification problems. Finally, this paper further documents that effect of financial constraints on audit fees there is partially mediated positively by corporate cash holdings, discretionary accruals and corporate tax avoidance.

This study makes several contributions. First, this paper contributes to the audit fee literature by documenting a robust effect of financial constraints on audit fees and adds to the voluminous literature on the determinants of audit fees (Hay *et al.*, 2006). This study extends our understanding of how auditors incorporate an increase in client risk emanating from financial constraints, a hitherto untested audit-fee determinant. Second, it complements the growing literature on the consequences of financial constraints. Interest regarding research examining the consequences of financial constraints has increased in recent years and has moved beyond the consideration of investment policy consequences alone (e.g., Kurt, 2018; Chan *et al.*, 2017; Edwards *et al.*, 2016). This paper further extends this strand by incorporating an auditor's perspective. Finally, it also contributes to the corporate cash holdings, discretionary accruals and tax avoidance literature by documenting their significant role in mediating the financial constraints-audit fees link.

The remainder of the paper proceeds as follows. In the following section, a review the related literature and development of hypotheses is presented. Section 3 explains the research design. Sample selection, descriptive statistics and regression results are presented in Section 4. Section 5 concludes the paper.

2. Literature Review and Hypotheses Development

The auditor's cost of gathering and verifying evidence, and then rendering an audit opinion, depends on the cost of audit effort: a function of audit risk (Simunic, 1980; Simunic and Stein, 1996). Prior research on the determinants of audit fees shows that auditors respond to riskier clients by increasing audit fees (Bedard and Johnstone, 2004; Bell *et al.*, 2001; Davis *et al.*, 1993). Higher audit risks necessitate greater audit effort and, hence, any adjustments to the audit effort by auditors are closely reflected in the audit fees (Whisenant *et al.*, 2003). The risk-based audit approach requires a comprehensive understanding of clients' industries, business models, strategies, and processes (Bell *et al.*, 2008). Prior studies show that auditors behave in accordance with the audit risk model: i.e. expand their tests, increase budgeted audit hours, and increase audit fees for riskier clients (Habib *et al.*, 2018; Bell *et al.*, 2001). The following paragraphs outlines how the risk of financial constraints is priced by the auditors.

From a supply-side standpoint, it is conjectured that financial constraints elevate client-specific risk and lead to higher audit effort and fees. Financial constraints hamper firms' ability to pursue value-increasing investment opportunities and exert pressure on the earnings generating capabilities of constrained firms (Bates *et al.*, 2009) and as a result, firms suffer from lower growth and reduced operating performance (Denis and Sibilkov, 2010). Financial constraints make firms more vulnerable to economic shocks and to cut spending on technology, employment, R&D, and capital expenditure (Campello Graham and Harvey, 2010; Li, 2011), thus, exacerbating client risk. Additionally, firms with increased levels of financial constraints face high distress risk (Musso and Schiavo, 2008), low or negative profitability (Bates *et al.*, 2009; Benjamin *et al.*, 2015) and suffer from liquidity risk (Banos-Caballero *et al.*, 2014). The lack of operational and financial resources that accompany financial constraints are also likely to elevate auditors' concerns about the effectiveness of clients' control procedures or its control risks. Several studies support the argument that financially more constrained firms do not have an established reputation in financial markets (e.g. Devos *et al.*, 2012; Fernando *et al.*, 2012; Kasahara, 2008). Auditors are expected in this situation to exert more audit effort to collect sufficient evidence to render an appropriate opinion. When confronted with greater potential audit risk, auditors exert more effort in attestation to reduce the audit risk, and they charge higher audit fees to compensate for the effort (Chen *et al.*, 2017). As a consequence of all of the above, higher audit fees will be charged in firms with increased levels of financial constraints because of the perceived higher audit risk by auditors. On top of this, the elevated audit risks that auditors face with increased levels of firms' financial constraints in light of the above might also induce them to assign a fee premium. As auditors have strong incentives to incorporate a risk premium into audit fees (Donohoe and Knechel, 2014), increased financial constraints are likely to influence audit risk assessments and audit efforts, and as a result, audit fees. Additionally, audit risks emanating from financial constraints that firms face might not be able to be reduced to acceptable levels, even with additional investments in audit resources and in the presence of such non-audit risks, auditors increase the audit's scope and assign a fee premium (Stanley, 2011).

From a demand-side standpoint too, a positive association is hypothesized between financial constraints and audit fees. Financial constraints exist because of information asymmetry, moral hazard problems and agency costs. Information asymmetry between managers of the firm and external investors would cause external funds to be more costly than internal funds (Myers and Majluf, 1984). Firms with financial constraints may not subject themselves to capital market monitoring, as capital market participants usually monitor firms that seek funds externally (Easterbrook, 1984). Additionally, most financially-constrained firms are usually not rated by rating agencies, such as the Standard and Poor (S&P), thus,

exacerbating audit risks.³ Stakeholders of firms facing financial constraints may, therefore, demand other forms of monitoring: external auditing, in this case. The value of auditing arises, in part, because auditing is a form of monitoring, and reduces information risk (Chen *et al.*, 2011; Becker *et al.*, 1998; Watts and Zimmerman, 1986). Auditing reduces information risk faced by (uninformed) investors, because it allows them to verify the validity of financial statements gives and financial information its usefulness in reducing financing constraints by allowing lenders to put more faith in reported numbers (Hope *et al.*, 2011). As a consequence of all of the above, it is plausible to suggest that auditors would respond to the demand for higher monitoring and, subsequently, higher audit efforts in the form of high audit fees in firms with increased levels of financial constraints. Based on the arguments above the following hypothesis is posited:

H1: Financial constraints have a positive effect on audit fees.

Although intuitive, the above hypothesis remains silent on the possible channels through which financial constraints affect audit fees. This paper uses corporate cash holdings, discretionary accruals and corporate tax avoidance as three such mediating channels. Cash holdings can be valuable when other sources of funds are insufficient to satisfy firms' demand for capital (Faulkender and Wang, 2006; Gan and Park, 2017). As a result, firms with greater frictions in raising outside financing, save a greater portion of their cash flow as cash, than do those with fewer frictions (Almeida *et al.*, 2004) to minimize transaction costs and for precautionary purposes (Bates *et al.*, 2009; Denis and Sibilkov, 2010). Several studies have also found that information asymmetry and agency conflicts make it difficult for firms to obtain funds and, hence, induce them to build up cash resources (Garcia-Teruel and Martinez-Solano, 2008; Opler *et al.*, 1999). If auditors do regard cash holdings as value-enhancing in the face of financial constraints, cash holdings could mediate effect financing constraints on audit fees.

However entrenched managers can hoard cash to engage in non-value-maximizing endeavours, such as acquisitions and empire building (Harford *et al.*, 2008; Faulkender and Wang, 2006; Faleye, 2004) and execute other inefficient investments that are opaque to shareholders (Dittmar and Mahrt-Smith, 2007) or to shield from potential takeover bidders (Pinkowitz, 2000). Liquid asset holdings have also been associated with negative market perceptions (Harford, 1999) and shareholder criticism and activism (De La Merced, 2013, Feb 7). Moreover, Myers and Rajan (1998) and Johnson *et al.* (2000) document that cash assets are more vulnerable to managerial discretionary diversion or tunnelling than are noncash assets. The audit literature suggests that auditors generally charge higher audit fees for firms with free cash flows (Gul and Tsui, 1997; Griffin *et al.*, 2010; Gleason *et al.*, 2015). The free cash flow theory predicts that excess cash provides managers with an opportunity to extract rents, because it can shelter them from external monitoring by shareholders, allowing them to engage in value-destroying projects (Easterbrook, 1984; Jensen 1986) and inducing them to attempt to mitigate the deterioration of company value by manipulating the financial statements (Griffin *et al.*, 2010). Recent audit evidence documents a positive association between cash holdings and audit fees, suggesting that holding too much cash increases audit risk through accentuating agency conflicts (Gleason *et al.*, 2015; Benjamin *et al.*, 2015).

External monitoring facilitated by higher quality audits can discipline managers to reveal information about their inefficient use of investment resources (Kim *et al.*, 2015) and, thus, reduce the information risk faced by uninformed shareholders and enable them to verify the validity of financial statements. From the demand side perspective, auditors might respond

³ S&P ratings increase the monitoring of management, limit opportunistic behaviour and reduce information asymmetry between firms and their external shareholders (Ashbaugh-Skaife *et al.*, 2006).

to this higher demand for monitoring and exert higher audit efforts, as higher quality audit facilitates managerial discipline and reduces information asymmetries between managers and shareholders. Other possible types of audit risk that arise in relation to cash holdings and its potential consequences include shareholder class action lawsuits for lost wealth, which usually name both the client and the auditor as defendants, lost audit fees caused by declining client performance, and reputational damages due to the auditor's association with the client (Gleason *et al.*, 2015). Therefore, the mediating effect of cash holdings on the relation between financing constraints and audit fees is not clear *ex-ante*.

Discretionary accruals, the second mediating variable could also influence financial constraints and audit fees. A firm's discretionary accrual reporting can ease financial constraints by signalling positive prospects to the market and help a firm with financial constraints to fund valuable investment opportunities (Linck *et al.*, 2013). Managers have been reported to use their accounting discretion to convey their favourable private information to investors, and since investors could correctly conjecture this (Kurt, 2018), they might ease their demand for higher monitoring and audit effort in financially more constrained firms. However, some prior studies indicate that discretionary accruals can be costly as well and increase the need for investors to rely on the monitoring role of auditing. These studies suggest that discretionary accruals are costly to a firm because of disruption to operations (Dye, 1988), litigation costs (DuCharme *et al.*, 2004), reputation costs for misreporting (Feroz *et al.*, 1991; Healy, 1985) and investigations by regulatory authorities (Dechow *et al.*, 1996). From the supply-side audit perspective, discretionary accruals are, by nature, inherently riskier and more uncertain than other items in the financial statements (Karpoff *et al.*, 2008) and thus, are more difficult to audit regardless of the motivation for accrual reporting. A greater magnitude of discretionary accrual accounting leads to an upward revision of auditors' inherent risk assessments, thus, increasing audit efforts and audit fees (Gul *et al.*, 2003). Therefore, the mediating effect of discretionary accruals on the relation between financing constraints and audit fees is not clear *ex-ante*.

Finally, this study considers the mediating role of corporate tax avoidance. Corporate tax avoidance is defined as steps taken to reduce the explicit taxes per dollar of pre-tax earnings or cash flows (Hanlon and Heitzman, 2010). Cash flow savings achieved through corporate tax avoidance strategies is a potential source of financing in firms with increased levels of financial constraints (Edwards *et al.*, 2016).⁴ At the same time, the complexities in tax expense computations and the judgment needed to estimate tax accruals are frequently cited as causes of financial statement misstatements, hence increases audit risk. Prior research suggests that corporate taxes avoidance elevate audit risk assessment and audit effort and as a result, increase audit fees (Donohoe and Knechel, 2014). A firm's aggressive tax positions can also expose an auditor to litigation, regulatory, and reputational risks (Donohoe and Knechel, 2014). The financial reporting complexities associated with tax avoidance strategies might also create information asymmetries between managers and shareholders (Dhaliwal *et al.*, 2004) that could increase the demand on auditors to exert additional audit effort and hence higher audit fees. However, investors might possibly ease their demand for higher monitoring and audit effort in relation to corporate tax avoidance given that corporate tax avoidance is valuable when the levels of financial constraints increase. Therefore, the mediating effect of corporate tax avoidance on the relation between financing constraints and audit fees is not clear *ex-ante*. Based on the arguments above, the following hypotheses are developed:

H2A: Corporate cash holdings mediate the effect of financial constraints on audit fees.

H2B: Financial reporting quality mediates the effect of financial constraints on audit fees.

⁴ On a parallel note, unconstrained firms have been reported to engage in less aggressive tax planning strategies than constrained firms (Law and Mills, 2015).

H2C: Corporate tax avoidance mediates the effect of financial constraints on audit fees.

3. Research Design

3.1 Sample Selection and Data Source

The sample for this paper comprises all US publicly listed firms for the 2000–2016 period. It began with data from 2000, because this is the earliest year for which Audit Analytics (AA) provides audit-fee data for the US. I began with an initial sample of 190,677 firm-year observations with the Central Index Key (CIK) from AA and matched it with firm-year observations with the Global Company Key (GVKEY) from Compustat. I then delete (i) 84,864 firm-year observations with missing audit fee values; (ii) 26,777 and 7,156 firm-year observations from the financial (two-digit Standard Industrial Classification (SIC) codes 60–69) and utilities (two-digit SIC codes 48–49) industries, respectively; (iii) 7,921 observations with missing data for calculating financial constraints values and, finally, (iv) 12,736 firm-year observations with missing control variables (SIZE, SEG_BUS, MTB, LEV, ROA and COMP). The final sample, therefore, consists of 51,223 firm-year observations during the 2000 to 2016 sample period. Financial data were collected from Compustat. Panel A, Table 1, details the sample derivation procedure and Panel B reports the industry distribution of the sample. Firm-year observations come from a wide variety of industries, with two-digit SIC codes 35–39 (29.32%) commanding the largest industry representation in our sample, as reported in Panel B, Table 1.

Table 1: Sample derivation and industry distribution (2000 to 2016)

<i>Panel A: Sample derivation</i>			
Initial sample with financial year and CIK from Audit Analytics matched with COMPUSTAT (GVKEY) for the period 2000 to 2016:		190,677	
Less: missing audit fee observations		(84,864)	
Less: Financial institutions (#60–69)		(26,777)	
Less: Utilities (#48 & 49)		(7,156)	
Less: Missing variables			
Financial constraints		(7,921)	
SIZE		(3,883)	
SEG_BUS		(4,515)	
MTB		(3,136)	
LEV		(188)	
ROA		(84)	
COMP		(930)	
Final sample		51,223	
<i>Panel B: Industry distribution</i>			
Code	Industry	Observations	% observations
1-14	Agriculture & mining	3,239	6.32%
15-17	Building construction	535	1.04%
20-21	Food & kindred products	1,285	2.51%
22-23	Textile mill products & apparel	705	1.38%
24-27	Lumber, furniture, paper, and printing	1,614	3.15%
28-30	Chemical, petroleum, and rubber & allied products	7,006	13.68%
31-34	Metal	1,974	3.85%
35-39	Machinery, electrical, computer equipment	15,018	29.32%
40-47	Railroad and other transportation	2,099	4.10%
50-52	Wholesale goods, building materials	2,026	3.96%
53-59	Store merchandise, auto dealers, home furniture stores	3,470	6.77%
70-79	Business services	9,186	17.93%
80-99	Others	3,066	5.99%
	Total	51,223	100.00%

Notes: Variable definitions are presented in Appendix section.

3.2. Dependent Variable: Audit Fees

Consistent with most prior audit fee studies, the dependent variable for this study is the natural logarithm of audit fees (AF_{LN}).

3.3 Independent Variable: Financial Constraints

In order to measure financial constraints, this paper follow Hadlock and Pierce (2010) and use the SA Index as the first measure of a firm's level of financial constraint, denoted as FC_{SA} . Hadlock and Pierce (2010) find that leverage, cash flow and, particularly, firm size and firm age are useful predictors of financial constraints. FC_{SA} is derived using the formula: $(-0.737 * Size) + (0.043 * Size^2) - (0.040 * Age)$. $Size$ equals the natural logarithm of inflation-adjusted book assets and Age is the number of years the firm is listed with a non-missing stock price.

The second measure of the level of financial constraints is based on the Whited and Wu (WW) (2006) model and denoted as FC_{WW} . The WW index is a linear combination of six empirical factors: *cash flow to total assets* (CF) (-), *sales growth* (SG) (-), *long-term debt to total assets* ($TLTD$) (+), *natural logarithm of total assets* ($LNTA$) (-), *dividend policy indicator* ($DIVPOS$) (-), and the *firm's three-digit industry sales growth* (ISG) (+). The following is the formula for measuring the WW index.

$$-0.091CF - 0.035SG + 0.021TLTD - 0.044LNTA - 0.062DIVPOS + 0.102ISG \quad (1)$$

This study also use two text-based measures of the level of financial constraint recently developed by Hoberg and Maksimovic (2014) and Bodnaruk *et al.* (2015) in order to alleviate concerns over the sole use of accounting-based measures of financial constraints such as the FC_{SA} and FC_{WW} as the latter could be correlated with the control variables of this study. Hoberg and Maksimovic (2014) text-based financial constraint measure, denoted as FC_{DELAY} , focus on mandated disclosures in 10-K regarding each firm's liquidity, as well as the discussion of the sources of capital each firm intends to use in addressing its financing needs.⁵ Bodnaruk *et al.* (2015) classify a firm-year as more constrained when a predetermined list of "financial constraint" words occur more often in a firm's 10-K.⁶ In this paper the natural logarithm of the number of financial constraint words is denoted as FC_{CON} . Financially more constrained firms have higher FC_{SA} , FC_{WW} , FC_{DELAY} and FC_{CON} values.

3.4 Mediating Variables

Following Bates *et al.* (2009), this paper uses the natural logarithm of cash and marketable securities divided by net assets, denoted as LN_{CASH} , as the proxy of corporate cash holdings for testing the mediating effects of cash holdings on the association between financial constraints and audit fees.⁷ The mediating effect of discretionary accruals, denoted as DAC , is measured using the performance-matched discretionary accruals model developed by Kothari *et al.* (2005). Finally, following Hasan *et al.* (2017), the mediating effect of corporate tax avoidance is based on the cash effective tax rate (CETR) measure of tax avoidance. The Appendix section presents the detailed definitions of the variables used in this paper.

⁵ See Hoberg and Maksimovic (2014) for more details.

⁶ See Bodnaruk *et al.* (2015) for more details.

⁷ The results in this paper remain unchanged when cash holdings proxied by cash and marketable securities divided by total assets is used instead of LN_{CASH} .

3.5 Control Variables

Based on prior research on the audit fee-model (Asthana and Boone, 2012; Blankley *et al.*, 2012; Choi *et al.*, 2010; Simunic, 1980) the following variables are included in the regressions as control variables. *BIG4* is an indicator variable that equals 1 if the firm is audited by Deloitte & Touche, Ernst & Young, KPMG, or PricewaterhouseCoopers, and 0 otherwise; *SPEC* is auditor industry specialization and is a dummy variable coded 1 if, in a particular year, the auditor has the largest market share in a two-digit SIC industry, and if its market share is at least ten percentage points greater than the second largest industry leader in a national audit market, and 0 otherwise; *GC* is an indicator variable that equals 1 if the firm receives a going-concern opinion, and 0 otherwise; *ARL* is the natural log of number of calendar days between fiscal year-end to date of the audit's report; *BUSY* is an indicator variable that equals 1 if the firm's fiscal year-end is December 31 and 0 otherwise; *RESTATE* is an indicator variable that equals 1 if the firm has a financial statement restatement and 0 otherwise; *ICW* is an indicator variable coded 1 if the firm had any material weakness in internal controls, 0 otherwise (this paper does not include *ICW* in the baseline regression, but, rather, report on it separately, as the sample size shrinks by about 42% if it is included); *SIZE* is the natural log of total assets; *MTB* is market value of its equity divided by the book value of its equity; *LEV* is measured as the sum of total debt over total assets; *ROA* is net income before extraordinary items, divided by total assets; *LOSS* is an indicator variable that equals 1 if the firm's net income before extraordinary items is negative, and 0 otherwise; *FOREIGN* is the percentage of foreign sales to total sales; *MERGER* is an indicator variable that equals 1 if the firm had a merger or acquisition in a particular year, and 0 otherwise; *SEG_BUS* is the natural log of the number of firm's geographic segments; *SPI* is an indicator variable that equals 1 if the firm reports special items, and 0 otherwise; *COMP* is firm complexity measured as the sum of the firm's receivables and inventory divided by its total assets; and litigation risk (*LIT*) is an indicator variable coded 1 if firm-year observations belong to the biotechnology, computers, electronics and retailing industries, and 0 otherwise. I control for *LIT* because firms from the biotechnology, computers, electronics and retailing industries are exposed to higher litigation risks and auditors in such firms charge higher audit fees (Venkataraman *et al.*, 2008).

Audit fees are higher for firms with higher client complexity (larger size, more mergers and acquisitions, higher market-to-book ratio, a larger foreign sales percentage, more business segments); higher financial risk (higher leverage, lower *ROA*, a loss, larger special items); higher inherent risk (a larger amount of inventory and receivables); and engagement attributes (with a fiscal year end on December 31 and a larger gap between the fiscal year end and the earnings announcement date) (Asthana and Boone, 2012; Blankley *et al.*, 2012; Choi *et al.*, 2010; Simunic, 1980).

3.6 Regression Model

The seminal audit-fee model of Simunic (1980) shows that audit fees depend on the clients' audit resource requirements, the cost of those resources and the potential risks of the audit engagement. This study uses the conventional audit-fee model, with an emphasis on controlling for fee determinants associated with firm risk, client characteristics, and audit and auditor characteristics mentioned in the preceding section (Asthana and Boone, 2012; Blankley *et al.*, 2012; Choi *et al.*, 2010; Simunic, 1980) and estimate the following audit-fee model:

$$\begin{aligned}
 AF_{LN} = & \gamma_0 + \gamma_1 FC + \gamma_2 BIG4 + \gamma_3 SPEC + \gamma_4 GC + \gamma_5 ARL + \gamma_6 BUSY \\
 & + \gamma_7 RESTATE + \gamma_8 ICW + \gamma_9 SIZE + \gamma_{10} MTB + \gamma_{11} LEV \\
 & + \gamma_{12} ROA + \gamma_{13} LOSS + \gamma_{14} FOREIGN + \gamma_{15} MERGER \\
 & + \gamma_{16} SEG_{BUS} + \gamma_{17} SPI + \gamma_{18} COMP + \gamma_{19} LIT \\
 & + INDUSTRY_{FE} + YEAR_{FE} + \varepsilon
 \end{aligned}
 \tag{2}$$

AF_{LN} is the natural logarithm of audit fees. FC is the financial constraint variable and is measured using four different proxies, namely, FC_{SA}, FC_{WW}, FC_{CON} and FC_{DELAY}. The model also includes dummy variables to control for year effects (Year FE) and two-digit SIC industry effects (Industry FE) in the regression models. The coefficients of the FC variables are expected to be significantly positive, which will support *H1*.

4. Empirical Results

4.1. Descriptive Statistics

Table 2 reports the descriptive statistics for the dependent variable (*AF_{LN}*), four variants of the primary independent variable (financial constraints), and control variables.

Table 2: Descriptive statistics

	Variable	Observations	Mean	S.D.	p.25	Med	p.75
Dependent variable	LN_AF	51,223	13.19	1.47	12.12	13.19	14.17
Independent variables	FC_SA	51,223	-3.19	0.97	-3.70	-3.18	-2.65
	FC_WW	51,223	-0.08	0.46	-0.29	-0.20	-0.07
	FC_CON	44,049	4.53	1.08	3.85	4.55	5.29
	FC_DELAY	37,482	-0.01	0.10	-0.08	-0.02	0.05
Mediating variables	LN_CASH	51,211	0.34	0.49	0.04	0.15	0.42
	DAC	49,597	0.07	0.09	0.02	0.04	0.08
	CETR	17,579	0.24	0.16	0.10	0.23	0.33
Control variables	BIG4	51,223	0.72	0.45	0.00	1.00	1.00
	SPEC	51,223	0.21	0.40	0.00	0.00	0.00
	GC	51,223	0.07	0.26	0.00	0.00	0.00
	ARL	51,223	69.32	34.20	53.00	65.00	80.00
	BUSY	51,223	0.60	0.49	0.00	1.00	1.00
	RESTATE	51,223	0.11	0.31	0.00	0.00	0.00
	ICW	20,807	0.07	0.25	0.00	0.00	0.00
	SIZE	51,223	5.50	2.33	3.94	5.51	7.04
	MTB	51,223	2.67	7.81	1.03	1.89	3.43
	LEV	51,223	0.16	0.23	0.00	0.08	0.25
	ROA	51,223	-0.17	1.14	-0.09	0.02	0.07
	LOSS	51,223	0.40	0.49	0.00	0.00	1.00
	FOREIGN	51,223	0.41	0.49	0.00	0.00	1.00
	MERGER	51,223	0.11	0.32	0.00	0.00	0.00
	SEG_BUS	51,223	1.05	1.02	0.00	1.10	1.95
	SPI	51,223	0.63	0.48	0.00	1.00	1.00
COMP	51,223	0.27	0.20	0.11	0.24	0.38	
LIT	51,223	0.38	0.49	0.00	0.00	1.00	

Notes: This table reports descriptive statistics for the variables used in the regression analysis. Variable definitions are presented in the Appendix section.

The mean (median) *AF_{LN}* is 13.19 (13.19), with a standard deviation of 1.47. The means of *FC_{SA}* and *FC_{WW}* are -3.19 and -0.08. The means of *FC_{CON}* and *FC_{DELAY}* are 4.53 and -0.01, respectively. Descriptive statistics for the mediating variables are also presented in Table 2. The mean and median value of *LN_CASH* is 0.34, and 0.16, respectively, suggesting a skewed distribution. The mean (median) discretionary accruals (*DAC*) is 0.07 (0.04). The

mean (median) of *CETR* is 0.24 (0.23). Descriptive statistics for the control variables reveal that Big 4 firms audit about 72% of the firm-year observations, 7% of the sample firms receive a going concern opinion, and 11% restate their financial statements. Sample firms, on average, report negative earnings (mean *ROA* of -0.17 and mean *LOSS* of 0.40). About 41% of the firm-year observations have revenue from foreign operations.

4.2. Regression Results

Regression results are reported in Table 3. This paper uses the ordinary least square (OLS) with standard errors clustered at the firm level for Models (1), (2), (3) and (4). Column (1) presents results using *FC_SA* as a proxy for financial constraint. The coefficient on *FC_SA* is positive and significant (coefficient 0.05, $p < 0.01$). This result is consistent with the hypothesized positive association between audit fees and financial constraints. In terms of economic significance, the reported coefficient implies a 4.85% increase in audit fees for one standard deviation change in *FC_SA*, calculated as $[0.97 (\text{SD of } FC_SA) * 0.05 (\text{regression coefficient for } FC_SA)]$. Columns (2) to (4) report results using the alternative financial constraint measures. The coefficients are 0.023 ($p < 0.01$), 0.051 ($p < 0.01$) and 0.211 ($p < 0.01$) for *FC_WW*, *FC_CON* and *FC_DELAY* measures respectively. In terms of the regression coefficients for the control variables, there is significant associations between *AF_LN*, and almost all the control variables.

Columns (5) and (6) provide firm fixed-effects (FFE) regression results for *FC_SA* and *FC_CON*, respectively. The FE models are used to control for the effects of variables that are time-invariant. The coefficients on *FC_SA* and *FC_CON* are again positive and significant (coefficients are 0.11 and 0.013, respectively, significant at better than the 1% level).⁸ Columns (7) and (8) include *ICW* as an additional explanatory variable. Although the inclusion of *ICW* reduces the sample size substantially, the regression confirms that the coefficients on both *FC_SA* and *FC_CON* are positive and significant (coefficients are 0.041 ($p < 0.05$) and 0.039 ($p < 0.01$)), respectively.⁹ The coefficient on *ICW*, too, is significantly positive. Taken together, these results support *H1* that auditors charge higher audit fees for in firms with increased levels of financial constraints.

4.3 Propensity Score Matching (PSM)

Selection bias arises when financing constraints are correlated with the error term of the audit-fee model. The presence of this violates the standard OLS assumptions, and the least squares coefficients of the financial constraint measures could be biased. The propensity score matching (PSM) methodology (Rosenbaum and Rubin, 1983, 1985) can be used for controlling for self-selection by matching sample firms with control firms having similar characteristics according to a function of covariates. First, this paper selects the optimal match based on the nearest neighbour (NN) technique of the propensity score matching procedure. The NN approach, with replacement, picks a single control firm according to the closest propensity score. In this approach, instead of measuring financial constraints as a continuous measure, firms are split into two groups; i.e., financially constrained and non-constrained ones. Prior literature is followed in relying on this procedure in an attempt to control for differences in characteristics between financially-constrained versus non-constrained firms (e.g., Austin, 2011; Heckman *et al.*, 1997). Second, one of the most widely studied average causal effects in the treatment effects context is also used in this paper i.e. the average treatment effect (ATE) (Heckman and Vytlačil, 1999).

⁸ Untabulated results using the *FC_WW* and *FC_DELAY* measures also reveal positive and significant effects of financial constraints on audit fees.

⁹ Untabulated results using the *FC_WW* and *FC_DELAY* measures also reveal positive and significant effects of financial constraints on audit fees.

Table 3: OLS & Firm Fixed-effects (FFE) regression results: Financing constraints and audit fees

Variables	(1) <i>FC_SA</i> OLS	(2) <i>FC_WW</i> OLS	(3) <i>FC_CON</i> OLS	(4) <i>FC_DELAY</i> OLS
<i>FC</i>	0.050*** [3.85]	0.023*** [3.16]	0.051*** [12.61]	0.211*** [3.41]
<i>BIG4</i>	0.307*** [18.37]	0.304*** [18.14]	0.339*** [20.42]	0.344*** [19.47]
<i>SPEC</i>	0.103*** [8.14]	0.105*** [8.30]	0.091*** [7.15]	0.091*** [6.73]
<i>GC</i>	0.216*** [11.30]	0.227*** [11.95]	0.182*** [9.43]	0.186*** [9.13]
<i>ARL</i>	0.001*** [7.23]	0.001*** [7.63]	0.002*** [13.02]	0.003*** [13.64]
<i>BUSY</i>	0.072*** [5.52]	0.076*** [5.81]	0.099*** [7.50]	0.096*** [6.80]
<i>RESTATE</i>	0.130*** [13.47]	0.128*** [13.08]	0.112*** [11.45]	0.112*** [10.66]
<i>ICW</i>	-	-	-	-
<i>SIZE</i>	0.510*** [84.80]	0.498*** [104.39]	0.480*** [96.44]	0.480*** [92.68]
<i>MTB</i>	0.003*** [6.03]	0.003*** [6.16]	0.003*** [6.23]	0.002*** [4.75]
<i>LEV</i>	0.109*** [4.60]	0.112*** [4.72]	0.097*** [3.99]	0.125*** [4.80]
<i>ROA</i>	-0.095*** [-17.10]	-0.096*** [-17.11]	-0.090*** [-16.13]	-0.095*** [-16.78]
<i>LOSS</i>	0.133*** [13.35]	0.135*** [13.54]	0.124*** [12.06]	0.126*** [11.48]
<i>FOREIGN</i>	0.256*** [18.09]	0.250*** [17.63]	0.285*** [20.13]	0.276*** [18.44]
<i>MERGER</i>	0.037*** [3.04]	0.039*** [3.21]	0.027** [2.11]	0.044*** [3.12]
<i>SEG_BUS</i>	0.098*** [13.95]	0.089*** [13.15]	0.085*** [12.40]	0.085*** [11.75]
<i>SPI</i>	0.147*** [17.04]	0.146*** [16.92]	0.129*** [14.89]	0.131*** [14.34]
<i>COMP</i>	0.342*** [8.70]	0.332*** [8.49]	0.320*** [8.05]	0.320*** [7.59]
<i>LIT</i>	0.023 [1.26]	0.027 [1.44]	0.052*** [2.79]	0.051*** [2.66]
Constant	8.759*** [51.01]	8.676*** [50.04]	8.468*** [43.49]	8.645*** [41.37]
Industry	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No
Observations	51,223	51,223	44,049	37,482
Adjusted R ²	0.81	0.81	0.81	0.80

Notes: This table reports the regression results for the effect of financing constraints on audit fees. The regression models are estimated using the ordinary least squares (OLS) with standard errors adjusted for heteroskedasticity and within-firm clustering and the FFE regressions. Robust standard-errors in brackets. *** Indicates 0.01 significance level for a two-tailed test. ** Indicates 0.05 significance level for a two-tailed test. Variable definitions are presented in the Appendix section.

Table 3 (continued)

Variables	(5) <i>FC_SA</i> FFE	(6) <i>FC_CON</i> FFE	(7) <i>FC_SA</i> OLS	(8) <i>FC_CON</i> OLS
<i>FC</i>	0.109*** [3.04]	0.013*** [4.58]	0.041** [2.37]	0.039*** [6.77]
<i>BIG4</i>	0.246*** [11.34]	0.231*** [10.03]	0.276*** [11.80]	0.267*** [11.25]
<i>SPEC</i>	0.083*** [7.85]	0.082*** [7.12]	0.085*** [5.65]	0.082*** [5.35]
<i>GC</i>	0.062*** [3.52]	0.066*** [3.46]	0.192*** [4.91]	0.179*** [4.52]
<i>ARL</i>	0.002*** [14.03]	0.002*** [13.91]	0.002*** [7.68]	0.003*** [8.68]
<i>BUSY</i>	0.051*** [3.12]	0.051*** [2.74]	0.023 [1.24]	0.023 [1.25]
<i>RESTATE</i>	0.102*** [14.67]	0.104*** [14.35]	0.078*** [5.86]	0.077*** [5.73]
<i>ICW</i>	-	-	0.279*** [12.37]	0.265*** [12.08]
<i>SIZE</i>	0.402*** [28.98]	0.357*** [42.35]	0.492*** [58.13]	0.474*** [61.53]
<i>MTB</i>	0.000 [0.57]	0.000 [0.75]	0.001 [1.24]	0.001 [1.30]
<i>LEV</i>	0.056*** [2.60]	0.053** [2.25]	0.111*** [2.95]	0.101*** [2.58]
<i>ROA</i>	-0.049*** [-10.03]	-0.049*** [-9.25]	-0.211*** [-5.16]	-0.203*** [-4.96]
<i>LOSS</i>	0.050*** [6.83]	0.044*** [5.58]	0.092*** [5.73]	0.078*** [4.80]
<i>FOREIGN</i>	0.101*** [7.24]	0.105*** [7.09]	0.245*** [12.65]	0.244*** [12.51]
<i>MERGER</i>	0.040*** [4.69]	0.041*** [4.33]	-0.039*** [-3.01]	-0.052*** [-3.84]
<i>SEG_BUS</i>	0.046*** [4.08]	0.048*** [3.90]	0.103*** [11.24]	0.093*** [10.66]
<i>SPI</i>	0.053*** [9.09]	0.053*** [8.41]	0.126*** [10.06]	0.125*** [10.00]
<i>COMP</i>	0.319*** [7.37]	0.310*** [6.63]	0.626*** [8.58]	0.632*** [8.67]
<i>LIT</i>	0.011 [0.09]	-	0.049* [1.87]	0.057** [2.19]
Constant	9.847*** [113.07]	9.730*** [184.19]	9.999*** [34.35]	9.777*** [35.07]
Industry	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	No	No
Observations	51,223	44,059	20,807	19,116
Adjusted R ²	0.90	0.89	0.75	0.74

Notes: This table reports the regression results for the effect of financing constraints on audit fees. The regression models are estimated using the ordinary least squares (OLS) with standard errors adjusted for heteroskedasticity and within-firm clustering and the FFE regressions. Robust standard-errors in brackets. *** Indicates 0.01 significance level for a two-tailed test. ** Indicates 0.05 significance level for a two-tailed test. Variable definitions are presented in the Appendix section.

In this paper's setting, the basic approach to PSM is to first model the probability of a firm becoming constrained based on its firm-specific determinants. The sample is divided into two groups based on the yearly median level of FC_SA . The group with $FC_SA > \text{median } FC_SA$ is considered as the treated group, and those with $FC_SA < \text{median } FC_SA$ as the control group. A set of firm characteristics (e.g. Almeida *et al.*, 2004; Denis and Sibilkov, 2010; Faulkender and Petersen, 2006; Lamont *et al.*, 2001; Whited and Wu, 2006), that may explain the likelihood of a firm suffering from financial constraints is included. For this purpose, $SIZE$, MTB , LEV , ROA , $CAPEX$, $R\&D$, DIV_D , CFO_TA , RE_TA and $RATING$ are included as some of the likely drivers of financial constraints (variables are defined in the Appendix section). Importantly, inclusion of these controls ensures a proper balance between treated and untreated subjects in the matched sample, which is one of the key criteria for PSM (Austin, 2011).

One important aspect of PSM is to examine the distribution of measured baseline covariates between treated and untreated subjects within the PSM sample. If, after conditioning on the propensity score, no systematic differences exist in baseline covariates between treated and untreated subjects, this indicates that the PSM has been correctly specified (Austin, 2011). In Table 4, most of the variables (all but LEV and RE_TA) are insignificantly different between financially constrained and non-constrained firms.

Table 4: Propensity-matching analyses (Covariate matching table)

Variable	Treated	Controls	Difference	t-stat
$SIZE$	3.94	4.17	-0.23	-1.74
MTB	2.74	2.79	-0.06	-0.10
LEV	0.13	0.24	-0.11	-5.64***
ROE	-0.16	-0.16	-0.01	-0.09
$CAPEX$	0.05	0.05	0.00	0.19
$R\&D_TA$	0.13	0.11	0.01	1.67
DIV_D	0.19	0.14	0.05	1.22
CFO_TA	-0.10	-0.09	-0.01	-0.93
RE_TA	-3.62	-4.39	0.77	3.39***
$RATING$	0.04	0.04	0.00	-0.14

Table 5 shows the PSM regression results. Consistent with the baseline regression results, this paper continues to find positive and significant coefficients on various financial constraint measures. For example, the coefficients on FC_SA are 0.055 ($p < 0.05$) in Column (1) and 0.05 ($p < 0.01$) in Column (2) following ATE and NN approach, respectively. The corresponding coefficients are 0.048 ($p < 0.01$) and 0.044 ($p < 0.01$) for FC_CON (Columns 3 and 4).¹⁰ Taken together, the PSM results are consistent with the prediction that audit fees are higher for firms with more, as opposed to less, financing constraints.

¹⁰ Untabulated results using the FC_WW and FC_DELAY measures also reveal positive and significant effects of financial constraints on audit fees.

Table 5: Propensity-matching analyses (PSM regression results)

Variables	(1) ATE FC_SA	(2) NN FC_SA	(3) ATE FC_CON	(4) NN FC_CON
<i>FC</i>	0.055** [2.43]	0.050*** [2.74]	0.048*** [8.70]	0.044*** [10.05]
<i>BIG4</i>	0.369*** [10.57]	0.378*** [16.16]	0.327*** [21.54]	0.318*** [24.85]
<i>SPEC</i>	0.048 [1.50]	0.051*** [2.75]	0.093*** [6.61]	0.093*** [8.13]
<i>GC</i>	0.225*** [3.11]	0.174*** [4.81]	0.228*** [9.41]	0.218*** [10.62]
<i>ARL</i>	0.001* [1.79]	0.001*** [3.60]	0.002*** [6.83]	0.002*** [8.05]
<i>BUSY</i>	0.063** [2.24]	0.092*** [4.85]	0.118*** [10.32]	0.110*** [11.79]
<i>RESTATE</i>	0.158*** [3.70]	0.164*** [5.94]	0.106*** [7.35]	0.109*** [9.20]
<i>SIZE</i>	0.520*** [47.73]	0.479*** [54.47]	0.492*** [105.50]	0.493*** [128.39]
<i>MTB</i>	0.004*** [2.70]	0.003*** [4.03]	0.003*** [4.92]	0.003*** [5.59]
<i>LEV</i>	0.085 [1.50]	0.124*** [3.10]	0.101*** [4.28]	0.110*** [5.65]
<i>ROA</i>	-0.069** [-2.07]	-0.073*** [-5.87]	-0.093*** [-16.65]	-0.095*** [-17.46]
<i>LOSS</i>	0.163*** [5.34]	0.145*** [7.63]	0.125*** [9.68]	0.121*** [11.51]
<i>FOREIGN</i>	0.253*** [8.97]	0.214*** [10.85]	0.293*** [23.48]	0.294*** [28.95]
<i>MERGER</i>	0.031 [0.76]	0.003 [0.08]	0.043*** [2.66]	0.031** [2.41]
<i>SEG_BUS</i>	0.092*** [5.66]	0.065*** [5.93]	0.099*** [17.12]	0.104*** [21.73]
<i>SPI</i>	0.155*** [5.01]	0.133*** [6.48]	0.113*** [9.41]	0.116*** [11.29]
<i>COMP</i>	0.427*** [4.97]	0.109** [2.23]	0.334*** [9.49]	0.368*** [12.23]
<i>LIT</i>	0.133*** [3.41]	0.110*** [4.39]	0.052*** [3.31]	0.057*** [4.49]
Constant	8.609*** [33.38]	8.765*** [92.22]	8.478*** [65.27]	8.528*** [85.18]
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	11,701	31,013	23,363	34,960
Adjusted R ²	0.83	0.70	0.82	0.83

Notes: This table reports the PSM estimation results for the effect of financing constraints on audit fees. *ATE* and *NN* denotes average treatment effect and nearest neighbour, respectively. Panel A presents the covariate matching results while Panel B presents the PSM regression results. The regression models are estimated using ordinary least squares (OLS) regressions with standard errors adjusted for heteroskedasticity and within-firm clustering. Robust standard-errors in brackets. *** Indicates 0.01 significance level for a two-tailed test. ** Indicates 0.05 significance level for a two-tailed test. Variable definitions are presented in the Appendix section.

4.4 Mediation Test Results

For the mediation tests this paper employs corporate cash holdings (LN_CASH), discretionary accruals (DAC), and corporate tax avoidance ($CETR^*-I$) as the mediating variables. This paper follows the mediation test approach of Baron and Kenny (1986) and Pearl (1994), who propose that a mediation effect exists when the following three conditions are fulfilled: (1) Path A: variations in the levels of the independent variable (i.e., various individual FC measures in this study) account significantly for variations in the proposed mediators (i.e., LN_CASH , DAC , and $CETR^*-I$) (Equation 3 below); (2) Path B: variations in the proposed mediators account significantly for variations in the dependent variable (AF_LN) (Equation 4 below); and (3) Path C: the significant relationship between FC and AF_LN (Equation 5 below) becomes insignificant once Paths A and B are controlled (full mediation); or the significant relation is reduced once Paths A and B are controlled (partial mediation) (Equation 6 below).

The following set of equations is developed to conduct the mediation tests:

$$MV = \alpha_0 + \alpha_1 * FC + \sum Industry + \sum Year + \varepsilon_{i,t} \quad (3)$$

$$AF_LN = \beta_0 + \beta_1 * MV + \sum Controls + \sum Industry + \sum Year + \varepsilon_{i,t} \quad (4)$$

$$AF_LN = \tau_0 + \tau_1 * FC + \sum Controls + \sum Industry + \sum Year + \varepsilon_{i,t} \quad (5)$$

$$AF_LN = \gamma_0 + \gamma_1 * FC + \gamma_2 * MV + \sum Controls + \sum Industry + \sum Year + \varepsilon_{i,t} \quad (6)$$

where MV represents the three mediating variables. Other variables are defined as before. The total effect of financial constraints on audit fees can be decomposed into direct and indirect effects. The direct effect is γ_1 from Equation (6) above, while the indirect effect is $\alpha_1 * \gamma_1$ from the cash holdings channel. To test for the indirect effect, the null hypothesis may be set as follows:

$$Ho: \alpha_1 * \gamma_1 = 0 \quad (7)$$

Table 6 reports tests for the mediating effect of corporate cash holdings (LN_CASH) for the relation between financing constraints and audit fees. Column (1) shows that the effect of financing constraints (FC_SA) on LN_CASH is positive and significant (coefficient = 0.024, $p < 0.01$), implying that financially more constrained firms hold more cash. The coefficient on LN_CASH is positive and significant in column (2), implying that audit fees are higher for firms holding more cash (coefficient 0.072, $p < 0.01$). Column (3) reveals that financially more constrained firms pay more audit fees (coefficient 0.048, $p < 0.01$). The coefficients on both FC_SA and LN_CASH are positive and significant when included in the same regression model (column 4) (coefficients of 0.0483, $p < 0.01$ and 0.105, $p < 0.01$ respectively). The effect of FC_SA through its effect on LN_CASH (indirect effect) is positive and statistically significant (coefficient 0.0026, $p < 0.01$), reported under column (4) at the bottom of the table. The results indicate that there is a partial positive mediation effect of corporate cash holdings

on the association between financial constraints and audit fees. The results remain similar when *FC_CON* is used as the financial constraint variable (columns 5 to 8).¹¹ These regressions are rerun using *CASH_TA* (cash and marketable securities deflated by total assets) as the proxy of cash holdings. Again, consistent results are obtained using the *LN_CASH* variant (untabulated).

Table 7 reports tests for the mediating effect of discretionary accruals (*DAC*) on the relation between financial constraints and audit fees. Column (1) shows that the effect of financing constraints (*FC_SA*) on *DAC* is positive and significant (coefficient = 0.017, $p < 0.01$), implying that financially more constrained firms report higher levels of discretionary accruals, engage in higher levels of earnings management or produce low quality financial reports (Kurt, 2018). In column (4), the coefficients on both *FC_SA* and *DAC* are positive and significant (coefficients 0.04 ($p < 0.01$) and 0.147 ($p < 0.01$) respectively) when included in the same regression model. Importantly, the effect of *FC_SA* through its effect on *DAC* (indirect effect), is positive and statistically significant (coefficient = 0.0025, $p < 0.01$), reported under column (4) at the bottom of the table. This suggests a partial positive mediation effect of financial reporting quality on the association between financial constraint and audit fees. Columns (5) to (8) repeat the same analysis using *FC_CON* as the financial constraint proxy and provide consistent evidence to the results reported in columns (1) to (4). For example, the effect of *FC_CON* through its effect on *DAC* (indirect effect), is positive and statistically significant (coefficient = 0.00014, $p < 0.01$), reported under column (8) at the bottom of the table.¹²

Finally, Table 8 reports tests for the mediating effect of tax avoidance, proxied by cash effective tax rates (*CETR*-I*), for the relation between financing constraints and audit fees. In column (1), the effect of *FC_SA* on tax avoidance is positive and significant (coefficient 0.01, $p < 0.01$), suggesting that financially more firms constrained avoid taxes more. Column (2) shows that the effect of tax avoidance on audit fees (*LN_AF*) is insignificant. Column (3) reveals that effect of *FC_SA* on audit fees (*LN_AF*) is positive and significant (coefficient 0.039, $p < 0.05$). In column (4), the coefficients on both *FC_SA* and *CETR*-I* are positive and significant (coefficients 0.038, $p < 0.01$, and 0.077, $p < 0.01$, respectively), when included in the same regression model. Importantly, the effect of *FC_SA* through its effect on *CETR*-I* (indirect effect) is positive and statistically significant (coefficient 0.00077, $p < 0.05$), reported under column (4) at the bottom of the table. This suggests a partial positive mediation effect of corporate tax avoidance on the association between financial constraint and audit fees. The partial mediation effect, however, is insignificant for *FC_CON* measure (coefficient 0.00031, t -stat 1.50), reported under column (8) at the bottom of the table.¹³

Taken together, reported results in Table 6 to 8 suggest that corporate cash holdings, discretionary accruals and corporate tax avoidance mediate partially and positively the association between financial constraint and audit fees.

¹¹ Results using *FC_WW* and *FC_DELAY* provide consistent evidence as well. Results are not tabulated for the sake of brevity.

¹² Results using *FC_WW* and *FC_DELAY* provide consistent evidence as well. Results are not tabulated for the sake of brevity.

¹³ A positive partial mediation effect of corporate tax avoidance is found for the *FC_WW* and *FC_DELAY* measures. Results are not tabulated for the sake of brevity.

Table 6: Mediation test using cash holdings as the mediator

Dep. Variable	FC_SA (1) LN_CASH	FC_SA (2) LN_AF	FC_SA (3) LN_AF	FC_SA (4) LN_AF	FC_CON (5) LN_CASH	FC_CON (6) LN_AF	FC_CON (7) LN_AF	FC_CON (8) LN_AF
<i>FC_SA</i>	0.024*** [6.96]	-	0.048*** [3.67]	0.0483*** [8.47]	0.021*** [7.45]	-	0.049*** [11.97]	0.0476*** [15.45]
<i>LN_CASH</i>	-	0.072*** [4.64]	-	0.105*** [13.51]	-	0.056*** [3.60]	-	0.085*** [10.58]
<i>CAPX</i>	-0.990*** [-26.94]	-	-	-	-1.017*** [-13.59]	-	-	-
<i>NWC</i>	-0.171*** [-54.13]	-	-	-	-0.169*** [-11.05]	-	-	-
<i>R&D</i>	0.243*** [18.35]	-	-	-	0.236*** [4.13]	-	-	-
<i>DIV</i>	-0.100*** [-23.53]	-	-	-	-0.101*** [-12.21]	-	-	-
<i>CFO_TA</i>	0.076*** [8.10]	-	-	-	0.059** [2.41]	-	-	-
<i>CFO_VOL</i>	0.151*** [15.08]	-	-	-	0.146*** [4.86]	-	-	-
<i>BIG4</i>	-	0.292*** [17.03]	0.303*** [17.91]	0.294*** [35.25]	-	0.337*** [19.67]	0.335*** [19.94]	0.328*** [37.69]
<i>SPEC</i>	-	0.100*** [7.83]	0.098*** [7.64]	0.098*** [12.61]	-	0.087*** [6.71]	0.087*** [6.73]	0.087*** [10.62]
<i>GC</i>	-	0.243*** [12.57]	0.217*** [11.23]	0.225*** [17.48]	-	0.199*** [10.12]	0.181*** [9.32]	0.188*** [14.32]
<i>ARL</i>	-	0.001*** [7.61]	0.001*** [7.03]	0.001*** [14.40]	-	0.003*** [13.62]	0.003*** [13.14]	0.003*** [23.26]
<i>BUSY</i>	-	0.077*** [5.78]	0.075*** [5.68]	0.074*** [11.62]	-	0.104*** [7.74]	0.102*** [7.69]	0.100*** [15.14]
<i>RESTATE</i>	-	0.130*** [13.20]	0.133*** [13.55]	0.133*** [14.22]	-	0.113*** [11.47]	0.112*** [11.35]	0.112*** [11.90]
<i>SIZE</i>	0.008*** [5.63]	0.503*** [102.35]	0.512*** [83.21]	0.516*** [200.26]	0.001 [0.29]	0.493*** [96.91]	0.483*** [95.74]	0.487*** [206.53]

The Effect of Financial Constraints on Audit Fees

Table 6 (continued)

<i>MTB</i>	0.004*** [15.25]	0.003*** [5.69]	0.003*** [5.73]	0.003*** [6.76]	0.004*** [10.21]	0.003*** [5.76]	0.003*** [5.98]	0.003*** [6.85]
<i>LEV</i>	-0.426*** [-49.90]	0.148*** [6.11]	0.122*** [5.15]	0.157*** [11.49]	-0.431*** [-20.94]	0.133*** [5.37]	0.107*** [4.43]	0.138*** [9.94]
<i>ROA</i>	-	-0.096*** [-16.79]	-0.093*** [-16.42]	-0.091*** [-31.26]	-	-0.089*** [-15.34]	-0.088*** [-15.34]	-0.086*** [-29.15]
<i>LOSS</i>	-	0.243*** [17.06]	0.247*** [17.51]	0.124*** [17.89]	-	0.274*** [19.22]	0.275*** [19.49]	0.116*** [16.07]
<i>FOREIGN</i>	-	0.041*** [3.33]	0.032*** [2.66]	0.248*** [36.52]	-	0.029** [2.26]	0.023* [1.80]	0.274*** [37.98]
<i>MERGER</i>	-	0.092*** [13.30]	0.097*** [13.68]	0.040*** [3.90]	-	0.085*** [12.06]	0.084*** [12.15]	0.027** [2.53]
<i>SEG_BUS</i>	-	0.128*** [12.69]	0.130*** [12.97]	0.099*** [29.67]	-	0.129*** [12.34]	0.121*** [11.73]	0.086*** [25.87]
<i>SPI</i>	-	0.148*** [17.30]	0.145*** [16.97]	0.150*** [22.97]	-	0.136*** [15.78]	0.126*** [14.76]	0.129*** [18.82]
<i>COMP</i>	-	0.427*** [9.96]	0.357*** [9.17]	0.439*** [21.07]	-	0.380*** [8.72]	0.334*** [8.51]	0.395*** [18.51]
<i>LIT</i>	-	0.004 [0.20]	0.009 [0.50]	-0.003 [-0.41]	-	0.034* [1.82]	0.036** [1.98]	0.026*** [2.98]
Constant	0.401*** [10.79]	8.599*** [47.70]	8.739*** [48.58]	8.679*** [146.00]	0.278*** [4.83]	8.540*** [42.62]	8.448*** [42.38]	8.397*** [129.86]
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	49,842	49,842	49,842	49,842	42,851	42,851	42,851	42,851
Adjusted R ²	0.33	0.81	0.81	0.81	0.33	0.81	0.81	0.81
Indirect effect	-	-	-	0.0026*** [6.18]	-	-	-	0.0010*** [8.78]
Direct effect	-	-	-	0.0483*** [8.47]	-	-	-	0.0476*** [15.45]
Total effect	-	-	-	0.0509*** [8.90]	-	-	-	0.0486*** [15.46]

Notes: This table reports the mediation test results for the effect of financing constraints on audit fees. The regression models are estimated using ordinary least squares (OLS) with standard errors adjusted for heteroskedasticity and within-firm clustering. Robust standard-errors in brackets. *** Indicates 0.01 significance level for a two-tailed test. ** Indicates 0.05 significance level for a two-tailed test. Variable definitions are presented in Appendix section.

Table 7: Mediation test using financial reporting quality as the mediating channel

Dep. Variable	FC_SA (1) DAC	FC_SA (2) LN_AF	FC_SA (3) LN_AF	FC_SA (4) LN_AF	FC_CON (5) DAC	FC_CON (6) LN_AF	FC_CON (7) LN_AF	FC_CON (8) LN_AF
<i>FC</i>	0.017*** [24.91]	-	0.043*** [3.22]	0.0404*** [7.11]	0.003*** [7.13]	-	0.050*** [12.10]	0.0493*** [15.96]
<i>/DAC/</i>	-	0.167*** [3.63]	-	0.147*** [4.14]	-	0.153*** [3.21]	-	0.139*** [3.78]
<i>CFO_TA</i>	-0.00017 [-1.50]				-0.00016 [-1.39]			-
<i>BIG4</i>	-0.013*** [-12.81]	0.306*** [18.00]	0.307*** [18.06]	0.308*** [37.48]	-0.015*** [-12.84]	0.351*** [20.61]	0.339*** [20.12]	0.341*** [39.25]
<i>SPEC</i>	-0.000 [-0.29]	0.100*** [7.84]	0.099*** [7.73]	0.099*** [12.85]	-0.000 [-0.12]	0.086*** [6.63]	0.086*** [6.67]	0.086*** [10.48]
<i>GC</i>	-	0.207*** [10.93]	0.205*** [10.71]	0.199*** [15.32]	-	0.169*** [8.73]	0.170*** [8.82]	0.164*** [12.27]
<i>ARL</i>	-	0.001*** [7.23]	0.001*** [7.05]	0.001*** [13.73]	-	0.003*** [13.28]	0.003*** [13.11]	0.003*** [22.67]
<i>BUSY</i>	-	0.074*** [5.63]	0.072*** [5.44]	0.071*** [11.35]	-	0.102*** [7.61]	0.099*** [7.46]	0.098*** [14.83]
<i>RESTATE</i>	-	0.130*** [13.17]	0.132*** [13.49]	0.132*** [14.16]	-	0.113*** [11.46]	0.112*** [11.32]	0.112*** [11.84]
<i>SIZE</i>	-0.005*** [-16.75]	0.503*** [102.32]	0.514*** [82.94]	0.514*** [203.26]	-0.011*** [-43.85]	0.494*** [97.71]	0.487*** [96.11]	0.488*** [207.03]
<i>MTB</i>	0.000*** [5.53]	0.003*** [6.04]	0.003*** [6.05]	0.003*** [7.34]	0.000*** [6.08]	0.003*** [5.92]	0.003*** [6.13]	0.003*** [7.32]
<i>LEV</i>	0.011*** [6.27]	0.116*** [4.77]	0.114*** [4.70]	0.114*** [8.33]	0.012*** [6.69]	0.109*** [4.37]	0.101*** [4.06]	0.100*** [7.12]
<i>ROA</i>	-	-0.118*** [-16.51]	-0.116*** [-16.32]	-0.115*** [-29.81]	-	-0.108*** [-15.41]	-0.107*** [-15.38]	-0.107*** [-27.65]
<i>LOSS</i>	0.004*** [5.05]	0.134*** [13.24]	0.131*** [13.05]	0.131*** [19.11]	0.006*** [6.45]	0.135*** [12.85]	0.122*** [11.80]	0.122*** [16.78]
<i>FOREIGN</i>	-	0.244*** [17.25]	0.248*** [17.55]	0.249*** [36.91]	-	0.276*** [19.41]	0.275*** [19.56]	0.276*** [38.06]

The Effect of Financial Constraints on Audit Fees

Table 7 (continued)

<i>MERGER</i>	-	0.036*** [2.92]	0.034*** [2.80]	0.034*** [3.40]	-	0.023* [1.78]	0.022* [1.76]	0.022** [2.06]
<i>SEG_BUS</i>	-	0.088*** [12.83]	0.095*** [13.36]	0.095*** [28.63]	-	0.081*** [11.66]	0.083*** [11.98]	0.083*** [24.91]
<i>SPI</i>	-	0.142*** [16.59]	0.143*** [16.66]	0.143*** [22.06]	-	0.131*** [15.08]	0.124*** [14.47]	0.124*** [18.13]
<i>COMP</i>	-	0.349*** [8.97]	0.366*** [9.34]	0.360*** [18.99]	-	0.319*** [8.06]	0.342*** [8.70]	0.338*** [17.22]
<i>LIT</i>	-	0.013 [0.69]	0.010 [0.53]	0.009 [1.05]	-	0.042** [2.30]	0.037** [2.02]	0.036*** [4.12]
Constant	0.164*** [22.71]	8.634*** [50.33]	8.719*** [51.08]	8.696*** [150.13]	0.134*** [15.97]	8.560*** [43.93]	8.433*** [43.63]	8.418*** [131.59]
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	49,572	49,572	49,572	49,572	42,593	42,593	42,593	42,593
Adjusted R ²	0.14	0.81	0.81	0.81	0.13	0.81	0.81	0.81
Indirect effect	-	-	-	0.0025*** [4.08]	-	-	-	0.00014*** [6.53]
Direct effect	-	-	-	0.0404*** [7.11]	-	-	-	0.0493*** [15.96]
Total effect	-	-	-	0.0428*** [7.56]	-	-	-	0.0497*** [16.93]

Notes: This table reports the mediation test results for the effect of financing constraints on audit fees. The regression models are estimated using ordinary least squares (OLS) with standard errors adjusted for heteroskedasticity and within-firm clustering. Robust standard-errors in brackets. *** Indicates 0.01 significance level for a two-tailed test. ** Indicates 0.05 significance level for a two-tailed test. Variable definitions are presented in Appendix section.

Table 8: Mediation test using corporate tax avoidance as the mediating channel

Dep. Variable	FC_SA (1) CETR*-1	FC_SA (2) LN_AF	FC_SA (3) LN_AF	FC_SA (4) LN_AF	FC_CON (5) CETR*-1	FC_CON (6) LN_AF	FC_CON (7) LN_AF	FC_CON (8) LN_AF
<i>FC</i>	0.010*** [4.71]	-	0.039** [2.19]	0.038*** [4.50]	0.002 [1.57]	-	0.046*** [7.34]	0.046*** [9.46]
<i>CETR*-1</i>	-	-0.033 [-0.85]	-	0.077*** [2.73]	-	0.032 [0.82]	-	0.152*** [5.17]
<i>CASH</i>	0.001 [0.06]	-	-	-	-0.010 [-1.08]	-	-	-
<i>INTANG</i>	-0.018** [-2.26]	-	-	-	-0.013 [-1.53]	-	-	-
<i>NOL_D</i>	0.078*** [27.94]	-	-	-	0.089*** [29.97]	-	-	-
<i>LN_EMP</i>	-0.016*** [-8.41]	-	-	-	-0.009*** [-4.87]	-	-	-
<i>CFO_VOL</i>	0.049*** [3.62]	-	-	-	0.073*** [3.93]	-	-	-
<i>R&D</i>	0.216*** [7.61]	-	-	-	0.249*** [8.27]	-	-	-
<i>BIG4</i>	-	0.279*** [10.53]	0.282*** [10.68]	0.281*** [20.47]	-	0.291*** [10.84]	0.286*** [10.76]	0.286*** [19.89]
<i>SPEC</i>	-	0.084*** [5.02]	0.083*** [4.95]	0.083*** [7.32]	-	0.075*** [4.39]	0.076*** [4.44]	0.076*** [6.46]
<i>GC</i>	-	0.479*** [4.39]	0.472*** [4.32]	0.470*** [5.34]	-	0.344*** [3.64]	0.327*** [3.51]	0.321*** [3.49]
<i>ARL</i>	-	0.002*** [4.85]	0.002*** [4.60]	0.002*** [9.20]	-	0.003*** [7.77]	0.003*** [7.65]	0.003*** [13.36]
<i>BUSY</i>	-	0.085*** [4.40]	0.081*** [4.22]	0.081*** [8.25]	-	0.116*** [5.98]	0.113*** [5.93]	0.112*** [10.86]
<i>RESTATE</i>	-	0.130*** [8.43]	0.132*** [8.53]	0.132*** [9.01]	-	0.122*** [7.86]	0.122*** [7.88]	0.123*** [8.30]
<i>SIZE</i>	0.009*** [6.68]	0.520*** [67.75]	0.529*** [61.00]	0.528*** [138.14]	0.002** [2.13]	0.518*** [65.25]	0.513*** [63.90]	0.513*** [134.84]

The Effect of Financial Constraints on Audit Fees

Table 8 (continued)

<i>MTB</i>	0.000 [0.96]	0.005*** [4.87]	0.005*** [4.85]	0.005*** [6.26]	0.000 [0.28]	0.006*** [4.93]	0.006*** [4.88]	0.006*** [6.30]
<i>LEV</i>	0.074*** [9.43]	0.137*** [2.81]	0.128*** [2.63]	0.121*** [4.18]	0.051*** [6.99]	0.128** [2.56]	0.113** [2.29]	0.102*** [3.40]
<i>ROA</i>	0.249*** [11.61]	-0.129 [-0.90]	-0.139 [-0.97]	-0.155* [-1.93]	0.167*** [6.42]	-0.023 [-0.16]	0.005 [0.03]	-0.019 [-0.22]
<i>LOSS</i>	-	0.166*** [4.18]	0.166*** [4.19]	0.162*** [4.24]	-	0.159*** [3.69]	0.151*** [3.52]	0.152*** [3.67]
<i>FOREIGN</i>	-0.017*** [-5.93]	0.273*** [12.30]	0.278*** [12.54]	0.277*** [26.28]	-0.021*** [-6.94]	0.298*** [13.13]	0.298*** [13.26]	0.298*** [26.38]
<i>MERGER</i>	-	0.010 [0.62]	0.009 [0.53]	0.009 [0.61]	-	0.000 [0.01]	-0.001 [-0.07]	-0.001 [-0.08]
<i>SEG_BUS</i>	-	0.082*** [8.83]	0.090*** [8.98]	0.090*** [17.69]	-	0.077*** [8.24]	0.079*** [8.54]	0.079*** [15.78]
<i>SPI</i>	-	0.169*** [11.82]	0.169*** [11.79]	0.168*** [16.20]	-	0.164*** [11.10]	0.157*** [10.83]	0.156*** [14.29]
<i>COMP</i>	-	0.450*** [6.66]	0.464*** [6.83]	0.462*** [14.13]	-	0.438*** [6.44]	0.452*** [6.69]	0.455*** [13.50]
<i>LIT</i>	0.017*** [4.21]	0.029 [1.02]	0.022 [0.78]	0.020 [1.38]	0.018*** [4.16]	0.051* [1.73]	0.045 [1.53]	0.039*** [2.63]
Constant	-0.280*** [-12.63]	8.608*** [35.59]	8.687*** [36.39]	8.704*** [101.26]	-0.304*** [-13.13]	8.472*** [34.49]	8.320*** [34.13]	8.362*** [93.28]
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,579	17,579	17,579	17,579	15,200	15,200	15,200	15,200
Adjusted R ²	0.13	0.82	0.82	0.82	0.13	0.82	0.82	0.83
Indirect effect	-	-	-	0.00077** [2.36]	-	-	-	0.00031 [1.50]
Direct effect	-	-	-	0.03805*** [4.50]	-	-	-	0.046*** [9.46]
Total effect	-	-	-	0.0388*** [4.60]	-	-	-	0.04631 [9.31]

Notes: This table reports the mediation test results for the effect of financing constraints on audit fees. The regression models are estimated using ordinary least squares (OLS) with standard errors adjusted for heteroskedasticity and within-firm clustering. Robust standard-errors in brackets. *** Indicates 0.01 significance level for a two-tailed test. ** Indicates 0.05 significance level for a two-tailed test. Variable definitions are presented in Appendix section.

5. Conclusions

This paper examines financial constraints as a potential determinant of audit fees, and investigate three possible channels through which this relationship might be further revealed. The results, based on a large sample of U.S.-listed firms are consistent with greater levels of financial constraints being associated with higher audit fees. The interpretation of this evidence that emerges from this study is that financial constraints reflect information that represents higher audit risk, thus, increases auditors' effort and, therefore, induces them to charge higher fees. The results confirm that the relation between financial constraints and audit fees is also mediated by cash holdings, discretionary accruals and corporate tax avoidance. These results are robust to alternative proxies for financial constraints and to alternative regression specifications. Although this study is based on a large dataset of US companies, the results the results obtained may not be generalizable across other markets and the emerging markets.

Overall, this study contributes to the audit literature by documenting how auditors react, in terms of audit fees, to firms' financial constraints. This study also contributes to the emerging research that enriches our understanding of certain economic consequences of firms' financial constraints.

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Appendix A

Table A1: Variable Definitions

Variables	Definition
<i>AF_LN</i>	Natural log of audit fees.
<i>FC_SA</i>	We follow Hadlock and Pierce (2010) and use SA Index as our financing constraint measure. They find that leverage, cash flow and, particularly, firm size and firm age are useful predictors of financial constraints. The SA index is derived using the formula: $-0.737*SIZE+0.043*SIZE^2-0.040*AGE$ where <i>SIZE</i> is the natural log of book assets (in millions).
<i>FC_WW</i>	The financing constraints measure developed by Whited and Wu (2006). The WW index is a linear combination of six empirical factors: cash flow to total assets (-), sales growth (-), long-term debt to total assets (+), log of total assets (-), dividend policy indicator (-), and the firm's three-digit industry sales growth (+).
<i>FC_CON</i>	Natural logarithm of the number of words in the 10-K that are constraining. Examples of constraining words include <i>required</i> , <i>obligations</i> , <i>requirements</i> , <i>comply</i> , and <i>require</i> . A complete list of 184 constraining words is presented in appendix C to the Bodnaruk <i>et al.</i> (2015) paper.
<i>FC_DELAY</i>	Hoberg and Maksimovik (2014) text-based financing constraint measure. They focus on mandated disclosures regarding each firm's liquidity, as well as the discussion of the sources of capital each firm intends to use in addressing its financing needs. <i>FC_DELAY</i> captures financial constraints due to broad liquidity challenges leading to potential under-investment.
<i>LN_CASH</i>	Natural logarithm of cash and marketable securities (<i>CHE</i>) divided by net assets (<i>AT</i> - <i>CHE</i>). Cash and marketable securities are deflated by the book value of total assets, net of liquid assets, under the assumption that a firm's ability to generate future profits is a function of its assets in place. Following Itzkowitz (2013) we use the natural log of one plus the ratio of cash to net assets.
<i>CASH_TA</i>	Cash and marketable securities (<i>CHE</i>) divided by total assets (<i>AT</i>).
<i>DAC</i>	The residuals from a cross-sectional estimation of the modified Jones model, controlling for firm performance (Dechow <i>et al.</i> , 1995; Kothari <i>et al.</i> , 2005). We estimate the model for all firms in the same industry (using the SIC two-digit industry code) with at least eight observations in an industry in a particular year.
<i>CETR</i>	Cash effective tax rates defined as cash taxes paid (TXPD)/ [pre-tax income (PI) minus special items (SP)]. We exclude observations with negative TXPD and PI. We also exclude observations $CETR \leq 0$ and $CETR > 1.00$. In order to obtain <i>CETR</i> *-1, we multiply <i>CETR</i> by -1 so that higher values imply more cash savings through increased tax avoidance.
<i>BIG4</i>	An indicator variable that equals 1 if the firm is audited by Deloitte & Touche, Ernst & Young, KPMG, or PricewaterhouseCoopers, and 0 otherwise
<i>SPEC</i>	A dummy variable coded 1 if, in a particular year, the auditor has the largest market share in a two-digit SIC industry and if its market share is at least ten percentage points greater than the second largest industry leader in a national audit market, and 0 otherwise.
<i>GC</i>	An indicator variable that equals 1 if the firm receives a going-concern opinion, and 0 otherwise.
<i>ARL</i>	The natural log of number of days between the fiscal year-end and the annual earnings announcement date.
<i>BUSY</i>	An indicator variable that equals 1 if the firm's fiscal year-end is December 31 and 0 otherwise.
<i>RESTATE</i>	An indicator variable that equals 1 if the firm has a financial statement restatement and 0 otherwise.
<i>ICW</i>	An indicator variable coded 1 if the firm had any material weakness in internal controls, 0 otherwise.
<i>SIZE</i>	Natural log of total assets.

Table A1 (*continued*)

<i>MTB</i>	The firm's market-to-book ratio defined as the market value of its equity divided by the book value of its equity.
<i>LEV</i>	Firm leverage measured as the sum of total debt over total assets.
<i>ROA</i>	The firm's return-on-assets calculated as net income before extraordinary items, divided by beginning-of-the-year total assets.
<i>ROE</i>	The firm's return-on-equity calculated as net income before extraordinary items, divided by beginning-of-the-year total equity.
<i>LOSS</i>	An indicator variable that equals 1 if the firm's net income before extraordinary items is negative, and 0 otherwise.
<i>FOREIGN</i>	The percentage of foreign sales to total sales.
<i>MERGER</i>	An indicator variable that equals 1 if the firm had a merger or acquisition, and 0 otherwise.
<i>SEG_BUS</i>	The natural log of the number of a firm's business segments.
<i>SPI</i>	An indicator variable that equals 1 if the firm reports special items, and 0 otherwise.
<i>COMP</i>	Firm complexity measured as the sum of the firm's receivables and inventory divided by its total assets.
<i>LIT</i>	An indicator variable coded 1 if firm-year observations belong to biotechnology (SIC codes 2833–2836 and 8731–8734), computers (SIC codes 3570–3577 and 7370–7374), electronics (SIC codes 3600–3674), and retailing (SIC codes 5200–5961), and zero otherwise.
<i>NWC</i>	Net working capital calculated as working capital (<i>WCAP</i>) minus cash and marketable securities (<i>CHE</i>) scaled by total assets (<i>AT</i>).
<i>CAPEX</i>	Capital expenditure (<i>CAPX</i>) divided by total net assets (<i>AT</i>).
<i>R&D</i>	R&D (<i>XRD</i>) over sales (<i>SALE</i>). We replace missing R&D with zero.
<i>DIV</i>	Dividends scaled by income before extraordinary items (<i>DVC/IB</i>).
<i>DIV_D</i>	An indicator variable that equals 1 if the firm paid dividends during the year, and 0 otherwise.
<i>CFO_TA</i>	Operating cash flow deflated by total assets (<i>AT</i>). Operating cash flow is measured as income before extraordinary items (<i>IB</i>) minus dividends to common shareholders (<i>DVC</i>).
<i>CFO_VOL</i>	Rolling standard deviation of the CFO over past 3 years for firms in the same industry as defined by the 2-digit SIC code.
<i>NOL_D</i>	An indicator variable set equal to 1 if there is a tax loss carried forward during year <i>t</i> , and 0 otherwise.
<i>INTANG</i>	Intangible assets as a proportion of total assets.
<i>LN_EMP</i>	Natural log of number of employees.
<i>RE_TA</i>	Retained earnings divided by total assets.
<i>RATING</i>	A dummy variable coded 1 for firm-year observations that do not have their short-term debt or long-term debt rated by S&P, and 0 otherwise.
