Intellectual Capital Disclosure, Earnings Quality, and Audit Effort

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Abstract: Recent revisions to International Standard on Auditing 720 (UK) require some forms of assurance on company Strategic Report (SR), relating to "other information" included in a firm's annual report. As the standard was being implemented, auditors and regulators have raised concerns about the impact of these reforms. The purpose of this paper is to investigate whether intellectual capital (IC) information disclosed in SR is associated with higher audit effort carried out by external auditors. By including new and unique disclosure variables in the audit fee model, we predict and find that firms with more IC disclosure in the previous year pay higher audit fees (proxied for audit effort) in the current year. The results are robust once we control for risk-based, firm-specific and audit-related factors. Results from conditional tests on earnings quality further suggest a robust relationship between IC disclosure and audit effort. Overall, our results suggest that IC disclosure behavior in SR significantly affects audit effort. This study provides direct evidence for the recent regulation adoptions of auditing in the UK, and thus our findings are of interest to standard setters, researchers, and practitioners involved in auditing and assurance works.

Keywords: nonfinancial disclosure, earnings quality, audit effort, audit fee, strategic report, UK

Intellectual Capital Disclosure, Earnings

Quality, and Audit Effort

1. Introduction

The change in the Companies Act in the United Kingdom (UK) has required all companies listed in the London Stock Exchange (LSE) to include a strategic report (SR) in their annual reports (Companies Act 2006, as amended with relevant regulation in 2013). SR commonly includes a number of meaningful disclosures of the business model, development, strategy, position, performance, and prospects (FRC, 2018), widely covering the content of intellectual capital (IC) information. External auditors, on the other hand, are required to attest to the information contained in SRs. The objective of this paper is, therefore, to examine empirically an unexplored issue so far which is the relation between the quantity of IC disclosures published in SRs and the audit effort exerted by external auditors to verify those attestations within client SRs. Through examining this relationship, we provide evidence on the extent to which auditing firms appear to incorporate IC-related information in their audit planning. Conditioning on earnings quality in such a relationship, we further provide evidence that enhances our understanding of the underlying determinant (i.e., financial information) of audit fees.

While prior IC disclosure studies evidence the benefits from reduced information asymmetry, such as lowering the cost of equity capital (Mangena et al., 2016), driving market value (Bukh et al., 2005), enhancing a firm's debt capacity (Liu and Wong, 2011) and guiding investors' investment decisions (García-Meca and Martínez, 2007; Abhayawansa et al., 2018), there is a paucity of research into whether auditors incorporate IC-related information into their work. Many auditing studies motivated by certain regulation adoptions have examined financial reporting (e.g., Raghunandan and Rama; 2006; Hong and Hwang, 2018) and voluntary disclosure (e.g., Ball et al., 2012; Yang et al., 2018; Hossain et al., 2019; Nasr, 2022). To our knowledge, however, litter research exists on the effects of companies' IC disclosures on auditing costs (Demartini and Trucco, 2016).

Investigating the extent to which firms that disclose more IC information are likely to require a higher (or lower) audit effort is consistent with an analysis in Bell et al. (2001: 36) who state that "*the publicly available information about the riskiness of the company is efficiently impounded in a market-determined audit price and explicit consideration of a company's risk is not required for an individual audit firm*". They found that high business risk causes an increase in the number of auditor hours but not the fee per hour (Bell et al., 2001). In our study, discussing the business risk arising from IC disclosure in SRs is in the context of International Standards on Auditing ISA (UK) 720[1] (FRC, 2016b: 5), and we raise concerns about new challenges to audit workloads. Compared to the previous ISA (UK) on narrative

[1] The International Standard on Auditing [ISA] (UK) 720 requires auditors to assure the statutory other information (i.e., financial and non-financial information included in an entity's annual report other than financial statements and the auditor's report., such as the strategic report), and confirm whether the SRs are free of material misstatements and whether information given in the SR for the financial year is consistent with financial statements (FRC, 2016b). This regulation has been implemented since 17 June 2016.

information[2], the recently revised ISA (UK) 720 provides a meaningful context for this research to investigate the impact of IC information content in SR on auditing.

We also consider IC disclosure and its relationship with audit effort as appropriate in the context of ISA (UK) 315, which requires a business risk assessment in the audit planning to gain understanding of the entity's objectives, strategies, operations, investments, internal control, and financial performance (FRC, 2016a: 3-4). On one hand, these substantial revisions encourage firms to provide a high level of narratives to shareholders. On the other hand, the increased level of nonfinancial information (NFI) in SR may increase the burden on the additional obligations imposed by regulations to the work undertaken by auditors. It is, therefore, not surprising that FTSE 350 companies experienced the most sharply increase in audit fees between 2017 and 2018 following implemented in 2016, as reported by FRC (2019). Hence, we tend to provide evidence on whether IC disclosure in SRs, a contributing factor in a business's value creation processes, may associate with the degree of audit effort as reflected in the audit fees.

IC information is concerned with value realization in the forms of historical value generated by a company (Roslender and Fincham, 2004), and value creation in the forms of forward looking to deliver sustainable competitive advantage (Boedker et al., 2005: 515). Potentially, such voluntary-based disclosure is able to provide an understanding of firms' total value behind financial statements (Lev and Zarowin, 1999). Considering the practically dynamic nature of IC, MERITUM (2002) specifies two notions that may exist simultaneously within firms – *Static* and *Dynamic* – where IC is more than simply the sum of a firm's human capital (HC), structural capital (SC) and relational capital (RC)[3]. In a similar vein, the nature of 'connectivity' has been noted by analytical IC studies (e.g., Beattie and Smith, 2013: 249). Even more important to be likely challenging auditors, few researchers have taken this perspective to examine IC information (or NFI) and attempted to explain their impact on auditing matters. Other than IC disclosure in general, we further test the dynamics and connectivity of IC on audit effort.

A further concern of the study is that the relationship between IC disclosure and audit effort could be conditional on earnings quality. Consistent with prior research (Francis et al., 2008; Caramanis and Lennox, 2008), earnings quality represents the level of information transparency emanating from a firm's financial accounting system. Such transparency is the basis of auditing and could affect the auditors' workloads in disclosures. Following Francis et al. (2008), we measure

[2] Previously, as Beattie and Smith (2012: 492) noted, *"voluntary disclosure in the annual report is merely 'reviewed' by the auditors for consistency with the financial statements, and so may not be fully credible"*.

[3] *Static* would be considered as IC resources that can be measured at any given time, such as IP rights/certain technologies (SC), skills (HC) and customer satisfaction index (RC), while *dynamic* sustains and improves existing ones in relation to the activities of allocating and developing IC resources, such as training activities/employee surveys (HC), R&D investments (SC) and business collaboration policies (RC). For instance, *human capital* includes information such as employee skills, know-how, competence, education, vocational qualification, work-related knowledge, work-related competencies and entrepreneurial spirit; *structural capital*, such as information system, quality, innovation, R&D, technologies, corporate image, organizational documents and concepts; and *relational* capital, such as brands, customer satisfaction, market share, supplier relationship, and relationship with shareholders/other stakeholders (Guthrie and Petty, 2000; Edvinsson and Malone, 1997; MERITUM, 2002; Ricceri, 2008).

earnings quality by the common factor estimated on accruals quality, abnormal accruals, and earnings variability.

Our findings support the two hypotheses of this study, as evidenced by examining the relation between current one-year audit fees (proxied for audit effort) and IC disclosures in SRs of FTSE 350 companies from the previous period[4]. The results hold for disclosures in *overall*, *notion*, *structural capital*, and *connectedness with strategy*. These findings are robust to controlling for risk-based, firm-specific and audit-related factors. We also found that clients pay more audit fees when their earnings quality stays higher over the course of a decade.

We make several important contributions. First, this study directly examines the effects of the auditing regulatory revisions in the UK audit market and provides relevant and appropriate evidence to public policy makers. Second, prior studies highlighted various benefits of disclosing IC information to the capital market but showed very limited evidence on the impact of the costs of IC disclosures. We demonstrate that IC disclosures are an important part of 'other information' in corporate annual reports and are the strong determinant of audit effort. This consideration of IC disclosures by auditors is happening regardless of the company earnings quality. An additional contribution of this study is that we provide a link between the disclosure literature and the literature in auditing, especially when we construct for both IC disclosure and earnings quality within the audit fee model. While prior research on the consequences of IC disclosure largely focused on investors, we take a back seat to information intermediaries, i.e., auditors. By examining IC disclosure in its dynamics for each construct and for a constant sample of firms, our study provides an initial trial of these issues.

The rest of this paper is organized as follows: the next section reviews the literature and develops the hypotheses, followed by research design in Section 3. Section 4 presents data and empirical results, and additional analyses. Conclusions are drawn in section 5.

2. Literature Review and Hypothesis Development

Intellectual capital (IC) is a comprehensive set of knowledge, networks, capabilities, operation processes and organizational relations that drive a firm's value creation (e.g., Stewart, 1997; Edvinsson and Malone, 1997; Sveiby, 1997; MERITUM, 2002; OECD, 2006). An effective reporting of IC complements traditional transaction-based financial reporting for accountability needs and investment decision making (Lev, 2001; OECD, 2006; Beattie et al., 2002; Guthrie et al., 2006; Zimmerman, 2015). A large number of prior studies on IC disclosure in annual reports have been conducted in many regions of the world. Studies in European countries are rich including Ireland (e.g., Brennan, 2001), Italy (e.g., Bozzolan et al., 2003; Cordazzo, 2007), Denmark (e.g., Bukh et al., 2005; Vergauwen et al., 2007), Spain (e.g., García-Meca and Martínez, 2005), Germany (e.g., Gerpott et al., 2008), Portugal (e.g., Oliveira et al., 2010), Sweden (e.g., Vandemaele et al., 2005; Vergauwen et al., 2007), the Netherlands (e.g., Vergauwen and van Alem, 2005),

[4] A one-year lag sample period is upon the practice of most UK financial firms (e.g., KPMG), where a general fee will be agreed between clients and auditors in an engagement letter before the current fiscal year ends. Therefore, prior year disclosing behavior should be observable when current year audit fees are negotiated.

and the UK (e.g., Williams, 2001; Vandemaele et al., 2005; Bozzolan et al., 2006; Striukova et al., 2008; Li et al., 2008; Campbell and Rahman, 2010; Duff, 2018). Most of these studies concluded that disclosed IC information is in narrative forms and that there is a lack of consistency on the disclosure patterns.

It is commonly acknowledged that business risk is more related to company activities (e.g., its policies, targets, investments, business strategies) than company resources (e.g., its historical value, KPIs, situations) because of the uncertain future outcomes. We follow MERITUM' (2002) and provide a comprehensive insight into the IC disclosure effects on audit effort by considering *static* (i.e., IC-related resources) vs *dynamic* (i.e., IC-related activities). Further, we bring this logic into integrated constructs because integrating with IC has been a suggested area for future corporate reporting (e.g., Beattie and Smith, 2013; IIRC, 2013; 2021).

The motivation to focus on IC disclosure rather than other types of voluntary-based disclosure is grounded for two main reasons. First, the growing importance of IC is extensively examined. Empirical studies evidence that more IC disclosure is associated with lower cost of equity capital (Mangena et al., 2016), positive effect on market capitalization (Taliyang et al., 2014), high firms' debt capacity (Liu and Wong, 2011) and perceived high level of risk by external auditors (Demartini and Trucco, 2016). Second, after the recent new regulations, auditors in the UK are required to assure the contents of SR and confirm whether information given in SRs is consistent with the financial statements (FRC, 2016b; 2018)[5], while the required contents of SR[6] remain largely relevant to IC information. As discussed above, such information can deliver many meanings behind accounting figures, which can be largely informative for assessing a company's business risk to a trade-off. Thus, studying the relation of firms' IC disclosures with auditors' behavior reflects to the recent auditing standards and also is an empirical question worth exploring further.

2.1. Disclosure and audit effort

The central premise of the literature on disclosures is that demand for disclosures arises from information asymmetry in the capital market (Healy and Palepu, 2001). Disclosure of IC information has been evidenced as a way of reducing the information gap between shareholders and managers (Orens et al., 2009; Mangena et al., 2010; Boujelbene and Affes, 2013). At publicly listed firms, managers are motivated to keep transparency high by committing to an increased level of IC disclosure in order to reduce agency conflicts. Meanwhile, auditing as a mean of increasing the credibility of financial reporting must incur costs because audit effort can vary for committing to a particular level of company information transparency (Healy and Palepu, 2001; ICAEW, 2005). Although these auditor costs may offset the benefits from great disclosures, company managers are willing to pay more for verifying their credibility in the published information.

[5] The Guidance on SR requires auditors to state whether the information in the SRs is "(a) consistent with the financial statements, (b) has been prepared in accordance with legal requirements, and (c) contains any material misstatements" (FRC, 2018: 11). See the Note 1 as well.

[6] A central part of the SR is assigned to provide a holistic and meaningful picture of an entity's business model, development, strategy, position, performance, and prospects (FRC, 2018).

In respect of disclosure by companies, some studies have treated audit fees as a function of audit risk (e.g., Bell et al., 2001; Lyon and Maher, 2005; Demartini and Trucco, 2016; Wang et al., 2019), while others are more likely to proxy audit fees with audit effort (e.g., Davis, et al., 1993; Bentley et al., 2013; Hong and Hwang, 2018). Also, several studies directly use audit fees to explain business risks on disclosure (e.g., Raghunandan and Rama, 2006; Krishnan et al., 2012; Yang et al., 2018). Under the view of Bell et al. (2001), a counterargument from our study is that auditors can make efforts to mitigate the perceived risk rather than price the risks because auditors do not take direct legal liability for firms' business risk. Given that IC varies between companies in level of their business risk, we argue that auditors exert different levels of effort on their clients' IC disclosures.

Prior studies provide a strong evidence base that high audit fees are charged on audit assurance in terms of certain regulation adoptions. For example, Raghunandan and Rama (2006) find that audit fees are higher for those firms disclosing material weaknesses in internal controls over financial reporting pursuant to section 404 of SOX. Similarly, Hong and Hwang (2018) find that auditors increase their audit fees after the adoption of FAS 132(R)-1 about disclosure on pension plan assets. Prior literature also documents that audit fees are higher for firms with greater voluntary-based disclosures, such as management forecast disclosure (e.g., Ball et al., 2012; Krishnan et al., 2012; Shan et al., 2021), company risk disclosure (e.g., Yang et al., 2018), CSR disclosure (e.g., Chen et al., 2016; Wang et al., 2019), and narrative disclosure (e.g., Hossain et al., 2019). Bentley et al. (2013) find that auditors recognize business strategies as a more comprehensive business risk and adjust audit efforts in assessing their audit clients. In sum, evidence from these studies suggests increased audit effort necessary to assure firm-provided narrative information.

Guidance on the SRs within the ISA (UK) 720 specifically states that auditors should assess: 1) whether the issuance of SR is in accordance with legal requirements, 2) whether there are material misstatements in the SR, and 3) whether information given in SR is consistent with the financial statements (FRC, 2016b; 2018). Within a certain quality of audit service provided by audit firms, this new requirement would possibly increase auditor workloads. Other auditing standards, such as ISA 315 and ISA 330, have also encouraged auditors to perform a substantive procedure to obtain an understanding of the entity's operation, objectives, and strategies in relation to business risk (FRC, 2016a, 2017). The only prior work considering the new SR regime is done by Reid et al. (2019), who failed to find a significant relation between the increased mean number of areas/words in SRs and audit fees and called for further research on the new reporting requirement. This suggests a need of research on investigating certain information contents (like IC) disclosed in SRs, thereby specifically understanding the impacts of SR on audit work.

Despite that IC information is emphasized as a component of business risk in value creation (Holland, 2006), few studies include IC disclosure as a determinant of audit effort. To our knowledge, DeMartini and Trucco (2016) is the only attempt to explicitly focus on such relation in a sample of 166 UK firms and find that firms with more IC disclosures in their stand-alone social and intellectual capital statements

lowered audit risk but did not reduce audit fees. It implies that the perceived low audit risk may be rewarded by audit effort necessary to attest IC-related information.

Along with these recent reforms to auditing requirements that have been implemented in the UK since 2016, the fee paid by clients is more likely to reflect the increased workloads that auditors must perform to attest IC information within SRs. Ultimately, this leads to a direct test on whether auditors incorporate company IC information in their audit effort as reflected on audit fees. Therefore, our first hypothesis is as follows:

H1*: Company IC disclosure is positively associated with the level of audit effort.*

2.2. Disclosure, earnings quality, and audit effort

We further investigate whether company earnings quality (EQ) could be a condition of the relationship between IC disclosure and audit effort. Beyer et al. (2019) state that EQ is a measure of the information asymmetry caused by accounting estimates and earnings management, while auditing firms face higher litigation risk when their clients report poor earnings quality (Pratt and Stice, 1994; Heninger, 2001). Accounting literature documents that litigation risk effect is priced and shows that audit fees reflect possible future losses that may arise from the audited financial statements (Simunic 1980; Francis, 1984; Palmrose 1986; Francis and Simon 1987; Simon and Francis 1988; Pratt and Stice, 1994; Lyon and Maher, 2005). In addition, Caramanis and Lennox (2008) find that earnings will be less manipulated when audit effort is higher.

It is generally recognized that higher clients' earnings quality reduces audit risk. Bedard and Johnstone (2004) find that auditors exert greater audit effort and charge higher billing rates to clients with higher earnings manipulation risk. Literature also documents conflicting results about how earnings quality influences audit fees (e.g., Frankel et al., 2002; Kinney and Libby, 2002; Venkataraman et al., 2008; Mitra et al., 2009; Choudhary et al., 2019). One strand supports that the improved earnings quality incurs higher audit fees, and another strand shows that as earnings quality increases auditors have low risks and thus lower audit charges (Bedard and Johnstone, 2004).

A separate but related issue is whether IC disclosures reflect the level of EQ. According to Francis et al. (2008), the relationship between voluntary disclosure and earnings quality can be complementary or substitutive. Given auditors are now required to perform assurance of IC information disclosed within companies' SRs which in turn is linked to financial statements (as discussed in Section 2.1 above), EQ can take a first-order effect to determine the influence of IC disclosures on audit fees, followed by IC disclosures as a second-order effect. Specifically, if IC disclosures complement EQ, firms with better EQ will disclose more and then require more audit effort to assure more IC disclosures. In contrast, the audit effort will be less required if IC disclosure is a substitute of better EQ. In the opposite vein, firms with poor EQ will deliver a sign of high perceived risks arising from disclosed IC information and thus audit effort is argued to be higher regardless of the relations they are in.

Consequently, IC disclosure will affect the audit effort conditionally on EQ on either possibility of predicted signs. Therefore, we cannot specify the sign of the relation between IC disclosure and audit effort conditionally on EQ. Since fully controlling for these effects is less possible, disclosure may be related to the audit effort to the extent that IC disclosure absorbs such related omission of variables. We formally state this prediction concerning the relation between IC disclosure and audit effort conditional on earnings quality as:

***H2**: Controlling for earnings quality, IC disclosure is associated with the level of audit effort.*

3. Research Design

3.1. Measurement of main variables

The main variables in the present study are audit effort, IC disclosure score, and earnings quality. We specify how each of these variables is measured below.

3.1.1. Audit effort

Existing studies consider audit fees as a good proxy from different perspectives to serve different purposes. They could represent audit quality concerning about corporate governance interests in the pricing effect (e.g., Carcello et al., 2002; Goodwin-Stewart and Kent, 2006; Ghafran and O'Sullivan, 2017). Studies proxied audit fees for audit effort, such as Davis et al. (1993), Bentley et al. (2013), and Hong and Hwang (2018), while others explain audit fees from financial information verification (e.g., Ball et al., 2012; Chen et al, 2016). In addition, many studies have directly treated audit fees as a function of audit risk (e.g., Bell et al., 2001; Lyon and Maher, 2005; Demartini and Trucco, 2016; Wang et al., 2019), or business risk on disclosure (e.g., Raghunandan and Rama, 2006; Krishnan et al., 2012; Yang et al., 2018). In this study, audit fee is a proxy for audit effort by using the disclosed fees paid to auditors in the year t+1 for audit-related services. Following prior literature, the natural logarithm of the reported audit fee (*lnAFEE*) is used as the dependent variable.

3.1.2. IC disclosure score

The disclosure scores are constructed by content analysis approach which has been widely adopted by prior studies in IC research (e.g., Guthrie and Petty, 2000; Beattie and Thomson, 2007; Li et al., 2008; Brüggen et al., 2009; Cuozzo et al., 2017). In our study, the quantity of companies' IC disclosures is scored upon a self-developed index of 64 IC items, pertaining to a three-category scheme, namely human capital (HC), structural capital (SC), and relational capital (RC). There are 23 items in HC (e.g., employee know-how, competence, education, work-related competencies, entrepreneurial spirit, productivity, motivation and satisfaction, training, and development), 19 items in SC (e.g., communication system, technologies, intellectual property, business model, operation process and efficiency, infrastructure, management philosophy, research and development), and 22 items in RC (e.g., customers, suppliers, business collaborations, business agreements). The IC disclosure checklist for each item is presented in Appendix A.

[Insert Appendix A around here]

Scoring under 'text unit' is adopted to allow information across different categories to be coded separately when items from more than one IC categories appear in a sentence (Li et al., 2008; Abhayawansa and Guthrie, 2014). All coding analysis is manually organized with MAXQDA. Despite the popularity of text search, which increases the speed for data collection substantially and allows a larger sample size, it is not considered a good fit for this study given single words could have no meaning in the absence of sentences or other texts (Milne and Adler, 1999). Beattie and Thomson (2007) argue that IC information is meaningful in its own way, which could be missed from the word search approach. Further, visual content is also meaningful as pictures, tables, charts and diagrams have been used to communicate stories of firms' value creation (Steenkamp and Hooks, 2011). We only code relevant visual content as IC disclosure when it is substantiated by word descriptions.

In order to explore the disclosure effect of dynamic IC information, disclosure data was collected under either *static* or *dynamic*. Following the basic principles in MERITUM (2002), we define *static* information as certain features, such as result, status, situation, importance, relevance, and current practices, while *dynamic* information is characterized as activity, initiative, program, rule, guideline, policies, evaluation, etc. *Dynamic* emphasizes the importance of both operational and strategic activities in relation to sustaining IC-related resources (MERITUM, 2002). Moreover, this study has developed constructs on *connection* to capture IC information through two ways: connectedness across the three IC categories (i.e., HC, SC, RC) and connectedness with strategy.

For a multiple view, IC disclosure is measured in disclosure index *(ICDisc_index)* for the 'variety', frequency *(ICDisc_frqt)* for the 'focus', and word count *(ICDisc_wc)* for the 'volume' respectively. The disclosure index measure has been widely used in prior IC disclosure studies (e.g., Gray et al., 1995a; Haniffa and Cooke, 2002; Li et al., 2008; Whiting and Woodcock, 2011; Baldini and Liberatore, 2016). During the scoring, if an IC item in the checklist is disclosed in static or dynamic notion, a score of 1 is given and 0 otherwise. Like Li et al. (2008), the IC disclosure index $ICDisc\_index_j$ for each firm is calculated as follows:

$$ICDisc\_index_j = \frac{\sum_{i=1}^{n_j} X_{ij}}{n_j} \quad (1)$$

Where: n_j= number of items for j^{th} firm, n_j = 128 (i.e., 64 items in *static* or *dynamic*),
X_{ij}=1 if i^{th} item disclosed, 0 if i^{th} item not disclosed, so that 0 ≤ $ICDisc\_index_j$ ≤ 1.

Both frequency (*ICDisc_frqt*) and word count (*ICDisc_wc*) are grouped into the measurement method of frequency disclosure. *ICDisc_frqt* is measured as the total number of times an IC item is present per SR. This metric is argued to signify the importance of the items disclosed (Unerman, 2000). Although time-consuming to collect, it gives a comprehensive understanding of the 'focus' on IC items disclosed in the sampled SRs. *ICDisc_wc* further counts the words per IC item for each

presence as a third metric. *Connectedness* is measured by frequency and word count only.

3.1.3. Earnings quality

Due to the nature of earnings quality, there is no commonly agreed metric for the construct. Following Francis et al. (2008), we estimate earnings quality in four measures: accruals quality (*AQ*), abnormal accruals (*AA*), earnings variability (*EarnVar*), and a weighted average measure based on the first three metrics (*EarnQua*) from the principal component analysis (PCA)[7]. All the measures are estimated over a time series because the underlying EQ effect on audit fees is less likely to link with any individual years alone.

Our first proxy of EQ is accruals quality, based on the modified model of Dechow and Dichev (2002) by McNichols (2002) which views accruals as a function of past, present and future cash flows, and considers the property, plant and equipment (*PP&E*) and changes in revenue. Through firm-specific regressions of changes in working capital in the prior period, current period and future period, as well as the *PP&E* and changes in revenue, the standard deviation of these firm-specific residuals is the measure of *AQ*, where a lower standard deviation represents higher quality. Because of demanding long time-series of data for the regression-based estimation of *AQ*, it is estimated via equation (2) below for each firm using data from 2008 to 2016 and requires each firm to have 11 years of data, 2007-2017[8]. By generating a series of firm-time specific residuals to form the basis, *AQ* is the standard deviation of residuals for each firm over the estimated years. The higher the standard deviation, the poorer the accruals quality is.

$$\frac{TCA_{j,t}}{Asset_{j,t}} = k_0 + k_1\frac{CFO_{j,t-1}}{Asset_{j,t}} + k_2\frac{CFO_{j,t}}{Aset_{j,t}} + k_3\frac{CFO_{j,t+1}}{Asset_{j,t}} + k_4\frac{\Delta REV_{j,t}}{Asset_{j,t}} + k_5\frac{PPE_{j,t}}{Asset_{j,t}} + \epsilon_{j,t} \quad (2)$$

Where:

Subscripts j and t denote firm j, and year t, respectively.

TCA is total current accruals in year *t*, measured as changes in [current assets (CA: *DataStream* WC02201) – current liability (CL: *DataStream* WC03101) – cash (Cash: *DataStream* WC02003) + debt in current liabilities (STDEBT: *DataStream* WC03051)].

Asset is total assets *(DataStream* WC02999), measured by the average total assets in year *t* and *t-1*.

[7] Rather than factor analysis used by Francis et al. (2008), this study takes principal component analysis (PCA) to combine the three measures into a common factor based on the weighted average of each measure. It can allocate the importance of each measure in a connected relation.

[8] Sloan (1996) finds that earnings that can be sustained for a long period of time have higher quality. Thus, this accounting-based approach requires a time series of observations for each firm, and we consider a 9-year earnings with both a lead and lag cash flow term to the need of 11 years of data.

CFO is cash flow from operation in year *t*, measured by net income before extraordinary items (NIBE: *DataStream* WC01551) – total accrual [TA = change in CA – change in CL – change in Cash + change in STDEBT – depreciation & amortization expense (DEPN: *DataStream* WC01151)].

ΔREV is the change in revenues (*DataStream*: WC01001) between year *t* and *t-1*.

PPE is the gross value of property, plant and equipment (*DataStream*: WC02501) in year *t*.

The second proxy for EQ is the estimated abnormal accruals (AA, also termed 'discretionary accruals' in literature) by the modified Jones (1991). The first step is to estimate the cross-sectional regression to total accruals (*TA*) for each of the eight sector groups complying with the restriction of at least six observations per industry-year combination[9]. Second, we use the *TA* parameter estimates from equation (3) below to separate the *TA* into abnormal accruals (*AA*) and normal accruals (*NA*). *NA* is the predicted part of *TA*, while *AA* is the estimates from the equation (4). For being comparable to other two measures, the absolute by firm over the year 2008-2017 is averaged to get a firm-specific measure.

$$\frac{TA_{j,t}}{Asset_{j,t-1}} = k_1\frac{1}{Asset_{j,t-1}} + k_2\frac{(\Delta REV_{j,t} - \Delta REC_{j,t})}{Asset_{j,t-1}} + k_3\frac{PPE_{j,t}}{Asset_{j,t-1}} + \epsilon_{j,t} \quad (3)$$

$$AA_{j,t} = \frac{TA_{j,t}}{Asset_{j,t-1}} - [k_1\frac{1}{Asset_{j,t-1}} + k_2\frac{(\Delta REV_{j,t} - \Delta REC_{j,t})}{Asset_{j,t-1}} + k_3\frac{PPE_{j,t}}{Asset_{j,t-1}}] \quad (4)$$

Where:

Subscripts j and t denote firm j, and year t, respectively.

TA is total accruals in year *t*, measured as changes in [CA – CL – Cash + STDEBT – DEPN], ΔREV is change in revenue, PPE is the gross value of property, plant and equipment, and ΔREC is change in account receivable [calculated through account receivable days (*DataStream:* WC08131)].

Our third EQ measure, earnings variability (*EarnVar*), is the standard deviation of the firm's earnings over the period 2008-2017. 'Earnings' is defined as earnings before extraordinary items (NIBE), scaled by total assets. Higher value implies poorer earnings quality.

Finally, our fourth (final) proxy is the common factor generated from the use of principal component analysis (PCA) of the above three EQ measures, i.e., *AQ*, *AA*, and *EarnVar*. The common factor, *EarnQua*, retains the proportioning (weighted) of the underlying variables, *AQ*, *AA* and *EarnVar*. Larger values indicate poorer EQ.

3.2. Sample selection and data collection

The sample for this study is drawn from the FTSE 350 companies for the fiscal year end 2017 between 1 April 2017 and 31 March 2018. In line with prior

[9] The restriction applied is consistent with prior studies, such as García Lara et al. (2005), and Debnath (2017).

studies (e.g., Lim et al., 2007), the highly regulated firms from both Financial and Utilities sectors are excluded. Following ICB structure[10], we identified 208 companies from eight industries, i.e., Basic Resources, Consumer Goods, Consumer Services, Health Care, Industrials, Technology, Telecommunication, and Oil & Gas. Further, we required that companies have followed the guidance on Strategic Report (FRC, 2014; 2018), we excluded firms incorporated outside the UK[11] during the sample preparation and, thus, obtained a reduced sample size of 181 companies. We further excluded firms that are listed after 1 April 2017 and without a SR available to reach a useful sample of 175 companies. Further excluding firms that lack data necessary for tests, our final sample consists of 171 listed companies as shown in Table 1.

[Insert Table 1 around here]

Disclosure data was collected from strategic reports for the fiscal year 2017 for all companies in our final sample. Data for calculating our measure of EQ is collected from DataStream. Regarding audit fees and various control variables used in our empirical model, they were from either DataStream or FAME database depending on the availability.

4. Model specification

This study adopts the model of Bell et al. (2001) with three key modifications. First, we add voluntary-based IC disclosures as the principal independent variables which may reflect audit fees and audit effort. Second, we control for EQ that has been shown to be associated with litigation risk, primarily clarifying the concern that audit fees might absorb the effects of disclosure due to the omission of financial information transparency. Third, we change and add a few other control variables that associated with client risk and the UK context. Therefore, the audit fee models are formed as follows:

$$Log\ of\ audit\ fees = f\ (IC\ disclosure, controls) \quad (5)$$

$$Log\ of\ audit\ fees = f\ (IC\ disclosure, earnings\ quality, controls) \quad (6)$$

Where, IC disclosure includes *overall*, *notion*, *category*, and *connection* in three metrics: disclosure index, frequency and word count. As noted earlier, EQ is the common factor (*EarnQua*) estimated upon three underlying constructs, *AQ*, *AA* and *EarnVar*.

Following the existing audit fee research, we include a set of control variables concerning both company risk-related factors and firm-audit characteristics. Audit fee research commonly employs client risk proxies such as inventory and receivable ratios, gearing ratio, liquidity ratio, and company's loss to reflect audit risk exposure (e.g., Simunic and Stein, 1996; Lyon and Maher, 2005; Ghafran and O'Sullivan,

[10] The Industry Classification Benchmark (ICB) is an industry classification taxonomy launched by Dow Jones and FTSE in 2005. (See: https://research.ftserussell.com/products/downloads/ICB_Rules.pdf)

[11] FRC (2014, 2018) requires all companies that are not small or micro-entities to prepare a strategic report. In practice, some of non-UK incorporated companies (e.g., CRH PLC, TUI AG) still use names like 'strategic review' or 'combined management reports' with diverse coverage and formats. In order to remove ambiguity, only UK-incorporated companies are included in our sample.

2017). Prior studies provide mixed results for individual risk variables, but a consistent positive link between client risk and audit fees. Thus, five risk-related factors are included in this study. *LEV* is the ratio of debt to total capital. *BETA* is the slop coefficient to represent the risk level of shares for each firm on the market. *CREDIT* is the score of a firm's credit worthiness when bonds are issued. *ARCA* is the percentage of current assets scaled by account receivable, while *INVCA* is the percentage of current assets scaled by inventories.

Firm-specific control variables for this study are *SIZE* (sales turnover) to capture firm size as auditors exert more time and effort for a larger client than smaller client (O'Keefe et al., 1994; Chan, 1993; Hassan and Naser, 2013), *NAFEE* (non-audit fees) to capture demand for non-audit related services (e.g. consultancy, mergers and acquisitions, corporate finance, reorganization), and *BUSY* (audit timing) to capture the 'busy season' that could be the likelihood of higher audit fees from work pressures (López and Peters, 2011). We also consider the effects of a firm' profitability and complexity through *ROA* (return on assets) and *NSUB* (number of subsidiaries) respectively. In addition to this, upon Basioudis and Francis (2007) who focused on the UK context, we add audit-related variables of *TENU* (audit tenure), *DURA* (duration of auditing), *LONDON* (London-based location), and *AUDITOR* (industry leader). Descriptions for each variable discussed above are detailed in Appendix B.

[Insert Appendix B around here]

Both models (5 & 6) are to test *H1* and *H2* respectively by using OLS estimation with robust standard errors. All variables are winsorized for regressions to avoid the influence of outliers. Multicollinearity problems have been tested during the selection of control variables.

5. Data Analysis and Results

5.1. Descriptive statistics

Table 2 provides the descriptive statistics for a basic understanding of all variables to be used in the regression models. The mean (median) index of *ICDisc_index* is 0.49 (0.48) with a range from 0.33 to 0.70, suggesting that 49% of 64 IC items is disclosed in the sample and nearly half of sampled firms disclosed 48% of these items. The mean (median) score of *ICDisc_frqt* is 250 (238), indicating that, on average, 250 times are disclosed upon the 64 IC items in the sampled firms. The mean of *ICDisc_wc* in the sample is 6,229 words with a highest of 16,508 and lowest of 2,317 words. Overall, the data indicates great variation in IC disclosure levels across the sampled firms.

The mean (median) value of *AFEE* is £2.85 (£1.15) million, whilst the mean (median) *NAFEE* is £0.70 (£0.2) million. The mean (median) *SIZE* is £7,532 (£1,753) million. This suggests that the sample size consists of larger firms. The mean (median) *LEV* is 35.3% (33.05%) which indicates that on average sampled firms have lower risk of insolvency. The mean (median) *ROA* is 9.6% (7.98%). Regarding auditing season (*BUSY*), about 55% of firms takes the fiscal year as 31st December. More than 50% of firms receive credit scores (*CREDIT*) of over 90. The mean

(median) account receivable scaled by current assets (*ARCA*) is around 38% for sampled firms, while the inventories (*INVCA*) accounts for 26% among current assets. The mean (median) *NSUB* is 175 (96). Half of sampled firms have the *BETA* index up to 0.80.

[Insert Table 2 around here]

In terms of proxies for earnings quality, the mean estimate of *AQ* is 0.029, which is similar to 0.028 reported by Dechow and Dichev (2002) and 0.026 by Francis et al. (2004) but larger than the mean 0.0159 reported by Francis et al. (2008). The proxy of *AA* shows the mean (median) value of 0.0417 (0.0326) that is slightly smaller than 0.0465 (0.0397) of Francis et al. (2008). However, the mean (median) of *EarnVa*r exhibits 0.0650 (0.0414), which is much larger than 0.0494 (0.0344) of Francis et al. (2008). The standard deviations for *AQ*, *AA* and *EarnVar* are 0.0196, 0.0284 and 0.0903 respectively, which suggests substantial cross-sectional variation among these variables.

Table 3 reports the pairwise correlation of key variables in this study. It is shown that disclosure variables (*ICDisc_index*, *lnICDisc_frqt* and *lnICDisc_wc*) have statistical correlation with audit fees ($p<0.01$), which means that auditors could view the verification of IC information in SRs as a workload-increasing activity. The correlation between *SIZE* and *lnAFEE* is 0.736, indicating a strong positive relation which is consistent with prior studies. In addition, the positive relations with *ARCA* (0.227), *LEV* (0.337) and *BETA* (0.369) suggest that firm-related risks are greatly considered by auditors. A negative relation was found for the *ROA*, which suggests that the more profitable a company, the less the audit fees are charged. With respect to earnings quality, these four measures were highly correlated. In addition to AQ, all other three proxies were negatively correlated with *lnAFEE*, suggesting that higher earning quality results in higher audit fees. However, it is noted that earnings quality and IC disclosure was not correlated.

[Insert Table 3 around here]

5.2. Multivariate analysis

Table 4 reports the results of both unconditional (labelled 'ICDisc') and conditional (labelled 'Both') tests for the predicted association between the quantity of IC disclosure and audit fees (proxied for audit effort). To specify the separate effect of EQ on the audit fees, we also report the results of examining the effect of EQ (labelled 'EarnQua'). Using the robust standard errors that allow for the presence of heteroskedasticity, we report coefficient estimates and *t*-statistics obtained from OLS regressions in Panel A after excluding all other factors, Panel B reports results after including risk factors, and Panel C after including both risk and other control factors. VIFs for all variables in the regressions range from 1.11 to 2.28, suggesting that multicollinearity would not be a problem. In terms of the adjusted *R*-square, the explanatory powers of three levels of regressions increased from below 20% to over 70%. For brevity, we only tabulate and discuss the principal component factor variable for earnings quality, *EarnQua*.

Panel A of Table 4 summarizes the results of regressions that exclude other factors to affect audit fees. These results show a significant unconditional positive relation between audit fees and IC disclosure scored by three measures (*t*-stat = 4.011 for *ICDisc_index*, *t*-stat = 6.484 for *ICDisc_frqt*, and *t*-stat = 6.044 for *ICDisc_wc*). It is evident that high levels of IC disclosure have a substantially larger effect (p value < 1%) on the audit effort than does low disclosure, which supports *H1*. The coefficient estimate on EQ (*EarnQua*) is negatively significant, indicating that high earnings quality leads to high audit effort. Further, the conditional tests show that when the *ICDisc* and EQ are included in a regression model, *ICDisc* is still strongly significant in explaining audit fees (*t*-stat = 3.907 for *ICDisc_index*, *t*-stat = 6.700 for *ICDisc_frqt*, and *t*-stat = 6.192 for *ICDisc_wc*). That supports *H2*.

[Insert Table 4 around here]

In addition, higher earnings quality (small accruals) results in higher audit fees, which is consistent with studies from Frankel et al. (2002) and Larcker and Richardson (2004). The negative sign of EQ itself also confirms the findings of Caramanis and Lennox (2008) that abnormal accruals are lower when audit hours are higher. Taken together, these results suggest that both great IC disclosures and better earnings quality require higher degree of audit effort.

Since audit services may be priced by levels of risk, tests are conducted by including risk-based factors: *ARCA*, *INVCA*, *LEV*, *BETA* and *CREDIT*. As presented in Panel B of Table 4, IC disclosure is distinct from these risk factors to keep strong significance at 1% level, while the second observation is that *EarnQua* is still negatively significant in any of the regressions. This finding is consistent with prior evidence (e.g., Simunic and Stein, 1996; Bell et al. 2001; Demartini and Trucco, 2016) that risk-related factors are important in the audit pricing, but reduced risks do not lower audit fees. Compared with conditional models, the significance of *ICDisc* in unconditional models suggests the possibility that *ARCA* explains the cross-sectional variation in the audit fees as EQ does. It indicates that accrual-based EQ measures might be intertwined with some of risk factors.

Panel C of Table 4 shows that when firm-specific and audit-related factors are included as other control variables, *ICDisc* exhibits statistically weak but still positive association (p value <5%) with the audit fees (t stat = 2.303 for *ICDisc_index*, 1.979 for *ICDisc_frqt* and 2.010 for *ICDisc_wc*) in unconditional regressions. When EQ is added as a condition, it was found that coefficients on *ICDisc* become slightly large, but EQ effect was disappeared in comparison with that of Panel B. This suggests that the effect of EQ is likely to be absorbed by adding more firm-audit factors. Consistent with prior audit fee studies on disclosure (e.g., Raghunandan and Rama, 2006; Ball et al., 2012; Krishnan et al., 2012; DeMartini and Trucco, 2016; Wang et al., 2019; Hossain et al., 2019), the effects of firm size (*lnSIZE*), profitability (*ROA*), audit independence (*NAFEE*), some of risk factors (*ARCA*, *LEV* and *BETA*), auditing duration (*DURA*) and location (*LOCATION*) remain strongly significant.

On the whole, these findings show that earnings quality does not take the first-order effect on audit fees, while the quantity of IC disclosure in all three metrics has a robust influence on the audit effort reflected in audit fees regardless of the quality of earnings and control factors.

5.3. Analysis of IC disclosures in notion, category, and connection

As discussed in Section 4.1.2., *ICDisc* is also explored in certain attributes: 1) *category*: human capital, structural capital, and relational capital, 2) *notion*: static vs dynamic, and 3) *connectedness*: connectedness across category vs connectedness with strategy. Results for the association between different attributes of IC disclosure and audit fees are reported in Table 5 for *notion*, Table 6 for *category*, and Table 7 for *connectedness*.

Table 5 shows that static scores measured by disclosure index (*ICDisc_S_index*) have no significant effect, whereas the significant level is stable for both *ICDisc_D_index* and *ICDisc_D_frqt* with the inclusion of all other variables. It suggests that auditors view IC activity-related information riskier and thus requires more efforts to verify compared to those in static notion.

[Insert Table 5 around here

Regarding IC disclosures by *category* (see Table 6), both unconditionally and conditionally, it was found that coefficient estimates relating *SC* (all three measures) to audit fees is significantly positive at 1% or 5% level in the models of 'excluding/including other factors'. Before controlling for other factors, results of *ICDisc_RC_frqt,* and *ICDisc_RC_wc* are similar to those of SC. Comparatively, other two categories (*HC&RC*) are statistically weak or not affected, especially for all control variables added. It was interesting that HC has no associated with audit effort in any models.

[Insert Table 6 around here]

As reported in Table 7, results from the impact of IC disclosures connecting with strategy on audit effort show a strong significant relation at 1% level for all unconditional and conditional regressions regardless of the effect of control variables. This suggests that auditors view strategy-connected IC disclosures as additional risk, which is consistent with the findings of Bentley et al (2013). In contrast, disclosures connecting across three IC categories are only significant before controlling for other control factors, suggesting that auditors do not repeatedly put efforts when firm characterizes are involved. Similar to 'overall' disclosures, earnings quality effects for each attribute of disclosures become less significant or even disappeared when control variables are included.

[Insert Table 7 around here]

5.4. Robustness tests on earnings quality

The measure of earnings quality used in Table 4 is the common factor calculated from *AA*, *AQ* and *EarnVar* by PCA. In order to test the sensitivity of these findings, we repeated the tests by using each of three EQ measures respectively. As presented in Appendix C, the insignificance of *AA* and *AQ* suggests the possibility that accrual-based earnings quality is not an origin to affect audit fees, compared with absolute earning-based quality (*EarnVar*) or both types combined. However,

disappeared negative effect of earnings quality from *AA* and *AQ* does not change the positive relation of IC disclosure with audit fees.

6. Conclusion

This paper provides evidence in support of the relationship between corporate IC disclosure behavior and audit effort. Using a self-constructed index of 64 IC items to analyze SRs of FTSE350 companies, we found a significant positive relationship between audit fees and IC disclosure scores in *overall*, *dynamic*, *structural capital*, and *connectedness with strategy*. Such relationship is robust when being conditional on earnings quality and controlled for risk and firm-audit factors. These findings highlight the important role of IC disclosure played in auditor work, while earnings quality is not an omission to the positive linkage between IC disclosure and audit effort. Generally, evidence from this study supported and extended the audit fee model in Bell et al. (2001).

It is noted that IC disclosure effect on audit fees is not altered in the presence of earnings quality. It was found that firms with good earnings quality pay high audit fees, but such effect disappeared when adding more firm-audit factors. This finding suggests that quality of earnings would not be a base to affect the effort made on IC disclosure, which is also seen from Table 3 that the level of IC disclosure and earnings quality are not statistically correlated. It is not consistent with findings of Francis et al. (2008) that voluntary disclosure is the second effect order determined by the first effect order of earnings quality to influence on the cost of capital. This might be because many of items in Francis et al. (2008)'s coding checklist refer to financial and nonfinancial indicators, thereby producing a direct supplement to financial statements.

Overall, these findings are important for two reasons. First, prior disclosure studies provide empirical evidence of various benefits (i.e., reduced agency costs in general) from voluntarily disclosing corporate information (e.g., Watson et al., 2002; Francis et al., 2008) but show limited evidence about the costs of disclosure. While revisions to auditing regulations in relation to SR have recently been implemented in the UK, the impact of these reforms on auditing and assurance is unknown, i.e., whether it could be challenging some routines on auditors' work or becoming new business opportunities for audit firms. As evidenced from this research, auditors may pass along these costs incurred by the new requirements to their clients. In other words, a firm should carefully balance between costs and benefits of IC-related information disclosed in SRs. Second, this has important implications for policymakers in further promoting transparency on nonfinancial information in SRs and their possible outcomes. From a public policy perspective, it is important to know that auditors consider the high level of IC-related information as an increase of their effort arising from business risk, especially for those disclosures relating to activities and connecting with strategy.

Due to the complexity and alternative operationalizations of the constructs we examined, i.e., the IC disclosures in SRs and earnings quality, we believe that future work is needed to explore whether other types of nonfinancial information in SRs can play a role in audit effort (e.g., risk disclosure or CSR), as well as explain conflicting evidence in the literature concerning relations between earnings quality and audit

fees. In addition, future studies can explore how auditors incorporate IC-related information in the procedures of audit planning and any mechanisms that help them to define the necessary efforts for fulfilling their duties in the assurance of SRs. Also, future research will benefit from having access to data on audit hours, although audit effort and audit fees are argued to be highly correlated (Deis and Giroux, 1996).

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Table 1 Sample selection and distribution

Panel A: Sample selection		Firms
Initial sample on FTSE350 for the period 2017-2018		350
Less: firms in the sectors of Financials and Utilities		142
firms that are not from United Kingdom		27
firms listed after 1 April 2017		2
missing strategic reports		4
missing data to firm-specific data		2
missing data to calculate the earnings quality		2
Final sample for tests		171
Panel B: Industry distribution	**%**	**Firms**
Basic Materials	10%	17
Consumer Goods	16%	27
Consumer Services	27%	46
Health Care	6%	11
Industrials	30%	51
Oil & Gas	4%	7
Technology	5%	8
Telecommunications	2%	4
Total	**100%**	**171**

Table 2 Descriptive statistics for all variables

	Variable	Obs	Mean	Median	STD	Min	Max
Dependent Variable							
Audit Fee	AFEE ('m)	171	2.85	1.15	4.82	0.12	36.83
Principal Independent Variables							
-- ICDisc (Total)							
Overall	ICDisc_index	171	0.49	0.48	0.07	0.33	0.70
	ICDisc_frqt	171	249.64	238.00	80.96	83.00	776.00
	ICDisc_wc	171	6229.32	5984.00	2253.86	2317.00	16508.00
Notion	ICDisc_S_index	171	0.52	0.53	0.08	0.30	0.73
	ICDisc_D_index	171	0.45	0.45	0.08	0.25	0.69
	ICDisc_S_frqt	171	149.86	143.00	53.87	46.00	510.00
	ICDisc_D_frqt	171	99.78	96.00	36.97	34.00	266.00
	ICDisc_S_wc	171	3710.99	3467.50	1500.93	1179.50	11145.00
	ICDisc_D_wc	171	2518.32	2386.00	1075.35	624.00	7523.60
Category	ICDisc_HC_index	171	0.57	0.57	0.10	0.30	0.83
	ICDisc_SC_index	171	0.70	0.74	0.12	0.37	1.00
	ICDisc_RC_index	171	0.68	0.68	0.10	0.32	0.86
	ICDisc_HC_frqt	171	54.36	51.00	22.32	14.00	148.00
	ICDisc_SC_frqt	171	90.96	81.00	38.93	18.00	265.00
	ICDisc_RC_frqt	171	104.32	100.00	43.32	24.00	363.00
	ICDisc_HC_wc	171	1315.44	1208.00	599.57	348.00	3660.00
	ICDisc_SC_wc	171	2254.44	1986.00	1134.56	512.00	7072.80
	ICDisc_RC_wc	171	2659.44	2476.00	1191.39	488.00	7678.00
Connection	ICDisc_CRO_frqt	171	7.32	6.00	4.76	0.00	29.00
	ICDisc_STG_frqt	171	15.48	14.00	8.77	2.00	56.00
	ICDisc_CRO_wc	171	239.58	194.00	227.10	0.00	1708.00
	ICDisc_STG_wc	171	445.77	400.00	261.98	20.00	1657.00
-- Earnings Quality							
Accruals quality	AQ	171	0.0290	0.0253	0.0196	0.0000	0.1429
Abnormal accruals	AA	171	0.0417	0.0326	0.0284	0.0064	0.1682
Earnings variability	EarnVar	171	0.0650	0.0414	0.0903	0.0066	0.8208
Control Variables							
Firm-specific	SIZE ('m)	171	7532.16	1753.14	23502.77	24.63	230639.00
	NAFEE ('m)	171	0.70	0.20	1.56	0.00	12.30
	BUSY	171	0.55	1.00	0.50	0.00	1.00
	ROA (%)	171	9.60	7.98	11.24	-39.41	64.14
	NSUB	171	175.34	96.00	220.89	0.00	1612.00
Risk-based	ARCA (%)	171	37.99	38.33	21.01	1.45	92.22
	INVCA (%)	171	25.93	22.85	23.24	0.00	95.77
	LEV (%)	171	35.30	33.05	29.70	0.00	172.86
	BETA	171	0.83	0.80	0.56	-0.71	3.00
	CREDIT	171	90.95	92.00	9.95	26.00	99.00
Auditor-related	TENURE	171	11.61	8.00	12.84	1.00	68.00
	DURA	171	60.73	59.00	12.30	27.00	100.00
	LONDON	171	0.66	1.00	0.47	0.00	1.00
	AUDITOR	171	0.12	0.00	0.32	0.00	1.00

Notes: winsorized all continuous variables (i.e., AFEE, SA, NAFFE, ROA, ARCA, INVCA, LEV) at the 1st and 99th percentiles to ensure that our results are not driven by extreme values. See Appendix B for definitions of variables.

Table 3 Correlations (Pearson) coefficients

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
lnAFEE(1)	1														
ICDisc_index (2)	0.285***	1													
lnICDisc_frqt (3)	0.458***	0.696***	1												
lnICDisc_wc(4)	0.432***	0.569***	0.844***	1											
EarnQua (5)	-0.187**	-0.0771	-0.0228	-0.0202	1										
AA (6)	-0.172**	0.00568	0.0122	-0.0567	0.648***	1									
AQ (7)	-0.0579	-0.00043	0.0735	0.0576	0.620***	0.480***	1								
EarnVar (8)	-0.169**	-0.111	-0.0783	-0.0400	0.832***	0.279***	0.141*	1							
lnSIZE (9)	0.736***	0.196**	0.391***	0.324***	-0.179**	-0.227***	-0.0411	-0.146*	1						
ROA (10)	-0.248***	-0.120	-0.117	-0.111	0.0764	0.0573	0.0317	0.0694	-0.181**	1					
ARCA (11)	0.227***	0.131*	0.0777	0.101	-0.122	-0.161**	-0.125	-0.0441	-0.0061	0.00929	1				
INVCA (12)	-0.166**	0.0190	-0.00659	-0.0235	-0.0332	-0.00106	0.0897	-0.0971	0.0451	0.129*	-0.504***	1			
LEV (13)	0.337***	0.0405	0.172**	0.166**	0.0312	-0.0165	-0.0454	0.0761	0.207***	-0.120	0.174**	-0.262***	1		
BETA (14)	0.369***	0.162**	0.267***	0.325***	0.0599	-0.0312	-0.0415	0.120	0.180**	-0.180**	0.114	-0.192**	0.170**	1	
CREDIT (15)	-0.0685	0.108	-0.00253	0.0127	-0.269***	-0.227***	-0.0088	-0.293***	0.0133	0.0397	-0.0313	0.0475	-0.364***	-0.042	1

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. 'ln': variables are transformed into log.
Correlations are based on a sample of 171 firms. Variables are defined in Appendix B.

Table 4 Test of the relation between IC disclosure and audit fees

Panel A: Regression Excluding Other Factors

	Unconditional_ICDisc				Conditional_Both		
Variable	*index*	*frqt*	*wc*	*EQ*	*index*	*frqt*	*wc*
ICDisc_index	5.026***				4.806***		
t-Stat	4.011				3.907		
lnICDisc_frqt		1.886***				1.877***	
t-Stat		6.484				6.700	
lnICDisc_wc			1.542***				1.532***
t-Stat			6.044				6.192
EarnQua				-0.305***	-0.272***	-0.296***	-0.295***
t-Stat				(2.815)	(2.599)	(3.157)	(3.296)
Adj.R	**0.072**	**0.201**	**0.178**	**0.028**	**0.094**	**0.228**	**0.205**

Panel B: Regression Including Risk Control Factors

	Unconditional_ICDisc				Conditional_Both		
Variable	*index*	*frqt*	*wc*	*EQ*	*index*	*frqt*	*wc*
ICDisc_index	3.660***				3.573***		
t-Stat	3.011				3.113		
lnICDisc_frqt		1.425***				1.424***	
t-Stat		4.726				5.013	
lnICDisc_wc			1.092***				1.091***
t-Stat			3.850				4.036
EarnQua				-0.337***	-0.328***	-0.336***	-0.336***
t-Stat				-3.288	-3.261	-3.699	-3.668
ARCA	0.00773*	0.00823*	0.00810*	0.008	0.00562	0.00602	0.00588
t-Stat	1.701	1.905	1.880	1.651	1.239	1.389	1.367
INVCA	0.00106	0.000303	0.000737	0.00149	-0.000127	-0.000949	-0.000520
t-Stat	0.257	0.074	0.184	0.381	-0.032	-0.240	-0.134
LEV	0.0112***	0.0094***	0.0098***	0.0110***	0.0105***	0.0088***	0.0091***
t-Stat	3.469	2.963	2.982	3.633	3.508	2.929	2.938
BETA	0.620***	0.492***	0.483***	0.727***	0.652***	0.522***	0.513***
t-Stat	4.032	3.342	3.026	4.423	4.215	3.543	3.253
CREDIT	0.00270	0.0031	0.00277	-0.001990	-0.00511	-0.00499	-0.00531
t-Stat	0.313	0.369	0.312	-0.254	-0.622	-0.603	-0.608
Adj.R	**0.253**	**0.321**	**0.295**	**0.251**	**0.284**	**0.355**	**0.328**

Panel C: Regression Including Risk, Firm-Specific and Audit Control Factors

	Unconditional_ICDisc				Conditional_Both		
Variable	*index*	*frqt*	*wc*	*EQ*	*index*	*frqt*	*wc*
ICDisc_index	1.916**				1.925**		
t-Stat	2.303				2.319		
lnICDisc_frqt		0.390**				0.402**	
t-Stat		1.979				2.055	
lnICDisc_wc			0.326**				0.331**
t-Stat			2.010				2.051
EarnQua				-0.066	-0.0682	-0.0756	-0.0709
t-Stat				-0.890	-0.891	-1.026	-0.970
ARCA	0.0109***	0.0117***	0.0117***	0.0117***	0.0104***	0.0111***	0.0112***
t-Stat	3.179	3.290	3.287	3.188	3.033	3.166	3.175
INVCA	0.00128	0.00178	0.00175	0.00186	0.00102	0.00149	0.00149
t-Stat	0.452	0.630	0.626	0.65	0.364	0.536	0.538

(Continued)

LEV	0.0505**	0.0504**	0.0509**	0.0511**	0.0486**	0.0483**	0.0489**
t-Stat	2.553	2.526	2.526	2.497	2.447	2.408	2.414
BETA	0.232*	0.224*	0.214*	0.270**	0.243*	0.235*	0.224*
t-Stat	1.814	1.784	1.703	2.245	1.895	1.872	1.793
CREDIT	0.000619	0.00225	0.00214	0.000693	-0.000843	0.000635	0.000632
t-Stat	0.132	0.473	0.451	0.137	-0.161	0.122	0.121
lnSIZE	0.341***	0.333***	0.342***	0.359***	0.339***	0.331***	0.341***
t-Stat	5.000	4.794	5.073	5.291	5.020	4.797	5.077
ROA	-0.0111*	-0.0124**	-0.0125**	-0.0119**	-0.0105*	-0.0117**	-0.0119**
t-Stat	-1.973	-2.171	-2.255	-2.15700	-1.830	-2.028	-2.116
NAFEE	0.00023***	0.00024***	0.00024***	0.00023***	0.00023***	0.00024***	0.00024***
t-Stat	4.375	4.556	4.707	4.314	4.392	4.582	4.737
NSUB	0.00087**	0.000762*	0.000750*	0.000752*	0.000835*	0.000718*	0.000710*
t-Stat	2.033	1.799	1.764	1.721	1.949	1.699	1.673
BUSY	0.345***	0.318***	0.304**	0.340***	0.358***	0.333***	0.318***
t-Stat	2.931	2.667	2.513	2.822	3.029	2.787	2.630
lnTENU	0.0867*	0.0892*	0.0922*	0.0827*	0.0831*	0.0852*	0.0885*
t-Stat	1.805	1.854	1.906	1.673	1.731	1.773	1.832
lnDURA	-0.702**	-0.620**	-0.636**	-0.651**	-0.686**	-0.601**	-0.619**
t-Stat	-2.294	-2.095	-2.163	-2.160	-2.231	-2.010	-2.086
LONDON	0.229*	0.204*	0.203*	0.219*	0.229**	0.204*	0.203*
t-Stat	1.969	1.792	1.788	1.855	1.982	1.803	1.797
AUDITOR	-0.106	-0.071	-0.066	-0.0797	-0.116	-0.0818	-0.0761
t-Stat	-0.832	-0.523	-0.502	-0.609	-0.906	-0.602	-0.577
Adj.R	**0.736**	**0.733**	**0.732**	**0.727**	**0.735**	**0.733**	**0.732**

Robust t-statistics in parentheses. Significant level: ***p<0.01, ** p<0.05, * p<0.1

Table 5 Test of the relation between IC disclosure and audit fees _ Notion

Panel A: Regression Excluding Other Factors

	Unconditional_ICDisc				Conditional_Both		
Variable	*S+D_index*	*S+D_frqt*	*S+D_wc*	*EQ*	*S+D_index*	*S+D_frqt*	*S+D_wc*
ICDisc_S_index	1.790				1.945		
t-Stat	1.414				1.553		
ICDisc_D_index	3.309***				2.934**		
t-Stat	2.671				2.364		
lnICDisc_S_frqt		1.275***				1.261***	
t-Stat		3.662				3.650	
lnICDisc_D_frqt		0.572*				0.576**	
t-Stat		1.970				2.003	
lnICDisc_S_wc			0.924***				0.947***
t-Stat			3.555				3.641
lnICDisc_D_wc			0.614***				0.582***
t-Stat			2.759				2.629
EarnQua				-0.305***	-0.265**	-0.294***	-0.298***
t-Stat				-2.815	-2.453	-3.104	-3.286
Adj.R squre	**0.073**	**0.203**	**0.176**	**0.028**	**0.093**	**0.230**	**0.204**

Panel B: Regression Including Risk Control Factors

	Unconditional_ICDisc				Conditional_Both		
Variable	*S+D_index*	*S+D_frqt*	*S+D_wc*	*EQ*	*S+D_index*	*S+D_frqt*	*S+D_wc*
ICDisc_S_index	1.156				1.324		
t-Stat	0.990				1.176		
ICDisc_D_index	2.601**				2.324*		
t-Stat	2.160				1.971		
lnICDisc_S_frqt		0.873**				0.858**	
t-Stat		2.558				2.604	
lnICDisc_D_frqt		0.519*				0.534*	
t-Stat		1.846				1.945	
lnICDisc_S_wc			0.548**				0.561**
t-Stat			2.110				2.206
lnICDisc_D_wc			0.557**				0.547**
t-Stat			2.484				2.518
EarnQua				-0.337***	-0.322***	-0.337***	-0.339***
t-Stat				-3.288	-3.165	-3.695	-3.697
ARCA	0.00761*	0.00791*	0.00833*	0.00765	0.00559	0.00574	0.00606
t-Stat	1.682	1.826	1.946	1.651	1.238	1.320	1.416
INVCA	0.000805	0.000455	0.000601	0.00149	-0.000257	-0.000827	-0.000647
t-Stat	0.193	0.110	0.148	0.381	-0.0643	-0.206	-0.165
LEV	0.0111***	0.0093***	0.0098***	0.011***	0.011***	0.009***	0.009***
t-Stat	3.454	2.914	2.960	3.633	3.495	2.883	2.923
BETA	0.611***	0.493***	0.470***	0.727***	0.644***	0.522***	0.501***
t-Stat	3.879	3.238	2.905	4.423	4.062	3.467	3.143
CREDIT	0.00187	0.0027	0.00134	-0.00199	-0.00553	-0.00543	-0.00674
t-Stat	0.219	0.312	0.140	-0.254	-0.679	-0.626	-0.732
Adj.R squre	**0.253**	**0.319**	**0.294**	**0.251**	**0.283**	**0.353**	**0.328**

(Continued)

Panel C: Regression Including Risk, Firm-Specific and Audit Control Factors

	Unconditional_ICDisc				Conditional_Both		
Variable	*S+D_index*	*S+D_frqt*	*S+D_wc*	*EQ*	*S+D_index*	*S+D_frqt*	*S+D_wc*
ICDisc_S_index	0.215				0.265		
t-Stat	0.293				0.364		
ICDisc_D_index	1.740**				1.692**		
t-Stat	2.261				2.253		
lnICDisc_S_frqt		0.00427				0.017	
t-Stat		-0.0209				0.0809	
lnICDisc_D_frqt		0.376**				0.375**	
t-Stat		2.018				2.020	
lnICDisc_S_wc			0.0688				0.080
t-Stat			0.402				0.465
lnICDisc_D_wc			0.249				0.245
t-Stat			1.607				1.599
EarnQua				-0.066	-0.0586	-0.0731	-0.0683
t-Stat				-0.890	-0.771	-1.008	-0.949
ARCA	0.011***	0.012***	0.012***	0.012***	0.010***	0.012***	0.011***
t-Stat	3.138	3.474	3.342	3.188	2.996	3.361	3.235
INVCA	0.000826	0.00127	0.00139	0.00186	0.000639	0.00101	0.00116
t-Stat	0.293	0.462	0.495	0.65	0.226	0.368	0.415
LEV	0.049**	0.049**	0.050**	0.051**	0.048**	0.047**	0.048**
t-Stat	2.456	2.388	2.439	2.497	2.368	2.273	2.335
BETA	0.225*	0.204	0.207	0.270**	0.235*	0.215*	0.217*
t-Stat	1.764	1.582	1.586	2.245	1.836	1.668	1.670
CREDIT	-0.000564	0.000992	0.00109	0.000693	-0.00174	-0.000543	-0.000314
t-Stat	-0.120	0.202	0.217	0.137	-0.331	-0.099	-0.056
lnSIZE	0.339***	0.331***	0.339***	0.359***	0.338***	0.329***	0.337***
t-Stat	5.004	4.804	4.982	5.291	5.017	4.808	4.995
ROA	-0.0116**	-0.0124**	-0.0122**	-0.0119**	-0.0110*	-0.0118**	-0.0117**
t-Stat	-2.003	-2.171	-2.153	-2.15700	-1.883	-2.040	-2.032
NAFEE	0.0002***	0.0003***	0.0002***	0.0003***	0.0002***	0.0003***	0.0002***
t-Stat	4.334	4.558	4.679	4.314	4.352	4.592	4.715
NSUB	0.000937**	0.000886**	0.000821*	0.000752*	0.000901**	0.000841*	0.000778*
t-Stat	2.170	2.002	1.864	1.721	2.095	1.914	1.779
BUSY	0.347***	0.321***	0.301**	0.340***	0.358***	0.335***	0.314**
t-Stat	2.906	2.676	2.470	2.822	2.998	2.786	2.587
lnTENU	0.077	0.0885*	0.0912*	0.0827*	0.075	0.0847*	0.0877*
t-Stat	1.613	1.864	1.895	1.673	1.551	1.781	1.820
lnDURA	-0.714**	-0.678**	-0.663**	-0.651**	-0.699**	-0.658**	-0.645**
t-Stat	-2.312	-2.243	-2.191	-2.160	-2.252	-2.160	-2.115
LONDON	0.224*	0.206*	0.209*	0.219*	0.224*	0.206*	0.209*
t-Stat	1.950	1.823	1.821	1.855	1.959	1.832	1.827
AUDITOR	-0.111	-0.073	-0.062	-0.0797	-0.119	-0.0826	-0.0717
t-Stat	-0.842	-0.511	-0.452	-0.609	-0.900	-0.584	-0.526
Adj.R squre	**0.737**	**0.735**	**0.732**	**0.727**	**0.736**	**0.735**	**0.732**

Robust t-statistics in parentheses. Significant level: *** p<0.01, ** p<0.05, * p<0.1

Table 6 Test of the relation between and IC disclosure and audit fees _ Category

Panel A: Regression Excluding Other Factors

Variable	Unconditional_ICDisc				Conditional_Both		
	HC+SC+RC _index	*HC+SC+RC _frqt*	*HC+SC+RC _wc*	*EQ*	*HC+SC+RC _index*	*HC+SC+RC _frqt*	*HC+SC+RC _wc*
ICDisc_HC_ index	-0.751				-0.476		
t-Stat	-0.786				-0.522		
ICDisc_SC_ index	3.023***				2.976***		
t-Stat	3.937				3.940		
ICDisc_RC_ index	0.342				0.0902		
t-Stat	0.362				0.097		
lnICDisc_HC _frqt	0.00136				0.00606		
t-Stat		0.0197				0.089	
lnICDisc_SC_ frqt	0.194***				0.197***		
t-Stat		3.598				3.705	
lnICDisc_RC _frqt	0.192***				0.180***		
t-Stat		4.388				4.232	
lnICDisc_HC _wc			0.154				0.0920
t-Stat			0.782				0.459
lnICDisc_SC_ wc			0.730***				0.775***
t-Stat			3.457				3.712
lnICDisc_RC _wc			0.603***				0.598***
t-Stat			3.177				3.265
EarnQua				-0.305***	-0.287***	-0.270***	-0.309***
t-Stat				-2.815	-2.844	-3.187	-3.474
Adj.R	**0.064**	**0.221**	**0.172**	**0.028**	**0.088**	**0.243**	**0.202**

Panel B: Regression Including Risk Control Factors

	Unconditional_ICDisc				Conditional_Both		
Variable	*HC+SC+RC _index*	*HC+SC+RC _frqt*	*HC+SC+RC _wc*	*EQ*	*HC+SC+RC _index*	*HC+SC+RC _frqt*	*HC+SC+RC _wc*
ICDisc_HC _index	-0.656				-0.240		
t-Stat	-0.723				-0.277		
ICDisc_SC _index	2.386***				2.305***		
t-Stat	2.911				2.947		
ICDisc_RC _index	0.305				0.0996		
t-Stat	0.323				0.107		
lnICDisc_HC _frqt	0.0360				0.0554		
t-Stat		0.539				0.842	
lnICDisc_SC _frqt	0.143**				0.137**		
t-Stat		2.389				2.330	
lnICDisc_RC _frqt	0.134***				0.121***		
t-Stat		2.937				2.745	

(Continued)

lnICDisc_HC _wc			0.282				0.265
t-Stat			1.437				1.365
lnICDisc_SC _wc			0.486**				0.496**
t-Stat			2.013				2.114
lnICDisc_RC _wc			0.337*				0.338*
t-Stat			1.747				1.839
EarnQua				-0.337***	-0.324***	-0.313***	-0.333***
t-Stat				-3.288	-2.979	-3.467	-3.612
ARCA	0.0107**	0.00876**	0.00846*	0.00765	0.00832*	0.00669	0.00633
t-Stat	2.303	2.010	1.967	1.651	1.780	1.536	1.451
INVCA	0.000784	0.000471	0.0000541	0.00149	-0.000531	-0.000779	-0.00118
t-Stat	0.190	0.115	0.0131	0.381	-0.131	-0.195	-0.298
LEV	0.0110***	0.00880***	0.00988***	0.0110***	0.0105***	0.00843***	0.00921***
t-Stat	3.323	2.801	3.007	3.633	3.398	2.819	2.935
BETA	0.555***	0.473***	0.470***	0.727***	0.582***	0.504***	0.498***
t-Stat	3.453	2.983	2.828	4.423	3.612	3.170	3.019
CREDIT	0.00361	0.00352	0.00257	-0.00199	-0.00420	-0.00430	-0.00525
t-Stat	0.411	0.405	0.278	-0.254	-0.511	-0.491	-0.572
Adj.R	**0.251**	**0.331**	**0.292**	**0.251**	**0.280**	**0.359**	**0.325**

Panel C: Regression Including Risk, Firm-Specific and Audit Control Factors

	Unconditional_ICDisc				Conditional_Both		
Variable	*HC+SC+RC _index*	*HC+SC+RC _frqt*	*HC+SC+RC _wc*	*EQ*	*HC+SC+RC _index*	*HC+SC+RC _frqt*	*HC+SC+RC _wc*
ICDisc_HC _index	0.129				0.226		
t-Stat	0.209				0.369		
ICDisc_SC _index	1.176**				1.160**		
t-Stat	2.077				2.038		
ICDisc_RC _index	-0.0504				-0.0772		
t-Stat	-0.0959				-0.146		
lnICDisc_HC _frqt	0.219				0.236		
t-Stat		1.377				1.481	
lnICDisc_SC _frqt	0.374**				0.367**		
t-Stat		2.483				2.454	
lnICDisc_RC _frqt	-0.165				-0.166		
t-Stat		-1.154				-1.165	
lnICDisc_HC _wc			0.198				0.195
t-Stat			1.512				1.493
lnICDisc_SC _wc			0.266*				0.265*
t-Stat			1.952				1.939
lnICDisc_RC _wc			-0.104				-0.098
t-Stat			-0.896				-0.853
EarnQua				-0.066	-0.0715	-0.0802	-0.0623
t-Stat				-0.890	-0.910	-1.074	-0.838
ARCA	0.0122***	0.0129***	0.0121***	0.0117***	0.0116***	0.0122***	0.0117***
t-Stat	3.421	3.724	3.542	3.188	3.315	3.590	3.441

(Continued)

INVCA	0.000792	0.000360	0.000517	0.00186	0.000495	0.000046	0.000305
t-Stat	0.266	0.126	0.185	0.65	0.167	0.0163	0.111
LEV	0.0512**	0.0518**	0.0479**	0.0511**	0.0496**	0.0498**	0.0462**
t-Stat	2.477	2.573	2.357	2.497	2.396	2.463	2.263
BETA	0.199	0.172	0.202	0.270**	0.211	0.186	0.211
t-Stat	1.416	1.314	1.532	2.245	1.497	1.424	1.607
CREDIT	0.000872	0.001750	0.000937	0.000693	-0.000703	-0.000077	-0.00036
t-Stat	0.177	0.376	0.194	0.137	-0.128	-0.015	-0.068
lnSIZE	0.361***	0.333***	0.342***	0.359***	0.359***	0.331***	0.341***
t-Stat	5.236	4.959	5.169	5.291	5.244	4.968	5.170
ROA	-0.0105*	-0.0118**	-0.0124**	-0.0119**	-0.00979	-0.0110*	-0.0119**
t-Stat	-1.802	-2.043	-2.141	-2.15700	(-1.646)	(-1.892)	(-2.037)
NAFEE	0.000220***	0.000235***	0.000231***	0.000233***	0.000221***	0.000236***	0.000232***
t-Stat	4.183	4.940	4.847	4.314	4.192	4.994	4.881
NSUB	0.000761*	0.000866**	0.000854**	0.000752*	0.000732*	0.000826**	0.000816*
t-Stat	1.811	2.168	2.061	1.721	1.745	2.075	1.972
BUSY	0.310**	0.245**	0.256**	0.340***	0.322***	0.260**	0.269**
t-Stat	2.586	2.092	2.088	2.822	2.691	2.235	2.208
lnTENU	0.0847*	0.0926*	0.0857*	0.0827*	0.0807*	0.0881*	0.0826*
t-Stat	1.767	1.937	1.776	1.673	1.687	1.839	1.703
lnDURA	-0.747**	-0.679**	-0.687**	-0.651**	-0.727**	-0.659**	-0.671**
t-Stat	-2.363	-2.315	-2.285	-2.160	-2.294	-2.238	-2.218
LONDON	0.247**	0.190*	0.194*	0.219*	0.249**	0.189*	0.195*
t-Stat	2.092	1.688	1.748	1.855	2.109	1.696	1.758

AUDITOR	-0.115	-0.118	-0.0839	-0.0797	-0.126	-0.130	-0.0924
t-Stat	-0.933	-0.830	-0.602	-0.609	-1.032	-0.919	-0.666
Adj.R	**0.733**	**0.744**	**0.738**	**0.727**	**0.733**	**0.744**	**0.738**

Robust t-statistics in parentheses. Significant level: *** p<0.01, ** p<0.05, * p<0.1

Table 7 Test of the relation between IC disclosure and audit fees _ Connectedness

Panel A: Regression Excluding Other Factors

	Unconditional_ICDisc			Conditional_Both	
Variable	*CRO&STG _frqt*	*CRO&STG _wc*	*EQ*	*CRO&STG _frqt*	*CRO&STG _wc*
lnICDisc_CRO_frqt	0.397***			0.370***	
t-Stat	4.165			3.868	
lnICDisc_STG_frqt	0.253***			0.263***	
t-Stat	3.426			3.619	
lnICDisc_CRO_wc		0.275***			0.267***
t-Stat		2.724			2.681
lnICDisc_STG_wc		0.0595***			0.0584***
t-Stat		4.869			4.887
EarnQua			-0.305***	-0.262***	-0.275***
t-Stat			-2.815	-2.618	-2.914
Adj.R	**0.168**	**0.130**	**0.028**	**0.187**	**0.152**

Panel B: Regression Including Risk Control Factors

	Unconditional_ICDisc			Conditional_Both	
Variable	*CRO&STG _frqt*	*CRO&STG _wc*	*EQ*	*CRO&STG _frqt*	*CRO&STG _wc*
lnICDisc_CRO_frqt	0.304***			0.268***	
t-Stat	3.199			2.828	
lnICDisc_STG_frqt	0.187**			0.210***	
t-Stat	2.439			2.820	
lnICDisc_CRO_wc		0.158			0.147
t-Stat		1.590			1.488
lnICDisc_STG_wc		0.0462***			0.0460***
t-Stat		3.731			3.892
EarnQua			-0.337***	-0.319***	-0.327***
t-Stat			-3.288	-3.103	-3.295
ARCA	0.00753*	0.00816*	0.008	0.006	0.006
t-Stat	1.700	1.846	1.651	1.266	1.390
INVCA	0.000	0.000	0.001	-0.001	-0.001
t-Stat	0.047	-0.059	0.381	-0.201	-0.360
LEV	0.00920***	0.00979***	0.0110***	0.00876***	0.00922***
t-Stat	2.903	3.010	3.633	3.012	3.054
BETA	0.568***	0.547***	0.727***	0.594***	0.578***
t-Stat	3.834	3.560	4.423	4.034	3.787
CREDIT	0.002	0.002	-0.002	-0.006	-0.006
t-Stat	0.272	0.249	-0.254	-0.678	-0.663
Adj.R	**0.305**	**0.275**	**0.251**	**0.334**	**0.306**

Panel C: Regression Including Risk, Firm-Specific and Audit Control Factors

	Unconditional_ICDisc			Conditional_Both	
Variable	*CRO&STG _frqt*	*CRO&STG _wc*	*EQ*	*CRO&STG _frqt*	*CRO&STG _wc*
lnICDisc_CRO_frqt	0.018			0.017	
t-Stat	0.253			0.240	
lnICDisc_STG_frqt	0.245***			0.252***	
t-Stat	2.715			2.760	
lnICDisc_CRO_wc		-0.0268			-0.0296
t-Stat		-0.669			-0.741
lnICDisc_STG_wc		0.220***			0.224***
t-Stat		3.093			3.118

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EarnQua			-0.066	-0.0803	-0.0761
t-Stat			-0.890	-1.080	-1.051
ARCA	0.0113***	0.0115***	0.0117***	0.0107***	0.0109***
t-Stat	3.175	3.190	3.188	3.053	3.092
INVCA	0.002	0.001	0.00186	0.00135	0.000808
t-Stat	0.577	0.396	0.65	0.479	0.297
LEV	0.0507**	0.0529**	0.0511**	0.0485**	0.0510**
t-Stat	2.491	2.501	2.497	2.374	2.397
BETA	0.216*	0.217*	0.270**	0.228*	0.228*
t-Stat	1.779	1.735	2.245	1.868	1.831
CREDIT	0.0008	0.0013	0.000693	-0.00096	-0.00039
t-Stat	0.153	0.252	0.137	-0.165	-0.0705
lnSIZE	0.348***	0.363***	0.359***	0.346***	0.362***
t-Stat	5.041	5.358	5.291	5.049	5.387
ROA	-0.0124**	-0.0109**	-0.0119**	-0.0117**	-0.0102*
t-Stat	-2.346	-1.987	-2.15700	-2.173	-1.833
NAFEE	0.000227***	0.000231***	0.000233***	0.000228***	0.000232***
t-Stat	4.446	4.565	4.314	4.471	4.588
NSUB	0.000795*	0.000704	0.000752*	0.000750*	0.000659
t-Stat	1.800	1.607	1.721	1.698	1.507
BUSY	0.311***	0.307**	0.340***	0.327***	0.321***
t-Stat	2.641	2.607	2.822	2.771	2.736
lnTENU	0.0812*	0.0744	0.0827*	0.0768	0.0700
t-Stat	1.699	1.560	1.673	1.610	1.474
lnDURA	-0.685**	-0.624**	-0.651**	-0.667**	-0.605**
t-Stat	-2.370	-2.179	-2.160	-2.291	-2.098
LONDON	0.231**	0.236**	0.219*	0.232**	0.236**
t-Stat	2.026	2.044	1.855	2.047	2.058
AUDITOR	-0.0308	-0.0248	-0.0797	-0.0407	-0.0347
t-Stat	-0.245	-0.203	-0.609	(-0.326)	(-0.287)
Adj.R	**0.737**	**0.736**	**0.727**	**0.737**	**0.736**

Robust t-statistics in parentheses. Significant level: *** p<0.01, ** p<0.05, * p<0.1

Appendix A IC Checklist

	Human Capital		*Structural Capital*		*Relational Capital*
1	Employees	1	Intellectual Property	1	Customers
2	Employee Relations	2	Business Model	2	Customer Profile
3	Employee Equality/Equity	3	Organizational Structure	3	Customer Relations
4	Employee Diversity/Inclusion	4	Quality Management	4	Customer Loyalty
5	Employee Education	5	Technology	5	Customer Satisfaction
6	Employee Competence	6	Communication System	6	Customer Involvement
7	Work-related Experience	7	Management Process	7	Customer Retention
8	Employee Know-how	8	Operation Process & Efficiency	8	Channel Relations
9	Employee Attitude	9	Operation Presence & Capacity	9	Supplier Relations
10	Employee Flexibility	10	Health & Safety in Operation	10	Supplier Knowledge
11	Employee Turnover	11	Distribution Channel	11	Corporate Reputation & Image
12	Employee Motivation	12	Knowledge-based Infrastructure	12	Brands
13	Employee Commitment	13	Company Know-how	13	Market Presence
14	Employee Recognition	14	Corporate Culture	14	Market Share & Position
15	Employee Engagement	15	Management Philosophy	15	Marketing
16	Employee Satisfaction	16	Organizational Flexibility	16	Market Knowledge
17	Employee Involvement	17	Research & Development	17	Business Collaboration
18	Employee Productivity	18	Innovation	18	Other Collaborations
19	Employee Training	19	Accreditation & Certification	19	Business Agreement
20	Employee Development			20	Financing Relations
21	Entrepreneurial Spirit			21	Financing Capabilities
22	Employee Care			22	Stakeholder Relations
23	Employee Teamwork				

Appendix B Variable descriptions

Construct	Variable	Description	Data Source
Dependent variable			
Audit Fee	AFEE	Log of audit fees paid to the auditor in year t+1 (2018) for audit-related services.	FAME
Disclosure variables (fiscal year 2017)			
Total of IC disclosure	ICDisc_index	Number of items disclosed in the disclosure index instrument divided by 128	Strategic Report
	ICDisc_frqt	Number of frequencies disclosed in relation to 64 items	
	ICDisc_wc	Number of words disclosed in relation to 64 items	
Notions of IC disclosure	ICDisc_S_index	Number of items (static) disclosed in the disclosure index instrument divided by 64	
	ICDisc_D_index	Number of items (dynamic) disclosed in the disclosure index instrument divided by 64	
	ICDisc_S_frqt	Number of frequencies (static) disclosed in relation to 64 items	
	ICDisc_D_frqt	Number of frequencies (dynamic) disclosed in relation to 64 items	
	ICDisc_S_wc	Number of words (static) disclosed in relation to the 64 items	
	ICDisc_D_wc	Number of words (dynamic) disclosed in relation to the 64 items	
Categories of IC disclosure	ICDisc_HC_index	Number of items (human capital) disclosed in the disclosure index instrument divided by 46	
	ICDisc_SC_index	Number of items (structual capital) disclosed in the disclosure index instrument divided by 38	
	ICDisc_RC_index	Number of items (relational capital) disclosed in the disclosure index instrument divided by 44	
	ICDisc_HC_frqt	Number of frequencies (human capital) disclosed in relation to 23 items	
	ICDisc_SC_frqt	Number of frequencies (structual capital) disclosed in relation to 19 items	
	ICDisc_RC_frqt	Number of frequencies (relational capital) disclosed in relation to 22 items	
	ICDisc_HC_wc	Number of words (human capital) disclosed in relation to 23 items	
	ICDisc_SC_wc	Number of words (structual capital) disclosed in relation to 19 items	
	ICDisc_RC_wc	Number of words (relational capital) disclosed in relation to 22 items	

(Continued)

Connectedness of IC disclosure	ICDisc_CRO_frqt	Number of frequencies connected among HICD, SICD and RICD in relation to 64 items	
	ICDisc_STG_frqt	Number of frequencies connected with strategy in relation to 64 items	
	ICDisc_CRO_wc	Number of words connected among HICD, SICD and RICD in relation to 64 items	
	ICDisc_STG_wc	Number of words connected with strategy in relation to 64 items	
Earnings quality variables			
Accruals quality	AQ	Modified model of Dechow and Dichev (2002) from McNichols (2002) for the year 2007-2017	DataStream
Abnormal accruals	AA	Modified Jones (1991) for the year 2008-2017	
Earnings variability	EarnVar	Earnings before extraordinary items scaled by total assets over 2008-2017	
Common factor	EarnQua	Principal component analysis (PCA) based on the first three measures of AQ, AA and EarnVar	
Control variables			
Firm-specific	lnSIZE	Log of total turnover of the firm (in £ millions) by the end of year 2017	FAME
	NAFEE	Non-audit service fees for the year 2017	Annual Report
	BUSY	A value of 1 given to firms that end their fiscal year on 31st December 2017, 0 otherwise	Annual Report
	ROA	Return on assets at the end of year 2017	FAME
	NSUB	Number of subsidiaries at the end of year 2017	FAME
Risk-based	ARCA	Account receivable/current assets at the end of year 2017	DataStream
	INVCA	Inventories/current assets at the end of year 2017	DataStream
	LEV	Debt/total capital at the end of year 2017	DataStream
	BETA	Beta at the end of year 2017	DataStream
	CREDIT	Credit rating at the end of year 2017	FAME
Auditor-related	TENURE	Number of years performed as auditor	Annual Report
	DURA	Number of days between financial year end date and signed date of auditing report for the year 2017	Annual Report
	LONDON	1 = London-based company, 0 = otherwise	Annual Report
	AUDITOR	A value of 1 given to firms that hold an industry specialist at a national level, 0 otherwise	Audit Analytics

Appendix C Robustness tests

Robustness analysis in relation to earnings quality estimated by abnormal accruals (AA), accrual quality (AQ) and earning variability (EarnVar), respectively.

Dependent variable	**AFEE**			**AFEE**			**AFEE**		
Individual EQ measure	**AA: abnormal accruals**			**AQ: accruals quality**			**EarnVar: earnings variability**		
Number of Firms	171	171	171	171	171	171	171	171	171
R-squared	0.727	0.73	0.727	0.727	0.73	0.727	0.736	0.739	0.736
Adj. R-squared	0.707	0.711	0.707	0.707	0.71	0.707	0.716	0.720	0.717
Constant	-0.655	-2.247*	-3.056*	-0.609	-2.233*	-2.957*	-0.0976	-1.684	-2.411
	(-0.661)	(-1.758)	(-1.928)	(-0.661)	(-1.756)	(-1.874)	(-0.0998)	(-1.344)	(-1.613)
ICDisc_index	1.831**			1.837**			1.744**		
	(2.115)			(2.177)			(2.171)		
lnICDisc_frqt		0.506**			0.505**			0.487**	
		(2.238)			(2.269)			(2.355)	
lnICDisc_wc			0.380**			0.379**			0.372**
			(2.137)			(2.130)			(2.240)
AA	0.382	0.0821	0.583						
	(0.214)	(0.047)	(0.348)						
AQ				0.941	0.253	0.466			
				(0.446)	(0.127)	(0.223)			
EarnVar							-1.373**	-1.372**	-1.412**
							(-2.220)	(-2.242)	(-2.298)
SIZE	0.416***	0.391***	0.409***	0.413***	0.391***	0.406***	0.409***	0.387***	0.401***
	(6.039)	(5.533)	(6.043)	(6.169)	(5.723)	(6.141)	(6.257)	(5.829)	(6.216)
NAFEE	0.000186***	0.000200***	0.000197***	0.000187***	0.000200***	0.000198***	0.000187***	0.000199***	0.000198***
	(4.032)	(4.338)	(4.408)	(4.051)	(4.363)	(4.428)	(4.172)	(4.489)	(4.585)
BUSY	0.246**	0.222**	0.207*	0.241**	0.221**	0.203*	0.278**	0.256**	0.240**
	(2.244)	(2.024)	(1.851)	(2.195)	(2.016)	(1.817)	(2.507)	(2.334)	(2.158)
ROA	-0.00909**	-0.0104**	-0.0106**	-0.00916**	-0.0104**	-0.0106**	-0.00763*	-0.00892**	-0.00900**
	(-2.018)	(-2.310)	(-2.426)	(-2.058)	(-2.324)	(-2.433)	(-1.660)	(-1.975)	(-2.042)

(Continued)

Dependent variable	AFEE			AFEE			AFEE		
Individual EQ measure	AA: abnormal accruals			AQ: accruals quality			EarnVar: earnings variability		
NSUB	0.000779	0.000671	0.000663	0.000783	0.000672	0.000663	0.000715	0.000614	0.000601
	(1.622)	(1.446)	(1.410)	(1.632)	(1.450)	(1.411)	(1.540)	(1.361)	(1.317)
ARCA	0.0100***	0.0107***	0.0108***	0.0100***	0.0107***	0.0107***	0.00910***	0.00980***	0.00975***
	(2.950)	(3.092)	(3.116)	(2.987)	(3.111)	(3.123)	(2.899)	(3.060)	(3.079)
INVCA	-0.00106	-0.000661	-0.000622	-0.00114	-0.000679	-0.000707	-0.00188	-0.00147	-0.00152
	(-0.356)	(-0.220)	(-0.209)	(-0.386)	(-0.227)	(-0.240)	(-0.670)	(-0.519)	(-0.550)
LEV	0.000177	0.000106	0.000106	0.000158	0.000102	9.37E-05	7.38E-05	9.93E-06	2.84E-06
	(0.349)	(0.217)	(0.217)	(0.313)	(0.207)	(0.190)	(0.151)	(0.021)	(0.006)
BETA	0.313**	0.292**	0.287**	0.315**	0.293**	0.289**	0.348***	0.326***	0.322***
	(2.540)	(2.383)	(2.295)	(2.552)	(2.363)	(2.285)	(2.997)	(2.847)	(2.764)
CREDIT	-0.00117	-4.54E-06	0.000123	-0.00143	-6.19E-05	-0.000216	-0.00445	-0.00318	-0.00341
	(-0.245)	(-0.00101)	(0.028)	(-0.320)	(-0.0143)	(-0.0507)	(-0.843)	(-0.633)	(-0.679)