Asia Pacific Management Review xxx (xxxx) xxx

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Asia Pacific Management Review

journal homepage: www.elsevier.com/locate/apmrv

Audit Office's unused capacity and audit quality☆

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ARTICLE INFO

Article history:
Received 15 December 2021
Received in revised form
19 May 2022
Accepted 25 July 2022
Available online xxx

Keywords:
Unused capacity
Time pressure
Audit quality

ABSTRACT

While prior studies have linked the relationship between resources, time pressure, and audit quality, prior empirical studies generally measure the notion of audit offices' resources or capacity in relatively simplified, indirect, or context-specific ways. In this study, we use two measures of an audit office's unused capacity pertaining to normal audit tasks in Yu (2018) to examine their associations with several proxies for audit quality (discretionary accruals, earnings benchmarks, and going concern audit opinions). Empirical results show some evidence that higher (lower) unused capacity can result in better (worse) audit quality; and if any, this seems to occur only in Big 4 audit offices.

1. Introduction

Many experimental or survey-based auditing studies have attempted to verify the association between auditor's resources, pressure, and audit quality (e.g., Agoglia et al., 2010; Bennett et al., 2015; Coram et al., 2004; Lambert et al., 2017; McDaniel, 1990; Mocadlo, 2021). On the one hand, audit engagements conducted in fiscal year-end months with high levels of unused resources or capacity may impose less pressure on auditors, and the resources available to deal with unexpected and difficult audit-related decisions may also be more sufficient, leading to better quality audits. On the other hand, audit engagements conducted in fiscal year-end months with tight capacity conditions may impose more pressure on auditors and limit their access to resources, possibly resulting in inferior audits. In empirical studies, although many prior papers have attempted to capture different aspects of resources or capacity to investigate the association between pressure and audit quality, their proxies, are somehow relatively simplified, indirect, or context-specific (e.g., Bills et al., 2016; Czerney et al., 2019; Francis et al., 2017; López & Peters, 2012). Therefore, in this study, we use the measures of an audit office's "unused capacity pertaining to normal audit tasks" in Yu (2018), to examine their associations with audit quality.[1] The first measure, *UNUSCAP1*, is calculated as one minus "the current year's aggregate audit fees in a specific month for an audit city office, divided by the current year's highest monthly aggregate audit fees for that audit city office."[2] Alternatively, considering the potential entrance barriers among client firms from different industries, the second measure, *UNUSCAP2*, is calculated using office-industry (SIC division) as another calculation unit. The identification of "month" referenced above is based on the client firms' fiscal year-end month.[3]

We use data for public companies from the U.S. between 2008 and 2015 due to the mandatory disclosure of audit fees and the availability of practicing office data, which are, in contrast, not easily collected concurrently in some Asia Pacific jurisdictions, such as Taiwan and China (Gul et al., 2013; Pittman et al., 2021). Unused capacity is calculated at the audit office level because city offices of audit firms generally function as the core decision unit of audit tasks, as indicated by prior literature and in practice (e.g., Francis et al., 2017; Reichelt & Wang, 2010; Wallman, 1996). Regarding the proxies for audit quality, we use the absolute value and positive

☆ This paper is based on a part of Chun-Chan Yu's dissertation at National Cheng Kung University, which received the 2019 Outstanding Prize of Ph.D. dissertation of the 12th TSC Thesis Award.

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Peer review under responsibility of College of Management, National Cheng Kung University.

[1] In this study, "unused capacity pertaining to normal audit tasks" and "unused capacity" appear interchangeably to refer to the same meaning.

[2] Yu (2018) defines *UNUSCAP1* (*UNUSCAP2* by the same token) as one minus "the current year's aggregate audit fees in a specific month for an audit city office, divided by *the average of the current and previous year's* highest monthly aggregate audit fees for that audit city office." However, this formula might lead to unused capacity with negative values. Therefore, in this study, we instead use the formula appearing in Yu's (2018) robustness checks (see his Subsection 6.2). We thank the comment raised by one of the referees.

[3] We raise a concrete example to calculate unused capacity in Section 3.

https://doi.org/10.1016/j.apmrv.2022.07.005

value of discretionary accruals, earnings benchmark (zero earnings, prior year earnings, and the earnings consensus among financial analysts), and going concern audit opinions.

Empirically, we find some evidence that *ceteris paribus*, higher (lower) unused capacity can result in better (worse) audit quality, and if any, only occurs in Big 4 audit offices. We raise two possible explanations.[4] First, the existing quality control and/or firm-wide consultation mechanisms, especially after the passage of U.S. SOX, may function to some extent to provide uniform audit quality. However, the partial significant associations found in Big 4 audit offices may reflect the fact that, compared with those of the non-Big 4 offices: (1) the demanded level of the quality control system is higher in Big 4 auditors (Choi et al., 2010); (2) the client firms of Big 4 are generally more difficult to audit.[5] The above two factors thus make the requirements for the Big 4's quality control policies more difficult to fully comply with, especially under higher pressure (i.e., lower unused capacity). Second, unused capacity is linked mainly to the level of *audit offices* (or *office-industry*), yet may not accurately represent the pressure that *individual* auditors face.

This study contributes to the literature mainly in three ways. First, we provide new empirical evidence on how audit quality is affected by time pressure, which is caused by the level of available capacity or resources we measure directly. Compared with prior studies, our distinct findings suggest that additional inputs, such as capacity proxies with better granularity or better research settings, should be used to further investigate this issue. Second, Yu (2018) finds that higher values of *UNUSCAP1* and *UNUSCAP2* are both negatively associated with audit fees, corroborating that audit offices will charge less when they have fewer channels to consume unused capacity. Combined with the empirical findings in this study, audit services delivered when city offices have higher levels of unused capacity may represent not only lower fees being charged, but also better or unaffected audit quality, in contrast to other pricing strategies such as "low-balling" (DeAngelo, 1981). Third, although we use data from the U.S., we believe that even in many Asia-Pacific regions, city offices still play a key role in audit-related decisions and outcomes, such as the role of industry expertise and office size on audit quality and pricing. Therefore, our measures and empirical results have implications for researchers, practitioners, and regulators in Asia-Pacific settings.

The remainder of this paper is organized as follows. In Section 2, we review the relevant literature. Section 3 details the research design and the data. Section 4 and 5 presents the empirical results. Section 6 includes robustness checks, other tests, and discussion. Section 7 concludes.

2. Literature review

Many earlier or even recent auditing studies use experimental and/or survey methodologies to verify one of the consequences of insufficient or tight resources: time pressure, and its effects on the determinants of audit quality. Generally, these studies find that time pressure can negatively impact audit effectiveness, cause reductions in quality, and constrain the effective use of audit techniques (Agoglia et al., 2010; Bennett et al., 2015; Coram et al., 2004; Lambert et al., 2017; McDaniel, 1990; Mocadlo, 2021). However, experimental and/or survey methodologies generally face the concerns of external validity or limited sample size. Although relatively scarce and new, several empirical papers also attempt to capture different aspects of resources or capacity to investigate the association between pressure and audit quality. For example, López and Peters (2012) use busy season (i.e., a firm ends its fiscal year in December) and the relative level of workload compression of a local audit office to measure the degree of office-level busyness and pressure. They find that client firms ending their fiscal year-end month in December are associated with greater magnitudes of abnormal accruals and are more likely to beat earnings benchmarks. Further, the associations are enhanced when an audit office has higher workload compression in a subsample composed of firm-years ending their fiscal year-end month in December. However, they find that an auditor's propensity to issue a going concern audit opinion is relatively not affected by workload compression. Czerney et al. (2019) measure client deadline concentration at the audit office level by using the Herfindahl index based on each public company client's filer status and find a positive association between client deadline concentration and subsequent likelihood of restatement and other three audit quality proxies. However, when calculating client deadline concentration, they use the number of client firms and ignore differences in the size and complexity between client firms. In addition, at least three papers relate a *temporary shock* in audit office capacity to effects on audit quality. Bills et al. (2016) refer to production economics theory and find that recent growth at the *office-level* results in temporarily lower audit quality (specifically, client firms have higher magnitude of absolute discretionary accruals and are more likely to restate earnings) due to capacity constraints. Francis et al. (2017), using the gain (loss) of major industry clients as the proxy for short-term capacity shock, find a two-year persistent decrease (increase) in client firms' earnings quality. Lambert et al. (2017) find that time pressure due to filing deadline changes reduces audit lag and therefore negatively affects earnings quality.

Although the empirical papers discussed above link the relation between resources, time pressure, and audit quality, their measures for resources are somehow relatively simplified, indirect, or context-specific. After all, in this stream of literature, resource or capacity *per se* is the fundamental cause that illuminates the association between time pressure and audit quality. For example, as found by Yu (2018), not all audit offices have the highest workload for client firms ending their fiscal year in December. The loss of major industry clients, as used by Francis et al. (2017), is not a regular event for most audit offices; moreover, it is a binary variable, and its quantitative effect on an audit office's unused capacity cannot be measured accurately.[6]

Therefore, in this study, we use the measure of an audit office's unused capacity pertaining to normal audit tasks in Yu (2018). Referring to the economics concept of opportunity costs, Yu (2018) finds that both his measures of unused capacity are negatively associated with audit fees. Besides being linked to the magnitude of opportunity costs, based on the reasoning above, unused capacity can be linked to time pressure faced by auditors. Audit engagements conducted in fiscal year-end months with greater unused capacity may impose less pressure on auditors because the resources available to deal with unexpected and/or difficult audit-related decisions are more sufficient. On the contrary, audit engagements conducted in fiscal year-end months with tighter unused capacity may impose greater pressure on auditors and limit their access to resources.[7] Therefore, it is plausible that the

[4] Our results cannot be interpreted as Big 4 audit firms providing inferior audit quality to non-Big 4 audit firms because the research models of this study are not designed to investigate this issue.

[5] We acknowledge that the difficulties or complexity of client firms may positively affect the demanded level of the quality control system.

[6] We compare the measures of Yu (2018) with that of López and Peters (2012) in Subsection 3.2.2.

[7] Another channel through which insufficient capacity would harm audit quality is ineffective resource deployment when auditors must allocate resources across multiple concurrent audit engagements (Czerney et al., 2019).

measures of unused capacity pertaining to normal audit tasks may be positively associated with audit quality. Although audit firms generally have quality control and firm-wide consultation mechanisms intended to ensure the uniform quality of audit engagements, and these mechanisms have become even more crucial since the passage of SOX (Francis & Yu, 2009), we still propose the research hypothesis in an alternative form based on previous studies mentioned above:

H1. *Ceteris paribus*, the unused capacity pertaining to normal audit tasks positively affects audit quality.

3. Research design and sample selection

3.1. Proxies for audit quality

We use discretionary accruals as the proxy for audit quality because it is most commonly used in audit quality research (DeFond & Zhang, 2014). If higher levels of unused capacity can lead to higher audit quality, the possibility that accrual-based earnings management in financial statements will be mitigated will be higher. Specifically, four kinds of discretionary accruals are used: absolute values of performance-adjusted discretionary accruals (*ABSDA*), positive values of performance-adjusted discretionary accruals (*POSDA*), absolute values of performance-adjusted current discretionary accruals (*ABSCDA*), and positive values of performance-adjusted current discretionary accruals (*POSCDA*). Current accruals are used because managers have the most discretion over them (e.g., Ashbaugh et al., 2003; Becker et al., 1998; Chi & Chin, 2011; Wu et al., 2020). We choose not to use negative discretionary accruals because it is difficult to determine whether a decrease in negative discretionary accruals (i.e., toward zero) suggests a correction of income-decreasing earnings management or a compromise of auditor conservatism (Lennox et al., 2016).

3.2. Model and variables

3.2.1. Empirical model

Performance-adjusted discretionary accruals (*DA*) are calculated using the following steps (Jones, 1991; DeFond & Jiambalvo, 1994; Dechow et al., 1995; Hribar & Collins, 2002; Kothari et al., 2005; Reichelt & Wang, 2010). First, we run Equation (1.1) by industry (two-digit SIC code) and year, and require that each industry-year combination has at least 20 observations. Previous return on assets (ROA_{t-1}) is controlled for because prior literature indicates that accruals are correlated with firm performance (Dechow et al., 1995; Kothari et al., 2005). Second, the coefficients obtained from step one are inserted into Equation (1.2) to get the expected total accruals (*ETA*). Finally, the differences between actual total accruals (*TA*) and the expected total accruals are performance-adjusted discretionary accruals (*DA*). Equation (1.1) and Equation (1.2) are as follows:

$$TA = \alpha_1(1/AT_{t-1}) + \alpha_2(\Delta REV/AT_{t-1}) + \alpha_3(PPE/AT_{t-1}) + \alpha_4 ROA_{t-1} + \varepsilon \quad (1.1)$$

$$ETA = \widehat{\alpha_1}(1/AT_{t-1}) + \widehat{\alpha_2}((\Delta REV - \Delta AR)/AT_{t-1}) + \widehat{\alpha_3}(PPE/AT_{t-1}) + \widehat{\alpha_4} ROA_{t-1} \quad (1.2)$$

where:
TA = actual total accruals;
AT = total assets;
ΔREV = changes in sales from the prior year;
PPE = gross amount of property, plant, and equipment;
ROA = return on assets, measured by net income divided by average total assets;
$\widehat{\alpha_1}$ to $\widehat{\alpha_4}$ = estimated coefficients from Equation (1.1);
ETA = expected total accruals; and
ΔAR = changes in accounts receivable from prior year.
Detailed definitions of variables are listed in the Appendix.

When calculating the performance-adjusted current discretionary accruals (*CDA*), we follow the same steps as those used for performance-adjusted discretionary accruals, except that the related equations are as follows:

$$TCA = \alpha_1(1/AT_{t-1}) + \alpha_2(\Delta REV/AT_{t-1}) + \alpha_3 ROA_{t-1} + \varepsilon \quad (2.1)$$

$$ETCA = \widehat{\alpha_1}(1/AT_{t-1}) + \widehat{\alpha_2}((\Delta REV - \Delta AR)/AT_{t-1}) + \widehat{\alpha_3} ROA_{t-1} \quad (2.2)$$

where:
TCA = actual total current accruals;
$\widehat{\alpha_1}$ to $\widehat{\alpha_3}$ = estimated coefficients from Equation (2.1); and.
ETCA = expected total current accruals.
Detailed definitions of variables are listed in the Appendix.

To test the association between the measures of unused capacity pertaining to normal audit tasks and discretionary accruals, the following models that include the control variables are used:

$$\begin{aligned} ABSDA = {} & \alpha_0 + \alpha_1 UNUSCAP + \alpha_2 AUD\_CHANGE + \alpha_3 LNTA + \alpha_4 LAF + \alpha_5 AF \\ & + \alpha_6 SALESGROWTH + \alpha_7 CFO + \alpha_8 LOSS + \alpha_9 LEVERAGE + \alpha_{10} SRSEGS \\ & + \alpha_{11} FORGN + \alpha_{12} OVERTHREE + \alpha_{13} LNOFFICE + \alpha_{14} LNLAG + \alpha_{15} CI \\ & + \alpha_{16} NATIONALONLY + \alpha_{17} CITYONLY + \alpha_{18} JOINTLEADER \\ & + \alpha_{19} CFOVOL + \alpha_{20} MB + \alpha_{21} BANKRUPTCY + \alpha_{22} LAGABSTA \\ & + \alpha_{23} BIG4 + \beta STOCK\_EXC + \gamma YEAR + \lambda IND + \varepsilon \end{aligned} \quad (3.1)$$

$$\begin{aligned} POSDA = {} & \alpha_0 + \alpha_1 UNUSCAP + \alpha_2 AUD\_CHANGE + \alpha_3 LNTA + \alpha_4 LAF + \alpha_5 AF \\ & + \alpha_6 SALESGROWTH + \alpha_7 CFO + \alpha_8 LOSS + \alpha_9 LEVERAGE + \alpha_{10} SRSEGS \\ & + \alpha_{11} FORGN + \alpha_{12} OVERTHREE + \alpha_{13} LNOFFICE + \alpha_{14} LNLAG + \alpha_{15} CI \\ & + \alpha_{16} NATIONALONLY + \alpha_{17} CITYONLY + \alpha_{18} JOINTLEADER \\ & + \alpha_{19} CFOVOL + \alpha_{20} MB + \alpha_{21} BANKRUPTCY + \alpha_{22} LAGABSTA \\ & + \alpha_{23} BIG4 + \beta STOCK\_EXC + \gamma YEAR + \lambda IND + \varepsilon \end{aligned} \quad (3.2)$$

$$ABSCDA = \alpha_0 + \alpha_1 UNUSCAP + \alpha_2 AUD\_CHANGE + \alpha_3 LNTA + \alpha_4 LAF + \alpha_5 AF + \alpha_6 SALESGROWTH + \alpha_7 CFO + \alpha_8 LOSS + \alpha_9 LEVERAGE + \alpha_{10} SRSEGS + \alpha_{11} FORGN + \alpha_{12} OVERTHREE + \alpha_{13} LNOFFICE + \alpha_{14} LNLAG + \alpha_{15} CI + \alpha_{16} NATIONALONLY + \alpha_{17} CITYONLY + \alpha_{18} JOINTLEADER + \alpha_{19} CFOVOL + \alpha_{20} MB + \alpha_{21} BANKRUPTCY + \alpha_{22} LAGABSTCA + \alpha_{23} BIG4 + \beta STOCK\_EXC + \gamma YEAR + \lambda IND + \varepsilon \quad (3.3)$$

$$POSCDA = \alpha_0 + \alpha_1 UNUSCAP + \alpha_2 AUD\_CHANGE + \alpha_3 LNTA + \alpha_4 LAF + \alpha_5 AF + \alpha_6 SALESGROWTH + \alpha_7 CFO + \alpha_8 LOSS + \alpha_9 LEVERAGE + \alpha_{10} SRSEGS + \alpha_{11} FORGN + \alpha_{12} OVERTHREE + \alpha_{13} LNOFFICE + \alpha_{14} LNLAG + \alpha_{15} CI + \alpha_{16} NATIONALONLY + \alpha_{17} CITYONLY + \alpha_{18} JOINTLEADER + \alpha_{19} CFOVOL + \alpha_{20} MB + \alpha_{21} BANKRUPTCY + \alpha_{22} LAGABSTCA + \alpha_{23} BIG4 + \beta STOCK\_EXC + \gamma YEAR + \lambda IND + \varepsilon \quad (3.4)$$

We take the absolute values of *DA* and *CDA* as the dependent variables in Equation (3.1) and Equation (3.3), respectively (i.e., *ABSDA* and *ABSCDA*). Regarding Equation (3.2) and Equation (3.4), only the subsamples with positive values of *DA* and *CDA* are retained (i.e., *POSDA* and *POSCDA*). The detailed definition of the variable of interest, *UNUSCAP*, is discussed in Subsection 3.2.2. The detailed definition of the control variables is introduced in the Appendix, and the expected coefficient signs are presented in the table reporting the regression results (i.e., Table 3) according to prior studies (e.g., Asthana & Boone, 2012; Francis & Yu, 2009; Huang et al., 2015; López & Peters, 2012; Reichelt & Wang, 2010). To avoid the influence of outliers, all non-dummy variables are winsorized at the top and bottom 1% of their distributions throughout this study.

3.2.2. Variable of interest

The variable of interest, *UNUSCAP1* (the first measure of unused capacity pertaining to normal audit tasks), is calculated as one minus the metrics calculated below. The numerator is the current year's aggregate audit fees for a specific month of an audit city office. The denominator is equal to the current year's highest monthly aggregate audit fees of that audit city office. The identification of "month" indicated above is based on the client firms' fiscal year-end month. For example, if the monthly aggregate audit fees of an audit office with client firms ending their fiscal year in May of the current year are $5,000,000, and the highest monthly aggregate audit fees (e.g., in December of the current year) for that city office is $20,000,000, then the value of *UNUSCAP1* is 1- ($5,000,000/$20,000,000) = 0.75. Please note that in this case, we do not mean that audit office has unused capacity pertaining to normal audit tasks of 75% in May. Rather, we mean that the audit office has unused capacity pertaining to normal audit tasks of 75% *when auditing client firms ending their fiscal year-end month in May*. This calculation is used to measure a specific city office's unused capacity pertaining to normal audit tasks during a specific month for the following reasons. First, similar to Ng et al. (2016), it is assumed that for an audit office, a specific fiscal year-end month with the highest aggregate audit fees retains the smallest unused capacity.[8] Second, prior literature (i.e., Francis & Yu, 2009; Akono et al., 2011; López & Peters, 2012; Bills et al., 2016) emphasizes a strong connection between audit efforts and audit fees, and the core capacity for audit offices is engagement hours provided by auditors. As Francis and Yu (2009, 1524) indicate, "Audit fees are directly related to engagement hours …" Third, sales are commonly used as the observable driver for many costs (inclusive of labor costs, number of employees, and hours worked) in prior studies, especially in the stream of sticky cost research (e.g., Anderson et al., 2003; Banker et al., 2014; Dierynck et al., 2012). We acknowledge that according to auditing theory and empirical findings, the audit fees charged by audit firms actually comprise other components, such as litigation risks and reputation effects (Hay, 2013; Hay et al., 2006). However, unless we could obtain large-scale proprietary data on capacity or cost drivers, the most feasible way for empirical studies is to use an acceptable basis to proxy for it (Anderson et al., 2003). Therefore, audit fees are used as the basis by which to estimate unused capacity pertaining to normal audit tasks. To test the validity of our measures, we follow Yu (2018) to conduct a simple "horserace test"[9] by including *UNUSCAP1* and the traditional proxy for tight capacity *BUSY* (López & Peters, 2012) in an audit fee model to determine which measure better captures the notion of unused capacity. Untabulated results show that when using *BUSY* alone as the research variable, the coefficient is positively significant (coefficient = 0.057, $p < 0.01$). However, when putting *BUSY* along with *UNUSCAP1*, the coefficient of *BUSY* turn insignificant. In contrast, the coefficient of *UNUSCAP1* is negatively significant (coefficient = −0.061, $p < 0.05$), thus providing evidence that our measure of unused capacity better captures the notion of unused capacity than does *BUSY*. The results are unchanged when we instead put *UNUSCAP2* (as introduced below) and *BUSY* together to conduct another horserace test (untabulated).

However, we note that the calculation of unused capacity pertaining to normal audit tasks mentioned above is based on the implicit assumption that the auditors within the same city office can support each other without any entrance barriers between industries. In practice, however, different industries have different reporting focuses, business models, auditing processes, and risks. For example, Maletta and Wright (1996) find significant differences in financial statement error incidence, magnitude, and method of detection across industries. In some special industries, such as the financial industry, related knowledge is very specific (e.g., assessing the adequacy of loan loss provisions) (Krishnan, 2003). In practice, city offices often divide their operations *per* client firm industry. Therefore, we also try to employ office-industry as another

[8] We note that *UNUSCAP1* is very similar to the "resource constraints" (called "seasonal labor constraints") in Ng et al. (2016). We primarily differentiate our measures from theirs by calculating another measure of unused capacity, *UNUSCAP2*.

[9] We note that the purpose of the "horserace" test is not to isolate unbiased causal effects but to compare the explanatory power of horse-raced variables (Whited et al., 2021).

Table 1
Sample Selection.

Sample selection process	(1) *DA*	(2) *CDA*
US firms with audit fee data in *Audit Analytics* in 2008–2015	76,768	76,768
Less: Financial firms (SIC: 6000–6999)	(14,420)	(14,420)
Less: Missing values in *Audit Analytics*	(22,901)	(22,901)
Less: Merge with *Compustat*	(8,574)	(8,574)
Less: Missing values in *Compustat*	(8,212)	(8,184)
Less: Industry-year not at least 20 observations	(3,008)	(2,925)
Final sample for *ABSDA* or *ABSCDA*	19,653	19,764
Big 4 Auditees	12,884	12,900
Non-Big 4 Auditees	6,769	6,864
Final sample for *ABSDA* or *ABSCDA*	19,653	19,764
Less: Negative values in *DA* or *CDA*	(12,044)	(12,836)
Final sample for *POSDA* or *POSCDA*	7,609	6,928
Big 4 Auditees	4,620	4,096
Non-Big 4 Auditees	2,989	2,832

calculation unit to measure unused capacity pertaining to normal audit tasks (i.e., *UNUSCAP2*). When defining an industry, this study uses the SIC division[10] because it is assumed that some degree of mutual support is still feasible at this higher industry classification level.[11] Digging into office-industry level distinguishes this study from that of Ng et al. (2016) and is also consistent with the work of Francis et al. (2017) suggesting that "… offices gaining a major client will experience a short-term capacity constraint (labor shortage) that could exacerbate workload or time-pressure problem and lead to lower-quality audits for same-industry clients …." Note that although *UNUSCAP2* may be more suitable than *UNUSCAP1* to measure unused capacity for larger city offices, it eventually depends on the specific client portfolio and organizational structure of each city office. Therefore, we use both in the main analyses.

López and Peters (2012) create a proxy for the relative level of workload compression (*AUD_WLC*) to measure the degree of *office-level* busyness and pressure in a specific fiscal year-end month. Our variable of interest, *UNUSCAP1*, may be associated with *AUD_WLC*, but is conceptually and empirically different from it in two ways. First, although the numerator is the same (i.e., the current year's aggregate audit fees of an audit office for a specific month), the denominator of *AUD_WLC* is the *total audit* fees collected by the office for the *current* year. By contrast, *UNUSCAP1* considers the concept of capacity (the maximum resources an organization can provide in a reasonably short period) and thus uses *the current year's highest monthly aggregate audit* fees of an audit office as the denominator. Second, if we want to convert *UNUSCAP1* to *AUD_WLC*, the ratio is constant *only within* the same office-year.

[10] Agriculture, Forestry and Fishing: 0100–0999; Mining: 1000–1499; Construction: 1500–1799; Manufacturing: 2000–3999; Transportation, Communications, Electric, Gas and Sanitary Service: 4000–4999; Wholesale Trade: 5000–5199; Retail Trade: 5200–5999; Finance, Insurance and Real Estate: 6000–6799; Services: 7000–8999; Public Administration: 9100–9729; Non-classifiable: 9900–9999.

[11] This assumption is supported by Chu et al. (2018, 130), who state: "Many differences at the 2-digit industry level may not be relevant to auditors. For example, whether an audit client manufactures "textile mill products" (SIC industry 22) or "apparel & other textile products" (SIC industry 23) or "lumber and wood products" (SIC industry 24) may not matter."

Table 2
Descriptive statistics.

Panel A: All Client Firms

Variable	n	Mean	Std Dev	25th Pctl	Median	75th Pctl
ABSDA	19,653	0.081	0.098	0.022	0.048	0.099
UNUSCAP1	19,653	0.231	0.375	0.000	0.000	0.527
UNUSCAP2	19,653	0.154	0.305	0.000	0.000	0.122
AUD_CHANGE	19,653	0.072	0.259	0.000	0.000	0.000
LNTA	19,653	19.698	2.278	18.119	19.758	21.309
LAF	19,653	0.385	0.487	0.000	0.000	1.000
AF	19,653	0.338	0.473	0.000	0.000	1.000
SALESGROWTH	19,653	0.084	0.381	−0.060	0.046	0.165
CFO	19,653	0.037	0.211	0.007	0.080	0.139
LOSS	19,653	0.393	0.488	0.000	0.000	1.000
LEVERAGE	19,653	0.544	0.376	0.306	0.488	0.676
SRSEGS	19,653	2.219	0.793	1.414	2.236	2.828
FORGN	19,653	0.576	0.494	0.000	1.000	1.000
OVERTHREE	19,653	0.866	0.341	1.000	1.000	1.000
LNOFFICE	19,653	16.547	1.945	15.212	16.948	18.094
LNLAG	19,653	4.175	0.228	4.025	4.143	4.317
CI	19,653	0.135	0.211	0.019	0.052	0.142
NATIONALONLY	19,653	0.092	0.290	0.000	0.000	0.000
CITYONLY	19,653	0.251	0.434	0.000	0.000	1.000
JOINTLEADER	19,653	0.111	0.314	0.000	0.000	0.000
CFOVOL	19,653	0.085	0.131	0.022	0.044	0.088
MB	19,653	3.305	5.217	1.034	1.887	3.451
BANKRUPTCY	19,653	0.771	5.296	0.657	1.884	2.929
LAGABSTA	19,653	0.109	0.116	0.037	0.074	0.135
BIG4	19,653	0.656	0.475	0.000	1.000	1.000

Panel B: Differences in Means—Big 4 Auditees vs. Non-Big 4 Auditees

	Big 4 Auditees		Non-Big 4 Auditees		
Variable	n	Mean	n	Mean	Diff. (*t*-test)
ABSDA	12,884	0.068	6,769	0.107	−0.039***
UNUSCAP1	12,884	0.238	6,769	0.218	0.020***
UNUSCAP2	12,884	0.168	6,769	0.126	0.042***
AUD_CHANGE	12,884	0.026	6,769	0.161	−0.135***
LNTA	12,884	20.757	6,769	17.682	3.075***
LAF	12,884	0.556	6,769	0.058	0.499***
AF	12,884	0.363	6,769	0.291	0.072***
SALESGROWTH	12,884	0.084	6,769	0.085	−0.001
CFO	12,884	0.069	6,769	−0.026	0.095***
LOSS	12,884	0.318	6,769	0.536	−0.218***
LEVERAGE	12,884	0.541	6,769	0.551	−0.010*
SRSEGS	12,884	2.382	6,769	1.908	0.474***
FORGN	12,884	0.663	6,769	0.410	0.253***
OVERTHREE	12,884	0.916	6,769	0.769	0.147***
LNOFFICE	12,884	17.645	6,769	14.458	3.187***
LNLAG	12,884	4.087	6,769	4.342	−0.255***
CI	12,884	0.086	6,769	0.228	−0.142***
NATIONALONLY	12,884	0.141	6,769	0.001	0.140***
CITYONLY	12,884	0.307	6,769	0.144	0.163***
JOINTLEADER	12,884	0.169	6,769	0.000	0.169***
CFOVOL	12,884	0.063	6,769	0.125	−0.062***
MB	12,884	3.449	6,769	3.032	0.417***
BANKRUPTCY	12,884	1.567	6,769	−0.744	2.311***
LAGABSTA	12,884	0.094	6,769	0.137	−0.043***

Sample period: 2008–2015.
See Appendix for variable definitions.
*, ** and *** denote significant differences from zero at the 10%, 5% and 1% levels, respectively (two-tailed).

Therefore, the regression coefficients of using *UNUSCAP1* and *AUD_WLC*, respectively, will not be identical or proportional. The above discussions may partially explain why our empirical results are different from those of López and Peters (2012), let alone our second variable of interest, *UNUSCAP2*.

3.3. Sample selection

Table 1 presents the sample selection. Regardless of the combination of proxies for audit quality and the variable of interest, the sample selection processes are very similar. Therefore, we only discuss the detailed process of *DA* in Column (1), which includes *ABSDA* and *POSDA* as audit quality proxies. The sample selection results are identical irrespective of using *UNUSCAP1* or *UNUSCAP2* as the variable of interests. The process starts with 76,768 US firm-years (the basis by which to calculate unused capacity) with audit fee data from *Audit Analytics* in 2008–2015. Due to the unique characteristics in the financial industry (Fields et al., 2004), 14,420 firm-years with SIC codes ranging from 6000 to 6999 are dropped. We lose 22,901 observations when obtaining complete audit-related variables. 8,574 observations are deleted when merging with *Compustat*. 8,212 observations are further lost when obtaining

Table 3
Audit quality regression results I dependent variable: Discretionary accruals (*ABSDA*, *ABSCDA*, *POSDA*, *POSCDA*).

Panel A: All Client Firms and Absolute Values

Variable	Exp. Sign	DV: *ABSDA* Coeff.	t-stat	DV: *ABSCDA* Coeff.	t-stat
Intercept	?	0.120	3.54***	0.108	3.24***
UNUSCAP1	−	**−0.003**	**−1.38***	**−0.002**	**−1.21**
AUD_CHANGE	+	0.004	1.38*	0.003	1.01
LNTA	−	−0.005	−6.12***	−0.005	−6.10***
LAF	−	−0.003	−0.81	0.002	0.67
AF	−	−0.002	−0.88	0.000	0.16
SALESGROWTH	+	0.019	6.73***	0.014	4.97***
CFO	?	0.035	3.97***	0.033	3.83***
LOSS	−	0.028	13.09***	0.027	13.25***
LEVERAGE	+	0.023	6.34***	0.027	7.10***
SRSEGS	?	−0.003	−2.34**	−0.003	−3.15***
FORGN	?	0.000	0.07	0.000	0.09
OVERTHREE	?	−0.001	−0.63	−0.001	−0.50
LNOFFICE	−	0.002	1.85**	0.001	1.79**
LNLAG	+	0.004	0.73	0.007	1.35*
CI	−	0.008	1.55*	0.009	1.70**
NATIONALONLY	?	0.001	0.48	−0.001	−0.48
CITYONLY	−	0.001	0.83	0.000	0.14
JOINTLEADER	−	0.000	0.09	−0.000	−0.10
CFOVOL	+	0.111	10.27***	0.117	10.89***
MB	+	0.001	3.16***	0.001	3.50***
BANKRUPTCY	−	−0.002	−5.63***	−0.002	−5.75***
LAGABSTA	+	0.069	7.27***	–	–
LAGABSTCA	+	–	–	0.087	8.73***
BIG4	−	−0.000	−0.24	−0.000	−0.28
STOCK_EXC		Controlled		Controlled	
YEAR		Controlled		Controlled	
IND		Controlled		Controlled	
N		19,653		19,764	
F stat.		131.75***		134.40***	
$\overline{R}^2$		22.58%		23.86%	

Panel B: Big 4 Client Firms and Absolute Values

Variable	Exp. Sign	DV: ABSDA Coeff.	t-stat	DV: ABSCDA Coeff.	t-stat
UNUSCAP1	−	**−0.004**	**−2.15****	**−0.003**	**−1.49***
n		12,884		12,900	
F stat.		99.19***		162.33***	
$\overline{R}^2$		21.47%		22.20%	

Panel C: Non-Big 4 Client Firms and Absolute Values

Variable	Exp. Sign	DV: AB*SDA* Coeff.	t-stat	DV: *ABSCDA* Coeff.	t-stat
UNUSCAP1	−	**−0.002**	**−0.35**	**−0.002**	**−0.57**
n		6,769		6,864	
F stat.		182.44***		78986.2***	
$\overline{R}^2$		19.91%		22.09%	

Panel D: All Client Firms and Positive Values

Variable	Exp. Sign	DV: *POSDA* Coeff.	t-stat	DV: *POSCDA* Coeff.	t-stat
Intercept	?	0.126	3.13***	0.143	3.72***
UNUSCAP1	−	**−0.003**	**−1.37***	**−0.005**	**−2.03****
AUD_CHANGE	+	0.003	0.87	0.002	0.45
LNTA	−	−0.002	−1.77**	−0.003	−2.42***
LAF	−	−0.022	−4.63***	−0.017	−3.60***
AF	−	−0.011	−3.33***	−0.009	−2.84***
SALESGROWTH	+	0.016	5.20***	0.014	4.78***
CFO	−	−0.128	−13.08***	−0.134	−14.32***
LOSS	−	−0.039	−15.59***	−0.045	−18.17***
LEVERAGE	+	0.006	1.49*	0.007	1.72**
SRSEGS	?	0.001	0.38	−0.001	−0.78
FORGN	?	−0.004	−1.69*	−0.000	−0.00
OVERTHREE	?	−0.002	−0.62	−0.001	−0.41
LNOFFICE	−	0.001	0.59	0.002	1.62*

(*continued on next page*)

Table 3 (*continued*)

Panel A: All Client Firms and Absolute Values					
		DV: *ABSDA*		DV: *ABSCDA*	
Variable	Exp. Sign	Coeff.	t-stat	Coeff.	t-stat
LNLAG	+	0.002	0.34	−0.001	−0.17
CI	−	0.002	0.31	0.007	1.11
NATIONALONLY	?	0.003	1.05	0.001	0.37
CITYONLY	−	0.001	0.76	0.002	0.75
JOINTLEADER	−	0.002	0.73	0.000	0.15
CFOVOL	+	0.031	2.60***	0.044	3.81***
MB	+	0.000	0.71	0.000	1.20
BANKRUPTCY	−	−0.000	−0.00	−0.000	−0.25
LAGABSTA	+	0.088	8.15***	−	−
LAGABSTCA	+	−	−	0.106	10.24***
BIG4	−	−0.005	−1.30*	−0.007	−2.23**
STOCK_EXC		Controlled		Controlled	
YEAR		Controlled		Controlled	
IND		Controlled		Controlled	
N		7,609		6,928	
F stat.		202.87***		191.22***	
$\overline{R}^2$		25.42%		29.22%	
Panel E: Big 4 Client Firms and Positive Values					
		DV: *POSDA*		DV: *POSCDA*	
Variable	Exp. Sign	Coeff.	t-stat	Coeff.	t-stat
UNUSCAP1	−	**−0.005**	**−1.75****	**−0.006**	**−2.19****
N		4,620		4,096	
F stat.		108.08***		289.31***	
$\overline{R}^2$		19.26%		22.15%	
Panel F: Non-Big 4 Client Firms and Positive Values					
		DV: *POSDA*		DV: *POSCDA*	
Variable	Exp. Sign	Coeff.	t-stat	Coeff.	t-stat
UNUSCAP1	−	**−0.001**	**−0.22**	**−0.003**	**−0.72**
N		2,989		2,832	
F stat.		2347.77***		289.78***	
$\overline{R}^2$		25.21%		29.81%	
Panel G: Summarized Regression Results Using *UNUSCAP2* as Another Test Variable All Client Firms and Absolute Values					
		DV: ABSDA		DV: ABSCDA	
Variable	Exp. Sign	Coeff.	t-stat	Coeff.	t-stat
UNUSCAP2	−	**−0.002**	**−0.86**	**−0.001**	**−0.55**
N		19,653		19,764	
F stat.		131.44***		134.19***	
$\overline{R}^2$		22.57%		23.86%	
Big 4 Client Firms and Absolute Values					
		DV: *ABSDA*		DV: *ABSCDA*	
Variable	Exp. Sign	Coeff.	t-stat	Coeff.	t-stat
UNUSCAP2	−	**−0.003**	**−1.33***	**−0.002**	**−0.75**
N		12,884		12,900	
F stat.		99.14***		162.15***	
$\overline{R}^2$		21.45%		22.19%	
Non-Big 4 Client Firms and Absolute Values					
		DV: *ABSDA*		DV: *ABSCDA*	
Variable	Exp. Sign	Coeff.	t-stat	Coeff.	t-stat
UNUSCAP2	−	**−0.004**	**−0.71**	**−0.004**	**−0.75**
N		6,769		6,864	
F stat.		182.07***		195.96***	
$\overline{R}^2$		19.91%		22.09%	
All Client Firms and Positive Values					
		DV: *POSDA*		DV: *POSCDA*	
Variable	Exp. Sign	Coeff.	t-stat	Coeff.	t-stat
UNUSCAP2	−	**−0.004**	**−1.44***	**−0.006**	**−2.25****
N		7,609		6,928	

Table 3 (*continued*)

Panel A: All Client Firms and Absolute Values					
		DV: *ABSDA*		DV: *ABSCDA*	
Variable	Exp. Sign	Coeff.	t-stat	Coeff.	t-stat
F stat.		203.13***		191.21***	
$\overline{R}^2$		25.42%		29.23%	
Big 4 Client Firms and Positive Values					
		DV: *POSDA*		DV: *POSCDA*	
Variable	Exp. Sign	Coeff.	t-stat	Coeff.	t-stat
UNUSCAP2	−	**−0.003**	**−1.04**	**−0.007**	**−2.21****
N		4,620		4,096	
F stat.		108.70***		289.61***	
$\overline{R}^2$		19.23%		22.12%	
Non-Big 4 Client Firms and Positive Values					
		DV: *POSDA*		DV: *POSCDA*	
Variable	Exp. Sign	Coeff.	t-stat	Coeff.	t-stat
UNUSCAP2	−	**−0.005**	**−0.80**	**−0.003**	**−0.54**
n		2,989		2,832	
F stat.		2739.07***		308.39***	
$\overline{R}^2$		25.22%		29.86%	

Table 3 presents the empirical results of testing the association between discretionary accruals and the measures of unused capacity pertaining to normal audit tasks (i.e., *UNUSCAP1* and *UNUSCAP2*). Panel A shows the results using *ABSDA* and *ABSCDA* as dependent variables. Panel D shows the results using *POSDA* and *POSCDA* as dependent variables. Both the two panels use client firms audited by Big 4 and non-Big4 audit offices. Then, we partition the sample into client firms audited by Big 4 (Panel B and Panel E) and non-Big 4 (Panel C and Panel F) audit offices. Note that *UNUSCAP1* is the test variable in the above panels. Finally, we summarize the empirical results in Panel G by using *UNUSCAP2* as the test variable. For brevity, the results of control variables are not provided in Panel B, C, E, F, and G.
Sample period: 2008–2015. The t-statistics are adjusted for clustering by firms.
See Appendix for variable definitions.
*, ** and *** denote significant differences from zero at the 10%, 5% and 1% levels, respectively. All significance tests are one-tailed, except for those variables with directional expectations (i.e., two-tailed).

complete financial statement independent variables in *Compustat*. Finally, we delete 3,008 firm-years that do not have sufficient observations in each year-industry combination (20). The above processes lead to a final sample of 19,653 for *ABSDA*, which includes 12,884 Big 4 auditees and 6,769 non-Big 4 auditees, respectively. After further deleting 12,044 firm-years with negative *DA* values, we have a final sample for *POSDA* of 7,609, which includes 4,620 Big 4 auditees and 2,989 non-Big 4 auditees, respectively.

We choose 2008 as the inception year for the following reasons. First, to comply with SOX 404, U.S. accelerated filers were required to file both a management report and an auditor's attestation of internal control over financial reporting for fiscal years ending on or after November 15, 2004 (SEC, 2004). This may have led to unstable fluctuations in audit fees at least for several years (Huang et al., 2009). Second, in 2005, the SEC defined a new filer called "large accelerated filer" (hereafter, LAF[12]) and required a 60-day filing deadline beginning with the annual report filed for its first fiscal year ending on or after December 15, 2006 (SEC, 2005). This requirement may again have made the audit fee market unstable for a while.

4. Empirical results

4.1. Descriptive statistics

Panel A of Table 2 shows the descriptive statistics for the final sample, combined with using the absolute values of performance-adjusted discretionary accruals (*ABSDA*) as the proxies for audit quality (n = 19,653). The descriptive statistics of other combinations in this study are untabulated but are available upon request. Compared with Big 4 auditees, non-Big 4 auditees exhibit higher discretionary accruals, a higher frequency of auditor changes, higher debt ratios, smaller size, less profits, and less frequent audits by industry experts (Panel B of Table 2). The mean of *UNUSCAP1* in Panel A of Table 2 suggests that, on average, client firms are audited by a city office with unused capacity pertaining to normal audit tasks of 0.231. Compared with *UNUSCAP1*, the mean of *UNUSCAP2* is smaller (0.154). On average, compared with non-Big 4 audit offices, Big 4 audit offices exhibit higher unused capacity when auditing their clients.

4.2. Regression results

Table 3 presents the regression results. All regression models are significant ($p < 0.01$ for all models). Panel A shows the results using *ABSDA* and *ABSCDA* as dependent variables. Panel D shows the results using *POSDA* and *POSCDA* as dependent variables. The two panels use client firms audited by all audit offices. Then, we partition the sample into client firms audited by Big 4 (Panel B and Panel E) and non-Big 4 (Panel C and Panel F) audit offices. Note that *UNUSCAP1* is the test variable in the above panels. Finally, we summarize the empirical results in Panel G using *UNUSCAP2* as the test variable. For brevity, the results of control variables are not provided in some panels (available upon request). Because some independent variables (inclusive of the variables of interests, *UNUSCAP1* and *UNUSCAP2*) have directional expectations, all significance tests are one-tailed, except for those variables without directional expectations (i.e., two-tailed) throughout regression tables of this study. In Panel A, the coefficients of *UNUSCAP1* are marginally significant (coefficient = −0.003, $p < 0.1$) when using

[12] According to SEC (2005) definition, LAF is an Exchange Act reporting company with a worldwide market value of $700 million or more of outstanding voting and non-voting common equity held by non-affiliates.

absolute values of discretionary accruals (but not significant when using absolute values of current discretionary accruals), providing initial evidence that higher unused capacity in an audit office can deliver higher audit quality. However, when further dividing the sample into Big 4 (Panel B) and non-Big 4 (Panel C) client firms, the significant association only holds for client firms audited by Big 4 city offices. Panel D to Panel F provide similar but even stronger results. Both the coefficients of *UNUSCAP1* are significant when using positive values of (current) discretionary accruals as audit quality proxies and the significant results are primarily driven by Big 4 audit offices. The coefficients of *UNUSCAP1* are also economically meaningful. For example, when using *ABSDA* as the dependent variable, the coefficient of *UNUSCAP1* in Panel B is −0.004, which seems modest in terms of magnitude. However, compared with the median of *ABSDA* (0.042, untabulated), an increase in one standard deviation of *UNUSCAP1* in the sample (0.387, untabulated) equals a 3.69% reduction in the median absolute values of performance-adjusted discretionary accruals. Furthermore, an increase in the interquartile range of *UNUSCAP1* in the sample (0.585, untabulated) equals a 5.57% reduction in the median absolute values of performance-adjusted discretionary accruals. The evidence becomes slightly weaker when using *UNUSCAP2* as the variable of interest. In Panel G, only four combinations are significant: i.e., all client firms and *POSDA* (coefficient = −0.004, $p < 0.1$), all client firms and *POSCDA* (coefficient = −0.004, $p < 0.05$), Big 4 client firms and *ABSDA* (coefficient = −0.003, $p < 0.1$), and Big 4 client firms and *POSCDA* (coefficient = −0.007, $p < 0.05$). The control variables used in the models of discretionary accruals are generally consistent with expectations (or have opposite signs but are not statistically significant), except for partial coefficients of *LOSS*, *LNOFFICE* and *CI*. To summarize, we get consistent and generally significant evidence that *ceteris paribus*, higher (lower) unused capacity results in better (worse) audit quality; and if any, this seems to occur only in Big 4 audit offices.

5. Other proxies for audit quality

In this section, we further test two commonly used audit quality proxies: earnings benchmarks and going concern audit opinions.

5.1. Earnings benchmarks

Prior studies suggest that managers have incentives to manipulate earnings to meet or beat earnings benchmarks (e.g., Bartov et al., 2002; Burgstahler & Dichev, 1997). Auditors who deliver higher audit quality should therefore mitigate the possibility of such behavior. Three earnings benchmarks are used: zero earnings, prior year earnings, and the earnings consensus of financial analysts. The empirical models using logistic regressions are as follows:

$$\begin{aligned}SP = {}& \alpha_0 + \alpha_1 UNUSCAP + \alpha_2 AUD\_CHANGE + \alpha_3 LNTA + \alpha_4 LAF + \alpha_5 AF \\ & + \alpha_6 SALESGROWTH + \alpha_7 CFO + \alpha_8 LEVERAGE + \alpha_9 SRSEGS \\ & + \alpha_{10} FORGN + \alpha_{11} OVERTHREE + \alpha_{12} LNOFFICE + \alpha_{13} LNLAG + \alpha_{14} CI \\ & + \alpha_{15} NATIONALONLY + \alpha_{16} CITYONLY + \alpha_{17} JOINTLEADER \\ & + \alpha_{18} CFOVOL + \alpha_{19} MB + \alpha_{20} BANKRUPTCY + \alpha_{21} TA \\ & + \alpha_{22} BIG4 + \beta STOCK\_EXC + \gamma YEAR + \lambda IND + \varepsilon\end{aligned} \tag{4.1}$$

$$\begin{aligned}SIN = {}& \alpha_0 + \alpha_1 UNUSCAP + \alpha_2 AUD\_CHANGE + \alpha_3 LNTA + \alpha_4 LAF + \alpha_5 AF \\ & + \alpha_6 SALESGROWTH + \alpha_7 CFO + \alpha_8 LOSS + \alpha_9 LEVERAGE + \alpha_{10} SRSEGS \\ & + \alpha_{11} FORGN + \alpha_{12} OVERTHREE + \alpha_{13} LNOFFICE + \alpha_{14} LNLAG + \alpha_{15} CI \\ & + \alpha_{16} NATIONALONLY + \alpha_{17} CITYONLY + \alpha_{18} JOINTLEADER \\ & + \alpha_{19} CFOVOL + \alpha_{20} MB + \alpha_{21} BANKRUPTCY + \alpha_{22} TA \\ & + \alpha_{23} BIG4 + \beta STOCK\_EXC + \gamma YEAR + \lambda IND + \varepsilon\end{aligned} \tag{4.2}$$

$$\begin{aligned}EBANALY = {}& \alpha_0 + \alpha_1 UNUSCAP + \alpha_2 AUD\_CHANGE + \alpha_3 LNTA + \alpha_4 LAF + \alpha_5 AF \\ & + \alpha_6 SALESGROWTH + \alpha_7 CFO + \alpha_8 LOSS + \alpha_9 LEVERAGE + \alpha_{10} SRSEGS \\ & + \alpha_{11} FORGN + \alpha_{12} OVERTHREE + \alpha_{13} LNOFFICE + \alpha_{14} LNLAG + \alpha_{15} CI \\ & + \alpha_{16} NATIONALONLY + \alpha_{17} CITYONLY + \alpha_{18} JOINTLEADER \\ & + \alpha_{19} CFOVOL + \alpha_{20} MB + \alpha_{21} BANKRUPTCY + \alpha_{22} TA \\ & + \alpha_{23} BIG4 + \alpha_{24} ROA + \alpha_{25} LNUMFOR + \alpha_{26} ANALYSTD \\ & + \beta STOCK\_EXC + \gamma YEAR + \lambda IND + \varepsilon\end{aligned} \tag{4.3}$$

SP (*SIN*) is defined as one if a firm's return on assets (changes in return on assets) in year *t* falls between 0.00 and 0.05 (0.00 and 0.013) (Francis & Yu, 2009), and zero otherwise. *EBANALY* is defined as one if a firm's earnings per share exactly meet or beat the latest analysts' earnings forecast by one cent, and zero otherwise (Fung et al., 2017; Reichelt & Wang, 2010). Actual earnings per share and earnings forecast data are from the I/B/E/S unadjusted detail database. The control variables in Equation (4.1) to Equation (4.3) are basically very similar to those in the models of discretionary accruals because Davis et al. (2009) suggest that these variables may influence the ability to use discretionary accruals to meet or beat earnings benchmarks. However, the expected directions of some variables (i.e., *LNTA*, *LAF*, *AF*, *CFOVOL*) are contrary to those in the models of discretionary accruals because Reichelt and Wang (2010) suggest that client firms that are larger in size or less volatile in operations are more likely to meet or beat earnings forecasts. *LOSS* is not included in Equation (4.1) because of the issue of quasi-complete separation.[13] We follow Reichelt and Wang (2010) to control for total accruals (*TA*) in all equations. Finally, return on assets (*ROA*), the natural logarithm of the number of analyst forecasts (*LNUMFOR*), and the standard deviation of analysts' earnings forecasts (*ANALYSTD*) (Asthana & Boone, 2012; Reichelt & Wang, 2010) are controlled for in Equation (4.3). The expected coefficient signs of control variables are presented in Table 4. Detailed definitions of variables are listed in the Appendix.

[13] In case that *LOSS* = 1, the value of *SP* will constantly be 0.

Table 4
Audit quality regression results II dependent variable: Meeting or beating earnings benchmark (*SP*, *SIN*, *EBANALY*).

Panel A: All Client Firms

Variable	Exp. Sign	DV: *SP* Coeff.	DV: *SP* z-stat	DV: *SIN* Coeff.	DV: *SIN* z-stat	DV: *EBANALY* Coeff.	DV: *EBANALY* z-stat
Intercept	?	−5.040	−4.28***	−2.708	−2.75***	−0.301	−0.19
UNUSCAP1	−	**−0.125**	**−1.79****	**0.028**	**0.42**	**0.046**	**0.47**
AUD_CHANGE	+	−0.012	−0.16	−0.044	−0.39	0.062	0.30
LNTA	+	0.157	5.66***	0.128	4.57***	0.042	1.00
LAF	+	−0.490	−4.39***	0.115	0.95	−0.091	−0.44
AF	+	−0.057	−0.74	0.004	0.04	−0.060	−0.35
SALESGROWTH	+	−0.141	−2.30**	−0.087	−0.98	0.009	0.09
CFO	−	0.898	4.87***	0.115	0.43	−0.772	−1.35*
LOSS	−	−	−	−0.957	−11.38***	−0.012	−0.10
LEVERAGE	+	0.233	2.35***	−0.148	−1.36*	−0.234	−1.30*
SRSEGS	?	0.080	1.88*	−0.060	−1.43	−0.051	−0.81
FORGN	?	−0.157	−2.33**	−0.138	−2.00*	0.207	1.99**
OVERTHREE	?	−0.035	−0.55	−0.015	−0.19	−0.059	−0.44
LNOFFICE	−	−0.082	−2.75***	−0.012	−0.41	−0.100	−2.29**
LNLAG	+	0.085	0.56	−0.135	−0.87	−0.101	−0.40
CI	−	−0.201	−1.17	0.096	0.51	−0.494	−1.60*
NATIONALONLY	?	−0.086	−1.08	−0.012	−0.16	0.129	1.16
CITYONLY	−	−0.003	−0.05	−0.012	−0.21	0.225	2.62***
JOINTLEADER	−	−0.042	−0.49	−0.029	−0.37	−0.015	−0.14
CFOVOL	−	−2.064	−4.67***	−5.319	−4.54***	−0.560	−1.15
MB	+	−0.059	−5.06***	−0.002	−0.34	0.009	1.36*
BANKRUPTCY	−	0.046	4.16***	0.013	1.04	−0.084	−3.14***
TA	+	2.767	15.44***	0.789	2.87***	−0.932	−1.36*
BIG4	−	0.141	1.66**	−0.086	−0.92	−0.175	−1.19
ROA	+	−	−	−	−	1.611	2.51***
LNUMFOR	+	−	−	−	−	0.261	5.03***
ANALYSTD	−	−	−	−	−	−4.394	−4.63***
STOCK_EXC		Controlled		Controlled		Controlled	
YEAR		Controlled		Controlled		Controlled	
IND		Controlled		Controlled		Controlled	
N		21,897		21,902		10,096	
Wald Test		253.43***		34.43***		22.46***	
Pseudo $\bar{R}^2$		10.17%		11.46%		3.84%	

Panel B: Big 4 Client Firms

Variable	Exp. Sign	DV: *SP* Coeff.	DV: *SP* z-stat	DV: *SIN* Coeff.	DV: *SIN* z-stat	DV: *EBANALY* Coeff.	DV: *EBANALY* z-stat
UNUSCAP1	−	**−0.172**	**−2.07****	**0.044**	**0.57**	**0.064**	**0.62**
N		14,248		14,253		8,715	
Wald Test		30.67***		25.79***		32.53***	
Pseudo $\bar{R}^2$		8.6%		10.52%		3.81%	

Panel C: Non-Big 4 Client Firms

Variable	Exp. Sign	DV: *SP* Coeff.	DV: *SP* z-stat	DV: *SIN* Coeff.	DV: *SIN* z-stat	DV: *EBANALY* Coeff.	DV: *EBANALY* z-stat
UNUSCAP1	−	**0.021**	**0.16**	**0.033**	**0.22**	**−0.229**	**−0.63**
N		7,530		7489		1,229	
Wald Test		843.08***		79.91***		32.95***	
Pseudo $\bar{R}^2$		14.33%		12.38%		13.79%	

Panel D: Summarized Regression Results Using *UNUSCAP2* as Another Test Variable All Client Firms

Variable	Exp. Sign	DV: *SP* Coeff.	DV: *SP* z-stat	DV: *SIN* Coeff.	DV: *SIN* z-stat	DV: *EBANALY* Coeff.	DV: *EBANALY* z-stat
UNUSCAP2	−	**−0.055**	**−0.67**	**0.091**	**1.09**	**0.012**	**0.10**
n		21,897		21,902		10,096	
Wald Test		252.85***		34.49***		22.41***	
Pseudo $\bar{R}^2$		10.15%		11.46%		3.84%	

Big 4 Client Firms

Variable	Exp. Sign	DV: *SP* Coeff.	DV: *SP* z-stat	DV: *SIN* Coeff.	DV: *SIN* z-stat	DV: *EBANALY* Coeff.	DV: *EBANALY* z-stat
UNUSCAP2	−	**−0.092**	**−0.98**	**0.100**	**1.09**	**0.026**	**0.21**
N		14,248		14,253		8,715	
Wald Test		30.19***		25.76***		32.46***	

(*continued on next page*)

Table 4 (*continued*)

Panel A: All Client Firms							
		DV: *SP*		DV: *SIN*		DV: *EBANALY*	
Variable	Exp. Sign	Coeff.	z-stat	Coeff.	z-stat	Coeff.	z-stat
Pseudo $\bar{R}^2$		8.58%		10.53%		3.80%	
Non-Big 4 Client Firms							
		DV: *SP*		DV: *SIN*		DV: *EBANALY*	
Variable	Exp. Sign	Coeff.	z-stat	Coeff.	z-stat	Coeff.	z-stat
UNUSCAP2	−	**0.195**	**1.12**	**0.114**	**0.55**	**−0.356**	**−0.76**
N		7,530		7,489		1,229	
Wald Test		59.90***		80.03***		32.87***	
Pseudo $\bar{R}^2$		14.36%		12.39%		13.81%	

Table 4 presents the empirical results of testing the association between meeting or beating earnings benchmarks (SP, SIN, EBANALY) and the measures of unused capacity pertaining to normal audit tasks (i.e., UNUSCAP1 and UNUSCAP2). Panel A shows the results of all client firms. Panel B and Panel C show the results of Big 4 and non-Big 4 client firms, respectively. Note that UNUSCAP1 is the test variable in the above panels. Finally, we summarize the empirical results in Panel D by using UNUSCAP2 as the test variable. For brevity, the results of control variables are not provided in Panel B, C, and D. Note that the sample size of full sample is not always equal to the sum of Big 4 client firms and non-Big 4 client firms because STATA drops observations due to the issue of quasi-complete separation.
Sample period: 2008–2015. The z-statistics are adjusted for clustering by firms.
See Appendix for variable definitions.
*, ** and *** denote significant differences from zero at the 10%, 5%, and 1% levels, respectively. All significance tests are one-tailed, except for those variables with directional expectations (i.e., two-tailed).

Table 4 presents the empirical results. All regression models are significant ($p < 0.01$ for all models). Panel A shows the results for all client firms. Panel B and Panel C show the results for the Big 4 and non-Big 4 client firms, respectively. Note that *UNUSCAP1* is the test variable in these panels. Finally, we summarize the empirical results in Panel D by using *UNUSCAP2* as another test variable. For brevity, the results of control variables are not provided in some panels (available upon request). In Panel A, a significantly negative association is found between *SP* and *UNUSCAP1* (coefficient = −0.125, $p < 0.05$), which provides evidence that city offices with higher levels of unused capacity can more effectively constrain their clients from meeting or beating the zero earnings benchmark. However, we do not find similar results between *UNUSCAP1* and small earnings increase (*SIN*) or analyst consensus (*EBANALY*) throughout Table 4. When further dividing the sample into Big 4 client firms (Panel B) and non-Big 4 client firms (Panel C), the significantly negative association between *SP* and *UNUSCAP1* only holds in client firms audited by Big 4 (coefficient = −0.172, $p < 0.05$), which suggests that the findings in Panel A are driven by Big 4 client firms. Economically, an increase in one standard deviation of *UNUSCAP1* in the sample (0.318, untabulated) of Panel B equals a 1.00% marginal decrease in the probability of meeting or beating the zero earnings benchmark, given all independent variables are at their means (Carcello & Li, 2013). Compared with the mean of *SP* (0.249, untabulated), this represents a 4.02% reduction in the probability of reporting small positive earnings.

However, the association turns out to be insignificant (but the coefficient signs are unchanged) when using *UNUSCAP2* as the test variable, as shown in Panel D. To summarize, we get partial evidence (if any, only in Big 4 auditees) that higher levels of unused capacity can constrain managers from engaging in earnings management to meet or beat zero earnings benchmarks.[14] The control variables used in the earnings benchmark models are generally consistent with expectations (or have opposite signs but are not statistically significant), except for partial coefficients of *LAF*, *SALESGROWTH*, *CFO*, *CITYONLY*, *MB*, *BANKRUPTCY*, *TA*, *BIG4* and are primarily driven by the subsample of non-Big 4 client firms.

5.2. Going concern audit opinions

Prior literature often links a higher likelihood of issuing going concern audit reports (GCs) to better audit quality (DeFond et al., 2002; Francis & Yu, 2009; Reichelt & Wang, 2010). Thus, we test the association between the measures of unused capacity pertaining to normal audit tasks and GCs. The empirical models using logistic regressions are as follows (DeFond et al., 2002; Francis & Yu, 2009; Huang et al., 2015; López & Peters, 2012; Menon & Williams, 2016; Reichelt & Wang, 2010):

$$\begin{aligned} IGC = {} & \alpha_0 + \alpha_1 UNUSCAP + \alpha_2 AUD\_CHANGE + \alpha_3 LNTA + \alpha_4 CFOVOL + \alpha_5 LEVERAGE \\ & + \alpha_6 MB + \alpha_7 BANKRUPTCY + \alpha_8 OVERTHREE + \alpha_9 ROA + \alpha_{10} TA \\ & + \alpha_{11} BIG4 + \alpha_{12} NATIONALONLY + \alpha_{13} CITYONLY + \alpha_{14} JOINTLEADER \\ & + \alpha_{15} LNOFFICE + \alpha_{16} AF + \alpha_{17} LAF + \alpha_{18} CASH + \alpha_{19} STOCK\_RET \\ & + \alpha_{20} LNLAG + \beta STOCK\_EXC + \gamma YEAR + \lambda IND + \varepsilon \end{aligned} \tag{5}$$

We use first-time GCs (*IGC*, equals one if a firm receives GCs in the current year and a clean opinion in the previous year, and zero otherwise) because a first-time GC is more informative of audit quality (Carcello & Neal, 2003; Goodwin & Wu, 2016; Menon & Williams, 2016). Further, the sample is restricted to financially distressed companies that have negative earnings and negative operating cash flows in the current period (Carey & Simnett, 2006;

[14] The results are unchanged when other measures are used to define *SP* (i.e., using income before extraordinary items and discontinued operations as the numerator to calculate return on assets) or other intervals to define *SIN* ((0.00 and 0.05)) and *EBANALY* ((0, 2 cents)).

Table 5
Audit quality regression results III dependent variable: First-time going concern audit report (*IGC*).

Panel A: Regression Results Using *UNUSCAP1* as Test Variable

Variable	Exp. Sign	All Client Firms Coeff.	All Client Firms z-stat	Big 4 Auditees Coeff.	Big 4 Auditees z-stat	Non-Big 4 Auditees Coeff.	Non-Big 4 Auditees z-stat
Intercept	?	−18.193	−7.69***	−25.343	−5.40***	−12.348	−4.34***
UNUSCAP1	+	**−0.070**	**−0.45**	**0.129**	**0.43**	**−0.100**	**−0.54**
AUD_CHANGE	−	−0.011	−0.07	0.605	1.05	0.015	0.09
LNTA	−	0.141	2.46***	0.016	0.11	0.085	1.20
CFOVOL	+	−0.494	−3.33***	−0.186	−0.59	−0.523	−3.04***
LEVERAGE	+	−0.302	−3.15***	0.066	0.30	−0.381	−3.29***
MB	−	−0.007	−0.78	−0.035	−1.59*	−0.001	−0.09
BANKRUPTCY	−	0.008	1.00	0.006	0.37	0.011	1.19
OVERTHREE	?	0.026	0.19	0.500	1.49	−0.033	−0.21
ROA	−	−1.837	−8.14***	−2.132	−4.80***	−1.634	−6.34***
TA	−	1.063	3.81***	0.845	1.42*	0.935	2.92***
BIG4	+	0.295	1.44*	–	–	–	–
NATIONALONLY	?	−0.209	−0.74	−0.176	−0.52	–	–
CITYONLY	+	−0.230	−1.71**	−0.045	−0.18	−0.239	−1.31*
JOINTLEADER	+	−0.260	−1.13	−0.313	−1.03	–	–
LNOFFICE	+	0.092	2.12**	0.098	1.00	0.071	1.39*
AF	−	−0.224	−1.35*	0.112	0.39	−0.179	−0.81
LAF	−	−0.710	−1.94**	−0.190	−0.33	−0.424	−0.38
CASH	−	−0.835	−3.76***	−1.137	−2.33**	−0.853	−3.03***
STOCK_RET	−	−0.738	−5.10***	−0.718	−2.22**	−0.714	−4.54***
LNLAG	+	2.951	6.99***	4.865	5.78***	2.000	3.89***
STOCK_EXC		Controlled		Controlled		Controlled	
YEAR		Controlled		Controlled		Controlled	
IND		Controlled		Controlled		Controlled	
N		5,041		1,878		3,026	
Wald Test		122.08***		44.33***		90.19***	
Pseudo $\bar{R}^2$		15.86%		31.20%		11.47%	

Panel B: Regression Results Using *UNUSCAP2* as Another Test Variable

Variable	Exp. Sign	All Client Firms Coeff.	All Client Firms z-stat	Big 4 Auditees Coeff.	Big 4 Auditees z-stat	Non-Big 4 Auditees Coeff.	Non-Big 4 Auditees z-stat
UNUSCAP2	+	**−0.026**	**−0.14**	**0.728**	**2.55*****	**−0.300**	**−1.23**
N		5,041		1,878		3,026	
Wald Test		111.11***		44.88***		89.76***	
Pseudo $\bar{R}^2$		15.86%		31.61%		11.53%	

Table 5 presents the empirical results of testing the association between the first-time going concern audit report (IGC) and the measures of unused capacity pertaining to normal audit tasks (i.e., UNUSCAP1 and UNUSCAP2). Panel A presents the results of all client firms, Big 4 auditees, and non-Big 4 auditees by using UNUSCAP1 as the test variable. We summarize the empirical results in Panel B by using UNUSCAP2 as the test variable. For brevity, the results of control variables are not provided in Panel B. Note that the sample size of all client firms is not always equal to the sum of Big 4 auditees and non-Big 4 auditees because STATA drops observations due to the issue of quasi-complete separation. The z-statistics are adjusted for clustering by firms.
Sample period: 2008−2015.
See Appendix for variable definitions.
*, ** and *** denote significant differences from zero at the 10%, 5%, and 1% levels, respectively. All significance tests are one-tailed, except for those variables with directional expectations (i.e., two-tailed).

DeFond et al., 2002) because a going-concern opinion decision is most salient for this type of client firms (Francis & Yu, 2009). The expected coefficient signs of control variables are presented in Table 5. Detailed definitions of variables are listed in the Appendix.

Table 5 presents the empirical results. All regression models are significant ($p < 0.01$ for all models). Panel A presents the results of all client firms, Big 4 auditees, and non-Big 4 auditees by using *UNUSCAP1* as the test variable. We summarize the empirical results in Panel B by using *UNUSCAP2* as the test variable. In Panel A, no significant association is found between *IGC* and *UNUSCAP1* in any of the samples (i.e., full sample, Big 4 auditees, and non-Big 4 auditees). In Panel B, the empirical results for the full sample and non-Big 4 auditees are basically consistent with those in Panel A, except that in the sample of Big 4 auditees, the coefficient of *UNUSCAP2* is positive and highly significant (coefficient = 0.728, $p < 0.01$), which provides evidence that higher unused capacity in Big 4 audit offices can result in better quality audits. Using the same approach as that used in the previous subsection to calculate the economic implications, an increase in one standard deviation of *UNUSCAP2* in the sample (0.303, untabulated) of Panel B equals a 1.68% marginal increase in the likelihood that a first-time GC will be issued, given that all independent variables are at their means. Compared with the mean of *IGC* (0.075, untabulated), this represents a 22.4% increase in the likelihood that a first-time GC will be issued. The control variables used in the going concern models are generally consistent with expectations (or have opposite signs but are not statistically significant), except for partial coefficients of *LNTA*, *CFOVOL*, *LEVERAGE*, *TA*, *CITYONLY* and are primarily driven by the subsample of non-Big 4 client firms.

To summarize, combined with the results in Section 4, the empirical results of the association between the measures of unused capacity pertaining to normal audit tasks and the proxies for audit quality provide some evidence that higher (lower) levels of unused capacity results in better (worse) audit quality, and if any, occurs only in Big 4 audit offices. These results may suggest two possibilities. First, the existing quality control and/or firm-wide consultation mechanisms, especially after the passage of U.S. SOX, function to some extent to provide uniform audit quality. However, the significant associations found in Big 4 audit offices may reflect the fact that, compared with non-Big 4 audit offices: (1) the demanded level of quality control system is higher among Big 4 auditors (Choi et al., 2010); (2) the client firms of Big 4 are generally more difficult to audit. These two factors thus make the requirements for the Big 4's quality control policies more difficult to fully comply with, especially under higher levels of pressure (i.e., lower levels of unused capacity). Second, unused capacity is linked mainly to the level of *audit offices* (or *office-industry*), yet may not accurately represent the pressure that *individual* auditors face.

6. Robustness checks and others

6.1. Robustness checks

We conduct the following tests to verify the robustness of empirical findings in this study. First, in the main analyses, the current year's monthly aggregate *audit* fees of an audit office (office-industry), divided by the current year's highest monthly aggregate audit fees of that audit office (office-industry), are used to calculate *UNUSCAP1* (*UNUSCAP2*). To test the robustness of these measures, the following alternatives are used to rerun the above audit quality models: (1) monthly aggregate *total* fees divided by the highest current monthly aggregate total fees, and (2) monthly aggregate *number of client firms* divided by the highest current monthly aggregate number of client firms. Combined with two levels (i.e., office and office-industry) to measure unused capacity, this amounts to four measures of unused capacity pertaining to normal audit risks. Although the number of client firms implicitly assumes that all client firms are similar in size and complexity, they can avoid the potential measurement bias caused by using audit fees and total fees, which are determined by various factors other than audit efforts. To summarize, the results using total fees are generally consistent with those of the main analyses, but the results using the number of client firms become much weaker, possibly due to the unrealistic assumption mentioned above.[15] Second, when deciding the sample period, a concern may arise regarding the issuance of Auditing Standard No. 5 (AS5) by PCAOB, which is effective for fiscal years ending on or after November 15, 2007, that may again affect the audit fee market. For example, Doogar et al. (2010) evidence a significant fee reduction in the transition from AS No.2 to AS No.5. Therefore, we delete observations in 2008 and repeat the main analyses. The results are generally unchanged. Third, since the variables of interest, *UNUSCAP1* and *UNUSCAP2*, are calculated using audit fee data of only public companies collected from *Audit Analytics*, it is possible that measurement errors will be higher in smaller cities where the number of public companies is relatively small (i.e., the portion of audit fees from non-public companies may be higher).[16] Therefore, similar to Numan and Willekens (2012), we drop the firm-year observations in Table 1 with city-year combinations of less than five (ten) public companies and rerun the empirical equations. The results of these procedures show that the findings are still robust after deleting observations that have potentially higher measurement errors. Fourth, while measuring *UNUSCAP2*, there might be some city-industry combinations with only few observations which might bias the measure. Therefore, we tentatively delete observations which belong to a city-industry combination of less than three client firms. The empirical results are still similar to those of *UNUSCAP2* in the main analysis.[17]

6.2. Moderating effects

We tentatively investigate whether the associations between unused capacity and audit quality proxies are moderated by variables other than the size of auditees' audit firms (i.e., Big 4 or non-Big 4), such as the size or the degree of industry expertise of audit offices, or the existence of a first-time audit. Regarding the audit office size, we partition the final sample into two groups (i.e., large audit office and small audit office) following Francis and Yu (2009), which is based on yearly audit fees earned by a city office. The 50th percentile (median) is chosen as the thresholds to classify the sample. Regarding the degree of industry expertise of audit offices, we partition the final sample into four groups (*JOINTLEADER* = 1, *CITYONLY* = 1, *NATIONALONLY* = 1, and Not Ind. Expertise). To investigate the moderating effect of the first-time audit, we add an interaction term *UNUSCAP*AUD_CHANGE* in all audit quality models. The results (untabulated) are summarized as follows. First, there are few significant interaction effects. That is, the association between unused capacity and audit quality is not magnified in the auditor's first engagement year. Second, neither group of different level of industry expertise exhibits consistent association pattern between unused capacity and audit quality proxies. Third, the significantly negative association between unused capacity and audit quality proxies mainly appears in client firms audited by large audit offices (however, there does not exist any significant associations between unused capacity and *SP*). These results may be because large audit offices capture similar characteristics as those of Big 4 audit offices.,[18,19]

6.3. Assumptions affecting the accuracy of UNUSCAP1 and UNUSCAP2 to capture unused capacity pertaining to normal audit tasks

There are two implicit assumptions behind the measures of unused capacity pertaining to normal audit tasks (i.e., *UNUSCAP1*

[15] Although having strength similar to that of the number client firms, total assets and net sales are not used as the basis by which to calculate the measures of unused capacity pertaining to normal audit tasks in this study for the following reasons. First, similar to what López and Peters (2012) argue, the auditability of every dollar asset (and off-balance sheet) is different between industries, which will potentially induce huge measurement errors in the calculation of unused capacity (especially *UNUSCAP1*), and this argument should also be applied to sales. Second, recall that in Table 1, the initial number of client firms with audit fee data in 2008–2015 is 76,768. However, even after merged with *Compustat* to maximize the sample size, the observation numbers with total assets and net sales data in 2008–2015 are 56,490 and 52,997, which significantly decreases by 26.41% and 30.96%, respectively. Again, this is another source of potentially huge measurement errors.

[16] This kind of measurement error is prevalent and often unavoidable in many measures of auditing research, such as audit office size, industry market share, and client importance.

[17] We are grateful for the comment made by one of the referees.

[18] For example, in the final sample for *ABSDA* or *ABSCDA* of Table 1 (n = 19,653), the Pearson correlation coefficient between *BIG4* and large audit office is 0.688 ($p < 0.01$).

[19] We also investigate whether differences exist in unused capacity between client firms audited by large audit offices and small audit offices. Due to the large sample size in this study, most differences, regardless of mean or median, are indeed significant (except for the three combinations: *UNUSCAP1*-median-*POSDA*, *UNUSCAP1*-mean-*IGC*, and *UNUSCAP1*-median-*EBANALY*). However, taking the mean of unused capacity as an example, unused capacity of large audit offices is not always larger than that of small audit offices in every case and the *absolute* magnitude of differences in mean unused capacity between the two groups seems not large (ranges from 0.8% to 7%). Therefore, there is no persuasive evidence of whether differences in unused capacity between the two groups can explain their distinct association with audit quality proxies.

and *UNUSCAP2*). Theoretically, the magnitude of measurement errors of the two measures hinges on the extent to which audit practices approach these assumptions. The first assumption is that the audit process and strategy are generally the same across all client firms within an audit office. This assumption is, of course, somewhat oversimplified. For example, due to the level of audit difficulty, the audit work for larger auditees is likely to happen all throughout the year, whereas the audit work for smaller auditees may primarily take place after the balance sheet date. However, as López and Peters (2012, 141–142) point out, "… certain procedures cannot be performed until the end of the fiscal year period or shortly thereafter (AICPA, 2006). In addition, some auditing standards emphasize the importance of year-end evidence as a means to reduce audit risk (AICPA, 1983)." Therefore, these practices to some extent mitigate the distance between the practice and the first assumption. Given that *UNUSCAP1* and *UNUSCAP2* are based only on audit fees, the second assumption is that the operations of audit and non-audit services within a city office are independent. That is, an auditor will not provide non-audit services, and *vice versa*. After inquiring with one partner and one manager who worked in the PWC New York office and the EY New York office, the current practice is generally consistent with the second assumption, with the exception that some information technology specialists provide both audit (e.g., evaluation of internal control) and non-audit services (e.g., design of internal control system). However, as long as the portion of such personnel is relatively small, or the distribution of their capacity between audit and non-audit services is stable, the negative effects on the accuracy of *UNUSCAP1* and *UNUSCAP2* to capture unused capacity pertaining to normal audit tasks should be limited as well.

7. Conclusion

Differentiating from prior empirical studies that measure the notion of audit offices' resources or capacity in relatively simplified, indirect, or context-specific ways, we use audit office's unused capacity pertaining to normal audit tasks in Yu (2018) to directly investigate whether time pressure caused by the level of an audit office's capacity can influence audit quality. Although this study may contribute to the literature by measuring capacity of audit offices in a different way, readers must keep in mind the underlying assumptions and limitations regarding the calculation of *UNUSCAP1* and *UNUSCAP2* discussed throughout this paper. Finally, we urge more researchers to come up with measures that better capture the notion of resources or capacity, especially under some Asia-Pacific jurisdictions (e.g., Taiwan and China) where the data for practicing offices are not easily collected.

Acknowledgments

We are grateful for the helpful comments from Steven Lilien, Chansog (Francis) Kim, Jeffrey Pittman, Terrence Martell, Rong Huang, Rong-Ruey Duh, Ling-Tai Lynette Chou, Fu-Jiing Shiue, Shi-Ming Huang, Chen Li, Jeff Zeyun Chen, Wuchun Chi, Nicole Heron, Yu-Ting Hsieh, Chien-Min Pan, Binghao Zhao, Ying-Chu Li, Yung-Chih Lin, and other participants at the Eighth Annual Baruch – SWUFE Joint Research Conference, 2017 AAA Northeast Region Meeting, and 2019 AAA Annual Meeting. Hua-Wei Huang and Chun-Chan Yu gratefully acknowledges the Ministry of Science and Technology, ROC (Taiwan), for support of this work under contract (Project No. MOST 105-2410-H-006 -024 -MY2 and 108-2410-H-005-002).

APPENDIX. Variable Definitions

Variable	Definition
ABSDA	= The absolute values of *DA* for a firm in year *t*.
ABSCDA	= The absolute values of *CDA* for a firm in year *t*.
AF	= One if a firm is an accelerated filer in year *t*, and zero otherwise.
ANALYSTD	= Standard deviation of analysts' forecasts for a firm in year *t*. We require the earnings forecasts to be no older than two months before the earnings announcement date.
AT	= Total assets for a firm in year *t*.
AUD_CHANGE	= One if there is an audit firm change for a firm in year *t*, and zero otherwise.
BANKRUPTCY	= Altman Z-score (Altman, 1983), a measure of the probability of bankruptcy, calculated as follows: 0.717 * (working capital/total assets) + 0.847 * (retained earnings/total assets) + 3.107 * (earnings before interest and taxes/total assets) + 0.42 * (book value of equity/total liabilities) + 0.998 * (sales/total assets).
BIG4	= One if a firm is audited by a city office of Deloitte, PricewaterhouseCoopers, Ernst & Young, or KPMG in year *t*, and zero otherwise.
CASH	= The sum of cash and short-term investments, divided by total assets for a firm in year *t*.
CDA	= Performance-adjusted current discretionary accruals for a firm in year *t*, calculated as the difference between *TCA* and *ETCA*.
CI	= Client importance, equal to a client firm's audit fees divided by the current year's total audit fees of the audit office auditing the client firm.
CFO	= Operating cash flows divided by last year-end total assets for a firm in year *t*.
CFOVOL	= Standard deviation of operating cash flows deflated by last year-end total assets for a firm in year *t*, calculated over the current and prior two years. This variable has a winsorized maximum value of 10.
CITYONLY	= One for a city office not a national industry leader, but is a city (MSA) industry leader in year *t*, and zero otherwise (calculated by market share of audit fees based on two-digit SIC code).
DA	= Performance-adjusted discretionary accruals for a firm in year *t*, calculated as the difference between *TA* and *ETA*.
EBANALY	= One if a firm's earnings per share exactly meet or beat the latest analysts' earnings forecast by one cent in year *t*, and zero otherwise. We require the earnings forecast no older than two months before earnings announcement date (Lim & Tan, 2008). If there are more than two forecasts in the same latest date, we use the median.
ETA	= Expected total accruals, as the result of Equation (1.2).
ETCA	= Expected total current accruals, as the result of Equation (2.2).
FORGN	= One if a firm has at least one foreign segment in year *t*, and zero otherwise.
IGC	= One if a firm receives a going concern audit report in the current year and a clean opinion in the previous year, and zero otherwise.
IND	= Two-digit SIC code industry dummy variables.
JOINTLEADER	= One for a city office is both a national and city (MSA) industry leader in year *t*, and zero otherwise.
LAF	= One if a firm is a large accelerated filer in year *t*, and zero otherwise.

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(*continued*)

Variable	Definition
LAGABSTA	= Prior absolute values of total actual accruals for a firm in year *t*.
LAGABSTCA	= Prior absolute values of total actual current accruals for a firm in year *t*.
LNLAG	= Natural logarithm of the time period (in days) between the current fiscal year-end and the audit opinion date for a firm in year *t*.
LNOFFICE	= Audit office's size, calculated as aggregate audit fees for a city office in year *t*.
LNTA	= Natural logarithm of total assets for a firm in year *t*.
LNUMFOR	= Natural logarithm of number of analysts' forecasts for a firm in year *t*. We require the earnings forecasts to be no older than two months before the earnings announcement date.
LOSS	= One if a firm experiences a loss in year *t*, and zero otherwise.
MB	= Market value of common equity, divided by book value of common equity. zero if this ratio is negative (Stanley et al., 2015).
NATIONALONLY	= One for a city office not a city (MSA) industry leader, but is a national industry leader in year *t*, and zero otherwise (calculated by market share of audit fees based on two-digit SIC code).
OVERTHREE	= One if audit firm tenure for a firm in year *t* is over three years, and zero otherwise.
POSCDA	= *CDA* with a positive value for a firm in year *t*.
POSDA	= *DA* with a positive value for a firm in year *t*.
PPE	= Gross property, plant, and equipment for a firm in year *t*.
ROA	= Return on assets, measured as net income divided by average total assets for a firm in year *t*.
SALESGROWTH	= The change ratio of sales for a firm in year *t*. The variable has winsorized maximum and minimum values of 2 and -1, respectively.
SIN	= One if a firm's changes in return on assets in year *t* from prior year falls between 0.00 and 0.013, and zero otherwise.
SP	= One if a firm's return on assets in year *t* falls between 0.00 and 0.05, and zero otherwise.
SRSEGS	= Square root of the number of segments for a firm in year *t*.
STOCK_EXC	= Stock exchange dummy variables.
STOCK_RET	= A firm's 12-month stock returns in year *t*.
TA	= Actual total accruals for a firm in year *t*, calculated as income before extraordinary items and discontinued operations minus operating cash flow, plus cash flow from extraordinary items and discontinued operations, divided by prior total assets.
TCA	= Actual total current accruals for a firm in year *t*, calculated as income before extraordinary items and discontinued operations minus operating cash flow, plus cash flow from extraordinary items and discontinued operations and depreciation and amortization, divided by prior total assets.
UNUSCAP1	= The first measure of unused capacity pertaining to normal audit tasks, calculated as one minus current year's aggregate audit fees of a specific month of an audit city office, divided by the current year's highest monthly aggregate audit fees of that audit city office. The identification of "month" above is based on client firms' fiscal year-end month.
UNUSCAP2	= The second measure of unused capacity pertaining to normal audit tasks, calculated as one minus current year's aggregate audit fees of a specific month of an office-industry (specifically, SIC division) combination, divided by the current year's highest monthly aggregate audit fees of the office-industry combination. The identification of "month" above is based on client firms' fiscal year-end month.
YEAR	= Year dummy variables.
ΔAR	= Change in accounts receivable from prior year for a firm in year *t*.
ΔREV	= Change in sales from prior year for a firm in year *t*.

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