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Big N Auditors and Earnings Response Coefficients – A Comparison Study between the US and China*

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Abstract

In the past 20 years, there have been considerable developments and changes in the audit industry in the US and China. Building on the seminal work of Teoh and Wong (1993), this essay revisits the tests of the prediction that earnings reports audited by larger audit firms have higher earnings response coefficients (ERCs). Specifically, we investigate whether the positive association between ERCs and perceived audit quality holds in either the US or China using long-term historical data. Empirical analysis based on US data from 1984 to 2012 shows that the ERCs of Big N clients are generally higher than those of non-Big N clients, but such differences have dissipated since 2002, the year the Sarbanes-Oxley Act (SOX) came into effect. However, we find weak evidence in China during 1995 to 2012 that Chinese investors value the credibility of large international auditors. The results also reveal that the relationship between Big N and ERCs is stronger in the US than in China. Overall, our results show that auditor reputation is valued by investors in more developed markets, indicating that both institutional and industry structure affect the relationship between Big N and ERCs.

I. Introduction

Auditors provide at least two major valuable functions to increase the credibility of financial reporting. The first role of auditors is to verify financial reports prepared by firms and disclose the breaches in their clients' accounting reports (DeAngelo, 1981; Watts and Zimmerman, 1981). Through the auditing process, auditors increase the creditability of financial reports and help reduce information asymmetry (Watts and Zimmerman, 1986). The second role is the insurance role. By providing implicit insurance protection against investor loss (Watts and Zimmerman, 1986), auditors are accountable for expressing their opinions. As a result, the assurance service provided by auditors gives investors confidence in financial reports.

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The effectiveness of auditors in increasing the credibility of financial reporting varies with the size of the auditing firm. DeAngelo (1981) argues that Big N auditors, concerned about their valuable reputation capital, are more likely to provide higher audit quality. As earnings quality is related to the stock price reaction to earnings, earnings numbers that are certified by high quality auditors (Big N auditors) are likely to be more informative. Using a sample from 1973 to 1988, Teoh and Wong (1993) show that the ERCs of Big 8 clients are significantly higher than those of non-Big 8 clients.

Do large auditors play the same role in the China market as their counterparts in the US? Due to the distinct institutional background in China, whether large auditors increase financial reporting credibility has become of interest to researchers and regulators. Several studies have shed some light on the joint test of investors' response to earnings surprise and perceived audit quality in the Chinese stock markets. For example, Gul *et al.* (2003) find that the top 10 auditors in China during the period 1996 to 1997, including one international and nine domestic auditors, are perceived to be of higher quality, which leads to higher earnings response coefficients (ERCs) for their clients' earnings surprise. Lin *et al.* (2009) also find similar evidence that firms audited by the top 10 auditors have higher ERCs for unexpected earnings in the 2002-2004 period.

While prior studies have documented evidence that investors' response to earnings information is positively associated with perceived audit quality, there has been a growing interest in investigating this issue in a more recent sample period given that the structure and regulations of the audit market have changed in recent years in both developed and emerging markets.

In the US context, both the audit market and the regulation environment changed significantly after 2002 (including 2002); these changes are likely to reduce the audit quality gap between Big N and non-Big N auditors. First, the size and the client portfolios of second-tier auditors grew rapidly after 2002 (GAO, 2006; Rama and Read, 2006; Cassell *et al*., 2013). With their greater firm size, these auditors have a stronger incentive to protect their reputation capital (DeAngelo, 1981). Second, the Public Company Accounting Oversight Board (PCAOB) inspects public company audit firms annually. The inspection results show that the Big N auditors and some second-tier auditors met the criteria during the period from 2004 to 2011 (Cassell *et al.*, 2013), suggesting that second-tier auditors are likely to provide comparable audit quality to Big N auditors. These two factors are likely to contribute toward reducing the financial reporting credibility gap between Big N and non-Big N auditors. Recent studies (e.g. Boone, Khurana, and Raman, 2010; Chang, Cheng, and Reichelt, 2010; Cassell *et al.*, 2013) provide evidence to show that the quality (or perceived quality) difference between Big N and second-tier auditors becomes indistinguishable after the Sarbanes-Oxley Act (hereinafter, SOX) came into effect.

The development of the audit industry in China was prompted by the re-emergence of the Chinese stock markets in the late 1990s. However, for a long time, Chinese auditors have been criticised for lacking independence because most of them were sponsored by government agencies until 1999, when the Chinese Government launched a disaffiliation programme to cut the official business ties. This reform has helped to enhance audit quality in respect to the number of modified opinions (DeFond *et al*., 1999). Nonetheless, a wave of audit failures in the early 2000s triggered a public outcry over auditor independence in China. To rebuild the market's confidence in the audit industry, the Chinese regulator has imposed a higher litigation and sanction risk on audit firms since 2001. Chen *et al.* (2010) find that auditors have been more likely to issue modified opinions to important clients since 2001, when legal and regulatory institutions

became harsher. However, whether auditor independence is impaired by politics remains an important concern (e.g. Wang, Wong, and Xia, 2008; Chan, Lin, and Wong, 2010).

In this study, we follow Teoh and Wong (1993) and extend the sample period to 2012. Institutional details are omitted in the empirical tests, but the major historical trends are incorporated into the research design. Consistent with Teoh and Wong (1993), we find a positive relationship between Big N and ERCs in the US during the period 1983 to 2012. However, the results are not consistently significant. We then spilt our sample into two periods with 2002 as the cut-off year as the market and regulation environment changed significantly after the SOX came into effect. We find that the indicator of Big N auditors is significantly positively associated with ERC in the pre-SOX era, suggesting that Big N auditors provided a better audit service to their clients during the period 1983 to 2012. The results based on the post-SOX sample show that Big N clients' financial reports do not exhibit significantly higher ERC compared with non-Big N clients' financial reports. Our results are consistent with previous findings (Boone *et al.*, 2010; Chang *et al.*, 2010; Cassell *et al.*, 2013) and suggest that industry structure and regulations are important factors that affect investors' perception of audit quality.

Due to the data limitation of analyst forecasts, we use real earnings change as a proxy for earnings surprise in the China sample. Using a 1995-2012 sample, we fail to find clear evidence that firms audited by international Big 5 auditors have higher ERCs than their counterparts audited by local auditors. In addition, we find that the market reaction to different perceived audit quality is stronger in the post-2001 period when the Chinese regulator imposed more stringent regulations in response to great expectations for the improvement of audit quality (Chen *et al.*, 2010). However, it is worth noting that our results are sensitive when considering the issue of auditor choice. The overall results from the China market are much weaker than those from the US market; this difference may be explained by data or research design limitations as well as by different institutional development levels.

Our study provides empirical results on the association between ERCs and perceived audit quality in the two largest economies from a comparative perspective. The statistical summary is helpful to understanding audit industry structure in both the US and China markets and how audit industry and institutional reforms affect investors' perception of audit quality. Our results are generally consistent with recent studies (Boone *et al.*, 2010; Chang *et al.*, 2010; Cassell *et al.*, 2013) and support the notion that audit market competition and regulation environment are two important forces that affect perceived audit quality. The comparison results are also likely to provide additional evidence to support the argument that institutional factors are one of the important factors that affect perceived audit quality internationally (Khurana and Raman, 2004; Francis and Wang, 2008) .

The rest of the paper is organised as follows: Section II describes the data and the samples; Section III presents the research methodology; Section IV discusses the empirical results; and Section V concludes the article.

II. Research Design

2.1 Model specification

Teoh and Wong's (1993) paper was the first to investigate the effect of Big N auditors on ERCs. They argue that because investors cannot assess firms' earnings quality directly, they are likely to assess it by inferring from the quality (skills) of the auditor. To

examine the effect of Big N auditors on ERCs, they extend previous studies (Kormendi and Lipe, 1987; Easton and Zmijewski, 1989, among others) by adding the Big N auditor identity into the ERC model, in which larger coefficients of earnings suggest greater market response and hence better earnings quality. They also consider other firm characteristics that have been documented as affecting ERCs. Previous studies (Kormendi and Lipe, 1987; Easton and Zmijewski, 1989) have suggested that growth opportunity measured by the market-to-book (MB) value is positively linked to future earnings and higher MB is associated with greater ERCs (Collins and Kothari, 1989). Teoh and Wong (1993) use market beta as a proxy for firm risk, which is predicted to be negatively associated with ERCs. They also consider firm size proxied by the natural logarithm of firm's market value and information environment proxied by the number of analysts' forecasts in their empirical model. They show that the ERCs of the Big 8 clients are significantly higher than those of non-Big 8 clients during the period 1973-1988, implying that investors perceive the earnings quality of firms audited by Big 8 auditors to be higher.

For comparison purposes, we follow Teoh and Wong (1993) and use the following specification to examine the relationship between Big N auditors and ERCs in the US and China samples:

$$\begin{aligned} CAR_{it} = {} & \alpha_0 + \alpha_1 * UE_{it} + \alpha_2 * BIGN_{it} + \alpha_3 * UE_{it} * BIGN_{it} \\ & + \alpha_4 * UE_{it} * MB_{it} + \alpha_5 * UE_{it} * MB_{it} * BIGN_{it} \\ & + \alpha_6 * UE_{it} * BETA_{it} + \alpha_7 * UE_{it} * BETA_{it} * BIGN_{it} \\ & + \alpha_8 * UE_{it} * LMV_{it} + \alpha_9 * UE_{it} * LMV_{it} * BIGN_{it} \\ & + \alpha_{10} * UE_{it} * 1/N_{it} + \alpha_{11} * UE_{it} * 1/N_{it} * BIGN_{it} \\ & + \text{fixed year / industry effect} + \varepsilon_{it} \end{aligned} \quad (1)$$

Following Teoh and Wong (1993), we use two proxies to measure investors' reaction to earnings surprise. We first measure the daily abnormal return as the raw return R_{it} minus the market return of the same day R_{mt}, which is proxied by the CRSP equally weighted stock index for the US sample and the CSMAR (China Stock Market Accounting Research) equally weighted return for the China sample. For the US sample, the measure of CAR is calculated as the 300-day accumulated abnormal returns from the announcement date: $CAR1 = \sum_{t}^{T} \log(1 + R_{it} - R_{mt})$. We discard firms with less than 100 trading days.

For the China sample, the first measure of market reaction is defined as the 3-day cumulative abnormal returns around earnings announcement dates: [2] $CAR1 = \sum_{t}^{T} \log(1 + R_{it} - R_{mt})$. Alternatively, we use the market model to measure the

[2] In the main tests, we use short-window abnormal returns to measure market response to earnings announcements, following Gul *et al.* (2003) and Lin *et al.* (2009). In untabulated tests, we also try the 300-day accumulated abnormal return from the earnings announcement date, but we fail to find any evidence that the ERCs of Big 5 auditors are higher than those of their non-Big 5 counterparts. One possible explanation is the UE information may be pre-empted due to the management earnings forecasts mandated by the listing rules of the Shanghai/Shenzhen exchanges, which require that listed companies should disclose management earnings forecasts when earnings either increase/decrease by 50% or change signs (Huang *et al.*, 2013).

daily abnormal returns. The model is estimated over the period from 256 to 7 days before the earnings announcement date, and a minimum estimation period of 100 days is required. The second measure of market reaction is defined as $CAR\,2 = \sum_{t}^{T} \log(1 + R_{it} - \hat{\alpha}_i + \hat{\beta}_i R_{mt})$.

To be consistent with Teoh and Wong (1993), our first earnings surprise measure (*UE*1) is the difference between actual earnings and forecast consensus in year t scaled by stock price in the US sample. As analyst forecast data are not available in China until 2005 and the coverage is relatively small, we also construct a second earnings surprise measure (*UE2*) to proxy for earnings surprise, especially in the China sample. *UE2* is calculated as the difference between earnings in year t and year t-1 scaled by stock price on the day prior to the earnings announcement dates, or the fiscal year-end stock price if the former is not available. *BIGN* is a dummy variable which equals 1 for Big N auditors and 0 otherwise. In the China context, we use Big 5 to identify international accounting firms, including Arthur Andersen, PricewaterhouseCoopers, Deloitte Touche Tohmatsu, Ernst & Young, and KPMG. Following Gul *et al.* (2003) and Lin *et al.* (2009), we also use the indicator Top 10 to identify the 10 largest auditors each year in terms of total assets audited and *DBIG5* to identify the five largest domestic Chinese auditors each year in terms of total assets audited. MB is the market-to-book ratio, a proxy for growth and persistence, which is equal to market value of equity divided by book value of equity. BETA is the slope coefficient derived from the market return model to proxy for firm risk. LMV is the natural log of the market equity value of a firm. 1/N is equal to 1 divided by the number of analyst forecasts in year t. We do not include 1/N in the ERC regressions based on the China sample due to the limitation of analysts' forecasts data. Our variable of interest is α_3. A significantly positive α_3 suggests a positive relationship between Big N and ERC.

III. Sample and Data

For the US sample, we extract analyst forecasting data from IBES and accounting data from COMPUSTAT. Stock return data are sourced from the merged CRSP. Due to data availability,[3] we restrict our sample period to 1983 to 2012. Following Teoh and Wong (1993), we remove firm-years with less than 100 trading days return data and observations in four-digit SIC industries where Big N auditors have 100% of the market share. We further exclude observations with missing variables shown in our empirical models. Finally, we winsorise the top and bottom 1% of continuous variables to mitigate the outlier effect. Through these procedures, we obtain 38,206 observations.

The data for the China sample consist of a dataset over the period 1995 to 2012 from the CSMAR database. The sample starts in 1995, when the Big 5 international auditors can be identified in the database. We require that each observation have the necessary CSMAR data on market capitalisation and financial statements and the necessary daily price data to compute cumulative abnormal returns. To be consistent with the literature, we also exclude firms operating in the finance industry. There are 20,662 firm observations that meet the selection criteria.

We present the descriptive statistics in Table 1. As the result in Panel A of Table 1 shows, Big N market share is around 80% in our US sample, suggesting a dominant market position in the US market. The market share of Big N declines after 2002 because

[3] IBES do not provide sufficient data for our analyses before 1983. As a result, we start our analyses from 1983.

of the collapse of Arthur Andersen. During the sample period, the percentage of Big N clients' total assets is larger than that of market share, suggesting that Big N clients are larger than non-Big N clients. These figures together indicate that Big N auditors dominate in the US market.

Panel B of Table 1 presents the yearly distribution of the China sample firms and their choice of auditors. The market share of Big 5 auditors in terms of number of clients varies across years, ranging from 3.91% in 1998 to 9.39% in 2003. In total, Big 5 auditors audit 6.22% of listed firms in China, on average accounting for 43.25% of the total assets in the market, which indicates that the market share of Big 5 auditors in China is substantially lower than it is in the US.

Table 1 Yearly distribution of clients

Panel A: The US sample

	No. of clients			Total client assets ($million)		
Year	Non-Big N	Big N	% Big N clients	Non-Big N	Big N	% Big N client assets
1983	46	119	72.12%	16,119	115,667	87.77%
1984	65	169	72.22%	16,925	133,484	88.75%
1985	78	246	75.93%	20,086	162,714	89.01%
1986	78	253	76.44%	22,443	157,156	87.50%
1987	76	339	81.69%	21,923	220,740	90.97%
1988	89	389	81.38%	16,786	371,223	95.67%
1989	95	451	82.60%	41,737	413,967	90.84%
1990	85	458	84.35%	16,278	536,779	97.06%
1991	82	467	85.06%	11,085	312,229	96.57%
1992	122	574	82.47%	106,074	402,515	79.14%
1993	122	679	84.77%	101,992	545,829	84.26%
1994	123	927	88.29%	33,428	1,243,264	97.38%
1995	137	1133	89.21%	43,946	1,556,917	97.25%
1996	138	1213	89.79%	34,452	1,101,437	96.97%
1997	139	1306	90.38%	34,031	1,690,304	98.03%
1998	153	1346	89.79%	53,245	1,713,209	96.99%
1999	162	1355	89.32%	62,588	2,179,746	97.21%
2000	157	1261	88.93%	65,730	2,025,778	96.86%
2001	111	989	89.91%	56,362	1,795,439	96.96%
2002	111	1031	90.28%	94,755	2,727,870	96.64%
2003	132	1070	89.02%	74,960	1,952,629	96.30%
2004	218	1242	85.07%	79,146	2,786,586	97.24%
2005	486	1663	77.38%	336,548	7,352,547	95.62%
2006	595	1707	74.15%	458,651	9,227,229	95.26%
2007	661	1797	73.11%	508,341	11,762,907	95.86%
2008	673	1753	72.26%	567,561	10,635,352	94.93%
2009	696	1692	70.85%	638,857	11,978,547	94.94%
2010	608	1670	73.31%	599,854	11,130,293	94.89%
2011	600	1703	73.95%	619,215	13,293,683	95.55%
2012	619	1747	73.84%	744,926	14,069,554	94.97%
Total	7457	30749	80.48%	5,498,045	113,595,594	95.38%

Panel B: The China sample

Year	No. of clients			Total client assets (RMB billion)		
	Non-Big N	Big N	Big N share (%)	Non-Big N	Big N	Big N share (%)
1996	286	20	6.54%	305	79	20.57%
1997	483	27	5.29%	460	105	18.58%
1998	688	28	3.91%	768	123	13.80%
1999	785	33	4.03%	1,003	146	12.71%
2000	873	38	4.17%	1,244	174	12.27%
2001	991	50	4.80%	1,612	227	12.34%
2002	1,045	69	6.19%	1,827	731	28.58%
2003	1,062	110	9.39%	1,958	1,079	35.53%
2004	1,114	102	8.39%	2,399	1,176	32.90%
2005	1,198	89	6.92%	2,823	1,365	32.59%
2006	1,180	90	7.09%	2,990	1,684	36.03%
2007	1,222	91	6.93%	3,368	2,422	41.83%
2008	1,332	96	6.72%	4,539	4,561	50.12%
2009	1,409	96	6.38%	5,491	5,794	51.34%
2010	1,498	95	5.96%	7,472	7,049	48.54%
2011	1,824	111	5.74%	9,654	8,689	47.37%
2012	2,107	125	5.60%	12,166	10,528	46.39%
Total	19,377	1,285	6.22%	60,325	45,980	43.25%

The table presents the yearly distribution of Big N (5) /non-Big N (5) auditors' market share and the total assets of their clients in the US (China) market. Panel A displays the yearly distribution in the US market; the sample period is from 1983 to 2012. In Panel B, we report the yearly distribution in China during the sample period 1995 to 2012. In each year, we report the number of clients, market share (in percentage form), aggregated clients' assets (million), and percentage of clients' assets of each type of auditors.

Table 2 reports the descriptive statistics of the cumulative abnormal returns and the control variables used in the ERC regressions partitioned on the basis of auditor choice. Panel A of Table 2 presents the descriptive statistics based on the US sample. In general, it shows that Big N clients have better performance (higher *UE*), larger size (larger *LMV*), lower growth (lower *MB*), lower risk (lower *BETA*), and more analyst forecasts (lower *1/N*). Panel B of Table 2 presents the China sample's descriptive statistics. As shown, there are considerable variations in these variables between the Big 5 client firms and the Non-Big 5 client firms. Notable differences are that the Big 5 clients are, on average, larger and less risky and display smaller 3-day cumulative abnormal returns. The results in Table 2 also reveal that the characteristics of Big N clients differ in the US and China samples.

The pairwise Pearson correlation coefficients among the ERC regression variables are reported in Table 3. Consistent with prior studies, the correlation coefficients of most of the control variables are significant and in the expected direction. Panel B of Table 3 presents the correlation matrix for the China sample. The two measures of market reaction to earnings surprise are positively and significantly correlated (0.982). They are also positively correlated with the indicator of Big 5 auditors. Specifically, the correlation between CAR1 (CAR2) and BIG5 is 0.018 (0.017), providing evidence that investors' reaction to earnings news is affected by auditor choice. We also note that the correlations among several variables are greater than 0.970, particularly the correlation between two-variable and three-variable interactions. For example, UE_BIG5 is highly correlated with UE_BETA_BIG5 (0.979) and UE_LMV_BIG5 (0.999), indicating that multicollinearity could be a problem in multivariate analyses.

Table 2 Descriptive statistics of variables

Panel A: The US market

Big N	Variables	N	Min	P1	P25	Median	P75	P99	Max	Mean	Mean difference (T-stat)	Median difference (Z-stat)
0	*CAR1*	7,457	-2.562	-1.512	-0.400	-0.128	0.094	0.823	1.733	-0.174	-0.030	-0.028
1		30,749	-2.562	-1.482	-0.352	-0.100	0.103	0.875	1.733	-0.144	(-5.20***)	(-5.17***)
0	*UE*	7,457	-5.347	-1.357	-0.029	0.006	0.027	0.680	4.334	-0.035	-0.015	0.000
1		30,749	-5.347	-0.885	-0.022	0.006	0.023	0.567	4.334	-0.020	(-3.65***)	(-0.19)
0	*MB*	7,457	0.125	0.256	1.041	1.660	2.800	18.446	52.090	2.546	-0.561	-0.407
1		30,749	0.125	0.396	1.316	2.067	3.511	18.549	52.090	3.107	(-12.54***)	(-23.17***)
0	*LMV*	7,457	0.887	1.960	3.915	4.864	5.758	8.374	10.184	4.879	-1.373	-1.335
1		30,749	0.887	2.325	4.952	6.199	7.460	10.817	11.247	6.252	(-60.67***)	(-59.64***)
0	*BETA*	7,457	-0.550	-0.149	0.517	1.009	1.532	2.909	3.932	1.063	-0.256	-0.225
1		30,749	-0.550	-0.039	0.804	1.234	1.727	3.546	4.477	1.319	(-27.00***)	(-26.11***)
0	*1/N*	7,457	0.029	0.059	0.250	0.500	1.000	1.000	1.000	0.590	0.259	0.300
1		30,749	0.019	0.031	0.100	0.200	0.500	1.000	1.000	0.331	(60.84***)	(59.34***)

Panel B: The China market

Big N	Variables	N	Min	P1	P25	Median	P75	P99	Max	Mean	Mean difference (T-stat)	Median difference (Z-stat)
0	CAR1	19377	-1.170	-0.150	-0.036	-0.009	0.02	0.178	2.567	-0.005	-0.003	-0.005
1		1285	-0.236	-0.133	-0.028	-0.004	0.02	0.156	0.879	-0.002	(-1.77*)	(-3.141***)
0	CAR2	19377	-1.164	-0.149	-0.034	-0.007	0.022	0.181	2.571	-0.004	-0.004	-0.005
1		1285	-0.234	-0.138	-0.027	-0.002	0.021	0.161	0.884	-0.000	(-1.667*)	(-3.214***)
0	UE2	19377	-0.956	-0.231	-0.008	0.001	0.011	0.226	0.979	0.001	-0.002	-0.003
1		1285	-0.842	-0.324	-0.01	0.004	0.02	0.241	0.663	0.003	(-0.76)	(-3.932***)
0	MB	19377	0.048	0.701	1.923	3.032	4.737	20.473	1646.392	4.547	1.926	1.122
1		1285	0.042	0.143	1.278	1.91	3.006	12.184	100.438	2.621	(-3.583***)	(21.762***)
0	BETA	19377	-1.449	0.402	0.857	1.011	1.133	1.448	14.446	0.986	0.057	0.072
1		1285	0.231	0.385	0.774	0.939	1.091	1.446	1.597	0.929	(8.251***)	(9.949***)
0	LMV	19377	17.126	19.689	20.962	21.527	22.14	24.238	26.509	21.592	-1.072	-0.989
1		1285	16.319	18.009	21.655	22.516	23.642	26.919	29.243	22.664	(-37.256***)	(-27.940***)

The table presents the descriptive statistics of variables for the Big N and non-Big N samples in the US and China markets. For each variable, we report descriptive statistics for the Big N and non-Big N samples. We also report the difference of each variable between these two groups using T-stat (variable mean difference) and Z-stat (variable median difference). In the US market, *CAR1* is the cumulative abnormal return, calculated as continuously compounded daily abnormal return. In the China market, CAR1 is the 3-day cumulative abnormal returns around earnings announcement dates. CAR2 is the 3-day cumulative abnormal returns using the market model. In the US market, *UE* is the difference between actual earnings and forecast consensus in year t scaled by stock price, while UE in the China market sample is calculated as the difference between earnings in year t and year t-1 scaled by book value of equity. *Big* N is a dummy variable which equals 1 for *Big* N auditors and 0 otherwise. *BETA* is the slope derived from the market return model. *LMV* is the log value of the market equity value of a firm. *MB* is the market-to-book ratio, which is equal to market value of equity divided by book value of equity. 1/N is equal to 1 divided by the number of analysts' forecasts in year t. *, **, and *** indicate the 10%, 5%, and 1% significance level respectively.

Table 3 Correlation matrix

Panel A: The US sample

	CAR1	*UE*	*BIGN*	*BIGNUE*	*MBUE*	*MBBIGNUE*	*BETAUE*	*BETABIGNUE*	*LMVUE*	*LMVBIGNUE*	*1/NUE*
UE	**0.297**										
BIGN	**0.027**	**0.019**									
BIGNUE	**0.253**	**0.858**	**-0.028**								
MBUE	**0.132**	**0.395**	0.002	**0.389**							
MBBIGNUE	**0.110**	**0.355**	-0.005	**0.414**	**0.940**						
BETAUE	**0.271**	**0.866**	0.006	**0.805**	**0.359**	**0.335**					
BETABIGNUE	**0.234**	**0.753**	**-0.026**	**0.877**	**0.342**	**0.364**	**0.918**				
LMVUE	**0.291**	**0.926**	0.008	**0.854**	**0.434**	**0.406**	**0.870**	**0.802**			
LMVBIGNUE	**0.248**	**0.799**	**-0.023**	**0.931**	**0.416**	**0.442**	**0.803**	**0.874**	**0.918**		
1/NUE	**0.213**	**0.785**	**0.026**	**0.596**	**0.280**	**0.223**	**0.570**	**0.441**	**0.607**	**0.462**	
1/NBIGNUE	**0.173**	**0.652**	**-0.014**	**0.759**	**0.266**	**0.283**	**0.516**	**0.562**	**0.540**	**0.588**	**0.786**

Panel B: China sample

	CAR1	CAR2	BIG5	UE	UE_BIG5	UE_MB	UE_MB_BIG5	UE_BETA	UE_BETA_BIG5	UE_LMV	UE_LMV_BIG5
CAR1	1.000										
CAR2	**0.982**	1.000									
BIG5	**0.018**	**0.017**	1.000								
UE	**0.037**	**0.016**	0.014	1.000							
UE_BIG5	**0.028**	**0.021**	**0.082**	**0.279**	1.000						
UE_MB	**0.034**	**0.016**	0.004	**0.782**	**0.155**	1.000					
UE_MB_BIG5	**0.018**	0.012	**0.079**	**0.215**	**0.770**	**0.201**	1.000				
UE_BETA	**0.034**	0.013	0.012	**0.977**	**0.260**	**0.743**	**0.202**	1.000			
UE_BETA_BIG5	**0.026**	**0.020**	**0.058**	**0.273**	**0.979**	**0.153**	**0.762**	**0.266**	1.000		
UE_LMV	**0.038**	**0.016**	**0.015**	**0.999**	**0.293**	**0.785**	**0.228**	**0.977**	**0.286**	1.000	
UE_LMV_BIG5	**0.028**	**0.021**	**0.083**	**0.279**	**0.999**	**0.156**	**0.777**	**0.259**	**0.974**	**0.293**	1.000

This table reports the correlation among variables in the US and China market samples. Bold text indicates 5% significance or better.

IV. Empirical Results

4.1 The US sample

The main results of the US sample are reported in Table 4. Column 1 in Table 4 shows that the coefficients of *BIGN*UE* are 0.573 with less than 5% significance level, suggesting that Big N clients are associated with higher ERC. The coefficient in Column 2 in Table 2 is still positive but not significant. These results together show that during 1983-2012, investors perceive financial reports released by Big N clients as more credible compared with those released by non-Big N clients. The results are generally consistent with the findings in Teoh and Wong (1993). In Table 5, we present the partition results. The results show that the significantly positive relationship between Big N and ERC only exists in the pre-SOX era. These results are consistent with those in prior studies (e.g. Boone *et al.*, 2010; Cassell *et al.*, 2013; Chang *et al.*, 2010).

Table 4 The regression results of the US sample

Variables	UE=*UE1*		UE=*UE2*	
	Coefficient	T-value	Coefficient	T-value
UE	2.733***	13.24	0.185***	2.86
BIGN	0.011**	1.96	0.024***	4.46
*BIGN*UE*	0.573**	2.34	0.106	1.46
*UE*MB*	0.011	0.87	0.034***	5.13
*UE*MB*BIGN*	-0.050***	-3.26	-0.034***	-4.74
*UE*BETA*	0.049	0.87	0.025	1.32
*UE*BETA*BIGN*	-0.137**	-2.06	-0.001	-0.06
*UE*LMV*	-0.194***	-4.90	0.069***	4.52
*UE*LMV*BIGN*	0.008	0.17	-0.045***	-2.75
*UE*1/N*	-0.969***	-6.89	-0.052	-1.25
*UE*1/N*BIGN*	-0.460***	-2.70	-0.005	-0.10
Years	1983-2012		1983-2012	
Adj R-square	0.0843		0.0919	
Observations	38206		38206	

The table reports the regression results concerning the relationship between Big N and ERC. In column (1), we report the results using UE1 as the proxy for earnings surprise. In column (2), we present the results using UE2 as the earnings surprise proxy. CAR is the cumulative abnormal return for firm i, which is calculated as the continuously compounded daily abnormal return in year t. In this study, our daily abnormal return is equal to the difference between stock return and the CRSP equally weighted stock index. Our principal earnings surprise measure (UE1) is the difference between actual earnings and forecast consensus in year t scaled by stock price. The second earnings surprise measure (UE2) is calculated as the difference between earnings in year t and year t-1 scaled by book value of equity. Big N is a dummy variable which equals 1 for Big N auditors and 0 otherwise. BETA is the slope derived from the market return model. LMV is the log value of the market equity value of a firm. MB is the market-to-book ratio, which is equal to market value of equity divided by book value of equity. 1/N is equal to 1 divided by the number of analysts' forecasts in year t. *, **, and *** indicate the 10%, 5%, and 1% significance level respectively.

The selection bias problem in audit research has attracted increasing concerns in recent years (Lennox *et al.*, 2012).[4] To address the potential self-selection concern, we

[4] Although there is a debate on the comparative merits of Heckman (1976) and the matching method (Lennox *et al.*, 2012), this discussion is outside the scope of this study. Teoh and Wong (1993) use the matching sample approach. In our study, however, we follow recent studies in the area of auditor choice literature (for details, see Lennox *et al.*, 2012) and the Heckman two-stage approach.

Table 5 The effect of Big N on ERC in the US market -partition analyses

Panel A: The effect of Big N on ERC before SOX

Variables	UE=*UE1*		UE= *UE2*	
	Coefficient	T-value	Coefficient	T-value
UE	1.645***	2.89	-0.350	-1.28
BIGN	-0.002	-0.16	0.015	1.33
*BIGN*UE*	1.516**	2.50	0.726***	2.61
*UE*MB*	0.054***	2.57	0.025**	2.46
*UE*MB*BIGN*	-0.135***	-5.72	-0.021*	-1.87
*UE*BETA*	0.049	0.47	0.180***	3.10
*UE*BETA*BIGN*	-0.078	-0.67	-0.218***	-3.65
*UE*LMV*	0.151	1.44	0.336***	5.85
*UE*LMV*BIGN*	-0.173	-1.55	-0.253***	-4.31
*UE*1/N*	-0.793**	-2.00	-0.033	-0.19
*UE*1/N*BIGN*	-0.963**	-2.26	-0.019	-0.11
Years	1983-2001		1983-2001	
Adj R-square	0.0878		0.1139	
Observations	15732		15732	

Panel B: The effect of Big N on ERC after SOX

Variables	UE=*UE1*		UE=*UE2*	
	Coefficient	T-value	Coefficient	T-value
UE	2.851***	13.59	0.208***	3.39
BIGN	0.034***	5.49	0.051***	8.62
*BIGN*UE*	-0.450	-1.63	-0.077	-1.05
*UE*MB*	-0.030*	-1.82	0.017*	1.90
*UE*MB*BIGN*	0.044**	2.08	-0.021**	-2.23
*UE*BETA*	0.084	1.16	-0.025	-1.31
*UE*BETA*BIGN*	-0.162*	-1.79	0.003	0.14
*UE*LMV*	-0.229***	-4.85	0.079***	5.22
*UE*LMV*BIGN*	0.109**	2.00	-0.022	-1.29
*UE*1/N*	-0.955**	-6.70	-0.090**	-2.27
*UE*1/N*BIGN*	-0.117	-0.62	-0.025	-0.50
Years	2002-2012		2002-2012	
Adj R-square	0.0814		0.062	
Observations	22474		22474	

The table reports the regression results concerning the relationship between Big N and ERC in the pre- and post-SOX eras. We report the regression results in the pre-SOX era in Panel A and the results in the post-SOX era in Panel B. In column (1), we report the results using UE1 as the proxy for earnings surprise. In column (2), we present the results using UE2 as the earnings surprise proxy. CAR is the cumulative abnormal return for firm i, which is calculated as the continuously compounded daily abnormal return in year t. In this study, our daily abnormal return is equal to the difference between stock return and the CRSP equally weighted stock index. Our principal earnings surprise measure (UE1) is the difference between actual earnings and forecast consensus in year t scaled by stock price. The second earnings surprise measure (UE2) is calculated as the difference between earnings in year t and year t-1 scaled by book value of equity. Big N is a dummy variable which equals 1 for Big N auditors and 0 otherwise. BETA is the slope derived from the market return model. LMV is the log value of the market equity value of a firm. MB is the market-to-book ratio, which is equal to market value of equity divided by book value of equity. 1/N is equal to 1 divided by the number of analysts' forecasts in year t. *, **, and *** indicate the 10%, 5%, and 1% significance level respectively.

use Heckman's two-stage procedure to estimate the coefficients (Heckman, 1976). The first stage obtains an inverse Mills ratio (IMR) from the logistic regression on the

determinants of auditor choice in Wang *et al.* (2008). Specifically, the first-stage regression model is specified as follows:

$$BIGN_{it} = \alpha_0 + \alpha_1 SIZE_{it} + \alpha_2 * GROWTH_{it} + \alpha_3 * ROA_{it} + \alpha_4 * LEVERAGE_{it} + \alpha_5 * CACL_{it} + \alpha_6 * INVENTORY_{it} + \alpha_7 * REC_{it} + \alpha_8 * NYSEAMX_{it} + \varepsilon_{it} \quad (2)$$

To conserve space, Table 6 only reports the results of the second-stage regression. Untabulated results of the first-stage regression show that firms with larger size, greater growth, lower profit, healthy financial status (larger current ratio), higher receivable level, and lower inventory are more likely to hire Big N auditors. In addition, firms that are incorporated in major exchanges such as NYSE and AMEX are more likely to choose high quality auditors.

We use the IMR to adjust the self-selection problem. The IMR derived from the first-stage regression is used in the second-stage analysis. Table 6 consistently shows that Big N clients exhibit higher, but not statiscally significant, ERC. The results suggest that the main results in Table 4 are likely to be affected by the selection problem. The results are consistent with recent concerns regarding the selection problem in audit research (Lennox *et al.*, 2012).

Table 6 Sensitivity test of the US sample – two-stage analyses

Variables	UE=UE1		UE= UE2	
	Coefficient	T-value	Coefficient	T-value
UE	2.803***	8.62	0.280***	2.70
BIGN	-0.003	-0.36	-0.008	-1.18
BIGNUE	0.339	0.92	0.085	0.78
*UE*MB*	0.005	0.36	0.026***	3.63
*UE*MB*BIGN*	-0.069***	-4.12	-0.026***	-3.44
*UE*BETA*	0.045	0.59	0.080***	2.67
*UE*BETA*BIGN*	0.000	0.00	-0.052*	-1.64
*UE*LMV*	-0.078	-1.41	0.063***	2.90
*UE*LMV*BIGN*	-0.024	-0.40	-0.047**	-2.04
*UE*1/N*	-1.247***	-5.65	-0.130*	-1.91
*UE*1/N*BIGN*	-0.229	-0.91	0.049	0.65
IMR	-0.045***	-3.08	-0.175***	-12.31
Years	1983-2012		1983-2012	
Adj R	0.0841		0.0873	
Observations	31175		31175	

In this table, we address the selection problem by using Heckman's two-stage least square approach. SIZE is firm size measured as the natural log of total assets. GROWTH is the annual growth of sales revenues. ROA is net income scaled by total assets. LEVERAGE is total liabilities divided by total assets. CACL is current assets divided by current liabilities. REC is receivables scaled by total assets. INVENTORY is year-end inventory divided by total assets. NYSEAMX is an indicator equal to 1 if the client firm is incorporated in the NYSE or AMEX and 0 otherwise. We use IMR (inverse Mills ratio) to adjust the self-selection issue in examining the effect of Big N on ERC.

4.2 The China sample

Panel A of Table 7 presents the estimates from the OLS regression of equation (1) for the China sample. All of the continuous variables used in the regressions are

winsorised at the 5% level due to some outliers. To measure market reaction to earnings surprise, models 1 to 3 use CAR1 and models 4 to 5 use CAR2. Estimates from models 1 and 4 using the full sample and models 3 and 6 using the 2001-2012 sample suggest that Big 5 clients have greater market reactions. However, as shown in models 1 to 6, there is no statistically significant relationship between the CARs and earnings surprise UE nor between the CARs and the interaction term of UE and Big5. The results are inconsistent with our expectations and with prior studies (Gul *et al.*, 2003; Lin *et al.*, 2009) that find higher ERCs for firms audited by the 10 largest auditors in China in relatively short and earlier sample periods. One possible explanation for this is that the long sample period may incorporate many institutional reforms related to the audit market in China which may bring some noise to the empirical tests. Another explanation is that Big 5 audit firms are not perceived by Chinese investors as better quality auditors. For example, Liu *et al.* (2004) find that the clients of the Big 5 auditors tend to be less conservative compared with those audited by non-Big 5 auditors in China.

Table 7 The regression results of the China sample

Panel A: Regressions in the pre- and post-2001 periods

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	CAR1	CAR1	CAR1	CAR2	CAR2	CAR2
	Full sample	1995-2000	2001-2012	Full sample	1995-2000	2001-2012
Constant	-0.031***	-0.026***	-0.010***	-0.012**	-0.007	-0.009***
	(-6.22)	(-3.26)	(-3.24)	(-2.40)	(-0.91)	(-3.06)
BIG5	0.003**	0.003	0.003**	0.003**	0.003	0.003**
	(2.22)	(0.72)	(2.25)	(2.28)	(0.62)	(2.36)
UE	-0.108	-0.203	-0.449	0.236	-0.012	-0.049
	(-0.38)	(-0.18)	(-1.49)	(0.82)	(-0.01)	(-0.16)
UE_BIG5	0.758	2.661	0.321	0.324	2.894	-0.233
	(1.01)	(1.11)	(0.41)	(0.42)	(1.19)	(-0.30)
UE_MB	0.005	-0.003	0.004	0.004	-0.003	0.003
	(0.95)	(-0.12)	(0.63)	(0.81)	(-0.13)	(0.47)
UE_MB_BIG5	-0.022	0.006	-0.024	-0.028	-0.003	-0.031
	(-0.67)	(0.03)	(-0.74)	(-0.86)	(-0.02)	(-0.92)
UE_BETA	-0.000	0.308	0.082	0.008	0.352*	0.076
	(-0.01)	(1.62)	(1.35)	(0.14)	(1.80)	(1.22)
UE_BETA_BIG5	-0.156	0.579	-0.247	-0.115	0.569	-0.186
	(-0.77)	(0.66)	(-1.05)	(-0.57)	(0.64)	(-0.79)
UE_LMV	0.008	0.017	0.018	-0.010	0.003	-0.001
	(0.56)	(0.31)	(1.32)	(-0.77)	(0.06)	(-0.10)
UE_LMV_BIG5	-0.023	-0.150	0.001	-0.003	-0.158	0.024
	(-0.70)	(-1.40)	(0.03)	(-0.10)	(-1.45)	(0.78)
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,662	3,536	16,082	20,662	3,536	16,082
R-squared	0.022	0.076	0.015	0.013	0.042	0.014
Adj. R-squared	0.0204	0.0689	0.0135	0.0115	0.0347	0.0117

The table reports the regression results concerning the relationship between Big N and ERC in the China market. CAR1 is the 3-day cumulative abnormal returns around earnings announcement dates. CAR2 is the 3-day cumulative abnormal returns using the market model. BIG5 is a dummy variable which equals 1 if the auditor is one of top 5 auditors in China and 0 otherwise. BETA is the slope derived from the market return model. LMV is the log value of the market equity value of a firm. MB is the market-to-book ratio, which is equal to market value of equity divided by book value of equity. Robust t-statistics are reported in parentheses. *, **, and *** indicate the 10%, 5%, and 1% significance level respectively.

Panel B: Regressions without three-term interactions

VARIABLES	(1) CAR1 Full	(2) CAR1 1995-2000	(3) CAR1 2001-2012	(4) CAR1 full	(5) CAR1 1995-2000	(6) CAR1 2001-2012
Constant	-0.030***	-0.026***	-0.010***	-0.012**	-0.007	-0.009***
	(-6.22)	(-3.24)	(-3.35)	(-2.39)	(-0.88)	(-3.17)
D1	0.003**	0.003	0.003**	0.003**	0.003	0.003**
	(2.32)	(0.71)	(2.37)	(2.36)	(0.61)	(2.49)
UE	-0.047	0.281	-0.470*	0.250	0.497	-0.128
	(-0.18)	(0.28)	(-1.73)	(0.95)	(0.47)	(-0.47)
UE_D1	0.072*	0.024	0.056	0.090**	0.062	0.073*
	(1.72)	(0.16)	(1.38)	(2.10)	(0.42)	(1.75)
UE_MB	0.004	-0.001	0.002	0.003	-0.002	0.001
	(0.75)	(-0.05)	(0.40)	(0.56)	(-0.07)	(0.21)
UE_BETA	-0.010	0.370*	0.063	-0.002	0.415**	0.057
	(-0.18)	(1.96)	(1.08)	(-0.04)	(2.14)	(0.96)
UE_LMV	0.005	-0.009	0.020*	-0.010	-0.024	0.003
	(0.44)	(-0.19)	(1.65)	(-0.85)	(-0.47)	(0.28)
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,662	3,536	17,126	20,662	3,536	17,126
R-squared	0.022	0.075	0.016	0.013	0.041	0.014
Adj. R-squared	0.0204	0.0690	0.0140	0.0115	0.0348	0.0122

The table reports the regression results concerning the relationship between Big N and ERC in the China market. The results are based on a modified model in which three-term interactions are excluded. CAR1 is the 3-day cumulative abnormal returns around earnings announcement dates. CAR2 is the 3-day cumulative abnormal returns using the market model. D1 is a dummy variable which equals 1 if the auditor is one of top 5 auditors in China and 0 otherwise. BETA is the slope derived from the market return model. LMV is the log value of market equity value of a firm. MB is the market-to-book ratio, which is equal to market value of equity divided by book value of equity. Robust t-statistics are reported in parentheses. *, **, and *** indicate the 10%, 5%, and 1% significance level respectively.

However, untabulated results show that the variance inflation factors (VIF) from the two main regressions are quite high: the VIF values for some continuous variables are over 500, an indication that there is multicollinearity in the main regressions. As Panel B of Table 3 reveals that the correlation coefficients among some variables in equation (1) are near to 1, particularly those between the two-term and three-term interactions, we turn to a modified model by excluding all the three-term interactions in the original regressions of Teoh and Wong (1993).[5] Panel B of Table 7 compares the results using the model without the three-term interaction variables. The results indicate that using the modified model, the estimated coefficients of UE_Big5 become significant in both the full sample period and the post-2001 period.

In the above tests, the indicator of Big 5 auditors is the proxy for perceived audit quality in the China sample. To check the robustness of our results, we also repeat the ERC analyses using alternative proxies for perceived audit quality. Gul *et al.* (2003) and Lin *et al.* (2009) find that the client firms of the top 10 auditors in China have higher ERCs in the 1996-1997 and 2002-2004 periods, respectively. Using the indicator of the top 10 large auditors based on total assets audited, we fail to find any significant

[5] Multicollinearity could be more of a concern in the China sample due to the fact that Big 5 auditors dominate the market share of large companies: the 6.22% of Big 5 clients on average account for 43.25% of total client assets during the period 1995 to 2012 (see Panel B of Table 1).

association between ERCs and perceived audit quality in Panel A of Table 8. In addition, we also examine the difference in perceived audit quality between the international Big 5 auditors and the five largest domestic auditors (DBig5). The results in Panel B of Table 8 indicate that the Big 5 clients have higher ERCs than the clients of local large auditors.

Table 8 Sensitivity test of the China sample – alternative Big N indicators

Panel A: Regressions using Top 10 auditors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	CAR1	CAR1	CAR1	CAR1	CAR2	CAR2	CAR2	CAR2
	full	full	1995-2000	2001-2012	full	full	1995-2000	2001-2012
Constant	-0.031***	-0.031***	-0.026***	-0.010***	-0.012**	-0.012**	-0.007	-0.009***
	(-6.24)	(-6.24)	(-3.23)	(-3.37)	(-2.44)	(-2.43)	(-0.88)	(-3.19)
D0	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001
	(0.96)	(1.10)	(0.10)	(1.08)	(1.22)	(1.36)	(0.23)	(1.32)
UE	0.012	-0.131	0.323	-0.579**	0.402	0.143	0.504	-0.256
	(0.04)	(-0.51)	(0.32)	(-2.17)	(1.18)	(0.55)	(0.48)	(-0.95)
UE_D0	-0.263	0.024	0.034	0.004	-0.564	0.028	0.051	0.008
	(-0.51)	(0.97)	(0.38)	(0.16)	(-1.08)	(1.11)	(0.56)	(0.32)
UE_MB	0.004	0.003	-0.000	0.001	0.003	0.001	-0.001	-0.000
	(0.66)	(0.53)	(-0.00)	(0.15)	(0.50)	(0.28)	(-0.05)	(-0.08)
UE_BETA	0.021	-0.017	0.381**	0.055	0.028	-0.011	0.433**	0.047
	(0.32)	(-0.29)	(1.99)	(0.93)	(0.43)	(-0.18)	(2.19)	(0.78)
UE_LMV	0.001	0.010	-0.012	0.026**	-0.019	-0.005	-0.026	0.010
	(0.05)	(0.82)	(-0.25)	(2.16)	(-1.19)	(-0.40)	(-0.50)	(0.84)
UE_MB_D0	-0.002				-0.002			
	(-0.18)				(-0.20)			
UE_BETA_D0	-0.133				-0.128			
	(-0.99)				(-0.94)			
UE_LMV_D0	0.020				0.034			
	(0.87)				(1.45)			
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,662	20,662	3,536	17,126	20,662	20,662	3,536	17,126
R-squared	0.022	0.022	0.075	0.015	0.013	0.013	0.041	0.013
Adj. R-squared	0.0200	0.0200	0.0689	0.0136	0.0111	0.0111	0.0348	0.0117

Panel B: Regressions using Big 5 and local Big 5 indicators

	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
VARIABLES	CAR1	CAR1	CAR1	CAR1	CAR2	CAR2	CAR2	CAR2
	full	full	1995-2000	2001-2012	full	full	1995-2000	2001-2012
Constant	-0.031***	-0.030***	-0.026***	-0.010***	-0.012**	-0.012**	-0.007	-0.009***
	(-6.23)	(-6.22)	(-3.25)	(-3.34)	(-2.42)	(-2.40)	(-0.90)	(-3.17)
D1	0.003**	0.003**	0.003	0.003**	0.003**	0.003**	0.003	0.003**
	(2.19)	(2.30)	(0.74)	(2.32)	(2.27)	(2.37)	(0.64)	(2.46)
D2	0.000	0.000	0.001	-0.000	0.000	0.000	0.001	0.000
	(0.01)	(0.09)	(0.28)	(-0.15)	(0.23)	(0.30)	(0.38)	(0.05)
UE	0.027	-0.041	0.282	-0.482*	0.420	0.257	0.501	-0.138
	(0.08)	(-0.16)	(0.28)	(-1.77)	(1.26)	(0.97)	(0.48)	(-0.50)

UE_D1	0.623	0.074*	0.026	0.053	0.139	0.092**	0.067	0.070*
	(0.81)	(1.72)	(0.17)	(1.28)	(0.18)	(2.10)	(0.44)	(1.66)
UE_D2	-0.588	0.006	0.008	-0.011	-0.799	0.007	0.017	-0.009
	(-0.93)	(0.20)	(0.08)	(-0.35)	(-1.24)	(0.24)	(0.16)	(-0.29)
UE_MB	0.004	0.004	-0.001	0.002	0.003	0.003	-0.001	0.001
	(0.61)	(0.76)	(-0.04)	(0.38)	(0.42)	(0.57)	(-0.04)	(0.20)
UE_BETA	0.014	-0.010	0.370*	0.063	0.020	-0.002	0.416**	0.057
	(0.22)	(-0.17)	(1.94)	(1.08)	(0.30)	(-0.03)	(2.13)	(0.96)
UE_LMV	0.001	0.005	-0.009	0.021*	-0.020	-0.011	-0.024	0.004
	(0.04)	(0.41)	(-0.19)	(1.70)	(-1.24)	(-0.88)	(-0.48)	(0.32)
UE_MB_D1	-0.020				-0.026			
	(-0.62)				(-0.79)			
UE_MB_D2	0.010				0.013			
	(0.75)				(0.96)			
UE_BETA_D1	-0.170				-0.127			
	(-0.84)				(-0.62)			
UE_BETA_D2	-0.082				-0.068			
	(-0.51)				(-0.42)			
UE_LMV_D1	-0.016				0.006			
	(-0.47)				(0.17)			
UE_LMV_D2	0.031				0.040			
	(1.05)				(1.34)			
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,662	20,662	3,536	17,126	20,662	20,662	3,536	17,126
Adj. R-squared	0.0203	0.0203	0.0685	0.0139	0.0115	0.0114	0.0343	0.0121

The table reports the regression results concerning the relationship between Big N and ERC in the China market. In this table, we define D 1 (2) as a dummy variable which equals 1 if an auditor is ranked in the top 10 (5) and 0 otherwise. CAR1 is the 3-day cumulative abnormal returns around earnings announcement dates. CAR2 is the 3-day cumulative abnormal returns using the market model. BETA is the slope derived from the market return model. LMV is the log value of the market equity value of a firm. MB is the market-to-book ratio, which is equal to market value of equity divided by book value of equity. Robust t-statistics are reported in parentheses. *, **, and *** indicate the 10%, 5%, and 1% significance level respectively.

To mitigate the self-selection concern, we use Heckman's two-stage procedure to estimate the coefficients (Heckman, 1976). The first stage obtains an IMR following the logistic regression on the determinants of auditor choice in Wang *et al.* (2008). Specifically, the first-stage regression model is specified as

$$\begin{aligned} BIG5_{it} = {} & \beta_0 + \beta_1 * SIZE_{it} + \beta_2 * GROWTH_{it} + \beta_3 * ROA_{it} \\ & + \beta_4 * LEVERAGE_{it} + \beta_5 * CACL_{it} + \beta_6 * OTHREC_{it} \\ & + \beta_7 * INVENTORY_{it} + \beta_8 * SOE_{it} \\ & + \beta_9 LARGEHOLDING_{it} + \varepsilon_{it} \end{aligned} , \quad (3)$$

where SIZE is the natural log of total assets, GROWTH is the annual growth of sales revenues, ROA is net income scaled by total assets, LEVERAGE is total liabilities divided by total assets, and CACL is current assets divided by current liabilities.

OTHREC is other receivables scaled by total assets. INVENTORY is year-end inventory divided by total assets. SOE is an indicator which equals 1 if the client firm is a state-owned enterprise. LARGEHOLDING is the ownership held by the largest shareholder. We then add the IMR from the first-stage regression as an additional regressor in the second stage to repeat the major ERC analyses. To conserve space, Table 9 only presents the results from the second-stage regression models. The estimated coefficients of the ERCs are not significant, indicating that we should interpret the results reported in Panel B of Table 5 with caution.

Table 9 Sensitivity test of the China sample – two-stage analyses

VARIABLES	(1) CAR1	(1) CAR1	(3) CAR2	(4) CAR2
Constant	0.001	0.001	0.003	0.003
	(0.27)	(0.27)	(0.62)	(0.62)
BIG5	-0.002	-0.002	-0.002	-0.001
	(-0.94)	(-0.75)	(-0.74)	(-0.59)
UE	-0.191	-0.226	0.159	0.078
	(-0.55)	(-0.72)	(0.45)	(0.24)
UE_BIG5	0.251	0.062	-0.244	0.074
	(0.30)	(1.30)	(-0.29)	(1.53)
UE_MB	0.005	0.002	0.005	0.001
	(0.68)	(0.24)	(0.66)	(0.20)
UE_BETA	0.077	0.045	0.071	0.040
	(1.14)	(0.69)	(1.04)	(0.61)
UE_LMV	0.006	0.010	-0.011	-0.005
	(0.37)	(0.66)	(-0.68)	(-0.37)
UE_MB_BIG5	-0.039		-0.044	
	(-1.04)		(-1.16)	
UE_BETA_BIG5	-0.351		-0.286	
	(-1.42)		(-1.17)	
UE_LMV_BIG5	0.010		0.031	
	(0.29)		(0.88)	
IMR	-0.002	-0.002***	-0.002	-0.002***
	(-0.94)	(-4.11)	(-0.74)	(-4.41)
Year effect	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes
Observations	10,139	10,139	10,139	10,139
R-squared	0.019	0.019	0.017	0.017
Adj. R-squared	0.0166	0.0164	0.0148	0.0145

In this table, we address the selection problem by using Heckman's two-stage least square approach. CAR1 is the 3-day cumulative abnormal returns around earnings announcement dates. CAR2 is the 3-day cumulative abnormal returns using the market model. SIZE is the natural log of total assets. GROWTH is the annual growth of sales revenues. ROA is net income scaled by total assets. LEVERAGE is total liabilities divided by total assets. CACL is current assets divided by current liabilities. OTHREC is other receivables scaled by total assets. INVENTORY is year-end inventory divided by total assets. SOE is an indicator which equals 1 if the client firm is a state-owned enterprise. LARGEHOLDING is the ownership held by the largest shareholder. The IMR value derived from a first-stage regression is used to address the selection problem in the second stage.

V. Conclusion

In this paper, we follow Teoh and Wong (1993) to investigate the market reaction to the perceived audit quality of financial statements using long historical data in the US and China. On the basis of a US sample covering the period 1980-2012, we make some interesting findings in these two markets. First, we find that audit markets in the US and China do change over time and that the market structure is different in these two markets. The market share of large auditors in the US is dominant compared with that in China. Second, in the US market, we find evidence consistent with Teoh and Wong's (1993) argument that investors perceive the financial statements audited by Big N auditors to be of higher quality than those audited by Non-Big N auditors. The quality differentiation however becomes insignificant in the post-SOX period. Third, we test a modified Teoh and Wong (1993) model in China and find weak evidence that the ERCs of Big 5 clients are higher than those of Non-Big 5 clients. However, when multicollinearity is of less concern, the model performs favourably compared alongside the original model based on the China sample during the period 1995 to 2012. Taken together, our study suggests that the findings in Teoh and Wong (1993) hold but are likely to change due to audit industry and regulation changes. By comparing the results from these two markets, we also find that the results from the China market are weaker than those from the US market. This difference may be explained by differences in market developments and research design.

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