ECONOMIC RESEARCH CENTER
DISCUSSION PAPER

E-Series

No.E14-7

Auditor Size as a Measure for Audit Quality: A Japanese Study

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April 2014

ECONOMIC RESEARCH CENTER
GRADUATE SCHOOL OF ECONOMICS
NAGOYA UNIVERSITY

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SUMMARY

This study examines the Japanese audit market from 2001 to 2011 to demonstrate that audit quality does not differ with the size of audit firms in Japan. There has been a growing concern worldwide regarding the audit quality of large audit firms in Japan due to scandals such as the Kanebo (2005) and Olympus (2011). Thus, using inverse probability weighting (IPW) and five proxy variables for audit quality, we show that irrespective of their size, all audit companies in Japan provide the same quality of service, when controlled for client characteristics. We also find that small- to medium-sized audit firms in Japan provide going-concern audit opinions to their clients more readily. Finally, our results suggest that although only three major audit firms remain in the audit market after the dissolution of PricewaterhouseCooper's member firm in 2007, the audit quality offered by Big N has remained unchanged.

Key words: audit quality, auditor size, inverse probability weighting (IPW), propensity score, Japan

INTRODUCTION

The purpose of a financial audit is to ensure that the financial statements published by companies are a fair representation of their financial position and performance. The interested parties, including regulators, use the auditor verified financial statement information to make investment decisions and conduct economic activities. Thus, the level of audit quality is a concern for various interested parties, and the maintenance of audit quality is imperative to ensure the smooth performance of economic activities and economic development. This is the reason that issues related to the determination of the level of audit quality and retention of high quality in auditing have attracted the attention of multiple interested parties and are discussed widely by researchers and policy makers.

Many existing studies evaluate the relationship between audit quality and auditor size to identify the level of audit quality. In case the relationship between auditor size and audit quality is consistent, researchers can identify or predict the level of audit quality by observing the size of an audit firm. Studies on the U.S. market reveal that, generally, large audit firms with international brand names provide better audit quality than do other firms (e.g., Becker et al. 1998; Francis et al. 1999; Behn et al. 2008). The office size of audit practices is also positively related to audit quality (e.g., Francis and Yu 2009; Choi et al. 2010). In contrast, Louis (2005) suggests that smaller audit firms provide better acquisitions advice to their clients. However, Lawrence et al. (2011) suggest that there is no difference between the audit quality of large and small- to medium-sized audit firms when their client characteristics are controlled. Thus, the relationship between audit quality and auditor size is still a contentious point in the empirical research within the field of accounting and auditing.

Moreover, very few studies (e.g., Ajward 2010) have examined the relationship between audit quality and auditor size in Japan. Japan's role in global economy is quiet significant. In 2012, Japan recorded the third highest gross domestic product (GDP) in the world, and until 2011, it's stock market was the second largest in the world. In addition, the Japanese audit market is quite large, and in 2011 alone, it serviced around 3731 clients (also see Table 1). However, with the involvement of two of the

largest Japanese firms, ChuoAoyama (PricewaterhouseCoopers) and Azsa (KPMG), in the 2005 Kanebo scandal and the 2011 Olympus scandal (see Table 2 and Figure 2), respectively, the audit quality of the large audit firms in Japan has come under the scrutiny of investors worldwide. Besides, the Japanese audit market offers a unique data setting with low litigation risk and high volumes of work per auditor; in fact, one Big 4 international audit firm in Japan even lowered its scale and became a non-Big N audit firm. Thus, this study seeks to address this void in the literature by conducting a comprehensive study on all the listed companies in the Japanese stock market from 2001 to 2011.

This study uses various audit quality proxy variables to reveal that the audit quality of big and small- to medium-sized audit firms is essentially the same after controlling for the effect of clients companies' characteristics. This suggests that the positive relationship between audit quality and auditor size is due to the characteristics of audit firms' clients. More interestingly, this study finds that small- to medium-sized audit firms are more able, or willing, to identify and report going-concern issues, compared to large audit firms. Finally, we find that the audit quality of audit firms remains unaffected even when one of the "Big 4" audit firms reduces in scale.

This study contributes to the accounting and auditing literature in several ways. First, with an extensive review of studies on audit quality, this study sets five proxy variables for audit quality: discretionary accruals (Francis and Yu 2009; Choi et al. 2010; Lawrence et al. 2011), benchmark earnings targets (Francis and Yu 2009), going-concern audit reports (Francis and Yu 2009), ex ante cost of capital (Lawrence et al. 2011), and analyst forecast accuracy (Lawrence et al. 2011). In contrast, previous studies have only used one, two, or three variables to measure audit quality. Thus, this analysis tries to address the following research question more comprehensively: What is the relationship between audit quality and auditor size in Japan?

Second, this study attempts to add to the literature on the Japanese audit market, especially audit quality in Japan. Despite Japan's economic significance to global investors and its possession of one of the largest stock market, very few studies focus on the Japanese audit market. A search for abstracts

using the keywords “audit” and “Japan” in the English EconLit/EBSCO database returns eight papers, whereas a search using “audit quality” and “Japan” as keywords does not yield any results.

Third, this study uses the Japanese audit market’s unique date setting to address the following research question: How is audit quality influenced in an audit market where one of the big audit firms reduces in scale and the power relationship between audit firms and client companies changes?

Fourth, this study uses Rubin’s (1985) inverse probability weighting (IPW) method, a kind of propensity score weighting used in medical and social science research, to verify the relationship between audit quality and auditor size. Compared to the propensity score matching model of Rosenbaum and Rubin (1983), which is used in auditing or accounting studies (e.g., Lawrence et al. 2011), Rubin’s (1985) methodology decreases the bias that occurs during the process of reducing the sample in the application of the propensity score matching model. Therefore, this study seeks to utilize an improved method from the medical and social literature.

The remainder of this paper is structured as follows: Section 2 provides a background of the Japanese audit market and discusses its characteristics. Section 3 builds the hypothesis for this study and describes the five proxy variables for audit quality. Section 4 describes the methodology used in this paper, while section 5 describes the sample and presents the descriptive statistics. Section 6 and 7 provide the empirical and robustness results, respectively, before the conclusion of the study in section 8.

THE JAPANESE AUDIT MARKET

Table 1 compares the Japanese audit market with other major markets in the world. In 2012, Japan’s stock market was the third largest in the world and the number of auditors per company was extremely low compared to that in other countries.

Insert Table 1 here

In addition, Figure 1 presents the historical situation of the Japanese audit market. The figure shows that with the increase in market capitalization and the number of listed companies, especially during the

1970s, the number of auditors also increased in Japan. Consistent with Table 1, the number of auditors per company is low, suggesting that the personal and professional ability of every auditor is important when audit quality is considered.

Insert Figure 1 here

Insert Figure 2 here

Further, Figure 2 shows the transition history of audit firms in Japan. Since the late 1960s, several transitions have occurred in Japan and many small- to medium-sized audit firms have merged into larger audit firms. As of 2012, the four major Japanese audit companies with international affiliations were Tohmatsu (Deloitte Touche Tohmatsu), Aarata (PricewaterhouseCoopers [PwC]), ShinNihon (Ernst & Young), and Azsa (KPMG).

Additionally, Table 2 presents the market shares of the Big Four international audit firms in Japan. As indicated, in 2011, the market share of the PwC's member firm, Aarata, is only 2.41%, based on the number of clients in the entire audit market. Thus, there are only three large audit firms in the Japanese audit market according to the market shares based on client numbers.

Insert Table 2 here

LITERATURE REVIEW, HYPOTHESIS, AND MEASURES OF AUDIT QUALITY

Literature Review and Hypothesis

Previous studies generally concur that the audit quality of large audit firms (offices) with international brand names is better than that of small audit firms (offices) (DeAngelo 1981; Becker et al. 1998; Francis et al. 1999; Behn et al. 2008; Francis and Yu 2009; Choi et al. 2010). Some studies suggest that the difference in the audit quality of large and small audit firms is a result of their different client-industry specialty, independence, and accuracy levels. Dopuch and Simunic (1980) mention that large audit firms have abundant client-industry-specific knowledge and experience and spend significant amounts of money to educate auditors under their employment. DeAngelo (1981) also points out that

larger audit firms provide more independent audits in an attempt to protect their brand name reputation, as they have “more to lose” if their reputation is tarnished. She further argues that audit quality of larger audit firms is also higher in general. Moreover, Lennox (1999) reasons that large audit firms have many clients and depend on all their clients’ audit fees, regardless of the actual value of the amounts. They also have deeper pockets and therefore face higher litigation risks compared to small audit firms, which is another incentive to issue accurate reports.

Nonetheless, the Japanese audit market is significantly different from that of the U.S. Skinner and Srinivasan (2012, 1743) point out that “litigation against auditors [...] is virtually nonexistent in Japan,” showing that the litigation risk for Japanese audit firms is low and therefore need not be considered. Moreover, by using the propensity score matching model (an increasingly used model in accounting), Lawrence et al. (2011) find that after controlling for the clients’ characteristics, the differences between large and small audit firms disappear. This suggests that the differences between small- to medium-sized and large audit firms are due to the auditors’ clients and the market environment. Subsequently, this paper tests the following null hypothesis:

Hypothesis: There is no difference between the audit quality of large and small- to medium-sized audit firms in the Japanese audit market.

Measures of Audit Quality

A comprehensive review of the literature reveals that audit quality concept is difficult to define, unclear, and perceived differently by various stakeholders (e.g., Knechel et al. 2013; IAASB 2013). Thus, Francis (2011) and Knechel et al. (2013) summarize academic articles on audit quality and offer insights into the measurement of audit quality.

This study seeks to gather the knowledge from existing literature and use the following five proxy variables to capture audit quality: discretionary accruals, benchmark earnings targets, going-concern audit reports, ex ante cost of capital, and analyst forecast accuracy. Discretionary accruals are calculated

by subtracting non-discretionary accruals from total accruals and are not affected by management interference (Jones 1991). If the audit quality of financial statements is high, the discretionary accruals managed by the management are expected to decrease. This study uses discretionary accruals to measure audit quality using Dechow et al.'s (1995) model, which is the modified Jones model that has been used by Lawrence et al. (2011). This study also uses Kasznik's (1999), Dechow and Dichev's (2002), and Kothari et al.'s (2005) models to conduct additional analyses.

Furthermore, according to Burgstahler and Dichev (1997), a phenomenon unique to the U.S. market is the existence of many companies with a small net income and few companies with small negative net income. They reason that, in the U.S., the management manages earnings and tries to avoid recording losses. In contrast, earnings management is more conspicuous in Japan (Shuto 2000, 137). There are currently many companies with a small net income and few companies with a small negative net income. Thus, this study uses the the dummy variable of small positive earnings (net income deflated by the last term end; total assets between 0 and 1 percent) to measure audit quality and applies other several percentages of small positive earnings to recapture audit quality to conduct additional analyses.

Additionally, DeFond et al. (2002) argue that audit independence is a necessity for auditors to evaluate a company's financial position and report going-concern audit opinions. Thus, they use auditors' propensity to issue going-concern audit opinions as a substitute for auditors' independence. Since the audit independence level is considered for the assessment of the level of audit quality, previous studies (e.g., Francis and Yu 2009) use the information of going-concern audit opinions as a surrogate to audit quality. Therefore, this study uses the dummy variable of going-concern audit opinions as a proxy for audit quality. As the audit for going-concern systems in Japan began only in January 2002, the sample of this analysis part in which audit quality's proxy is the dummy variable of going-concern is smaller than that of other parts of this study.

Moreover, Khurana and Raman (2004) use ex ante cost of capital as the proxy variable for financial reporting credibility and find that the lower the ex ante cost of capital, the higher the audit quality in the

U.S. market. Given the results of Khurana and Raman (2004), Lawrence et al. (2011) also use ex ante cost of capital as the surrogate variable for audit quality. Thus, this study uses ex ante cost of capital as a substitute for audit quality to evaluate if the lower ex ante cost of capital is received positively by the market participants against the audit report.

Finally, Behn et al. (2008) and Lawrence et al. (2011) use analyst forecast accuracy as the proxy variable for audit quality. Lawrence et al. (2011) argue that analyst forecast accuracy could capture the post-audit financial reporting reliability, and might become a proxy variable for audit quality. Accordingly, this study uses analyst forecast accuracy as the fifth measure for audit quality.

RESEARCH DESIGN

We adopt the IPW methodology, developed by Rubin (1985), for this analysis. First, we estimate the propensity score (e_i), which is defined as the estimated probability of receiving a treatment, that is (in our case), the probability of a company to select a Big N as its auditor. We use a logistic regression model to estimate the propensity score (Big N's estimate in equation (1)) as follows (see the definitions of the variables in Table 3):

$$\begin{aligned} BigN_{i,t} = {} & \beta_0 + \beta_1 \ln ASSET_{i,t} + \beta_2 LOSS_{i,t} + \beta_3 LIAB_{i,t} + \beta_4 ATURN_{i,t} + \beta_5 CURR_{i,t} + \beta_6 ROA_{i,t} \\ & + \beta_7 DOCF_{i,t} + \beta_8 \lg ACCR_{i,t} + \beta_9 BETA_{i,t} + \beta_{10} CASH_{i,t} + \beta_{11} VOLATILITY_{i,t} + \beta_{12} \lg LOSS_{i,} \\ & + \beta_{13} SALESVOLATILITY_{i,t} + \beta_{14} SALESGROWTH_{i,t} + \beta_{15} CFOVOLATILITY_{i,t} \\ & + \beta_{16} SAF2002_{i,t} + \beta_{17} CONSOL_{i,t} + iD + yD + \varepsilon_{i,t} \end{aligned} \quad (1)$$

After the estimation of the propensity score (e_i, Big N's estimate in equation (1)), we weigh the two groups of samples (Big N vs. Non-Big N) by using the estimated inverse of probability (ie_i), calculated by the following equation:

$$ie_i = \frac{z_i}{e_i} \times \frac{N_1}{\sum_{i=1}^{N} \frac{z_i}{e_i}} + \frac{1-z_i}{1-e_i} \times \frac{N_2}{\sum_{i=1}^{N} \frac{1-z_i}{1-e_i}} \quad (2)$$

where, ie_i denotes the sampling weights, z denotes the treatment group (Big N group) and the

control group (Non-Big N group) (1, if it is in the Big N group, otherwise 0), e_i denotes the predicted propensity score, N_1 denotes the number of Big N samples, N_2 denotes the number of Non-Big N samples, and $N = N_1 + N_2$.

Insert Table 3 here

Then, we include only Big N as an independent variable to estimate the following equation after employing propensity score weighting, to test our hypothesis:

$$\left.\begin{array}{l} ADA_{i,t} \\ PROBIT[BENCHMARK=1] \\ PROBIT[GCREPORT=1] \\ RPEG_{i,t} \\ ACCY_{i,t} \end{array}\right\} = \beta_0 + \beta_1 BigN_{i,t} + \varepsilon_{i,t} \qquad (3)$$

ADA, *BENCHMARK*, *GCREPORT*, *RPEG*, and *ACCY* represent the five proxy variables that capture audit quality, that is, discretionary accruals, benchmark earnings targets, going-concern audit reports, ex ante cost of capital, and analyst forecast accuracy (see Table 3 for details). *PROBIT* refers to the probit model. If β_1 in this model is not significant, the hypothesis is proved, *ceteris paribus*.

Finally, we split the sample into two parts—before and after the dissolution of PwC's member firm, Chuo-Aoyama, in 2007—to verify if β_1 in equation (3) will change. If $\beta_{1,pre}$ is different from $\beta_{1,post}$, it means that audit quality in Japan has somewhat changed after the dissolution of Chuo-Aoyama.

SAMPLE AND DESCRIPTIVE STATISTICS

We used Nikkei NEEDS Data-Base to collect data for this study. The data consist of all the listed companies in the Japanese stock market from 2001 to 2011 that closed their yearly accounts in

March, excluding financial institutions such as banks. In sum, the sample used in this paper includes 14,985 firm years (See Table 4).

Insert Table 4 here

Insert Table 5 here

Table 5 compares the test results for client companies of Big Ns and Non-Big Ns. As can be seen, the client companies of Big Ns and Non-Big Ns have many differences when analyzed from various perspectives. This suggests that a propensity score to control for the differences in clients' characteristics is necessary.

Table 6 presents the correlations among variables used in this study. We could not find any potential multicollinearity problem in this case.

Insert Table 6 here

RESULTS

Insert Table 7 here

Table 7 shows the results of the regression for estimating propensity score. As can be seen, the logistic model results indicate eight variables that are significant to: lnASSET(+), ATURN(+), CASH(-), LAGLOSS(-), SALESVOLATILITY(-), CFOVOLATILITY(+), SAF2002(+), and CONSOL(+). In other words, it shows that the companies that have larger total assets, greater turnover of assets, a lower percentage of cash/ the total amount of assets, a positive net income in the last term, less volatile sales, highly volatile operating cash flow, a lower possibility of going bankrupt, and more complex organization have the propensity to choose larger audit firms for auditing activities. These results clearly justify the necessity to control for the clients' characteristics of Big N and Non-Big N audit firms.

Insert Table 8 here

Table 8 presents the results of audit quality in terms of auditor size using normal regression and IPW, respectively. When the absolute value of discretionary accruals, ADA, is used as the proxy variable of audit quality in normal regression, model 1, Big N is significantly negative, while in IPW regression,

model 2, Big N is not significant at all. In other words, after controlling for the characteristics of audit firms' clients, the discretionary accruals of Big N's clients are not different from that of the Non-Big N's. Thus, in the Japanese audit market, after controlling for various factors by propensity score, larger and smaller audit firms have the same restraining power on earnings management and the hypothesis of this paper is confirmed from this perspective.

When benchmark earnings targets, BENCHMARK (net income limited to the total amount of assets is 0~1%), is used as the proxy variable for audit quality, both model 1 and model 2 show that Big N are insignificant. It shows that both large and small- to medium-sized audit firms could restrain the management's accounting management actions to avoid a loss or to receive a small positive net income. This evidence once again supports our hypothesis.

We obtained quite an interesting result in the case of going-concern audit reports, GCREPORT (See Table 8). The Big N's coefficients in both model 1 and 2 are negative and significant, suggesting that large audit firms are less likely to report going-concern audit opinions. In other words, in the Japanese audit market, small- to medium-sized audit firms are more open to the idea of suggesting going-concern audit opinions.

Regarding the fourth proxy variable of audit quality, ex ante cost of capital (RPEG), the results of both model 1 and 2 show that there is no difference between large and small- to medium-sized audit firms. These results indicate that investors equally value the audit reports of large and small- to medium-sized audit firms.

Lastly, when the fifth proxy variable for audit quality, analyst forecast accuracy, ACCY, is used for normal regression, that is, in model 1, Big N is significantly negative, while in case of IPW regression, that is, model 2, Big N is not at all significant. These results suggest that for investors (analysts), the liability of getting reports audited by large and small- to medium-sized audit firms is the same.

Finally, the untabulated results indicate no difference in the β_1, the coefficient of Big N, of the samples from before and after the dissolution of PwC's member firm, Chuo-Aoyama, in 2007. The

z-values of ADA, BENCHMARK, GCREPORT, RPEG, and ACCY to test the difference before and after Chuo-Aoyama's dissolution are 0.276, 0.8226, -0.548, -0.917, and 1.017, respectively.

SENSITIVITY AND ROBUSTNESS TESTS

To calculate the first proxy variable for audit quality, the absolute value of discretionary accruals, we use the modified Jones model presented in section 6. To test the robustness of our results, we use Kasznik's (1999), Dechow and Dichev's (2002), and Kothari et al.'s (2005) models to calculate discretionary accruals individually. We find that the results do not change with the application of different models.

Moreover, to set the benchmark of earning targets, the second proxy variable, we use 0%~1% of the net income from the total assets (16% of the entire data set) as the benchmark. When we change the benchmark to 0~0.5% (6.5% of the entire data set), or to 0~1.5% (25% of the entire data set), the results do not change.

Carey and Simnett (2006) use going-concern reports as the surrogate variable for audit quality; however, they just include those company years in the sample where there are net losses or negative cash flows from operating activity. In our sample, a look at going-concern reports indicates that 89% of the companies suffered a net loss or had negative cash flows; nonetheless, when we use only this fraction for analysis, similar to Carey and Simnett (2006), the results do not change compared to that in section 6.

In addition, the regulations regarding the going-concern report changed in 2009. Inokuma (2013) states that after 2009, there has been an increase in propensity of audit firms to disclose their going-concern reports. When we split our sample into the years before and after 2009 and apply the same methodology, the results remain the same.

Finally, as discussed in section 2, we do not treat Aarata (PwC's member firm) as a large audit firm for our analysis in section 6 due to its smaller market share (see Table 2). To conduct the robustness test, we remove Aarata's data from the complete sample or consider it a part of the larger audit firm (PwC's)

for re-examination. In both cases, the results do not change.

CONCLUSION

Both the Kanebo scandal in 2005 and the Olympus scandal in 2011 involved large Japanese audit firms. This made investors worldwide concerned about the audit quality of large audit firms in Japan. Thus, this study attempts to verify the relationship between audit quality and auditor size by investigating all the listed companies (audit firms' clients) in the Japanese stock market from 2001 to 2011. We use IPW to investigate five proxy variables for audit quality to determine the relationship between audit quality and auditor size and confirm our hypothesis, which states that there is no difference between the audit quality of large and small- to medium-sized audit firms in the Japanese audit market.

Using discretionary accruals, benchmark earnings targets, ex ante cost of capital, and analyst forecast accuracy as the proxy variables for audit quality, we provide evidence in support of our hypothesis. In other words, in terms of the degree of restraint on accounting management, the market evaluation of audit reports and the reliability of financial statements, as evaluated by analysts (investors), are the same for large and small- to medium-sized audit firms after controlling for the clients' characteristics.

However, when going-concern audit reports are used as the proxy variable for audit quality, we find that small- to medium-sized audit firms tend to give their clients more positive going-concern audit opinions compared to large audit firms in Japan. There are two possible reasons for this result. First, there is a possibility that, in Japan, the majority of companies with going-concern problems are audited by small- to medium-sized audit firms instead of large audit firms. Azuma (2007) suggests that in Japan, large audit firms usually turn down clients if they anticipate a going-concern problem, and thus, the next audit firm to audit that client company would typically be a small- to medium-sized audit firm. Second, there is a possibility that small- to medium-sized audit firms follow a more appropriate procedure for the

issuance of a going-concern report. Louis (2005) points out that small audit firms are more informed of the local market and have closer relationships with their clients, when compared to the large audit firms. Accordingly, small- to medium-sized audit firms might are more conversant at assessing the possibility of a going-concern problem at their client company. In addition to these facts, there is also room for discussion regarding the validity of going-concern audit opinions as a proxy variable of audit quality. Lennox (1999) uses going-concern reports to identify the differences between large and small- to medium-sized audit firms and uses going-concern reports as a measure of the appreciation of audit opinion but not audit quality itself. Contrary to Francis and Yu's (2009) study in the U.S. market, which shows large audit firms tend to issue going-concern reports more readily than do small- to medium-sized audit firms, our findings indicate that the same is not true in case of the Japanese market.

Finally, our results do not indicate any change in the audit quality of Big N firms before and after the dissolution of PwC's member firm, Chuo-Aoyama, in 2007, suggesting that the audit quality offered by Big N has remained unaffected despite the reduction in scale of one of the Big 4 players.

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Table 1 The Japanese Audit Market Compared to Other Markets of the World in 2012

	Market capitalization (Dollar)	Domestic market capitalization of world market capitalization	The number of listed companies	The number of auditors	The number of auditors per company
USA	18,668,333,210,000	35.11%	4,102	352,297	85.88
China (exluding Hong Kong)	3,697,376,039,677	6.95%	2,494	100,000	40.10
Japan	3,680,982,116,116	6.92%	3,470	24,733	7.13
UK	3,019,467,050,240	5.68%	2,179	118,758	54.50
French	1,823,339,266,082	3.43%	862	18,500	21.46
Hong Kong	1,108,127,258,370	2.08%	1,459	33,901	23.24

Source: The World Bank (http://data.worldbank.org/) and the homepages of each country's Institute of Certified Public Accountants.

Table 2 The Market Shares of the Big Four International Audit Firms in Japan

Year	BigN (%) (based on client number)					Non-BigN (%) (based on client number)	Client Number
	Shinnihon (Ernst & Young's member firm)	Tohmatsu (Deloitte Touche Tohmatsu's member firm)	Chuo-Aoyama (PricewaterhouseCoopers's member firm)	Azsa (KPMG's member firm)	Arata (PricewaterhouseCoopers's member firm)		
2001	22.03	19.46	19.70	14.89		23.91	3,659
2002	21.61	20.37	20.37	15.09		22.57	3,957
2003	21.57	21.10	20.82	15.29		21.22	4,015
2004	20.70	21.61	20.90	16.15		20.63	4,086
2005	20.58	22.01	21.37	16.50		19.55	4,189
2006	20.97	21.71	20.13	17.29	0.46	19.90	4,302
2007	23.15	21.86	11.14	18.31	2.07	25.54	4,397
2008	26.59	24.95		20.73	2.28	27.72	4,076
2009	26.97	24.66		20.18	2.29	28.19	3,930
2010	26.19	24.72		19.42	2.34	29.66	3,810
2011	26.70	24.82		19.27	2.41	29.21	3,731

Note: Chuo Aoyama dissolved in 2007 due to the Kanebo scandal.

Source: Nikkei NEEDS Data-Base.

Table 3 Variables' Definition and Measurement

Variables	Definition
TA	Total accruals=income from continuing operations after tax cash flow from operation activity
lnASSET	Natural logarithm of total assets of t−1 year end
⊿REV	The increase of the sales: sales of this term−sals of last term
⊿REC	The increase of receivables: receivables of this term end−receivables of last term end
PPE	Property Plant, and Equipment
BigN	1 if the client has a BigN auditor, and 0 otherwise
LOSS	1 if the firm recorded net loss for year t, and 0 otherwise
LIAB	(Total liability for t−1 year end)/(total assets for t−1 year end)
ATURN	(Sales for year t)/(average total assets for t−1 year end)
CURR	(Current assets for t−1 year end)/(current liabilities for t−1 year end)
ROA	(Net income for year t)/(average total assets for year t)
DOCF	(Operating cash flows for year t− operating cash flows for year t−1)/(total assets for t−1 year end)
lgACCR	Total accruals for year t−1/total assets for t−1 year end
BETA	By CAPM model using past 36 months' return to estimate
CASH	Sum of a client's total cash deflated by total assets for t−1 year end
VOLATILITY	Stock volatility and is the standard deviation of past 12 monthly stock returns
lgLOSS	1 if the firm recorded net loss for year t−1, and 0 otherwise
SALESVOLATILITY	Standard deviation of sales revenue of the last three years
SALESGROWTH	(Sales for year t/sales for year t−1)−1
CFOVOLATILITY	Standard deviation of CFO of the last three years
SAF2002	SAF2002 value (Shirata 2003), which measures the probability of bankruptcy in Japan
CONSOL	Number of the firm's consolidated companies
ADA	Absolute of discretionary accruals
BENCHMARK	1 if net income/total assets for t−1 year end is 0−2%, otherwise 0
GCREPORT	1 if the note about going concern is disclosed in audit report, and 0 otherwise
RPEG	Ex ante cost of equity capital estimated by using Easton's (2004) approach
ACCY	Absolute number of earnings per stock minus estimate earnings per stock by analyst
iD	Industry dummy classified by Tokyo Stock Exchange
yD	Year dummy from 2001 to 2011.

Table 4 Details of the Sample, Classified by Industry

Classified by Industry	Firm-year	BigN %
Construction	1,195	81.42%
Foods	542	75.83%
Textiles & Apparels	403	78.66%
Chemicals	1,541	76.31%
Pharmaceutical	303	84.49%
Glass & Ceramics Products	390	89.49%
Iron & Steel	466	68.03%
Nonferrous Metals	323	87.62%
Metal Products	515	66.41%
Machinery	1,460	72.47%
Electric Appliances	1,677	74.78%
Transportation Equipments	904	75.22%
Precision Instruments	322	82.61%
Other Products	482	70.95%
Land Transportation	580	89.14%
Warehousing & Harbor Transportation Services	350	80.86%
Information & Communication	674	83.23%
Wholesale Trade	1,417	76.64%
Retail Trade	525	77.52%
Real Estate	317	66.88%
Services	599	78.80%
Total	14,985	77.16%

Table 5 Comparison between Big Ns and Non-Big Ns' Client Companies

		BigN	lnASSET	LOSS	LIAB	ATURN	CURR	ROA	DOCF	lgACCR	BETA	CASH	VOLATILITY	LAGLOSS	SALESVOLATILITY	SALESGROWTH	CFOVOLATILITY	SAF2002	CONSOL
BigN's client companies	firm-years	11,562	11,562	11,562	11,562	11,562	11,562	11,562	11,562	11,562	11,562	11,562	11,562	11,562	11,562	11,562	11,562	11,562	11,562
	Mean	1	11.275	0.172	2.754	1.099	2.028	0.019	0.002	−0.007	0.838	0.125	0.102	0.180	0.088	0.033	0.034	0.933	10.863
	Std. Dev.	0	1.399	0.377	21.776	0.603	18.478	0.046	0.068	0.013	2.031	0.099	0.078	0.384	0.104	0.202	0.035	0.360	30.133
	10%	1	9.693	0	0.370	0.571	0.808	−0.021	−0.061	−0.020	0.149	0.036	0.047	0	0.016	−0.125	0.008	0.524	0
	Median	1	11.073	0	1.314	0.964	1.425	0.019	0.001	−0.007	0.757	0.101	0.088	0	0.059	0.021	0.025	0.936	0
	90%	1	13.205	1	4.747	1.758	3.110	0.062	0.068	0.007	1.581	0.242	0.166	1	0.186	0.174	0.069	1.364	28
Non-BigN's client companies	firm-years	3,423	3,423	3,423	3,423	3,423	3,423	3,423	3,423	3,423	3,423	3,423	3,423	3,423	3,423	3,423	3,423	3,423	3,423
	Mean	0	10.809	0.219	2.391	1.073	1.868	0.008	0.001	−0.007	0.861	0.137	0.114	0.234	0.099	0.025	0.038	0.832	5.198
	Std. Dev.	0	1.327	0.414	6.476	0.600	2.827	0.097	0.078	0.022	0.813	0.103	0.138	0.424	0.156	0.288	0.042	0.820	13.608
	10%	0	9.206	0	0.390	0.542	0.815	−0.033	−0.070	−0.021	0.143	0.041	0.049	0	0.017	−0.163	0.008	0.450	0
	Median	0	10.771	0	1.264	0.931	1.491	0.016	−0.002	−0.007	0.772	0.117	0.091	0	0.064	0.011	0.028	0.906	0
	90%	0	12.486	1	4.493	1.733	3.057	0.056	0.071	0.007	1.629	0.252	0.180	1	0.203	0.173	0.074	1.317	15
All samples (All client companies)	firm-years	14,985	14,985	14,985	14,985	14,985	14,985	14,985	14,985	14,985	14,985	14,985	14,985	14,985	14,985	14,985	14,985	14,985	14,985
	Mean	0.7716	11.169	0.183	2.671	1.093	1.991	0.016	0.002	−0.007	0.843	0.128	0.104	0.192	0.090	0.031	0.035	0.910	9.569
	Std. Dev.	0.4198	1.397	0.386	19.377	0.602	16.287	0.062	0.071	0.016	1.826	0.100	0.095	0.394	0.118	0.224	0.037	0.505	27.359
	10%	0	9.564	0	0.374	0.564	0.810	−0.024	−0.063	−0.020	0.148	0.037	0.047	0	0.016	−0.131	0.008	0.505	0
	Median	1	11.006	0	1.304	0.958	1.439	0.019	0.001	−0.007	0.760	0.105	0.088	0	0.060	0.019	0.026	0.928	0
	90%	1	13.067	1	4.661	1.753	3.091	0.061	0.069	0.007	1.594	0.244	0.169	1	0.189	0.173	0.070	1.354	24
t-value			16.21	−5.96	1.57	2.23	0.89	6.39	0.79	1.77	−0.99	−6.20	−4.89	−6.73	−3.99	1.39	−4.68	6.96	15.56
			***	***		**		***		*		***	***	***	***		***	***	***
z-value			15.30	−6.26	1.95	3.27	−2.45	7.52	1.62	0.93	−1.87	−8.98	−4.39	−7.08	−4.03	5.33	−4.65	5.40	10.02
			***	***	**	***	**	***			*	***	***	***	***	***	***	***	***

Table 6 Correlation Coefficient of Pearson and Spearman

	BigN	lnASSET	LOSS	LIAB	ATURN	CURR	ROA	DOCF	lgACCR	BETA	CASH	VOLATILITY	LAGLOSS	SALESVOLATILITY	SALESGROWTH	CFOVOLATILITY	SAF2002	CONSOL
BigN	1	0.125	−0.051	0.016	0.027	−0.020	0.061	0.013	0.008	0.009	−0.073	−0.036	−0.058	−0.033	0.044	−0.038	0.044	0.082
lnASSET	0.140	1	−0.113	0.120	−0.112	−0.072	0.058	0.001	−0.041	0.027	−0.192	−0.069	−0.110	−0.137	0.056	−0.214	0.019	0.191
LOSS	−0.051	−0.113	1	0.111	−0.104	−0.162	−0.669	−0.093	−0.013	0.051	−0.070	0.181	0.276	0.055	−0.287	0.071	−0.468	0.008
LIAB	0.008	0.027	0.025	1	0.171	−0.764	−0.298	0.022	0.010	0.010	−0.345	0.186	0.176	0.079	−0.055	0.014	−0.653	0.140
ATURN	0.018	−0.119	−0.072	0.011	1	−0.108	0.155	0.034	0.022	−0.021	0.039	−0.008	−0.086	0.436	0.167	0.181	0.170	−0.072
CURR	0.004	0.010	−0.021	−0.007	−0.020	1	0.340	−0.001	0.068	−0.014	0.490	−0.095	−0.142	0.008	0.071	0.098	0.530	−0.126
ROA	0.074	0.113	−0.533	−0.050	0.066	0.024	1	0.107	0.001	−0.067	0.222	−0.107	−0.332	0.069	0.408	0.013	0.688	−0.048
DOCF	0.007	−0.011	−0.068	0.005	0.034	0.007	0.056	1	0.471	−0.055	0.062	0.020	0.097	0.046	0.130	0.035	0.038	0.023
lgACCR	0.019	−0.017	−0.021	−0.012	0.054	−0.018	0.114	0.451	1	0.022	0.012	−0.016	−0.040	0.021	0.017	0.024	−0.021	0.029
BETA	−0.004	0.028	0.029	−0.026	−0.021	−0.001	−0.036	−0.028	0.008	1	0.011	0.348	0.013	0.212	0.078	0.137	−0.109	−0.179
CASH	−0.052	−0.184	−0.074	−0.041	−0.001	0.040	0.161	0.119	0.001	0.019	1	0.049	−0.041	0.135	0.056	0.176	0.299	−0.092
VOLATILITY	−0.053	−0.104	0.132	0.032	−0.016	−0.012	−0.157	0.027	−0.048	0.090	0.057	1	0.208	0.240	−0.068	0.213	−0.266	0.011
LAGLOSS	−0.058	−0.111	0.276	0.068	−0.059	0.005	−0.246	0.080	−0.070	0.011	−0.045	0.174	1	0.064	−0.120	0.085	−0.356	0.039
SALESVOLATILITY	−0.040	−0.123	0.042	0.022	0.400	−0.004	−0.020	0.064	0.009	0.052	0.191	0.142	0.050	1	0.147	0.345	0.000	−0.150
SALESGROWTH	0.014	0.012	−0.170	−0.015	0.094	−0.002	0.191	0.154	0.060	0.018	0.144	−0.019	−0.029	0.370	1	−0.037	0.210	0.116
CFOVOLATILITY	−0.042	−0.219	0.062	0.001	0.147	−0.008	−0.061	0.093	−0.059	0.049	0.236	0.152	0.081	0.333	0.068	1	−0.055	−0.146
SAF2002	0.083	0.093	−0.397	−0.082	0.089	0.032	0.795	−0.002	0.115	−0.037	0.206	−0.256	−0.294	−0.063	0.116	−0.175	1	−0.123
CONSOL	0.087	0.410	−0.007	0.032	−0.047	−0.008	−0.001	0.006	−0.021	−0.012	−0.102	−0.027	0.012	−0.064	0.029	−0.102	−0.048	1

Note: The lower left is Pearson and the upper right is Spearman correlation coefficient.

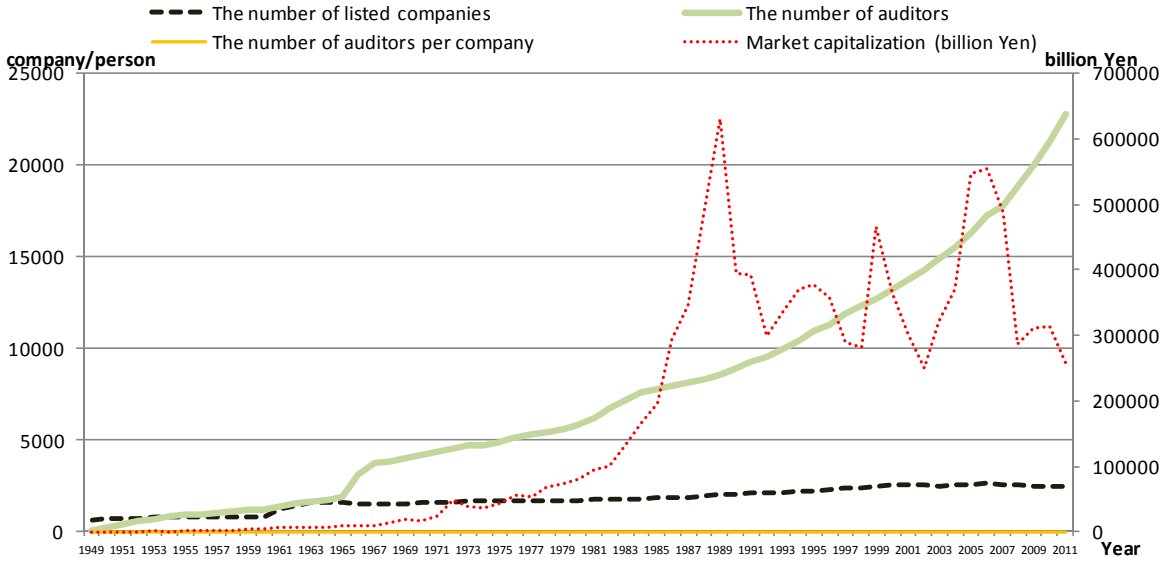
Table 7 Logistic Model Results for the Estimation of Propensity Score [Formula (1)]

	coefficien	Std. Dev.	z-vaule	
Intercept	−1.222	0.254	−4.81	***
lnASSET	0.198	0.019	10.67	***
LOSS	0.075	0.065	1.14	
LIAB	0.001	0.001	0.87	
ATURN	0.136	0.046	2.94	***
CURR	0.001	0.002	0.25	
ROA	0.301	0.613	0.49	
DOCF	0.180	0.342	0.53	
lgACCR	0.722	1.590	0.45	
BETA	−0.002	0.010	−0.15	
CASH	−1.090	0.224	−4.86	***
VOLATILITY	−0.316	0.217	−1.45	
LAGLOSS	−0.107	0.056	−1.93	*
SALESVOLATILITY	−0.509	0.208	−2.45	**
SALESGROWTH	0.091	0.104	0.87	
CFOVOLATILITY	1.436	0.629	2.28	**
SAF2002	0.370	0.081	4.57	***
CONSOL	0.008	0.002	4.45	***
iD & yD	included			
Percent Correctly Predicted	77.50%			
No. Obs	14,985			

Table 8 Results of audit quality in terms of auditor size using normal regression and IPW [Formula (3)]

	model 1: without weight (normal regression)				model 2: with weight (using estimating Bign from logistic model)			
ADA	coefficient	Std. Dev.	t-value		coefficient	Std. Dev.	t-value	
Intercept	0.0346	0.0006	57.40	***	0.0312	0.0006	52.93	***
BigN	-0.0031	0.0007	-4.45	***	-0.0002	0.0007	-0.26	
No. Obs		14,985				14,985		
BENCHMARK								
Intercept	-0.9845	0.0257	-38.37	***	-0.9889	0.0277	-35.76	***
BigN	-0.0060	0.0292	-0.21		-0.0010	0.0310	-0.03	
No. Obs		14,985				14,985		
GCREPORT								
Intercept	-1.8998	0.0473	-40.13	***	-2.1757	0.0458	-47.46	***
BigN	-0.4784	0.0619	-7.73	***	-0.1377	0.0617	-2.23	**
No. Obs		12,661				12,661		
RPEG								
Intercept	0.1545	0.0049	31.77	***	0.1531	0.0146	10.50	***
BigN	-0.0065	0.0055	-1.18		-0.0022	0.0147	-0.15	
No. Obs		6,190				6,190		
ACCY								
Intercept	-0.1033	0.0061	-16.84	***	-0.0952	0.0168	-5.65	***
BigN	0.0366	0.0069	5.28	***	0.0236	0.0170	1.39	
No. Obs		11,956				11,956		

Figure 1 The Historical Situation of the Japanese Audit Market



Note: The following companies listed in the Japanese stock exchange are included: Tokyo, Osaka, Nagoya, Sapporo, Niigata, Kyoto, Hiroshima, and Fukuoka. A double listed company is counted as one. The stocks of emerging markets in Japan, such as Mothers, Hercules, and the JASDAQ, are excluded.

Source: Tokyo Stock Exchange Fact Book 2012.

Figure 2 History of the Transition of Audit Firms in Japan