# Japanese Stock Market Reaction to the Announcements of News Affecting Auditors' Reputation: The Case of Olympus Fraud

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**ABSTRACT**

*Revelation of accounting fraud in Olympus Corporation gave rise to Olympus' shareholders' allegation of audit failure against Olympus auditors — Ernst & Young ShinNihon LLC and KPMG AZSA LLC in 2011. However, there is currently no literature investigating the effect of news announcements on Olympus auditors' reputation. In this study, we investigate whether auditors' affiliation with Olympus contributes to divergent perception of audit quality in the events of news announcements affecting reputation of Olympus auditors. First, we use nonparametric generalized rank event study methodology on 810 sample firms of the First Section of Tokyo Stock Exchange (TOPIX) to observe whether investors' perception of audit quality as proxied by abnormal returns are observed on events affecting Olympus auditors' reputation. Second, we perform linear regression on firms' abnormal return after controlling for confounding variables. We found that Japanese investors do not respond to negative or neutral reputational information arising from news announcements concerning Olympus auditors for firms with and without affiliation to Olympus auditors. Based on these results, we conclude that Japanese investors do not regard news announcements affecting Olympus auditors' reputation as convincing evidence to change their expectation on reputation of audit firms affiliated with Olympus fraud.*

## 1. Introduction

Accounting fraud perpetrated by Olympus management in 2011 provides a unique opportunity for assessing the impact of news announcements surrounding potential involvement of Olympus auditors on their reputation. During investigation of the fraud in last quarter of 2011, Olympus shareholders request independent investigation to confirm whether Olympus independent auditors (Ernst & Young ShinNihon LLC and KPMG AZSA LLC; hereafter referred to as E&Y and KPMG respectively) are legally responsible for the fraud (Olympus, 2011a). Their request suggests that investors believe that Olympus auditors have failed to fulfill their duty in issuing proper audit opinion on Olympus financial statements. This case illustrates another instance of audit failure, which can be defined as a circumstance when an auditor fails to issue a modified or qualified audit report in the appropriate circumstances (Francis, 2004). Inverse relationship which exists between the extent of audit failure and audit quality signals investors that audit quality performed by Olympus auditors is below expectation. As auditors' reputation is the function of audit quality, the release of new information that signals change to expected audit quality contributes to adjustment in auditors' economic value.

Relationship between audit quality and its economic value is generally described by two competing hypotheses in accounting literature: the insurance hypothesis and the reputation hypothesis. Insurance hypothesis assumes that the main role of auditors is for taking responsibility in case of investor suffering loss from management misrepresentation of financial statements. However, reputation hypothesis denotes that auditors derive value from providing reliable assurance services by certifying the reasonability of management's assertion of financial information presented to stakeholders.

The validity of insurance hypothesis is less justifiable compared to reputation hypothesis due to specific characteristics of Japanese corporate setting which provides better relevance for testing reputation hypothesis. Japan is categorized as a low-litigation country where shareholders and other third parties have had difficulties winning lawsuits against auditors (Numata & Takeda, 2010). Consequently, the possibility for Japanese shareholders to successfully indict auditors and demand compensation for negligence in performing financial statements audit in case of management fraud is low. We argue that events surrounding announcement of Olympus fraud provide an opportunities to test whether publication of news affecting auditors' reputation has an observable impact on share price of other Japanese public firms audited by the auditors affiliated with Olympus.

This study will provide additional empirical evidence on the impact of press release to clients audited by auditors alleged to be involved in corporate fraud in Japanese capital market. To the best of our knowledge, this paper represents the first attempt to detect the effect of potential auditors' reputation loss resulting from publication of news surrounding the Olympus fraud.

## 2. Literature Review and Hypotheses Development

### *2.1. Auditor Reputation and Value of Audit*

The provision of external audit by professional auditors has a long history as a provider of valuable service for their clients. External auditors represent an essential element of network together with management, internal auditors and audit committee who are collectively responsible for ensuring accurate representation of management assertion (Kueppers & Sullivan, 2010). The argument for the inherent value of audit to its client precedes the statutory requirements to report audited financial reports for government agencies. Prior research provides evidence of voluntary audit by British merchant guilds since the beginning of 13th century and proliferated during the establishment of joint stock companies in Europe during 16th century (Watts & Zimmerman, 1983). Owing to the absence of any statutory requirements, auditors' service has been employed as an efficient means for maintaining the enforcement of contractual agreement between management and shareholders. In this setting, success of audit firms largely depends on maintaining their reputation as providers of providing high quality

audit. This argument maintains that auditors' reputation represents the main source of value in audit service.

Alternative rationale for the value proposition of audit service is provided by Menon & Williams (1994), who provided empirical evidence on the validity of "deep pocket or insurance" hypothesis. Their research found that negative market reaction from auditors' client was observed during the dissolution of their auditors due to litigation charge, while no positive stock price recovery is observed during the appointment of new auditors. This evidence leads Menon & Williams to conclude that the value of audit service is mainly derived from auditors' role of providing their clients with additional buffer against litigation claim in the event of clients' business failure. In that case, auditors were frequently viewed as a party with a "deep pocket" able to absorb the litigation charge.

Both of these reputation and insurance hypotheses attempt to provide plausible explanations on the value of audit and the market reaction following the failure of auditors to uphold those ideal. However, considerable overlap in explaining the market reaction resulting from loss of audit value observed in previous empirical studies makes it difficult to clearly differentiate which hypothesis is explaining the true causal factor of the market reaction (Ball, 2009). In certain circumstances however, preferential treatment between reputation and insurance hypotheses is preferable. Piot (2005) investigated the determinants of auditors' reputation in three distinct capital market and legal framework: Canada, France, and Germany. Piot concluded that evidence of insurance hypothesis is more evident in Canada (higher risk litigation environment) and France (higher shareholder-debt holder conflict potential) when compared to Germany where there is a maximum legal cap on the litigation against auditor.

In their research on market reaction resulting from KPMG-ComROAD AG scandal; Weber, Willenborg, & Zhang (2008) applied reputation hypothesis rationale to conclude that there is evidence for abnormal negative return on KPMG clients following disclosure of the event. Japan shares many similar features with Germany regarding legal environment on auditor litigation. Shareholders plaintiffs in Japan are generally characterized by low win percentage, few settlements of lawsuits, low monetary amount of settlements, and low correlation between stock price and law suits (West, 2001). Since our paper discusses the impact of Olympus fraud in Japanese capital market environment, we consider reputation hypothesis as the most suitable explanatory factor in analyzing the effect of audits failure in Olympus fraud.

### *2.2. Audit Failure and Fraud Detection*

Although financial statements audit is not specifically designed to detect fraud, investors nevertheless expect auditors to protect their investments from management fraud. The widening expectation gap between auditors and investors mainly results from the failure of auditors to

design audit program that properly identify high-risk areas of fraud and modify audit procedures in light of those risks (Hogan, Rezaee, Riley, & Velury, 2008). Investors need to rely on an independent third party opinion on the fairness of financial statements; a responsibility which is fulfilled by mandating independent audit for all publicly listed companies.

If auditors fail to conduct proper audit by releasing unqualified opinion for fraudulent financial reports; their reputation will suffer. Francis (2004) classified audit failure into two main categories: failure to detect the misuse or neglect of GAAP by clients (GAAP failure) and auditor failure to issue timely qualified or modified audit report in proper situation expected by the users of those audit report (audit report failure). Empirical research on audit failure occurred in US capital market from 1980 to 2004 suggested that the occurrence of audit failures is less than 1% of total annual financial report filings (Francis, 2004). However, audit failure caused by fraud invites greater concern since clients are able to systematically misrepresent financial statements to investors and deliberately withhold key information to keep auditors in the dark. Consequently, the inability of Olympus' auditors to expose Olympus accounting fraud provides a rationale for investors to downgrade the financial statements' quality of firms audited by Olympus' auditors and degrade auditors' reputation. Both of those factors will cause negative stock price pressure for firms whose auditors are affiliated with Olympus.

### *2.3. Influence of News Announcement and Press Coverage*

Efficient market hypothesis indicates that share price should only responsive to new information released to public. However, no new-news contents of news publication can results in more significant share price reaction and industry spillover effect compared to the release of the original news which was published earlier (Huberman & Regev, 2001). Huberman shows that the act of publishing news without any new-news content could result in market reaction. This finding represents an anomaly in the efficient market hypothesis.

Market also has asymmetric response depending on whether the news contains good or bad news. Chan (2003) argues that stock price of firms exposed to bad news exhibits stronger drift behavior (slow stock price reaction) compared to stocks that experienced good news show. Chan attributes the drift behavior to investors' biased self-attribution in which investors are overconfident in their own information while dismissing public information.

Among various sources of capital market information providers, press plays an important role in disseminating new information to capital market by performing original investigative articles. Journalists are in good position to expose high profile corporate fraud due high reputational incentives (Dyck, Morse, & Zingales, 2010). The propensity for press to publish investigative articles on firms committing accounting fraud are directly related to the degree of public

visibility that the article will produce (Miller, 2006). Consequently, corporate fraud case with significant magnitude or social cost has more likely chance to get covered in press.

Business media who regularly publish investigative articles on potential fraud case generally have access to relevant information from other external sources (analysts, short sellers, or key employees) and can confirm the validity of the information (Dyck et al., 2010). Since those media are also exposed to risk of losing their reputation by publishing false positive information; media generally only publish articles that they are certain to reflect the facts. Aman (2013) demonstrated that publication of original news by media in Japanese market is more likely to induce stock price jump.

### *2.4. Capital Market Reaction on Auditors Reputation Loss*

Theoretical framework for informational value of securities prices is formalized in the efficient market hypothesis (Fama, 1970). In his study of existing empirical literature on efficient market model, Fama conceptualized three forms of tests for efficient market hypothesis that reflects different assumptions for information in influencing securities prices. Subsequent research however has provided evidence of investor irrationality that challenged the informational value of securities prices in efficient market hypothesis. Dreman & Lufkin (2000) investigated investor overreaction on stocks in their relation with fundamental variables of business growth. They found that changes in growth fundamentals do not account to stock market return differences between stocks with best and worst fundamentals.

Langevoort (1997) argues that market demand of constant high earnings put high pressures for managers to employ aggressive accounting and distort disclosures. When the companies present truthful but negative earnings results, inherently optimistic market expectation results in excessive negative market reaction. Investor overreaction on publication of adverse news is also observed in the substantial negative price reaction after auditors disclose going concern opinion that is followed by reverse positive price changes that offset the majority of prior loss (Schaub, 2006).

Investors' reaction in response to adverse news related to auditors performance and opinions have been widely documented. In particular, auditors' inspection by capital market regulators usually triggers negative investor reaction. Auditors report investigation by U.K. Department of Trade negatively affect auditors' reputation in providing high quality service that in turn negatively impact their clients market value and loss of audit clients and fee (Firth, 1990). When California State Board of Accountancy threatened to revoke Ernst & Young (E&Y) practice license due to possibility of audit failure however, E&Y clients only exhibit moderate negative reaction following the event (Pacini & Hillison, 2003). Public announcement of Public Company Accounting Oversight Board (PCAOB) financial penalty against Deloitte audit failure

of Ligand also resulted in negative market reaction to Deloitte clients, where financially distressed clients are more susceptible to the negative news (Dee, Lulseged, & Zhang, 2011).

Observation of market response following publication of non-standard audit opinion is another method for explaining the informational value of audits. Soltani (2000) analyzed qualified audit reports on French public companies from 1986-1995 and concluded that the evidence suggests significant negative abnormal return around the announcement of audit report. Inclusion of going concern modification in audit report can also trigger unfavorable investor reaction. Herbohn, Ragunathan, & Garsden (2007) observed substantial negative market reaction prior to the announcement of going concern modification. This evidence suggests that audit report fulfill the role of attesting previously available information rather than signaling the availability of new information.

Negative rumors on auditors circulating in capital market also play an important role in shaping investors expectation on auditors' reputation and audit quality. Hillison & Pacini (2004) investigated stock price effect on audit clients following rumor on bankruptcy litigation facing Ernst and Young in late 2000 and subsequent effort to restore credibility by self-advertising. They reported evidence that investors reacted negatively after the release of adverse information and self-advertising fails to restore investor confidence. Linthicum, Reitenga, & Sanchez (2010) also showed that social responsibility measures performed by Arthur Andersen clients during the uncovering of Enron fraud do not mitigate the negative market response. Instead, good corporate governance measures better mitigate the negative impact of adverse rumors. Following the negative reaction on Elan aggressive accounting practice in Wall Street Journal, the number of independent boards of directors in Ireland companies is positively related with the companies' ability to mitigate the contagious effect of negative news on their stock return (Donnelly, 2008).

Accounting restatements can also be considered as attempts from managements to voluntary amend and disclose their historically inappropriate application of accounting standards. There are evidence of negative return and changes of stocks' return residual in the event of accounting restatement (Cox & Weirich, 2002). Furthermore, company size is considered to contribute more to the probability of accounting restatements compared with the choice of auditors (Eisenberg & Macey, 2004). Their finding suggests that there is no notable difference of audit quality among auditors. Restatements that results in loss of stock value can also affect other non-restating firms in the same industry (peer companies). Gleason, Jenkins, & Johnson (2008) concluded that accounting restatement of large companies causes investor/analyst to scrutinize the reliability of peer companies' financial statements that might results in the decrease of their confidence in audited financial statements. In addition, they observed that companies with high

accrual, low operating cash flow and high capital market pressure are more vulnerable to the negative contagious effect.

Enron accounting fraud and the subsequent failure of Arthur Andersen (AA) have prompted many researchers to investigate market reaction in the event of auditor failure. Multiple research papers observed the evidence of negative market reaction particularly on Andersen clients audited by Houston office (Chaney & Philipich, 2002; Huang & Li, 2009); adverse contagious effect to peer firms (Akhigbe, Madura, & Martin, 2005); negative reaction to Andersen clients' secondary equity offering (Rauterkus & Song, 2005) and susceptibility of companies with higher information ambiguity to the adverse news of Andersen failure (Autore, Billingsley, & Schneller, 2009). Other research studied the auditor switch timing of Andersen clients following the investigation of the fraud. The evidence suggests that clients with more visibility in capital market are more likely to switch sooner to other Big 5 auditors (Barton, 2005) and investors react positively for clients that switch auditors earlier (Krishnamurthy, Zhou, & Zhou, 2006). Further study suggests that clients with stronger corporate governance are more likely to switch auditor earlier and public disclosure of auditors switching lead to positive investors reaction (Asthana, Balsam, & Krishnan, 2010).

In addition, several researchers indicated evidence of absence of market reaction in the event of auditors' reputation decline. Arthur Andersen failure did not trigger negative market reaction on their clients in Spain despite their audit market share dominance (Barbera & Martinez, 2006). After controlling for global macroeconomic confounding factor and industrial structure of AA clients; Nelson, Price, & Rountree (2008) demonstrated that there is no sufficient evidence to support the influence of auditors' reputation loss on the negative market reaction. Contrary to negative stock return observed in AA clients, AA nonprofit clients did not experience negative change in their income despite the perceived importance of auditors reputation in securing donation (Harris & Krishnan, 2012).

The profession of independent Certified Public Accountant (CPA) in Japan was first introduced after the end of World War II (Jinnai, 1990). Consequently, professional and independent character of Japanese CPA profession has not reached the same level of sophistication compared to their Western counterparts. Dual accounting regulation that is derived from both Securities and Exchange Law and Commercial Code often results in conflict of interest and complicated bureaucracy that weakens enforcement of capital market regulations (Oguri & Hara, 1990). Japanese capital market itself is characterized by the absence of litigation risk against auditor even in case of corporate failure (Sakagami, Yoshimi, & Okano, 1999). The combination of these institutional and legal complexities further limits the explanatory power of insurance hypothesis in explaining investors' reaction in Japanese capital market. Following this rationale, Numata & Takeda (2010) investigate Japanese investors market price reaction due to

loss of ChuoAoyama PricewaterhouseCoopers reputation during Kanebo scandal using reputation hypothesis. They concluded that the negative market reaction results from perceived low audit quality following their failure to prevent or detect Kanebo fraudulent accounting.

### *2.5. Chronological Summary of Olympus Fraud*

On October 14, 2011, Japanese business world was shocked with the sudden dismissal of Olympus CEO, Michael C. Woodford. Even as Olympus cited the problem of incompatible management style as the reason of Woodford dismissal (Kyodo News Service, 2011a), this unexpected news is negatively responded by investor, as evidenced by the loss of the company's stock by 24% at the next trading day (Kyodo News Service, 2011b). The ensuing days revealed more light on much deeper problem behind the Olympus corporate governance, as Woodford questioned the rationality of acquisitions moves done in 2008 and regarded his removal due to his critical inquiry on the issue. After only one week after the event, Olympus stock value has decreased around 50% from 2,482 yen on October 13, the day before Woodford's dismissal to 1,231 yen (Kyodo News Service, 2011c).

Olympus utilized *tobashi* (improper transfer of losses) to hide losses from its investment in financial assets when the bubble economy burst in 1990. Using specified money trusts and specified fund trusts (*tokkin*) to recover their losses, the amount of unrealized investment loss as of 1995 has grown to tens of billions of yen (Third Party Committee, 2011). However, revision in Japanese accounting standard No. 10 "Accounting Standards for Financial Products" which is effective in fiscal year 2000 requires major financial assets to be marked at fair value. Consequently, accounting scheme to hide unrealized losses that occurred in the bubble economy period through *tobashi* to fund trust accounts and non-consolidation of affiliates will no longer be viable (Yamazaki, 1999).

In order to avoid recognizing unrealized valuation losses on financial assets which have grown to 95 billion yen in 1998, Olympus executives arranged the establishment of "receiver funds" entities in Cayman Islands that would not be consolidated with Olympus (Third Party Committee, 2011). The "receiver funds" were then financed by financial institutions using bonds owned by Olympus as collateral. Those entities then purchased financial instruments with unrealized losses from Olympus through the *tokkin* at book value. Since the purchase price is equal to the total unrealized losses of those instruments, Olympus does not record losses from those transactions.

However, the financial assets kept in "receiver funds" have to be eventually repaid. Using acquisition transactions as a cover up, Olympus paid the "receiver funds" a huge amount of consulting fees resulting from corporate acquisitions which will be recognized as goodwill. KPMG was the designated independent auditor of Olympus from fiscal year ending in March

2003 to March 2009, until E&Y replaced KPMG from fiscal year March 2010. Investigation report published by Olympus in December 2011 acknowledged that although both auditors were involved in approving the fraudulent transactions, Olympus management was able to withhold essential information from auditors, preventing them to raise any red flag.

### *2.6. Problem Statements & Hypotheses Development*

In the event of audit failure, public expect that audit report produced by auditors associated with audit failure will provide lower level of assurance to the users of financial statements. Consequently, clients of auditors with history of audit failure are more likely to overstate their earnings and book values without being identified by auditor (Chaney & Philipich, 2002). The extent of auditors' reputation loss caused by the exposure of financial statements fraud are expected to be more severe for clients of alleged firms as financial statements audited by them are more likely to be subjected for stricter scrutiny by investors and analysts.

Accordingly, the revelation of Olympus fraud which was started by circulation of media rumor from the middle of 2011 and ended by publication of official investigation report in the beginning of 2012 provides a unique opportunity to investigate change of Olympus auditors' reputation in Japanese stock market and its market effect on other public companies audited by auditors associated with Olympus.

The purpose of this study was to identify market reaction of clients of auditors whose reputation is affected by publication of news that imply their active role on Olympus fraud. This paper investigates the market effect of key events surrounding news announcements with potential adverse auditors' reputational effect for clients of accounting firms associated with Olympus. We examine whether Japanese public companies audited by E&Y and KPMG are affected by the announcement of news and whether the extent of the market reaction are more severe for clients audited by audit firms associated with Olympus compared to clients audited by auditors not affiliated with Olympus.

We proposed the following hypotheses in alternative forms:

*H1: Abnormal share returns of publicly listed clients of auditors associated with Olympus (E&Y and KPMG) have direct relation to news publication affecting reputation of auditors associated with Olympus.*

*H2: The extent of market reaction observed during the news publication affecting reputation of auditors associated with Olympus (E&Y and KPMG) is more pronounced compared to other firms whose auditor is not associated with Olympus.*

## 3. Methodology and Data

### *3.1. Determination of Event Days and Samples*

In this section, we assess whether news announcements which negatively affects reputation of auditors associated with Olympus fraud generates negative reaction from clients of alleged audit firms. As shown in Table 1, we determined six events that have the largest possibility to alter the investors' perception on reputation of Olympus auditors. The event date ($t_0$) is based on the date when news were made available to public. We investigate whether abnormal investors' reaction on clients of auditors alleged to be involved in the fraud was observed around these events.

Out of six events identified, the first two events (Event 1 and Event 2) cover the initial publicity of suspicious acquisitions transactions by a Japanese financial magazine, FACTA, prior to the start of official investigations by Olympus. The rest of the events (Events 3, 4, 5 and 6) cover the announcement date of official press releases published by Olympus and investigation reports results from independent committees commissioned by Olympus to investigate the fraud case. Event 1 to Event 5 covers news publication that contains negative implication on reputation of Olympus auditors; while Event 6 has a neutral implication on their reputation.

Event 1 included the earliest public press publication that raised doubt on the fairness of Olympus acquisition on Gyrus in 2008 (Abe, 2011a). Although the article did not contain direct reference of potential involvement of Olympus auditors on the acquisition, we argue that investors might react to such information. Event 2 involved a publication of follow up article from FACTA that reported no official response from Olympus regarding FACTA's initial inquiry in July 2011 (Abe, 2011b). We assume that Event 2 will gave rise to negative perception on Olympus auditors' audit quality if investors associate the non-reply from Olympus as indication of inappropriate transaction.

Event 3 covered the period where Olympus published official press release in response of media report that reported the reason why Olympus changed auditor in fiscal year 2010 from KPMG to E&Y is due to KPMG withdrawal from auditing Gyrus, a subsidiary alleged to be involved in improper acquisition transaction (Olympus, 2011b). Instead, Olympus stated that the motivation for the change in auditor is reasonable as KPMG's audit contract has expired and KPMG reported unqualified audit opinion for fiscal year 2009 consolidated financial statements. We argue that this press release was announced in response to FACTA inquiries in Event 1 and 2 and we will investigate whether Olympus response generates investors' reaction.

Event 4 covered the announcement of Olympus shareholders' request to investigate whether Olympus independent audit firms since 1999 (KPMG and E&Y) were negligent on their duties of care owed to report to the board of auditors (Olympus, 2011a). If such breach of duties exists, Olympus will be required to file legal action against those audit firms for such breach of negligence. In response of this request, Olympus commissioned Non-Director Management Liability Investigation Committee to issue a report that was published in January 2012 to investigate parties that can be held legally responsible for the fraud (Event 6). On further note, this is the first occasion where Olympus press release explicitly mentioned independent auditors as potential suspects who took part in the fraud.

On December 6, 2011, Third Party Committee released results of its investigations on inappropriate acquisitions transactions (Event 5). The report contained chronological summary of transaction schemes, institutions, and individuals involved in hiding deferral losses and implementation of the acquisition transactions. Specifically, the report documented Olympus independent auditors' rationale and opinion on accounting treatments for transactions schemes designed by Olympus executives and their role in Olympus internal control and corporate governance system (Third Party Committee, 2011). However, there is no any reference to legal responsibility directed to any parties as this is not the objective of the report. Event 1 to event 5 summarizes news announcements with negative reputational effect on Olympus auditors.

Event 6 covered the release date of Non-Director Management Liability Investigation Committee Investigation Report whose objective is to assess the possibility for Olympus to file legal suit to pursue liability against non-director parties involved in the fraud. In relation to the involvements of Olympus independent auditors, the report investigated whether violations of duty of care exist and whether auditor succession from KPMG to E&Y in 2010 and E&Y decision to accept accounting treatment of goodwill are appropriate ((Non-Director Management Liability Investigation Committee, 2012). The report concludes that both Olympus audit firms were not held legally liable for the fraud. Event 6 represents news announcement with neutral reputational effect on Olympus auditors.

*Table 1*
*News Announcements Affecting Olympus Auditors' Reputation*

| | | |
|---|---|---|
| **Publication Date of FACTA Articles on Olympus Fraud** | | |
| Event 1 | Jul. 15, 2011 | FACTA, a Japanese financial magazine, published an article questioning suspicious M&A activities in Olympus. |
| Event 2 | Sep. 15, 2011 | FACTA published a second article reporting no response from Olympus regarding FACTA's initial inquiry and investigation on Olympus' suspicious acquisitions in July. |
| **Official Olympus Press Releases and Investigation Reports** | | |
| Event 3 | Oct. 24, 2011 | Olympus released press release denied that the reason for auditor change is due to KPMG's withdrawal to audit subsidiary of Olympus. |
| Event 4 | Nov. 25, 2011 | Olympus received requests from its shareholders to investigate whether Olympus independent auditors (KPMG and E&Y) were negligent in their duty. |
| Event 5 | Dec. 6, 2011 | Investigation report was issued by Olympus Third Party Committee that |

| | | |
|---|---|---|
| | | mentioned potential role of Olympus audit firms in the fraud. |
| Event 6 | Jan. 17, 2012 | Olympus Corporation Non-Director Management Liability Investigation Committee Investigation Report was released. It concluded that no legal liability will be charged against Olympus independent auditors. |

We sample all firms listed in the First Section of the Tokyo Stock Exchange (TOPIX) during the period of observed events. Stock information, industry classification and financial variables data were obtained from fiscal year 2011 Japanese securities filings information (*Yukashoken-Hokokusho*) extracted from NEEDS (Nikkei Economic Electronic Database Systems) FinancialQuest database. From 1,751 firms that were initially sampled, we adjusted final samples by excluding firms with missing stock price and financial variables and firms with qualified or disclaimer audit opinion, finance and insurance companies, and firms who changed auditors between fiscal year 2010 and 2011 to control for audit quality variability due to auditor change in initial years of audit. Description of the samples selection process and auditors distribution of final samples is provided in Table 2.

*Table 2*
*Samples Selection*

| | |
|---|---|
| Firms listed on First Section of TOPIX in 2011 (excluding Olympus) | 1,751 |
| Less: Missing data or firms with qualified or disclaimer audit opinion | 512 |
| Firms that change auditor between fiscal year 2010 and 2011 | 309 |
| Finance and insurance companies | 120 |
| Final samples | 810 |
| | |
| Distribution of final samples categorized by auditors | |
| ShinNihon (E&Y) | 323 |
| AZSA (KPMG) | 12 |
| Tohmatsu (Deloitte) | 251 |
| Aarata (PwC) | 39 |
| Non Big-4 | 185 |
| Final samples | 810 |

### *3.2. Event Study Methodology*

We employ nonparametric generalized rank (GRANK) test methodology for multiple event windows (Kolari & Pynnonen, 2011) to evaluate whether abnormal price reaction are observed with events associated with news with information content related to Olympus auditors' reputation as described in Hypothesis 1. This test procedure improves on nonparametric rank testing approach of Corrado (1989) and Corrado & Zivney (1992), where the GRANK test is able to measure cumulative abnormal returns (CAR) on multiple days.

This study utilizes daily stock and excess return for an individual security which exhibits substantial departures from normality that are not observed with monthly data (Brown & Warner, 1985). Therefore, distribution free characteristic of nonparametric GRANK test procedure makes it less sensitive to distributional assumption of parametric tests (Kolari & Pynnonen, 2011). Kolari & Pynnonen (2011) demonstrated that empirical properties of GRANK test is better compared to popular parametric tests (e.g., ordinary t-test, Patell (1976) t-test, and

Boehmer, Masumeci, & Poulsen (1991) t-test) as well as existing nonparametric rank tests (e.g., Corrado & Zivney (1992) rank test and cumulated ranks test of Cowan (1992) and Campbell & Wesley (1993)). GRANK test also exhibits robustness to event-induced cross-sectional volatility, autocorrelation of abnormal returns, and cross-correlation caused by event day clustering (Kolari & Pynnonen, 2011).

The accuracy of event study's findings are highly dependent on the existence of any confounding events (e.g., a simultaneous dividend and earnings announcement) which concur with the events of interest to the researcher (Kothari, 2001). The importance to isolate confounding events is demonstrated by Nelson et al. (2008) who challenge results of Chaney & Philipich (2002) and Krishnamurthy et al. (2006) research that attribute the negative market reaction of Andersen clients to Andersen's reputation decline. Nelson et al. (2008) argue that abnormal negative returns are mainly observed in firms from technology sector negatively affected by sharp decline in oil price around the Andersen event. Those firms form a disproportionate share of Andersen clients compared to other Big 5 firms which contributed to higher degree of negative returns for Andersen clients.

In order to control for adverse news announced during the event window which could disproportionately affect sample firms from different industry sectors; we examined news announcement around event window from Wall Street Journals, Financial Times, New York Times, Nikkei Business, Yomiuri Shinbun, and Japan Times extracted from LexisNexis database. From our observations, we did not identify global macroeconomic news during the event window that could disproportionately result in systematic return differences across different industries.

If an event is unanticipated by market and incomplete prior information exists, abnormal return observed during the event measures shareholders' reaction on the impact of the events (Brown & Warner, 1980). This observation is consistent with market efficiency hypothesis. We denote the event day as $t_0$, the initial date of the event window as $t_1$, and the final date of the event window as $t_2$. We select four event windows ($t_1$, $t_2$) = (0,1), (0,2), (0,3), and (−1,3) in order to guarantee robust measure of price reaction (Numata & Takeda, 2010). CAR that covers multiple days window are calculated to capture price effects of announcements which occur after the stock market closes on the announcement day. Price reaction 1 day prior to event is also included to observe possibilities of information leaked prior to event day (MacKinlay, 1997). The estimation window is set at 250 trading days before the event window of the first event.

We use Fama-French 3 factors models rather than market model to estimate abnormal return because 3 stock market factors (overall market, firm size and book-to-market equity) factors can explain the differences in common variation and cross section of average stock returns (Fama & French, 1993). Since the purpose of event studies is to isolate incremental impact of an event on

security price performance; Fama-French 3 factors model is more capable of isolating performance associated with the event from those 3 known factors of performance determinants (Kothari & Warner, 2007). From statistical power perspective, multifactor model reduces variance of the abnormal return by explaining more variation in the normal return (MacKinlay, 1997). Using returns data from this study, we found that $R^2$ value of expected return estimated by Fama-French 3 factors model is higher than market model.

Expected returns for each sampled firms using the following Fama-French 3 factors returns model as illustrated in Equation (1) (Fama & French, 1996) [1]. Stock and market returns data used to estimate Fama-French model are transformed into their natural logarithm value.

$$R_{i,t} - R_{f,t} = \alpha + \beta_{i,m}\left(R_{m,t} - R_{f,t}\right) + \beta_{i,smb}SMB_t + \beta_{i,hml}HML_t + u_{,t} \quad (1)$$

Excess (abnormal) return is then estimated using the following equation:

$$AR_{i,t} = (R_{i,t} - R_{f,t}) - [\alpha + \beta_{i,m}\left(R_{m,t} - R_{f,t}\right) + \beta_{i,smb}SMB_t + \beta_{i,hml}HML_t] \quad (2)$$

where:

| | |
|---|---|
| $R_{i,t}$ | stock daily return |
| $R_{f,t}$ | market risk-free rate |
| $R_{m,t} - R_{f,t}$ | stock excess return on a broad market portfolio (TOPIX) |
| $SMB$ | the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (SMB, small minus big) |
| $HML$ | the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (HML, high minus low) |
| $AR_{i,t}$ | estimated abnormal return |

We then calculated standardized abnormal return (SAR) for each stock over estimation window:

$$SAR_{it} = \frac{AR_{it}}{S_{AR_i}} \quad (3)$$

where $S_{AR_i}$ is the standard deviation of the regression prediction errors in abnormal returns defined in (MacKinlay, 1997).

Cumulative abnormal return (CAR) and standardized abnormal return (SCAR) are computed for each stock in event window:

$$CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{i,t} \quad (4)$$

$$SCAR_{i,(t_1,t_2)} = \frac{CAR_i(t_1, t_2)}{S_{CAR_i(t_1,t_2)}} \quad (5)$$

where $S_{CAR_i(t_1,t_2)}$ is the standard deviation of prediction errors in cumulative abnormal returns as defined in (MacKinlay, 1997).

[1] Fama-French factors data for Japan stock market are obtained from Prof. French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html). Monthly return value of Fama-French factors is then adjusted to daily return.

Next, we compute re-standardized SCAR (SCAR*) to account for possible event-induced volatility (Boehmer et al., 1991):

$$SCAR_i^* = \frac{SCAR_{i,(t_1,t_2)}}{S_{SCAR_{(t_1,t_2)}}} \tag{6}$$

where

$$S_{SCAR_{(t_1,t_2)}} = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(SCAR_{i,(t_1,t_2)} - \overline{SCAR_{(t_1,t_2)}})^2} \tag{7}$$

is cross-sectional standard deviation of $SCAR_i$.

The generalized standardized abnormal return (GSAR) is computed as:

$$GSAR_{it} = \begin{cases} SCAR_i^*, \ for\ CAR\ window\ (t_1, t_2) \\ SAR_{it}, \ for\ other\ time\ period \end{cases} \tag{8}$$

where $SCAR_i^*$ is defined in Equation (6), and $SAR_{it}$ is defined in Equation (3).

The demeaned standardized abnormal ranks of the GSAR are then calculated following the following formula:

$$U_{it} = \frac{Rank(GSAR_{it})}{(T+1)} - 1/2 \tag{9}$$

where T is equal to length of estimation period (250 days) plus 1 CAR event day which represents total number of observation.

Given the null hypothesis of no mean event effect:
$H_0: \mu_{(t_1,t_2)} = 0$

where $\mu_{(t_1,t_2)}$ is the expected value of the CAR over the period of event window $(t_1, t_2)$.

The generalized rank t-statistic (GRANK-T) for testing $H_0$ is defined as:

$$t_{grank} = Z\left(\frac{T-2}{T-1-Z^2}\right)^{\frac{1}{2}} \tag{10}$$

where $Z = \frac{\overline{U}_0}{S_{\overline{U}}}$ (11) with $\overline{U}_t = \frac{1}{n_t}\sum_{i=1}^{n_t} U_{it}$ (12)

$$S_{\overline{U}} = \sqrt{\frac{1}{T}\sum_{t\in T}\frac{n_t}{n}\overline{U}_t^2} \tag{13}$$

$n_t$ is the number of valid $GSAR_{it}$ available at time point *t*, T is the number of observations and $\overline{U}_0$ is the mean $\overline{U}_t$ at *t* = 0 (the cumulative abnormal return). Asymptotic distribution of GRANK-T follows Student t-distribution with T−2 degrees of freedom.

### *3.3. Cross-Sectional Analysis*

We perform cross-sectional analysis to analyze firms specific variables that influence mean CAR observed in six observed events. The following multivariate regression models are estimated using fixed effect model after correcting for heteroskedastic standard errors (Equation 14). Fixed effect model is utilized to control for samples heterogeneity across different industries.

$$CAR_i = \beta_1 + \beta_2 Olympus_i + \beta_3 Opinion_i + \beta_4 RoA_i + \beta_5 Assets_i + \beta_6 Leverage_i + \beta_7 FreeFloatRatio_i + \beta_8 Segments_i + \beta_9 ForeignShareholders_i + \beta_{10} OverseasSales_i + u_i \quad (14)$$

where

| | |
|---|---|
| *CAR* | mean cumulative abnormal return (%) |
| *Olympus* | dummy variable for clients audited by Olympus auditor (ShinNihon or AZSA) (1 = true, 0 = otherwise) |
| *Opinion* | dummy variable for audit opinion (1 = unqualified, 0 = unqualified with explanatory paragraph) |
| *RoA* | return on assets (net income divided by total assets (%) |
| *Assets* | natural logarithm of total assets |
| *Leverage* | total liabilities divided by total assets (%) |
| *FreeFloatRatio* | ratio of listed shares available for trading in the market (number of floating shares divided by total number of shares owned by shareholders) (%) |
| *Segments* | number of distinct divisions for which shares of total sales are reported |
| *ForeignShareholders* | ratio of listed shares owned by foreign corporations (number of shares owned by foreign corporations divided by total number of shares owned by shareholders) (%) |
| *OverseasSales* | ratio of sales outside Japan to total sales (%) |

The control variables are drawn from previous research on stock market reactions which include audit opinion, leverage, return on assets, total assets, free float ratio, ratio of foreign shareholders, overseas sales ratio, and number of segments (Numata & Takeda, 2010; Skinner & Srinivasan, 2012). Dummy variable *Olympus* is included as main independent variable for the purpose of testing Hypothesis 2. The variable takes a value of 1 if firms were audited by Olympus auditor (ShinNihon or AZSA) and 0 if otherwise. We predict that the estimated coefficients should be insignificant when there is no difference in market reaction between firms audited by Olympus auditors and firms not affiliated with Olympus auditors. Conversely, we estimate negative and significant coefficient for the variable if Olympus auditors' clients experienced more negative market reaction compared to clients of other auditors.

*Opinion* variable is a dummy variable which we use to control for difference in audit opinion. It takes a value of 1 if audit opinion for each firm in fiscal year 2011 is unqualified and 0 if the

opinion released is unqualified with explanatory paragraph. Variable *RoA* controls for profitability performance for each firms which is affected by earnings management. The next two balance sheet variables, *Assets* and *Leverage*, control for size effects and risk of debt insolvency respectively. Variable *FreeFloatRatio* controls for trading liquidity for each stock. Stocks with higher free-float ratio imply that shareholders can trade their stocks more easily compared to stocks with lower free-float ratio. In addition, we use *Segments* variable as a proxy to control firms' business operation complexity. Firms with higher number of business segments require more complex audit procedures which in turn involves the need for higher audit quality and more dependence on auditors' reputation. The last two variables, *ForeignShareholders* and *OverseasSales*, control for the degree of influence of foreign stockholders on sampled Japanese firms from the equity and income perspective respectively.

## 4. Analysis Results

### *4.1. Descriptive Statistics*

Industry distribution of samples across auditors is provided in Table 3. We classified the samples' industry distribution by auditor's affiliation to Olympus and auditor size. Firms in Group I denote sample firms audited by E&Y and KPMG who are affiliated with Olympus. On the other hand Group II consists of sample firms audited by other auditors not affiliated with Olympus which includes other Big 4 and non-Big 4 auditors.

We observe that 810 sample firms in this study are diversely distributed across 29 industries. For each group of samples classified by their affiliation with Olympus, we found that there is no single industry which comprises of more than 12% of total samples. The diversified samples across industries makes the samples less susceptible to cross-industries confounding factors.

*Table 3*

*Industry Distribution Categorized by Auditors' Affiliation with Olympus*

| **Industry** | **Group I (Clients of Auditors Affiliated with Olympus)** | | **Group II (Clients of Auditors Not Affiliated with Olympus)** | |
|---|---|---|---|---|
| | Freq. | % | Freq. | % |
| Air Transportation | 1 | 0.30% | 0 | 0.00% |
| Chemicals | 38 | 11.34% | 38 | 8.00% |
| Construction | 30 | 8.96% | 18 | 3.79% |
| Electric Appliances | 30 | 8.96% | 50 | 10.53% |
| Electric Power & Gas | 2 | 0.60% | 6 | 1.26% |
| Fishery, Agriculture & Forestry | 3 | 0.90% | 1 | 0.21% |
| Foods | 11 | 3.28% | 15 | 3.16% |
| Glass & Ceramics Products | 6 | 1.79% | 8 | 1.68% |
| Information & Communication | 14 | 4.18% | 28 | 5.89% |
| Iron & Steel | 5 | 1.49% | 11 | 2.32% |
| Land Transportation | 9 | 2.69% | 9 | 1.89% |
| Machinery | 30 | 8.96% | 45 | 9.47% |
| Marine Transportation | 3 | 0.90% | 3 | 0.63% |
| Metal Products | 4 | 1.19% | 14 | 2.95% |
| Mining | 4 | 1.19% | 1 | 0.21% |
| Nonferrous Metals | 10 | 2.99% | 5 | 1.05% |
| Oil & Coal Products | 2 | 0.60% | 1 | 0.21% |
| Other Products | 5 | 1.49% | 19 | 4.00% |
| Pharmaceutical | 9 | 2.69% | 9 | 1.89% |
| Precision Instruments | 3 | 0.90% | 11 | 2.32% |
| Pulp & Paper | 4 | 1.19% | 2 | 0.42% |
| Real Estate | 10 | 2.99% | 16 | 3.37% |
| Retail Trade | 29 | 8.66% | 46 | 9.68% |
| Rubber Products | 5 | 1.49% | 1 | 0.21% |
| Services | 15 | 4.48% | 31 | 6.53% |
| Textile & Apparels | 10 | 2.99% | 9 | 1.89% |
| Transport Equipment | 14 | 4.18% | 27 | 5.68% |
| Warehousing and Harbor transportation | 3 | 0.90% | 5 | 1.05% |
| Wholesale Trade | 26 | 7.76% | 46 | 9.68% |
| | 335 | 41.36% | 475 | 58.64% |

Table 4 presents descriptive statistics for variables used for cross-sectional analysis as described in Equation 14. We classified descriptive statistics results according to sample firms' auditors name, auditors' size and auditors' affiliation to Olympus (Group I consists of clients of auditors

affiliated with Olympus (E&Y and KPMG) while Group II comprises of clients of auditors not affiliated with Olympus).

*Table 4*

*Descriptive Statistics*

| Variables | Statistics | Auditor | | | | | Auditor Size | | Auditor Affiliation with Olympus | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | E&Y | KPMG | Deloitte | PwC | Non Big-4 | Big 4 | Non Big-4 | Group I (Clients of Auditors Affiliated with Olympus) | Group II (Clients of Auditors Not Affiliated with Olympus) |
| CAR | Mean | -0.0029 | -0.0109 | -0.0058 | -0.0008 | -0.0044 | -0.0041 | -0.0044 | -0.0031 | -0.0048 |
| | Median | -0.0047 | -0.0079 | -0.0068 | 0.0004 | -0.0053 | -0.0057 | -0.0053 | -0.0049 | -0.0058 |
| | St. Deviation | 0.0154 | 0.0170 | 0.0134 | 0.0124 | 0.0129 | 0.0145 | 0.0129 | 0.0155 | 0.0132 |
| Olympus | Mean | 1 | 1 | 0 | 0 | 0 | 0.5360 | 0 | 1 | 0 |
| | Median | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| | St. Deviation | 0 | 0 | 0 | 0 | 0 | 0.4990 | 0 | 0 | 0 |
| Opinion | Mean | 0.7830 | 0.9170 | 0.8650 | 0.6920 | 0.6970 | 0.8130 | 0.6970 | 0.7880 | 0.7850 |
| | Median | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | St. Deviation | 0.4130 | 0.2890 | 0.3430 | 0.4680 | 0.4610 | 0.3900 | 0.4610 | 0.4090 | 0.4110 |
| RoA | Mean | 0.0629 | 0.0901 | 0.0682 | 0.0660 | 0.0532 | 0.0657 | 0.0532 | 0.0638 | 0.0622 |
| | Median | 0.0513 | 0.0656 | 0.0600 | 0.0569 | 0.0435 | 0.0550 | 0.0435 | 0.0522 | 0.0528 |
| | St. Deviation | 0.0546 | 0.1010 | 0.0520 | 0.0651 | 0.0537 | 0.0555 | 0.0537 | 0.0568 | 0.0542 |
| Assets | Mean | 11.7400 | 10.7100 | 11.4900 | 11.7100 | 11.2000 | 11.6200 | 11.2000 | 11.7100 | 11.4000 |
| | Median | 11.5600 | 10.8800 | 11.3200 | 11.4100 | 11.1300 | 11.4500 | 11.1300 | 11.5500 | 11.2300 |
| | St. Deviation | 1.3400 | 1.2100 | 1.3600 | 1.4200 | 1.1500 | 1.3600 | 1.1500 | 1.3500 | 1.2900 |
| Leverage | Mean | 0.5340 | 0.4340 | 0.4700 | 0.4530 | 0.5050 | 0.5010 | 0.5050 | 0.5300 | 0.4830 |
| | Median | 0.5340 | 0.4650 | 0.4700 | 0.4420 | 0.4950 | 0.5070 | 0.4950 | 0.5290 | 0.4770 |
| | St. Deviation | 0.1850 | 0.1650 | 0.2010 | 0.1620 | 0.1930 | 0.1930 | 0.1930 | 0.1850 | 0.1950 |
| FreeFloatRatio | Mean | 0.1950 | 0.2250 | 0.1660 | 0.1440 | 0.2080 | 0.1800 | 0.2080 | 0.1960 | 0.1800 |
| | Median | 0.1740 | 0.2320 | 0.1470 | 0.1210 | 0.1760 | 0.1600 | 0.1760 | 0.1750 | 0.1570 |
| | St. Deviation | 0.1156 | 0.0882 | 0.0995 | 0.1025 | 0.1232 | 0.1090 | 0.1230 | 0.1150 | 0.1120 |
| Segments | Mean | 5.0300 | 3.9200 | 4.3500 | 4.4100 | 4.6800 | 4.7000 | 4.6800 | 4.9900 | 4.4900 |
| | Median | 5 | 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 |
| | St. Deviation | 2.7700 | 3.0000 | 3.0600 | 3.3300 | 2.7600 | 2.9400 | 2.7600 | 2.7800 | 2.9700 |
| ForeignShareholders | Mean | 0.1344 | 0.0729 | 0.1416 | 0.1383 | 0.1116 | 0.1360 | 0.1120 | 0.1320 | 0.1300 |
| | Median | 0.1064 | 0.0705 | 0.1164 | 0.1103 | 0.0746 | 0.1089 | 0.0746 | 0.1054 | 0.0965 |
| | St. Deviation | 0.1086 | 0.0500 | 0.1186 | 0.0964 | 0.1123 | 0.1110 | 0.1120 | 0.1080 | 0.1150 |
| OverseasSales | Mean | 0.1951 | 0.0903 | 0.1796 | 0.2912 | 0.1569 | 0.1930 | 0.1570 | 0.1910 | 0.1800 |
| | Median | 0.0422 | 0 | 0 | 0.3224 | 0 | 0 | 0 | 0 | 0 |
| | St. Deviation | 0.2420 | 0.2200 | 0.2480 | 0.2440 | 0.2080 | 0.2460 | 0.2080 | 0.2420 | 0.2350 |
| Observations | | 323 | 12 | 251 | 39 | 185 | 625 | 185 | 335 | 475 |

### *4.2. Event Study Results*

Table 5 presents GRANK-T statistics results of null hypothesis that there are no abnormal returns observed for firms categorized by their auditor's affiliation with Olympus for each events described in Section 3.

*Table 5*
*Results of GRANK tests of Abnormal Returns Observed around Olympus Events*

| | | **Group I (Clients of Auditors Affiliated with Olympus)** | | **Group II (Clients of Auditors Not Affiliated with Olympus)** | |
|---|---|---|---|---|---|
| | | **GRANK t statistics** | **p-value** | **GRANK t statistics** | **p-value** |
| Event 1 | (0,1) | 0.3527 | 0.7246 | 0.2932 | 0.7696 |
| | (0,2) | -0.1721 | 0.8635 | -0.1806 | 0.8568 |
| | (0,3) | -0.5712 | 0.5684 | -0.6832 | 0.4951 |
| | (-1,3) | -0.6927 | 0.4892 | -0.6175 | 0.5375 |
| Event 2 | (0,1) | 0.2492 | 0.8034 | 0.1653 | 0.8689 |
| | (0,2) | -0.0187 | 0.9851 | -0.0495 | 0.9605 |
| | (0,3) | -0.9974 | 0.3196 | -0.8211 | 0.4124 |
| | (-1,3) | -1.2933 | 0.1971 | -0.8879 | 0.3754 |
| Event 3 | (0,1) | 0.3282 | 0.7430 | 0.3669 | 0.7140 |
| | (0,2) | 0.3629 | 0.7170 | 0.3608 | 0.7185 |
| | (0,3) | -0.7096 | 0.4786 | -0.6924 | 0.4893 |
| | (-1,3) | -0.3956 | 0.6928 | -0.3288 | 0.7426 |
| Event 4 | (0,1) | -0.3910 | 0.6961 | -0.6448 | 0.5197 |
| | (0,2) | -0.7931 | 0.4285 | -0.8956 | 0.3713 |
| | (0,3) | -1.0522 | 0.2937 | -1.1754 | 0.2409 |
| | (-1,3) | -0.9131 | 0.3621 | -0.9334 | 0.3515 |
| Event 5 | (0,1) | 0.1108 | 0.9119 | 0.0914 | 0.9272 |
| | (0,2) | -0.1338 | 0.8937 | -0.3203 | 0.7490 |
| | (0,3) | 0.7141 | 0.4758 | 0.4519 | 0.6518 |
| | (-1,3) | 0.8103 | 0.4185 | 0.5549 | 0.5795 |
| Event 6 | (0,1) | 0.1574 | 0.8751 | 0.1358 | 0.8921 |
| | (0,2) | -0.9145 | 0.3613 | -0.9470 | 0.3446 |
| | (0,3) | -1.5743 | 0.1167 | -1.5785 | 0.1157 |
| | (-1,3) | -1.3137 | 0.1902 | -1.3429 | 0.1805 |
| Observations | | 335 | | 475 | |

*, ** and *** represent statistical significance at 10%, 5%, and 1% level, respectively.

The results show that from 6 events observed, we found that there is no abnormal market reaction observed with across two groups of firms categorized by their auditors' affiliation to Olympus. Therefore, we cannot reject H1 null hypothesis that news publication affecting reputation of auditors associated with Olympus do not contribute to abnormal share returns of publicly listed clients of auditors associated with Olympus (E&Y and KPMG). To conclude whether there is observed market reaction difference attributable to clients' auditors association with Olympus and controlling for firm specific characteristics, we perform cross-sectional regression analysis for abnormal returns observed in Event 6 in the next section.

*4.3. Cross-Sectional Results*

Table 6 presents multivariate regression estimation results from Equation (14) with dependent variables of mean CAR categorized by events.

*Table 6*
*Fixed Effect Model Multivariate Regression Results after Correcting for Heteroskedastic Standard Errors – CAR Estimated Using Fama-French 3 Factors Model*

| Variables | Mean CAR - All 6 Events | | | | Mean CAR -FACTA Events (Event 1-2) | | | | Mean CAR - Olympus Events (Event 3-6) | | | | Mean CAR - Negative News (Event 1-5) | | | | Mean CAR - Neutral News (Event 6) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Coeff.** | **t-value** | **Pr(>\|t\|)** | | **Coeff.** | **t-value** | **Pr(>\|t\|)** | | **Coeff.** | **t-value** | **Pr(>\|t\|)** | | **Coeff.** | **t-value** | **Pr(>\|t\|)** | | **Coeff.** | **t-value** | **Pr(>\|t\|)** | |
| Olympus | 0.001215 | 1.12 | 0.262 | | -4.25E-05 | -0.03 | 0.978 | | 1.84E-03 | 1.27 | 0.2 | | 1.05E-03 | 0.92 | 0.358 | | 0.002035 | 0.85 | 0.39527 | |
| Opinion | 0.002234 | 1.5 | 0.134 | | 2.26E-04 | 0.17 | 0.868 | | 3.24E-03 | 1.7 | 0.09 | * | 2.29E-03 | 1.87 | 0.062 | * | 0.001936 | 0.44 | 0.66155 | |
| RoA | -0.017708 | -1.41 | 0.16 | | 1.10E-02 | 0.55 | 0.581 | | -3.21E-02 | -2.17 | 0.03 | ** | -3.76E-03 | -0.35 | 0.724 | | -0.08742 | -2.57 | 0.01023 | * |
| Assets | 0.001291 | 1.95 | 0.052 | | 2.25E-03 | 2.22 | 0.027 | ** | 8.12E-04 | 1.39 | 0.16 | | 4.08E-04 | 0.62 | 0.532 | | 0.005704 | 4.97 | 8.40E-07 | *** |
| Leverage | 0.001298 | 0.32 | 0.746 | | -5.96E-03 | -1.28 | 0.2 | | 4.93E-03 | 0.91 | 0.36 | | 4.57E-04 | 0.14 | 0.889 | | 0.005503 | 0.39 | 0.70032 | |
| FreeFloatRatio | -0.003142 | -0.7 | 0.482 | | -9.23E-03 | -1.19 | 0.236 | | -9.92E-05 | -0.02 | 0.99 | | -5.41E-03 | -1.19 | 0.233 | | 0.008186 | 0.75 | 0.4562 | |
| Segments | -0.000122 | -0.66 | 0.509 | | -1.36E-04 | -0.62 | 0.534 | | -1.15E-04 | -0.46 | 0.65 | | -7.44E-05 | -0.5 | 0.615 | | -0.00036 | -0.68 | 0.49528 | |
| ForeignShareholders | -0.001773 | -0.28 | 0.78 | | -3.86E-03 | -0.51 | 0.609 | | -7.31E-04 | -0.1 | 0.92 | | 1.79E-04 | 0.03 | 0.976 | | -0.01154 | -1.04 | 0.29812 | |
| OverseasSales | 0.01204 | 6.06 | 2.20E-09 | *** | 4.49E-03 | 1.49 | 0.138 | | 1.58E-02 | 5.4 | 8.90E-08 | *** | 9.59E-03 | 5.46 | 6.30E-08 | *** | 0.024286 | 3.89 | 0.00011 | *** |
| Observations | 810 | | | | 810 | | | | 810 | | | | 810 | | | | 810 | | | |
| Industry Fixed Effects | Included | | | | Included | | | | Included | | | | Included | | | | Included | | | |
| Total Sum of Squares | 0.144 | | | | 0.28 | | | | 0.241 | | | | 0.128 | | | | 1.16 | | | |
| Residual Sum of Squares | 0.133 | | | | 0.269 | | | | 0.225 | | | | 0.122 | | | | 1.06 | | | |
| R-Squared | 0.075 | | | | 0.0391 | | | | 0.0676 | | | | 0.0441 | | | | 0.081 | | | |
| Adj. R-Squared | 0.0715 | | | | 0.0372 | | | | 0.0644 | | | | 0.042 | | | | 0.0772 | | | |
| p-value | 1.08E-09 | | | | 0.000307 | | | | 1.70E-08 | | | | 6.07E-05 | | | | 1.14E-10 | | | |

*, ** and *** represent statistical significance at 10%, 5%, and 1% level, respectively.

The regression results for *Olympus* variable in Table 6 yield statistically insignificant coefficient which suggest that for all instances of CAR observed in this study, there is no difference in market reaction between firms audited by Olympus auditors and firms not affiliated with Olympus auditors. These results suggest that we are unable to reject H2 null hypothesis that the extent of market reaction observed during the news publication affecting reputation of auditors associated with Olympus (E&Y and KPMG) is no different from other firms whose auditor is not associated with Olympus.

## 5. Discussion of Results

Event study and multivariate regression analysis results presented in the previous section indicate that there is no observed change in Olympus auditors' reputation surrounding the news announcements of their potential involvement in the fraud. Our research mirror results of previous study conducted in US which shown weak observed relation between public news announcement and market activity (Mitchell & Mulherin, 1994). Investor non-reaction which is observed for events that include news announcements with both neutral (Event 6) and negative contents (Event 1-5) on auditors' reputation indicate that Japanese investors do not regards changes of Olympus auditors' reputation as a significant contributor to the quality of financial statements audited by Olympus auditors.

The first group of events (Event 1 and 2) identified in the event study covered the publication of investigative articles on Olympus fraud published by a small Japanese business magazine. The publication time of those articles preceded follow-up articles by major Japanese media by at least two months[2]. We argue that lack of investors' reaction during the publication of FACTA articles is attributable to insufficient media coverage by major Japanese media[3]. In addition, limited distribution of FACTA articles — only available to subscribers — restrict the circulation of the news in the market. Furthermore, major media networks also possess higher public credibility when they expose high-profile corporate fraud compared to smaller media, which is publisher of FACTA in this case. We argue that the combination of aforementioned factors contributes to Japanese investors' non-reaction to publication of relevant news on Olympus auditors' reputation. Our results confirm that the observed non-reaction of Japanese investors to publication of FACTA articles represents an anomalous case of efficient market where publication of relevant news

[2] We searched Nikkei Telecom 21 database for the earliest publication date of articles covering Olympus fraud. The database covers citations of four major Japanese commercial newspapers: The Nikkei, the Nikkei Business Daily, the Nikkei Finance Journal, and the Nikkei Marketing Journal. The earliest Nikkei article pointing to indication of Olympus fraud is published in 18th October edition of Nikkei Sangyo Shinbun on whistleblowing action of Mr. Woodford.
[3] Major general Japanese media include the Nikkei, Yomiuri, Asahi, Mainichi, and Chunichi. Major business media in Japan includes Nikkei network which includes the Nikkei Business Daily and the Nikkei Marketing Journal.

affecting auditors' reputation does not necessarily result in change of investors' perception of audit quality due to the press's limited news coverage and exposure to broader Japanese investors.

We observe that E&Y and KPMG did not experience reputational loss due to their association with Olympus in the second group of events (Event 3 and 6) which covers negative news contents on Event 3, 4 and 5 and neutral news content on Event 6. There have been no recent history of E&Y and KPMG Japanese clients who are involved in accounting scandal prior to Olympus fraud. There is limited evidence which suggest the existence of persistent low audit quality of Olympus auditors. Therefore, news of potential involvement of Olympus auditors in the fraud do not provide sufficient confirmation value for investors to change their prior expectation of Olympus auditors' reputation and audit quality. This circumstance is significantly different from the case of Arthur Andersen reputational loss in the Enron fraud. Other major client of Arthur Andersen (Waste Management) was also involved in a major accounting fraud prior to Enron. Further revelation of Arthur Andersen active participation in Enron fraud confirmed investors expectation of Arthur Andersen's substandard audit quality which explained the negative contagion effect observed on their clients. However, assuming Japanese investors behave rationally; our findings suggest that Japanese investors consider news surrounding potential involvement of Olympus auditors to be not sufficiently significant to justify changes of their perception of Olympus auditors' reputation.

## 6. Conclusions

Our paper investigates the impact of news indicating Olympus auditors' potential involvement in Olympus fraud case on their reputation. Our study complements previous research by (Numata & Takeda, 2010) by providing additional evidence on Japanese investors' reactions on news of potential auditors involvements in an accounting fraud. We identified a series of events covering news announcements with reputational effects on both Ernst&Young Shin Nihon LLC and KPMG AZSA as Olympus auditors. Using event study and multivariate regression analysis, we found no observed changes in reputation of auditors affiliated with Olympus during publication of news affecting their reputation.

We argue that a number of factors contributed to Japanese investors' non-response on news announcements which affect Olympus auditors' reputation. First, articles exposing Olympus fraud which should have significant influence on Olympus auditors' reputation did not capture sufficient investors' attention due to limited public credibility and exposure to wider Japanese investors. Second, Japanese investors conservatively respond to release of official reports on potential involvements of Olympus auditors. There is a lack of prior evidence which can confirm investors' expectation on low audit quality of Olympus auditors prior to the Olympus fraud. Lacking this

evidence, our study shows that Japanese investors reacted rationally by not responding to release of news on potential Olympus auditors' involvement in the fraud.

## References


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