Cross-quarter differential market reactions

An investigation of the audit effect hypothesis

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Abstract

Purpose – The purpose of this paper is to investigate the audit effect hypothesis for the cross-quarter differential market reactions to earnings announcements.

Design/methodology/approach – Earnings response coefficients are focused upon as indicators of perceived earnings quality.

Findings – The evidence suggests that investors of Singapore listed companies respond more strongly to earnings announcements in the fourth quarter than other interim quarters. The findings support the notion that investors attach different degrees of reliability to interim quarter earnings relative to final quarter earnings.

Originality/value – Findings in this paper shed new light on the audit effect hypothesis and are relevant to accounting regulators and audit committee members seeking to enhance the credibility of earnings announcements.

Keywords Earnings quality, Audit effect, Earnings response coefficient

Paper type Research paper

1. Introduction

Interim financial reporting plays an important role in equity markets by providing timely information to investors for the tasks of valuation (Hagerman *et al.*, 1984) and external monitoring. As only annual reports are audited, researchers have long suspected that unaudited quarterly earnings are valued differently by investors as compared to the fourth quarter earnings. Intuitively, companies have more opportunities to manage interim earnings when unaudited (Mendenhall and Nichols, 1988; Kross and Schroeder, 1990). As a result, investors would view unaudited quarterly earnings as of lower quality (less reliable) and respond less strongly to earnings in the first three quarters as compared to that in the fourth quarter. Several studies have investigated this audit effect hypothesis which predicts a *higher* earnings response coefficient (ERC) in the fourth quarter than the preceding three quarters. However, contrary to the hypothesized audit effect, prior studies predominately find a *lower* ERC in the fourth quarter (Salamon and Stober, 1994; Kross and Schroeder, 1990, Lee and Park, 2000). The prevailing explanation offered by these studies is the settling up effect (Collins *et al.*, 1984). Because interim errors are dumped into the fourth quarter after the

The authors appreciate financial support provided by Deloitte & Touche, Ernst & Young, KPMG and PricewaterhouseCoopers for this research study.

Pacific Accounting Review
Vol. 28 No. 2, 2016
pp. 219-235

0114-0582
DOI 10.1108/PAR-07-2015-0030

annual audit, the fourth quarter earnings are injected with noise, leading to higher volatility and lower precision (Kross and Schroeder, 1990). Holthausen and Verrecchia (1988) and Choi and Salamon (1989) demonstrate that the magnitude of the stock price response decreases when the information becomes less precise (higher variance of the noise term).

In this study, we aim to shed new light on the audit effect hypothesis by selecting a setting that provides more power to detect the effect. There are reasons to believe that the US market is affected by various factors which attenuate the audit effects. Conceptually, a strong litigation and institutional environment can substitute for the audit effect. For a country like the USA where litigation costs and external monitoring (including regulatory oversight) are high, investors need to rely less on auditors for the reliability of financial reports. For example, litigation costs from shareholder lawsuits are high in the USA and provide disincentives to interim earnings management in the absence of an audit. In addition, monitoring from sophisticated institutional investors and powerful regulators (such as Securities and Exchange Commission, SEC) also constrains earnings management even when reports are unaudited. The strong litigation and institutional environment in the USA may explain why prior studies focusing on the US data failed to find evidence consistent with the audit effect hypothesis. In addition, since the year of 2000, companies listed in the USA are subject to the SEC requirement of a mandatory timely review of interim financial reports by their auditors [Securities and Exchange Commission (SEC), 1999]. If timely review of interim reports by auditors increases the reliability of interim earnings numbers from the investors' perspective (Manry *et al.*, 2003), then it becomes even less likely to empirically detect the audit effect in the US setting.

We chose Singapore market to test the audit effect hypothesis because we expect that investors need to rely more on auditors for the reliability of financial reports due to the legal and intuitional environment in Singapore (please refer to Section 3 for detailed discussion)[1]. Using a sample of 307 firms listed in the Singapore Stock Exchange with hand-collected quarterly financial data, we find some evidence of incrementally higher ERC in the fourth quarter as compared to other interim quarters, even after controlling for business seasonality. We next investigate whether our results are affected by firm size because the significance of the audit effect is different for large versus small firms. Large firms tend to have stronger internal monitoring (better corporate governance) and external monitoring (heightened media and regulatory attention, continuous involvement of auditors[2]), both of which mitigate earnings management for unaudited interim reports. On the other hand, the external and internal monitoring mechanism may not be as robust for small firms. When we divide the sample into two sub-samples based on firm size, incrementally higher ERC associated with the fourth quarter are found in the sub-sample of small firms but not in the sub-sample of large firms, as predicted. Our results suggest fourth-quarter (Q4) earnings numbers, especially for small firms, are perceived to be of higher quality by investors than interim-quarter (non-Q4) earnings. Overall, the empirical evidence is consistent with the audit effect hypothesis.

To ensure that our inference is not spurious, we conduct several additional tests. First, to assure that our main results are not driven by our research design choices, we examine a US sample using identical research design. Different from our main results, we find an incrementally lower ERC in the fourth quarter among the US listed

companies. Sub-sample analysis indicates that the lower ERC is mainly caused by small firms. For large firms, investors' reaction to earnings is not significantly different across quarters. Our US-based results are consistent with prior research and confirm that our main results are not driven by any research design choice. Second, to assure that our main results are not driven by favorable dividends news announced together annual earnings, we re-estimate our main models using two sub-samples:

(1) firms with no change in annual dividends payouts; and

(2) firms with zero dividends payouts.

Consistent with our main results, we find significantly higher ERC in the Q4 than the other quarters among these firms that are less affected by the dividend effect. Finally, we investigate the alternative explanation that companies run out of capacity to practice income-increasing earnings management in Q4 due to the reporting process, instead of the monitoring from auditors. We examine the income statement line item distribution in Q4 and non-Q4, and the evidence is inconsistent with this alternative explanation.

We contribute to the literature by providing empirical evidence in support of the audit effect hypothesis. We document incrementally higher ERC associated with the fourth quarter as compared to prior quarters. By focusing on listed companies in Singapore where lower litigation risks and institutional factors (such as higher ownership concentration and lower minority shareholder rights) may lead investors to rely more on audit review as a monitoring mechanism for financial reporting quality, we increase the test power, as compared to prior studies focusing on the US setting. It appears that investors in an environment of lower litigation costs and external monitoring than the USA perceive unaudited interim earnings as having lower reliability as compared to audited earnings. Our research findings are relevant to accounting regulators, investors and audit committee members seeking to enhance the credibility of earnings announcements.

The remainder of the paper is organized as follows. We discuss the literature and develop hypotheses in Section 2. In Section 3, we discuss the institutional background. In Section 4, we present the sample and research design. In Section 5, we discuss empirical results. In Section 6, we conclude.

2. Literature and hypothesis development

Numerous studies document that interim (quarterly) accounting numbers are valued by investors (Hagerman *et al.*, 1984). Quarterly financial reporting plays a crucial role in solving the resource allocation for the society at large by providing timely and relevant information[3]. However, unlike annual reporting, quarterly financial reporting may be issued with little auditor involvement. Regulators have been worried that the quality is compromised with issuance of quarterly financial reports, resulting in lower reliability (less faithful representation) of interim accounting numbers. For example, the Blue Ribbon Committee which was set up by the SEC to improve financial reporting oversight blames the incidence of fourth-quarter adjustments on "inaccuracies not detected during the preceding three quarters" [Blue Ribbon Committee on Improving the Effectiveness of Corporate Audit Committees (BRC) 1999, p. 35][4].

If quarterly financial reporting is of lower quality, one direct consequence is that investors will rely less on such accounting numbers. Several studies (Kross and Schroeder, 1990; Salamon and Stober, 1994; Lee and Park, 2000) hypothesize that there

exists an audit effect in the earnings–return relationship. Specifically, investors will react less to earnings announcements in the first three quarters as compared to the earnings announcements in the fourth quarter. For example, Kross and Schroeder (1990) argue that the market may believe that interim earnings numbers have less integrity (thus lower ERC) because management is less constrained in its ability to "manage" the financial statement numbers for the interim quarters. Furthermore, they hypothesize that such audit effect on ERC should concentrate on small firms because the auditors are essentially "in residence" for large firms during interim periods to produce and disseminate annual reports in a timely fashion.

However, contrary to the direction predicted by audit effect hypothesis, these studies predominately find a lower ERC in the fourth quarter as compared to non-fourth quarters[5]. Kross and Schroeder (1990) find that fourth quarter earnings announcement have smaller ERCs than interim announcements for small firms but not for large firms. Salamon and Stober (1994) demonstrate that the same phenomenon exists for both large and small firms, after controlling for the sales seasonality[6]. Using intraday analysis, Lee and Park (2000) find a lower ERC associated with the fourth quarter. The prevailing explanation offered by all these studies is the settling up effect where the fourth quarter is a "dumping ground" for adjustments necessitated by errors and approximations from the first three interim periods (Collins *et al.*, 1984). Firms generally do not publish the fourth-quarter earnings *per se*, and the fourth-quarter earnings are simply derived from the difference between annual earnings (subject to a full audit) and the sum of the earnings from the preceding three interim quarters[7]. Because additional "corrections" from the prior three quarters are injected into the fourth quarter earnings, the fourth quarter earnings are shown to be more volatile and associated with higher forecast errors (Collins *et al.*, 1984). Analytical work such as Holthausen and Verrecchia (1988) and Choi and Salamon (1989) demonstrate that the magnitude of the stock price response decreases when the information becomes less precise, that is, when the variance of the noise term increases.

Failures to find evidence supporting the audit effect by prior research do not imply the inexistence of the audit effect. Evidence shows that increased involvement of auditors with financial statements enhances reporting quality in the USA. For example, interim reports that have been timely reviewed by an auditor have fewer fourth-quarter adjustments (Ettredge *et al.*, 2000) and exhibit predominantly contemporaneous earnings–returns relationship (Manry *et al.*, 2003).

The high litigation risks and strong institutional environment (in the USA) attenuate the audit effects because investors need to rely less on auditors for the reliability of financial reports. In a non-US setting where litigation costs are lower and regulatory oversight is less rigorous than the USA, audit effect is expected to be more salient.

A few studies investigate the benefits of voluntary interim audit or interim review by an auditor in non-US settings, but the evidence is mixed. Haw *et al.* (2008) focus on Chinese public companies and find that firms that chose voluntary interim audit of semi-annual reports have higher earning quality (measured by ERC) than firms without voluntary audit. On the other hand, Bédard and Courteau (2015) examine the Canadian public companies and report no benefit for voluntary interim review[8]. Specifically, they find no significant association between the quality of earnings (measured by absolute unexpected accruals, earnings reversals and the timing of non-routine adjustments) in interim quarters (Q1-Q3) or in the fourth quarter and the fact that

interim reports were voluntarily reviewed by an auditor. Even though we expect that the investors need to rely more on auditor for the reliability of financial reports in Singapore due to the legal and institutional environment, it is not entirely obvious based on these results that investors will respond more strongly to earnings announcements in Q4 than to announcements in interim quarters in a Singapore setting. We state our first hypothesis (in alternative form) as:

H1. The stock market reacts more strongly to the earnings announcements in the fourth quarter than the announcements of the prior three quarters.

There are reasons to believe that investor's differential response to earnings in Q4 period versus in non-Q4 period is affected by firm size. For large firms, stronger internal and external monitoring mitigates interim earnings management in absence of an audit. For example, large firms tend to have better corporate governance and internal control measures in place and draw more attention from media and regulators. Kross and Schroeder (1990) also argue that auditors are essentially "in residence" for large firms. In contrast, monitoring mechanism may not be as robust for small firms. Thus, we expect the audit effect to be more salient for the small firms, as stated by our second hypothesis (in alternative form) below:

H2. The stronger stock market reaction to earnings announcements in the fourth quarter than the announcements of the prior three quarters is more significant for small firms.

3. Institutional background

Unlike the USA where quarterly financial reporting dates back more than four decades ago and is very well entrenched in today's listed corporations there, quarterly reporting is relatively new in Singapore as well as in Asia. The stock exchange of Singapore mandated quarterly financial reporting for listed companies only in 2003 and only for firms with market capitalization exceeding S$75m[9] (approximately USD40m). Listed firms with market capitalization below the S$75m threshold are not subject to quarterly reporting but remain subject to semi-annual reporting, as was required of all listed firms prior to 2003. The introduction of quarterly reporting in 2003 was also accompanied by more stringent requirement of standardized presentation formats for interim financial reports, thus improving comparability.

Quarterly financial reports in Singapore, however, are not required to be audited or reviewed by auditors. Mandatory audit remains a regulatory requirement only for annual financial reports. In the USA, the SEC requires mandatory audit review of quarterly financial reports. Some Singapore companies voluntarily choose to have their quarterly reports audited or reviewed by their auditors, but the incidence is very low. In our sample of 307 companies, only 17 (5.5 per cent) have voluntary audit reviews of their quarterly reports.

Regulatory surveillance of companies in Singapore is carried out by the Accounting and Corporate Regulatory Authority (ACRA). However, because quarterly financial reporting is a requirement mandated by the stock exchange of Singapore on listed companies, and not by ACRA, quarterly reports in Singapore are not subject to the more rigorous scrutiny as are those in the USA by the SEC.

There are also significant differences in ownership concentration, as well as shareholder rights, between Singapore and US companies[10]. Singapore listed firms

tend to be controlled by one or a few very large shareholders (e.g. founder's family or government-controlled companies). Ownership of US listed firms, on the other hand, tends to be more diffused. Using the La Porta *et al.* (1998)[11] ownership concentration score as an illustration, ownership concentration among Singapore companies is four times higher than among US firms. Minority shareholder rights are also stronger in the USA (e.g. the prevalence of class-action lawsuits against companies) than in Singapore. Based on the La Porta *et al.* (1998) aggregate measure of minority shareholder rights (on a scale of 0 to 5), Singapore scores 4 – similar to Australia, Japan and Malaysia, but behind the USA, UK and Hong Kong, which score 5.

Given this unique institutional background, the Singapore market environment for quarterly financial reporting, therefore, presents a natural setting to test the audit hypothesis. Higher ownership concentration and lower minority shareholder rights may lead investors of Singapore firms to rely more on audit review as a monitoring mechanism for financial reporting quality.

4. Sample and research design

Our main sample includes 307 Singapore listed companies covered by Datastream during a three-year period from 2011 to 2013. We start the sample period from 2011 to avoid the impacts of global financial crisis. All stock price-related data such as market price and market capitalization are obtained from Datastream. Each firm event window returns are calculated based on the total returns indices in Datastream, and the Straits Times Index total return indices are used to calculate the Singapore market returns. The excess/abnormal returns of each firm are their returns minus the Singapore market returns. We calculate two alternative measures of cumulative abnormal returns – one measure is the CAR3d return from time $(t - 1)$ to time $(t + 1)$ with t as the earnings announcement date; the other measure is the earnings announcement day stock returns CAR1d.

The quarterly financial statements numbers for our main sample are hand-collected from quarterly financial reports. We calculate two alternative measures of quarterly EPS change – one is quarter on prior quarter EPS change and the other is seasonal change in quarterly EPS (change from prior year quarter to current quarter). Both are scaled by the stock price at the beginning of the quarter. The month of fiscal year-end for each firm is identified manually from the annual report. We determine the quarters one to four for each firm based on when the fiscal year-end falls. As the fiscal year-end falls on different months, the data collected cover 2009 to 2014 to calculate the seasonal change in quarterly EPS. After dropping firm years with missing EPS, return and market capitalization data, we have a total of 4,074 firm year observations for quarter on quarter earnings change and 3,422 firm year observations for seasonal quarterly earnings change.

Earnings forecast by analysts for Singapore listed companies is not as widely followed by investors as in the USA. It is not clear whether the marginal investors' earnings expectation is based on analyst forecast for our sample firms. We measure earnings expectation from random walk and seasonal random walk models[12]. However, this choice may affect comparability with some of the prior studies which measure earnings surprises by analyst forecast errors. To ensure that our results are not caused by any difference in research design or sample period, we implement a sensitivity analysis by replicating regression analyses using the US data in the same

period (from 2011 to 2013) with identical research design. The US stock returns and market return are from the CRSP database. The excess/abnormal returns of each firm are their returns minus value weighted market return from CRSP (vwretd). We also calculate the CAR3d and CAR1d returns. The quarterly EPS for the USA are extracted from COMPUSTAT database. The month of fiscal year-end for each firm is identified by COMPUSTAT. We also calculate the quarter on prior quarter EPS change and seasonal change in quarterly EPS scaled by the stock price at the beginning of the quarter. To ensure the US sample is comparable to the Singapore sample, we also set a cap on the market capitalization of US firms in the sample at US$46,325m at the end of 2013, which is the equivalent market capitalization of the largest company in the Singapore sample. After dropping firm years with missing EPS, return and market capitalization data, we have a total of 42,007 firm year observations for quarter on quarter earnings change and 42,069 firm year observations for seasonal quarterly earnings change.

We use the following equation (1) to test *H1*:

$$CAR = \alpha_0 + \alpha_1 UE + \alpha_2 Q4 + \alpha_3 Q4 * UE + \alpha_4 LnMV + \alpha_5 Dec + \alpha_6 Lev + \alpha_7 LnMV * UE + \alpha_8 Dec * UE + \alpha_9 Lev * UE + Year\ controls \quad (1)$$

Where CAR is the cumulative abnormal returns either measured as CAR3d or CAR1d. CAR3d is the cumulative abnormal returns of stock over market returns (Straits Times Index returns as proxy for Singapore market returns; value weighted returns for US market returns) from $t - 1$ to $t + 1$, where t is the earnings announcement date. CAR1d is the cumulative abnormal returns on the earnings announcement date. UE is quarter on prior quarter EPS change, scaled by price at the beginning of quarter. Q4 is dummy variable which equals 1 for Quarter 4 and 0 otherwise. We control for firm size and December effects. LnMV is natural logarithm of market capitalization; Dec is dummy variable which equals 1 if fiscal year-end is December and 0 otherwise; and Lev is total liabilities divided by total shareholder's equity. Alternative to UE, we also use SUE, which is seasonal quarterly EPS change, scaled by price at the beginning of quarter. We winsorize CAR3d, CAR1d, UE, SUE and Lev[13]. The variables are defined in Table I.

If *H1* is supported, then we expect α_3 to be positive and statistically significant in our main sample. To test *H2*, we split the sample into two approximately equal-sized sub-samples based on the median market capitalization of S$171m for the entire Singapore sample. The large (small) firm sub-sample includes 154 (153) companies with median market capitalization of S$816 (S$68)m. We run equation (1) separately for the two sub-samples. If *H2* is supported, then we expect $\alpha 3$ to be positive and statistically significant in the small firm sub-sample and not the large firm sub-sample.

5. Empirical results

5.1 Results on H1 *and* H2

The descriptive statistics are shown in Panel A of Table II. The three-day and one-day cumulative abnormal/excess returns are close to 0 on average, but there is a variation across firm years, with a maximum (minimum) of 5 per cent (−5 per cent) for three-day excess returns and maximum (minimum) of 4 per cent (−4 per cent) for one-day excess returns. The average quarter on quarter EPS change (seasonal EPS change) scaled by start of the quarter stock price is −0.2 per cent (−1.6 per cent). The average (median)

Variable	Definition
CAR3d	Cumulative abnormal returns of stock over market returns (Straits Times Index returns as proxy for Singapore market returns; value weighted returns for US market returns) from $t-1$ to $t+1$, where t is earnings announcement date
CAR1d	Cumulative abnormal returns of stock over market returns on the earnings announcement date
UE	Quarter on prior quarter EPS change, scaled by price at beginning of quarter
SUE	Seasonal quarterly EPS change, scaled by price at the beginning of quarter
Q4	Dummy variable equals 1 for Quarter 4, 0 otherwise
LnMV	Natural logarithm of market capitalization
Dec	Dummy variable equals 1 if fiscal year-end is December, 0 otherwise
Lev	Leverage ratio calculated as total liabilities divided by total assets
PEAK	Peak sales quarter dummy variable equals 1 for the highest sales quarter in the year for each firm, equals 0 for other quarters

Table I.
Variable definition

Variable	Observation	Mean	SD	Minimum	Maximum	Median	Skewness
Panel A: Descriptive statistics							
CAR3d	4,984	−0.0003	0.0238	−0.0515	0.0509	0.0000	−0.0146
CAR1d	4,984	0.0003	0.0183	−0.0388	0.0423	0.0000	0.1523
UE	4,375	−0.0017	0.0739	−0.1981	0.1858	0.0000	−0.1567
SUE	3,627	−0.0156	0.1110	−0.3750	0.1972	0.0000	−1.6142
Q4	4,985	0.2562	0.4366	0.0000	1.0000	0.0000	1.1172
LnMV	4,358	5.5321	1.8014	1.1632	11.0606	5.1423	0.6610
Dec	4,985	0.6997	0.4584	0.0000	1.0000	1.0000	−0.8713
Lev	4,571	0.4410	0.1992	0.1095	0.8178	0.4293	0.0894

	CAR3d	CAR1d	UE	SUE	Q4	LnMV	Dec	Lev
Panel B: Pearson correlation matrix								
CAR3d	1.000							
CAR1d	0.655*	1.000						
UE	0.039*	0.035*	1.000					
SUE	0.075*	0.075*	0.365*	1.000				
Q4	0.010	0.001	−0.039*	−0.022	1.000			
LnMV	0.052*	0.031*	0.024	0.143*	0.013	1.000		
Dec	0.011	0.008	−0.016	−0.061*	−0.022	−0.024	1.000	
Lev	−0.005	−0.004	0.014	0.045*	−0.004	0.138*	0.039*	1.000

Note: *Denotes statistical significance at 5 %

Table II.
Descriptive statistics and correlation between variables

market capitalization of the Singapore firms is $253m ($171m). This shows the relatively small size of the Singapore stock exchange market. About 70 per cent of the firms in the sample have fiscal year ending December. Panel B show the correlation table. On a univariate basis, the 3 Day and 1 Day excess returns are both positively correlated with

quarter on quarter EPS change, seasonal EPS change and market capitalization, with the positive correlations statistically significant at 10 per cent. Quarter 4 EPS change tends to be smaller than other quarterly EPS change. Seasonal EPS change tends to be greater for large firms and non-December fiscal year-end firms. As expected, the three-day and one-day excess returns are positively related, and the quarter on quarter EPS change and seasonal EPS change are positively related.

Table III present results related to *H1*. Panel A shows that the coefficient of Q4 × UE(α_3) is positive at 0.0310 (0.0202) and statistically significant at 5 per cent (5 per cent) for the 3-Day (1-Day) event window, as predicted by *H1*. This suggests that Q4 earnings are perceived by the market as having higher quality (more reliable) than non-Q4 earnings. We note that ERC in non-Q4 periods (α_1) is positive but not significant. This could be due to limited attention to interim quarter announcements by investors. In comparison, Panel B shows that ERC is positive and significant in Q4 periods [14]. An alternative explanation for the incremental higher ERC in Q4 may be business seasonality. For example, Salamon and Stober (1994) find the ERC are higher in peak sales quarters. To rule out this explanation, we control for PEAK (a dummy variable equals 1 for the highest sales quarter in the year for each firm and 0 otherwise) and its interaction with quarterly EPS change. Panel C presents the result and the coefficients of Q4 × UE remains positive and statistically significant after controlling for the effect of peak sales quarter. In contrast to the finding reported by Salamon and Stober (1994), the ERC in peak sales quarters are not significantly higher than non-peak sales quarters in Singapore data.

To test *H2*, we examine sub-samples based on firm size. Table IV shows that α_3 is positive (0.0349) and statistically significant (p value = 0.030) in the sub-sample of small firms, as predicted. In contrast, α_3 is not significant in the sub-sample of large firms. This result further supports the audit effect hypothesis. Sensitivity analysis shows that our results are the same whether we include or exclude 17 firms with voluntary reviews by an auditor.

5.2 Sensitivity analyses using the US data

As discussed earlier, to ensure that our main results are not caused by any difference in the research design or choice of the sample period, we replicate all tests reported in Section 5.1 using the US data, and the results are presented in Table V. Panel A presents the descriptive statistics for the US sample. The 3 Day and 1 Day cumulative abnormal/excess returns are close to 0 on average, but there is a great variation across firm years, with a maximum (minimum) of 24 per cent (−23 per cent) for 3 Day excess returns and maximum (minimum) of 20 per cent (−20 per cent) for 1 Day excess returns. The average quarter on quarter EPS change (seasonal EPS change) scaled by start of the quarter stock price is 0.1 per cent (0.3 per cent). The average (median) market capitalization of the US sample is $2,613m ($579m). The US and Singapore stock markets are structurally different. The earnings announcement period excess returns and earnings news vary within a much wider range in the US market than in the Singapore market. On average, companies in the US sample are also larger than those in the Singapore sample. Panel B shows the correlation table. The 3 Day and 1 Day excess returns are both positively correlated (significant at 1 per cent) with quarter on quarter EPS change and seasonal EPS change. The degree of correlation is higher in the US data than in the Singapore data.

Variables	CAR3d Coefficient	*p*-value	CAR1d Coefficient	*p*-value
Panel A: Incremental ERC in Q4 versus non-Q4 periods				
UE	0.0050	(0.746)	−0.0127	(0.273)
Q4	0.0007	(0.435)	0.00002	(0.978)
Q4 × UE	0.0310**	(0.018)	0.0202**	(0.040)
LnMV	0.0005**	(0.018)	0.0003*	(0.075)
Dec	0.0001	(0.942)	0.0006	(0.390)
Lev	−0.0008	(0.705)	−0.0010	(0.539)
LnMV × UE	−0.00003*	(0.062)	−0.00002	(0.141)
Dec × UE	0.0001*	(0.063)	0.0001	(0.102)
Lev × UE	0.0239	(0.418)	0.0343	(0.124)
Year controls	Yes		Yes	
Intercept	−0.0121***	(0.000)	−0.0409	(0.000)
Adjusted R^2	0.0052		0.0044	
Number of observations	3,861		3,861	
Panel B: ERC in Q4 periods				
UE	0.0363***	(0.001)	0.0223***	(0.006)
LnMV	0.0004	(0.335)	0.0003	(0.422)
Dec	−0.0015	(0.378)	−0.0005	(0.698)
Lev	−0.0012	(0.754)	−0.0030	(0.320)
Year controls	Yes		Yes	
Intercept	−0.0008	(0.817)	−0.0009	(0.733)
Adjusted R^2	0.0117		0.0088	
Number of observations	1,068		1,068	
Panel C: Incremental ERC in Q4 versus non-Q4 periods, controlling for peak sales quarter				
UE	−0.0086	(0.584)	−0.0148	(0.206)
Q4	0.0007	(0.487)	−0.0001	(0.888)
Q4 × UE	0.0280**	(0.037)	0.0184*	(0.066)
LnMV	0.0005**	(0.016)	0.0003*	(0.071)
Dec	0.0005	(0.560)	0.0006	(0.403)
Lev	−0.0007	(0.740)	−0.0009	(0.560)
LnMV × UE	−0.00004*	(0.058)	−0.00002	(0.119)
Dec × UE	0.0002*	(0.058)	0.0001*	(0.085)
Lev × UE	0.0248	(0.402)	0.0351	(0.114)
PEAK	−0.0001	(0.927)	0.0004	(0.572)
PEAK × UE	0.0186	(0.218)	0.0097	(0.386)
Year controls	Yes		Yes	
Intercept	−0.0122*	(0.000)	−0.0410***	(0.000)
Adjusted R^2	0.0052		0.0042	
Number of observations	3,861		3,861	

Note: ***, ** and *are statistical significance at 1, 5 and 10%, respectively, for two-tailed test

Table III.
Regress excess returns on quarter on quarter EPS change

Panel C shows that the ERC is positive and highly significant (0.218 and *p*-value = 0.000). Unlike the results from the Singapore data, our results show an incrementally *lower* ERC in the fourth quarter. We find that α_3 is negative at −0.027 and marginally significant (*p*-value = 0.114 for two-tailed test) during a 3-Day event window when UE

Dependent Variable = CAR3d	Large firms Market cap. > median Coefficient	P value	Small firms Market cap. <= median Coefficient	P value
UE	0.0029	(0.925)	−0.0082	(0.635)
Q4	0.0008	(0.479)	0.0007	(0.668)
Q4 × UE	0.0051	(0.815)	0.0349**	(0.030)
LnMV	−0.0003	(0.455)	0.0022**	(0.018)
Dec	0.0005	(0.636)	0.0002	(0.886)
Lev	0.0001	(0.978)	−0.0006	(0.849)
LnMV × UE	−0.0001	(0.726)	−0.00007	(0.276)
Dec × UE	0.0005	(0.771)	0.0003	(0.270)
Lev × UE	0.0452	(0.474)	0.0218	(0.506)
Year controls	Yes		Yes	
Intercept	−0.0057*	(0.052)	−0.0098**	(0.033)
Adjusted R^2	0.0005		0.0056	
#Number of observations	1,946		1,915	

Note: ***, ** and *are statistical significance at 1, 5 and 10%, respectively, for two-tailed test

Table IV. Sub-sample analysis–large versus small firms

Variable	Observation	Mean	SD	Minimum	Maximum	Median	Skewness
Panel A: Descriptive statistics from the US data							
CAR3d	42,103	−0.0007	0.0739	−0.2270	0.2390	−0.0011	0.0821
CAR1d	38,753	−0.0014	0.0566	−0.1957	0.1966	−0.0015	0.0634
UE	42,285	0.0013	0.0609	−0.2787	0.3189	0.0003	0.6622
SUE	42,348	0.0031	0.0713	−0.3103	0.3973	0.0012	1.1827
Q4	42,348	0.19	0.40	0	1	0	1.55
LnMV	42,280	6.31	1.94	2.07	10.28	6.36	−0.07
Dec	42,348	0.76	0.43	0	1	1	−1.19
Lev	42,200	0.54	0.27	0.04	1.27	0.53	0.18

Variable	CAR3d	CAR1d	UE	SUE	Q4	LnMV	Dec
Panel B: Pearson correlation matrix from the US data							
CAR3d	1.000						
CAR1d	0.743***	1.000					
UE	0.115***	0.092***	1.000				
SUE	0.106***	0.078***	0.371***	1.000			
Q4	0.012**	0.011**	−0.049***	−0.008*	1.000		
LnMV	0.007	0.037***	−0.025***	−0.041***	−0.021***	1.000	
Dec	−0.014***	−0.001	0.007	0.016***	−0.050***	0.050***	1.000
Lev	0.025***	0.016***	0.016***	0.043***	0.002	0.067***	0.121***

(*continued*)

Table V. Sensitivity analysis using the US sample

Variables	CAR3d	CAR1d
Panel C: Incremental ERC in Q4 versus non-Q4 periods		
UE	0.218*** (0.000)	0.123*** (0.000)
Q4	0.003*** (0.000)	0.002*** (0.001)
Q4 × UE	−0.027 (0.114)	−0.009 (0.516)
LnMV	0.000 (0.115)	0.001*** (0.000)
Dec	−0.003*** (0.003)	−0.000 (0.591)
Lev	0.007*** (0.000)	0.003** (0.037)
LnMV × UE	−0.000 (0.925)	0.003 (0.382)
Dec × UE	−0.050** (0.020)	−0.023 (0.168)
Lev × UE	−0.044 (0.104)	−0.047** (0.020)
Intercept	−0.005*** (0.004)	−0.010*** (0.000)
Year Control	YES	YES
N	41,835	38,520
Adjusted R^2	0.01	0.01
Number of cluster	4,023	4,004
Variables	Small firms	Large firms
Panel D: Sub-samples analysis based on firm size		
UE	0.213*** (0.000)	0.538*** (0.000)
Q4	0.004*** (0.003)	0.002** (0.033)
Q4 × UE	−0.034* (0.086)	−0.004 (0.892)
LnMV	0.000 (0.405)	−0.001 (0.243)
Dec	−0.004*** (0.005)	−0.002 (0.158)
Lev	0.009*** (0.000)	0.003 (0.242)
LnMV × UE	−0.003 (0.709)	−0.025 (0.117)
Dec × UE	−0.037 (0.121)	−0.127*** (0.008)
Lev × UE	−0.034 (0.252)	−0.143** (0.018)
Intercept	−0.006* (0.075)	0.002 (0.635)
Year control	YES	YES
N	20,853	20,982
Adjusted R^2	0.02	0.01
Number of cluster	2330	2300

Notes: Robust *p*-value in parentheses. ***, ** and *are statistical significance at 1, 5 and 10%, respectively, for two-tailed test

Table V.

is used to measure earnings news[15]. Consistent with prior studies, we fail to find evidence supporting the audit effect hypothesis in the USA. We also find Q4 on average has a positive effect on market returns in the earnings announcement window, consistent with prior studies. Panel D further shows that the settling up effect in the USA concentrates in the sub-sample of small firms, while α_3 is not even marginally significant among the large firms. It suggests that small firms (but not large firms) tend to have interim errors which are not corrected until the fourth quarter. We attribute the different results from the US data and Singapore data to the institutional differences affecting the two stock markets. Taken as a whole, the sensitivity analyses using US data confirm that our main results from Singapore data are not due to any research

design choice (the usage of time series earnings expectation models) because identical research design is used for both samples.

5.3 Alternative explanations

One alternative explanation for our finding is that firms (especially small firms) tend to announce more favorable dividends news (change in dividends or special dividends) together with their fourth quarter earnings than interim earnings. Divecha and Morse (1983) find that investors react positively to firms that announce an increase in dividend payouts. As a result, the higher ERC in the fourth quarter in the Singapore setting may be driven by favorable dividends news announced with annual earnings. We implement two tests to examine this explanation by focusing on sub-samples less affected by the dividends announcements[16]. First, we focus on a sub-sample where the annual dividend payouts do not change (2,272 observations). We re-estimate equation (1) with this sub-sample and the un-tabulated results are similar as those reported in Panel A of Table III. Specifically, the coefficients of Q4 × UE remain significantly positive at 0.0357 (p-value = 0.021 for two-tailed test) during a three Day event window. Second, we re-estimate equation (1) with the sub-sample of firms with 0 dividends payout and again find evidence consistent with the audit effect. The coefficients of Q4 × UE is positive and strongly significant at 0.047032 (p-value = 0.004 for two-tailed test) during a three day event window among 1,610 observations. We acknowledge that dividend effect is a possible alternative explanation. To the extent that the two sub-samples constructed based on Datastream are valid, we are less concerned that our main results are driven entirely by dividends news announced with annual earnings.

Another alternative explanation for our finding is that firms run out of their capacity to practice income-increasing earnings management in Q4 as documented by Brown and Pinello (2007). As a result, the stock market is expected to react more strongly to earnings in Q4 due to the nature of the reporting process instead of the audit effect. To investigate this alternative explanation, we compare the revenues and earnings before interest and tax (EBIT) reported in Q4 and other quarters. We find that there is a higher incidence of companies (60.8 per cent) whose Q4 revenues are higher than non-Q4 revenues for the same financial year. On average, companies report 16.354 per cent higher revenues in Q4 than other quarters of the same financial year, and this difference is highly significant (p-value = 0.000). In contrast, EBIT margin is lower in the fourth quarter (mean = 4.542 per cent) than in the prior three quarters (mean = 14.22 per cent), and this difference is significant at 1 per cent (p-value = 0.0038). Further industry analysis suggests that the patterns of line items do not appear to be driven by business seasonality or industry factors. The distribution of line items in the Singapore sample is inconsistent with the alternative explanation that companies run out of capacity for income-increasing earnings management in the Q4 due to the reporting process instead of the audit effect. The line item distribution suggests that some companies in Singapore have a propensity to defer recognizing or systematically underestimate certain expense items or unrealized losses till the final quarter in view of the audit for the annual reporting.

6. Concluding remarks

In this study, we examine whether there exists cross-quarter differences in earnings response coefficients and whether such differential response might be because investors

attach different degrees of reliability to earnings numbers from Q4 and non-Q4 periods. Using a sample of 307 Singapore listed companies that reported quarterly earnings between 2011 and 2013, we provide some evidence that investors react more strongly to the final-quarter earnings numbers than to interim-quarter earnings numbers. This cross-quarter difference is found for small firms but not for large firms. We also conducted several sensitivity analyses to assure our results are not spurious and to rule out alternative explanations. Overall, our evidence is consistent with the audit effect hypothesis and suggests that investors perceive unaudited interim-quarter earnings numbers as of lower quality (reliability) as compared to audited final-quarter earnings numbers.

Similar to other empirical studies using stock returns to assess investors' reactions (Baber *et al.*, 2014), our study is affected by several caveats. First, we are influenced by investor' behavior bias such as limited attention. If investors pay more attention to earnings during fiscal year-end than other time due to behavior bias (instead of perceived quality difference), then we could observe similar effects. Second, we capture the perceptions of earnings quality, and higher-perceived earnings quality does not necessarily mean higher actual earnings quality. In addition, our results may be affected by measurement errors to the extent that the stock market's earnings expectations significantly deviate from time series models. The sensitivity analysis using the US data with identical research attempts to address this issue and to rule out the possibility that our main results are driven by any research design choice. We also note that such measurement errors should bias against us, finding significantly differential reactions to earnings news.

Even though we expect to find audit effect in other markets similar as Singapore, we are unable to conclude whether our results can be generalized to other markets because our study does not address global institutional differences comprehensively. We acknowledge this as one limitation of our study and leave the question to future researchers.

Notes

1. In addition, Singapore has a fairly efficient stock market and comparable interim reporting practices as compared to the USA (quarterly reporting instead of semi-annual reporting, unlike Hong Kong or the EU). Also, interim reports are not subject to mandatory auditor reviews in Singapore. Hence, it provides a more powerful setting to detect the audit effect. Finally, it is currently debated among regulators and practitioners in Singapore whether auditors should be more involved for interim reporting (interim review). We chose Singapore market to generate evidence useful to accounting regulators.
2. Kross and Schroeder (1990) argued that "the enormous size and complexity of large firms requires essentially continuous auditor involvement so that the annual report can be produced and disseminated in a timely fashion".
3. On the importance of interim information, Arif and De George (2015) suggest that investors in foreign firms learn from US interim disclosure for valuation purpose, especially when local interim disclosures are absent.
4. Several studies provide evidence consistent with fourth quarter adjustments (Jacob and Jorgensen, 2007; Das *et al.*, 2009; Dhaliwal *et al.*, 2004).
5. One exception is the study by Cornell and Landsman (1989), which suggests the fourth quarter earnings announcements are more informative to investors than interim earnings

announcements. This study features unique research design, which makes it not directly comparable to other studies in this stream of literature. For example, they look at longer security returns windows and concurrently incorporate analysts' forecast revisions, as well as earning forecast errors, into the estimation model.

6. Mendenhall and Nichols (1988) hypothesize that managers exercise greater discretion to delay the recognition of bad news over interim earnings than annual earnings. They find a higher ERC for bad news interim earnings than the fourth quarter bad news. However, the discussion paper by Palepu (1988) points out that this result is also consistent with the fourth quarter earnings announcements (both good and bad news), having smaller ERC than interim announcements.
7. Collins *et al.* (1984) also discussed that "an additional source of higher fourth-quarter errors might be related to interperiod allocation errors attributable to the use of integral reporting methods; for example, overhead rates could be predetermined at the beginning of the year and not modified during the year even in the face of anticipated changes in volume or costs".
8. On the cost side, Bédard and Courteau (2015) report that audit fees are 18 per cent higher for Canadian listed firms that choose to have interim reviews.
9. The threshold was raised to S$75m from an earlier S$20m, after public feedback indicated that the latter was too low and would have imposed significant reporting burden on many small companies.
10. In addition, there is no active market for class action shareholders lawsuits in Singapore due to the legal hurdle. There is also no strong evidence of shareholder activism in Singapore, unlike some Western countries and Asian countries like Japan or India.
11. The ownership concentration score is measured as the median percentage of common shares owned by the largest 3 shareholders in the 10 largest privately owned non-financial firms.
12. The other reason why we use time series data is due to the lack of availability of historical analyst forecasts. Any earnings forecasts when available are for larger firms.
13. For the US sample, we implemented 1 per cent winsorization to control for the issue of outliers. For the Singapore sample, we observe more outliers. It is possible that the Singapore data may contain more errors that need a higher percentage of winsorization. Hence, we adopt 5 per cent as the winsorization threshold.
14. We also investigate the market response to the firms' seasonal quarterly earnings changes. First, there is only weak evidence that seasonal quarterly earnings change is value relevant. When we use the basic model (including control variables without interacting with SUE), the coefficient of SUE is 0.0126 and statistically significant (p-value = 0.016 for one-tailed test). However, once we use the extended model (interacting SUE with every control variables), the coefficient on SUE is 0.0103 and insignificant (p = 0.304 for one-tailed test). Second, we do not find significantly higher response to seasonally quarterly earnings changes in the fourth quarter. The coefficient on the interactive term SUE × Q4 is 0.0111 (p-value = 0.122 for one-tailed test) for the basic model and 0.0093 (p = 0.167 for one-tailed test) with the extended model.
15. When SUE is used to measure earnings news, we find similar results. α_3 is −0.031 (p-value = 0.035 for two-tailed test) and −0.028 (p-value = 0.013 for two-tailed test) for the three-day and one-day event window, respectively. In addition, for the sub-sample analysis, α_3 is consistently negative and statistical significant among small firms. α_3 is not even marginally significant among the large firms.

16. We are able to directly control for dividends news announced with interim earnings and final quarter earnings due to unavailability of quarterly dividend data in Datastream. We use the annual dividend payouts available in Datastream to construct the sub-samples. Missing value is considered the same as 0.

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Further Reading

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