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The impact of reporting frequency on the information quality of share price: evidence from Chinese state-owned enterprises

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Abstract

As a major global exchange, the Stock Exchange of Hong Kong (SEHK) only requires semi-annual reporting whereas other major exchanges including the ones in Chinese mainland require quarterly reporting. We argue against the traditional view that higher reporting frequency is necessarily more beneficial. The decision on reporting frequency depends on how the information is being processed by the recipient traders and the results are not obvious. Using a sample of Chinese companies dual-listed in both China A share market and SEHK (AH shares) as the experimental group and mainland's companies listed on SEHK (H shares) only as the control group, we apply the difference-in-difference (DID) method to investigate the impacts of reporting frequency on stock information quality. The results suggest that after China A share market require quarterly financial reporting for all listed companies in 2002, the information asymmetry of the H tranche of AH stocks increases. Different from prior studies, the results suggest a negative association between stock information quality and financial reporting frequency. We argue that the increased information asymmetry in the H tranche is caused by the noise spilled over from the A tranche. We conduct multivariable GARCH tests and find evidence supporting this conjecture.

Keywords: Mainland market, Hong Kong market, Dual-listing, Reporting frequency, Information asymmetry, Volatility spillover effects

1. Introduction

Most of the major exchanges in the global markets, including Chinese mainland (sometimes “mainland”), United States (US), Japan and Singapore, require that their listed companies report financial statements quarterly whereas public companies listed in Hong Kong still reports semi-annually. SEHK, as one of the top global exchanges competing with the New York Stock Exchange (NYSE), has been criticized for not being as comparable in terms of reporting frequency as even emerging markets such as China's Shanghai and Shenzhen Stock Exchanges.¹ Hong Kong and mainland China have very close economic ties and SEHK relies heavily on Chinese companies for new listings. There is an on-going debate on whether SEHK should report quarterly with the latest Consultation Paper on the topic dated back as recently as 2007.²

Despite the obvious benefits of providing more transparency, requiring more frequent financial disclosure is still a controversial decision to make. The decision

depends on whether quarterly reporting is cost beneficial to stakeholders by aligning to international best practices, providing more timely disclosures and better investor protection. Interim and annual reports, which include management discussion and analysis as well as financial reports, are important publicly available information for investors and analysts to make investment decisions and recommendations.³

In 2002, mainland changed its reporting frequency from semi-annually since inception in 1993 to quarterly. For dual-listed AH shares companies in mainland and Hong Kong, even though they file financial reports semi-annually to SEHK, investors in Hong Kong would have access to more information as these companies also issue quarterly reports in A share market. We compare two groups of Chinese stocks listed in SEHK, pure H shares of Chinese companies (H share) and the H-tranche of A-H dual-listed Chinese companies (AH share). The former group follows HK reporting requirement to have semi-annual reporting. The latter group is dual-listed both in mainland and Hong Kong. The A-tranche of these AH shares follows Chinese reporting requirement since 2002 to have quarterly reporting. As such, we can avoid the two problems mentioned above.

The level of information asymmetry is further complicated by the use of different accounting standards for A and H shares companies, which are Chinese Accounting Standards (CAS) and Hong Kong Accounting Standards (HKAS), respectively. With the global trend to converge to one singular global accounting standard, many countries have adopted International Financial Reporting Standards (IFRS) from 2005 onwards. Hong Kong and mainland used Old HKAS and Old CAS up to 2004 and 2007, respectively. Hong Kong has adopted Hong Kong Financial Reporting Standards (HKFRS) from 2005 whereas mainland has adopted New CAS from 2008, which are both considered equivalent to IFRS, an indication of higher reporting quality. New CAS is about 90% to 95% converged with IFRS, except for some minor presentation, disclosure and accounting differences. There is a three-year lag for mainland to adopt IFRS equivalent standard perhaps due to the time it takes to be ready. Further, from 2011 onwards, as New CAS and IFRS are substantially converged, AH shares companies can also use New CAS for their AH shares reporting but only less than 10 companies have adopted this practice since then. Appendix A includes a diagram illustrating the timeline of the change in reporting frequency and reporting standards for AH shares from 1990 to 2015.

During the Period 1 from 1993 to 2001 when A share market was reporting semi-annually using Old CAS, mainland used Old CAS, which is not equivalent to IFRS and considered a lower quality accounting standard. Both AH and H shares have different accounting standards but the same semi-annual reporting frequency.

During the Period 2 from 2002 to 2007 when A share market was reporting quarterly using Old CAS, mainland still used Old CAS but started to have quarterly reporting. The level of investor sophistication in mainland has improved given the more frequent access to financial information despite the lower quality accounting standard. Both regulations and auditing standards had improved from Period 1.

During the Period 3 from 2008 to 2015 when A share market was reporting quarterly using New CAS, mainland adopted New CAS, which is equivalent to IFRS and considered to be a higher quality accounting standard than Old CAS. As both HKFRS and New CAS are considered equivalent to IFRS, AH shares investors would have access to quarterly reporting from 2008 onwards by reviewing the A share quarterly reporting as they are the same underlying companies.

This study would assess whether the more frequent reporting would benefit price informativeness and whether resulting trading activities would outweigh the impacts of more frequent reporting.

II. Literature review

Under agency theory, corporate insiders would have better access to information and could use inside information to extract benefits from minority shareholders (Jensen and Meckling 1979). Principal-agent conflicts could lead to information asymmetry because companies could selectively report positive information and withhold negative information. One way to reduce the principle-agent conflict is to minimize information asymmetry by disclosing more frequent financial information. More information does not necessarily imply better quality information as it depends on the accounting standards used. The presumption is that the more the accounting information is converged to IFRS, the higher the quality of the information. More frequent financial information that is also of high quality would enable the third parties such as investors, analysts, regulators and auditors to better monitor the companies which allow information to be timelier incorporated into stock prices.⁴

On the positive side, some prior studies support that higher reporting frequency reduces information asymmetry and put analysts and traders on a more level playing field as insiders (Leftwich et al. 1981; Schipper 1981; Verrecchia 1990; Botosan and Harris 2000; Yee 2004; Butler et al. 2007; Fu et al. 2012). On the negative side, firms that report more frequently have better incentive to disclose selective information to the market—firms may be more willing to disclose good news and withhold bad news (Brown et al. 2009). In addition, the accounting quality of more frequent financial reports could be lower if short-term monitoring pressure induces more earnings management (Gigler et al. 2014). In this paper, we argue against the traditional view of higher reporting frequent being necessarily more positive. The results are often not obvious and depend on how the traders process the information.

Even an exogenous setting mandated outside of the company's own will did not necessarily improve earnings timeliness (Yee 2004). Therefore, the benefits of more frequency reporting are mixed. The positive empirical studies referred to above supporting that higher frequency generally reduces information asymmetry, which leads to better price informativeness. Studies on both voluntary and mandatory adoptions mainly use the U.S. stock exchanges as a setting, whose reporting frequency requirement changed from semi-annual to quarterly in the 1970s. The U.S. stock exchanges are an open market with a balanced mixed of retail and institutional investors. More recent studies using post-1970 US data are largely not available. This study attempts to contribute to this line of studies on information asymmetry using a sample of Chinese companies listed in SEHK, which is a market outside the focus of existing studies and provides a setting with a less endogeneity problem.

Moreover, despite the enormous efforts by prior studies made to address the endogeneity problem, it is not eliminated completely. The existing studies suffer from endogeneity problem because the samples used have at least two limitations:

One type of studies has the sample setting of a mandatory, regulatory change from a low reporting frequency to a high reporting frequency. Although such setting will hence be exogenous by nature, it potentially faces an omitted-variable problem. Since

the corporate environment changes through time, it will never be sure if the change in stock price informativeness is really driven by the exogenous change in reporting frequency or by changes in environmental factors not captured in the researchers' regression models.

Another type of studies has the sample setting of different groups of firms practicing different reporting frequencies. Such setting enables researchers to implement DID approach to handle the omitted-variable problem mentioned above. However, it faces the endogeneity problem as the sample setting is typically the case that firms are voluntarily and not mandatorily choosing the reporting frequency they prefer. The mainland/Hong Kong setting we use in this study avoids the two difficulties mentioned above.

III. Data

The main research question is how higher reporting frequency impacts information asymmetry and the resulting processing of such information by investors through their trading activities. Stock price reflects long-term fundamental values if there are more company specific information available, but it could also reflect short-term growth momentum if there are higher growth prospects due to recent growth trend. In China, retail investors are primarily momentum oriented. However, given that information asymmetry is not readily measurable, among the well-established information asymmetry measurements in past academic studies, bid-ask spreads, illiquidity and stock price volatility are finally selected after examining the possible ones available.

To investigate the impact of reporting frequency on stock information quality, we analyze the information asymmetry of two groups of firms using the DID method. The treatment group contains 15 Chinese AH share companies that are dual-listed before 2002 and the control group contains 37 Chinese H share companies that are listed before 2002 but are not listed in China A share market. We require the companies to be listed before 2002 because 2002 is the year that China A share market adopts quarterly financial reporting. With such a sample, we have an apple-to-apple comparison between the two groups of firms. The two groups of firms are subject to similar economic environment but different regulations imposed by the stock exchanges.

The company stock data and stock index data are from Datastream database. The firm financial data are from Worldscope database. The sample period is from 1993 to 2015.

Table 1 presents the sample distribution of two types of stock across time. In 1993, the first dual-listed Chinese company in our sample starts trading on both exchanges, and there are six Chinese companies listed in SEHK only. The number of H share companies and AH share companies in the sample continue to increase until 2001 as we require all stocks in the sample to be listed before 2002. It is noted that given the smaller size before 2001 data in Period 1 would likely not produce meaningful results.

To investigate the impacts of China market adopting quarterly reporting on the information quality of AH shares in Hong Kong market, we analyze three measures of information asymmetry used in past literature, namely, bid-ask spread, illiquidity and volatility of AH shares and compare it with the information asymmetry of H shares (Fu et al. 2012).⁵

The first measure used in this study is the stock volatility calculated as the standard deviation of daily stock returns in the calendar year. Volatility is a statistical measure of

Table 1 Sample Composition

Year	Pure H share	AH share	Total Count
1993	6	1	7
1994	13	2	15
1995	14	2	16
1996	18	3	21
1997	28	9	37
1998	28	11	39
1999	29	12	41
2000	34	13	47
2001–2015	37	15	52

This table presents the sample composition across time

the dispersion of returns for a given stock which represents total risk. Commonly, the higher the volatility, the riskier the stock is. In other words, volatility refers to the amount of uncertainty or risk about the size of changes in a stock's value. A higher volatility means that a stock's value can potentially be spread out over a larger range of values. This means that the price of the stock can change dramatically over a short time period in either direction. A lower volatility means that a stock's value does not fluctuate dramatically, but changes in value at a steady pace over a period of time.

The second measure is the Amihud illiquidity (Amihud 2002). Liquidity describes the degree to which a stock can be quickly bought or sold in the market without affecting the stock price. Market liquidity refers to the extent to which a market, such as mainland or Hong Kong's stock market, allows stocks to be bought and sold at stable prices. Smaller capitalization stocks could be more illiquid whereas blue chip stocks could be more liquid. Although Amihud illiquidity is an illiquidity ratio which looks at the price component impact of liquidity, it addresses more than just liquidity.

We calculated daily illiquidity as the ratio of absolute value of daily return to the dollar amount of daily trading volume. The daily illiquidity is the median of the daily illiquidity in the calendar year.

$$\text{Illiquidity} = \frac{|\text{Daily return}|}{\text{Trading volume} \times (\text{Price}_{\text{ask}} + \text{Price}_{\text{bid}})/2}$$

The third measure used is the bid-ask spread which is the amount by which the ask price exceeds the bid. This is essentially the difference between the highest price that a buyer is willing to pay for a stock and the lowest price for which a seller is willing to sell it. For a stock, the larger the size of the difference in price, the lower the level of liquidity and vice versa. Smaller capitalization stocks could have larger bid-ask spreads whereas blue chip stocks could have smaller bid-ask spreads. Although bid-ask spread is also an illiquidity ratio which looks at the trading cost component of liquidity, it also addresses more than just liquidity. It is a good proxy for information asymmetry as determined by market makers who possess different level of information. For example, market participants would commend a higher bid-ask spread if there is more information asymmetry.

Yearly bid-ask spread is the average of daily spread calculated as follows:

$$\text{Bid-spread} = \frac{\text{Price}_{\text{ask}} - \text{Price}_{\text{bid}}}{(\text{Price}_{\text{ask}} + \text{Price}_{\text{bid}})/2}.$$

The three proxies above which are also standard proxies for information asymmetry based on previous studies are considered sufficient to conclude on our research hypotheses.⁴

We control for market level factors that may affect the information asymmetry level including market volatility, market turnover and market return of Hong Kong and mainland markets. Those control variables are controlled for the fundamental institutional differences between the two markets. Other firm level control variables include firm size, return on asset, market to book ratio (MTB), leverage and stock turnover to address the individual company's fundamental differences. These control variables are consistent with previous information asymmetry studies but are not considered exhaustive (Fu et al. 2012).⁶

Table 2 presents descriptive statistics of the information asymmetry measures and control variables. All the variables are trimmed at 1% level to alleviate outlier problem. Though some of the differences between the information asymmetry measures of A and AH shares and corresponding *p*-values suggest that AH firms have lower information asymmetry level, it is difficult to draw any conclusions from the results of this table as they are not robust without the controlling variables included. Moreover, some of the firm-level characteristics documented to be associated with information asymmetry are significantly different for the two types of stocks. The statistics in the table suggest that AH firms have larger balance sheets, higher profitability and leverage and the control variables are mainly to adjust for the size of the companies.

Table 3 presents the correlations among the three information asymmetry measures and control variables. The table shows that the three information asymmetry measures are significantly positively correlated. This suggests that these three proxies of information asymmetry are consistent with each other. The results suggest that the firm size and turnover, measured as the logarithm of total assets and value of all shares traded divided by capitalization, respectively, are both negatively associated with information asymmetry measures. This indicates larger firms are subject to lower information asymmetry, which is consistent with prior studies. As pointed out in Table 2, AH share companies are significantly larger. Therefore comparing the information asymmetry of two types of companies without controlling for company size effect could lead to biased results. Because of this, conducting multivariate regression analysis is necessary to obtain reliable results.

IV. Main results

In this section, we conduct multivariate regression tests on the informativeness of the two types of stocks: H share and AH share. Specifically, we compare three measures of information asymmetry of the AH shares with that of H shares. The conjecture is that when AH share companies need to file their reporting in Q1 and Q3 whereas H share companies do not need to, investors in Hong Kong will receive more information for AH shares than H shares and hence the share price of AH shares should be more informative than H share price.

We test the following specification:

Table 2 Descriptive Statistics

Variable	Share_type	Full Period		1993--2001		2002--2007		2008--2015	
		mean	median	mean	median	mean	median	mean	median
Bid-Ask Spread	H	0.015	0.011	0.018	0.015	0.015	0.010	0.012	0.007
	AH	0.011	0.007	0.016	0.013	0.013	0.009	0.007	0.004
	H-AH (<i>p</i> -value)	0.004 (0.00)	0.004 (0.00)	0.003 (0.05)	0.002 (0.13)	0.002 (0.39)	0.002 (0.00)	0.006 (0.00)	0.003 (0.00)
Illiquidity	H	0.421	0.049	0.565	0.133	0.433	0.037	0.317	0.024
	AH	0.156	0.007	0.444	0.069	0.065	0.007	0.061	0.003
	H-AH (<i>p</i> -value)	0.265 (0.00)	0.043 (0.00)	0.122 (0.36)	0.065 (0.09)	0.367 (0.00)	0.030 (0.00)	0.256 (0.00)	0.022 (0.00)
Stock Volatility	H	0.034	0.032	0.044	0.044	0.029	0.029	0.032	0.029
	AH	0.032	0.030	0.042	0.044	0.029	0.026	0.029	0.025
	H-AH (<i>p</i> -value)	0.002 (0.03)	0.001 (0.02)	0.002 (0.39)	--0.000 (0.61)	0.000 (0.82)	0.003 (0.39)	0.002 (0.07)	0.004 (0.03)
Log(Total Assets)	H	13.636	13.627	13.138	13.109	13.376	13.470	14.217	14.302
	AH	15.089	15.194	13.940	13.829	14.767	14.951	16.064	16.444
	H-AH (<i>p</i> -value)	--1.452 (0.00)	--1.566 (0.00)	--0.802 (0.00)	--0.720 (0.00)	--1.391 (0.00)	--1.481 (0.00)	--1.848 (0.00)	--2.143 (0.00)
Turnover	H	0.465	0.264	0.648	0.314	0.470	0.301	0.347	0.223
	AH	0.402	0.299	0.438	0.302	0.406	0.313	0.379	0.261
	H-AH (<i>p</i> -value)	0.063 (0.08)	--0.035 (0.14)	0.209 (0.03)	0.012 (0.43)	0.064 (0.28)	--0.012 (0.93)	--0.031 (0.44)	--0.038 (0.00)
Return on Asset	H	0.041	0.071	0.008	0.078	0.050	0.068	0.053	0.071
	AH	0.069	0.078	0.061	0.082	0.078	0.079	0.065	0.075
	H-AH (<i>p</i> -value)	--0.028 (0.11)	--0.007 (0.11)	--0.052 (0.36)	--0.005 (0.68)	--0.028 (0.26)	--0.011 (0.06)	--0.011 (0.48)	--0.004 (0.51)
MTB	H	1.169	0.895	1.245	0.968	1.283	1.100	1.020	0.715
	AH	1.050	0.804	0.928	0.729	1.246	1.019	0.957	0.617
	H-AH (<i>p</i> -value)	0.119 (0.10)	0.091 (0.25)	0.317 (0.04)	0.240 (0.13)	0.038 (0.76)	0.081 (0.73)	0.063 (0.55)	0.099 (0.62)
Leverage	H	0.424	0.401	0.387	0.369	0.394	0.351	0.477	0.472
	AH	0.509	0.510	0.431	0.459	0.499	0.523	0.566	0.554
	H-AH (<i>p</i> -value)	--0.085 (0.00)	--0.109 (0.00)	--0.044 (0.10)	--0.090 (0.09)	--0.105 (0.00)	--0.172 (0.00)	--0.089 (0.00)	--0.082 (0.00)
Market Turnover (SH)		1274.314	980.365	121.287	106.428	763.555	372.838	2419.601	2337.699
Market Turnover (HK)		24.142	12.866	4.846	4.794	18.708	11.507	40.973	40.547

This table presents descriptive statistics of the information asymmetry measures and control variables. The differences in means of H share and AH share data are accessed using *t*-test and medians using Wilcoxon rank sum test (*p*-value in parentheses)

$$\text{Information asymmetry} = \alpha + \beta_1 AH \text{ share}_{it} + \beta_1 AH \text{ share}_{it} \times Year_{post2002} + \gamma Control_{it} + \epsilon_{it},$$

where the dependent variable is the information asymmetry, measured by return volatility, stock illiquidity and bid-ask spread of a stock. The key independent variable is the AH share dummy. The variable takes a value of one if the stock is the AH shares. The variable takes a value of zero if the stock is the H shares. We controlled for several firm and market level variables that are documented to be associated with information asymmetry.

Table 3 Correlation Table

	Bid-Ask Spread	Illiquidity	Stock Volatility	Log(Total Assets)	Turnover	Return on Asset	MTB	Leverage
Bid-Ask Spread	1.00							
Illiquidity	0.82 ^a	1.00						
Stock Volatility	0.40 ^a	0.21 ^a	1.00					
Log(Total Assets)	-0.66 ^a	-0.49 ^a	-0.33 ^a	1.00				
Turnover	-0.14 ^a	-0.14 ^a	0.33 ^a	-0.02	1.00			
Return on Asset	-0.13 ^a	-0.19 ^a	-0.13 ^a	0.10 ^a	0.05	1.00		
MTB	-0.07	-0.02	0.09 ^a	-0.21 ^a	-0.21 ^a	0.03	1.00	
Leverage	-0.21 ^a	-0.13 ^a	-0.03	0.39 ^a	-0.05	-0.20 ^a	-0.26 ^a	1.00

This table presents the correlations among the three information asymmetry measures and control variables. ^a denotes significance on 1% level

The market level control variables include market return, turnover and return volatility of both A share and H share market. H share and A share markets are considered different in many institutional aspects, one of which is their degrees of openness. Hong Kong market is deemed as more open while market in the mainland as relatively closed. The majority of the A share listed companies are audited by the local Chinese audit firms rather than the international Big Four audit firms. Some stocks in Hong Kong market are included in emerging market indices such as MSCI, hence are likely to attract international investors. But very few, if any, shares in the A share market are included in such index.

There is the possibility that the difference in information asymmetry proxies between H share and AH share companies are due to not only reporting frequency but also the fundamental differences between the two exchanges. A share market is implicitly supported by the Chinese government during global stock market turmoil, moreover it has more trading activities and higher valuations given the more speculative nature by primarily retail investors. H share market is not explicitly supported by the Hong Kong government, but the Hong Kong government did intervene during the 1997 financial crisis when the market was attacked by shortsellers led by George Soros or when there are extreme fluctuations during normal economic cycles.⁷ Chinese and Hong Kong markets use RMB and HKD, respectively. Therefore, stock market characteristics are controlled in this regression tests.

The firm level control variables include firm size, return on assets (ROA), MTB ratio, stock turnover and leverage. Firm size is measured using the logarithm of total assets. ROA is the return on assets calculated as earnings per share scaled by year end stock price. MTB is the market to book ratio calculated as market capitalization divided by book value of total assets. Leverage is total liabilities over total assets. Stock turnover is the yearly trading volume divided by market capitalization. Although stock turnover could be considered as a proxy for information asymmetry, it also includes other impacts in addition to liquidity. For example, information asymmetry impacts liquidity and turnover but turnover can also directly impact liquidity if investors have different

expectations on information available. In any case, turnover is not a standard information asymmetry proxy used in past literature (Fu et al. 2012). As the firms come from very different industries such as oil & gas, basic materials, industrials, consumer goods, health care, consumer services, telecommunications, utilities, financials and technology etc., firm fixed effects are also incorporated into the results.

We allow the coefficients on the AH dummy to vary for different subperiods. Period 1 spans from 1993 (the beginning of our sample period) to 2001 during which mainland market practiced Old CAS and semi-annual reporting. Hence, the difference in information environment between AH and H shares comes mainly from the difference in accounting quality and the difference in firm characteristics. Period 2 spans from 2002 to 2007 during which A share market still uses Old CAS but the reporting frequency has been changed to quarterly. Given the difference of AH and H shares over Period 1, any difference between AH and H shares over Period 2 should be due to the change in reporting frequency of the A-tranche of the AH shares. Period 3 spans from 2008 to 2015 (the end of the sample period) during which Chinese mainland and Hong Kong use equivalent accounting standards. Comparing the two groups of firms over the three subperiods enables us to control for the differences in market characteristics, economic environment and accounting standards of the two markets.

The results are presented in Table 4. The three panels use different information asymmetry measures but provide similar results. The coefficient estimates on AH share dummy is significantly positive at the 99% level in Period 2 and Period 3 on a cumulative basis for bid-ask spread of 0.00518, illiquidity of 0.22698 and return volatility of 0.00482, which mainly compares information asymmetry differences between quarterly and semiannual reporting frequency. The insignificant results for bid-ask spread of 0.00124, illiquidity of 0.32118 and return volatility of -0.00113 in Period 1 indicate that before 2001, when both markets require semi-annual reporting, the information quality of the two types of stocks are not significantly different. Given the small sample sizes in Period 1 to be meaningful, the results are mainly for reference only.

However, the results are not as obvious when comparing Period 2 to Period 3 with lower bid-ask spread from 0.00746 to 0.00619, higher illiquidity from 0.24316 to 0.41473 and effectively no change in return volatility from 0.00137 to 0.00108. The individual Period 2 and 3 results for return volatility are also not significant. Such results are mainly testing for the change in accounting quality from Old to New CAS which is not the main focus of this study as there could be other control variables not considered in addition to testing for reporting frequency. But after China A share market requires quarterly financial reporting, the dual-listed Chinese companies have higher information asymmetry than the Chinese companies listed only in Hong Kong H share market. While the changes in accounting standard in the A share market may affect the information quality of the AH shares, the above interpretation is not affected. It is noted that the firm level control variables such as total assets, turnover, MTB, leverage and stock volatility are significant whereas the market level control variables such as market volatility, market turnover and market return are not significant, except for Period 3. This means that the institutional differences between the two markets do not have a significant impact on our results even if not controlled for.

In terms of placebo test from 1993 to 2001 before quarterly reporting is implemented, the results for bid-ask spread of 0.00102, illiquidity of 0.34823 and stock

Table 4 Multivariate Regression Results

Panel A			
	(1)	(2)	(3)
	Bid-Ask Spread 1993–2015	Bid-Ask Spread 2002–2015	Bid-Ask Spread 1993–2001
AH Stock	−0.00074(0.4738)	0.00518*** (0.0000)	0.00124(0.3717)
AH Stock×Year 2002–2007	0.00746*** (0.0000)		
AH Stock×Year 2008–2015	0.00619*** (0.0000)		
Log(Total Assets)	−0.00527*** (0.0000)	−0.00466*** (0.0000)	−0.00698*** (0.0000)
Turnover	−0.00813*** (0.0000)	−0.00964*** (0.0000)	−0.00454*** (0.0000)
Return on Asset	−0.00134(0.3352)	−0.00025(0.8991)	−0.00193(0.2140)
MTB	−0.00425*** (0.0000)	−0.00516*** (0.0000)	−0.00131*(0.0881)
Leverage	−0.00596*** (0.0036)	−0.01111*** (0.0000)	0.01081*** (0.0059)
Stock Volatility	0.39789*** (0.0000)	0.50731*** (0.0000)	0.10904(0.1484)
Market volatility (HK)	−0.87089(0.2946)	−1.12289(0.5040)	0.10975(0.5374)
Market turnover (HK)	0.00000(0.3936)	0.00000(0.5485)	−0.00000** (0.0144)
Market Return (HK)	−0.00454(0.6270)	−0.00887(0.7488)	0.01305*** (0.0000)
Market Volatility (SH)	0.04619(0.9145)	0.42988(0.7744)	−0.24213(0.1326)
Market Turnover (SH)	−0.00000(0.1223)	−0.00000(0.4761)	0.00000*** (0.0001)
Market Return (SH)	0.00717(0.1631)	0.00990(0.5702)	−0.01499*** (0.0013)
Constant	0.08839*** (0.0000)	0.08202*** (0.0000)	0.10894*** (0.0000)
Observations	881	666	215
Adjusted R ²	0.721	0.743	0.631
Panel B			
	(1)	(2)	(3)
	Illiquidity 1993–2015	Illiquidity 2002–2015	Illiquidity 1993–2001
AH Stock	0.00443(0.9732)	0.22698*** (0.0005)	0.32118(0.1470)
AH Stock×Year 2002–2007	0.24316*(0.0588)		
AH Stock×Year 2008–2015	0.41473*** (0.0011)		
Log(Total Assets)	−0.32957*** (0.0000)	−0.28926*** (0.0000)	−0.65692*** (0.0000)
Turnover	−0.45710*** (0.0000)	−0.42449*** (0.0000)	−0.46544*** (0.0000)
Return on Asset	−0.44642** (0.0178)	−0.30456(0.2236)	−0.41808*(0.0593)
MTB	−0.16932*** (0.0000)	−0.20471*** (0.0000)	−0.15606*(0.0858)
Leverage	−0.07362(0.6232)	−0.19375(0.1631)	0.29910(0.5063)
Market Volatility (HK)	−51.04054(0.5913)	−77.22211(0.6644)	18.41851(0.4403)
Market Turnover (HK)	0.00000(0.5333)	0.00000(0.5953)	−0.00000(0.7656)
Market Return (HK)	−0.54017(0.5843)	−1.17750(0.6796)	1.00884** (0.0142)
Market Volatility (SH)	−2.16878(0.9631)	39.40506(0.7999)	−36.46854*(0.0708)
Market Turnover (SH)	−0.00000(0.2774)	−0.00000(0.5376)	0.00000(0.5382)
Market Return (SH)	0.59772(0.2191)	1.05452(0.5535)	−0.38797(0.5602)
Constant	5.44451*** (0.0000)	5.03602*** (0.0000)	10.01265*** (0.0000)
Observations	832	631	201
Adjusted R ²	0.475	0.495	0.499
Panel C			
	(1)	(2)	(3)
	Stock Volatility 1993–2015	Stock Volatility 2002–2015	Stock Volatility 1993–2001
AH Stock	0.00255** (0.0425)	0.00482*** (0.0000)	−0.00113(0.5092)

Table 4 Multivariate Regression Results (*Continued*)

AH Stock×Year 2002–2007	0.00137(0.3171)		
AH Stock×Year 2008–2015	0.00108(0.4135)		
Log(Total Assets)	−0.00219***(0.0000)	−0.00239***(0.0000)	−0.00170**(0.0354)
Turnover	0.00540***(0.0000)	0.00721***(0.0000)	0.00425***(0.0003)
Return on Asset	−0.00325*(0.0733)	−0.00081(0.7381)	−0.00300(0.2149)
MTB	0.00139***(0.0006)	0.00111***(0.0096)	0.00211***(0.0087)
Leverage	0.00643**(0.0432)	0.00619*(0.0911)	0.01635***(0.0026)
Market Volatility (HK)	0.34718(0.7064)	−0.04231(0.9805)	1.40833***(0.0000)
Market Turnover (HK)	0.00000(0.6459)	0.00000(0.6292)	0.00000(0.1250)
Market Return (HK)	−0.00684(0.5038)	−0.01490(0.5942)	0.00144(0.7502)
Market Volatility (SH)	0.12482(0.7827)	0.54813(0.7170)	−0.27059(0.2459)
Market Turnover (SH)	−0.00000(0.9226)	−0.00000(0.7445)	−0.00000**(0.0241)
Market Return (SH)	0.00630(0.2815)	0.01246(0.4877)	0.01280*(0.0911)
Constant	0.03704***(0.0003)	0.04058***(0.0000)	0.03090(0.1013)
Observations	888	673	215
Adjusted R^2	0.654	0.547	0.629

This table presents the results of multivariate regression tests. The dependent variable is the information asymmetry measured by bid-ask spread in Panel A, Amihud illiquidity in Panel B and stock return volatility in Panel C. AH stock is a dummy variable that takes the value of one if the stock is the H tranche of a AH dual-listed company. Year and firm fixed-effects are included and standard errors are adjusted for heteroscedasticity. p -values are in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$)

volatility are not significant which means there are no effects to such proxy variables due to other factors without more frequent reporting. On the contrary, in terms of placebo test from 2002 to 2007 after quarterly reporting is implemented, the results for bid-ask spread of 0.00477 and stock volatility of 0.00654 are both significant at the 99% level. Although the result for illiquidity of 0.17253 is not significant, the original DID result of 0.24316 was not strong and only significant at 90% level. In terms of placebo test from 2002 to 2007, if we arbitrarily divide the period into first half and second half periods, the second half period results for illiquidity of 0.11517 and return volatility of −0.00023 are not significant which means there are no effect to such proxy variables due to factors other than with more frequent reporting. Although the result for the second half period for bid-ask spread of 0.00491 is significant, it is presumably due to unquantifiable new policy effects implemented during that period beyond the scope of the current study (Table 5).

The result is surprising that more frequent financial disclosures in A share market leads to lower information quality of the AH shares in Hong Kong market which is contrary to the findings from the US market. We argue against such traditional view that informativeness depends not only on reporting frequency, but more importantly, on the way investors process the reported information. There are both direct impact of AH share investors processing the more frequent A share information and indirect impact of AH share investors influenced by the A share investors' processing such information. After all, information can be incorporated into share price only through trading. Hence, how efficiently the information being incorporated into the share price critically depends on how investors process the information and trade on the information.

Table 5 Placebo Test Results

Panel A		
	(1)	(2)
	Bid-Ask Spread 1993–2001	Bid-Ask Spread 2002–2007
AH Stock	0.00102(0.5615)	0.00477***(0.0001)
AH Stock*Year 2005–2007		0.00491**(0.0189)
AH Stock*Year 1998–2001	0.00027(0.8907)	
Log(Total Assets)	–0.00698***(0.0000)	–0.00467***(0.0000)
Turnover	–0.00453***(0.0000)	–0.00838***(0.0000)
Return on Asset	–0.00193(0.2142)	–0.00411*(0.0635)
MTB	–0.00130*(0.0913)	–0.00358***(0.0000)
Leverage	0.01077***(0.0061)	–0.01293***(0.0001)
Stock Volatility	0.10930(0.1513)	0.76622***(0.0000)
Market Volatility (HK)	0.10899(0.5449)	–0.12596(0.8097)
Market Turnover (HK)	–0.00000**(0.0147)	0.00000(0.1368)
Market Return (HK)	0.01300***(0.0000)	0.03973(0.2333)
Market Volatility (SH)	–0.24207(0.1342)	4.82138(0.1980)
Market Turnover (SH)	0.00000***(0.0001)	–0.00000(0.1461)
Market Return (SH)	–0.01492***(0.0014)	0.00000(.)
Constant	0.10898***(0.0000)	0.00317(0.9549)
Observations	215	306
Adjusted R ²	0.629	0.784
Panel B		
	(1)	(2)
	Illiquidity 1993–2001	Illiquidity 2002–2007
AH Stock	0.34823(0.2435)	0.17253(0.2223)
AH Stock*Year 2005–2007		0.11517(0.3398)
AH Stock*Year 1998–2001	–0.03393(0.9195)	
Log(Total Assets)	–0.65680***(0.0000)	–0.31135***(0.0000)
Turnover	–0.46659***(0.0001)	–0.48176***(0.0000)
Return on Asset	–0.41714*(0.0605)	–0.38402(0.2905)
MTB	–0.15698*(0.0901)	–0.12701***(0.0027)
Leverage	0.30298(0.5089)	–0.20425(0.3869)
Market Volatility (HK)	18.48030(0.4419)	43.97013(0.3459)
Market Turnover (HK)	–0.00000(0.7652)	0.00000(0.1537)
Market Return (HK)	1.01547***(0.0186)	3.11894(0.2216)
Market Volatility (SH)	–36.50617*(0.0694)	374.28515(0.1888)
Market Turnover (SH)	0.00000(0.5345)	–0.00000(0.1649)
Market Return (SH)	–0.39651(0.5542)	0.00000(.)
Constant	10.00759***(0.0000)	–0.52510(0.8964)
Observations	201	289
Adjusted R ²	0.496	0.526
Panel C		
	(1)	(2)
	Stock Volatility 1993–2001	Stock Volatility 2002–2007
AH Stock	0.00081(0.6853)	0.00654***(0.0001)

Table 5 Placebo Test Results (*Continued*)

AH Stock*Year 2005–2007		−0.00023(0.8968)
AH Stock*Year 1998–2001	−0.00239(0.2892)	
Log(Total Assets)	−0.00169**(0.0361)	−0.00239***(0.0003)
Turnover	0.00418***(0.0005)	0.00327***(0.0004)
Return on Asset	−0.00294(0.2316)	0.00009(0.9774)
MTB	0.00205**(0.0123)	0.00017(0.7889)
Leverage	0.01667***(0.0024)	−0.00331(0.5718)
Market Volatility (HK)	1.41178***(0.0000)	−0.81096(0.1096)
Market Turnover (HK)	0.00000(0.1261)	−0.00000***(0.0002)
Market Return (HK)	0.00191(0.6868)	−0.09855***(0.0021)
Market Volatility (SH)	−0.27052(0.2457)	−11.61003***(0.0011)
Market Turnover (SH)	−0.00000**(0.0334)	0.00000***(0.0002)
Market Return (SH)	0.01218(0.1133)	0.00000(.)
Constant	0.03049(0.1083)	0.22668***(0.0000)
Observations	215	309
Adjusted R^2	0.628	0.498

This table presents the results of placebo tests. The dependent variable is the information asymmetry measured by bid-ask spread in Panel A, Amihud illiquidity in Panel B and stock return volatility in Panel C. AH stock is a dummy variable that takes the value of one if the stock is the H tranche of a AH dual-listed company. Year and firm fixed-effects are included and standard errors are adjusted for heteroscedasticity. p -values are in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$)

V. Further tests

Given the China market is dominated by retail investors who are noise traders, we argue that more (frequent) information processed by retail investors could add noise to share price. A recent working paper by Chan et al. (2015) shows that price informativeness improves after day trading was banned in the A share market in 2002. Presumably, reducing frequent trading of retail investors improves information quality. To the extent that more frequent reporting enhances more trading, our result is consistent with theirs. However, it is beyond the scope of the current study to carry out rigorous tests on our conjecture. Nonetheless, we carry out a test that provides some indirect evidence supporting the conjecture.

We construct two equal weighted portfolios of the A tranche and H tranche of AH share companies which allow us to examine the casual relation between stock return of same Chinese SOE companies in two different markets and run a bivariate GARCH model. We allow the spillover effects between the two portfolios to vary after 2002 and after 2008. The model specification is as follows:

$$R_{a,t} = \alpha_{a0} + \alpha_{a1}R_{a,t-1} + \alpha_{a2}D + \varepsilon_{a,t},$$

$$R_{h,t} = \alpha_{h0} + \alpha_{h1}R_{h,t-1} + \alpha_{h2}D + \varepsilon_{h,t},$$

$$h_{aa,t} = \beta_{a0} + \beta_{a1}h_{aa,t-1} + \beta_{a2}\varepsilon_{a,t-1}^2 + \beta_{a3}\varepsilon_{h,t-1}^2 + \beta_{a4}\varepsilon_{a,t-1}^2D + \beta_{a5}\varepsilon_{h,t-1}^2D,$$

$$h_{hh,t} = \beta_{h0} + \beta_{h1}h_{hh,t-1} + \beta_{h2}\varepsilon_{h,t-1}^2 + \beta_{h3}\varepsilon_{a,t-1}^2 + \beta_{h4}\varepsilon_{h,t-1}^2D + \beta_{h5}\varepsilon_{a,t-1}^2D,$$

$$h_{ah,t} = \rho_{ah,0}\sqrt{(h_{aa,t}h_{hh,t})}.$$

$R_a(R_h)$ is the daily stock return of an equal weighted portfolio of A tranche (H tranche) of AH share companies. D is a dummy variable that takes the value of one

after 2002 or 2008 and zero otherwise. h_{aa} and h_{hh} are conditional variances of A-tranche and H-tranche portfolio returns, respectively. h_{ah} is the conditional covariance that captures the extent of co-movement of the two portfolios. In the variance equations, we include ARCH terms from the other portfolio to capture the spillover effect. We use daily stock return from 30th August 1993 to 14th November 2014 because the first dual-listed company in our sample started trading in both exchanges on 30th August 1993 and the Shanghai-Hong Kong Connect was launched in 17th November 2014.

The results are presented in Table 6. The A and H portfolios are consistently highly correlated as evident by significant correlation coefficient of 0.332 and 0.339, respectively, during the periods before and after 2002 and 2008. The coefficient estimates of 0.011 and 0.010 on ARCH (H, A) are significantly positive, suggesting that the information from A tranche, captured by the unconditional volatility of the A tranche portfolio, spills over to the H tranche and significantly impacts the variance of H tranche portfolio. The coefficient estimates of 0.02 on the interaction of ARCH (H,A) with time dummy (ARCH (H, A) $\times D_{2002}$ and ARCH (H, A) $\times D_{2008}$) are not significant. This suggests that the spillover effect has been there since the first subperiod (1993–2001) and remains stable throughout the whole sample period. However, during Period 2, as such coefficient estimates of 0.02 are not significant in the opposite direction of the variance of the H tranche portfolio for the previous trading period to that of the A tranche portfolio for the current trading period, this shows that the spillover impact is mainly one directional from A to H share market. The results are consistent with the conjecture that after A share market requires quarterly financial reporting, the additional information brings noise to the market because individual traders dominate A share market, and the extra noise is spilled over to the H-tranche of AH shares and lowers the information quality of H-tranche stock price.

During Period 3, the coefficient estimates of 0.003 are also significant in the opposite direction of the variance of the H tranche portfolio for the previous trading period to that of the A tranche portfolio for the current trading period, this shows that the spillover impact is actually two directional from A to H share market and vice versa.

Table 6 Bivariate GARCH Model Results

	$D = 1$ after 2002		$D = 1$ after 2008	
	(1) R_a	(2) R_h	(3) R_a	(4) R_h
Constant (Return)	0.073 (0.140)	0.006 (0.921)	0.098*** (0.000)	0.129*** (0.000)
D	-0.014 (0.802)	0.091 (0.174)	-0.071* (0.085)	-0.077* (0.084)
AR(1)	-0.006 (0.607)	0.069*** (0.000)	-0.005 (0.716)	0.070*** (0.000)
Constant (Variance)	0.042*** (0.000)	0.058*** (0.000)	0.025*** (0.000)	0.031*** (0.000)
h_{t-1}	0.930*** (0.000)	0.880*** (0.000)	0.938*** (0.000)	0.892*** (0.000)
$\varepsilon_{a,t-1}^2$	0.079*** (0.000)	0.011*** (0.001)	0.063*** (0.000)	0.010*** (0.000)
$\varepsilon_{h,t-1}^2$	0.002 (0.147)	0.138*** (0.000)	0.003** (0.011)	0.116*** (0.000)
$\varepsilon_{a,t-1}^2 D$	-0.032*** (0.000)	-0.002 (0.632)	-0.023*** (0.000)	0.000 (0.954)
$\varepsilon_{h,t-1}^2 D$	0.000 (0.805)	-0.049*** (0.000)	0.001 (0.634)	-0.036*** (0.000)
ρ_{ah}	0.332*** (0.000)		0.339*** (0.000)	
N	5534		5534	

Notes. p -values are in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Although accounting quality has improved in Period 3 to enhance the direct impacts of H share investors processing the more frequent A share information, it appears the indirect impacts of H share investors influenced by A share investors processing such information are more dominant due to the high level of noise trading. Presumably, even though there is spillover impact overall from the A to H share market, the single H-tranche stock price without the additional information would be less contaminated by noise trading than the dual listed H-tranche. Given the fact that the Hong Kong market has a more balanced mix of retail and institutional investors, the spillover impact is presumably already more moderated than if there were a primarily retail investor base.

VI. Conclusions

The relationship between financial reporting frequency and stock price information quality has been attracting researchers' attention for years and induces abundant studies. China, however, as an important emerging market which has recently increased their financial reporting frequency requirements from semi-annually to quarterly, has been out of the spotlight of such research. This study investigates the impacts of more frequent financial disclosure on information quality for stock price with a sample of AH and H share mainland firms.

Controlling for company and market level variables, the results suggest that AH shares have higher information asymmetry than H shares in Period 2 and Period 3 but not Period 1, indicating that higher financial reporting frequency lead to lower information quality in the A share market. We construct two portfolios consisting of the A and H tranche of AH shares respectively and use a bivariate GARCH model to test the spillover effect. The results suggest that there is a spillover effect from the A tranche to the H tranche—the unconditional variance A tranche is significantly associated with the variance of H tranche. The spillover effect is stable throughout the whole sample period, indicating that the higher information asymmetry in H tranche of AH shares is driven by the increased noise in A tranche rather than stronger spillover effect.

Though the results suggest that higher reporting frequency leads to higher information asymmetry in the A share market and AH shares, it is not necessary and justified to conclude that Hong Kong market should not require quarterly reporting. Afterall, the Hong Kong stock market has different investor base from the markets in Chinese mainland. As the Hong Kong investors are a more balanced mixture of retail and institutional investors, there could be less excessive herd trading activities caused by the more frequently available high quality information resulting from the spillover impacts from markets in Chinese mainland as in the case of AH shares. This presumably would be more of the case for other Hong Kong listed companies which would not have such spillover impacts. As long as high quality information is available more frequently, there is benefit to the Hong Kong investors given the information could allow the prices of the H shares to be more priced in. If the investor's processing of information is not rational in an emerging market, perhaps more education for investors on the importance of fundamental research is warranted. However, the above conclusion on spillover impacts should not be generalized into more established markets like the US.

Endnotes

¹As of the date of this paper, SEHK is putting up for public consultation on dual-class shares for innovative companies to be more competitive with US exchanges.

²SEHK believes that its proposals would “*increase transparency and market efficiency, and bring Hong Kong reporting standards in line with international best practices; ensure the timely disclosure of information to shareholders and investors to enable them to make informed and timely investment decisions; provide investors with a continuous and structured flow of comparable information; and provide for better investor protection as investors would be able to monitor the performance and financial position of a listed issuer more closely*” (SEHK, 2007).

³However, financial reporting is only one type of important information as opponents of the 2007 SEHK proposal did state that “*the existing half-year and annual reporting requirements, together with the Rules on price-sensitive information and notifiable transactions, were sufficient for the timely dissemination of material information to investors*” (SEHK, 2007).

⁴Other variables such as stock price synchronicity and cost of equity were explored but not used. Stock price synchronicity is interpreted as the amount of firm specific information captured in the stock price (Morck et al. 2000). This type of price informativeness measurement might not be an appropriate proxy for this study as Chinese market could be noisier than the typical established markets. As a result, it might not be appropriate to indicate that the residual measurement simply as having more firm specific information. In addition, such measurement is designed for comparing two markets rather than a single market only as in the case of China here. Cost of equity is not a standard proxy for information asymmetry as it could be impacted by many other factors.

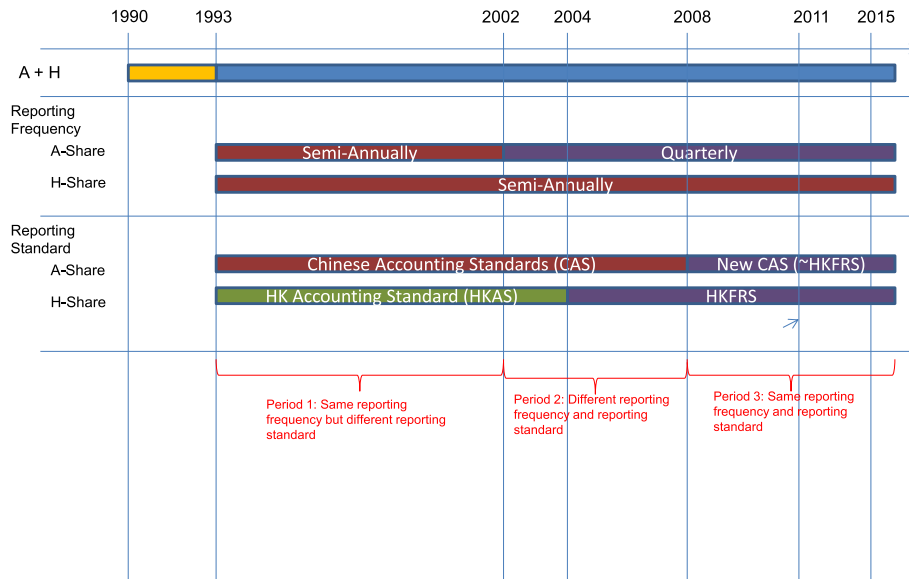
⁵In addition to stock price synchronicity and cost of equity mentioned above, other information asymmetry proxies such as analyst forecast precision, earnings response coefficient, crash risk and discretionary earnings accrual have been considered but not adopted given the smaller and homogeneous sample size to create meaningful results.

⁶To measure the exogenous impacts, companies that volunteer to report more frequently than required by the exchanges should be excluded. This is to control for companies that self-select for endogenous reasons such as having better financial performance or resources to report more frequently. As only a few H shares companies in the technology industry choose to report on a quarterly basis to be comparable with their US counterparts and given the small sample size of H shares, this has been considered but not taken out from the sample to further reduce its overall representativeness.

⁷Chinese market has price limits for trading. Shortselling in Hong Kong is more unrestricted than in Chinese mainland which has only been relaxed starting with mainland investors having been able to short A shares within certain volume limits since 2006 and then with the international investors having the ability to short A shares through Shanghai-Hong Kong Connect since 2014. Shortselling activities do not appear to have a significant impact given the bull market in China and relatively less shortsellers in China like Muddy Waters covering AH shares given their focus are mainly on Chinese ADRs listed in the US.

Appendix A

The following diagram illustrates the time line of the change in reporting frequency and reporting standard for AH shares from 1990 to 2015:



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Availability of data and materials

Datasets on which the conclusions of this manuscript are available in spreadsheets upon request.

Authors' contributions

YTL carried out the design of the study, participated in the statistical results analysis and drafted the manuscript. WHST performed the statistical results analysis. All authors read and approved the final manuscript.

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