The asymmetric impact of positive and negative news on stock return synchronicity

By

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ABSTRACT

I examine the asymmetric impact of positive and negative information on stock return synchronicity that occurs from a change in short-sale constraints. Using a unique Chinese dataset that segments the trading activity of individual and institutional investors, I am able to observe each investor group's relative preference for incorporating firm-level as opposed to market-level negative information. My results show the existence of an asymmetric impact. Moreover, institutional (individual) traders impound more firm-specific (market-wide) negative information relative to market-wide (firm-specific) negative information when they are allowed to short-sell. These findings suggest that the sentiment of the information that is being released plays a significant role in determining the level of stock return synchronicity. The extent to which firm-specific negative information is impounded into prices because of the change of short-sale constraints depends on investor type.

DECLARATION

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CHAPTER 1
Introduction

1 Introduction

Stock returns are driven by new information at both the market and firm level. The extent to which the amount of firm-specific, as opposed to market-wide, information that explains price changes bears important implications for investors. Roll (1988) proposes a measure named return synchronicity to capture such a relationship. Following Roll (1988), a growing body of research has investigated return synchronicity across firms and countries in an effort to find out the reasons for return synchronicity differences.

Factors addressed in the literature include, but are not limited to, the investment environment at the country level (e.g., Morck, Yeung, and Yu, 2000; Jin and Myers, 2006; Fernandes and Ferreira, 2008, 2009; Kim and Shi, 2010; Dang, Moshirian, and Zhang, 2015), firm-level information environment (e.g., Durnev, Morck, Yeung, and Zarowin, 2003; Veldkamp, 2006; Hutton, Marcus, and Tehranian, 2009; Gul, Kim, and Qiu, 2010; Dasgupta, Gan, and Gao, 2010; Chan, Hameed, and Kang, 2013; Hou, Peng, and Xiong, 2013; Kelly, 2014), and investor type (e.g., Gul, Kim, and Qiu, 2010; Piotroski and Roulstone, 2004; Li, Brockman, and Zurbruegg, 2015). Empirical findings suggest that markets with stronger trading protection, firms with a more transparent information environment, or firms dominated by institutional investors would encourage more incorporation of firm specific information. Although these external factors that affect return synchronicity have been well documented, relatively little is known about the information per se (i.e., good versus bad news). The literature shows strong evidence towards the asymmetric impact of positive and negative news on stock returns (e.g., Diamond and Verrecchia, 1987; Aitken, Frino, McCorry, and Swan, 1998; Biais, Bisiere, and Decamps, 1999; Reed, 2007; Bris, Goetzmann, and Zhu, 2007). Such a relationship

motivates me to investigate the potential influence of positive and negative news on stock return synchronicity.

In discussion of the asymmetric impact of positive and negative news on stock returns, prior literature shows that investors respond more to bad news than to good news (e.g., Skinner, 1994; Kasznik and Lev, 1995; Chan, 2003; Tetlock, 2007; Kothari, Shu, and Wysocki, 2009; Truong, 2011; García, 2013). However, these studies do not consider possible limitations on selling stocks. Unlike positive information, where investors can buy stocks at any time, reacting to negative news is restricted by selling existing stocks if short selling is not permitted. Moreover, even if short selling is permissible, investors' ability to short-sell may be restricted by a lack of sufficient capital[1], the recall risk[2], or the high search cost to find a stock lender in non-centralized short-selling markets[3]. In addition, individual investors are bound more by such restrictions since they are confronted with less capital and higher searching costs than institutional investors. Empirically, Boehmer, Jones, and Zhang (2008) show that about 75% of all short sales are executed by institutions, whereas individuals' trading occupies less than 2%. These real-world trading obstacles motivates me to investigate the impact of short-sale constraints on return synchronicity and associate it with investor type. By doing so, I aim to fill the gap in the literature by providing a deeper understanding of how positive and negative information leads to different types of investor response in incorporating firm-level information.

The primary objective of this research is to investigate any asymmetric impact of positive and negative information on the stock return synchronicity that occurs from a change in

[1] Investors need sufficient capital to cover the loss before they make a profit.
[2] The recall risk refers to the lender having the right to request the return of stocks at any time before making money.
[3] In non-centralized shorting markets, finding a lender takes longer and costs more, making it even more difficult to execute a short position.

short-sale constraints. Specifically, I formulate the following hypotheses. First, I posit that, with the relaxation of short-sale constraints, investors are offered more opportunities to impound negative information and thus result in a return synchronicity difference between shortable and non-shortable shares. Second, this study aims to contrast the abilities of institutional and individual investors in impounding negative information into the stock price. Given that institutional investors have a greater ability to execute short-sale orders, I presume a relatively larger synchronicity difference between shortable and non-shortable shares in markets dominated by institutional investors. Third, although the lifting of short-sale constraints is expected to facilitate the flow of negative information at both market and firm level, the facilitation of certain types of negative information may depend on investor type. Institutional (individual) investors trade relatively more on firm-specific (market-wide) information (Piotroski and Roulstone, 2004). Therefore, when they are allowed to short sell, I conjecture that institutional (individual) investors tend to incorporate more firm-specific (market-wide) negative information. In other words, the return synchronicity of shortable shares is relatively higher (lower) than non-shortable shares in markets where individual investors (institutional investors) dominate. Fourth, a better corporate governance structure encourages better information disclosure that results in investors' higher willingness to incorporate the information (e.g., Karamanou and Vafeas, 2005; Gul, Kim and Qiu, 2010; Armstrong, Balakrishnan, and Cohen, 2012; Li, Brockman, and Zurbruegg, 2015). I will test how a better corporate governance structure contributes to such an asymmetric impact of good and bad news on return synchronicity.

I examine my objectives using A- and H- dual listed shares[4] under China's unique capital market framework for the following reasons. First, these dual-listed stocks are one company traded in two economic zones (i.e., mainland China and Hong Kong) in one country. They have the same firm characteristics and firm-level information. This provides better controls when making a comparison. Second, only certain shares on the designated list can be short-sold in both the A- and H-share markets. The designated lists are different in the two markets and are regularly updated. This semi-open access to short-sales allows me to compare shortable and non-shortable shares in a single market. Third, the mainland Chinese stock market is dominated by Chinese citizens (tilted individual investors) but the majority of investors in Hong Kong are from Hong Kong and other countries (tilted institutional investors) (HKEx, 2016). This segmentation allows me to observe institutional and individual investors' different responses to positive and negative information. I collect a sample of 86 companies that are incorporated in mainland China and traded simultaneously on the Shanghai Stock Exchange or Shenzhen Stock Exchange (A-shares) and the Hong Kong Stock Exchange (H-shares). The sample period is January 2005 to December 2014. This period includes a change of short-sale regulations on the mainland Chinese market beginning March 2010. Using the accounting and financial data from DataStream and CSMAR, I construct a measure of firm-specific information based on stock return synchronicity. In detail, I gauge the firm-specific information incorporation using the R^2 obtained from the regression of the daily individual stock returns on the daily market returns. I collect the news data from Thomson Reuters News Analytics (TRNA) and obtain corporate governance data from the China Stock Market and Accounting Research (CSMAR).

[4] A-shares are shares issued on Shanghai Stock Exchange (SSE) or Shenzhen Stock Exchange (SZSE). H-shares are shares listed on the Hong Kong Stock Exchange (HKEx).

The empirical results show that short-sale constraints result in a significantly different level of return synchronicity. The magnitude of the difference in the H-share market is larger than the A-share market. Specifically, shortable A- (H-) shares present higher (lower) return synchronicity than non-shortable shares. My interpretation of these results is that when individual investors are allowed to short sell, they trade on market-wide negative information. In contrast, institutional investors trade on firm-specific negative information.

The second set of empirical results is generated from a series of robustness tests to support my interpretation above. First, I test the change of liquidity commonality due to the relaxation of short-sale constraints. The literature suggests that liquidity commonality is higher in markets with more correlated trading (e.g., Kamara, Lou, and Sadka, 2008; Koch, Ruenzi, and Starks, 2009) or more noisy traders (Huberman and Halka, 2001). Given that individual investors trade on market-wide negative information whereas institutional investors prefer to trade on firm-specific negative information, correlated trading can arise from trading on the same piece of information. In addition, Foucault, Sraer, and Thesmar (2011) suggest that individual investors are considered noisy or speculative. I expect that the shortable A- (H-) shares present higher (lower) liquidity commonality than non-shortable A- (H-) shares. Next, I conduct tests to observe separately trading volumes on days with market-wide news and firm-specific news. I rely on a news data set provided by Thomson Reuters News Analytics (TRNA) to collect the real-time news releases at the firm level from 2005 to 2014. TRNA not only records all news articles attached to each firm but also quantifies the sentiment (i.e., positive or negative) and the relevance (i.e., to what extent a news item is related to a company) based on professional algorithms. My previous findings suggest that individual (institutional) investors trade on market-wide (firm-specific) negative information.

Therefore, on days with market-wide negative news, I expect an increase of trading volumes for stocks that are allowed to short-sell in the A-share market. On days with firm-specific negative information, I expect larger trading volumes of H-shares than their dual-listed A-shares. The empirical results broadly confirm my expectation. They show a significantly higher (lower) liquidity commonality among shortable shares than non-shortable shares in the A-share (H-share) market. The shortable A-shares' trading volumes are significantly higher than non-shortable shares on days with market-wide negative news. On days with firm-specific negative information, H-shares' trading volumes are higher than their counterparts in the A-share market. All this evidence supports my primary expectation that positive and negative information have an asymmetric influence on return synchronicity. More interestingly, with the lifting of short-sale constraints, institutional investors in the H-share market incorporate more firm-specific negative information into prices. However, individual investors in the A-share market rely on market-wide negative information when they trade.

The last set of the tests incorporates the role that corporate governance plays in explaining the impact of short-sale constraints on return synchronicity. Good corporate governance leads to high quality information disclosure that then improves firm transparency (Karamanou and Vafeas, 2005; Armstrong, Balakrishnan, and Cohen, 2012). I expect that stronger (weaker) corporate governance increases (decreases) institutional investors' willingness to process firm-specific negative information and amplifies (mitigates) the asymmetric impact on the H-share market. I would expect no significant impact on the A-share market since individual traders rely on market-wide negative information. The empirical results show weak evidence on the importance of corporate governance but, to some extent, it supports my hypothesis. For instance, the dual roles of CEO and chairman of the board reduce institutional investors' incentive to incorporate firm-specific negative

information. Therefore, the return synchronicity disparity between the shortable and non-shortable shares is lessened.

In summary, my empirical results confirm the existence of the asymmetric impact of positive and negative news on return synchronicity. Institutional investors have a stronger capability to deal with firm specific information than individual investors. In particular, institutional (individual) investors trade more on firm-specific (market-wide) negative information when short-sale constraints are relaxed. In the robustness tests, I find that shortable shares show higher (lower) liquidity commonality on the A-share (H-share) market. The trading volumes of shortable A-shares are larger than non-shortable A-shares on days with market-wide negative information. The trading volumes of H-shares are larger than A-shares on days with firm-specific negative information. All this empirical evidence further supports my primary findings. Finally, in general, a better corporate governance environment has weak power to amplify this asymmetric impact. The dual role of CEO and chairman provides evidence of mitigation of the asymmetry effect in the H-share market.

This study contributes to the existing literature as detailed below. First, my research advances our understanding in previous return synchronicity literature by incorporating the impact of information per se (positive versus negative news sentiment). Second, my research findings provide additional evidence to support the view that return synchronicity is inversely related to the level of firm-specific information. Third, by using data from the Chinese market that separates the institutional and individual investors, I show institutional and individual investors' different trading preferences towards firm-specific as opposed to market-wide information when they are able to short-sell. In addition, the study provides several implications for capital market regulators. It is suggested that regulation of short-sale constraints should be tailored based on market

conditions. In markets with a larger proportion of individual investors, relaxation of short-sale constraints may lead to greater correlated trading or noisy trading. That is, individual investors overly concentrate on the market recession and overlook stocks with good firm-specific information, which might not serve the purpose of improving market efficiency. Alternatively, regulators could encourage more participation of institutional investors in the mainland Chinese market to facilitate incorporation of firm-specific negative information.

The remainder of this thesis is organized as follows. In chapter 2, I provide the background discussion for the mainland Chinese and Hong Kong markets. In chapter 3, I discuss related research. In chapter 4, I develop the hypotheses. In chapter 5, I describe my data sources and methodology. In chapter 6, I present the empirical results and discuss their implications. I conclude with chapter 7.

CHAPTER 2
Background

2 Background

This chapter provides a brief introduction to the mainland Chinese and Hong Kong stock exchanges. The first section discusses their history and provides a statistical overview. The second section points out the differences between the two stock markets such as trader type, trading rules and corporate governance. The third section introduces the price premium puzzle on cross-listed A- and H-shares.

2.1 The development and features of the mainland Chinese and Hong Kong stock exchanges

Until the late 1970s, China remained a centrally controlled economy with all economic activities and investment decisions planned and controlled by the government. Since the 1980s, the Chinese government has tried various strategies to transform the central planned economy to a market-oriented economy. One of the most influential strategies was the restructuring of state owned enterprises (SOEs). Limited by the capacity of government funding, SOEs have to raise capital from the public to support their operations and expansion. To facilitate this process, the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE) were established (Jiang, Yue, and Zhao, 2009). SSE was set up on 19 December 1990 and SZSE followed on 3 July 1991. At the end of 2014, 2613 companies were listed on these two exchanges.

A firm incorporated in mainland China has the option to issue five types of share to the domestic market. They are state shares, legal person shares, employee shares, A-shares and B-shares. State shares are held by government agencies such as local finance bureaus. Most listed Chinese companies have a large percentage of state shares. Legal person

shares are held by domestic companies or non-individual legal persons. They can also be held by the government through legal person entities. Only the last two types of shares (A-shares and B-shares) are freely tradable. A-shares are ordinary shares issued to residents of the People's Republic of China (PRC) and Qualified Foreign Institutional Investors (QFII). To qualify for an Initial Public Offering (IPO), companies are required to issue at least 25% of their total outstanding shares as tradable A-shares. B-shares have been available to foreign investors since 1992. Companies can choose to list their B-shares on either of the two national stock exchanges, SSE or SZSE. Given that China's renminbi (RMB) is not freely convertible, B-shares are traded in either US dollars on SSE or HK dollars on SZSE. B-shares were originally available only to foreign investors. Since February 2001, they have also been available to Chinese citizens if they have the required foreign currency. Before 2005, about two-thirds of the shares were not tradable because of government control. This strict separation between the tradable and non-tradable shares was re-structured in April, 2005, through the split share reform. It started with a pilot program with four listed firms and gradually expanded to almost all listed firms by the end of 2007. This reform reorganised companies as limited liability corporations with more freely tradable shares and profit-oriented objectives.

Attracted by China's economic growth potential, there has been an increasing demand from international traders to invest in Chinese companies. To make this happen, the Chinese government issued its first regulations on overseas listing on April 19, 1993. Because of the advantages of language, location, and political connections, the Hong Kong market became the preferred place for overseas listing. Hong Kong Exchanges and Clearing Limited (HKEx) developed from the merger of the Stock Exchange of Hong Kong Limited (SEHK), Hong Kong Futures Exchange Limited (HKFE) and Hong Kong Securities Clearing Company Limited (HKSCC). HKEx has three vertically integrated

core markets: a securities market[5], derivatives market and industrial metal market. Shares listed on the Hong Kong market (H-shares) offer investors from Hong Kong or other countries opportunities to invest in the Chinese market without the various eligibility and currency restrictions. Three months after the release of the oversea listing regulations, Tsingtao Brewery became the first H-share listed on the Hong Kong Stock Exchange. To gain a larger financing base, many H-shares chose to list back on the Shanghai or Shenzhen Stock Exchanges. Apart from H-shares, some shares are state-backed companies incorporated outside mainland China and listed on Hong Kong Stock Exchange through a direct IPO or backdoor listing[6]. These companies are usually big, powerful and diversified conglomerates. They are known as red chips because they usually represent the interests of China's provincial states or other leading authorities.

For each share type, I summarize the related exchanges, trading currency and eligible investors in Table 2.1. Even though there are no restrictions on the Hong Kong market, Chinese residents still have limited access to trade in Hong Kong because of currency management and capital control.

[5] By June 2016, there were 1902 listed companies.
[6] A backdoor listing is also known as a reverse takeover. It refers to a privately owned entity seeking a shell company on the stock exchange and using its listed status.

Table 2.1
A summary of the different types of shares on the Chinese market.

Share type	Exchange	Currency	Traders
A-shares	Shanghai	Chinese Renminbi (RMB)	Residents of PRC & QFII
	Shenzhen	Chinese Renminbi (RMB)	Residents of PRC & QFII
B-shares	Shanghai	U.S. dollars (USD)	Non-residents of PRC & residents of PRC (after 2001)
	Shenzhen	Hong Kong dollars (HKD)	
H-shares	Hong Kong	Hong Kong dollars (HKD)	No restriction
Red chips	Hong Kong	Hong Kong dollars (HKD)	No restriction

Source: SSE, SZSE and HKEx

Table 2.2
A summary of the China dimension in the HK market (2014).

Main board

	Number	Market capitalization (% of market)	Turnover (%)
H-shares	172	19.65	32.12
Red chips	125	21.71	15.43
All	297	41.36	47.55

Growth Enterprise Market

	Number	Market capitalization (% of market)	Turnover (%)
H-shares	23	3.13	1.99
Red chips	5	7.50	2.67
All	28	10.63	4.66

Source: Hong Kong Exchanges and Clearing Limited (HKEx), 2015

Information on the China dimension in the Hong Kong stock market is given in Table 2.2. By the end of 2014, there were 125 listed red chip companies on the main board accounting for 21.71% of the market capitalization. Five red chip companies were listed

on the Growth Enterprise Market (GEM), representing 7.5% of market capitalization. One hundred and ninety-five H-share companies are listed on the main board and GEM, accounting for 19.65% and 3.13% capitalisation, respectively. The turnover of H-shares is larger than red chips on both the main board and GEM.

Table 2.3
Securities market statistics in mainland China on December 2014.

	December 2013	December 2014	Percentage change in 2014 (%)
Number of domestic listed companies (A-shares and B-shares)	2489	2613	4.98%
Number of domestic listed foreign investment shares (B-shares)	106	104	-1.89%
Number of overseas listed companies (H-shares)	185	206	11.35%
Total issued shares (Unit: 100 million)	40569.08	43610.13	7.50%
Total market capitalization (Unit: RMB100 million)	239077.19	372546.96	55.83%
Turnover (Unit: RMB100 million)	39672.04	181362.61	152.00%
Average daily turnover (Unit: RMB100 million)	1803.27	7885.33	147.00%
SSE Composite Index (Close)	2115.98	3234.68	52.87%
SZSE Composite index (Close)	1057.67	1415.19	33.80%
Valid stock accounts (Unit: 10 thousand)	13247.15	14214.68	7.30%

Source: China Securities Regulatory Commission, 2015

Table 2.3 shows the securities market statistics at the end of December, 2014. A total of 2613 companies were listed on the mainland Chinese market; 104 of 2613 were of B-shares. The number of H-shares listed on the Hong Kong market was 206. The total market capitalization reached 372546.96 (RMB 100 million) and the turnover was 181362.61(RMB 100 million). Compared with 2013, the December 2014 SSE and SZSE composite indexes experienced a large increase, 52.87% and 33.8%, respectively.

2.2 A comparison of the mainland Chinese and Hong Kong markets

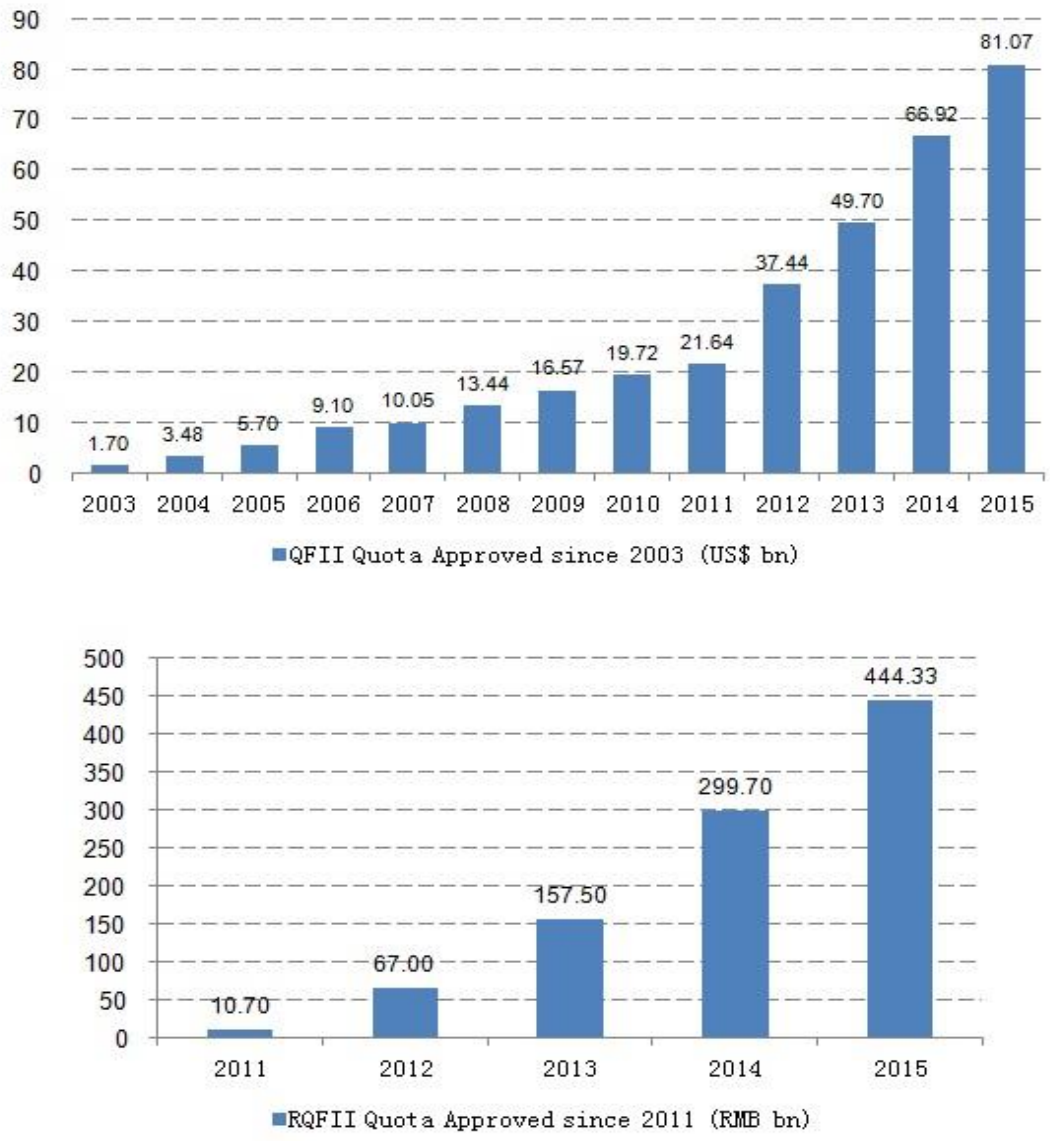
The trading environments of the mainland Chinese market and Hong Kong market differ in various ways. Compared with the Shanghai and Shenzhen Stock Exchanges, the Hong Kong Stock Exchange is more open, better developed and more rigorous about the information disclosure.

2.2.1 Investor composition

In terms of investor composition, A-shares are issued to the domestic Chinese citizens and Qualified Foreign Institutional Investors (QFII), whereas H-shares are available to international investors and Qualified Domestic Institutional Investors (QDII). Generally, the Hong Kong market is more international with a larger proportion of institutional investors. Institutional investors from Hong Kong and overseas comprise 65 per cent of the total turnover (HKEx, 2016). The mainland Chinese market is dominated by the local retail investors and offers limited access to the foreign investors.

Figure 1

Approved quotas for QFII and RQFII.



Source: Shanghai Stock Exchange, 2016

Regulation of the QFII program was introduced in 2002. It allows licensed foreign investors to buy RMB dominated A-shares in mainland China. The qualified domestic institutional investors (QDII) scheme was set up in 2006, allowing Chinese institutions and residents to invest in overseas financial products. In addition to QDII and QFII, a

new program named Renminbi Qualified Foreign Institutional Investor Scheme (RQII) was launched in December 2011. It allows Hong Kong subsidiaries[7] to invest in the mainland Chinese market with Renminbi funds raised in Hong Kong. QFII and RQFII must obtain investment licences through the China Securities Regulatory Commission (CSRC) and obtain an approved investment quota[8] from the State Administration of Foreign Exchanges (SAFE). According to the data from Shanghai Stock Exchange, at the end of 2015 over 200 foreign institutions had been granted a QFII licence and over 100 were qualified as RQFIIs. The QFII and RQFII quotas have reached 81.07 billion US dollars and 444.33 billion RMB, respectively (Figure1).

2.2.2 Accounting standards

The accounting standards used in the two markets are different. Chinese companies are required to prepare financial reports based on the Chinese Generally Accepted Accounting Principles (GAAP). These reports are generally audited by local accounting firms. Companies cross-listed on the Hong Kong Stock Exchange have to follow a dual reporting system and prepare the International Financial Reporting Standards (IFRS) disclosures audited by international auditing firms for the convenience of international comparison. According to the Central Peoples' Government of the Peoples' Republic of China, the Ministry of Finance issued new Accounting Standards for Business Enterprises (ASBE) on 15 February 2006. These updated accounting standards substantially converged with IFRS and took effect on 1 January 2007. However, cross-listed companies are still required to follow the dual reporting system. Effective from 15 December 2010, HKEx introduced a new rule allowing mainland incorporated Chinese

[7] Hong Kong subsidiaries refer to subsidiaries that Chinese fund management companies and securities companies set up in Hong Kong.
[8] Because of capital control in mainland China, QFIIs have to submit a quota application to SAFE for reviewing and approving. Once approved, they can open RMB cash accounts and securities accounts through custodian banks.

companies on the Main Board and Growth Enterprises Market to prepare financial reports using mainland Chinese accounting standards.

2.2.3 Short-sale constraints

An important difference between the Hong Kong and mainland Chinese markets is the short-sale constraints imposed on stocks. A short-selling pilot program was first launched with 17 eligible stocks in January 1994. Under the scheme, stocks could not be short-sold below the best current asking price. This rule was abolished in 1996 and re-imposed in 1998. Until now, not all stocks are allowed to short-sell on the Hong Kong stock market. Only companies on the designated list are eligible for short-sales but the list is subject to regular revision (HKEx, 2016). With regard to the mainland Chinese market, short-selling was totally banned before 2010. A trial program (i.e., a margin trading and security lending scheme) with a list of 90 constituent shares on the SSE 50 and SZSE component index was initially approved by the China Securities Regulatory Commission (CSRC) in March, 2010. In December 2011, seven exchange traded funds were added to the designated list. By the end of December 2014, 856 securities had become eligible to be short-sold through the margin trading and security lending policy.

Table 2.4 lists the events that shares in mainland China experienced with regard to short-selling. Column 1 gives the effective date of events; column 2 states the number of shares/companies added to the list; column 3 states the number of shares/companies deleted from the list; and column 4 gives the total number of shares/companies on the list. In November 2011, January 2013, September 2013 and September 2014, many companies were added to the designated list.

Table 2.4
The number of shares/companies on the designated list in mainland China

Date	No. added	No. deleted	No. on the list
31/03/2010	90		90
01/07/2010	5	5	90
29/07/2010	1	1	90
05/12/2011	189	1	278
04/06/2012	2		280
29/10/2012	1		281
31/01/2013	276		557
06/03/2013		1	556
07/03/2013		1	555
26/03/2013		2	553
29/03/2013	1	2	552
10/04/2013	1		553
24/04/2013	1		554
02/05/2013		1	553
03/05/2013		1	552
27/05/2013	1		553
25/07/2013	1		554
05/08/2013	1	2	552
16/09/2013	203		757
04/12/2013	1		758
17/03/2014	1		759
28/03/2014		1	758
01/04/2014		1	757
05/05/2014		2	755
22/09/2014	101		856

Source: SSE and SZSE

2.2.4 Corporate governance

In mainland China, security laws are imposed by CSRC, the Shanghai Stock Exchange and the Shenzhen Stock Exchange. With regard to corporate governance structure, the Code of Corporate Governance issued in 2002 specifies the requirements for listed companies (Xu and Lin, 2016). Some important rules briefly are:

1) Shareholder meetings are required once per year. Interim meetings are called by large shareholders, boards of directors, or boards of supervisors when necessary. A board is required to hold at least two meetings every year.

2) Listed companies are required to have 5 to 19 directors.

3) At least one-third of board members are required to be independent directors.

4) Qualified independent directors have to meet criteria like having no relationship with the manager, not being in the top 10 shareholders, not holding more than one per cent of the shares, or having business affiliations with the company.

5) China has a two-tier board structure (i.e., board of directors and board of supervisors).
6) There must be at least three supervisors on the board and at least one third of supervisory members have to be employee representatives.

When seeking overseas listing, Chinese companies are required to obtain approval from the China Securities Regulatory Commission (CSRC) and obey additional rules. For example, the companies are required to send a 45-day notice to shareholders before shareholders' meetings. Shareholders with greater than 5 per cent of the voting rights are allowed to present proposals at the shareholders' meeting. Dual-listed companies are required to release information simultaneously to the domestic and foreign markets.

The listing requirements on the mainland Chinese and Hong Kong stock exchanges are different. For instance, according to a corporate governance practice guide issued by HKEx, the definition of connected person or related party is broader in mainland China than in Hong Kong. An announcement is required when the transaction value is larger than 0.1 (0.5) per cent of net assets in Hong Kong (mainland China). Audit and remuneration committees must be established in Hong Kong, whereas they are not

compulsory in mainland China. Blackout periods for directors[9] are longer in Hong Kong than in Mainland China. In general, companies have to comply with stricter rules. For Chinese companies seeking to list on the Hong Kong Exchange as H-shares, some special requirements are added. For example, at least one of the independent non-executives is required to be a Hong Kong resident; supervisors have to demonstrate their competence for the position.

2.2.5 Other trading rules

Different trading agreements are also applied in the two markets. Based on the trading rules in SSE, SZSE and HKEx, some key differences are:

1) The mainland Chinese market triggers the suspension of trading when prices move beyond the limit; under Hong Kong's Volatility Control Mechanism (VCM), a five-minute cooling-off period is triggered when the price of an applicable stock moves 10% more than last traded price five minutes ago.

2) Quoted stocks whose prices are increasing (decreasing) are in red (green) in mainland China. The display colour is opposite in Hong Kong.

3) The settlement cycle for stocks is usually T+1 in mainland China whereas the Hong Kong market allows trading on the same day.

[9] Blackout periods for directors are periods that directors are prevented from trading around financial and other important announcements.

4) Shanghai and Shenzhen Exchanges open from 9:30 am to 11:30 am and 1:00 pm to 3:00 pm from Monday to Friday; the HKEx runs from 10:00 am to 12:30 am and from 2:30 pm to 4:00 pm, Monday to Friday.

5) The Hong Kong stock market allows investors to hold physical certificates but such a practice is not found in the mainland China stock market.

2.3 The price discrepancy puzzle

A price difference for one company simultaneously traded in two segmented markets is well known. Unlike cross-listed stocks in other markets, there are limited arbitrage channels for A- and H-shares in China.

The Hang Seng China AH Premium Index (HSAHP) measures the average price spread of A-shares over H-shares for the largest and most liquid cross-listed Chinese companies traded in mainland China and Hong Kong. If HSAHP is less (more) than 100, it indicates A-shares are traded at a discount (premium) compared with H-shares. As shown in Figure 2, A-shares are mostly traded at premium relative to simultaneously traded H-shares. Various explanations are provided in the literature about this price disparity puzzle. Chakravarty, Sarkar, and Wu (1998) emphasize the issue of information asymmetry. Foreign investors[10] bear an information disadvantage compared with local investors[11] and therefore are reluctant to pay the same price. Fernald and Rogers (2002) point to the problem of limited investment opportunities in mainland China, therefore, local investors are more willing to purchase at a relatively higher price given fewer investment options.

[10] Foreign investors refer to investors outside mainland China (H-share investors).
[11] Local investors refer to mainland Chinese investors (A-share investors).

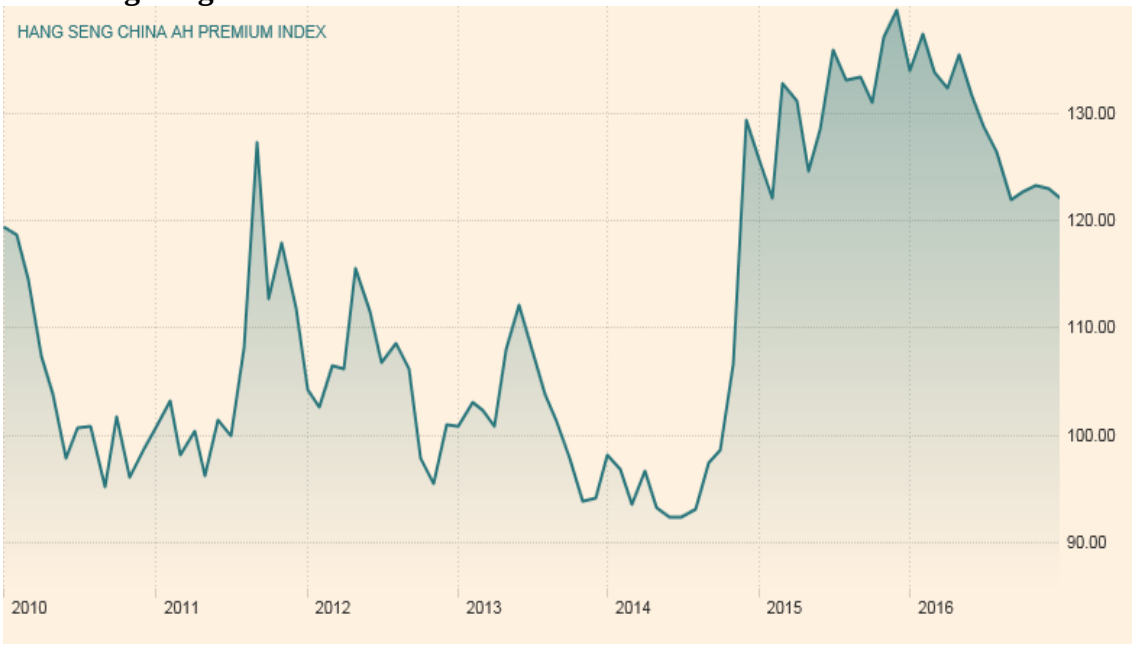
Chan and Kwok (2005) document other issues like capital controls, a low interest rate, and low liquidity in the debt market[12].

It is noteworthy that the average HSAHP dropped below 100 around the beginning of 2014. This HSAHP discount may be related to the Shanghai-Hong Kong Stock Connect Program announced by the Securities and Futures Commission (SFC) and the China Securities Regularity Commission (CSRC) on 10 April 2014. This connect program is an important step to speed up the integration of the mainland and Hong Kong stock markets. In addition to QFII, RQFII and QDII, it allows more Chinese investors to participate in the Hong Kong market and more foreign investors to purchase A-shares in China. In this way, Chinese investors are offered more investment alternatives and investment diversification. Also, it improves the trading efficiency for cross-listed AH shares. However, it is surprising that, after the official launch of the Shanghai-Hong Kong Connect Programme on 17 November 2014, the premium of A-shares over H-shares increased to around 30%. This may be explained by imperfect arbitrage because of the strict eligibility criteria for individual investors[13] and short-selling restrictions.

[12] In China, the debt market is concentrated in government securities and therefore presents low liquidity.
[13] Qualified RQFII Individual investors are required to hold at least RMB 500,000 on aggregate in their securities and cash accounts.

Figure 2

The Hang Seng China AH Premium Index 2010 to 2016



Source: Financial Times

CHAPTER 3
Literature Review

3 Literature Review

This chapter reviews the related research areas. The first section discusses the factors that influence stock return synchronicity. The second section summarises the determinants of liquidity commonality. The third section reviews the role of short-sale constraints in the market. The fourth section covers the relationship between news sentiment and the stock market. The last section discusses how corporate governance influences firms' information environment. The main focus of this chapter is to build a comprehensive understanding of return synchronicity and associate it to short-sale constraints, news sentiment, and corporate governance.

3.1 Return synchronicity

Roll (1988) suggests that stock synchronicity can be explained by the amount of firm-specific information, relative to the market or industry information, being incorporated into stock prices. This idea has been further investigated and developed in a body of literature at both the country and firm level. Various explanations have been provided.

Early empirical research studied return synchronicity at the country level. The focus was on countries' economic fundamentals (e.g., per capita Gross Domestic Product (GDP)), institutional settings, and the quality of the information environment (e.g., Morck, Yeung, and Yu, 2000; Jin and Myers, 2006; Fernandes and Ferreira, 2008, 2009; Kim and Shi, 2010; Dang, Moshirian, and Zhang, 2015). Morck, Yeung, and Yu (2000) examine return synchronicity across 40 countries and find a larger stock return co-movement in developing countries with weak property rights than in developed markets with stronger legal protection. They suggest that poor investor protection would reduce the participation of informed traders relative to noise traders and thus increase synchronicity.

They also show a declined return synchronicity in the U.S. market over the twentieth century. Similarly, Jin and Myers (2006) document a positive relationship between return synchronicity and countries' opaqueness. They further argue that the lack of transparency[14] is essential to reinforce the relationship between imperfect investor protection and the increase in return synchronicity. Using a risk division theory (i.e., the division of risk-bearing between managers and investors), they suggest that opaqueness leads to high return synchronicity and also shifts firm-specific risk to managers. It can be beneficial and harmful. The good side is allowing managers to take full advantage of cash flows when the company operates well. The bad side is encouraging managers to take the temporary downside risk and losses in the short term. In the long run, when bad news accumulates to the level that managers are not able to absorb it, large negative returns are delivered. Based on the time series evidence of decreasing return synchronicity in U.S. shown by Morck, Yeung, and Yu (2000), Li, Morck, Yang, and Yeung (2004) present a similar but weak pattern across most emerging markets. They find that decreasing synchronicity is related to greater capital market openness, but not goods market openness. The relationship is more significant in countries with better government. Fernandes and Ferreira (2008) and Kim and Shi (2010) also demonstrate higher synchronicity in emerging markets than in developed markets. For instance, Fernandes and Ferreira (2008) examine the synchronicity change of non-U.S. stocks that cross-listed in the U.S. market. Cross-listing is suggested as a strategy to improve information disclosure. Their results indicate an asymmetric impact of cross-listing on return synchronicity between developing and developed countries. Firms in developed markets with strong investor protection have lower return synchronicity through cross-listing, but

[14] Bushman, Piotroski, and Smith (2004) point out two types of transparency, financial transparency and governance transparency. Financial transparency refers to the quality and frequency of financial disclosure. Governance transparency refers to disclosures of directors, managers and remuneration, etc.

it is not so for firms in emerging markets. Chan and Hameed (2006) summarize some key reasons for high return synchronicity in emerging markets. First, developing countries may establish the same disclosure requirements as developed countries. Nevertheless, in practice, regulations are not firmly enforced. Second, voluntary disclosure is not strongly encouraged in emerging markets compared with developed markets. Third, concentrated ownership is prevalent in emerging countries. When firms are dominated by families or the government, or affiliated with large business groups, cash-flow rights and voting rights diverge. Concentrated ownership provides controlling shareholders with opportunities to act in their own interest at the cost of minority shareholders (La Porta, Lopez-De-Silanes, Shleifer, and Vishny 2000). To serve their purpose, controlling shareholders are more likely to withhold value-relevant information, resulting in information asymmetry (Fan and Wong, 2005). This information inequality would lead to increased costs of obtaining information and consequently decreased benefit of informed trading. Finally, the incorporation of firm-specific information is discouraged and return synchronicity increases. From an alternative perspective, the common internal financing pool or common business strategies within business groups may also contribute to the return co-movement. Most recently, Dang, Moshirian, and Zhang (2015) investigate return synchronicity across 41 countries. They find that a country's institutional environment and information production are positively correlated. Moreover, stock co-movement is higher in countries with stronger institutions than in those with weaker institutions. These authors argue that there are impediments to informed trading in less developed countries.

With respect to firm-level return synchronicity, empirical evidence is mixed. Consistent with the literature above, numerous papers present an inverse relationship between firm-level information incorporation and return synchronicity (e.g., Durnev, Morck, Yeung,

and Zarowin, 2003; Veldkamp, 2006; Hutton, Marcus, and Tehranian, 2009; Gul, Kim, and Qiu, 2010). Durnev, Morck, Yeung, and Zarowin (2003) investigate the relationship between stock return synchronicity and stock price informativeness using accounting measures. Stock price informativeness is measured by the extent to which the amount of information reflects future earnings in stock prices. This is estimated in a regression of current stock returns against future earnings. Their findings suggest that return synchronicity is negatively related to stock price informativeness. Veldkamp (2006) argues that stock returns co-move more when a piece of information can be simultaneously obtained by many investors, or can be used to forecast a number of different assets. Their argument implies a negative relationship between firm-specific information and return co-movement. Hutton, Marcus, and Tehranian (2009) employ earnings management as a measure of opacity and support the view that opacity is positively correlated with stock return synchronicity. Moreover, opaque firms are more likely to have high crash risk, supporting the argument of Jin and Myers (2006). Gul, Kim, and Qiu (2010) also find that the amount of earnings information reflected in stock returns is inversely associated with return synchronicity.

Contrary to the above findings, another stream of literature suggests that low stock return synchronicity is associated with lower level firm-specific information (e.g., Dasgupta, Gan, and Gao, 2010; Chan, Hameed, and Kang, 2013; Hou, Peng, and Xiong, 2013; Kelly, 2014). Dasgupta, Gan, and Gao (2010) argue that when the information environment is transparent, investors are able to obtain more information and frequently incorporate the information into prices. In this way, the market would be less surprised when events actually occur and tend to respond to such news less strongly. The empirical evidence supports their argument and shows that more transparent firms have less price variation and higher stock return synchronicity. Chan, Hameed, and Kang (2013) show that higher

return synchronicity is associated with lower information asymmetry. They argue that investors can infer future movements of stocks if they have a close co-movement with the market. However, it is much more difficult to predict stocks' future movements if they have their own pattern. Using various illiquidity measures, such as effective spread, price impact, and Amihud illiquidity, they find stocks with higher return synchronicity have higher liquidity. This indicates that stocks that exhibit higher return synchronicity have less information asymmetry and encourage more liquidity. Hou, Peng, and Xiong (2013) find that stocks' lower return synchronicity is related to medium-term price momentum and long- term price reversal, suggesting that low return synchronicity could be related to price inefficiency. In terms of firm characteristics, Kelly (2014) provides empirical evidence that stocks with low R^2 are usually small, young companies with lower institutional ownership, lower analyst coverage, lower liquidity and higher transaction costs. Therefore, a low R^2 represents a low level of price informativeness and weak information environment.

Some studies relate stock return synchronicity to investor type (e.g., Piotroski and Roulstone, 2004; Gul, Kim, and Qiu, 2010; Li, Brockman, and Zurbruegg, 2015). Investors can be categorized in different ways, such as individual versus institutional investors, local versus foreign investors, or SOEs versus non-SOEs, etc. Institutional investors, compared with individual investors, tend to have superior capabilities, resources and skills to collect and process value-relevant firm-specific information. The role that institutional investors play in the stock market has been reported in the literature. For example, Nofsinger and Sias (1999) find a strong, positive relationship between change of institutional ownership and future returns, and no subsequent return reversals are presented. This suggests that institutional investors are better informed than other

investors. Yan and Zhang (2009) document that short-term institutional trading[15] predicts future stock returns but not long-term institutional trading[16]. The forecasting does not reverse, suggesting that short-term institutions are better informed. Boehmer and Kelly (2009) use data from NYSE-listed stocks between 1983 and 2004 to examine the relation between institutional investors and price information efficiency. They find institutional trading leads to enhanced price efficiency and an improved information environment. Given the outstanding role institutional investors play in the stock market, Piotroski and Roulstone (2004) argue that different types of investor possess a different information advantage towards market-wide, industry-wide, and firm-specific information. They show that the presence of insiders and large institutional investors has the net effect of increasing the amount of firm-specific information being incorporated into stock prices. Gul, Kim, and Qiu (2010) studied Chinese listed firms from 1996 to 2003 and show a higher return synchronicity for companies with greater government-related ownership. Conversely, foreign investors and auditor quality decrease return synchronicity. Li, Brockman, and Zurbruegg (2015) examine Chinese cross-listed shares in mainland China and Hong Kong and show that shares that are traded by more foreign investors impound a greater amount of firm-specific information into stock prices and, thus, present lower return synchronicity.

Other literature examines the impact of return synchronicity on capital allocation (e.g., Wurgler, 2000; Durnev, Morck, and Yeung, 2004). For example, through an investigation across 65 countries, Wurgler (2000) demonstrates that the efficiency of capital allocation is negatively related to stock return synchronicity. Durnev, Morck, and Yeung (2004) show that U.S. firms with lower return synchronicity are more likely to obtain external

[15] Short-term institutional trading refers to more active institutional trading.
[16] Long-term institutional trading refers to less active institutional trading.

financing and achieve more efficient capital allocation. These studies propose that firms with larger firm-specific price variations (i.e., low return synchronicity) provide higher liquidity and lower transaction costs. Therefore, the participation of informed arbitrageurs is encouraged. It improves price efficiency, facilitates external financing and makes the corporate investment more efficient.

3.2 Liquidity commonality

The study of liquidity can be traced back to the 1970s. Bagehot (1971) suggests that market makers are critical to ensure a liquid stock market. They are market specialists who step into the market to provide liquidity whenever buy and sell orders fail to match at certain time. Generally, market makers win the game when they transact with liquidity-motivated traders and lose when they transact with informed traders. Liquidity indicates the speed and the ease at which investors can trade, but it is not easy to capture. To understand liquidity, Kyle (1985) proposes three elements. The first is tightness, which refers to the cost of successfully buying or selling assets in a short time. The second is depth. Depth captures the capability of digesting the submitted orders without incurring a big price movement. The third element is resilience. Resilience indicates the speed at which stock prices bounce back from uninformative shocks. Harris (1990) defines liquid stocks as shares that can be converted into cash immediately at minimum cost. The estimation of liquidity is described in diverse ways. For instance, trading volumes are suggested as a proxy by Karpoff (1986). He explains high trading volumes in two ways. First, investors disagree on the information, implying different interpretations of the same information. Second, they interpret the information in the same way but hold divergent prior expectations. The other commonly used liquidity measure is bid-ask spread. Amihud and Mendelson (1986) suggest that investors can either execute the order immediately at a given bid or ask price, or wait for a favourable offer. This implies that

the ask price contains a premium for immediate buying whereas the bid price contains a concession for immediate selling. Liquidity is measured by combining the buying premium and selling concession.

The importance of liquidity is well-known, but evidence of the existence of liquidity commonality and what leads to such co-movement is not fully understood. A body of literature demonstrates the existence of a systematic liquidity factor (e.g., Chordia, Roll, and Subrahmanyam, 2000; Huberman and Halka, 2001; Hasbrouck and Seppi, 2001; Brockman and Chung, 2002; Bauer, 2004; Kempf, and Mayston, 2008). Chordia, Roll, and Subrahmanyam (2000) conduct research on the common liquidity movements on 1169 New York Stock Exchange (NYSE) stocks for 254 trading days in 1992. They measure the co-movement using various measures including quoted spreads, quoted depth, and effective spreads. Common liquidity is significant and material after controlling for individual liquidity determinants such as volatility, volume and price. They also document an industry component and a size effect. Huberman and Halka (2001) test systematic liquidity using daily data of stocks traded on NYSE and document a time-varying systematic liquidity factor. They conjecture that this systematic component emerges through the presence of noise traders. Hasbrouck and Seppi (2001) examine liquidity commonality of 30 stocks using the 15-minute interval quote data. With principal component analysis they find a significant single common factor on order flows that explains approximately two-thirds of the return synchronicity. In addition to these studies conducted in quote-driven markets, Brockman and Chung (2002) and Bauer (2004) demonstrate liquidity commonality in order-driven markets using a data set from the Hong Kong Stock Exchange and the Swiss Stock Exchange, respectively. Unlike a quote-driven market, under an electronic and order-driven market structure, there is no obligation to provide liquidity. Therefore, liquidity providers have a “free exit”, which

allows them to withdraw liquidity during liquidity shocks. On the other hand, when they are free to enter, commonality would be less pronounced since the buy and sell orders can be easily spread out among a large amount of liquidity providers. Using intraday observations from 725 companies between May 1996 and December 1999, Brockman and Chung (2002) document a weaker systematic liquidity than reported in the quote-driven market. From a different angle, given the fact that some institutional investors walk up the order book, Kempf and Mayston (2008) use intraday limit order book data to test the liquidity commonality beyond best prices. They show liquidity commonality beyond the inside spread is much larger than it is at the inside spread. In addition, the commonality level is higher in the morning or when the market is falling.

Another body of research investigates whether systematic liquidity risk is priced in equity markets (Pastor and Stambaugh, 2003; Acharya and Pedersen, 2005; Chen, 2005; Sadka, 2006; Korajczyk and Sadka, 2008; Watanabe and Watanabe, 2008). Pastor and Stambaugh (2003) find that stocks that are more sensitive to systematic liquidity have higher expected returns. Moreover, the liquidity risk factor helps to explain half of the profits generated from a momentum strategy (i.e., purchasing past winners and selling past losers). Acharya and Pedersen (2005) propose a liquidity adjusted asset pricing model (LCAPM). The LCAPM provides a better explanation than a standard asset pricing model. Specifically, stocks that are more sensitive to the aggregate liquidity fluctuation earn larger returns than those that are less sensitive to the aggregate liquidity variation. Market participants are suggested to pay more attention to stock performance and tradability in market downturns and in liquidity dry-up periods. Chen (2005) uses a principal component technique to extract a common factor from seven liquidity proxies constructed on a daily basis. Consistent with Pastor and Stambaugh's (2003) paper, the author shows high market volatility during periods experiencing adverse liquidity shocks.

Moreover, stock liquidity, which is different from volatility, also provides an explanation for the momentum and price in bond markets. Sadka (2006) decomposes firm-level liquidity variation into variable and fixed price effects. He suggests that systematic liquidity is priced in the context of momentum and post earnings announcement drift portfolio returns. Korajczyk and Sadka (2008) examine 4055 NYSE listed stocks between 1983 and 2000 and construct a common factor from eight different measures of liquidity. They show the pricing power of systematic liquidity. Watanabe and Watanabe (2008) demonstrate the existence of time-varying liquidity betas and a liquidity risk premium. That is, stocks with higher return sensitives to aggregate liquidity variation earn higher expected returns.

Broadly speaking, liquidity commonality is induced by the common movement in the demand for liquidity, the supply of liquidity or both. Prior research tries to decompose the supply-side and demand-side effects, but to identify which perspective is at work at a certain time is a challenging task (Coughenour and Saad, 2004). Instead of the demand-supply perspective, the reasons for liquidity commonality are summarized as follows.

First, liquidity commonality can arise from financial intermediaries' funding constraints, especially in market downturns (e.g., Coughenour and Saad, 2004; Brunnermeier and Pedersen, 2009; Hameed, Kang, and Viswanathan, 2010; Næs, Skjeltorp, and Odegaard, 2011; Rosch and Kaserer, 2013; Comerton-forde, Hendershott, Jones, Moulton, and Seasholes, 2010). Coughenour and Saad (2004) argue that liquidity would co-move among stocks handled by the same specialist firm. This liquidity commonality is induced by common adjustments in the liquidity supply from a common pool of capital and inventory. They also find that co-variation is larger during a period with relatively large negative market returns. Brunnermeier and Pedersen (2009) study the association between market liquidity and availability of funds for financial intermediaries. The

amount of funds that financial intermediaries provide depends on the capital and margin requirements. In market declines or periods of highly uncertain firms' fundamentals, funding would be low and discourage traders from taking a position. This would lead to tight market liquidity and high volatility, further worsening the funding liquidity. Therefore, during financial distress, market liquidity and funding liquidity mutually reinforce. Similarly, Hameed, Kang, and Viswanathan (2010) show that commonality in liquidity on the New York Stock Exchange increases when the market declines, especially during periods of tight liquidity. Næs, Skjeltorp, and Odegaard (2011) suggest a strong relationship between stock market liquidity and the business cycle. Systematic liquidity variation is associated with "flight to quality[17]" during a recession. Rosch and Kaserer (2013) provide supporting evidence showing stronger liquidity commonality in market downturns, especially during a financial crisis. Comerton-forde, Hendershott, Jones, Moulton, and Seasholes (2010) argue that the liquidity supply from the market-maker matters for time-varying liquidity. They employ 11 years of NYSE specialist inventory positions and trading revenue data and show wider spreads at both aggregate market-level and specialist firm-level when specialists have large positions or lose money.

Second, some research focuses on the level of institutional ownership and correlated trading activity (e.g., Kamara, Lou, and Sadka, 2008; Koch, Ruenzi, and Starks, 2016). The rationale is that higher institutional ownership leads to higher correlated trading across stocks. The subsequently intense buying/selling pressure results in a commonality in liquidity. Kamara, Lou, and Sadka (2008) document a liquidity commonality variation from 1963 to 2005 in the U.S. stock market. In detail, large firms show increased liquidity commonality whereas small firms show decreased liquidity commonality. This

[17] "Flight to quality" means investors suddenly shift their portfolios towards less risky stocks.

phenomenon can be explained by the increase in institutional ownership over time and their preferred trading in large stocks. It also lends support to Chordia, Roll, and Subrahmanyam's (2000) conclusion that institutional investors exhibit stronger herding behaviour when they trade large stocks and less herding when they trade smaller stocks. Koch, Ruenzi, and Starks (2016) examine the correlated trading of mutual funds and show that stocks with higher mutual fund ownership present liquidity co-movement about twice as high as those stocks with lower mutual fund ownership. This correlation is stronger among stocks owned by mutual funds with higher turnover ratios and during periods of negative aggregate mutual fund flows.

Third, investor sentiment can contribute to commonality in liquidity. Based on Black's (1986) argument with respect to noise traders (i.e., noise traders facilitate liquidity), Huberman and Halka (2001) conjecture that liquidity commonality can be caused by the presence of noise traders. However, they do not provide a model to capture the relationship. Karolyi, Lee, and Van Dijk (2012) investigate liquidity commonality with various sentiment measures, including the U.S. investor sentiment index, local closed-end fund discounts and global closed-end fund discounts[18]. Their results suggest that liquidity commonality is higher when investors' sentiment is more optimistic.

Fourth, international studies pay more attention to the importance of the information environment (e.g., Bekaert, Harvey, and Lundblad, 2007; Brockman, Chung, and Pérignon, 2009, Karolyi, Lee, and van Dijk, 2012; Liang and Wei, 2012; Dang, Moshirian, Wee, and Zhang (2015)). Bekaert, Harvey, and Lundblad (2007) investigate the country level liquidity risk in 19 emerging markets. They suggest a stronger predictability of liquidity on expected returns in countries with high political risk and poor law systems.

[18] Greater closed-end fund discounts refer to more pessimistic investor sentiment (Froot and Ramadori, 2008).

Brockman and Pérignon (2009) study liquidity commonality across 47 stock exchanges using intraday spread and depth data. Apart from the exchange level systematic factor, they illustrate a significant global component in both bid-ask spread and depth. Compared with exchange level sources that contribute to commonality in liquidity (roughly 39%), the global source contributes an additional 19%. Asian stock exchanges exhibit the strongest commonality in bid-ask spread and depth. Liang and Wei (2012) show that global liquidity risk is a significant pricing factor across developed countries after controlling for global market, value and size factors. They also suggest that a more effective country level corporate governance structure and a better investor protection mechanism decrease the liquidity premium. Karolyi, Lee and van Dijk (2012) examine stocks across 40 countries around the world and suggest that liquidity commonality is greater in countries with a larger proportion of institutional investors, more correlated trading behaviour, low transparency and in times of high market volatility. Dang, Moshirian, Wee, and Zhang (2015) examine the impact of cross-listing on stock liquidity commonality and suggest an asymmetric impact on the local and host markets. Specifically, co-movements with the local market decrease whereas the co-variations with the host market increase. This negative impact of cross-listing on local market liquidity commonality is more pronounced in countries with weak institutional environment, less transparency, and high market segmentation.

Finally, cross-asset learning of price information has a significant impact on liquidity commonality (e.g., Gallmeyer, Hollifield, and Seppi, 2005; Patton and Verardo, 2012; Liu and Wang, 2013; Cespa and Foucault, 2014). Gallmeyer, Hollifield, and Seppi (2005) find that dynamic trading activity helps asymmetrically informed investors to learn about others' preferences. It means investors can use trading data (e.g., trading volumes and market liquidity) as measures of future risk preference. This demand discovery process

builds up a link between market liquidity and future returns. Patton and Verardo's (2012) model is based on the rationale that investors tend to do cross-asset learning about firm-level fundamentals. Firms with informative earnings information present returns that co-move strongly with the market since these stocks are considered benchmarks for other stocks. The empirical results show that, following earnings announcements, firms whose earnings contain information about the profitability of non-announcing firms experience greater increases in market betas. The increase is greater for stocks with higher turnover and analyst following. Liu and Wang (2013) suggest that liquidity commonality is driven by investors' learning about asset payoffs from other asset payoffs. This helps to explain why commonality in liquidity and prices can be caused by non-fundamental news. Cespa and Foucault (2014) argue that liquidity providers learn information about an asset from other assets. Therefore, a small liquidity variation of an individual asset, through a feedback loop, leads to a large variation in market liquidity and price informativeness. This feedback loop provides alternative explanations for liquidity commonality and liquidity dry-ups.

3.3 The role of short-sale constraints in the market

Not all markets and nor a given market at all times trade unrestricted. Indeed, short-sales are completely or partially prohibited in most emerging markets (Bris, Goetzmann, and Zhu, 2007). Some developed markets ban short-selling during financial crises (Boehmer, Jones, and Zhang, 2013). Short-sale constraints influence the capital market in numerous ways and evidence of the impact is controversial. The following discussion covers some important issues such as the stock overvaluation, the asymmetric impact of positive and negative information and market stabilization.

The first issue is overvaluation. Theoretically, Miller (1977) proposes that short-sales constraints result in more optimistic opinions attached to prices and stocks are consequently overpriced. The rationale for the overvaluation is as follows. When short-sales are not permitted, or are costly to implement, pessimistic investors bail out of the market. The market is then directed by optimistic investors who continuously bid up stock prices above the fundamental level. Consistent with Miller (1977), Figlewski (1981) points out the disproportionate weight to optimistic forecasts compared with pessimistic forecasts because of short-sale constraints, which results in overvaluation. Other papers also show an adverse impact of short-sale constraints on future returns (e.g., Asquith and Meulbroek, 1995; Aitken, Frino, McCorry, and Swan, 1998; Danielsen and Sorescu, 2001). Jones and Lamont (2002) provide additional evidence in showing that expensive or difficult-to-short-sell stocks exhibit high valuation and low subsequent returns. Using mutual fund data, Chen, Hong, and Stein (2002) also support the evidence of overvaluation and show that stocks with short-sale constraints realize lower future returns. Research by Ofek and Richardson (2003) investigated option lockups[19] using a sample of internet stocks from 1998 to 2000. They document a negative impact of constraints on subsequent returns, supporting the overvaluation argument.

A number of papers suggest an asymmetric impact of short-sale constraints on stocks with positive and negative news. These studies argue that short sale constraints have a stronger impact on negative information. Diamond and Verrecchia (1987) model the effects of short-sale constraints on stocks' speed of adjustment to the information. They find that short-sale constraints have an asymmetric effect on positive and negative information. Stocks that are prohibited from short-selling adjust more slowly to bad news

[19] "Lockup" means investors cannot sell the shares. Lockup expiry is similar to loosening short-sale constraints.

than good news. Nevertheless, different from Miller (1977), they argue that short-sale constraints would not lead to an overvaluation on average, assuming traders have rational expectations. Aitken, Frino, McCorry, and Swan (1998) examined the Australian Stock Exchange on the intraday basis and suggest short-sales are almost instantaneously bad news. Biais, Bisiere, and Decamps (1999) investigate stocks subject to leverage and short-sale constraints traded on the Paris spot market. They show the stocks reflect positive information more quickly than negative information. Reed (2007) documents that stocks subject to short-sale constraints have a larger price reaction to earnings announcements, particularly negative news, implying informational inefficiency for constrained stocks. Bris, Goetzmann, and Zhu (2007) analyse 46 equity markets around world using both cross-sectional and time-series data to test whether short-selling affects market efficiency. They find that, in countries without short-selling constraints, prices incorporate negative information more quickly.

The literature on whether short-sale constraints stabilize the capital market is controversial. In supporting the argument of market destabilization, Diamond and Verrecchia (1987) find stock returns are more negatively skewed when short-selling is not allowed. Hong and Stein (2003) develop a market crash theory based on investors' heterogeneous opinions (bearish versus bullish investors). They argue that short-selling constraints restrict the incorporation of negative information by bearish investors. If bearish investors are forced to sit out of the market, the accumulating negative news would be revealed in the price when the market falls, which further exacerbates market declines and ultimately leads to a market crash. They argue that extreme negative returns are more pronounced when short-sale constraints are imposed. In supporting the argument of market stabilization, Bris, Goetzmann, and Zhu (2007) examine the frequency of extreme negative returns and the skewness of both individual stock returns

and market indices. They find that in markets where short selling is not allowed or not practised, market returns display less negative skewness, which contradicts the results of Diamond and Verrecchia (1987) and Hong and Stein (2003). Nevertheless, they fail to identify significant differences in skewness at the individual stock level. Consistently, Chang, Cheng, and Yu (2007) document increased volatility, lower skewness, and increased occurrence of extremely negative returns after a short-sale ban is lifted in Hong Kong. Other evidence shows an insignificant relationship between short-sale constraints and price instability. Saffi and Sigurdsson (2010) study the relationship between short-sale constraints and price efficiency using a global data set across 26 countries. They find that relaxing constraints is not related to increased price instability or increased occurrence of negative returns. Boehmer, Jones, and Zhang (2013) investigate the U.S. short-sale ban in September 2008 and find stock prices seem unaffected by the ban.

There are some other issues related to short-sale constraints, such as price efficiency (Saffi and Sigurdsson, 2010; Chen and Rhee, 2010), dispersion of opinion (Li and Fleisher, 2004; Diether, Malloy, and Scherbina, 2002; Boehme, Danielsen, and Sorescu, 2006), and short-selling commonality (Lynch, Nikolic, Yan, and Yu, 2014). For example, Saffi and Sigurdsson (2010) use a global data set from 26 countries and show that stocks with short-sale constraints have lower price efficiency. Chen and Rhee (2010) focus on the Hong Kong market in which some shares can be short while others cannot. They document a more rapid price adjustment among shortable stocks than non-shortable stocks in Hong Kong. With the unique setting in Hong Kong that shares will be removed from or added into the short-sell list quarterly, they measure the speed of price adjustment three months before and after a stock is added into the short-sell list. They find short-selling has a positive effect on the speed of price adjustment. In terms of opinion dispersion, Li and Fleisher (2004), using Chinese stock market data, find that the

dispersion of domestic analysts' forecasts is negatively correlated to stock returns in the A-share market (i.e., the market where short sales restrictions are binding), but is not significantly related to the returns of B-shares (i.e., the market where short sales restrictions are not binding). Diether, Malloy, and Scherbina (2002) use the dispersion of analysts' earnings forecasts to measure the degree of divergence of opinion and show that stocks with higher dispersion earn lower future returns than otherwise similar stocks. They argue that analysts' incentive structures [20] can be viewed as an alternative mechanism to short-sale constraints. Boehme, Danielsen, and Sorescu (2006) show that the interaction between high dispersion of investor opinion and short sales constraints leads to stock price overvaluation. From a new point of view, Lynch, Nikolic, Yan, and Yu (2014) find the existence short-selling commonality and suggest that short-sellers act on market-wide information. They also find that stocks with higher hedge fund ownership present stronger commonality in short-sales. Moreover, commonality in short-selling is stronger in market downturns and among high beta stocks, suggesting a lower willingness to short-sell if there is a positive market return.

3.4 Tone of news and the market response

News is the source of stock price movements. Substantial research has been conducted in finance and accounting to examine the value relevance of quantitative information. Admittedly, sophisticated statistics have aided us to develop a deeper understanding of financial markets. Nevertheless, the quantitative content alone still has difficulties in fully explaining stock market movements. Therefore, research has recently switched its focus from quantitative content to qualitative content. The studies employ advanced textual analysis to convert qualitative information into quantifiable scores by analysing the

[20] Incentive structure discourages analysts to voice pessimism about firms' prospects. It is viewed as a mechanism that impedes unfavourable information flows.

optimistic or pessimistic tone of the news. The quantitative information, alongside the qualitative information, assists investors to better understand firms' prospects.

Empirical evidence illustrates the importance of qualitative information and demonstrates an asymmetric market reaction to good and bad news (e.g., Antweiler and Frank, 2004; Tetlock, 2007; García, 2013). The pioneering research in finance that focuses on textual analysis was conducted by Antweiler and Frank (2004). By analysing the activity of internet stock message boards posted on the Yahoo! Finance and Raging Bull websites, they document greater trading volumes when larger disagreements in investors' opinions are present. Tetlock (2007) adopts the General Inquirer and Harvard IV-4 dictionary to analyse the content of news released in the Wall Street Journal (WSJ) column "Abreast of the market". He finds that the daily Dow Jones Industrial Average (DJIA) index is significantly negatively related to the frequency of negative words in the news. Similarly, García (2013) investigates the relationship between the market return and news using the daily DJIA index returns and the news in "Financial Markets" and "Topics in Wall Street" columns. He divides the words in the news into positive and negative and provides evidence on the negative relationship between media pessimism and daily DJIA returns. Additionally, García (2013) points out that the negative relationship is pronounced in market recessions, suggesting an asymmetric optimistic and pessimistic media sentiment in financial markets under different market conditions. Other research conducted by Dougal, Engelberg, García, and Parsons (2012) associates the tone of news with stock returns from the perspective of an analysis of journalist styles. They propose that one piece of news can be interpreted with a more bullish or bearish tone because of journalists' different styles. They find that the fixed effects of journalists' styles increase the R^2 by roughly 35%. The results imply the importance of interpreting the public news with appropriate tones.

Some research emphasizes the importance of optimistic and pessimistic information in accounting and financial reports (e.g., Skinner, 1994; Kasznik and Lev, 1995; Chan, 2003; Kothari, Shu, and Wysocki, 2009; Truong, 2011). Skinner (1994) documents a greater stock response to negative earnings forecasts than to positive earnings forecasts. Kasznik and Lev (1995) report a greater earnings surprise for firms that release negative earnings forecasts than for positive earnings forecasts. Chan (2003) shows that the post earnings announcements drift is larger up to 12 months after the scheduled announcement for firms issuing bad news compared with those releasing positive news. Tetlock, Saar-Tsechansky, and Macskassy (2008) suggest that the fraction of negative words in firm-specific disclosures has predictive power on stocks' future earnings and returns. Kothari, Shu, and Wysocki (2009) also find evidence in support of the asymmetric post earnings announcement drift. They argue that managers tend to withhold bad news but release good news immediately. Also, investors exert more trust in unfavourable news than favourable news. In the Chinese market, Truong (2011) finds that the drift is larger after negative earnings announcements than positive earnings surprises. He suggests that the asymmetric post earnings announcement drift is caused by short sale constraints.

The asymmetric influence of positive and negative news on the stock market can be explained by the prospect theory (Tversky and Kahneman, 1986) or the psychological principle (Baumeister, Bratslavsky, Finkenauer, and Vohs, 2001). Tversky and Kahneman (1986) propose a loss aversion theory that shows larger negative responses to losses than positive responses to similar size gains. In the psychology field, Baumeister, Bratslavsky, Finkenauer, and Vohs (2001) show that bad events have greater power than good events and it is a general principle used widely for diverse psychological phenomena. Such an asymmetric response is also supported by an experiment conducted by Schuck and de Vreese (2008). They examine the effect of news coverage about the

Dutch EU Constitutional referendum on the risk-induced electoral mobilization. They find that EU-sceptics have more incentive to participate in the elections when they are given an unfavourable story than a favourable one.

3.5 Corporate governance and firms' information environment

High quality information disclosure can help to reduce the agency problem between managers and shareholders. In contrast, poor information disclosure can mislead investors. Prior literature has built a link between firms' corporate governance structure and the information environment. For instance, Karamanou and Vafeas (2005) examine the relationship between corporate governance and voluntary financial disclosure, which is measured by management earnings forecasts. Corporate governance, in their paper, was estimated by corporate boards, audit committees and ownership characteristics. They show that the effective corporate governance is related to a higher willingness to provide earnings forecasts with regular updates. Moreover, effective corporate governance is even more strongly associated with management forecasting in the presence of bad news, suggesting a more protective mechanism for investors in firms with better corporate governance. To illustrate a causal relationship, Armstrong, Balakrishnan, and Cohen (2012) use the passage of the state antitakeover laws in U.S. as an exogenous event to overcome the endogeneity issue. They find that the passage of the antitakeover laws decreases the information asymmetry, reduces private information and improves the informativeness of the financial statements. Other literature demonstrates improved transparency from certain perspectives, such as the percentage of independent directors (Armstrong, Core, and Guay, 2014; Xu and Lin, 2016), SOEs (Chen, Firth, Gao, and Rui,

2006), supervisory boards (Xu and Lin, 2016), and CEO duality (Grove, Patelli, and Victoravich, 2011).

Two papers have established a relationship between corporate governance and stock return synchronicity (Gul, Kim, and Qiu, 2010; Li, Brockman, and Zurbruegg, 2015). Gul, Kim, and Qiu (2010) investigate Chinese listed companies from 1996 to 2003. They find an inverse relationship between auditor quality and return synchronicity. Moreover, stock return synchronicity is a concave function of ownership concentration. Since Gul, Kim, and Qiu's (2010) sample period does not include the implementation of QDII (Qualified Domestic Institutional investors) program in 2007, Li, Brockman, and Zurbruegg (2015) provide additional evidence using Chinese listed companies from January 2005 to December 2010. They divide the corporate governance variables into four categories: ownership structure variables, board characteristic variables, compensation variables, and capital structure. Their empirical results show improved firm-specific information incorporation because of the increased participation of foreign investors. The degree of improvement depends on the corporate governance structure.

CHAPTER 4
Hypotheses Development

4 Hypotheses development

This chapter re-emphasizes the key literature that motivates my research and presents the questions that I attempt to answer. I will also present the reasons for achieving these objectives through a unique market frame in China.

The main literature stream is related to the factors that influence stock return synchronicity, such as the institutional strength (e.g., Morck, Yeung, and Yu, 2000; Jin and Myers, 2006; Fernandes and Ferreira, 2008, 2009; Kim and Shi, 2010; Dang, Moshirian, and Zhang, 2015), traders (e.g., Gul, Kim, and Qiu, 2010; Piotroski and Roulstone, 2004; Li, Brockman, and Zurbruegg, 2015), and firm opaqueness (e.g., Durnev, Morck, Yeung, and Zarowin, 2003; Veldkamp, 2006; Hutton, Marcus, and Tehranian, 2009; Gul, Kim, and Qiu, 2010; Dasgupta, Gan, and Gao, 2010; Chan, Hameed, and Kang, 2013; Hou, Peng, and Xiong, 2013; Kelly, 2014). These studies suggest that stock return synchronicity is lower in countries with stronger institutional settings, more transparent information disclosure, and a larger proportion of institutional investors. Lower return synchronicity indicates that investors incorporate more firm-specific information into stock prices. Even though these authors document various factors that lead to different degrees of return synchronicity, no one has focussed on the information per se (positive versus negative). Indeed, the news content is the fundamental source influencing the returns and then the return synchronicity.

Before attempting to build a direct link between news sentiment (i.e., optimistic versus pessimistic) and return synchronicity, I introduce two literature streams that relate news sentiment to stock returns. The first stream discusses the asymmetric impact of negative

and positive news on the stock market (e.g., Skinner, 1994; Kasznik and Lev, 1995; Chan, 2003; Tetlock, 2007; Kothari, Shu, and Wysocki, 2009; Truong, 2011; García, 2013). These authors argue that investors respond more to bad news than good news. Such a phenomenon can be explained by the prospect theory (Tversky and Kahneman, 1986) or the psychology theory (Bratslavsky, Finkenauer, and Vohs, 2001). The second stream examines the impact of short-sale constraints on stock movements. It is suggested that short-sale constraints influence optimistic and pessimistic information asymmetrically. The impact is more pronounced towards pessimistic information disclosures (e.g., Diamond and Verrecchia, 1987; Aitken, Frino, McCorry, and Swan, 1998; Biais, Bisiere, and Decamps, 1999; Reed, 2007; and Bris, Goetzmann, and Zhu, 2007). Consequently, trading activities on pessimistic news are restricted and bearish investors bail out of the market, resulting in an overvaluation (e.g., Miller, 1977; Figlewski, 1981; Asquith and Meulbroek, 1995; Aitken, Frino, McCorry, and Swan, 1998; Danielsen and Sorescu, 2001; Chen, Hong, and Stein, 2002; Jones and Lamont, 2002; and Ofek and Richardson, 2003). Furthermore, market stability can be affected (e.g., Diamond and Verrecchia, 1987; Bris, Goetzmann, and Zhu, 2007; Chang, Cheng, and Yu, 2007; Saffi and Sigurdsson, 2010; Boehmer, Jones, and Zhang, 2013). In summary, investors are strongly inclined to pessimistic information disclosures but they may be bound by short-sale restrictions. Therefore, the obstacles to impounding negative information exert an asymmetric impact of positive and negative news on stock returns. I conjecture a similar effect on return synchronicity.

I propose an asymmetric impact of good and bad information on return synchronicity, which occurs from a change of short-sale constraints. This fills the gap in the previous return synchronicity literature by considering the information per se (positive versus negative) rather than those external factors that influence the information first and then

stock synchronicity. In addition, institutional investors possess a better ability to short sell than individual investors (Boehmer, Jones, and Zhang, 2008). I will test this difference using a Chinese data set that segments individual and institutional investors' trading. I expect to observe a more pronounced impact of short-sale constraints on return synchronicity among shares held by institutional investors than individual investors.

To achieve these objectives, the A- and H- dual listed shares (A-shares on the Mainland China Stock Exchanges and H-shares on the Hong Kong Exchange) in China are selected as a sample to run the tests. This set offers a natural vantage point for the investigation for the following reasons. First, an AH dual-listed stock refers to one company traded in one country but two economic zones. It provides better controls when making a cross-market comparison. Secondly, short-selling is permitted only for certain stocks in both the A- and H-share markets[21], making it possible to compare the return synchronicity between shortable and non-shortable shares in a single market. The list of designated short-selling securities in the two markets differs and is subject to regular revision. Thirdly, the mainland Chinese stock market is dominated by individual investors whereas the Hong Kong market is dominated by institutional investors (HKEx, 2016). This allows me to contrast institutional and individual investors' capability to incorporate firm-specific information. Xu and Wan (2015) show that, during the two years from April 2010 to April 2012 in mainland China, 97.3% of the futures volumes were executed by individual investors, whereas 2.7 % of the volumes were executed by institutional investors. Given the short history of the local market, Chinese investors possess less trading experience and hence the level of sophistication is lower than those investors in

[21] Hong Kong Stock Exchange launched the lending and marginal trading programme earlier than the Chinese Stock Exchange. In the Hong Kong market, the stock exchange introduced a pilot program in January 1994 with 17 stocks that may be short-sold for regulated short-selling. For the mainland Chinese market, since 31 March 2010, the China Security Regulatory Commission (CSRC) has approved the margin trading and securities lending program among a list of selected stocks.

developed markets (Ng and Wu, 2007). There are two types of capital control in the Chinese market[22], and such controls better segment individual and institutional investors.

4.1 Primary tests

My primary hypothesis is that there is an asymmetric impact of optimistic and pessimistic news because of the change in short-sale constraints. I posit that, with the relaxation of short-sale constrains, investors are offered more opportunities to impound negative information and this leads to different levels of return synchronicity. In detail, given that institutional investors have a greater ability to execute short-sale orders, I expect a significant and relatively larger (smaller) synchronicity difference between shortable and non-shortable shares in the markets that are dominated by institutional investors (H-share market) than individual investors (A-share market).

H1: Shortable and non-shortable shares present different levels of return synchronicity in the A-share and H-share markets.

H1a: The magnitude of difference is larger in the H-share market than in the A-share market.

The lifting of short-sale constraints is expected to encourage the incorporation of negative information at both the market and firm level. Nonetheless, the preference for a certain type of information may depend on investor type. Institutional (individual) investors trade more on firm-specific (market-wide) information (Piotroski and Roulstone, 2004). When they are allowed to short sell, institutional (individual) investors are conjectured to incorporate more firm-specific (market-wide) negative information. In other words, the

[22] Two types of capital control are: 1) limitations of foreign ownership of domestic equities, and 2) the limitation of domestic investment in foreign capital markets.

return synchronicity of shortable shares is relatively higher (lower) than non-shortable shares in markets where individual investors (institutional investors) dominate.

H1b: Shortable shares show a higher (lower) stock return synchronicity than non-shortable shares in A- (H-) share market.

4.2 Robustness tests

To further support my hypotheses above, several robustness tests are established. The first test is derived from the liquidity commonality literature. Empirical evidence shows that liquidity commonality is a systematic risk factor and is priced in equity markets (Pastor and Stambaugh, 2003; Acharya and Pedersen, 2005; Chen, 2005; Sawka, 2006; Korajczyk and Sadka, 2008). Influential factors include but are not limited to funding constraints from financial intermediaries in market downturns (e.g., Coughenour and Saad, 2004; Brunnermeier and Pedersen, 2009; Hameed, Kang, and Viswanathan, 2010; Næs, Skjeltorp, and Odegaard, 2011; Rosch and Kaserer, 2013; Comerton-forde, Hendershott, Jones, Moulton, and Seasholes, 2010), the level of institutional ownership and the correlated trading activity (e.g., Kamara, Lou, and Sadka, 2008; Koch, Ruenzi, and Starks, 2009), investor sentiment (Huberman and Halka, 2001; Karolyi, Lee, and Van Dijk, 2012), and the information environment (e.g., Liang and Wei, 2012; Bekaert, Harvey, and Lundblad, 2007; Brockman, Chung, and Pérignon, 2009, Karolyi, Lee, and van Dijk, 2012; Dang, Moshirian, Wee, and Zhang, 2015). The literature suggests that liquidity commonality is higher in markets with more correlated trading, low transparency and larger proportion of noise traders.

The market is likely to exhibit more correlated trading when most investors are individual investors since they trade with similar information (i.e., market-wide information). Moreover, compared with institutional traders, individual traders are considered as noise

traders because of the lack of financial knowledge and skills. Individual investors in the mainland Chinese market also show herding behaviour (Tan, Chiang, Mason, and Nelling, 2008). Therefore, the liquidity commonality of shortable shares is expected to be higher than non-shortable shares in the market dominated by individual investors. Conversely, institutional investors possess better skills to deal with firm-specific information, thus the liquidity commonality of shortable shares is expected to be lower than non-shortable shares. In conclusion, I posit that shortable A- (H-) shares show a higher (lower) liquidity commonality than non-shortable shares.

H2: Shortable shares show a higher (lower) stock liquidity commonality than nonshortable shares in A- (H-) share market.

Additionally, I conduct separate tests to observe individual and institutional investors' trading behaviour on days with market-wide and firm-specific negative information. Trading volumes are employed as a proxy to measure individual and institutional investors' responses. It is expected that on days with market-wide negative information, the trading volumes of shortable A-shares are higher than non-shortable A-shares. In the H-share market, no significant difference is expected since institutional investors tend to trade on firm-specific negative information.

H3: On days with market-wide negative news, trading volumes of shortable A- shares are higher than non-shortable A-shares.

For dual-listed companies, the release of firm-specific information is the same. Therefore, to test institutional and individual investors' different responses to the same pieces of information, I conduct a paired t test to compare the trading volumes between A- and H-shares. In this way, I control for firm-level characteristics. Given that investors in the H-share (A-share) market respond more (less) to the firm-specific negative information

when shares are shortable, I posit that on days with firm-specific negative information, the trading volumes of H-shares are higher than their counterparts in the A-share market.

H4: On days with firm-specific negative information, trading volumes of H-shares are larger than the corresponding A-shares.

4.3 Short-sale constraints and corporate governance

Finally, I introduce the role that corporate governance might play when interacting with the short-sale constraints. A stronger corporate governance structure is positively associated with better information disclosure (e.g., Karamanou and Vafeas, 2005; Gul, Kim and Qiu, 2010; Armstrong, Balakrishnan, and Cohen, 2012). Improved information disclosure could encourage investors' willingness to incorporate firm-specific information. That is, without short-sale constraints, investors are more willing to impound firm-specific negative information within a better corporate governance environment. Consequently, in the H-share market, I expect an increased willingness to incorporate firm-specific negative information on companies with stronger corporate governance structure. In other words, the asymmetric impact of positive and negative news is enlarged. Nevertheless, an improved firm-level information environment is not A-share investors' primary concern when they short-sell because of their reliance on market-wide negative information. As a result, I expect to observe no significant joint impact in the A-share market.

H5: The return synchronicity difference between shortable and non-shortable shares increases among firms with better corporate governance in the H-share market, but not in the A-share market.

CHAPTER 5
Data and Methodology

5 Data and Methodology

This chapter discusses the data and methodology used in the research. The first section covers the sample period, variables and data sources. The second section presents the methodologies employed for the main and robustness tests.

5.1 Data

This research covers a ten-year sample period from January 1, 2005 to December 31, 2014. I include 86 firms incorporated in China and simultaneously listed on the mainland China and Hong Kong markets. My sample period contains a regulation change (i.e., the relaxation of short-sale constraints) in mainland China at the beginning of 2010. I obtain the daily closing price, market indices, daily bid and ask prices, trading volumes and other firm control variables from DataStream and China Stock Market and Accounting Research (CSMAR). The daily short-sale information is collected from Shenzhen Stock Exchange, Shanghai Stock Exchange, and Hong Kong Stock Exchange. The corporate governance related variables are obtained from the CSMAR database. To differentiate between firm-specific and market-wide news, I collect the daily news data from Thomson Reuters News Analytics (TRNA). TRNA provides the intraday news articles, indicates the predominant sentiment class[23] (positive versus negative), and displays relevance scores[24] that range from zero to one. In the TRNA database, news is recorded in real time,

23 Sentiment class equal to "1"indicates a piece of positive news and sentiment class equal to "-1" indicates a piece of negative news.

24 The relevance score is calculated by comparing the relative number of occurrences of assets with the number of occurrences of other organizations within the text of the item. In addition, if the asset is mentioned in the headline, the relevance is set to one. For stories with multiple assets, the asset with the most mentions will have the highest relevance. An asset with a lower number of mentions will have a lower relevance score (TRNA)

seven days a week. However, the stock exchanges operate only from Monday to Friday. Therefore, for all news released on Saturday, Sunday and after hours on Friday, I treat it as news that would influence trading activity on Monday. I define a firm with firm-specific negative news on a day based on the following criteria. First, I filter the firm-specific news items with a relevance score greater than or equal to 0.8 and the number of relevant firms[25] equal to or less than 3. Second, I calculate the daily relevance weighted sentiment score for each firm. Third, firms with a negative daily average sentiment score are defined as firms with firm-specific negative news on that day. On the other hand, days with market-wide negative news are estimated by a significant drop of market index on that day. A significant market index drop is defined as at least one per cent decrease in one day.

5.1.1 Stock return synchronicity and stock liquidity commonality

I obtain individual stocks' returns and market return from DataStream and CSMAR. Following Li, Brockman, and Zurbruegg's (2015) work, return synchronicity (SYNC) is then estimated by regressing daily stock returns on daily market returns. To measure liquidity, I use the percentage spread as a proxy. Like Dang, Moshirian, and Zhang (2015), individual stock's daily spread is defined as twice the absolute value of the difference between the daily trading price and the midpoint of the bid and ask prices, which is then divided by the midpoint of the bid and ask prices. Market liquidity is defined as the equally weighted average of all daily individual stock liquidity in the market. The liquidity commonality (Liqcom) is calculated in a similar way to the return synchronicity. The detailed models are presented in the methodology section below.

[25] In the TRNA database, the field "Number of companies" indicates the total number of companies mentioned in each news item. It is useful to determine if a pieces of news influence one company only or a group of companies.

5.1.2 Control variables used in the return synchronicity and liquidity commonality regressions

Following Dang, Moshirian, and Zhang (2015) and a number of prior papers (e.g., Piotroski and Roulstone, 2004; Chan and Hammed, 2006; Fernandes and Ferreira, 2008), I control for a series of firm-specific characteristics that are likely to affect stock return synchronicity and liquidity commonality in the regression analysis. All controls are measured on a yearly basis, including log of total assets (Size), the annualized standard deviation of monthly stock returns (Volatility), the log of stock price at the end of the year (Price), annual returns (Return) and annual turnover (Turnover). I also control for the price to book ratio (PB), volatility of the return on assets (TDROA) and leverage ratio (Leverage) discussed in Li, Brockman, and Zurbruegg (2015). Year dummies are included to control for systematic time variations. The definitions of firm-specific characteristic variables are provided in Appendix A.

5.1.3 Variables in the robustness check

The daily trading volumes are used as a proxy to capture investors' responses towards firm-specific and market-wide negative news. The data of daily trading volumes and turnover are collected from DataStream. The data for news related variables are obtained from Thomson Reuters News Analytics (TRNA). Thomson Reuters News Analytics database is powered by a unique processing system from a linguistics technology innovator. It provides a real-time numerical insight into the events in the news in a format that can be directly calculated by algorithmic trading systems. News items are scored individually for every company mentioned in the news. The numerical values I use in this research are the relevance score and the sentiment score. The relevance score is calculated by counting the occurrence of a company in a piece of news compared with other

companies. Its value is within a range from zero to one. Sentiment indicates the tone of news in a positive, neutral or negative manner. Negative news is defined as a news item with a negative sentiment score. Because of the release of multiple firm-specific news on one day, I work out the daily relevance weighted sentiment score. I define the firm-specific negative news in three steps. First, I find all the firm-specific news items. They are defined as a relevance score above or equal to 0.8 and the number of relevant firms no greater than 3. Second, I convert the intra-day score to a daily score by calculating the daily relevance weighted sentiment score for each firm. Third, I define firms with a negative daily average sentiment score as firms with firm-specific negative news on that day. To define days with market-wide negative news, I use a minimum one per cent reduction of market index in one day as a proxy. Control variables include log of total assets (Size), lagged trading volumes (TV_{t-1}), liquidity (Liquidity), lagged liquidity ($Liquidity_{t-1}$), the annualized standard deviation of monthly stock returns (Volatility), the log of stock price at the end of the year (Price), annual returns (Return), price to book ratio (PB), volatility of the return on assets (TDROA), leverage ratio (Leverage), and year dummies.

Better corporate governance structure adds credibility to a firm's information disclosure and, consequently, enhances investors' willingness to trade on such information. The corporate governance variables included in my sample are a state-owned enterprises [26](SOE) dummy, the percentage of independent directors on the board (Indep), the number of members on the supervisory board (Supervisory), the size of the management team (Management), a CEO_Chair dummy[27], and a Linktop10 dummy[28]. From the corporate fraud perspective, Chen, Firth, Gao, and Rui (2006) find that SOEs are charged

[26] SOE equals one if the company is state-owned and zero otherwise.
[27] CEO_chairman equals one if CEO is also chairman and zero otherwise.
[28] Linktop10 equals one if the top ten shareholders are related and zero otherwise.

with being responsible for financial statement fraud. However, the proportion of outside directors is negatively related to fraud. Armstrong, Core, and Guay (2014) document improved corporate transparency when the proportion of indirect independent directors increases. The supervisory board is considered a monitoring mechanism. Nevertheless, because of the unique institutional environment in China, the effectiveness of the supervisory board is in doubt (Xu and Lin, 2016). They point out that the Assets Supervision and Administration Commission (SASAC) has the power to nominate the members of directory and supervisory boards for SOEs. CEO duality is argued to be a double-edged sword by Finkelstein and D'aveni (1994). On one hand, the duality of CEO can establish a clear leadership duty based on organization theory. On the other hand, CEO duality creates agency problems and reduces monitoring effectiveness (Grove, Patelli, and Victoravich, 2011).

5.2 Methodology

5.2.1 Return synchronicity

The primary variable of interest in the regression is return synchronicity. It is widely used to estimate the amount of firm-specific information being incorporated into stock prices. It is important to notice that there is a significant mutual feedback of information on cross-listed stocks (Xu and Fung, 2002). The prices of dual-listed stocks are co-integrated and mutually adjusting (Su and Chong, 2007). Therefore, to measure the co-movement in stock returns for each firm in a given year, I regress each stock's daily return on the contemporaneous, lead and lagged returns of the local and the cross-listed foreign markets, which is indicated below

$$R_{i,t} = \alpha + \beta_1 R_{A,t} + \beta_2 R_{A,t+1} + \beta_3 R_{A,t-1} + \beta_4 R_{H,t} + \beta_5 R_{H,t+1} + \beta_6 R_{H,t-1} + \varepsilon_{i,t} \quad (1)$$

Where $R_{i,t}$ represents daily stock return of stock i on day t which is for either A- or H-shares. $R_{A,t}$ and $R_{H,t}$ are the market returns on the mainland Chinese and Hong Kong markets on day t, respectively.

The value of R^2 is bounded by zero and one. When used as the dependent variable in the regression analysis, it is suggested that it be transformed into continuous values. Following Morck, Yeung, and Yu (2000), I take the logistic transformation of the R^2 measures as $\log({R^2}_{i,t}/(1-{R^2}_{i,t}))$.

$$SYNC_{i,t} = \log({R^2}_{i,t}/(1-{R^2}_{i,t}) \quad (2)$$

Where $SYNC_{i,t}$ is the return commonality of stock i in year t. ${R^2}_{i,t}$ is the coefficient of determination from equation (1) for firm i in year. The log transformation is to replace a bounded dependent variable with an unbounded continuous variable.

5.2.2 Liquidity commonality

I use an analogous procedure to estimate co-movement in stock liquidity. In detail, stock liquidity co-movement is measured by the R^2 from the regression of an individual stock's daily liquidity change on the market's daily liquidity change. Liquidity is measured by the daily percentage quoted spread. This spread is defined as twice the absolute value of difference between the trading price and the mid-point of the bid and ask prices, which is then divided by the midpoint of the bid and ask prices. Daily market liquidity is defined

as the equally weighted average of all daily individual stock liquidity. To construct the liquidity commonality variable, I regress each stock's daily liquidity on the contemporaneous, lead and lagged liquidity of the local and the cross-listed foreign markets as follows

$$Liq_{i,t} = \alpha + \beta_1 Liq_{A,t} + \beta_2 Liq_{A,t+1} + \beta_3 Liq_{A,t-1} + \beta_4 Liq_{H,t} + \beta_5 Liq_{H,t+1} + \beta_6 Liq_{H,t-1} + \varepsilon_{i,t} \quad (3)$$

Where $Liq_{i,t}$ is the liquidity of stock i on day t which is for either A- or H- shares. $Liq_{A,t}$ and $Liq_{H,t}$ are the equally weighted mainland Chinese and Hong Kong markets liquidity on day t, respectively.

Like the return commonality, I take the logistic transformation of the R^2 measures as log $(R^2{}_{i,t}/(1 - R^2{}_{i,t})$ when they are used as the dependent variables in the empirical analysis.

$$Liqcom_{i,t} = \log(R^2{}_{i,t}/(1 - R^2{}_{i,t}) \quad (4)$$

Where $Liqcom_{i,t}$ is the liquidity commonality of stock i in year t. $R^2{}_{i,t}$ is the coefficient of determination from equation (3) for firm i in year.

5.2.3 The impact of short-selling constraints on return synchronicity and liquidity commonality

To examine the impact of short-sale constraints on return synchronicity and liquidity commonality, I include a dummy variable that indicates the short-sale information for stocks i in year t. During the sample period, stocks can be deleted or added to the designated list. I define the stocks that are allowed to short-sell in year t as the stocks stay in the designated list for at least three quarters in a given year. A full report of short-sale allowance for each stock is in appendix C.

$$SYNC_{i,t} = \alpha + \beta Short_{i,t} + Controls_{i,t} + \varepsilon_{i,t} \quad (5)$$

Where $SYNC_{i,t}$ is the return synchronicity of a stock i in year t which is for either A- or H- shares from equation (2). $Short_{i,t}$ represents a dummy variable equal to one if short-selling is allowed and zero otherwise. $Controls_{i,t}$ are the firm-level control variables, including firm size (Size), return volatility (Volatility), price (Price), annual returns (Return), turnover (Turnover), price to book ratio (PB), volatility of the return on assets (TDROA), and leverage ratio (Leverage). Year dummies are included to control for systematic time variations. The definitions of the control variables are given in Appendix A.

$$Liqcom_{i,t} = \alpha + \beta Short_{i,t} + Controls_{i,t} + \varepsilon_{i,t} \quad (6)$$

Where $Liqcom_{i,t}$ is the liquidity commonality of a stock i in year t, which is either A- or H- shares from equation (4). $Short_{i,t}$ represents a dummy variable equal to one if short-selling is allowed and zero otherwise. $Controls_{i,t}$ are the firm-level control variables, including firm size (Size), return volatility (Volatility), price (Price), annual returns (Return), turnover (Turnover), price to book ratio (PB), volatility of the return on assets (TDROA), leverage ratio (Leverage), and year dummies (not reported).

5.2.4 The impact of short-selling constraints on trading volumes on days with negative news

I propose that investors in the A-share market respond more to market-wide negative information whereas investors in the H-share market respond more to firm-specific negative information. Therefore, I expect larger trading volumes among shortable shares than non-shortable shares on the A-share market when market-wide negative news is released. I expect no such significant difference in the H-share market. Days with market-wide negative information are defined as a significant drop of the market index in one day (i.e., at least a 1% drop).

$$Trading\ volumes_{i,t} = \alpha + \beta_1 Short_{i,t} + Controls_{i,t} + \varepsilon_{i,t} \quad (7)$$

Where $Trading\ volumes_{i,t}$ is the trading volume for firm i in day t, which is either A- or H- shares. $Short_{i,t}$ represents a dummy variable equal to one if short-selling is allowed and zero otherwise. $Controls_{i,t}$ are firm-level control variables. They are firm size (Size), lagged trading volumes (TV_{t-1}), Liquidity (Liquidity), lagged liquidity ($Liquidity_{t-1}$),

price to book ratio (PB), volatility of the return on assets (TDROA), leverage (Leverage), annual returns (Return), return volatility (Volatility), and price (Price).

To compare trading volumes between A- and H-shares on days with firm-specific negative information, I conduct a paired t test since A- and H- shares refer to the same company with the identical firm-level characteristics and same firm-level information.

5.2.5 Robustness check with alternative return synchronicity measures

I also test my main results with slightly modified measures of stock return synchronicity as indicated below. Equation (8) calculates return synchronicity by regressing each stock's daily return on the contemporaneous, lead and lagged return of only the local market. Equation (9) regresses each stock's daily return on the contemporaneous, and lagged local market return. Equation (10) is similar to equation (1) but without the lead market returns.

$$R_{i(A\ or\ H),t} = \alpha + \beta_1 R_{A\ or\ H,t} + \beta_2 R_{A\ or\ H,t+1} + \beta_3 R_{A\ or\ H,t-1} + \varepsilon_{i,t} \quad (8)$$

$$R_{i(A\ or\ H),t} = \alpha + \beta_1 R_{A\ or\ H,t} + \beta_3 R_{A\ or\ H,t-1} + \varepsilon_{i,t} \quad (9)$$

$$R_{i,t} = \alpha + \beta_1 R_{A,t} + \beta_2 R_{A,t-1} + \beta_3 R_{H,t} + \beta_4 R_{H,t-1} + \varepsilon_{i,t} \quad (10)$$

Where $R_{i,t}$ represents daily stock return of stock i on day t, which is either A- or H- shares. $R_{A,t}$ and $R_{H,t}$ are the market returns on the mainland Chinese and Hong Kong markets on day t, respectively.

5.2.6 Short-sale constraints and corporate governance

A firm's corporate governance structure can influence the quality of information disclosure and thus investors' response to negative information. This may further affect the asymmetric impact of positive and negative information on stock return synchronicity. To examine the additional effect of corporate governance factors on the relationship between short-sale constraints and stock return synchronicity, I rerun model (5) with the interaction terms between the corporate governance and the short sale constraints.

$$SYNC_{i,t} = \alpha + \beta_1 Short_{i,t} + \beta_2 Short_{i,t} * Corp_{i,t} + Corp_{i,t} + Controls_{i,t} + \varepsilon_{i,t} \quad (11)$$

Where $SYNC_{i,t}$ is the return synchronicity of a stock i in year t, which is either A- or H-shares from equation (2). $Short_{i,t}$ represents a dummy variable equal to one if short-selling is allowed and zero otherwise.

$Corp_{i,t}$ are the firm-level corporate governance variables, including the state-owned enterprises (SOE) dummy, the percentage of independent directors on board (Indep), the number of members on the supervisory board (Supervisory), the size of management team (Management), a CEO_Chair dummy, and a Linktop10 dummy.

$Controls_{i,t}$ are firm-level control variables, including firm size (Size), return volatility (Volatility), price (Price), annual returns (Return), turnover (Turnover), price to book ratio (PB), volatility of the return on assets (TDROA), and leverage ratio (Leverage).

CHAPTER 6
Empirical Results

6 Empirical Results

This chapter presents the descriptive statistics and the results from the univariate tests and multiple-linear regression analyses. In the first section, I provide an overview of my sample. In section two, I conduct simple univariate tests to check the return synchronicity difference (i.e., A-shares versus H-shares; shortable versus non-shortable shares). According to Li, Brockman, and Zurbruegg (2015), A-shares impound more market-wide information whereas H-shares impound more firm-specific information. In other words, return synchronicity of A-shares is higher than H-shares. I expect a like pattern using a similar sample within a different time horizon. By analogy, I posit that A-shares (H-shares) impound more market-wide (firm-specific) negative information when they are allowed to be short-sold. Section three summarizes the empirical results of regression analyses that support the existence of an asymmetric impact of positive and negative information. Section four provides a series robustness tests, including the liquidity commonality difference because of the change of short-sale constraints, a comparison of trading volumes between shortable and non-shortable shares on days with market-wide negative information, and a comparison of trading volumes between A-shares and H-shares on days with firm-specific negative information, to support the interpretation of the regression results. The last section tests the incremental effect that the corporate governance structure adds to the asymmetric impact.

6.1 Descriptive data

My sample includes 86 dual-listed companies traded as A-shares in mainland China and H-shares in Hong Kong. The industry categories are shown in Panel A of Table 6.1 and the number of A- and H- shares' IPOs from 1991 to 2014 is presented in Panel B. A complete report of the basic information for each company is presented in Appendix B. The industry is classification is according to the China Securities Regulatory Commission (CSRC). Nearly half of the dual-listed companies in my sample operate in the manufacturing industry. Over 30 per cent of the companies are in the finance and transportation industries. The rest of the industries are utilities, construction, retail and real estate. The earliest listing on the mainland Chinese Stock Exchange in my sample is 1991, when SSE and SZSE were established. The Chinese companies have listed on the Hong Kong market since 1993. There were 13 companies that went IPO on the Hong Kong Stock Exchange in 1997. This large number of listings may have been encouraged by the transfer of the sovereignty of Hong Kong from the United Kingdom to the People's Republic of China. The year 2007 was a peak for A-shares listing when 16 companies listed on the Chinese stock exchanges. That year, 2007, is important to Chinese stock market history because the market experienced a big stock bubble. The Shanghai composite index rose to 6092 in October 2007 and then plunged dramatically.

Table 6.1
Descriptive summary of A- and H-shares.

Panel A: Number of Stocks by Industry		
Name	Number of shares	Percentage
Mining	9	10.47%
Manufacturing	39	45.35%
Utilities	4	4.65%
Construction	4	4.65%
Retail	1	1.16%
Transportation	12	13.95%
Finance	15	17.44%
Real estate	2	2.33%
Total	86	100.00%

Panel B: Number of Stocks by the year of IPO		
Year	Number of A-shares	Number of H-shares
1991	1	0
1993	4	6
1994	6	5
1995	5	1
1996	2	6
1997	4	13
1998	2	2
1999	1	1
2000	3	2
2001	5	1
2002	4	2
2003	3	3
2004	0	5
2005	1	5
2006	6	6
2007	16	4
2008	5	3
2009	3	4
2010	5	5
2011	4	4
2012	6	4
2013	0	1
2014	0	3
Total	86	86

Table 6.2
Percentage of shortable and non-shortable A- and H-shares from 2005 to 2014.

		2005	2006	2007	2008	2009
A	Non-shortable shares	100.00%	100.00%	100.00%	100.00%	100.00%
	Shortable shares	0.00%	0.00%	0.00%	0.00%	0.00%
H	Non-shortable shares	33.96%	30.51%	22.58%	20.00%	28.17%
	Shortable shares	66.04%	69.49%	77.42%	80.00%	71.83%

		2010	2011	2012	2013	2014
A	Non-shortable shares	59.46%	58.97%	45.24%	33.33%	27.71%
	Shortable shares	40.54%	41.03%	54.76%	66.67%	72.29%
H	Non-shortable shares	18.67%	16.67%	21.95%	22.89%	17.44%
	Shortable shares	81.33%	83.33%	78.05%	77.11%	82.56%

Note: "A" indicates A-shares "H" indicates H-shares

As discussed in the background section, shares can be added to or deleted from the designated list within a year. To compare the return synchronicity between shortable and non-shortable shares on a yearly basis, I define a stock that can be short-sold in a given year as a stock staying in the designated list for at least three quarters during a year. Table 6 describes the percentage of shortable and non-shortable shares for A- and H-shares each year from 2005 to 2014. As shown in Table 6.2, A-shares were completely prohibited from short selling until 2009. In 2010, 40.54% of the A-shares were permitted to short sell. The percentage increased to 72.29% in 2014. Unlike A-shares, shares on the Hong Kong market could be short sold since 1994. In 2005, roughly 66% of the H-shares in my sample were allowed to short-sell. The percentage of shortable shares reached 83.33% in 2011 and decreased slightly to 82.56% in 2014. Compared with the Hong Kong market, the mainland Chinese market imposes more restrictions on short-selling. This semi-open short-selling mechanism applying to certain stocks makes it possible to compare the return synchronicity between shortable and non-shortable shares in a single market. At the same time, it allows me to compare the impact of short-sale constraints with the same set of companies traded in two economic zones.

Table 6.3

Descriptive statistics of return synchronicity and firm characteristics.

This table shows descriptive statistics for the dependent and independent variables used in the regression analysis. SYNC_A is the annual return synchronicity for A-shares. SYNC_H is the annual return synchronicity for H-shares. Size is the firm Size. Volatility is the annual stock return volatility. Price is the annual stock price. Return is the annual stock return. Turnover is the annual stock turnover. PB is the price to book ratio. STDROA is the volatility of return on assets. Leverage is the leverage ratio. The definition of variables is given in Appendix A.

Variable	Observations	Mean	Std. Dev.	Min	Max
SYNC_A	779	-0.361	0.811	-3.281	1.463
SYNC_H	687	-0.688	0.994	-4.699	5.233
Size	963	17.658	2.278	13.068	23.358
Volatility_A	767	0.117	0.056	0.033	0.301
Price_A	735	2.105	0.784	0.815	4.184
Return_A	682	0.001	0.595	-1.616	1.647
Turnover_A	774	1.846	1.809	0.037	10.004
Volatility_H	673	0.119	0.049	0.040	0.278
Price_H	649	1.774	0.994	-0.236	4.187
Return_H	605	0.123	0.569	-1.378	1.539
Turnover_H	677	2.492	2.182	0.253	12.873
PB	771	2.627	2.434	-1.817	16.336
STDROA	752	0.016	0.015	0.001	0.089
Leverage	788	0.532	0.242	0.027	0.972

I summarise the descriptive statistics of return synchronicity and the firm-level characteristics in Table 6.3. The value of firm-specific information is measured by SYNC estimated from equation (2). It is important to notice first that there is a difference between A- and H-shares in terms of firm-specific information impounded into the stock prices. The return synchronicity of A-shares is higher than that of H-shares. The degree of return synchronicity and the level of firm-specific information is inversely related, suggesting less firm-specific information has been incorporated into A-share prices. Given that the A- (H-) share market is dominated by individual (institutional) investors (HKEx, 2016), it can be interpreted that individual investors impound less firm-specific information into stock prices than institutional investors. A univariate test will be conducted in the next section to support this primary finding. The average price of A-

shares is greater than the price of their counterparts[29]. This is consistent with the fact that there is a price disparity between dual-listed AH shares. H-shares are discounted relative to A-shares. Various explanations have been provided for this price discrepancy. Sun and Tong (2000) summarize the possible reasons: different demand[30], the liquidity problem, and information asymmetry. The average leverage ratio for these cross-listed firms is approximately 0.532. To make a better comparison, I extend the descriptive statistics to the yearly basis.

As shown in Table 6.4, the return synchronicity of A- and H-shares reached its highest point and turned positive in 2008, indicating the return of A- and H-share co-move more closely with the market indices during the global financial crisis. This is consistent with the discussion in chapter 3. During a financial crisis, investors tend to trade on market-wide information, resulting in a higher return synchronicity. On a yearly basis, the average prices of A-shares are relatively higher than H-shares from 2005 to 2013, but the price of A-shares is slightly at a discount relative to H-shares in 2014. This can be explained by the Shangahai-Hong Kong Stock Connect program launched in 2014. Under the program, investors in the segmented markets were able to trade in both markets. This mutual market strategy further opens up the A-share market to overseas investors and allows more participation of Chinese retail and institutional investors in the Hong Kong market. The mean volatility of A-shares is larger than of H-shares in most years throughout the sampling period. This may be explained by the different ownership structure (institutional versus individual investors). Foucault, Sraer, and Thesmar (2011)

[29] Prices of A- and H-shares are expressed in RMB.

[30] The "different demand" refers to the demand elasticity. In the mainland Chinese market, listing quotas are set by the China Securities Regulatory Commission. The issue of foreign shares needs additional approval. Moreover, there are limited investment options for Chinese investors and the deposit rate is not attractive to Chinese citizens. Therefore, the demand elasticity is very low. In contrast, investors from Hong Kong and other countries do not suffer this problem.

show that individual investor's trading activity is positively related to stock volatility since they are considered as noise or speculative traders. The average leverage ratio of these dual-listed companies was relatively lower (0.452) in 2004 and increased to 0.527 in 2014. The mean price to book ratio fluctuated during the sample period, from a low of 1.576 in 2013 to a high of 6.533 in 2007. In terms of turnover, H-shares are always greater than A-shares, indicating H-shares are more liquid than their counterparts.

The correlation matrix for the variables used in the primary test is tabulated in Table 6.5. The return synchronicity of A-shares and H-shares is highly co-correlated (ρ=0.705). The return synchronicity of A- and H-shares has a close positive relationship with firm size, suggesting larger firms have higher return synchronicity. The correlations between return synchronicity and other firm-level controls are quite low.

Table 6.4

Descriptive statistics of return synchronicity and firm characteristics on an annual basis

This table shows yearly descriptive statistics for the dependent and independent variables used in the regression analysis. SYNC_A is the annual return synchronicity for A-shares. SYNC_H is the annual return synchronicity for H-shares. Size is the firm size. Volatility is the annual stock return volatility. Price is the annual stock price. Return is the annual stock return. Turnover is the annual stock turnover. PB is the price to book ratio. STDROA is the volatility of return on assets. Leverage is the leverage ratio. The definition of variables is given in Appendix A.

	2005	2006	2007	2008	2009
SYNC_A	-0.545	-1.244	-0.449	0.446	-0.031
SYNC_H	-1.686	-1.107	-0.589	0.313	-0.304
Size	16.882	17.084	17.522	17.667	17.798
Volatility_A	0.108	0.116	0.179	0.216	0.140
Price_A	1.817	1.531	2.004	3.062	1.883
Return_A	-0.098	-0.185	0.528	1.023	-1.107
Turnover_A	1.448	2.222	2.998	1.716	3.049
Volatility_H	0.081	0.107	0.136	0.181	0.158
Price_H	1.371	1.316	1.838	2.429	1.490
Return_H	-0.022	0.007	0.611	0.663	-0.857
Turnover_H	2.592	2.997	3.794	3.018	3.327
PB	1.606	2.707	6.533	2.034	3.609
STDROA	0.016	0.017	0.018	0.022	0.016
Leverage	0.452	0.527	0.530	0.561	0.572

	2010	2011	2012	2013	2014
SYNC_A	-0.202	-0.064	-0.153	-0.524	-1.022
SYNC_H	-0.439	-0.035	-0.744	-0.848	-1.283
Size	18.005	18.144	18.248	18.353	18.482
Volatility_A	0.115	0.079	0.088	0.109	0.088
Price_A	2.489	2.292	1.948	1.993	1.920
Return_A	0.658	-0.099	-0.350	0.047	-0.041
Turnover_A	1.821	1.500	1.161	1.566	1.763
Volatility_H	0.098	0.150	0.100	0.097	0.090
Price_H	2.100	2.169	1.758	1.930	1.930
Return_H	0.628	0.126	-0.407	0.171	0.051
Turnover_H	1.995	1.762	1.524	1.647	1.638
PB	3.000	1.897	1.885	1.576	2.113
STDROA	0.015	0.015	0.014	0.015	0.014
Leverage	0.552	0.582	0.527	0.536	0.527

Table 6.5

Correlation matrix of return synchronicity and firm characteristics.

SYNC_A is the annual return synchronicity for A-shares. SYNC_H is the annual return synchronicity for H-shares. Size is the firm size. Volatility is the annual stock return volatility. Price is the annual stock price. Return is the annual stock return. Turnover is the annual stock turnover. PB is the price to book ratio. STDROA is the volatility of return on assets. Leverage is the leverage ratio. The definition of variables is given in Appendix A.

	SYNC_A	SYNC_H	Size	Volatility_A	Price_A	Return_A	Turnover_A
SYNC_A	1						
SYNC_H	0.705	1					
Size	0.474	0.513	1				
Volatility_A	0.052	0.17	-0.194	1			
Price_A	0.237	0.271	0.046	0.274	1		
Return_A	0.007	0.067	-0.047	0.302	0.436	1	
Turnover_A	-0.154	-0.100	-0.339	0.286	0.184	0.024	1
Volatility_H	0.164	0.212	-0.210	0.570	0.223	0.029	0.250
Price_H	0.279	0.353	0.321	0.109	0.864	0.299	0.180
Return_H	-0.010	0.076	-0.072	0.215	0.355	0.873	0.020
Turnover_H	-0.014	-0.021	-0.292	0.347	0.181	0.038	0.400
PB	-0.183	-0.100	-0.218	0.251	0.111	0.102	0.250
STDROA	-0.162	-0.086	-0.304	0.214	0.154	0.137	0.130
Leverage	0.117	0.187	0.483	-0.034	-0.076	-0.033	-0.030

	Volatility_H	Price_H	Return_H	Turnover_H	PB	STDROA	Leverage
Volatility_H	1						
Price_H	0.095	1					
Return_H	0.090	0.284	1				
Turnover_H	0.366	0.086	0.056	1			
PB	0.195	0.009	0.144	0.156	1		
STDROA	0.217	0.059	0.150	0.155	0.113	1	
Leverage	-0.020	-0.036	-0.048	-0.177	0.064	-0.250	1

6.2 Univariate tests

To confirm my primary findings in the descriptive summary, I conduct a univariate test on a yearly basis to check the return synchronicity difference between A- and H-shares. As shown in Table 6.6, the t-tests support the results obtained in the previous section. During most years in my sample, the return synchronicity of A-shares is statistically higher than H-shares. These results can be interpreted as the A-share market impounding more market wide information whereas the H-share market impounds more firm-specific information into stock prices. With this logic, I propose that shortable A-shares (H-shares) impound more market-wide (firm-specific) negative information into prices than non-shortable A-shares (H-shares).

Table 6.6
Univariate tests for dual-listed stocks' return synchronicity estimations.
This table presents the average return synchronicity of A-shares and H-shares in each year. "A-H" is the return synchronicity difference between A-shares and H-shares. Superscripts *, **, and *** denote the significance levels at 10%, 5%, and 1%, respectively.

	2005	2006	2007	2008	2009
SYNC_A	-0.545	-1.244	-0.449	0.446	-0.031
SYNC_H	-1.686	-1.107	-0.589	0.313	-0.304
A-H	1.142***	-0.137	0.140	0.133	0.272**
T-test	(7.955)	(-0.697)	(1.090)	(0.944)	(1.930)

	2010	2011	2012	2013	2014
SYNC_A	-0.202	-0.064	-0.153	-0.524	-1.022
SYNC_H	-0.439	-0.035	-0.744	-0.848	-1.283
A-H	0.237**	-0.029	0.591***	0.325***	0.260**
T-test	(1.995)	(-0.286)	(3.966)	(2.492)	(1.967)

Taking one step back, I observe different levels of return synchronicity between shortable and non-shortable shares. Therefore, I conduct univariate tests to examine the effect of short-sale constraints on stock return synchronicity (Table 6.7). I notice that the return synchronicity for shortable A-shares is statistically significantly higher than non-shortable shares, suggesting shortable shares impound more market-wide negative

information than non-shortable shares. However, there is no statistically significant difference in return synchronicity for H-shares.

Table 6.7

Univariate tests for stock return synchronicity estimations and short-sale constraints.

This table presents the difference in return synchronicity between shortable and non-shortable shares for both A- and H-shares. "Diff SYNC_A" is equal to SYNC_A of shortable shares minus SYNC_A of non-shortable shares; "Diff SYNC_H" is equal to SYNC_H of shortable shares minus SYNC_H of non-shortable shares. Superscripts *, **, and *** denote the significance levels 10%, 5%, and 1%, respectively.

	2010	2011	2012	2013	2014
Diff SYNC_A	0.640***	0.504***	0.847***	0.758***	0.861***
	(3.954)	(4.805)	(5.859)	(4.678)	(5.075)
Diff SYNC_H	-0.469	-0.085	-0.167	-0.556**	-0.539
	(-1.372)	(-0.264)	(-0.442)	(-1.961)	(-1.574)

These results are essential for the following regression analyses. In the next section, I first test the difference of return synchronicity between shortable and non-shortable shares after controlling for a series of firm-level characteristics. Secondly, I posit that the magnitude of change is greater in markets with a larger proportion of institutional investors because roughly 75% of short-sale orders are executed by institutional investors rather than retail investors (Boehmer, Jones, and Zhang, 2008). Thirdly, the relaxation of short-sales is expected to result in an increase (decrease) in return synchronicity in the A- (H-) share market. That is, individual investors in the A-share market tend to impound market-wide negative information whereas institutional investors in the H-shares market tend to incorporate firm-specific negative information.

6.3 Multiple linear regression analysis

In this section, a number of multiple linear regressions are reported. Since short-selling was permitted in March 2010 on the mainland Chinese market, I set the sample period to start from 2010 to make a better comparison between the A- and H-share markets (Table 6.8). A separate regression for H-shares between 2005 and 2009 are presented in Table 6.9.

Table 6.8 presents multivariate regression results based on equation (5) using different sets of explanatory variables. In column (1), I include the set of variables (size, volatility, price, return, and turnover) used in Dang, Moshirian, and Zhang's (2015) paper. In column (2), I also include the variables price to book ratio, volatility of return on assets, and leverage according to Li, Brockman, and Zurbruegg (2015). To correct for firm-level clustering, in column (3) I rerun the regression in column (2) but estimate the standard errors with a robust option. Starting with column (1), I find that the coefficient estimate of Short is significant on both A- and H-share markets when controlled for size, volatility, price, return and turnover. This indicates a significant impact of short-selling on stock return synchronicity. In addition, the magnitude of the short-selling impact is larger on the H-share market than the A-share market (0.494 versus 0.305), suggesting institutional investors possess a stronger ability to process negative information. The coefficient estimate of Short is significantly positive on the A-share market, but it is significantly negative on the H-share market. This suggests that, when stocks are allowed to short-sell, more market-wide negative information is impounded into prices on the A-share market whereas more firm-specific negative information is impounded into the stock prices on the H-share market. I interpret these results as individual (institutional) investors prefer to trade on market-wide (firm-specific) negative information. In columns (2) and (3), the

effect of short-selling is more pronounced when controlled for the more firm-specific characteristics (i.e., PB, STDROA and leverage).

During 2005 to 2009, short-selling was totally banned on the mainland Chinese market but was partially open to some H-shares in the designated list. Table 6.9 reports the impact of short-selling on return synchronicity on the Hong Kong market using the alternative sample period 2005 to 2009. The coefficient estimate of Short is positive in column (1) with a short list of controls and becomes insignificant after controlling for the full set of firm-specific variables. This sample period includes the financial crisis that started in 2007 which exerted adverse shocks on all firms. During recessions, investors' decisions are more likely to be influenced by market-wide negative news than at other times. That is, institutional investors tend to consider firm-specific and market-wide negative information at the same time. Therefore, investors' balanced consideration of firm-specific negative information relative to the market-wide negative information may not change the level of return synchronicity.

Table 6.8
Short-sale constraints and return synchronicity.
This table reports the regressions of stocks' return synchronicity on short-sale constraints at the firm level. The regression model is as follows:
$Sync_{i,t} = \alpha + \beta Short_{i,t} + Controls_{i,t} + \varepsilon_{i,t}$
Where $SYNC_{i,t}$ is the logistic transformation of return synchronicity for firm i in year t. $Short_{i,t}$ represents a dummy variable equal to one if short-selling is allowed, and zero otherwise. $Controls_{i,t}$ are the firm-level control variables, including firm size (Size), return volatility (Volatility), price (Price), annual returns (Return), turnover (Turnover), price to book ratio (PB), volatility of the return on assets (TDROA), and leverage (Leverage). The definition of variables is given in Appendix A. Observations is the number of observations, Adjusted R-squared is the adjusted R-squared value, and Year Fixed Effects are included (not reported). Superscripts *, **, and *** denote the significance levels of 10%, 5%, and 1%, respectively. The sample period is 2010 to 2014.

Panel A: A-shares

	A-shares		
Dep. Variable	SYNC_A		
	(1)	(2)	(3)
Short	0.305***	0.308***	0.308***
	(3.450)	(3.558)	(3.475)
Size	0.121***	0.116***	0.116***
	(5.900)	(4.880)	(4.390)
Volatility	-2.085**	-1.484	-1.484
	(-2.042)	(-1.480)	(-0.975)
Price	0.156***	0.158***	0.158***
	(3.265)	(3.254)	(3.272)
Return	-0.416***	-0.345***	-0.345***
	(-3.407)	(-2.858)	(-3.023)
Turnover	-0.011	-0.007	-0.007
	(-0.369)	(-0.233)	(-0.209)
PB		-0.045**	-0.045*
		(-2.454)	(-1.907)
STDROA		-6.755***	-6.755**
		(-2.810)	(-2.304)
Leverage		-0.365**	-0.365**
		(-2.358)	(-2.136)
Constant	-2.319***	-1.925***	-1.925***
	(-5.454)	(-4.235)	(-3.787)
Year Fixed Effects	Yes	Yes	Yes
Observations	368	368	368
Adjusted R-squared	0.472	0.499	0.499

Panel B: H-shares

	H-shares		
Dep. Variable	SYNC_H		
	(1)	(2)	(3)
Short	-0.494***	-0.584***	-0.584***
	(-3.380)	(-3.571)	(-4.106)
Size	0.278***	0.293***	0.293***
	(13.928)	(11.527)	(12.600)
Volatility	-1.931*	-1.588	-1.588
	(-1.688)	(-1.330)	(-1.155)
Price	0.143***	0.140***	0.140***
	(3.531)	(3.253)	(3.026)
Return	-0.199*	-0.227*	-0.227
	(-1.664)	(-1.817)	(-1.525)
Turnover	0.143***	0.124***	0.124***
	(3.601)	(2.962)	(3.145)
PB		0.012	0.012
		(0.524)	(0.502)
STDROA		-3.712	-3.712
		(-1.277)	(-1.063)
Leverage		-0.250	-0.250
		(-1.335)	(-1.288)
Constant	-5.248***	-5.265***	-5.265***
	(-13.555)	(-11.625)	(-11.766)
Year Fixed Effects	Yes	Yes	Yes
Observations	309	301	301
Adjusted R-squared	0.571	0.569	0.569

Table 6.9

Short-sale constraints and H-shares' return synchronicity during 2005 to 2009.

This table reports the regressions of stocks' return synchronicity on short-sale constraints at the firm level. The regression model is as follows:

$SYNC_{i,t} = \alpha + \beta Short_{i,t} + Controls_{i,t} + \varepsilon_{i,t}$

Where $SYNC_{i,t}$is the logistic transformation of return co-movement for firm i in year t. $Short_{i,t}$ represents a dummy variable equal to one if short-selling is allowed, and zero otherwise. $Controls_{i,t}$ are the firm-level control variables, including firm size (Size), return volatility (Volatility), price (Price), annual returns (Return), turnover (Turnover), price to book ratio (PB), volatility of the return on assets (TDROA), and leverage (Leverage). The definition of variables is given in Appendix A. Observations is the number of observations, Adjusted R-squared is the adjusted R-squared value, and Year Fixed Effects are included (not reported). Superscripts *, **, and *** denote the significance levels of 10%, 5%, and 1%, respectively. The sample period is 2005 to 2009.

	H shares		
Dep. Variables	SYNC_H		
	(1)	(2)	(3)
Short	0.297*	-0.145	-0.145
	(1.777)	(-0.926)	(-0.888)
Size	0.283***	0.384***	0.384***
	(10.296)	(12.378)	(12.896)
Volatility	1.636	2.760**	2.760**
	(1.402)	(2.523)	(2.544)
Price	0.093	0.159***	0.159***
	(1.585)	(3.004)	(2.981)
Return	-0.226*	-0.174	-0.174
	(-1.684)	(-1.415)	(-1.417)
Turnover	0.000	-0.016	-0.016
	(-0.019)	(-0.815)	(-0.922)
PB		-0.024	-0.024
		(-1.404)	(-1.594)
STDROA		-3.053	-3.053
		(-1.172)	(-1.139)
Leverage		-1.437***	-1.437***
		(-7.112)	(-6.762)
Constant	-6.957***	-7.720***	-7.720***
	(-14.852)	(-15.872)	(-16.522)
Year Fixed Effects	Yes	Yes	Yes
Observations	208	167	167
Adjusted R-squared	0.689	0.808	0.808

All these empirical findings support my first hypothesis. To confirm my conjecture about individual and institutional investors' different trading preferences in processing market-wide and firm-specific negative information, robustness tests are conducted and are reported in the section below.

6.4 Robustness tests

In the previous section, I conjecture that A-share investors tend to incorporate more market-wide negative information when they are allowed to short-sell. Conversely, H-share investors tend to incorporate more firm-specific negative information. To test this statement, I run a set of robustness tests, including checking the difference in liquidity commonality between shortable and non-shortable shares by comparing the trading volumes on days with market-wide and firm-specific negative news.

First, liquidity commonality is tested to observe A- and H-shareholders' response to market-wide and firm-specific information. Prior literature suggests that liquidity commonality is higher in markets with more correlated trading (Kamara, Lou, and Sadka, 2008; Koch, Ruenzi, and Starks, 2009) or a larger proportion of noise traders (Huberman and Halka, 2001). Since individual investors trade more on market-wide information, such trading activities on similar information would lead to more correlated trading. Tan, Chiang, Mason, and Nelling (2008) show that herding behaviour is prevalent among individual investors in mainland China. Also, individual traders are considered noise traders compared with institutional investors (Foucault, Sraer, and Thesmar, 2011). Therefore, I posit that shortable shares' liquidity commonality is higher (lower) in the A- (H-) share market when the short-sale constraints are lifted.

Table 6.10 reports the multivariate regression results based on equation (6) with different sets of firm-specific control variables. Like the return synchronicity regression, in column

(1), I include the set of variables (size, volatility, price, return, and turnover) used in Dang, Moshirian, and Zhang's (2015) paper. In column (2), I include additional variables (price to book ratio, volatility of return on assets, and leverage) based on Li, Brockman, and Zurbruegg (2015). In column (3), the regression is the same but I estimate the standard errors with a robust option to correct for firm-level clustering. In the A-share market, the coefficient estimate of Short is significantly positive using different sets of controls, suggesting liquidity commonality is higher among stocks without short-sale constraints. In the H-share market, the coefficient estimate of Short is significantly negative when controlled for size, volatility, price, return, and turnover. However, it becomes insignificant after controlling for PB, STDROA and leverage. This provides weak evidence suggesting lower liquidity commonality for stocks that are allowed to short-sell. These results broadly support my argument.

Table 6.10
Short-sale constraints and liquidity commonality.
This table reports the regressions of stocks' liquidity commonality on short-sale constraints at the firm level. The regression model is as follows:
$Liqcom_{i,t} = \alpha + \beta Short_{i,t} + Controls_{i,t} + \varepsilon_{i,t}$
Where $Liqcom_{i,t}$ is the logistic transformation of liquidity comovement for firm i in year t. $Short_{i,t}$ represents a dummy variable equal to one if short-selling is allowed, and zero otherwise. $Controls_{i,t}$ are the firm-level control variables, including firm size (Size), return volatility (Volatility), price (Price), annual returns (Return), turnover (Turnover), price to book ratio (PB), volatility of the return on assets (TDROA), and leverage (Leverage). The definition of variables is given in Appendix A. Observations is the number of observations, R-squared is the R-squared value, and Year Fixed Effects are included (not reported). Superscripts *, **, and *** denote the significance levels of 10%, 5%, and 1%, respectively. The sample period is 2010 to 2014.

Panel A: A-shares

	A-shares		
Dependent Variable	Liqcom_A		
	(1)	(2)	(3)
Short	0.293**	0.275**	0.275**
	(2.563)	(2.399)	(2.318)
Size	-0.073***	-0.045	-0.045
	(-2.750)	(-1.434)	(-1.594)
Volatility	-0.353	-0.643	-0.643
	(-0.268)	(-0.485)	(-0.490)
Price	-0.188***	-0.214***	-0.214***
	(-3.038)	(-3.337)	(-3.770)
Return	0.052	0.009	0.009
	(0.330)	(0.056)	(0.056)
Turnover	0.010	0.016	0.016
	(0.265)	(0.399)	(0.402)
PB		0.037	0.037*
		(1.525)	(1.870)
STDROA		4.473	4.473
		(1.408)	(1.632)
Leverage		-0.104	-0.104
		(-0.510)	(-0.576)
Constant	-1.599***	-2.098***	-2.098***
	(-2.913)	(-3.491)	(-3.673)
Year Fixed Effects	Yes	Yes	Yes
Observations	368	368	368
Adjusted R-squared	0.071	0.076	0.076

Panel B: H-shares

	H-shares		
Dependent Variable	Liqcom_H		
	(1)	(2)	(3)
Short	-0.316*	-0.237	-0.237
	(-1.966)	(-1.324)	(-1.155)
Size	-0.054**	-0.058**	-0.058**
	(-2.477)	(-2.096)	(-2.034)
Volatility	-0.050	0.322	0.322
	(-0.040)	(0.246)	(0.244)
Price	0.034	0.042	0.042
	(0.758)	(0.890)	(0.841)
Return	0.059	0.065	0.065
	(0.451)	(0.478)	(0.488)
Turnover	-0.028	-0.020	-0.020
	(-0.648)	(-0.435)	(-0.475)
PB		0.000	0.000
		(0.000)	(0.000)
STDROA		-3.943	-3.943*
		(-1.240)	(-1.682)
Leverage		0.054	0.054
		(0.261)	(0.262)
Constant	-2.425***	-2.436***	-2.436***
	(-5.694)	(-4.915)	(-4.856)
Year Fixed Effects	Yes	Yes	Yes
Observations	309	301	301
Adjusted R-squared	0.056	0.028	0.028

Table 6.11

Trading volumes and short-sale constraints on days with market-wide negative information.

This table reports the regressions of stocks' percentage change in trading volumes on short-sale constraints in market downturn at the firm level. The regression model is as follows:

$Trading\ volumes_{i,t} = \alpha + \beta_1 Short_{i,t} + Controls_{i,t} + \varepsilon_{i,t}$

Where $Trading\ volumes_{i,t}$ is the percentage change of trading volumes for firm i in day t. $Short_{i,t}$ represents a dummy variable equal to one if short-selling is allowed, and zero otherwise. $Controls_{i,t}$ are the firm-level control variables, including firm size (Size), lagged trading volumes (TV_{t-1}), Liquidity (liquidity), lagged liquidity (Liquidityt-1), price to book ratio (PB), volatility of the return on assets (TDROA), leverage (Leverage), annual returns (Return), return volatility (Volatility), and price (Price). A 1% drop indicates minimum1% market index drop in one day, 2% drop indicates minimum 2% market index drop in one day, and 3% drop indicates minimum 3% market index drop in one day. Observations is the number of observations. R-squared is the R-squared value. Superscripts *, **, and *** denote the significance levels of 10%, 5%, and 1%, respectively. The sample period is 2010 to 2014.

Panel A: A-shares

	A-shares					
Dep. Variable	Percentage change of trading volumes					
	(1)	(2)	(3)	(4)	(5)	(6)
	1% drop	2% drop	3% drop	1% drop	2% drop	3% drop
Short	0.007***	0.007***	0.013***	0.011***	0.009***	0.016***
	(5.326)	(2.792)	(3.021)	(7.399)	(3.482)	(3.549)
Size	0.011***	0.016***	0.016***	0.019***	0.023***	0.027***
	(10.400)	(7.549)	(4.537)	(14.878)	(9.095)	(6.188)
TVt-1	-0.015***	-0.016***	-0.020***	-0.019***	-0.021***	-0.025***
	(-28.237)	(-15.798)	(-11.278)	(-31.263)	(-17.086)	(-12.710)
Liquidity	1.171***	0.926***	1.228*	0.711***	0.611**	0.384
	(5.318)	(3.061)	(1.714)	(3.102)	(1.989)	(0.527)
Liquidityt-1	-0.563*	-0.115	-0.54	-1.890***	-1.340**	-2.502**
	(-1.717)	(-0.204)	(-0.462)	(-5.147)	(-2.212)	(-2.027)
PB				-0.000***	0.000	0.000
				(-2.974)	(0.529)	(0.737)
STDROA				-0.080*	-0.174**	-0.227
				(-1.954)	(-2.145)	(-1.505)
leverage				0.000	-0.002	-0.012
				(0.052)	(-0.356)	(-1.477)
Return				0.001	0.003	-0.004
				(0.413)	(0.842)	(-0.579)
Volatility				0.174***	0.125***	0.107*
				(10.380)	(3.682)	(1.896)
Price				-0.012***	-0.012***	-0.016***
				(-11.102)	(-5.773)	(-4.555)
Constant	0.037***	0.045*	-0.023	0.052***	0.092***	0.091***
	(3.793)	(1.796)	(0.511)	(5.481)	(5.182)	(3.101)
Observations	9,164	2,078	623	8,510	1,940	586
Adjusted R-squared	0.093	0.178	0.191	0.115	0.202	0.242

Panel B: H-shares

	H-shares					
Dep. Variable	Percentage change of trading volumes					
	(1)	(2)	(3)	(4)	(5)	(6)
	1% drop	2% drop	3% drop	1% drop	2% drop	3% drop
Short	0.004	0.008	-0.007	0.006	-0.002	-0.037**
	(0.713)	(1.101)	(-0.561)	(0.842)	(-0.175)	(-2.110)
Size	0.019***	0.017***	0.015***	0.041***	0.039***	0.044***
	(13.030)	(9.143)	(4.708)	(19.499)	(15.214)	(8.586)
TVt-1	-0.030***	-0.027***	-0.030***	-0.046***	-0.042***	-0.048***
	(-25.748)	(-17.660)	(-10.752)	(-28.627)	(-21.307)	(-12.744)
Liquidity	0.579*	-0.212	0.087	0.411	0.300	-0.022
	(1.872)	(-0.599)	(0.136)	(1.116)	(0.732)	(-0.032)
Liquidityt-1	1.305***	0.664	-0.371	1.293***	0.629	-0.848
	(3.663)	(1.393)	(-0.373)	(3.021)	(1.231)	(-0.793)
PB				-0.001**	0.000	-0.001
				(-2.266)	(1.312)	(-1.267)
STDROA				0.092	-0.036	-0.096
				(0.774)	(-0.249)	(-0.316)
leverage				-0.023***	-0.036***	-0.043***
				(-3.336)	(-4.276)	(-2.780)
Return				0.004	0.003	0.014
				(0.818)	(0.646)	(1.316)
Volatility				0.271***	0.273***	0.240**
				(6.761)	(5.782)	(2.452)
Price				-0.034***	-0.030***	-0.038***
				(-14.573)	(-11.099)	(-7.175)
Constant	0.057***	0.100***	0.115***	0.020	0.057***	0.098**
	(3.384)	(5.341)	(3.570)	(1.171)	(2.711)	(2.483)
Observations	7,973	1,844	563	7,030	1,596	476
Adjusted R-squared	0.084	0.155	0.179	0.113	0.242	0.280

Next, to make a more direct comparison, investors' responses on days with market-wide and firm-specific negative information are examined. Trading volumes are used as an estimate. To capture days with market-wide negative information, a significant market index drop is used as a proxy (i.e., minimum 1% decrease in one day). Using equation (7), I compare the percentage change of trading volumes between shortable and non-shortable shares (Table 6.11). Columns (1) and (4) test the relationship on days with at least a 1% drop in market return, columns (2) and (5) test the relationship on days with

at least a 2% market return decrease and columns (3) and (6) test the relationship on days with at least a 3% reduction in market return. In the mainland Chinese market, the coefficient estimate of Short is significantly positive in market downturns, suggesting investors in the A-share market respond to market-wide negative news when they are allowed to short-sell. The coefficient estimate of Short becomes more pronounced when controlled for more firm-level characteristics (i.e., PB, STDROA, leverage, return, volatility and price) and on days with a larger decease in the market index. On the Hong Kong market, the coefficient estimate of Short is insignificant. This indicates that H-share traders do not short-sell stocks based on market-wide negative information unless there is a serious market index drop, which denotes a minimum 3% of the market index in one day.

Since firm-specific information released by a company traded in two markets is the same, I conduct a paired t test to analyse trading volumes on days with firm-specific negative information. As shown in Table 6.12, I compare the trading volumes and the turnover using two samples. The first is a full sample including all shares. The second is a sub-sample including shares that may be short-sold in the A- and H- share markets at the same time. I find that the trading volumes of A-shares are statistically significantly lower than their counterparts listed on the Hong Kong market on days with firm-specific negative information. The measure of turnover gives the same conclusion. These results further confirm my expectation that institutional investors on the Hong Kong market respond more to firm-specific negative information than do individual investors on the mainland Chinese market.

Table 6.12

Trading volumes and short-sale constraints on days with firm-specific negative news.

This table reports the trading volume differences between A- and H-shares on days with firm-specific negative news. TV_A is the trading volumes of A-shares, TV_H is the trading volumes of H-shares, TO_A is the turnover of A-shares, and TO_H is the turnover of H-shares. Superscripts *, **, and *** denote the significance levels of 10%, 5%, and 1%, respectively.

All shares			
Trading volumes		Turnover	
Variable	Mean	Variable	Mean
TV_A	9.617	TO_A	0.004
TV_H	9.713	TO_H	0.009
T-test	-6.083***	T-test	-24.912***

Shortable Shares			
Trading volumes		Turnover	
Variable	Mean	Variable	Mean
TV_A	9.919	TO_A	0.003
TV_H	10.023	TO_H	0.007
T-test	-4.700***	T-test	-20.619***

The last set of robustness tests is to re-run model (5) with a full list of control variables (i.e., size, volatility, price, return, and turnover, price to book ratio, volatility of return on assets and leverage), but using alternative synchronicity measures indicated in methodology section 5.2.5. As displayed in Table 6.13, the return synchronicity values in columns (1), (2) and (3) are estimated by equations (8), (9) and (10), respectively. All coefficients remain qualitatively identical to the results presented and discussed in Table 6.8.

Table 6.13

Short-sale constrains and return synchronicity using alternative synchronicity measures.
This table reports the regressions of stocks' return synchronicity on short-sale constraints at the firm level. The regression model is as follows:

$SYNC_{i,t} = \alpha + \beta Short_{i,t} + Controls_{i,t} + \varepsilon_{i,t}$

Where $SYNC_{i,t}$ is the logistic transformation of return synchronicity for firm i in year t. $Short_{i,t}$ represents a dummy variable equal to one if short-selling is allowed, and zero otherwise. $Controls_{i,t}$ are the firm-level control variables, including firm size (Size), return volatility (Volatility), price (Price), annual returns (Return), turnover (Turnover), price to book ratio (PB), volatility of the return on assets (TDROA) and leverage (Leverage). The definition of variables is given in Appendix A. Observations is the number of observations, Adjusted R-squared is the adjusted R-squared value, and Year Fixed Effects are included (not reported). Superscripts *, **, and *** denote the significance levels of 10%, 5%, and 1%, respectively. The sample period is from 2010 to 2014.

Panel A: A-shares

Dep Variables	SYNC_A		
	(1)	(2)	(3)
Short	0.327***	0.313***	0.325***
	(3.462)	(3.484)	(3.454)
Size	0.117***	0.118***	0.116***
	(4.057)	(4.438)	(3.998)
Volatility	-1.821	-1.529	-1.805
	(-1.062)	(-0.979)	(-1.059)
Price	0.156***	0.159***	0.153***
	(3.066)	(3.285)	(2.996)
Return	-0.351***	-0.346***	-0.351***
	(-2.953)	(-3.010)	(-2.958)
Turnover	-0.006	-0.008	-0.004
	(-0.174)	(-0.245)	(-0.110)
PB	-0.047*	-0.044*	-0.047*
	(-1.936)	(-1.895)	(-1.928)
STDROA	-7.161**	-6.724**	-7.237**
	(-2.285)	(-2.286)	(-2.314)
Leverage	-0.356*	-0.370**	-0.350*
	(-1.901)	(-2.130)	(-1.879)
Constant	-1.936***	-1.981***	-1.897***
	(-3.516)	(-3.862)	(-3.443)
Year Fixed Effects	Yes	Yes	Yes
Observations	368	368	368
Adjusted R-squared	0.492	0.498	0.492

Panel B: H-shares

Dep Variables	SYNC_H		
	(1)	(2)	(3)
Short	-0.567***	-0.605***	-0.541***
	(-3.695)	(-4.107)	(-3.620)
Size	0.297***	0.298***	0.292***
	(11.904)	(12.596)	(11.947)
Volatility	-2.357	-1.795	-2.069
	(-1.539)	(-1.255)	(-1.410)
Price	0.140***	0.142***	0.138***
	(2.667)	(2.999)	(2.666)
Return	-0.190	-0.239	-0.187
	(-1.217)	(-1.558)	(-1.233)
Turnover	0.118***	0.132***	0.112***
	(2.841)	(3.197)	(2.847)
PB	0.004	0.011	0.007
	(0.151)	(0.428)	(0.283)
STDROA	-3.316	-3.541	-3.451
	(-0.822)	(-0.992)	(-0.869)
Leverage	-0.303	-0.23	-0.306
	(-1.497)	(-1.146)	(-1.563)
Constant	-5.358***	-5.364***	-5.294***
	(-10.942)	(-11.774)	(-10.936)
Year Fixed Effects	Yes	Yes	Yes
Observations	301	301	301
Adjusted R-squared	0.601	0.567	0.602

6.5 Short-sale constraints and corporate governance

A stronger corporate governance structure encourages better information disclosure (e.g., Karamanou and Vafeas, 2005; Gul, Kim, and Qiu, 2010; Armstrong, Balakrishnan, and Cohen, 2012), which leads to investors' greater willingness to incorporate firm-specific information. Therefore, the quality of the corporate governance structure may contribute to the effects of short-sale constraints on investors' willingness to impound firm-specific negative information. Specifically, A-share (H-share) investors trade more on market-wide (firm-specific) information. I would thus expect an increased willingness to incorporate firm-specific negative information with a better corporate governance structure among H-share investors, but not A-shareholders.

Table 6.14
Descriptive statistics of corporate governance variables on an annual basis.
SOE is a dummy variable if the company is state-owned, and otherwise zero. Indep is the percentage of independent members on board. Supervisory is the number of members on the supervisory board. Management is the size of management team. CEO_Chair is a dummy variable equal to one if CEO is also the chairman of the board, and zero otherwise. Linktop10 is a dummy variable equal to one if the top ten shareholders are linked, and zero otherwise.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SOE	0.432	0.411	0.434	0.390	0.280	0.175	0.108	0.087	0.063	0.056
Indep	0.361	0.361	0.373	0.381	0.381	0.380	0.384	0.385	0.391	0.380
Supervisory	4.763	4.813	5.016	5.046	5.014	5.053	4.963	5.035	5.105	4.907
Management	7.395	7.854	8.813	8.369	8.406	8.671	9.038	9.233	9.256	8.907
CEO_Chair	0.080	0.098	0.113	0.092	0.101	0.079	0.090	0.116	0.093	0.116
Linktop10	0.407	0.306	0.426	0.481	0.484	0.286	0.472	0.407	0.395	0.419

The descriptive statistics for corporate governance variables on an annual basis are summarized in Table 6.14. Before 2005, most cross-listed companies were state-owned. The stock split reform was carried out in April 2005 and has gradually restructured the companies into limited liability corporations. As indicated in the table, this proportion decreased significantly from approximately 40 per cent to less than 10 per cent.

According to CSRC, listed firms are required to have one third of independent directors on the board. In my sample, the ratio of independent directors on the board (Indep) is roughly 36% for 2005 and has a small increase to 38% in 2014. The number of members on the supervisory board (Supervisory) is around five throughout the sample period. The average size of the management team (Management) is approximately eight. Around 10% of the companies have that CEO as chairman of the board. Approximately 40 per cent of the firms have the top 10 shareholders linked. Generally, the corporate governance structure has not changed much in the past 10 years except for the SOE component.

Table 6.15

Stock return synchronicity, short-sale constraints and corporate governance.

This table reports the regression of stock return synchronicity on short-sale constraints with the interaction between short-sale constraints and the firm-specific corporate governance, and other firm-level control variables. The regression model is as follows:

$Sync_{i,t} = \alpha + \beta_1 Short_{i,t} + \beta_2 Short_{i,t} * Corp_{i,t} + Corp_{i,t} + Controls_{i,t} + \varepsilon_{i,t}$

Where $SYNC_{i,t}$ is the logistic transformation of return synchronicity for firm i in year t. $Short_{i,t}$ represents a dummy variable equal to one if short-selling is allowed, and zero otherwise. $Corp_{i,t}$ are firm-level corporate governance variables, including a dummy variable equal to 1 if the company is a state-owned enterprise (SOE) and zero otherwise, the percentage of independent directors on the board (Indep), the number of members on the supervisory board (Supervisory), the size of the management team (Management), a dummy variable equal to one if CEO is also the chairman of the board (CEO_Chair), and zero otherwise, a dummy variable equal to one if the top 10 shareholders are linked (Linktop10), and zero otherwise. $Controls_{i,t}$ are the firm-level control variables, including firm size(Size), return volatility (Volatility), price (Price), annual returns (Return), turnover (Turnover), price to book ratio (PB), volatility of the return on assets (TDROA) and leverage(Leverage). The definition of the variables is given in Appendix A. Observations is the number of observations, Adjusted R-squared is the adjusted R-squared value, and Year Fixed Effects are included (not reported). Superscripts *, **, and *** denote the significance levels of 10%, 5%, and 1%, respectively. The sample period is 2010 to 2014.

Panel A: A-shares

	A-shares					
Dep. Variable	SYNC_A					
	(1)	(2)	(3)	(4)	(5)	(6)
Short	0.270***	0.278***	0.171	0.244	0.438**	0.372
	(2.808)	(2.978)	(0.409)	(0.456)	(2.050)	(1.624)
SOE	-0.580**	-0.542				
	(-2.072)	(-1.619)				
Short*SOE	0.325	0.250				
	(0.820)	(0.561)				
Indep			-0.333	-0.209		
			(-0.365)	(-0.153)		
Short*Indep			0.366	0.180		
			(0.340)	(0.123)		
Supervisory					0.042	0.030
					(1.067)	(0.628)
Short*Supervisory					-0.026	-0.012
					(-0.627)	(-0.241)
Size	0.124***	0.119***	0.121***	0.116***	0.109***	0.105***
	(5.985)	(4.464)	(5.742)	(4.365)	(4.649)	(3.558)
Volatility	-1.671	-1.117	-2.089**	-1.496	-2.069**	-1.480
	(-1.612)	(-0.789)	(-2.029)	(-0.977)	(-2.017)	(-0.959)
Price	0.158***	0.156***	0.155***	0.156***	0.160***	0.160***
	(3.286)	(3.300)	(3.210)	(3.176)	(3.305)	(3.261)
Return	-0.421***	-0.347***	-0.412***	-0.341***	-0.413***	-0.343***
	(-3.463)	(-3.050)	(-3.350)	(-2.950)	(-3.364)	(-3.001)
Turnover	-0.017	-0.011	-0.010	-0.006	-0.013	-0.010
	(-0.567)	(-0.350)	(-0.311)	(-0.188)	(-0.440)	(-0.285)
PB		-0.047**		-0.044*		-0.045*

		(-2.004)		(-1.902)		(-1.903)
STDROA		-6.034**		-6.815**		-6.416**
		(-2.101)		(-2.320)		(-2.093)
Leverage		-0.367**		-0.369**		-0.375**
		(-2.096)		(-2.161)		(-2.176)
Constant	-2.332***	-1.940***	-2.200***	-1.837**	-2.314***	-1.866***
	(-5.446)	(-3.876)	(-3.969)	(-2.450)	(-4.873)	(-3.232)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	368	368	366	366	366	366
Adjusted R-squared	0.477	0.504	0.469	0.496	0.472	0.498

Cont.

A-shares						
Dep. Variable	SYNC_A					
	(7)	(8)	(9)	(10)	(11)	(12)
Short	0.306	0.22	0.277***	0.291***	0.353***	0.348***
	(1.515)	(1.053)	(3.021)	(3.180)	(3.087)	(3.034)
Management	0.001	-0.010				
	(0.030)	(-0.493)				
Short*Management	0.000	0.011				
	(-0.007)	(0.464)				
CEO_Chair			0.016	0.081		
			(0.095)	(0.381)		
Short*CEO_Chair			0.244	0.144		
			(1.116)	(0.604)		
Linktop10					0.015	-0.004
					(0.118)	(-0.031)
Short_Linktop10					-0.223	-0.185
					(-1.442)	(-1.221)
Size	0.121***	0.117***	0.126***	0.121***	0.132***	0.133***
	(5.600)	(4.301)	(6.081)	(4.533)	(5.823)	(4.564)
Volatility	-2.100**	-1.508	-2.235**	-1.66	-5.256***	-4.653***
	(-2.041)	(-0.987)	(-2.179)	(-1.099)	(-4.427)	(-2.681)
Price	0.156***	0.161***	0.144***	0.145***	0.171***	0.169***
	(3.144)	(3.310)	(2.973)	(2.975)	(3.257)	(3.145)
Return	-0.414***	-0.339***	-0.410***	-0.340***	-0.615***	-0.575***
	(-3.365)	(-2.965)	(-3.349)	(-3.010)	(-4.371)	(-4.222)
Turnover	-0.011	-0.007	-0.015	-0.011	0.045	0.048
	(-0.348)	(-0.196)	(-0.495)	(-0.306)	(1.239)	(1.129)
PB		-0.048**		-0.043*		-0.023
		(-1.997)		(-1.825)		(-0.863)

STDROA		-6.814**		-6.836**		-4.711
		(-2.309)		(-2.309)		(-1.632)
Leverage		-0.355**		-0.364**		-0.269
		(-2.068)		(-2.156)		(-1.414)
Constant	-2.318***	-1.858***	-2.354***	-1.957***	-1.994***	-1.828***
	(-5.258)	(-3.460)	(-5.491)	(-3.811)	(-3.866)	(-3.038)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	366	366	365	365	284	284
Adjusted R-squared	0.469	0.497	0.476	0.502	0.522	0.529

Panel B: H-shares

	H-shares					
Dep. variable	SYNC_H					
	(1)	(2)	(3)	(4)	(5)	(6)
Short	-0.468***	-0.566***	0.160	0.219	-0.39	-0.643
	(-2.964)	(-3.679)	(0.143)	(0.256)	(-0.446)	(-1.100)
SOE	0.410	0.364				
	(0.445)	(0.739)				
Short*SOE	-0.432	-0.365				
	(-0.456)	(-0.668)				
Indep			1.744	2.117		
			(0.581)	(0.956)		
Short*Indep			-1.781	-2.230		
			(-0.585)	(-0.954)		
Supervisory					0.056	0.027
					(0.330)	(0.252)
Short*Supervisory					-0.009	0.021
					(-0.051)	(0.189)
Size	0.278***	0.293***	0.280***	0.294***	0.255***	0.269***
	(13.737)	(12.225)	(13.869)	(12.519)	(11.311)	(10.505)
Volatility	-1.936*	-1.582	-1.956	-1.504	-1.541	-1.201
	(-1.664)	(-1.148)	(-1.633)	(-1.072)	(-1.321)	(-0.852)
Price	0.146***	0.141***	0.144***	0.141***	0.156***	0.150***
	(3.538)	(3.059)	(3.531)	(3.042)	(3.829)	(3.183)
Return	-0.212*	-0.228	-0.205*	-0.217	-0.238*	-0.249*
	(-1.722)	(-1.526)	(-1.655)	(-1.469)	(-1.943)	(-1.663)
Turnover	0.135***	0.124***	0.137***	0.124***	0.136***	0.124***
	(3.280)	(3.086)	(3.310)	(3.029)	(3.325)	(3.139)

PB		0.013		0.008		0.007
		(0.527)		(0.308)		(0.265)
STDROA		-3.694		-3.925		-2.82
		(-1.094)		(-1.108)		(-0.739)
Leverage		-0.251		-0.261		-0.256
		(-1.285)		(-1.382)		(-1.298)
Constant	-5.270***	-5.281***	-5.928***	-6.035***	-5.213***	-5.050***
	(-13.301)	(-11.423)	(-4.932)	(-6.667)	(-5.415)	(-6.614)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	304	301	304	301	304	301
Adjusted R-squared	0.570	0.567	0.570	0.567	0.578	0.574

Cont.

	H-shares					
Dep. variable	SYNC_H					
	(7)	(8)	(9)	(10)	(11)	(12)
Short	-0.350	-0.572	-0.600***	-0.696***	-0.502***	-0.503***
	(-0.931)	(-1.089)	(-3.535)	(-4.314)	(-2.616)	(-2.860)
Management	0.005	-0.008				
	0.121	(-0.160)				
Short*Management	-0.019	-0.003				
	(-0.452)	(-0.049)				
CEO_Chair			-0.365	-0.342*		
			(-1.254)	(-1.703)		
Short*CEO_Chair			0.535*	0.533**		
			(1.666)	(2.257)		
Linktop10					-0.170	-0.047
					(-0.562)	(-0.187)
Short_Linktop10					-0.008	-0.126
					(-0.025)	(-0.468)
Size	0.283***	0.294***	0.281***	0.299***	0.301***	0.306***
	13.768	12.845	13.728	11.908	13.024	11.924
Volatility	-2.150*	-1.794	-2.369**	-1.947	-3.102**	-2.892*
	(-1.816)	(-1.320)	(-2.010)	(-1.396)	(-2.284)	(-1.717)
Price	0.162***	0.155***	0.138***	0.130***	0.171***	0.166***
	(3.753)	(3.058)	(3.326)	(2.612)	(3.612)	(3.073)
Return	-0.208*	-0.221	-0.206*	-0.220	-0.484***	-0.501***
	(-1.696)	(-1.459)	(-1.680)	(-1.486)	(-3.332)	(-2.792)
Turnover	0.139***	0.129***	0.138***	0.126***	0.110**	0.103**
	(3.359)	(3.226)	(3.354)	(3.141)	(2.317)	(2.291)
PB		0.010		0.012		0.018

		(0.338)		(0.505)		(0.600)
STDROA		-3.67		-4.236		-2.372
		(-1.005)		(-1.176)		(-0.661)
Leverage		-0.221		-0.297		-0.085
		(-1.172)		(-1.511)		(-0.393)
Constant	-5.389***	-5.243***	-5.161***	-5.196***	-5.720***	-5.745***
	(-10.897)	(-7.409)	(-12.790)	(-10.957)	(-10.165)	(-10.187)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	304	301	302	299	237	235
Adjusted R-squared	0.572	0.568	0.57	0.566	0.583	0.575

Table 6.15 reports the results from regression (11) with the interaction term between the short-sale constraints and firms' corporate governance variables. Panel A presents the regression results for A-shares. The coefficient estimates of Short remain positive and statistically significant even after controlling for the corporate governance variables, suggesting that the effect of short-sale constraints on return synchronicity is partly independent of the firm-level information environment. I notice that none of the individual corporate governance factors and the intersection with short-sale constraints is statistically significant. This indicates that firm corporate structure is irrelevant in the asymmetric impact of positive and negative news on A-shares' return synchronicity. These results can be explained by the evidence that individual investors in the mainland Chinese market short sell stock based on the market-wide negative information. Therefore, stronger or weaker firm-level corporate governance is not their main focus and thus would not influence their trading activity. Panel B presents the regression results for H-shares. Most coefficient estimates of Short remain negative and statistically significant even after controlling for the corporate governance variables. It is noteworthy that the coefficient estimate of the interaction term between CEO_Chair and Short is significantly positive, suggesting an decrease in the effect of short-sale on return synchronicity if the CEO is also chairman of the board. This is consistent with the argument that duality of CEO and chairman weakens the monitoring function (Grove, Patelli, and Victoravich, 2011) and results in fewer investors' willing to incorporate firm specific information. A detailed interpretation is as follows. H-share investors short sell stocks based on firm-specific negative information. The duality of CEO and chairman, as a proxy for weaker corporate governance, discourages H-share investors' trading activity on firm-specific negative information. As a result, the impact of short-sale constraints on return synchronicity is reduced. The rest of the corporate governance characteristics do

not contribute significantly to the relationship between short-sale constraints and H-shares' return synchronicity. The insignificance of these corporate governance variables can be explained by the unique corporate governance features in China (Li, Brockman, and Zurbruegg, 2015). They point out that, in China, the effectiveness of the supervisory board still remains a question because the supervisory board comes into play only when there are suspicious irregular activities. Shareholders' meetings are generally controlled by the large (controlling) shareholders, which weakens the supervisory board's monitoring role. In summary, the supervisory board has weak power to perform its duty. In terms of independent directors on the board, their effectiveness is also in doubt. Xu and Lin (2016) provide several alternative explanations. First, the inside control problem[31] makes it difficult for independent directors to play an independent role. Second, the proportion of independent directors is too low to challenge inside directors' decisions. Third, the human resource market for independent directors is immature. Around 40 per cent are scholars who work for multiple companies. Based on these findings and discussion, it is crucial to reinforce better practice in corporate governance rather than simply meeting the requirements.

[31] In China, the independent directors are appointed by the managers rather than the shareholders.

CHAPTER 7
Conclusion

7 Conclusion

To the best of my knowledge, this research is the first attempt to examine the asymmetric impact of positive and negative information on return synchronicity, which occurs from a change in short-sale constraints. I explain the asymmetry by separately examining individual and institutional investors' capabilities to impound firm-specific information as opposed to market-wide information, especially firm-specific negative information. I conduct a series of robustness tests on liquidity commonality and trading volumes to support my primary test. Finally, I examine the joint impact of corporate governance factors and short-sale constraints on stock return synchronicity. Using AH dual-listed shares from China's unique capital market settings helps achieve these objectives. I collect data from a variety of sources, including DataStream, Thomson Reuters News Analytics (TRNA), and China Stock Market and Accounting Research (CSMAR). The trading related data are from the Datastream database, news related data are from TRNA and corporate governance data are from CSMAR.

By investigating 86 dual-listed stocks traded on both the mainland Chinese and Hong Kong markets from January 2005 to December 2014, my empirical results support my hypotheses. First, H-shares present a significantly lower level of stock return synchronicity than their A-share counterparts. Since return synchronicity is inversely related to firm-specific information, it suggests that institutional investors are more capable of incorporating firm-specific information. Second, there is an asymmetric impact of optimistic and pessimistic information on return synchronicity in both the mainland Chinese and Hong Kong markets. The magnitude of the difference is larger in the Hong Kong market. This implies that institutional investors are better able to incorporate negative information when short-sale constraints are relaxed. Third,

compared with non-shortable shares, shortable shares present a significantly greater return synchronicity on the mainland Chinese market, whereas there is a smaller return synchronicity on the Hong Kong Stock Exchange. This suggests that individual (institutional) investors in the mainland Chinese (Hong Kong) market incorporate more market-wide (firm-specific) negative information into stock prices with the lifting of short-sale constraints. This argument is supported by several robustness tests. In the first test, I investigate the effect of short-sale constraints on stock liquidity commonality. Shortable shares' liquidity commonality is larger (smaller) than non-shortable shares on the mainland Chinese (Hong Kong) market. In the second test, I compare the trading volumes on days with market-wide negative news. Shortable shares have greater trading volumes than non-shortable shares on the mainland Chinese market, but not on H-share market. Finally, I use a paired t test to compare the trading volumes of A- and H-share in times with firm-specific news. H-shares' trading volumes are significantly larger than simultaneously traded A-shares. All these robustness tests confirm my interpretation. In addition, I investigate whether better corporate governance characteristics, measured by SOE component and several board characteristic variables, enhance or mitigate the impact of short-sale constraints on stock return synchronicity. Among the variables, only the duality of CEO and chairman mitigates the effect of short-selling on return synchronicity of H-shares, suggesting weak corporate governance discourages institutional investors from impounding firm-specific negative information.

My findings make one major contribution to the existing return synchronicity literature by showing an asymmetric impact of good and bad news on return synchronicity. They also provide additional evidence to support the inverse relationship between the incorporation of firm-specific information and return synchronicity. More interestingly, I find that this asymmetric impact differs between the groups of shares held by

institutional and individual investors. In addition, the results show how the firm-level information environment, together with short-sale constraints, influences return synchronicity. This provides some implications for policy regulators and company executives.

My results may help policy makers draw some implications as follows. The lifting of short-sale constraints should be tailored according to market conditions (i.e., the composition of traders). Individual investors tend to short-sell stocks based on market-wide negative information, which means they may overlook good firm-specific news released by a company. Therefore, regulators should be more cautious about the risk of relaxing short-sale constraints in markets with a large proportion of individual investors. Alternatively, the participation of institutional investors can help to facilitate the incorporation of firm-specific negative information and reduce return synchronicity. It is recommended more participation of institutional investors be encouraged. Importantly, for both authorities and company executives, it is suggested that better practice in corporate governance structure can help to facilitate firm-specific information and improve price efficiency.

CHAPTER 8
Appendixes

8 Appendixes

Appendix A
This appendix provides a detailed description of the construction of all the variables used in the tables.

Variable	Acronym	Description	Data sources
Stock return synchronicity	SYNC	Logistic transformation of R^2 estimated from a firm's daily stock returns regressed on A-share market and H-share market indices	Datastream
Stock liquidity synchronicity	Liqcom	Logistic transformation of R^2 estimated from a firm's daily stock bid-ask spread regressed on equally weighted A-share market and H-share market bid-ask spreads.	Datastream
Short-sale	Short	A dummy variable equal to one if short-selling is allowed, and zero otherwise	
Firm size	Size	Log of total assets	Datastream
Annual stock returns	Return	Annual stock returns	Datastream
Stock price	Price	Log of stock price	Datastream
Stock return volatility	STD	Annualized standard deviation of monthly stock returns	Datastream
Liquidity	Liquidity	Twice the absolute value of the difference between the trading price and the midpoint of the bid and ask prices, which is then divided by the midpoint of the bid and ask prices	Datastream

Variable	Acronym	Description	Data sources
Leverage	Leverage	Total liability/total assets	Datastream
Volatility of return on assets	STDROA	Volatility of return on assets over the last five quarters, including the current quarter	Datastream
Trading volumes	TV	Stock trading volumes	Datastream
Turnover	TO	Stock turnover	Datastream
State owned enterprises	SOE	State-owned enterprises	CSMAR
Independent directors	Indep	The percentage of independent directors on board	CSMAR
Supervisory board	Supervisory	The number of members on the supervisory board	CSMAR
Management team	Management	The size of management team	CSMAR
CEO & chairman	CEO_Chair	A dummy variable equal to one if CEO is also the chairman of the board, and zero otherwise	CSMAR
Linked top10 shareholders	Linktop10	A dummy variable equal to one if the top 10 shareholders are linked, and zero otherwise	CSMAR

Appendix B
A description of the 86 dual-listed A- and H-shares

No.	Name	A-share code	A-share list date	H-share code	H-share list date	Industry
1	CHINA VANKE CO., LTD	2	29/01/1991	2202	25/06/2014	K
2	CHINA INTERNATIONAL MARINE CONTAINERS (GROUP) CO., LTD	39	08/04/1994	2039	19/12/2012	C
3	ZTE CORPORATION	63	18/11/1997	763	09/12/2004	C
4	ZOOMLION HEAVY INDUSTRY SCIENCE AND TECHNOLOGY CO., LTD.	157	12/10/2000	1157	23/12/2010	C
5	WEICHAI POWER CO., LTD.	338	30/04/2007	2338	11/03/2004	C
6	SHANDONG CHENMING PAPER HOLDINGS LTD.	488	20/11/2000	1812	18/06/2008	C
7	LIVZON PHARMACEUTICAL (GROUP) INC.	513	28/10/1993	1513	16/01/2014	C
8	NORTHEAST ELECTRIC DEVELOPMENT CO., LTD.	585	13/12/1995	42	06/07/1995	C
9	JINGWEI TEXTILE MACHINERY CO., LTD.	666	10/12/1996	350	02/02/1996	C
10	SHANDONG XINHUA PHARMACEUTICAL CO., LTD.	756	06/08/1997	719	31/12/1996	C
11	ANGANG STEEL COMPANY LIMITED	898	25/12/1997	347	24/07/1997	C
12	HISENSE KELON ELECTRICAL HOLDINGS COMPANY LIMITED	921	13/07/1999	921	23/07/1996	C
13	XINJIANG GOLDWIND SCIENCE&TECHNOLOGY CO.,LTD	2202	26/12/2007	2208	08/10/2010	C
14	SHANDONG MOLONG PETROLEUM MACHINERY CO. LTD.	2490	21/10/2010	568	07/02/2007	C

No.	Name	A-share code	A-share list date	H-share code	H-share list date	Industry
15	BYD CO., LTD	2594	30/06/2011	1211	31/07/2002	C
16	DONGJIANG ENVIRONMENTAL COMPANY LIMITED	2672	26/04/2012	895	28/09/2010	C
17	ZHEJIANG SHIBAO COMPANY LIMITED	2703	02/11/2012	1057	09/03/2011	C
18	HUANENG POWER INTERNATIONAL CO., LTD	600011	06/12/2001	902	21/01/1998	D
19	ANHUI EXPRESSWAY CO., LTD	600012	07/01/2003	995	13/11/1996	G
20	CHINA MINSHENG BANKING CO., LTD.	600016	19/12/2000	1988	26/11/2009	J
21	COSCO SHIPPING Energy Transportation Co., Ltd.	600026	23/05/2002	1138	11/11/1994	G
22	HUADIAN POWER INTERNATIONAL CO., LTD.	600027	03/02/2005	1071	30/06/1999	D
23	CHINA PETROLEUM & CHEMICAL CORPORATION	600028	08/08/2001	386	19/10/2000	B
24	CHINA SOUTHERN AIRLINES CO., LTD	600029	25/07/2003	1055	31/07/1997	G
25	CITIC SECURITIES CO., LTD	600030	06/01/2003	6030	06/10/2011	J
26	CHINA MERCHANTS BANK CO., LTD	600036	09/04/2002	3968	22/09/2006	J
27	CHINA EASTERN AIRLINES CO., LTD.	600115	05/11/1997	670	05/02/1997	G
28	YANZHOU COAL MINING CO., LTD.	600188	01/07/1998	1171	01/04/1998	B
29	SHANGHAI FOSUN PHARMACEUTICAL (GROUP) CO., LTD.	600196	07/08/1998	2196	30/10/2012	C

No.	Name	A-share code	A-share list date	H-share code	H-share list date	Industry
30	GUANGZHOU BAIYUNSHAN PHARMACEUTICAL HOLDINGS COMPANY LIMITED	600332	06/02/2001	874	30/10/1997	C
31	JIANGXI COPPER CO., LTD.	600362	11/01/2002	358	12/06/1997	C
32	JIANGSU EXPRESSWAY CO., LTD	600377	16/01/2001	177	27/06/1997	G
33	SHENZHEN EXPRESSWAY CO., LTD	600548	25/12/2001	548	12/03/1997	G
34	ANHUI CONCH CEMENT CO.,LTD	600585	7/02/2002	914	21/10/1997	C
35	TSINGTAO BREWERY CO., LTD.	600600	27/08/1993	168	15/07/1993	C
36	CSSC OFFSHORE & MARINE ENGINEERING (GROUP) COMPANY LIMITED	600685	28/10/1993	317	06/08/1993	C
37	SINOPEC SHANGHAI PETROCHEMICAL CO., LTD.	600688	08/11/1993	338	26/07/1993	C
38	NANJING PANDA ELECTRONICS CO., LTD.	600775	18/11/1996	553	02/05/1996	C
39	SHENJI GROUP KUNMING MACHINE TOOL CO.,LTD	600806	03/01/1994	300	07/12/1993	C
40	MAANSHAN IRON & STEEL CO., LTD.	600808	06/01/1994	323	03/11/1993	C
41	HAITONG SECURITIES COMPANY LTD	600837	24/02/1994	6837	27/04/2012	J
42	BEIJING JINGCHENG MACHINERY ELECTRIC COMPANY LIMITED	600860	06/05/1994	187	06/08/1993	C
43	SINOPEC OILFIELD SERVICE CORPORATION	600871	11/04/1995	1033	29/03/1994	B
44	TIANJIN CAPITAL ENVIRONMENTAL PROTECTIONGROUP COMPANY LIMITED	600874	30/06/1995	1065	17/05/1994	D

No.	Name	A-share code	A-share list date	H-share code	H-share list date	Industry
45	DONGFANG ELECTRIC CORPORATION LIMITED	600875	10/10/1995	1072	06/06/1994	C
46	LUOYANG GLASS CO., LTD.	600876	31/10/1995	1108	08/07/1994	C
47	CHONGQING IRON & STEEL COMPANY LIMITED	601005	28/02/2007	1053	17/10/1997	C
48	FIRST TRACTOR COMPANY LIMITED	601038	08/08/2012	38	23/06/1997	C
49	CHINA SHENHUA ENERGY COMPANY LIMITED	601088	09/10/2007	1088	15/06/2005	B
50	SICHUAN EXPRESSWAY COMPANY LIMITED	601107	27/07/2009	107	07/10/1997	G
51	AIR CHINA LIMITED	601111	18/08/2006	753	15/12/2004	G
52	CHINA RAILWAY CONSTRUCTION CORPORATION LIMITED	601186	10/03/2008	1186	13/03/2008	E
53	GUANGZHOU AUTOMOBILE GROUP CO., LTD.	601238	29/03/2012	2238	30/08/2010	C
54	AGRICULTURAL BANK OF CHINA LIMITED	601288	15/07/2010	1288	16/07/2010	J
55	CHINA CNR CORPORATION LIMITED	601299	29/12/2009	6199	22/05/2014	C
56	PING AN INSURANCE (GROUP) COMPANY OF CHINA, LTD.	601318	01/03/2007	2318	24/06/2004	J
57	BANK OF COMMUNICATIONS CO., LTD.	601328	15/05/2007	3328	23/06/2005	J
58	GUANGSHEN RAILWAY COMPANY LIMITED	601333	22/12/2006	525	14/05/1996	G
59	NEW CHINA LIFE INSURANCE COMPANY LTD.	601336	16/12/2011	1336	15/12/2011	J

No.	Name	A-share code	A-share list date	H-share code	H-share list date	Industry
60	CHINA RAILWAY GROUP LIMITED.	601390	03/12/2007	390	07/12/2007	E
61	INDUSTRIAL AND COMMERCIAL BANK OF CHINA LIMITED	601398	27/10/2006	1398	27/10/2006	J
62	BEIJING NORTH STAR COMPANY LIMITED	601588	16/10/2006	588	14/05/1997	K
63	ALUMINUM CORPORATION OF CHINA LIMITED	601600	30/04/2007	2600	12/12/2001	C
64	CHINA PACIFIC INSURANCE (GROUP) CO., LTD.	601601	25/12/2007	2601	23/12/2009	J
65	SHANGHAI PHARMACEUTICALS HOLDING CO.,LTD.	601607	24/03/1994	2607	20/05/2011	F
66	METALLURGICAL CORPORATION OF CHINA LTD.	601618	21/09/2009	1618	24/09/2009	E
67	CHINA LIFE INSURANCE COMPANY LIMITED	601628	09/01/2007	2628	18/12/2003	J
68	GREAT WALL MOTOR COMPANY LIMITED	601633	28/09/2011	2333	15/12/2003	C
69	ZHENGZHOU COAL MINING MACHINERY GROUP CO., LTD	601717	03/08/2010	564	05/12/2012	C
70	SHANGHAI ELECTRIC GROUP COMPANY LIMITED	601727	05/12/2008	2727	28/04/2005	C
71	CRRC CORPORATION LIMITED	601766	18/08/2008	1766	21/08/2008	C
72	CHINACOMMUNICATIONSCONSTRUCTIONCOMPANYLIMITED	601800	09/03/2012	1800	15/12/2006	E
73	CHINA OILFIELD SERVICES LIMITED	601808	28/09/2007	2883	20/11/2002	B
74	CHINA EVERBRIGHT BANK COMPANY LIMITED	601818	18/08/2010	6818	20/12/2013	J

No.	Name	A-share code	A-share list date	H-share code	H-share list date	Industry
75	PETROCHINA COMPANY LIMITED	601857	05/11/2007	857	07/04/2000	B
76	COSCO SHIPPING DEVELOPMENT CO., LTD	601866	12/12/2007	2866	16/06/2004	G
77	DALIAN PORT (PDA) CO., LTD	601880	06/12/2010	2880	28/04/2006	G
78	CHINA COAL ENERGY COMPANY LIMITED	601898	01/02/2008	1898	19/12/2006	B
79	ZIJIN MINING GROUP CO. LTD	601899	25/04/2008	2899	23/12/2003	B
80	COSCO SHIPPING HOLDINGS CO. LTD	601919	26/06/2007	1919	30/06/2005	G
81	CHINA CONSTRUCTION BANK CORPORATION	601939	25/09/2007	939	27/10/2005	J
82	BANK OF CHINA LIMITED	601988	05/07/2006	3988	01/06/2006	J
83	DATANG INTERNATIONAL POWER GENERATION CO. LTD	601991	20/12/2006	991	21/03/1997	D
84	BBMG CORPORATION	601992	01/03/2011	2009	29/07/2009	C
85	CHINA CITIC BANK CORPORATION LTD	601998	27/04/2007	998	27/04/2007	J
86	CHINA MOLYBDENUM CO. LTD	603993	09/10/2012	3993	26/04/2007	B

Symbol	Name
B	Mining
C	Manufacturing
D	Utilities
E	Construction
F	Retail
G	Transportation
J	Finance
K	Real estate

Appendix C

Short-sale details for each stock from 2010 to 2014

No.	Name	2010	2011	2012	2013	2014	No.	Name	2010	2011	2012	2013	2014	No.	Name	2010	2011	2012	2013	2014
1	A						30	A	No	No	No	Yes	Yes	59	A		No	No	Yes	Yes
	H					Yes		H	Yes	Yes	Yes	Yes	Yes		H		No	Yes	Yes	Yes
2	A	Yes	Yes	Yes	Yes	Yes	31	A	Yes	Yes	Yes	Yes	Yes	60	A	Yes	Yes	Yes	Yes	Yes
	H			No	No	No		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
3	A	Yes	Yes	Yes	Yes	Yes	32	A	No	No	No	No	No	61	A	Yes	Yes	Yes	Yes	Yes
	H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
4	A	Yes	Yes	Yes	Yes	Yes	33	A	No	No	No	No	No	62	A	No	No	Yes	No	No
	H	No	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	No	No	Yes
5	A	Yes	Yes	Yes	Yes	Yes	34	A	No	No	Yes	Yes	Yes	63	A	Yes	Yes	Yes	Yes	Yes

No.	Name	2010	2011	2012	2013	2014	No.	Name	2010	2011	2012	2013	2014	No.	Name	2010	2011	2012	2013	2014
	H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
6	A	No	No	No	No	No	35	A	No	No	Yes	Yes	Yes	64	A	Yes	Yes	Yes	Yes	Yes
	H	Yes	Yes	No	No	No		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
7	A	No	No	No	Yes	Yes	36	A	No	No	No	No	No	65	A	No	No	Yes	Yes	Yes
	H					Yes		H	Yes	Yes	Yes	No	Yes		H		Yes	Yes	Yes	Yes
8	A	No	No	No	No	No	37	A	No	No	No	No	Yes	66	A	No	Yes	Yes	Yes	Yes
	H	No	No	No	No	No		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
9	A	No	No	No	No		38	A	No	No	No	No	No	67	A	Yes	Yes	Yes	Yes	Yes
	H	No	No	No	No	Yes		H	No	No	No	No	No		H	Yes	Yes	Yes	Yes	Yes
10	A	No	No	No	No	No	39	A	No	No	No	No	No	68	A		No	No	Yes	Yes
	H	No	No	No	No	No		H	No	No	No	No	No		H	Yes	Yes	Yes	Yes	Yes
11	A	Yes	Yes	Yes	No	No	40	A	No	No	No	No	No	69	A	No	No	Yes	Yes	Yes
	H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes		H			No	No	No
12	A	No	No	No	No	Yes	41	A	Yes	Yes	Yes	Yes	Yes	70	A	No	No	Yes	No	No
	H	No	No	No	No	No		H			No	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
13	A	Yes	Yes	Yes	Yes	Yes	42	A	No	No	No	No	No	71	A	Yes	Yes	Yes	Yes	Yes
	H	Yes	Yes	Yes	Yes	Yes		H	No	No	No	No	No		H	Yes	Yes	Yes	Yes	Yes
14	A	No	No	No	Yes	Yes	43	A	No	No	No	No	No	72	A			No	Yes	Yes
	H	No	Yes	No	No	No		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
15	A		No	No	Yes	Yes	44	A	No	No	No	No	Yes	73	A	No	No	Yes	Yes	Yes
	H	Yes	Yes	Yes	Yes	Yes		H	No	Yes	Yes	No	No		H	Yes	Yes	Yes	Yes	Yes
16	A			No	No	No	45	A	No	No	Yes	Yes	Yes	74	A	No	No	Yes	Yes	Yes
	H	No	No	No	Yes	No		H	Yes	Yes	Yes	Yes	Yes		H				No	Yes
17	A			No	No	No	46	A	No	No	No	No	No	75	A	Yes	Yes	Yes	Yes	Yes
	H	No	No	No	No	No		H	No	No	No	No	No		H	Yes	Yes	Yes	Yes	Yes
18	A	No	No	No	Yes	Yes	47	A	No	No	No	Yes	Yes	76	A	No	No	Yes	Yes	Yes
	H	Yes	Yes	Yes	Yes	Yes		H	Yes	No	No	No	No		H	Yes	Yes	Yes	Yes	Yes

No.	Name	2010	2011	2012	2013	2014	No.	Name	2010	2011	2012	2013	2014	No.	Name	2010	2011	2012	2013	2014
19	A	No	No	No	No	No	48	A			No	Yes	Yes	77	A	No	No	No	No	No
	H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
20	A	Yes	Yes	Yes	Yes	Yes	49	A	Yes	Yes	Yes	Yes	Yes	78	A	Yes	Yes	Yes	Yes	Yes
	H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
21	A	No	No	No	No	No	50	A	No	No	No	No	No	79	A	Yes	Yes	Yes	Yes	Yes
	H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
22	A	No	No	No	Yes	Yes	51	A	Yes	Yes	Yes	Yes	Yes	80	A	Yes	Yes	Yes	No	No
	H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
23	A	Yes	Yes	Yes	Yes	Yes	52	A	Yes	Yes	Yes	Yes	Yes	81	A	Yes	Yes	Yes	Yes	Yes
	H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
24	A	No	No	Yes	Yes	Yes	53	A			No	No	Yes	82	A	Yes	Yes	Yes	Yes	Yes
	H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
25	A	Yes	Yes	Yes	Yes	Yes	54	A	Yes	Yes	Yes	Yes	Yes	83	A	No	No	No	Yes	Yes
	H		No	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
26	A	Yes	Yes	Yes	Yes	Yes	55	A						84	A		No	No	Yes	Yes
	H	Yes	Yes	Yes	Yes	Yes		H					Yes		H	No	Yes	Yes	Yes	Yes
27	A	No	No	Yes	Yes	Yes	56	A	Yes	Yes	Yes	Yes	Yes	85	A	No	Yes	Yes	Yes	Yes
	H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
28	A	No	No	Yes	Yes	Yes	57	A	Yes	Yes	Yes	Yes	Yes	86	A			No	No	No
	H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes		H	Yes	Yes	Yes	Yes	Yes
29	A	No	No	Yes	Yes	Yes	58	A	No	No	No	Yes	Yes							
	H			No	No	Yes		H	Yes	Yes	Yes	Yes	Yes							

Note: “A” indicates A-shares; “H” indicates H-shares

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