Economic Modelling 34 (2013) 37–41

Contents lists available at ScienceDirect

Economic Modelling

journal homepage: www.elsevier.com/locate/ecmod

An empirical analysis of the Shanghai and Shenzhen limit order books ☆

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ARTICLE INFO

JEL classification:
G14

Keywords:
Limit order book
Chinese stock market
Microstructure
VAR model

ABSTRACT

This paper investigates the market microstructure of the Shanghai and Shenzhen Stock Exchanges. The two major Chinese stock markets are pure order-driven trading mechanisms without market makers, and we analyze empirically both limit order books. We begin our empirical modeling using the vector autoregressive model of Hasbrouck and extend the model to incorporate other information in the limit order book. We also study the market impact on A shares, B shares and H shares, and analyze how the market impact of stocks varies cross sectionally with market capitalization, tick frequencies, and turnover. Furthermore, we find that market impact is increasing in trade size. Order imbalances predict the next day's returns, with small order imbalances having a negative effect.

1. Introduction

There are two stock exchanges in mainland China. The Shanghai Stock Exchange was founded on November 26, 1990 and trading began on December 19, 1990. The Shenzhen Stock Exchange started stock trading on December 1, 1990. After the first year of trading, the market capitalization, including all shares in Shanghai Stock Exchange and Shenzhen Stock Exchange, was only about 3 billion Renminbi (RMB). Shanghai had only eight listings, and had a daily average turnover of only 18 million RMB.

Since these modest beginnings, both markets have seen impressive growth which we describe in Table 1. By December 2007, Shanghai Stock Exchange's market capitalization ranked sixth worldwide and Shenzhen ranked 20th. Their combined market capitalization of $4,479 billion USD was the second largest globally after the United States. At year-end 2011, there are more than 2,000 listings on the two markets, and combined daily average trading volume is nearly $26 billion.

After peaking in 2007–8, the markets have fallen by more than half and only partially recovered. The Shanghai Stock Exchange Composite Index, which once reached 6,092 in October 2007, retreated to 2,086 at the end of the third quarter of 2012. The Shenzhen Composite Index closed at 853.826, after peaking at 1,576.501 on January 15, 2008.

The trading mechanism of the stock market in mainland China, summarized in Table 2, is similar to that of the Hong Kong or Tokyo Stock Exchanges. Both Shanghai and Shenzhen run a pure order-driven trading mechanism on electronic systems without official market makers. Trading is conducted from Monday to Friday, except holidays. For each trading day, there is a morning session and afternoon session. The morning session includes one pre-trading auction 9:15–9:25 AM and one continuous trading period 9:30–11:30 AM. The afternoon session includes only one continuous trading period 13:00–15:00. Only limit orders and market orders are allowed in both exchanges and orders are filled following price, time and size priority. The limit of price change for each trading day is ±10% of the previous closing price, beyond which, trading will be halted for the rest of the day. The quantity of stock purchased must be in round lots of 100 while there is no requirement on the quantity of sales.

There are three types of shares in the market: A shares that are denominated in Renminbi, H shares that are denominated in Hong Kong Dollar (HKD) and B shares that are dominated by U.S. Dollar (USD). H shares are only traded in Shenzhen Stock Exchange while B shares are only traded in Shanghai Stock Exchange. A shares are traded in both exchanges. Domestic investors can trade all 3 types of shares while the foreign investors only have access to B shares and H shares. The minimum tick sizes for A shares, B shares and H shares are 0.01RMB, 0.001USD and 0.01HKD, respectively.

There is a limited literature about the microstructure of the Chinese stock market, but only a few papers analyze intra-day limit order book information. Xu (2000) discussed the trading mechanism of Chinese stock market but the paper's quantitative study focused on stocks' daily returns. As to limit order book, Shenoy and Zhang (2007) studied the relationship between daily order imbalance from limit order book and daily stock returns. Bailey et al. (2009) separated the order imbalance from individual, institutional and proprietary investors and investigated the various influences of different traders. Liu and Maheu (2012) estimate intra-daily durations for three randomly selected A and B share stocks.

☆ We would like to thank two anonymous referees as well as Enzo Weber and participants at the Chinese Financial Markets and the World Economy conference at the Bank of Finland for helpful comments.

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http://dx.doi.org/10.1016/j.econmod.2012.11.055

Table 1
Market statistics for Shanghai and Shenzhen.
The data are from the World Federation of Exchanges (http://www.world-exchanges.org/statistics). Market capitalization and daily average trading volume are in millions of US dollar (USD mn).

	Dec. 2007	Dec. 2011
Market cap. (USD mn):	4,479	4,027
Shanghai	3,694	2,357
Shenzhen	785	1,054
Daily avg. trading volume (USD mn):	25,506	25,934
Shanghai	16,816	14,606
Shenzhen	8,690	11,328
Number of listings	1,530	2,242
Shanghai	860	931
Shenzhen	670	1,411

The vector autoregressive (VAR) model of Hasbrouck (1991) presents a basic structure of the dynamic interaction between security trades and quote processes on a limit order book. Dufour and Engle (2000) use the Hasbrouck model to explore the informational role of time durations between transactions. Chan et al. (2002) analyze empirically the information content of stock and option net trade volume in the specification of a VAR model.

Two papers utilize the baseline Hasbrouck model on Chinese equities. Meng et al. (2007) find lags in the impounding of private information, particularly in smaller stocks. Zhou et al. (2011) analyze the intra-day dependence between returns and trades of Chinese equities and warrants using a VAR model.

This paper extends Hasbrouck's model by analyzing the market impact of limit order book information in Chinese stock markets. We then examine the cross-sectional influences on market impact. Stocks with larger market capitalization, less frequent quote updates, and higher turnover have a larger market impact.

The last portion of the manuscript analyzes the information in trade size. There is an extensive literature on U.S. equities that finds "stealth trading" by institutions. Barclay et al. (1993) report that medium size trades are the most informative. Cai et al. (2006) find that block trades are the most informative in China. We examine the market impact from different trade sizes and find that market impact increases with trade size. Small order imbalances also have a persistent negative effect on returns.

The manuscript is organized as follows. Section 2 introduces the data and basic statistics. Section 3 specifies the baseline Hasbrouck model and reports the market impact of trades on stock prices. In Section 4, we extend the model to incorporate other information on limit order book and assess the market impact of one buy order in our limit order book model. Section 5 studies the relationship between market impacts and microstructure characteristics. Section 6 pays particular attention to small and block order market impacts and the effect of order imbalances on returns. Section 7 concludes.

2. Data

We obtained the China Securities Market Trade and Quote Research Database, a database of Chinese securities analogous to the New York Stock Exchange TAQ database. We have limit order book information on 1,652 Chinese stocks for the month of June 2007, including all A shares, B shares and H shares traded on Shanghai Stock Exchange and Shenzhen Stock Exchange during the sample period. In this limit order book, we have trade-driven data with 5 bids and 5 asks with quantities, with updates no faster than every second. The trades are not combined with each other even if they happened on the same price at the same time. The data set identifies whether the trade was buyer or seller initiated. We report summary statistics on the three share classes in Table 3.

A shares' median price in our data set is 12.26 RMB, while the median prices of B shares and H shares are 0.998 USD (about 6.78 RMB) and 6.65 HKD (about 5.86 RMB), respectively. As to market cap, the median market cap of A share is 1,964 RMB (mn), higher than that of B shares, 201 USD (mn) or about 1,367 RMB (mn), and that of H shares, 999 HKD (mn), or about 879 RMB (mn). A shares have much higher turnover

Table 2
Comparison of microstructures.

Characteristic	Shanghai/Shenzhen	NYSE	NASDAQ	Tokyo	Hong Kong
Market type	Order-driven	Hybrid	Hybrid	Order-driven	Order-driven
Floor trading	No	Yes	No	No	No
Market makers	No	Yes	Yes	No	Yes
Open hours	09:30–11:30 13:00–15:00	9:30–16:00	9:30–16:00	09:00–11:00 12:30–15:00	10:00–12:30 12:30–14:30 14:30–16:00
Pre-trading period or opening session	09:15–09:25	04:00–09:30	07:00–09:30	No	9:30–10:00
After hours trading	No	16:00–20:00	16:00–20:00	No	16:00–16:10
Market order	Yes	Yes	Yes	Yes	No
Limit order	Yes	Yes	Yes	Yes	Yes
Stop limit order	No	Yes	Yes	No	No
Fill-or-kill order	No	Yes	Yes	No	Yes
Call auction used?	Yes	Yes	No*	Yes	Yes
At market opening?	Yes	Yes	No*	Yes	Yes
At market closing?	No	No	No	Yes	No
Call auction design	Price/Time	Price/Time	N/A	Price/No time priority	Order type/Price/Time
Intraday trading mechanism	Continuous auction	Continuous auction	Continuous auction	Continuous auction	Continuous auction
Priority	Price/Time/Size	Price/Time	Price/Time/Size or Price/Size/Time or Price/Time/Access Fee	Price/Time	Price/Time
Tick size	A shares: 0.01RMB B shares: 0.001USD H shares: 0.01HKD	0.01 USD	0.01 USD	JPY: ≤2k: 1 2k–3k: 5 3k–30k: 10 30k–50k: 50 50k–500k: 100 500k – 1M: 1k 1M – 20M: 10k 20M – 30M: 50k >30M: 100k	HKD: ≤0.25: 0.001 0.25–0.5: 0.005 0.5–2: 0.01 2–5: 0.025 5–30: 0.05 30–50: 0.1 50–100: 0.25 100–200: 0.5 200–1k: 1 1k–9995: 2.5

Table 3
Statistics on share classes.
The table reports summary statistics for 1,652 Chinese stocks from the Shanghai and Shenzhen exchanges for the month of June 2007. The database utilized is the China Securities Market Trade and Quote Research Database.

	Median	5%	95%
A shares (RMB)			
Price	12.26	6.75	40.49
Market cap (mn)	1,964	525	15,656
Shares outstanding (mn)	146	33	832
Turnover	0.0537	0.0138	0.0929
B shares (USD)			
Price	0.998	0.547	2.213
Market cap (mn)	201	63	845
Shares outstanding (mn)	176	59	519
Turnover	0.0202	0.0078	0.0348
H shares (HKD)			
Price	6.65	3.30	31.57
Market cap (mn)	999	260	6,629
Shares outstanding (mn)	133	57	736
Turnover	0.0202	0.0050	0.0442

0.0537 than H shares and B shares, whose turnover rates are both around 0.0202. This is in accordance with the common understanding that A shares are traded much more actively than B shares and H shares.

3. Hasbrouck model

Hasbrouck's vector autoregressive model (1991) is regarded as the standard model in analyzing intra-day quotes and trades of a limit order book. According to Hasbrouck's theory, the ultimate price impact of a trade can meaningfully measure the trade's information effect.

We begin our empirical modeling of Chinese stock market's limit order book using Hasbrouck's model. Let r_t be the percentage change in the midpoint of the bid-ask spread, $log((p_t^b+p_t^a)/2)-log((p_{t-1}^b+p_{t-1}^a)/2)$. Let x_t denote the sequence of signed trades. A transaction is considered to be a buy (sell) and is signed $+1$ (-1) if it is initiated by a buy (sell) order. Our data set provides trade initiation.

The quote revision model is specified as

$$r_t = a_{r,0} + \sum_{i=1}^{M} a_{r,i} r_{t-i} + \sum_{i=0}^{M} b_{r,i} x_{t-i} + \varepsilon_{r,t}, \tag{1}$$

$$x_t = a_{x,0} + \sum_{i=1}^{M} a_{x,i} r_{t-i} + \sum_{i=1}^{M} b_{x,i} x_{t-i} + \varepsilon_{x,t}. \tag{2}$$

We recognize that time between ticks varies over the trading day and across stocks, so we allow the lag length of the autoregression to adapt tick time to calendar time. We choose M to be the average number of ticks over 3 min in each 4 h trading day,

$$M = 1 + \text{int}(3 \times \text{Ticks}/(4 \times 60)]). \tag{3}$$

Market impact, which indicates the trade's information effect, is determined by the arrival of a buy order to the market,

$$\partial r_{t+s}/\partial x_t. \tag{4}$$

We apply the model to our data set and limit our sample to stocks that trade at least 1,000,000 shares in the trading month. The market impact of a trade is summarized across different share classes and market caps in Table 4.

Based on Hasbrouck's model, the median market price impact $5\times M$ periods ahead is 0.1364%. This means, on average, a buy trade increases the quote midpoint of the stock by 0.1364% after $5\times M$ periods.

A shares' median market impact is 0.1364%. Since A shares include many more stocks than B shares and H shares, we should consider A shares as a large sample whose market impact range (0.0006%, 3.24%) contains B shares' (0.006%, 0.5%) and H shares' (0.036%, 1.2%). Thus, we cannot simply compare A shares with B shares or H shares.

Table 4
Hasbrouck model market impact estimates.
We estimate market impact from the Hasbrouck structural vector autoregression 1–2 for the 1,455 stocks in our sample that trade more than 1 million shares in June 2007. The table reports the median estimate of market impact after $5\times M$ ticks following an unexpected buy order. M is the average length in ticks corresponding to approximately 3 min and is given by 3. We also report the [5%, 95%] range for these estimates. We then estimate market impact separately for the three share classes: A (RMB), B (USD), and H (HKD) shares. We further breakdown the market impact estimates for the A shares into market capitalization groups. The small cap group includes stocks with less than 1 billion Ren (RMB), the mid-cap group spans 1–4 billion RMB, and the large cap group has stocks with more than 4 million RMB.

	Median	5%	95%
A, B, H: Overall	0.1364%	0.0094%	0.4091%
A: Overall	0.1372%	0.0094%	0.4091%
A: Small cap	0.1446%	0.0092%	0.3637%
A: Mid cap	0.1507%	0.0115%	0.3943%
A: Large cap	0.0993%	0.0078%	0.4490%
B: Overall	0.0988%	0.0115%	0.3669%
H: Overall	0.1593%	0.0609%	0.5811%

B shares has lower median market impact 0.0993% than H shares' 0.1594%, indicating that the average trade's price impact in B shares is lower than that in H shares. The reason will be explained in Section 5.

4. An empirical model of the limit order book

In this section, we extend the VAR model as in Mizrach (2008) to incorporate more details in the limit order book, beyond the inside quote and apply the model to our data set.

Let $p_{k,t}^b$ be the bid on the tier k of the quote montage at time t, and let $p_{k,t}^a$ be the corresponding quote on the tier k of the ask. The posted depths of each participant are denoted by $q_{k,t}^b$ and $q_{k,t}^a$. Now we incorporate the entire book of quotes and depths into an extended specification for the VAR,

$$\begin{aligned} r_t = {} & a_{r,0} + \sum_{i=1}^{M} a_{r,i} r_{t-i} + \sum_{i=0}^{M} b_{r,i} x_{t-i} \\ & + \sum_{i=1}^{M} \sum_{k=1}^{5} \beta_{r,k} \left(q_{k,t-i}^b - q_{k,t-i}^a \right) + \varepsilon_{r,t}, \end{aligned} \tag{5}$$

$$\begin{aligned} x_t = {} & a_{x,0} + \sum_{i=1}^{M} a_{x,i} r_{t-i} + \sum_{i=1}^{M} b_{x,i} x_{t-i} \\ & + \sum_{i=1}^{M} \sum_{k=1}^{5} \beta_{x,k} \left(q_{k,t-i}^b - q_{k,t-i}^a \right) + \varepsilon_{x,t}. \end{aligned} \tag{6}$$

$$\begin{aligned} q_{k,t}^b - q_{k,t}^a = {} & a_{i,0} + \sum_{i=1}^{M} a_{n,i} r_{t-i} + \sum_{i=1}^{M} b_{n,i} x_{t-i} \\ & + \sum_{i=1}^{M} \sum_{k=1}^{5} \beta_{1,i} \left(q_{k,t-i}^b - q_{k,t-i}^a \right) + \varepsilon_{q,k,t}, k = 1, \ldots, 5. \end{aligned} \tag{7}$$

where M is the average length in ticks corresponding to roughly 3 min.

The 3 variable VAR is now given by 5, 6, 7. While there are about $7\times M$ parameters in each equation, the large data sample makes the estimation feasible.

We then use this system to examine the effects over the next $5\times M$ periods of a net one unit buy, $x_t=1$. We still limit our sample to stocks that trade at least 1,000,000 shares in the trading month. The estimates are summarized in Table 5.

In the extended model, the median market impact $5\times M$ periods ahead is 0.1021% on price, less than that of Hasbrouck's model, but the 5%–95% range of market impact, 0.0086%–0.4343%, is larger than that of Hasbrouck model, 0.0098%–0.4192%. A shares' median market impact is 0.1000%. We still have B shares' median market impact 0.0887% lower than H shares' 0.1531%. We will try to put these results into perspective in the next section.

Table 5
Order book model market impact estimates.
We estimate market impact from the order book structural vector autoregression 5–7 for the 1,455 stocks in our sample that trade more than 1 million shares in June 2007. The table reports the median estimate of market impact after $5\times M$ ticks following an unexpected buy order. M is the average length in ticks corresponding to approximately 3 min and is given by 3. We also report the [5%, 95%] range for these estimates. We then estimate market impact separately for the three share classes: A (RMB), B (USD), and H (HKD) shares. We further breakdown the market impact estimates for the A shares into market capitalization groups. The small cap group includes stocks with caps less than 1 billion Ren (RMB), the mid-cap group spans 1–4 billion RMB, and the large cap group has stocks with more than 4 million RMB.

	Median	5%	95%
A, B, H: Overall	0.1020%	0.0086%	0.4332%
A: Overall	0.0999%	0.0085%	0.4290%
A: Small cap	0.0988%	0.0091%	0.3620%
A: Mid cap	0.1060%	0.0085%	0.4177%
A: Large cap	0.0873%	0.0080%	0.4820%
B: Overall	0.0865%	0.0254%	0.6112%
H: Overall	0.1530%	0.0091%	0.3620%

5. Cross section estimation of market impact

Hasbrouck (1991) stated that information asymmetries are larger for smaller companies. Mizrach (2008) empirically checked the cross-sectional market impacts on the Nasdaq and found them to be positively related with average price, tick frequency, number of market makers and negatively related with market capitalization.

As for the Chinese markets, we investigated cross-sectional cumulative market impacts first for various share classes and fit the following relationship,

$$\sum_{s=1}^{5M} \partial r_{j,t+s}/\partial x_t = \alpha + \beta_1 \text{Ticks}_j + \beta_2 \text{Turnover}_j + \beta_2 \text{Mkt.Cap} + \varepsilon_j \quad (8)$$

Average price has an insignificant influence in this case, and we omitted it from the final specification. For all A shares, the market impacts in Table 6 are positively related with turnover and market cap while negatively related with tick frequencies. These results are robust for all three market capitalization groups, with the best fit among small caps and large caps.

If we consider A shares, B shares and H shares altogether, market cap becomes insignificant. The market impacts are only positively related with turnover and negatively related with tick frequencies. The median number of ticks for B shares is 14,446 and for H shares, 11,687. Compared with B shares, H shares have the same turnover but lower tick frequency. Thus H shares' median market impact is larger than B shares, consistent with our findings in Sections 3 and 4.

Table 6
Cross sectional market impact estimates.
We estimate the model 8 for the cross-sectional effect of various liquidity measures on market impact from the order book model. We look at grouped A, B and H share classes, A shares overall, and A shares within market capitalization defined above. Ticks are the number of order book updates in the trading month. Turnover is volume divided by shares outstanding, and market cap is based on the end of month value of shares outstanding. t-statistics are in parentheses.

Dep. var.	Constant	Ticks	Turnover	Market cap	$\overline{R}^2$
A: Overall	8.40×10^{-4}	-2.33×10^{-8}	0.025	4.37×10^{-15}	0.1506
	(4.73)	(−4.62)	(14.95)	(2.02)	
A: Small cap	0.0021	-1.9×10^{-7}	0.0354	1.16×10^{-12}	0.4725
	(3.36)	(−7.74)	(12.41)	(1.34)	
A: Mid cap	8.60×10^{-4}	-7×10^{-8}	0.027	5.76×10^{-13}	0.0737
	(2.88)	(−6.54)	(6.92)	(5.44)	
A: Large cap	8.96×10^{-4}	-1.7×10^{-8}	0.029	7.77×10^{-15}	0.2297
	(2.93)	(−2.12)	(9.79)	(1.24)	
A, B, H: Overall	0.001	-2.56×10^{-8}	0.024		0.1443
	(6.70)	(−5.65)	(15.09)		

6. Small trades and block trades

In Hasbrouck's empirical tests, all trade sizes are constrained to have a similar price impact. In this section, we separate the effects of small trades and block trades and attain some interesting findings here. Barclay et al. (1993) find that trade size in the U.S. market is informative. They claim that "stealth trading," designed to minimize market impact, is best conducted through medium size trades. Cai et al. (2006) suggest that it is the large trades in the Chinese market that have the biggest subsequent effect on returns. In this section, we explore both the short-run market impact and whether there are persistent effects on returns.

6.1. Market impact

Ng and Wu (2007) analyzed Chinese individual and institutional investors' trading behaviors from brokerage accounts. According to their survey in 2000–2001 period, the average trading sizes of small individual accounts, middle individual accounts, wealthy individual accounts and institutional accounts are about 650, 2,150, 16,800 and 111,800 shares, respectively. Thus, we classify trades with size less than 650 shares as small trades and others as average trades. We report the two results for Hasbrouck's model in the left side of Table 7.

The median market impact of small trades is 0.0234%, while the median market impact of average trades is larger, 0.1026%.

This conclusion is robust in our empirical models with other limit order book information which appears in the right side of Table 7. The median market impact of small and average trades are 0.0445% and 0.1151%, respectively. We have explored the sensitivity of our results to these categories. We broke up the trade sizes into 5 bins: <650; 651–2,150; 2,151–16,800; 16,801–111,800; and >111,800. The market impact estimates remain monotone in trade size, 0.0491%, 0.0783%, 0.1285%, 0.2250%, and 0.2690%.[1]

These results appear to refute the stealth trading hypothesis for Chinese equities. Market impact is increasing in trade size.

6.2. Effect on returns

To investigate the informational impact of small trades, we also check the relationship between daily order imbalance of small trades and contemporaneous daily return. In Table 8, we show that volume-weighted daily order imbalances of small trades are negatively related with both the contemporaneous daily and next day's returns.

Table 7
Market impact by trade size.
We estimate market impact from the Hasbrouck and order book structural vector autoregressions for the 1,455 stocks in our sample that trade more than 1 million shares in June 2007. Trades are classified by size, with trades of 650 shares or less going into the small category.

	Market impact					
	Hasbrouck model			Order book model		
	Median	5%	95%	Median	5%	95%
Small	0.0234%	−0.2587%	0.3826%	0.445%	−2.407%	0.394%
Large	0.1026%	−0.1598%	0.4952%	0.1151%	−0.1499%	0.4804%

[1] These results are qualitatively similar if we divide the data into quartiles by trade sizes or RMB.

Table 8
Impact of trade size on returns.
We examine the effect of daily order imbalances (OIB) for our two trade size categories. We regress the current period order imbalance and the current and next day's returns. *t*-statistics are in parentheses. The sample is the 1,455 stocks with 1 million shares traded or more.

Shares	$\mathbf{r}_t$	$\overline{R}^2$	$\mathbf{r}_{t+1}$	$\overline{R}^2$
<650				
Vol. Wtd. OIB	-1.343×10^{-6} (−83.39)	0.198	-5.252×10^{-7} (−30.48)	0.032
>650				
Vol. Wtd. OIB	1.401×10^{-9} (14.04)	0.007	3.902×10^{-10} (3.90)	0.001

According to Hasbrouck's analysis, the market impact of a trade is a function of how informed the trader is. Since most small trades are from individual investors, it is reasonable to assume that the small trades are less informed and have smaller market impact.

There is an established literature on retail investors' poor trading performance. Hvidkjaer (2008) found that small trades are negatively related with a stocks' future performance. Stocks with intensive sell-initiated small trade volume outperform those with intensive buy-initiated small trade volume, from 1 month to 2 years later. And Barber et al. (2009) also showed that, in Taiwan's stock market, individual traders' losses are equivalent to 2.2% of Taiwan's GDP. Our empirical findings actually show that small trades, which are mostly conducted by retail investors, may be a magnet for informed traders and result in persistent negative returns.

7. Conclusions and extensions

In this paper, we investigate the microstructure of the Chinese stock markets and focus on limit order book information. We first compare the Shanghai and Shenzhen Stock Exchange's trading mechanism with other microstructures. We then apply Hasbrouck's vector autoregressive model, and then extend his specification to incorporate more limit order book information. We analyze how the market impact of stocks varies cross sectionally with market capitalization, tick frequencies, and turnover. Furthermore, we distinguish the market impacts in small and average trades. Market impact is increasing in trade size unlike the U.S. market where stealth trading makes trade size less informative. Small order imbalances have a persistent negative effect on returns.

There is additional work needed on the properties of the limit order book, such as liquidity, depth, and clustering. A direct comparison of price impacts in mainland China to Hong Kong and Tokyo, for stocks of similar size and liquidity, would also provide a useful quantitative perspective.

References

Bailey, Warren, Cai, Jun, Cheung, Yan Leung, Wang, Fenghua, 2009. Stock returns, order imbalance and commonality: evidence on individual, institutional, and proprietary investors in China. Journal of Banking and Finance 33, 9–19.
Barber, Brad M., Lee, Yi-Tsung, Liu, Yu-Jane, Odean, Terrance, 2009. Just how much do individual investors lose by trading? Review of Financial Studies 22, 609–632.
Barclay, M.J., Dunbar, C.G., Warner, J.B., 1993. Stealth trading and volatility: which trades move prices. Journal of Financial Economics 34, 281–306.
Cai, Bill M., Cai, Charlie X., Keasey, Kevin, 2006. Which trades move prices in emerging markets?: evidence from China's stock market. Pacific-Basin Finance Journal 14, 453–466.
Chan, Kalok, Peter Chung, Y., Fong, Wai-Ming, 2002. The informational role of stock and option volume. Review of Financial Studies 15, 1049–1075.
Dufour, Alfonso, Engle, Robert F., 2000. Time and the price impact of a trade. Journal of Finance 55, 2467–2498.
Hasbrouck, Joel, 1991. Measuring the information content of stock trades. Journal of Finance 46, 179–207.
Hvidkjaer, Soeren, 2008. Small trades and the cross-section of stock returns. Review of Financial Studies 21, 1123–1151.
Liu, Chun, Maheu, John, 2012. Intraday dynamics of volatility and duration: evidence from the Chinese stock market. Pacific Basin Finance Journal 20, 329–348.
Meng, Hailiang, Ren, Ruoen, Xie, Mingxia, 2007. Informed Trade on the Chinese Stock Market: An Empirical Investigation. International Conference on Service Systems and Service Management Proceedings 2007, 1–5.
Mizrach, Bruce, 2008. The next tick on Nasdaq. Quantitative Finance 8, 19–40.
Ng, Lilian, Wu, Feng, 2007. The trading behavior of institutions and individuals in Chinese equity markets,. Journal of Banking and Finance 31, 2695–2710.
Shenoy, Catherine, Zhang, Ying Jenny, 2007. Order imbalance and stock returns: evidence from China. The Quarterly Review of Economics and Finance 47, 637–650.
Xu, Cheng Kenneth, 2000. The microstructure of the Chinese stock market. China Economic Review 11, 79–97.
Zhou, Chunyang, Chongfeng, Wu., Yang, Li, 2011. The informational role of stock and warrant trades: empirical evidence from China. Emerging Markets Finance and Trade 47, 78–93.