

SOURCES OF LIQUIDITY COMMONALITY, ASYMMETRIC INFORMATION AND OWNERSHIP STRUCTURE IN EMERGING MARKETS: EVIDENCE FROM THE CHINESE STOCK MARKET

Xinwei Zheng*

Abstract

This study examines if common factors of liquidity can be determined by ownership structure measured by asymmetric information in an emerging market that has adopted an order-driven trading system. Using China as a case for the study, I select a broad sample of stocks from two separate Chinese stock exchanges to measure and analyse the relationship. My empirical evidence seems significant and pervasive. These findings about the Chinese stock market provide useful pointers for understanding commonality in emerging economies and shed critical light on a new dimension of the working of emerging markets.

Keywords: commonality in liquidity, asymmetric information, ownership structure, emerging markets

* *Durham Business School, University of Durham, Durham, UK*

1. Introduction

First made popular by Chordia, Roll and Subrahmanyam (2000), the commonality literature shows liquidity varies over time and across stocks. The co-movement of market liquidity represents a systemic risk factor and so is to be priced. Profound implications consequently flow from this literature. Now, asset pricing models will not only have to explain the impact of individual liquidity on an asset's price, but also consider common determinants of liquidity. Eventually, liquidity commonality will make contact with monetary theory, and also to be considered in the regulation of financial markets.

The new theory of commonality in liquidity calls for attention to the facts that individual stock liquidity can be driven by common underlying determinants and shocks to these common factors tend to generate market-wide effects. However, it is not fully known what precisely these common factors are. This means the underlying economic drivers of this 'commonality in liquidity' are not well understood.

Ownership structure has the important effects on market liquidity by asymmetric information. Glosten and Milgrom (1985) show the activities of privately informed traders can cause illiquidity. Sarin, Shastri and Shastri (2000) show that the higher insider ownership with higher adverse selection costs can cause the loss of liquidity. Lipson (2003) also mention informed traders can influence corporate decisions and the costs of liquidity. As a result, I will explore the relationship between asymmetric information and

common factors of liquidity for proving if ownership structure is the source of commonality in liquidity using data from China, arguably the most important emerging market.

Research into liquidity commonality in emerging markets and its causes can significantly advance the commonality literature. Current research primarily concerns with most liquid markets such as that of the US; little investigation has been conducted into the emerging markets cases. This ignorance is surprising because one major concern triggering the development of the commonality literature was the liquidity commonality as a contributing factor to financial crises in emerging economies during 1997 – 98. This suggests that there is a critical gap of mission that urgently requires the current literature to fulfill.

A further reason for our research to focus on emerging markets is that these markets provide an ideal setting for the study of liquidity issues. In addition to cross-sectional and temporal variations in liquidity in these markets, liquid effects in emerging markets prove to be more acute than in developed markets. This is because, in the US market for example, liquid effects can be mitigated by large number of traded securities, diversified ownership structures, and combinations of long- and short-term investors (Bekaert, et al., 2007).

It is also important to address liquidity issues in emerging market rather than concentrate research efforts on a handful of liquid, mature market (US, Hong Kong, and Australia) because liquidity is a major concern for international investment in

emerging markets. Chuhan (1992) indicates poor liquidity was one of the main reasons that prevented foreign institutional investors from investing in emerging markets. In a widely acclaimed paper, Lesmond (2005) points out that investments in emerging markets can yield substantial but volatile returns. The fact that spectacularly high returns can be significantly reduced by the increased illiquidity highlights the importance of addressing liquidity concerns and determinants of emerging markets (Lesmond, 2005). In this enterprise, our research may shed critical lights on what and how systemic factors affect market liquidity in these economies.

An added significance of our research is from our focus on an order driven trading system. Existent research on sources of commonality is mostly concerned with mature markets that operate a quote driven system. Under this market organization, a minimal liquidity is ensured by market makers in addition to the liquidity provided by other participants. In contrast, emerging economies typically adopt computerized order driven trading systems under which liquidity is provided by participants placing orders. This market organization dispenses with market makers, which calls into question the applicability of the research findings that commonality can be caused by a common market maker in a specialist market (Coughenour and Saad, 2004; Mortal, 2006). While quote driven markets can only make available to researchers the best quoted price and quantities and actual trades for use as the proxies for liquidity, order driven market can provide additional information about the trader's intention to trade, hence can provide finer information on liquidity (Bauer, 2004). In this light, research on sources of commonality in emerging markets can have wider implications.

As arguably the most important emerging economy, China provides a weighty case for the study of sources of commonality in emerging markets. The Chinese stock market is experiencing extraordinary growth, increased risk and volatility, which are typical of an emerging economy. The situation is made more complex by China's adoption of an order-driven market structure. Furthermore, in common to other emerging markets, the Chinese stock market is featured by high synchronicity of returns and poor protection of property rights, which deter risk arbitrage and cause more noise trading, leading to an increase in market-wide stock price variation. The underdevelopment of the Chinese market affords few alternative investments and therefore investors needing to liquidate may be unable to diversify their liquidity shocks among several asset classes, and this may lead to co-variation in liquidity. Therefore, an exploration of the determinants of commonality in the Chinese context would improve our understanding of the sources of co-variation in liquidity in emerging

markets with order-driven systems, and better our understanding of the functioning of those financial markets.

Evidence of existence of commonality in emerging markets has been discovered using data from the Chinese stock market (Zheng and Zhang, 2006). Using transaction and quote data of every 15 minutes within a trading day during July 2000 to June 2002 and for 'A' shares on two major Chinese stock exchanges, i.e. the SHSE and SZSE, I uncover that common factors are evident in measures of asymmetric information based on trading frequency in market-wide and industry-wide components. Assuming that the number of trades can be used as a reliable indicator of informed trading, these results suggest a common component in asymmetric information at both market and industry levels.

The rest of the paper is organized as follows. Section 2 describes the background to market liquidity, asymmetric information and state owned structure in the Chinese stock market; Section 3 explains the data; Section 4 provides empirical evidence; Section 7 comprises concluding marks.

2. Market liquidity, asymmetric information and state owned structure of the Chinese Stock Market

On the Chinese stock market, transaction prices are generated according to the bid/ask prices and time of order submission. A broker on the SHSE and the SZSE has responsibility not only for the buyers but also for the sellers. According to Yang, Sun and Shi (2002), the biggest difference for brokers between the Chinese stock markets and the dealership markets is that spread does not form part of the profits on the Chinese stock markets, but does in the dealership markets. Wang and Chen (2006) argue that, of the three main determinants in the conventional liquidity models, the inventory costs are irrelevant for China because there is no need for traders to hold inventories in China's order-driven market. On the other hand, as China has adopted a computer based automated trading system, the order processing costs are more or less fixed, and hence cannot be a significant factor causing changes in liquidity of individual assets. Thus, in theory, the adverse selection costs due to asymmetric information are left to be the main determinants of liquidity.

Much research has confirmed that adverse selection is a significant factor influencing liquidity in China. Using depth as a measure of liquidity, Yang, Sun and Shi (2002) find that, on average, the adverse selection effect accounts for 36.2 % of liquidity changes. Mu, Wu and Liu (2004) provide evidence that, both in relative and absolute terms, adverse selection costs are greater than order processing costs in China. Other researchers' estimates of the adverse

selection component in the total bid-ask spread vary, from 0.186 (Han, Wang, Yue, 2006) to 0.3908 for the SHSE, and from 0.3621 (Wang and Chen, 2006) to 0.62 (Lei and Zheng, 2006) for the SZSE, depending on the selection of shares in the portfolio and the time period under examination. However, they all confirm that the adverse selection effect is a significant liquidity determinant. Moreover, it is also generally agreed that on the Chinese market adverse selection has a stronger effect than in other, mature order driven markets such as Hong Kong (Wang and Chen, 2006).

The importance of adverse selection as a liquidity determinant is also reflected in its effect on liquidity variations with time. The intraday spreads on both the SHSE and the SZSE exchanges display an L-shaped pattern, similar to the pattern reported in Foster and Viswanathan (1990). This pattern occurs because shortly (about 10 minutes) after the morning trading session starts in China, the relative spread would be very wide, but after about one hour it starts to narrow and gradually stabilises at the daily mean level. This continues throughout the rest of the day with no widening again around the closing time. This pattern differs from the usual U-shaped pattern seen in other markets such as in Hong Kong (Qu and Wu, 2002; Sun and Shi, 2002; Yang, Li and Liu, 2002). The changing level of adverse selection within the day has been identified as the main cause of this pattern. During the overnight halt, it is likely that new information may have arrived. However, since the Chinese call auction in the opening session is closed to the public, no information is to be released. While informed traders may take advantage of this by engaging in transactions soon after the session opens to the public, liquidity traders tend to withdraw during this time. With the passage of the day, new information will gradually become known and so adverse selection will decrease (Yang, Sun and Shi, 2002; Qu and Wu, 2002; Mu, Wu and Liu, 2004; Han, Wang and Yue, 2006; Lei and Zheng, 2006; Wang and Chen, 2006). A similar adverse selection effect may also be found in the bid-ask spread on Mondays, which is higher on both the Shanghai and the Shenzhen exchanges, perhaps because on Mondays more information is available after the non-trading period of the weekend (Yang, Li and Liu, 2002).

The Chinese stock market is dominated by large numbers of small and individual investors. Because of their limited financial resources and sectoral expertise, and their inadequate investment training, they are disadvantaged in acquiring and processing information. They are therefore usually uninformed traders on the market. To protect their interests, they tend to migrate to the market of shares with large capitalisation, where the issuing firms are subject to greater scrutiny from regulators, investment analysts and general investors due to their market influence. These big firms are under greater pressure to have a

relatively better structure of corporate governance, and higher standards of information disclosure. This is helpful for reducing possible information asymmetry, which in turn attracts individual investors. Institutional investors on the other hand, are then left to explore their informational advantage in small-cap markets. Thus the small-cap Chinese shares tend to be subject to larger effects of adverse selection (Song and Tang, 2002). Han, Wang and Yue (2006) and Wang and Chen (2006) all empirically demonstrate that adverse selection components of the bid-ask spread of large firms are smaller than those of small-cap firms. It follows that there are differences in the level of adverse selection, hence differential impacts of adverse selection across firms. Large companies, because of the relatively low degree of adverse selection, tend to have higher levels of liquidity. The higher degree of adverse selection in the shares of small-cap firms means that for those firms, liquidity is lower.

On the Chinese markets, adverse selection is also found to be associated with trading volume and stock prices. Evidence has shown that non-actively traded shares usually have a larger adverse selection component and are less liquid, while the reverse is true for shares with active trading and large transaction volumes. Adverse selection is also negatively related to share prices. High price shares show less effects of adverse selection than do low priced shares. Again, it is plausible that these differential impacts are because heavily traded and high priced shares are subject to more stringent scrutiny from regulators and the market, so asymmetric information is relatively less prevalent (Mu, Wu, and Liu, 2004; Han, Wang, and Yue, 2006; and Wang and Chen, 2006).

In addition, some attributes of microstructure are proved to have impacts on liquidity in China. A special factor in this regard is the existence of illiquid shares. These non-tradable shares, which represent a considerable proportion of outstanding Chinese shares owned by the State or legal persons, are neither negotiable nor tradable on the market (Yang, Li and Liu, 2002). As a consequence, the illiquid shares tend to overvalue the price of tradable shares, since their existence creates the liquidity premium to tradable shares.

These illiquid shares also enhance the level of asymmetric information among investors. Owners of non-tradable shares are usually the state government or their representatives. They play a more important role in corporate governance than do investors in secondary markets. Because of this, they possess insider information about the companies under their control and can decide the announced prices of their stocks which are not open to public trading, whilst the common traders receive little information. This fact leads to high adverse selection costs and hence the

wider bid-ask spread. As a result, market liquidity tends to decrease with the increase in the proportion of illiquid shares (Yang, Li and Liu, 2002). Mu et al. (2004) find similar empirical evidence, showing that the proportion of non-tradable shares in the total outstanding shares is a significant determinant of liquidity. It is negatively correlated with the level of liquidity of a security.

Another microstructure factor affecting liquidity in China is that China imposes a price limit on stock prices, which allows a stock to trade within plus or minus 10% of its closing price on the previous day. Research has shown that appropriate price limits cannot restrict, and may actually augment, market liquidity. However, improper price limits do to some extent restrict the market liquidity (Liu et al., 2004). Jiang (2005) observes that market liquidity increases as prices rise to the upper price limit (10%), then decreases. Conversely, it decreases when prices fall to the price floor (10%).

On these two exchanges, most Chinese listed companies are state-owned and they have issued two types of shares that have different properties of liquidity. One category is the tradable shares (TS). They are usually in the form of new issues to the public, the funds from which are used to develop the issuing company. They are the only shares that can be openly traded on both exchanges. The other type of shares is non-tradable shares (NTS) which are in essence the certificates of existing assets assessed and valued before listing (Beltratti and Bortolotti, 2006; Guo, 2006).

Sixty percent of shares held by the Administration of State-Owned Property and State-Owned Corporation bodies are non-tradable, while only 30% are circulating shares held by general investors. Wu and Wang (2005) point out that this ownership structure results in a thin stock market. Furthermore, there is a danger of an event risk whereby the illiquid shares may one day be circulated unexpectedly.

In January 2004, the Chinese government officially recognized NTS as a significant obstacle to domestic financial development. As a result, on April 29, 2005, the China Securities Regulatory Commission (CSRC) announced a pilot program to allow four companies (Tsingua Tongfang, Hebei Jinniu Energy Resources, Shanghai Zi Jiang Enterprise Group, and Sany Heavy Industry) to transform their NTS into TS. Existing shareholders would be compensated through an offer of bonus shares, cash, and options. This project was different from earlier moves in that holders of non-tradable and tradable shares may enter into negotiations over the transfer of NTS. The scheme has been seen as a success, with only one of the four pilot companies, Tsinghua Tongfang, failing to win approval of its reform proposal owing to shareholders' disagreement

on the compensation plan (China Securities Regulatory Commission, 2005). The NTS reform therefore continued into 2005 and 2006, and successfully turned many NTS into TS (Beltratti and Bortolotti, 2006).

According to Beltratti and Bortolotti (2006), the NTS reform had a significant impact on the behaviour of Chinese listed firms. Once all NTS become tradable, minority shareholders will be able to play a greater role in management decisions, and this may lead to better corporate governance. The reform will facilitate privatisation via the issuing of secondary equity, thus curbing political interference and improving operating performance. The substantial increase in the free float will lead the market to expect better liquidity for the stocks. Furthermore, the market will resolve uncertainty about the timing of the reform process, and this will have positive effects on valuation.

At market prices, NTS have a capitalisation value of about RMB 7883.44 billion (\$US1010.70 billion). Most of the NTS are owned by the government and legal entities, which can be in any form of corporation such as privately owned companies, state-owned enterprises or a combination of the two. In 2007, the non-tradable equity of all listed companies was about 947.54 billion shares, or 61.77% of total market equity. Of these NTS, the government owns 80.12%, the legal-entities 17.81%, and others about 2.07%.

3. Data

The database provided by the China Stock Market & Accounting Research (CSMAR) comprises details of every transaction and related information for every working day, including data by bid and ask record. I obtained from CSMAR intra-day transactions and quote data for the period July 2000 to June 2002 for A-shares listed on the SHSE and the SZSE. Previous studies on the determination of commonality use data of only one year or less. The sample period chosen is particularly interesting because of the variations in market states. The Chinese market was bullish in July 2000 and June 2001, while in July 2001 and June 2002 there was a bear market.

I set up the sample selection filter following the same method as Chordia et al. (2000). To be included in the sample a stock had to be listed constantly on the SHSE and the SZSE for 24 months in the sample period. To avoid possible bias due to trading units, no stocks which had paid dividends or been split during the sample period are selected and these stocks must have been traded at least once in at least ten trading days over the sample period of 24 months. To focus on normal trading activity during the continuous trading session, opening trades were deleted from the study. In addition, I deleted trades and transactions

with ST and PT³² conditions to avoid eruptive movement of stock prices. Finally, observations of all shares for June 24th, 2002 are not included, because there was an unusually large market shock in China on that day due to the announcement by the government on the decision to shelf the state stock reduction program.

4. Empirical Analysis

In view of the existence of time-varying information asymmetry and the evidence that information asymmetry is one of the drivers behind liquidity in order-driven markets (Brockman and Chung, 2002), I can infer that aggregate variations in information asymmetry might explain variations in market liquidity on the Chinese market. As such, there may be a market wide information asymmetry component which can explain variations in firm level information asymmetry and liquidity. Following the methodology of Brockman and Chung (2002), in what follows I first examine this effect.

Barclay and Wamer (1993) examine informed investors' trade-size choices and report that informed trades concentrate their trades in medium size and tend to hide their identity by broking up their large accumulations (10,000 shares or more) into medium-size trades. From this, one may find a positive association between the numbers of trades and asymmetric information. Jones, Kaul, and Lipson (1994) show the evidence that it is the transactions per se, rather than their volume, that generates volatility and that trade volume has no information beyond that contained in the frequency of transactions. Based on these findings, Chordia, et al. (2000) and Brockman and Chung (2002) believe that the number of trades rather than the trade size can be used as an indicator of individual firm is asymmetric information and this indicator has been used in their studies of the sources of commonality. Following this line of research, I use the regression model developed by Brockman and Chung (2002) to test for sources of commonality at the market and industry levels:

$$\Delta NTrades_{J,t} = \alpha + \theta_1 \Delta NTrades_{M,t} + \theta_2 \Delta NTrades_{M,t+1} + \theta_3 \Delta NTrades_{M,t-1} + \lambda_1 \Delta NTrades_{I,t} + \lambda_2 \Delta NTrades_{I,t+1} + \lambda_3 \Delta NTrades_{I,t-1} + \delta_1 Return_{M,t} + \varepsilon_{J,t},$$

where $NTrades_{J,t}$ is the total number of trades for firm J during the trading day t as a measure of transaction

frequency. $NTrades_{M,t}$ is the equally weighted average on day t of the number of trades for all firms (but excluding firm J) in the sample. $Return_{M,t}$ is the equally weighted average of the daily return for all firms. Sample firms are classified into the three industry sectors designated by the Chinese securities authorities. $NTrades_{I,t}$ is the equally weighted average of the number of trades for all firms in the industry.

The results for model are presented in Table 1. On the SHSE, from the time-series regressions, the number of marketwide concurrent coefficient that is positive and significant accounts for 63.5% of the total estimates, which is twice that found by Brockman and Chung (2002). On the SZSE, 74.6% of the time-series regressions have a positive and significant concurrent coefficient for the whole market. Both market and industry variables are positive and highly significant for the sum of concurrent, lag, and lead coefficients for the SHSE and the SZSE. Also in the time-series regressions, 45.8% of the concurrent industry-wide coefficient are positive and significant, which is much higher than the results from Brockman and Chung (2002). Given that the number of trades is a reliable indicator of informed trading, these results suggest, at both market and industry levels, there is a common component in the number of trades implying asymmetric information is likely a source of commonality in liquidity.

Despite the availability of information regarding market variables, at certain periods, especially during significant macro-economic changes, it may become difficult to value a firm. Traders who have more information about firm operations, and better communication channels with management, are better equipped to estimate how economic changes will affect firm value. This represents an informational advantage, which will motivate informed trading. Such an advantage will add up across firms and is non-diversifiable (Mortal, 2006).

Asymmetry of information is particularly severe in China. According to Wang (2002), the cost of asymmetric information represents about 80% of the cost of bid-ask spread. One reason for this is that Chinese firms tend not to fully disclose material changes in their business conditions, and published statements do not always meet international accounting standards. In addition, there is widespread share manipulation and insider trading, and little protection for investors (Chan, Menkveld and Yang, 2008). In this environment, a shock of asymmetric information will induce systematic change in liquidity (Fernando and Herring, 2003). My empirical results support this hypothesis. Guo (2006) suggests that asymmetric information has an important role in the patterns for liquidity. My results expand their findings and provide evidence that asymmetric information may also critically impact the patterns of commonality in liquidity.

³² Since 1996, firms which suffered losses for two consecutive years in SHSE and SZSE should be under special treatment (ST). Since 1998, firms that have suffered losses for three consecutive years in SHSE and SZSE should be under particular treatment (PT). The shares with PT can only be traded each Friday and there is a price limit of 5 percent fluctuation per day. The shares with PT will be deleted from trading on the market if their losses cannot be reversed in a year (Lee and Xue, 2002).

5. Conclusion

While conventional research mainly documents the sources of individual stock's liquidity, the new literature on liquidity commonality has investigated various common factors causing movements of liquidity across stocks under different market organisations. The literature suggests ownership structure has the important effects on market liquidity by asymmetric information. Following this line of research, I test the sources of commonality at the market and industry levels using the number of trades as an indicator of informed trading. The results for the sum of concurrent, lagged, and leading coefficients on such a variable show that the asymmetric information proxy is positive and highly significant for stocks from the SHSE and the SZSE. Given that the number of trades is a reliable indicator of informed trading, this outcome suggests that asymmetric information is a significant source of liquidity commonality in China. This finding sheds critical light on the working of the Chinese stock market. Asymmetric information is a particularly severe problem in China. Chinese firms tend to disclose only incomplete or even biased information on their business and in the marketplace share manipulation and insider trading are pervasive. In this environment a shock of asymmetric information tends to induce systematic change in liquidity across the market. My empirical results give evidence to the importance of asymmetric information as a determining factor causing liquidity commonality which is a vital attribute of the Chinese stock market.

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Table 1. Commonality and Asymmetric Information

Independent Variable (SHSE)		Mean (Median) of Est. Coe.	%+ and Sig.	%+ and inSig.	%- and inSig.	%- and Sig.	SUM_M and SUM_I Mean (median) [p-value]
$\Delta NTrades_{M,t}$	θ_1	1.751 (1.061)	63.5%	35.2%	1.3%	0	0.695 (-0.312) [0.000]
$\Delta NTrades_{M,t+1}$	θ_2	-0.164 (0.174)	1.9%	16.7%	80.1%	1.3%	
$\Delta NTrades_{M,t-1}$	θ_3	-0.892 (-1.026)	2.6%	12.1%	84%	1.3%	
$\Delta NTrades_{I,t}$	λ_1	0.522 (0.195)	51.3%	46.8%	1.9%	0	0.992 (-0.067) [0.000]
$\Delta NTrades_{I,t+1}$	λ_2	0.677 (1.104)	0.6%	16.1%	80.7%	2.6%	
$\Delta NTrades_{I,t-1}$	λ_3	-0.207 (-0.260)	2.6%	12.1%	84%	1.3%	
Independent Variable (SZSE)		Mean (Median) Est. Coe.	%+ and Sig.	%+ and inSig.	%- and inSig.	%- and Sig.	SUM_M and SUM_I Mean (median) [p-value]
$\Delta NTrades_{M,t}$	θ_1	4.850 (4.203)	74.6%	23.7%	1.7%	0	4.942 (0.381) [0.000]
$\Delta NTrades_{M,t+1}$	θ_2	-0.553 (-0.589)	2.8%	23.2%	72.3%	1.7%	
$\Delta NTrades_{M,t-1}$	θ_3	0.645 (1.009)	1.7%	41.8%	53.7%	2.8%	
$\Delta NTrades_{I,t}$	λ_1	1.440 (1.488)	45.8%	48%	6.2%	0	0.774 (-0.211) [0.000]
$\Delta NTrades_{I,t+1}$	λ_2	-0.387 (-0.348)	2.8%	10.2%	85.3%	1.7%	
$\Delta NTrades_{I,t-1}$	λ_3	-0.279 (-0.244)	2.3%	16.3%	78.6%	2.8%	

Notes: This table presents the regression results for commonality in liquidity is driven by asymmetric information on the Chinese Stock Exchange between July 2000 and June 2002. Asymmetric information is measured by the number of trades. The Chinese Stock Exchange includes the Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE). $NTrades$ is the total number of trades.