

A Study of How Stock Liquidity Differs in Bullish and Bearish Markets: The Case of China's Stock Market

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Abstract—Considering the market factors and industry factors, this paper conducts a study of the difference of stock liquidity between bullish and bearish market. The study takes 45 stocks respectively from 9 main industries in CSI 300 market as the objects, the 16th of Oct. in 2007 as the cut-off point, the sample period is two years before and after the point, uses t-test to examine the significance of the differences between two samples. The results show that the difference between the bullish and the bearish market is significant, the stock liquidity in the bullish market is significantly higher than in the bearish market, and the difference of liquidity in different industries also exists.

Key words—stock liquidity, bullish, bearish, panel data

I. INTRODUCTION

Liquidity does not have an authentic and consistent definition in economics sense, several definitions show the term from different degrees and focus. A widely acceptable definition is the ability of trading a large amount of stocks in a low transaction cost, and having a slight effect on the market price. Jia & Li defines liquidity as the asset's ability of realization without loss, and represented by the relationship between the time scale (difficulty in realization) and price scale (discount compared to fair market value) of an investment [1].

Since liquidity is an essential factor of the stock market, and it can reflect the operation quality of the stock market, finance investors always attach significance to stock liquidity. A perfect and normative stock market will have a high liquidity, the investors in the market can trade a certain scale of stocks conveniently and rapidly, and the stock market can also complete the accommodation of funds and appreciation in fixed assets [2]. In addition, making the stock market have more liquidity can also attract more investors, increasing investors' confidence and defending the external shocks. Subsequently, understanding its appropriate measurement is an important factor to estimate the risk of stock market and keep the market steady.

In August of 2008, a subprime crisis affected economy almost worldwide, this financial crisis which is related to the lack of liquidity tolled the alarm bells to the world, and revealed the importance of stock liquidity in financial activities. Recently, a growing number of literatures refer to the stock liquidity. However, there is not much consensus about the

measurement of the stock liquidity, different studies have identified different measurements and can not meet a consistent. This study will take CSI 300 market as instance to do empirical analysis of the difference of stock liquidity between bullish and bearish market by choosing the most appropriate measurements. In addition, by intensively analyzing the features of China's stock liquidity intensively, the study will also give investors advice to take different correct actions in bullish and bearish markets based on the stock liquidity.

The rest of the paper will be organized as follows: Section 2 reviews the relevant theoretical literature of the measurements of stock liquidity. Section 3 introduces the source of the sample data and outlines the methodology. Section 4 presents and discusses the results. The last section gives a final conclusion.

II. LITERATURE REVIEW

A great deal of literature has focused on the differences between bullish and bearish markets in terms of varieties of aspects. This study will review some valuable papers which are relevant to the stock liquidity. In addition, different measurements are also referred to and compared in order to select the most appropriate measurements.

A. Review of Effects of Market Trend to Stock Liquidity

Singh & Bhowal studied the performance of IPOs in the bullish and bearish market. Their results show that almost all issued IPO in bullish market were heavily oversubscribed [3]. In terms of subscription, performance in the bullish market of the IPO both by the institutional investors as well as retail investors was found to be attractive. The results of the bearish market are found opposite to the bullish market, most IPO were just subscribed or undersubscribed. An optimistic performance of IPO will benefit the liquidity of stock market, since the investors' decision are largely depends on the market trend, a bullish market will own a high liquidity and attract more investors.

Huang & Wang studied the influence of monetary policy on stock market in bullish and bearish markets [4]. Their findings stated that the monetary policy shows an evident influence on

stock market in bullish market, however the monetary policy exerts an extremely small effect on stock market in bearish market. Since the investors show less confidence and endurance in a bearish market, the monetary policy loses its effectiveness. And the stock liquidity will also be lower because the stocks can not be traded swiftly at a low cost.

The forecast of the market trend is another important effect of stock liquidity. Clarke & Statman studied the how investors' decisions are affected by the forecast of the market trend [5]. Their findings, as the forecast of market trend, have a significance different effect on bearish and bullish markets. With a bearish forecast, the investors will adopt a more defensive strategy than in bullish forecast to reduce the loss, consequently the stock price, trading volume and the velocity of circulation will also be affected and thus cause a low stock liquidity.

Previous literatures about stock liquidity mostly focus on the relationship between stock liquidity and stock price, or between stock liquidity and rate of return. Few of them make direct comparisons between liquidity in bearish and bullish markets. Zeng & Tang studied the difference of liquidity risk premium between bullish and bearish markets, the results show that in bullish market, liquidity risk premium does not exist, but in bearish market the liquidity risk premium is significant [6]. In terms of the industry, in bearish market the stock of industry which has an incentive policy will have a lower liquidity risk premium. But since different measurements and different data will cause different results, this study will choose a measurement which is most appropriate to the sample data.

B. Review of Stock Liquidity Measurements

There are several conventional measurements of stock liquidity, and among these measurements, trade stocks amount $Q(\Delta t)$, trade deals $S(\Delta t)$, transaction amount $N(\Delta t)$, turnover rate $T(\Delta t)$ and velocity of circulation $L(\Delta t)$ are the widely used ones. Zhuang & Zhao gave the formula of turnover rate and velocity of circulation [7]:

$$T(\Delta t) = Q(\Delta t) / M(\Delta t)$$

$$L(\Delta t) = N(\Delta t) / \frac{LM_1(\Delta t) + LM_2(\Delta t)}{2}$$

In the formula, $M(\Delta t)$ is the amount of the circulation stocks during the period Δt ; $Q(\Delta t)$ is the sum of turnover during the period Δt ; $N(\Delta t)$ is total volume of transaction during period Δt ; $LM_1(\Delta t)$ is currency value in the last period, $LM_2(\Delta t)$ is currency value in this period.

These indexes will be effective to measure the stock liquidity if other factors are similar, for example, trade stocks

amount $Q(\Delta t)$ and trade deals $S(\Delta t)$ will be effective if the amount of circulated stocks is similar, transaction amount $N(\Delta t)$ will be effective when circulation market value is similar. In addition, turnover rate $T(\Delta t)$ and velocity of circulation $L(\Delta t)$ is respectively the further developed measurement based on the trade stocks amount $Q(\Delta t)$ and transaction amount $N(\Delta t)$ [8]. However, these measurements face the same problem, i.e. when fluctuation range has a great difference, they can not compare and reflect the stock liquidity exactly, since even though these index are high, if the fluctuation range is higher, the high index do not indicate a high stock liquidity.

Market depth which is defined as the trading volume needed for every unit change in price, is another widely used measurement in quote driven system. In 1988, NYSE began to use the proportion of the number of trades whose changes of the stock price caused by every 3000 shares invested are under 12.5% to measure the market depth. The NYSE market depth is shown in Table I.

This method is a more faultless measurement of stock liquidity, but in China's emerging stock market some indexes can not be measured [8].

The preceding measurements are usually used to calculate the instantaneous stock liquidity, but the measurement of liquidity in a certain period is more valuable in practice. This paper will study how liquidity differs between bullish and bearish market. To compare the liquidity in different markets and different periods, some other suitable measurements should be referred to.

Zhuang & Zhao used fluctuation range to measure the stock liquidity [7]:

$$LIQ(\Delta t) = \frac{Q(\Delta t)}{M(\Delta t)} / VR(\Delta t)$$

The fluctuation range is denoted as:

$$VR(\Delta t) = \begin{cases} \frac{h}{p_2(\Delta t)}, \\ \frac{p_1(\Delta t) - p_2(\Delta t)}{p_2(\Delta t)}. \end{cases}$$

In this formula, $p_1(\Delta t)$ is the highest transaction price in period Δt , $p_2(\Delta t)$ is the lowest transaction price in period Δt , h is the tick size ($h=0.01$).

This measurement is ratio of turnover rate to the fluctuation range, so it avoids the effect of the fluctuation range to the liquidity since the measurement considers the turnover rate and fluctuation range at the same time. Therefore, this study will choose the fluctuation index as one of the measurements of the stock liquidity.

TABLE I. NYSE MARKET DEPTH IN 1988 TO 1997

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Market depth	92.1	87.1	94.4	85.5	97.1	88.3	88.6	90.8	90	86.9

^a Data source: NYSE Fact Book 1997

Amihud's illiquidity index is another widely used measurement in stock market. This index is defined as the ratio of absolute value of rate of return to the total volume of trade:

$$ILLIQ_{iy} = 1/D_{iy} \sum_{i=t}^{D_{iy}} |R_{iyd}| / VOLD_{iyd}$$

D_{iy} is the number of days for which data are available for stock i in year y ; R_{iyd} is the return on stock i on day d of year y and $VOLD_{iyd}$ is the respective daily volume in dollars. [9] Although this measurement is not precise to some degree, the data needed is convenient to obtain.

This study will choose turnover rate, fluctuation index and Amihud's illiquidity index as three measurements of the stock liquidity to avoid the potential bias of choosing single measurement, and examine the significance of the differences in order to investigate how to adopt correct strategy respectively in bullish and bearish markets.

III. METHODS AND DATA

A. Data

This study takes the 16th of October in 2007 as the cut-off point, the justification of setting this date is that the SZSE met the highest point of 6124 in the history on 16th of Oct. in 2007, then SZSE decreased about 70%, the stock market transfers to bearish market [6]. The data are collected from Yahoo Finance, selecting 45 stocks respectively from 9 main industries (5 stocks for an industry) in Shanghai Stock Exchange and Shenzhen Stock Exchange, and the period is from Oct. 16, 2006 to Oct. 16, 2008.

The nine main industries are consumption, energy, material, finance, Unicom, IT, public, manufacturing and medicine. The classification of industry is based on the study of Zeng & Tang [6]. This study selects 5 stocks respectively from each industry as the sample stock instead of a random selection in order to avoid the other noise variables such as policy in different industries affecting the test result.

After finishing collecting data, this study will calculate the average of $ILLIQ_{iy}$, TR_{it} and $LIQ(\Delta t)$ in each industry and do

IV. RESULT AND DISCUSSION

Firstly, this study calculates the average and standard deviation of each variable in nine industries respectively. The outcome is shown in Table III. To make the outcome simple and easy to compare, the variable $ILLIQ$ is multiplied by 100 million.

Fig. 1 makes a comparison between the turnover rate in Finance and Manufacturing. It can be seen that turnover rate of Manufacturing is overwhelmingly higher than Finance in bullish market, however, after Oct. 16 in 2007, Manufacturing declined dramatically in turnover rate while the turnover rate did not fluctuate a lot and even exceeded the Manufacturing at the end of 2008.

Fig.2 and 3 show the effect of market trend on Zhuang & Zhao's liquidity index and Amihud's illiquidity index. The line

the t-test to examine the significance of the difference of the liquidity between bearish and bullish market.

B. Description of Variables

Table II shows all the related variables. Observing the outcome of each sector, it is obvious that Finance shows the least elasticity to the market trend, for the turnover rate, just 0.01% higher in bullish market than in bearish market. The reason is that the price of stocks in Finance industry is mostly not high, and follows a stable trend [10]. In addition, Finance stocks play a vital role in stock market, so governments always focus on the Finance stocks like bank stocks or security stocks. Therefore, although in bearish market, the stocks in Finance industry will not be affected a lot since the favourable policies of governments. In contrast, an obvious spread of three variables are shown in other eight industries. Before doing the empirical test, the study illustrates three line chart to have a clear and visual trend of three variables.

TABLE II. VARIABLES

Variable	Index	Formula
$ILLIQ_{it}$	Amihud's illiquidity index	$ILLIQ_{iy} = 1/D_{iy} \sum_{i=t}^{D_{iy}} R_{iyd} / VOLD_{iyd}$
T_{it}	Turnover rate	$T(\Delta t) = Q(\Delta t) / M(\Delta t)$
VR_{it}	Fluctuation range	$VR(\Delta t) = \begin{cases} h \\ p_1(\Delta t) - p_2(\Delta t) \\ p_2(\Delta t) \end{cases}$
LIQ_{it}	Zhuang & Zhao's liquidity index	$LIQ(\Delta t) = \frac{Q(\Delta t)}{M(\Delta t)} / VR(\Delta t)$

^b: Other variables:

^c: D_{iy} : the number of days for which data are available for stock i in year y

^d: R_{iyd} : the return on stock i on day d of year y

^e: $VOLD_{iyd}$: the respective daily volume in dollars

^f: $DTMV_{iyd}$: the amount of the circulation stocks

^g: $p_1(\Delta t)$: the highest transaction price in period Δt

^h: $p_2(\Delta t)$: the lowest transaction price in period Δt

ⁱ: h : the tick size

charts show an obvious trend in both two indexes. For Zhuang & Zhao's liquidity index, the line has an evident valley in a bullish market but the general level is significantly higher than in bearish market. For Amihud's illiquidity index, the difference of general level is also significant. Visually, since the Amihud's illiquidity index is inversely ratio to stock liquidity, these two line charts both show that the liquidity in bullish market is higher than in bearish market.

To do the empirical analysis, the study uses SPSS to do the independent sample t-test to examine the significance of the differences of stock liquidity between bullish and bearish markets. Table II shows the outcome of the test.

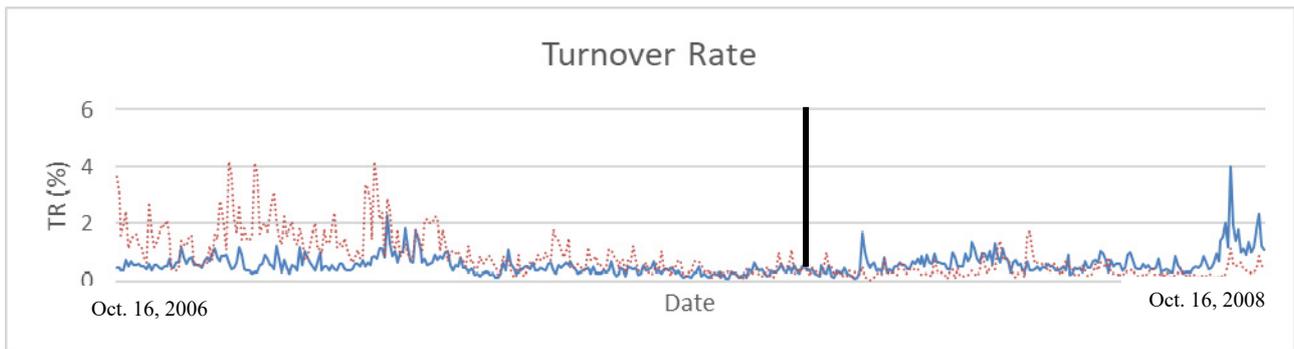
The significance tests verify the preceding judgement from Table IV and line charts, the difference in Finance stocks between bullish and bearish market is not significant when applying Turnover rate and Liquidity index (p-value=0.757 and

0.195 respectively) as measurement. For the total test, the p-value of three tests are respectively 0.001***, 0.000*** and 0.002***, all of the three p-value are less than 0.01. It indicates that the difference of stock liquidity between bullish and bearish market is significant in all three measurements. A

bullish market shows a higher stock liquidity in which stocks can trade at a low transaction cost, in contrast, the investors show less confidence in a bearish market so stocks can not be traded swiftly at a low cost.

TABLE III. AVERAGE AND STANDARD DEVIATION

Variable	TR _{it}		LIQ _{it}		ILLIQ _{iy}	
	Bullish	Bearish	Bullish	Bearish	Bullish	Bearish
Finance	0.57(0.30)	0.56(0.42)	10.91(5.94)	10.20(7.24)	4.05(3.89)	6.13(7.93)
Unicom	1.71(0.85)	0.74(0.48)	38.69(20.25)	14.20(7.58)	0.04(0.04)	0.17(0.12)
Material	1.14(0.64)	1.04(0.99)	25.96(14.98)	16.89(11.30)	10.03(23.33)	14.39(47.28)
IT	1.61(0.89)	1.26(1.06)	33.48(17.60)	20.48(15.68)	5.04(4.44)	11.35(9.48)
Energy	1.35(0.92)	1.05(0.53)	22.56(12.00)	16.58(8.20)	27.22(39.76)	62.73(38.70)
Public	2.74(1.54)	1.33(0.97)	45.19(25.16)	22.35(27.18)	3.85(10.44)	6.42(6.51)
Manufacturing	1.26(0.83)	0.37(0.25)	19.65(11.33)	6.31(3.79)	87.24(46.11)	200.06(74.63)
Consumption	2.55(1.52)	1.29(0.86)	53.41(30.33)	24.07(14.62)	2.35(2.13)	4.09(3.54)
medical	2.24(1.19)	0.91(0.72)	41.13(22.83)	16.82(10.65)	3.57(3.33)	6.50(5.70)
Total	15.31(5.02)	8.59(2.88)	282.83(92.60)	148.82(58.14)	215.34(77.08)	267.16(94.90)



^j Note: Red dot line represents manufacturing and blue solid line represents finance

Fig. 1. Effects of market trend on turnover rate

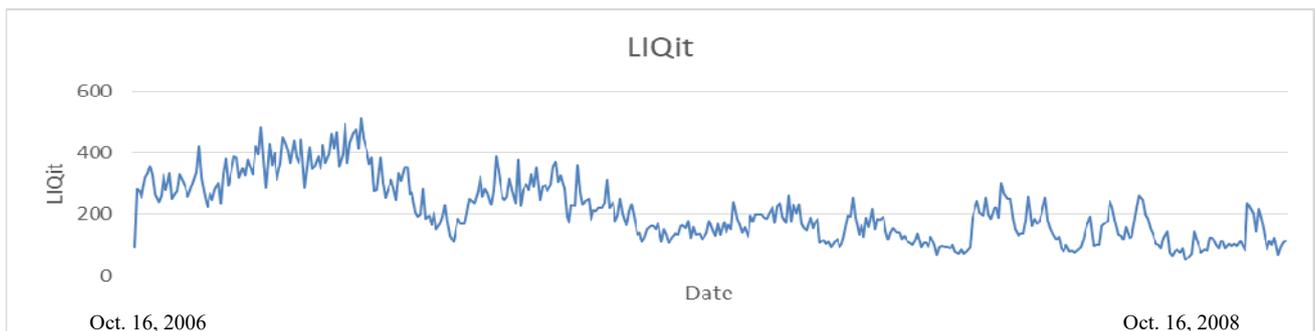


Fig. 2. Effects of market trend on Liquidity index

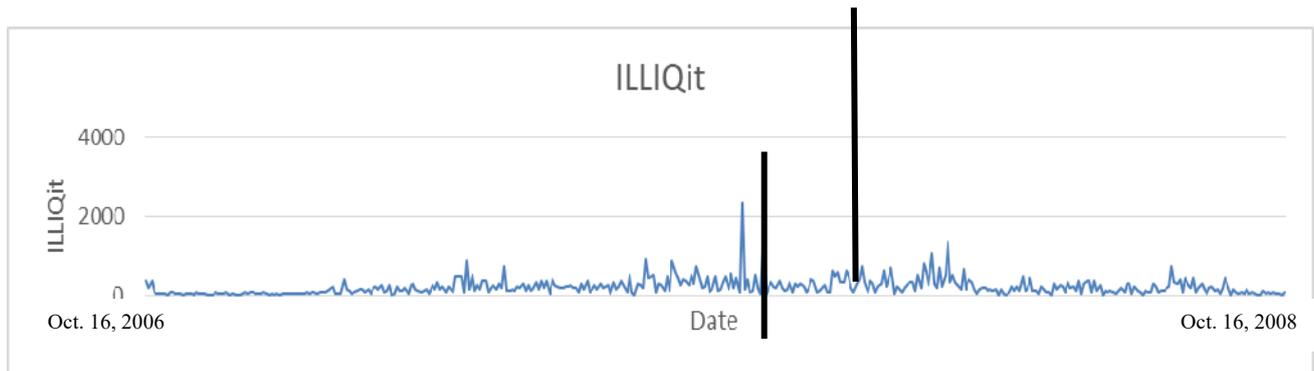


Fig. 3. Effects of market trend on Amihud's illiquidity index

TABLE IV. DIFFERENCE SIGNIFICANCE T-TEST

Variable	TR _{it}		LIQ _{it}		ILLIQ _{it}	
	Mean difference	p-value	Mean difference	p-value	Mean difference	p-value
Industry						
Finance	0.0104	0.757	0.7796	0.195	2.1052	0.000**
Unicom	0.9726	0.000**	24.4584	0.000**	0.1257	0.000**
Material	0.0904	0.261	9.0321	0.000**	4.3703	0.208
IT	0.3485	0.000**	12.9331	0.000**	6.3229	0.000**
Energy	0.2942	0.000**	5.9514	0.000**	35.4500	0.178
Public	1.4074	0.000**	22.8012	0.000**	2.5746	0.001***
Manufacturing	0.8937	0.000**	13.3326	0.000**	113.4582	0.000**
Consumption	1.2572	0.000**	29.3080	0.000**	1.7314	0.000**
Medical	1.3252	0.000**	24.3234	0.000**	2.9543	0.000**
Total	6.4378	0.001***	132.8483	0.000***	63.0270	0.002***

^k, *, **, *** respectively means the 90%, 95%, 99% confidence level

In terms of the industry, the differences between bullish and bearish market in each industry are mostly significant in all three measurements, the p-value of significance t-test is less than 0.05 (p-value < 0.05) in 95% confidence level, except for Finance. In other words, the stock liquidity is significantly higher in bullish market than in bearish market. However, even in bearish market, the stock liquidity in some industries is extremely high. The reason for that is governments will introduce policies to revitalize the economy in bearish market, to some degree these macropolicies can produce different effect on each industry and its stock liquidity, among nine sectors, the performance of industry, material and energy is better than others, these three industries show a high elasticity to the incentive policy, their stock liquidity is high and the stock trading is active [6].

V. CONCLUSION

This study investigates how stock liquidity differs in bullish and bearish market. To do an integrated analysis and avoid the drawbacks of using single measurement, the study uses turnover rate, Zhuang & Zhao's liquidity index and Amihud's illiquidity index as three measurements of stock liquidity, do

the empirical analysis of the 45 stocks in 9 industries in CSI 300 market, the period is divided into a bullish market (2006.10.16-2007.10.16) and a bearish market (2007.10.17-2008.10.16). After taking the t-test to examine the significance of the difference, the results show that the stock liquidity in bullish market is significantly higher than in bearish market in all three measurements. In terms of industry, the difference in Finance is not significant, others' differences are significant; in addition, stock liquidity in industry, material and energy sectors are extremely higher than others. Therefore, investors should invest in the industries which are supported by the government's policy and have higher liquidity to cut loss in bearish market; in bullish market, investors should not be overoptimistic to follow the trend blindly, making a sober judgement and choosing a stock with high liquidity is essential. This study also has its limitations, the 45 sample stocks are randomly selected from 9 main industries, so it is hard to say that these sample stocks can perfectly represent all stocks in 9 industries or whole stock market. In further study, more stocks will be taken into account in order to obtain more accurate data and draw a more representative conclusion.

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