

# Comparison of Various Liquidity Measures in LQ45 Stocks

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**Abstract**—The liquidity of stock is the decisive factor that must be considered for investment in capital market. Though various liquidity measures were proposed, no works have shown what is the best one. This paper compares the various liquidity measures in predicting the expected return of LQ45 stocks. LQ45 is a group of 45 stocks in Indonesia Stock Exchange which are liquid based on the mostly traded. In this work, the liquidity measure is divided into non-amortized liquidation cost and amortized liquidation cost. The compared liquidity measured are bid-ask spread, Amihud factor, price change, both amortized and non-amortized one. The suitability of liquidity measure is measured by the R-squared value. This work has used LQ45 data from 2002 to 2016. Based on the data analysis, it is found that the highest R-squared value is price change. It is also found in this work that the R-square can be improved by taking into account the stock size. Price change is still the best when the size is considered.

**Keywords**—liquidity; LQ45; bid-ask spread; Amihud factor; price change

## I. INTRODUCTION

Indonesia stock market has grown significantly in the last five years. The amount of investors increased almost 300% from 281 thousands to more than one million investors. Indonesia composite indexed, that is called IHSG, increased 135% in the last ten years from 2,534 to 5,933. Indonesia stocks have grouped 45 stocks which are the most frequently traded as LQ45. This LQ45 stock group is considered as the most liquid stock measured by the trading frequency.

The importance of liquidity on asset pricing has been known since 1958 by Tobin [1]. However a complete analysis of liquidity effect on asset pricing is presented by Amihud and Acharya et.al [2,3]. Since then many works on liquidity effect on asset pricing were published [2-9]. Amihud proposed bid-ask spread and Amihud factor as liquidity measure. Pastor and Stambugh used price reversal to measure the liquidity [2,10,11]. Trading volume as a measure of liquidity is used by Brennan et.al [12]. Kyle is using price change to analyze the effect of liquidity on the expected return [13,14]. Number of no trading days is proposed by Lesmond et.al [15]. It was claimed that this liquidity measured is appropriate for emerging markets [16]. Comparison among several liquidity measures have also been published [17]. Though a lot of works have been

published, a general conclusion about the effect of liquidity on the expected return is still unclear.

In recent years, the first author has proposed a liquidity measure that is called amortized liquidation cost [18]. The amortized liquidation cost is taking account both liquidation cost and turnover of trading stock. It has been shown that a consistent result is obtained if amortized liquidation cost is used as liquidity measure. This paper is another application of amortized liquidation cost to LQ45 data to check further the validity of the previously proposed concept.

This paper presents the relationship between liquidation cost, both non-amortized and amortized, and expected return for LQ45, using monthly data taken from 2002 to 2016. Bid-ask spread, amihud factor, and price change are compared. R-squared value is used as performance indicator. As expected, the results are still consistent after controlled by size. The size effect is using market capitalization. It is found that price change is the best liquidity measure.

## II. THEORETICAL REVIEW

The investors receive a return (R) per unit time continuously from the stock that they hold. In one holding period (T), the generated total return is R times T. In average, the generated return of any stock must be equal to the total cost. Under such balanced condition, the total return should be equal to the liquidation cost. The liquidation cost is the cost that should be faced by the investor when a stock is traded or liquidified. The exact value of liquidation cost is C times P, where C is liquidation cost per unit price and P is the stock price. This reasoning can be formulated simply as the following.

$$I \tag{1}$$

or

$$r = \frac{R}{P} = \frac{C}{T} \tag{2}$$

Equation (2) shows clearly that the return per unit time per unit price ( $r$ ) is determined by the liquidation cost and holding period. Equation (2) also shows that liquidation cost ( $C$ ) has positive impact on the expected return. According to Amihud [2], there is a clientele effect that shows a positive relationship between holding period and liquidation cost. Thus, the holding period increases with the liquidation cost. Consequently, the total effect of liquidation cost can be positive or negative depending on how fast the holding period is increased with the liquidation cost. As it is found, there is no significant relationship between liquidation cost and holding period in emerging markets [19]. In this case, the effect of liquidation cost on the return cannot be determined, as the return is affected both by the liquidation cost and holding period.

According to Atkins and Dyl [20], the average holding period can be approximated by,

$$T = \frac{Os}{Vol} \tag{3}$$

Where  $Os$  is outstanding share and  $Vol$  is trading volume. Substituting (3) into (2), the following is obtained,

$$r = C \times \frac{Vol}{Os} \tag{4}$$

The ratio of trading volume to outstanding share is defined as turnover, that is,

$$To = \frac{Vol}{Os} \tag{5}$$

Thus, the return can also be written as follow,

$$r = C \times To \tag{6}$$

Equations (4) and (6) look contradictive with current belief. Present belief, the liquidity is higher when the trading volume or turnover is higher and, therefore, the return must be lower. However, equations (4) and (6) show that the expected return increases with the trading volume or turnover. Deeper understanding on (4) and (6) reveals that the cost expended for liquidation cost per unit time is increased when the turnover increased. Thus, the return per unit time must be increased when the turnover increased. If there is a clientele effect, however, where the liquidation cost is reduced when the turnover is increased, the total effect of trading volume or turnover can be positive or negative depending on how fast the liquidation cost decreases with the turnover.

Based on the above analysis, the return is determined by both liquidation cost and turnover. The effects of liquidation cost and turnover on the expected return can be positive or negative depending on the relationship between liquidation cost and turnover. Thus, the proper proxy to determine the expected return must be liquidation cost times turnover, that is,

amortized liquidation cost. If amortized liquidation cost is used, the above analysis shows that the effect on the expected return will be positive regardless the relationship between liquidation cost and turnover. This conclusion is consistent with the results of Acharya and He [3,21].

The liquidation cost includes direct and indirect cost [22]. Direct cost consist of broker fee and taxes. On the other hand, indirect cost is the cost of waiting time and assymmetrical information. It is almost impossible to determine the actual indirect cost and, therefore, many proxies were proposed to represent the total liquidation cost. For example bid-ask spread [2], Amihud factor [10], trading volume [23], turnover [24], price change [13], proportion of zero return days or Lesmond index [15], price reversal [25], Effective tick [26]. Some proxies had been claimed to be suitable for emerging markets [27]. In this research, bid-ask spread, Amihud factor, and price change are used as the proxies for liquidation cost.

### III. METHOD

This work is using LQ45 monthly data from 2002 to 2016 in Indonesia Stock Exchanges. LQ45 is a group of the most active 45 stocks. Every six month, the stocks in LQ45 will be evaluated. There are 33 stocks in LQ45 that consistently exist during the observation period. Linear regression between liquidation cost, either non-amortized or amortized, and expected return is conducted to determine the relationship between these two variables. The persistence of the relationship is tested using the size.

The summary of data shown at table 1. It has been mentioned previously, only 33 stocks are included in the analysis.

TABLE I. SUMMARY OF DATA

No	Stock Code	Avg. of return	Avg. of bid-ask spread	Avg. of Amihud factor	Avg. of price change	Avg. of market cap.
1	AALI	0.024	0.147	3.729E-07	0.019	9.525E+13
2	ADHI	0.024	0.183	8.412E-08	0.019	2.570E+13
3	AKRA	0.037	0.735	2.925E-06	0.018	8.482E+13
4	ANTM	0.023	0.237	<b>4,250E-08</b>	0.022	7.817E+13
5	ASII	0.030	0.119	1.343E-08	0.019	9.413E+14
6	ASRI	0.010	0.133	1.955E-08	0.013	4.500E+13
7	BBCA	0.025	0.160	3.409E-06	0.015	1.137E+15
8	BBNI	0.017	0.270	6.020E-06	0.019	8.965E+13
9	BBRI	0.024	0.134	1.160E-08	0.017	9.185E+14
10	BDMN	0.016	0.228	1.329E-05	0.020	1.618E+14
11	BMRI	0.021	0.156	1.104E-08	0.017	9.696E+14
12	BMTR	0.019	0.301	1.684E-06	0.020	9.952E+13
13	BSDE	0.016	0.156	1.112E-05	0.014	9.471E+13
14	CPIN	0.036	0.319	7.638E-07	0.021	1.980E+14
15	EXCL	0.008	0.277	2.090E-05	0.015	1.571E+14
16	GGRM	0.018	0.111	1.034E-06	0.016	2.478E+14
17	INCO	0.029	0.197	1.937E-07	0.022	8.780E+13
18	INDF	0.220	0.231	3.968E-08	0.027	3.130E+14
19	ITMG	0.006	0.070	2.419E-07	0.013	1.307E+14
20	JSMR	0.007	0.087	2.993E-08	0.009	9.363E+13
21	KLBF	0.031	0.229	9.734E-09	0.018	1.940E+14
22	LPKR	0.022	1.092	3.679E-06	0.013	1.769E+14
23	LPPF	0.158	0.933	3.795E-05	0.037	1.261E+14
24	LSIP	0.028	0.218	1.982E-07	0.021	4.667E+13
25	MNCN	0.011	0.141	3.281E-07	0.014	9.723E+13

Table 1. Cont.

26	PTBA	0.026	0.207	9.925E-07	0.019	2.248E+13
27	PTPP	0.015	0.083	2.135E-08	0.009	142105843.3
28	SCMA	0.024	0.711	4.429E-06	0.018	7.856E+13
29	SMRA	0.019	1.230	3.287E-05	0.016	1.976E+13
30	TLKM	0.019	0.129	3.183E-09	0.016	6.243E+14
31	UNTR	0.035	0.176	9.300E-08	0.021	3.433E+14
32	UNVR	0.022	0.139	4.571E-07	0.014	3.529E+14
33	WIKA	0.014	0.124	2.725E-08	0.012	3.650E+13

IV. RESULTS AND DISCUSSION

The summary of regression results is shown in table 2 and table 3. The plots of these results are shown in figure 1.

TABLE II. COEFFICIENTS OF RELATIONSHIP BETWEEN LIQUIDITY AND RETURN

Liquidation Cost (Liquidity Measure)		Uncontrolled by size		Controlled by size	
		Coeff.	Prob.	Coeff.	Prob.
Non-Amortized Liquidation Cost	Bid-ask spread	0.040	0.830	0.052	0.791
	Amihud factor	0.030	0.251	0.032	0.224
	Price change	0.086	0.000***	0.833	0.000***
Amortized Liquidation Cost	Amortized Bid-ask spread	0.039	0.462	0.039	0.491
	Amortized Amihud factor	0.038	0.238	0.048	0.150
	Amortized price change	0.085	0.100*	0.102	0.065***

TABLE III. R-SQUARED OF RELATIONSHIP BETWEEN LIQUIDITY AND RETURN

Liquidation Cost (Liquidity Measure)		R-squared	
		Uncontrolled by size	Controlled by size
Non-Amortized Liquidation Cost	Bid ask spread	0,006	0,010
	Amihud factor	0,029	0,033
	Price change	0,613	0,639
Amortized Liquidation Cost	Amortized Bid ask spread	0,013	0,013
	Amortized Amihud factor	0,017	0,024
	Amortized price change	0,017	0,025

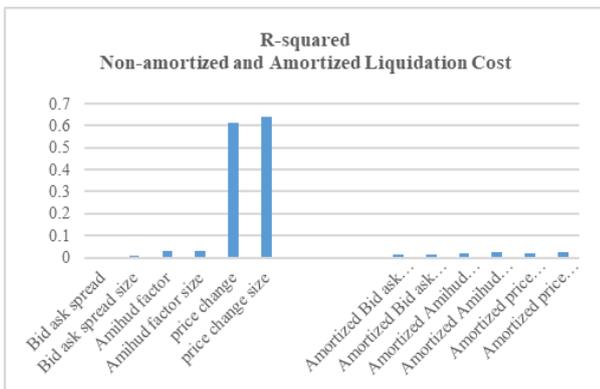


Fig. 1. R-squared values.

Table 2 shows that both non-amortized and amortized liquidation cost are priced in Indonesia Stock Exchanges. The effect of liquidation cost on the expected return is positive even after controlled by the size. Table 3 shows that the highest R-squared is obtained if price change is used as the liquidation cost. It should be noted that the R-squared values when Amihud factor and bid-ask spread are used as liquidation cost are very small.

V. CONCLUSION

This paper has shown that the liquidity is priced by the investor in Indonesia Stock Exchanges. Based on the analysis, it has been shown that price change is the best liquidation cost measure. This result is persisted even after controlled by the size. Generalisation of this conclusion using all data and aslo other group of stocks in Indonesia Stock Exchanges is in progress.

ACKNOWLEDGMENT

We would like to thank the Ministry of Research, Technology and Higher Education of the Republic of Indonesia for funding this research.

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