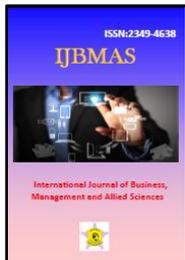

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STOCK MARKET LIQUIDITY: THE CONCEPTUAL FRAMEWORK

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ABSTRACT

Liquidity is a core element of the development of stock market as it can provide allocational efficiency and assist economic growth. In this paper the concept of stock market liquidity has been detailed along with its various dimensions. It covers various sources of liquidity costs. Liquidity is an important characteristic of a stock market that can have major impact on the prices of securities; therefore, it is critical to recognize, understand and measure it. The present paper includes various proxies utilized to capture stock market liquidity.

Keywords: Stock market liquidity, Financial markets, Transaction cost, Stock.

I. INTRODUCTION

The development of financial markets and institutions is a critical and inextricable part of the growth process (Levine, 1997). Liquidity is the lifeblood of financial markets (Wyss, 2004); a lubricating agent that facilitates a frictionless smooth functioning of the financial markets (Sharma, 2005; Bhyat, 2010; Mihhejev and Obertas, 2012; Varadi, 2012). Increase in liquidity should improve sharing of financial risks by influencing investor's trading decisions since it is easy to make changes to portfolio and holding diversified portfolios because of diminution in the transaction costs (Domowitz et al., 2005; Harford and Kaul, 2005; Agarwal, 2009). The liquidity of securities, that is, the relationship between volume of trading and changes in the market price, has won increasing recognition as an element of investment strategy in recent years (Grecuhina and Timofejeva, 2008). The study of liquidity in the stock market which is one of the fundamental components of market microstructure has attracted much attention in empirical and theoretical literature in recent years (Boujelbene et al., 2011; Munoz, 2013).

Illiquidity as measured by the absence of continuous trading implies that there is an extreme mismatch between the available buyers and sellers at a given point in time (Eleswarapu and Krishnamurti, 1994; Amihud et al., 2005). The increase of stock liquidity improves firm's reputation in financial markets and thus increases firm's value and reduces capital cost. Market liquidity is a component of the transaction costs (Figure 1) born by investors (Ginglinger and Hamon, 2007). It is also crucial for arbitrageurs to keep share prices in equilibrium. Thus, investors prefer to invest in liquid stock markets.

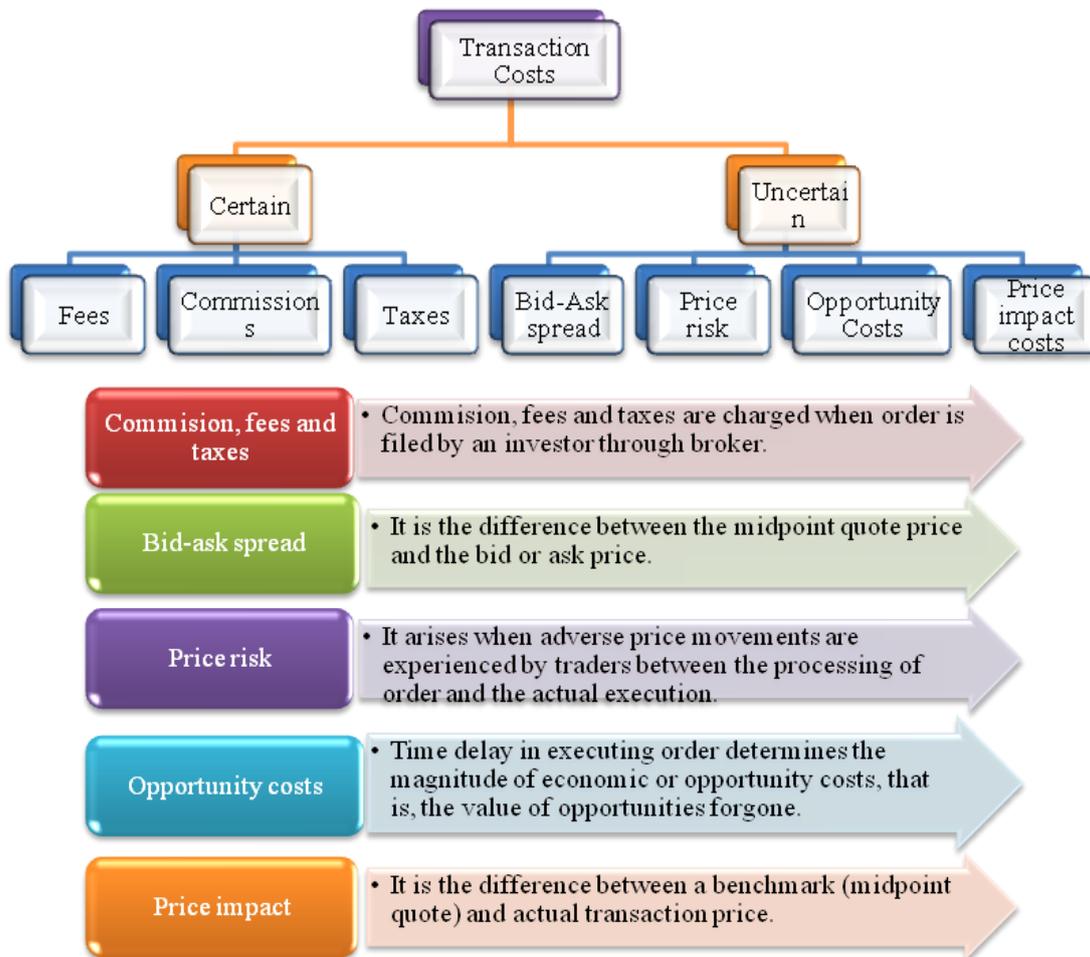


Figure 1: Elements of Transaction Cost

Source: Researcher’s own compilation based on Loebnitz (2006)

II. CONCEPT OF STOCK MARKET LIQUIDITY

Liquidity of a stock is generally defined as the ability to trade large volumes with minimal price impact (transaction price), cost and delay (Attig, 2003; Pastor and Stambaugh, 2003; Liu, 2006; Krishnan and Mishra, 2013; Jackson, 2013). In practice, a market with very low transactions costs is characterized as liquid while one with high costs is illiquid (Sarin et al., 2000). Figure 2 presents the essence of stock liquidity that measures the ease with which investors can either sell stocks without conceding a large proportion of the price or buy stocks without paying a large price premium (Jiang, 2011).

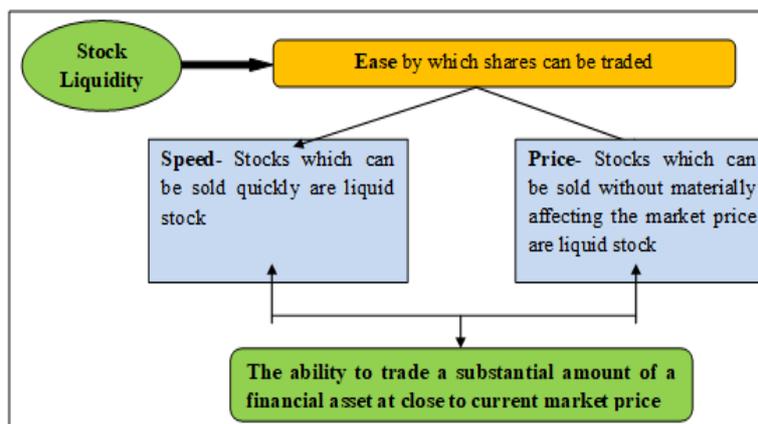


Figure 2: Stock Market Liquidity

Source: Researcher’s own compilation based on Dalgaard, 2009; Jiang, 2011

III. DIMENSIONS OF STOCK MARKET LIQUIDITY

Liquidity is an immediacy of exchange (Demsetz, 1968) characterised by resiliency, depth, tightness, immediacy, and breadth (Kyle, 1985; Sarr and Lybek, 2002; Ivanchuk, 2004). Figure 3 and Figure 4 presents the multiple dimensions and aspects of stock market liquidity.

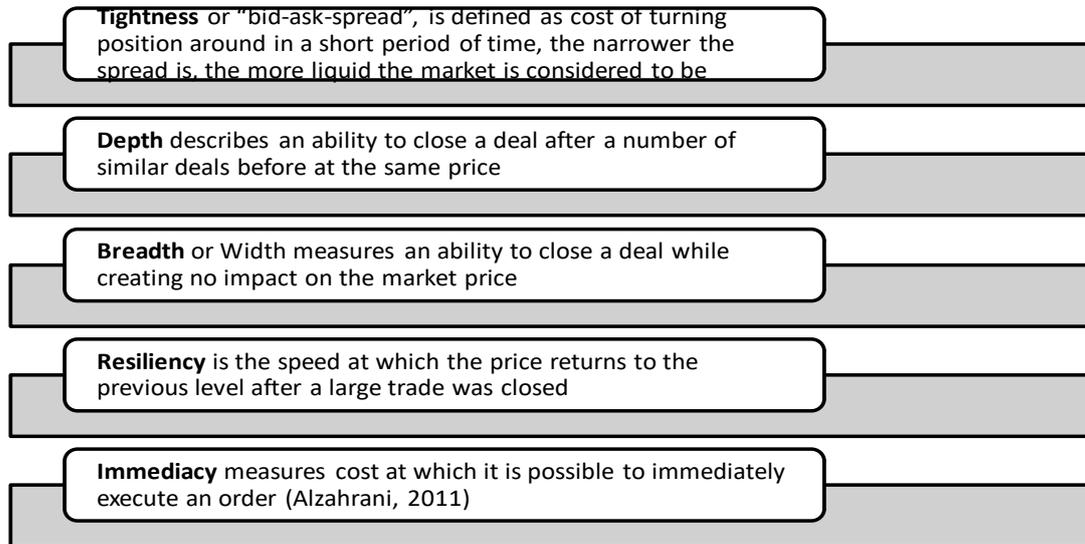


Figure 3: Dimensions of stock market liquidity

Source: Researcher's own compilation based on Sarr and Lybek, 2002; Wyss, 2004; Benic and Franic, 2009; Rosch, 2012

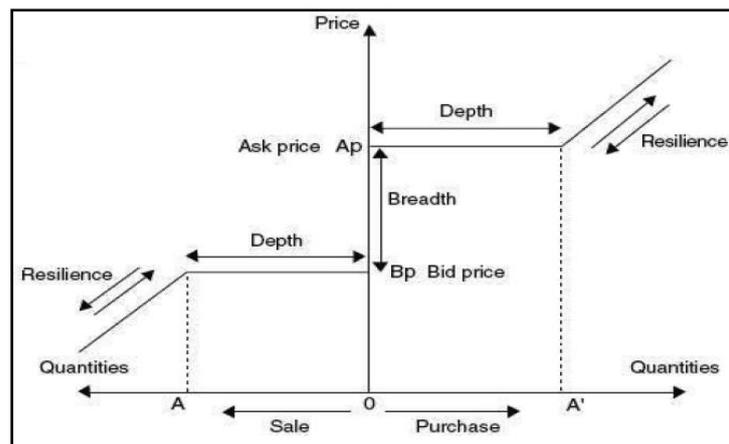


Figure 4: Aspects of Stock Market liquidity

Source: Bhyat, 2010

IV. SOURCES OF LIQUIDITY COSTS

Risk-averse investors, who are being exposed to liquidity risk, need compensation for it since liquidity is time-variant. As presented in Figure 5, various sources of illiquidity (Stoll, 1989; Stoll, 2000; Amihud et al., 2005) that imposes costs to the holder of the assets are as follows:

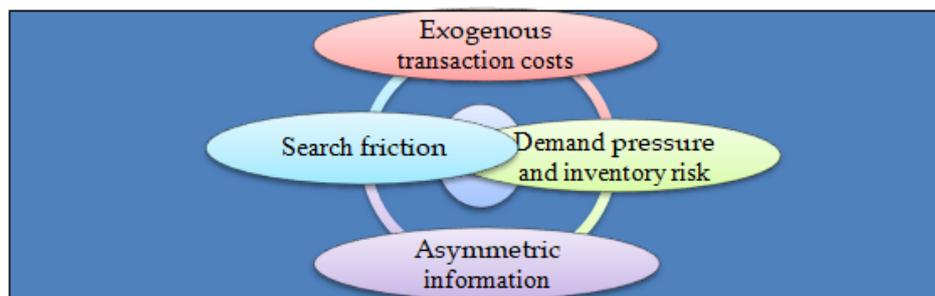


Figure 5: Sources of illiquidity

Source: Researcher's own compilation based on Dalgaard, 2009

- i. **Exogenous transaction costs:** It is an explicit cost of trading comprising of brokerage fees, order-processing costs, or transaction taxes. It reflects the compensation required for the intermediation processes of transacting an order (Demsetz, 1968; Roll, 1984).
- ii. **Demand pressure/Price impact and Inventory risk:** If an agent wants to sell a security hastily, then it may be possible that the natural buyers are not available immediately. Market makers provide immediacy by bridging this gap between the seller and buyer as they are present in the market continuously. For taking this risk due to adverse price changes (Rosch, 2012), he is required to be compensated.
- iii. **Asymmetric information/Private information:** Due to the adverse selection problem from informed traders, uninformed market participants will enhance the spreads, which results in poorer market liquidity, to compensate for the expected losses to these privately informed traders (Copeland and Galai, 1983). Traders of the securities may possess private information regarding the fundamentals of securities as well as the order flow, resulting in loss (illiquidity cost) to the counterparty on account of trading with an informed party. It causes adverse selection problem.
- iv. **Search friction:** Demand pressure give rise to search frictions (Dalgaard, 2009). A searching trader incurs various costs such as financing costs or opportunity costs as long as his trade is delayed (Stoll, 1978; Amihud and Mendelson, 1980; Ho and Stoll, 1981). In addition, he may be required to offer price concessions to the counterparty (which he eventually finds) in the negotiation process.

V. PROXIES OF STOCK MARKET LIQUIDITY

Liquidity has been measured using common proxies like bid-ask spread (Chen et al., 2007; Rhee and Wang 2009; Chung et al., 2010), trading volume and turnover (Malhotra et al., 2012; Krishnan and Mishra, 2013; Munoz, 2013), and Amihud illiquidity measure (Loukel and Yusfi, 2010; Chung et al., 2010; Hearn, 2010; Seth et al., 2010; Izadina and Ramsheh, 2011; Chan et al., 2013). Although the concept of liquidity is well understood, but choosing the optimal measure has proven elusive (Bertin et al., 2005). The literature has focused on the following broad groups of liquidity measures:

1. Spread-based Measures

- i. **Bid-ask Spread:** The principle spread-based measures are the: bid-ask spread, effective spread and relative effective spread. The proportional quoted bid-ask spread, is a widely used measure of market liquidity and is measured as the difference between the bid and ask price divided by the bid-ask midpoint. It directly measures the cost of executing a small trade.

$$\text{Bid-Ask Spread} = A_t - B_t \quad (1)$$

$$\text{Mid-Price}_t = M_t = \frac{1}{2} (B_t + A_t) \quad (2)$$

$$\text{Effective Spread}_t = P_t - M_t \quad (3)$$

$$\text{Relative-Effective Spread}_t = \frac{1}{M_t} (P_t - M_t) \quad (4)$$

Where, B_t = Bid price; A_t = Ask price; P_t = Transaction price

- ii. **Quoted spread:** The quoted spread is the implicit trading cost for market orders when a trade occurs at the quoted price with no price movement and it measures pre-trade transactions costs. The percentage proportional quoted *Spread* is defined as:

$$SPREAD_t = \frac{ask_t - bid_t}{(ask_t + bid_t)/2} \times 100$$

Where, ask_t = The daily closing ask price at time; bid_t = The closing daily bid price at time

- iii. **Roll's Spread:** Roll (1984) developed a spread based measure based on the serial covariance in daily returns. It is defined as:

$$\text{Roll's Spread} = \begin{cases} 2\sqrt{-\text{Covariance}(r_t, r_{t-1})} & \text{if covariance}(r_t, r_{t-1}) \leq 0 \\ 2\sqrt{\text{Covariance}(r_t, r_{t-1})} & \text{if covariance}(r_t, r_{t-1}) > 0 \end{cases}$$

Where, r_t = Daily returns on day t ; r_{t-1} = Daily returns on day $t-1$

2. Trading-Activity-Based Measures

The most commonly used trading-activity measures as cited in the literature are as follows:

- i. **Volume Traded:** It is the average of the total number of shares/bonds; etc traded over a specified period. It is therefore a measure that acts as a proxy for the activity and the existence of participants in the market (Rosch, 2012). It is calculated by aggregating the product of the price of a transaction P_x with the quantity transacted n_x for all transactions for a specified period of time:

$$V = \sum_x P_x \cdot n_x$$

Where, P_x = Price of a transaction; n_x = Quantity transacted

- ii. **Quote Size:** It is the quantity explicitly bid or offered at the bid or offer price, usually an average over some period and cited differently for bids and offers (Fleming, 2003)
- iii. **Trade Size:** It is the quantity actually traded at the bid or offer prices.
- iv. **Stock Turnover Ratio:** A stock market's turnover ratio is simply a measure of how frequent stock exchanges hands, that is, how well stocks are quickly turned into revenues (Chernor, 2013). Datar et al. (1998) define it as the number of shares divided by the number of shares outstanding in that stock.

$$\text{Turnover}_{i,t} = \frac{1}{12} \sum_{m=1}^{12} \frac{\text{Vol}_{i,t,m}}{\text{Shrout}_{i,t,m}}$$

Where, $\text{Turnover}_{i,t}$ = Share turnover of firm i in fiscal year t ; $\text{Vol}_{i,t,m}$ = Shares traded of firm i in month m of fiscal year t ; $\text{Shrout}_{i,t,m}$ = Number of shares outstanding of firm i in month m of fiscal year t

- v. **Trade Frequency:** It is measured as the number of trades initiated and executed over a time period (Fleming, 2003). It is strongly associated with market volatility.
- vi. **Order Imbalances:** It is calculated as the number of buy orders less the total sell orders over a particular period (Chordia et al., 2000). It gives an indication of the direction of price pressure.
- vii. **Zero day return (LOT measure):** This low frequency liquidity measure is developed by Lesmond et al. (1999), which assumes that low liquidity and less informed trading lead to a zero daily return. Lesmond et al. (1999) combined the proportion of zero returns with the return volatility and combined it into their LOT (Lesmond, Ogden and Trzcinka) measure.

$$\text{ZERO RETURN} = \frac{\text{Number of trading days with zero returns}}{\text{Number of trading days for the year}}$$

3. Price-Impact Measures

Price-impact measures represent the first move in liquidity-research towards directly computing the cost associated with liquidation (Bhyat, 2010).

- i. **Kyle's lambda:** Developed by Kyle (1985), the measure is defined as the slope of the regression line that relates transaction price changes to the net trade sizes which are associated with it (Bhyat, 2010).
- ii. **Pastor & Stambaugh measure of return reversal:** Pastor and Stambaugh (2003) contended that liquidity must feature strongly in asset pricing returns. They introduce the measure, ζ_i , to test their hypothesis regarding the temporary price impacts accompanying order flow. $\zeta_{i,t}$ in

Equation 5 is the Pastor and Stambaugh measure of volume-related return reversal for stock i in month t , calculated as the ordinary least squares (OLS) regression coefficient of the equation.

$$r_{i,d+1,t}^e = \theta_{i,t} + \phi_{i,t} r_{i,d,t} + \zeta_{i,t} \text{sgn}(r_{i,d,t}^e) V_{i,d,t} + e_{i,d+1,t} \quad (5)$$

Where, $d = 1, \dots, D$; $r_{i,d,t}$ = Return on the i^{th} stock on day d in month t ; $r_{i,d,t}^e = r_{i,d,t} - r_{m,d,t}$, the excess return of the stock over that of the market index m ; $V_{i,d,t}$ = The volume of the i^{th} stock on day d in month t

- iii. Amihud illiquidity ratio:** A stock is illiquid and thus has a high value for the ratio if its daily return for a give volume is high (Acharya and Pedersen, 2005). Amihud illiquidity ratio is positively related to the costs of selling and the price impact of a stock (Amihud, 2002). It is highly correlated to the Kyle's lambda and has been found to be the best available price-impact proxy constructed from daily data (Chen, 2005). Higher Amihud's illiquidity measure indicates that absolute stock returns' reaction to smaller dollar volume is more pronounced (Alzahrani, 2011).

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

Where, $ILLIQ_{iy}$ = Illiquidity of stock market of firm i in fiscal year y ; D_{iy} = Number of trading days of firm i in fiscal year y ; R_{iyd} = Absolute values of stock returns of firm i in day d of fiscal year y ; $\text{VOL}D_{iyd}$ = Volume of shares traded of firm i in day d of fiscal year y

- iv. Amivest Liquidity Ratio:** This ratio is strongly related to Amihud illiquidity ratio. It is introduced by Copper et al. (1985), that compares daily returns with daily volume measured in number of shares. The higher the volume, the more price movement can be absorbed.

$$AR_j = \frac{\sum_t V_{jt}}{\sum_t |R_{jt}|}$$

Where, AR_j = Amivest liquidity ratio of firm j ; $V_{j,t}$ = The trading volume for stock j on day t ; $|R_{j,t}|$ = The absolute return for stock j on day t ; t = The days with non-zero returns.

VI. CONCLUSION

The relationship between volume of trading and changes in the market price, that is, the liquidity of stock is very critical and essential component of market microstructure as it affects the investment strategy of investors. Generally a market with a low transaction cost is determined as a liquid market. In essence, liquidity is an immediacy of exchange (Demsetz, 1968) characterised by various dimensions, viz., resiliency, depth, tightness, immediacy, and breadth. There are various sources of illiquidity (Stoll, 1989; Stoll, 2000; Amihud et al., 2005) that imposes costs to the holder of the assets which are exogenous transaction costs, demand pressure and inventory risk, asymmetric information costs and search friction. Liquidity of stock has been captured by eminent scholars using different proxies. Empirical literature has put forth that liquidity has been measured using common proxies like bid-ask spread (Chen et al., 2007; Rhee and Wang 2009; Chung et al., 2010), trading volume and turnover (Krishna and Mishra, 2012; Malhotra et al., 2012; Munoz, 2013), and Amihud measure (Loukel and Yusfi, 2010; Chung et al., 2010; Hearn, 2010; Seth et al., 2010; Izadinia and Ramsheh, 2011; Chan et al., 2013).

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