Rx for Stock Liquidity

Stock liquidity is a frequent impetus for primary or secondary issuance and stock splits, as well as a factor in share repurchases and special dividends. However, there has been very little literature or rigorous guidance around what constitutes illiquidity, its impact, and potential remedies.

- How To Measure Stock Liquidity
- The 'Liquidity Discount'
- Policy Implications of Stock Illiquidity
- How To Improve Stock Liquidity
- Equity Issuance Among Illiquid Stocks
- Do Stock Splits Help?

* The authors gratefully acknowledge the thoughtful assistance of Professor Armen Hovakimian (Baruch) and of the UBS Investment Bank Equity Capital Markets Group, for numerous improvements to this effort; however, any errors or omissions remain purely our own.
SITUATION OVERVIEW

Stock liquidity is frequently cited as an impetus for primary or secondary issuance. It is also a consideration in stock split, share repurchase and special dividend decisions. However, much of the literature in this area targets the ‘buy side’ with investor metrics of liquidity (e.g. bid/ask spreads), lacking practical insight for issuers.\(^1\) There is little guidance around what constitutes illiquidity, its impact, and potential remedies.

We assess various measures of illiquidity, and corresponding benchmarks for these measures. We also evaluate the impact of illiquidity on stock prices, as well as the implications for financial policy and executive compensation. Finally, we also evaluate the capital markets solutions to stock liquidity problems.

Table 1 characterizes the liquidity of all stocks listed on the NYSE and NASDAQ.\(^2\) While average daily trading volume (180-day ADTV) averages $20MM per day, ADTV ranges from $10,000 for the 1\(^{st}\) percentile (e.g. Versata), to $272MM for the 99\(^{th}\) percentile (e.g. Verizon). Similarly, while we found free float to average $3.2bn, the range is from $3MM to $52.6bn. Similarly, we present the stock liquidity percentiles for ADTV/Float, ADTV/Outstanding, and shares outstanding, on U.S. listed stocks.

Table 1 - Stock Liquidity Percentiles (NYSE & NASDAQ)

<table>
<thead>
<tr>
<th>Percentile</th>
<th>1st</th>
<th>10th</th>
<th>25th</th>
<th>35th</th>
<th>50th</th>
<th>65th</th>
<th>75th</th>
<th>90th</th>
<th>99th</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADTV ($mm)</td>
<td>0.01</td>
<td>0.06</td>
<td>0.33</td>
<td>0.79</td>
<td>2.42</td>
<td>6.29</td>
<td>12.16</td>
<td>42.57</td>
<td>272.06</td>
<td>20.10</td>
</tr>
<tr>
<td>Float ($mm)</td>
<td>3</td>
<td>26</td>
<td>83</td>
<td>142</td>
<td>321</td>
<td>754</td>
<td>1,364</td>
<td>5,236</td>
<td>52,592</td>
<td>3,177</td>
</tr>
<tr>
<td>ADTV/Float (%)</td>
<td>0.03</td>
<td>0.15</td>
<td>0.35</td>
<td>0.46</td>
<td>0.92</td>
<td>1.18</td>
<td>2.02</td>
<td>6.98</td>
<td>1.11</td>
<td></td>
</tr>
<tr>
<td>ADTV/Shares Outstanding (%)</td>
<td>0.003</td>
<td>0.057</td>
<td>0.187</td>
<td>0.294</td>
<td>0.444</td>
<td>0.647</td>
<td>0.854</td>
<td>1.447</td>
<td>4.117</td>
<td>0.704</td>
</tr>
<tr>
<td>Shares Outstanding (mm)</td>
<td>1.6</td>
<td>5.8</td>
<td>14.2</td>
<td>20.7</td>
<td>32.7</td>
<td>52.6</td>
<td>82.5</td>
<td>268.2</td>
<td>2,128.3</td>
<td>141.2</td>
</tr>
</tbody>
</table>

SOURCE: UBS Investment Bank, Factset

Markets in other countries frequently demonstrate much lower levels of liquidity. ADTV on the Toronto Stock Exchange averages only XX, while the LSE averages XX. ADTV on the Tokyo Stock Exchange averages XX. Market averages obscure illiquidity, as it is largely a problem of the smaller companies. The emerging and developing markets exhibit the greatest stock market illiquidity and its associated challenges.

Liquidity discounts range from X% to XX% and increase with illiquidity. Empirically, stock liquidity may be impaired below $1MM ADTV or $150MM free float.

While liquid primary issues led to a slight increase in liquidity (5%) and were associated with small excess returns (1%), illiquid primaries improved stock liquidity by 186%, with positive excess returns of 4%. Liquid secondary issues increased liquidity slightly (13%) and were associated with significant excess returns (7%). Surprisingly, illiquid secondaries improved stock liquidity by 175%, but with no significant excess returns. There is insufficient block trade data, but anecdotally, the impact on liquidity and share price is discouraging. Similarly, stock splits had only a marginal benefit to stock liquidity, and for both liquid and illiquid stocks, splits actually exhibited negative excess returns.

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\(^2\) As at October 2005, this was 4,457 stocks, including ADRs. On each metric we used a prior 180-day sampling to determine arithmetic means for each stock, then arrayed the data to identify percentile benchmarks.
**Measuring Liquidity**

Stock illiquidity can lead to numerous challenges for both investors and issuers. Illiquidity creates practical limitations for investors, ultimately manifesting in a lower stock price, higher cost of equity, unusual stock ownership profiles and trading patterns, and market access difficulties. Investor reluctance stems not only from difficulty buying and selling illiquid stocks without moving the price, but also because it is difficult to gather a sufficiently meaningful size stake in an illiquid stock.

We present alternative measures of liquidity and their incidence, and provide their corresponding market benchmarks by identifying levels at which stock price discounts become significant. We also evaluate each liquidity measure for its predictive power.

**Average Daily Trading Volume (ADTV)**

Average Daily Trading Volume (ADTV) is an arithmetic average of the daily volume traded over a 180-day window. Long periods might be employed for smaller cap and other stocks that exhibit more volatile trading patterns. For example, stocks with strict ‘no guidance’ policies can exhibit more erratic trading volumes, with the bulk of the trading volume around the end of each quarter due to there being very little other information on which to trade. For these types of cases, longer averaging periods may be appropriate. Shorter periods may be more appropriate where there has been a significant change in the ownership or trading profile of the stock, to preclude the less relevant range of earlier data. For example, in cases where there has been a follow-on issuance, stock split, significant change in financial leverage, dividend policy, or fundamental changes in the business.

**Figure 1 - Distribution of ADTV (SMM)**

![Distribution of ADTV (SMM)](image)

**Source:** UBS Investment Bank, Factset

Figure 1 shows the incidence of average daily trading volumes for all U.S. listed stocks. While 60% of all companies exhibit less than $5MM ADTV, this represents only 15% of the total market capitalization because small companies are over-represented among illiquid stocks. Volumes below $1MM ADTV tended to exhibit signs of illiquidity. While this is 1,694 of the 4,457 companies (38th percentile), it is only 4% of the total market capitalization.

**Float (SMM)**

We measured Free Float ($MMs) as the freely traded equity stake (market capitalization, excluding the equity content of convertible bonds and employee stock options, minus restricted shares and other closely held insider holdings) averaged over

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a 180-day window. A large insider contingent can reduce effective liquidity due to trading restrictions (company imposed and regulatory), longer-term investment horizon, and typically bullish outlook on the company. However, free float is no guarantee of trading liquidity, as non-inside investors may also be less prone to trade.

Figure 2 shows the incidence of free float for all stocks listed on the NYSE and NASDAQ. While 64% of all companies exhibit floats of less than $1bn, this represents only 5% of the total market capitalization. We found that floats less than $150MM tended to exhibit signs of illiquidity. While this is 1,382 of the 4,457 companies (31\textsuperscript{st} percentile), it is only 1% of the total market capitalization.

**Figure 2 - Distribution of Float ($MM)**

![Distribution of Float ($MM)](#)

**ADTV/Float (%)**

We divide ADTV by Free Float to arrive at our size-adjusted measure of relative liquidity. It remains somewhat correlated with firm size. It is measured on a daily basis, averaged over 1-12 months. Relative liquidity is essential to accommodate efficient investor entry or exit from a stock (i.e. without impacting stock price). However, it is difficult for investors to establish a meaningful stake if volumes are small - even with high relative liquidity. Meaningful size stakes are important because investors face a high ‘fixed cost’ per stock to follow the name and maintain analytics.

**Figure 3 - Distribution of ADTV/Float (%)**

![Distribution of ADTV/Float (%)](#)

Figure 3 shows the incidence of ADTV/Free Float for all stocks listed on the NYSE and NASDAQ. 75% of the listed companies trade less than 1% of their float per day, or 89% of the total market capitalization. We found that less than 0.10% ADTV/Free Float is problematic for liquidity. This is 593 of the 4,457 companies (13\textsuperscript{th} percentile), or 27% of the total market.
RX FOR STOCK LIQUIDITY

ADTV/Shares Outstanding (%)
ADTV/Outstanding is the proportion of total shares that trade on average. This incorporates two size-based liquidity measures - trading volume and shares outstanding. A minor variant of our prior measure of relative liquidity, the divisor is total shares outstanding to reduce the risk of overstating relative liquidity in cases where there is a large insider block that reduces the size of the float. Liquidity may be impaired when trading volume relative to shares outstanding is abnormally low.

81% of the listed companies trade less than 1% of their outstanding per day, or 91% of the total market capitalization. We found that less than 0.10% ADTV/Outstanding can be problematic for liquidity. This is 755 of the 4,457 companies (17th percentile), or 27% of the market.

Shares Outstanding (MMs)
We measured shares outstanding as the total shares outstanding (including restricted shares but excluding the underlying shares for convertible bonds and employee stock options), averaged over 180-days. Again, it is correlated with firm size because so many companies hold their share price to a price point below 100MM; however, more shares outstanding does not ensure more trading, or more float.

While 77% of all companies have fewer than 100MM shares, this represents only 12% of the total market capitalization. We found that fewer than 10MM shares outstanding tended to exhibit signs of illiquidity. While this is 824 of the 4,457 companies (19th percentile), it is only 1% of the total market capitalization.

Testing The Metrics
We tested 10 alternative stock liquidity measures for statistical significance to determine which were most useful in discerning liquidity. ADTV was our most reliable measure of illiquidity, though Free Float and ADTV/Free Float also performed reasonably well. Our illiquidity benchmarks for these measures are $1MM ADTV, $150MM Free Float, and 0.10% ADTV/Free Float - at levels below these benchmarks we would expect to see an impairment of value and other associated problems.

Figure 4 - Statistical Significance of Various Liquidity Measures

SOURCE: UBS Investment Bank

While Ln of market capitalization was statistically significant, we discarded the measure because of its lower information content. Shares outstanding and ADTV/Outstanding were not significant; nor were Ln of assets, or stock beta.

4 For each of our stock liquidity metrics, we ran a T-Test on the bottom decile versus the top half of the data (Figure 4).
THE 'LIQUIDITY DISCOUNT'

We analyzed all 5,422 publicly traded companies on the NYSE and NASDAQ, but after excluding companies with missing data or negative EBITDA, our final universe was 4,457 companies from 10 different sectors and 64 sub industries (based on GICS codes). We calculated relative market premiums or discounts as each company’s ratio of EV/EBITDA versus the mean for its GICS sub industry. We then evaluated market value premiums/discounts as a function of stock liquidity. We employed five different measures of liquidity, including ADTV ($MM), Free Float ($MM), ADTV/Float (%), ADTV/Outstanding (%), and Shares Outstanding (MMs).

Figure 5 - Enterprise Value Premium/(Discount) By Liquidity

Source: UBS Investment Bank, Factset

Figure 5 shows the median enterprise value premium/discount for all stocks in each range of percentiles of stock liquidity, arrayed by each of the five stock liquidity measures. Depending on the metric, valuation discounts become observable from about the 10\(^{th}\) to 40\(^{th}\) deciles of stock liquidity. We generally found significance for discounts at about the 5% level. Results were much more stable with ADTV, than the less reliable, ADTV/Float or Shares Outstanding.

Table 2 - Enterprise Value Premium/(Discount) By Liquidity\(^5\)

<table>
<thead>
<tr>
<th>Percentile</th>
<th>1st</th>
<th>10(^{th})</th>
<th>25th</th>
<th>35th</th>
<th>50th</th>
<th>65th</th>
<th>75th</th>
<th>90th</th>
<th>99th</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADTV ($mm)</td>
<td>(19.4)</td>
<td>(17.0)</td>
<td>(12.0)</td>
<td>(4.3)</td>
<td>3.9</td>
<td>1.8</td>
<td>2.0</td>
<td>3.9</td>
<td>7.9</td>
<td>33.4</td>
</tr>
<tr>
<td>Free Float ($mm)</td>
<td>(70.1)</td>
<td>(25.8)</td>
<td>(2.6)</td>
<td>(6.6)</td>
<td>3.1</td>
<td>1.2</td>
<td>7.4</td>
<td>2.7</td>
<td>4.1</td>
<td>37.6</td>
</tr>
<tr>
<td>ADTV/Float (%)</td>
<td>(29.1)</td>
<td>(2.8)</td>
<td>1.3</td>
<td>1.8</td>
<td>(1.7)</td>
<td>1.9</td>
<td>4.4</td>
<td>2.4</td>
<td>(1.5)</td>
<td>37.4</td>
</tr>
<tr>
<td>ADTV/Outstanding (%)</td>
<td>(19.9)</td>
<td>(18.3)</td>
<td>(2.6)</td>
<td>(2.4)</td>
<td>1.3</td>
<td>3.6</td>
<td>4.1</td>
<td>5.8</td>
<td>2.7</td>
<td>33.4</td>
</tr>
<tr>
<td>Shares Outstanding (mm)</td>
<td>(19.6)</td>
<td>(9.0)</td>
<td>(2.6)</td>
<td>4.7</td>
<td>4.4</td>
<td>5.2</td>
<td>2.7</td>
<td>(1.3)</td>
<td>(5.8)</td>
<td>34.0</td>
</tr>
</tbody>
</table>

Source: UBS Investment Bank, Factset

Table 2 shows enterprise value 'liquidity discounts' range from 5% to 30%, and increase with illiquidity.\(^6\) There is no premium for higher levels of liquidity; stock prices may be impaired by illiquidity below $1MM ADTV or $150MM free float.

The impact of this apparent market inefficiency goes far beyond the roughly 1,800 U.S. listed stocks (including 83 ADRs of large multinationals) that potentially face a stock price discount. Many foreign exchanges exhibit considerably lower levels of stock liquidity and may face significant discounts for a large number of their listings.

\(^5\) Statistical significance at the 95% confidence level was generally established for these metrics at 4 to 6% (in grey).

\(^6\) Our results are similar to other findings in the literature. CITE THE SWISS PAPER & ITS FINDINGS HERE. Aswath Damodaran, in The Dark Side of Valuation, pp 245-249, Prentice Hall, 2001 indicates that illiquidity discounts fall in a continuum, with private companies typically valued at a 25-30% discount.
**Implications of Illiquidity**

We identified 1,815 companies with either ADTV of less than $1MM or a Free Float of less than $150MM (Figure 6). Stock illiquidity is found in most industries, but is especially problematic to financials and the technology sector. Many of our illiquid stocks were smaller companies, but others are ADRs, dual-class shares, stocks with large inside ownership positions, and other stocks with unique ownership profiles.

**Figure 6 - Incidence Of Illiquidity**

<table>
<thead>
<tr>
<th>Illiquidity by Industry</th>
<th>Illiquidity by Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telecom</td>
<td>Power</td>
</tr>
<tr>
<td>2.8%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Tech</td>
<td>Consumer</td>
</tr>
<tr>
<td>22.6%</td>
<td>16.2%</td>
</tr>
<tr>
<td>Industrials</td>
<td>Energy</td>
</tr>
<tr>
<td>17.2%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Health Care</td>
<td>Financials</td>
</tr>
<tr>
<td>12.9%</td>
<td>25.3%</td>
</tr>
</tbody>
</table>

**Source:** UBS Investment Bank, Factset database

Given the size and prevalence of the liquidity discount, the policy implications of stock illiquidity merit consideration. These are equally applicable, and potentially even more compelling, for smaller, foreign exchanges where illiquidity is even more prevalent.

**Optimal Capital Structure:** Traditional capital structure considerations should be dominated by the over-riding concern of illiquidity. Leverage policy objective will be to raise more equity to enhance stock liquidity. Cash policy will be to build and maintain large balances due to the cost and difficulties associated with market access.

**Shareholder Distributions:** Shareholder distributions (dividends and share repurchases) potentially represent ‘wasted’ equity for the illiquid stock. However, a very small dividend may enhance the stock’s profile through an increase in the number of eligible investors. Similarly, while too large a share repurchase program risks further eroding the float, a small program (i.e. 1% per year) can enhance liquidity by providing a natural buyer and making a market for the stock.

**Compensation:** Employees discount the value of their stock options for illiquidity and lack of diversification, but for the employees of illiquid companies it is even more so. Cash is preferable, though restricted shares can provide ‘back-door’ equity issuance.

**Disclosure:** Enhanced reporting, disclosure, and investor communications should be a policy goal of companies facing the challenges of illiquidity.

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7 CITE THE Lisa K. Meulbroek (Claremont McKenna College) PAPER ON THIS
**Solutions to Illiquidity**

Equity offerings, both primary and secondary, improve liquidity

Cosmetic solutions, such as stock splits, have little empirical benefits

**Primary Issuance**

Event study of primary issuance indicates associated excess returns are negative but strongly influenced by use of funds

**Figure 7 – Impact of Primary Issuance**

![Graph showing impact of primary issuance](image)

SOURCE: UBS Investment Bank, Equidesk

Usually increases float and absolute measures of liquidity immediately Botosan,

Market reaction is dominated by “use of funds” considerations

Lack of clear use of funds may provide a negative signal to investors

Although liquidity improves, use of proceeds is the primary driver of stock performance for primary offerings

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**Use of Proceeds**

Primary issuance has long been associated with negative excess returns; however, this typically does not control for stock liquidity. We find primary issuance is far less problematic for illiquid stocks, and in some cases, even leads to positive excess returns. Furthermore, the literature typically does not control for the use of proceeds.

The use of proceeds is an important consideration for any primary issuance, and we believe there are cases where primary issuance can be associated with positive excess returns. One published study makes an important contribution to the literature in this area, finding that the market reaction to common stock announcements is indeed highly dependent on the use of proceeds.10

Capital Expenditures: While 2-day announcement returns were -3.4%, excess returns were +6.7% when the prior two month run-up is included.11 Empirical evidence also shows that where proceeds of equity issuance are directed toward organic growth, stocks perform better if they are valued at higher premiums and have lower cash

---

10 The authors employ a piecewise linear model to test the relationship between announcement returns and firm and offer specific variables by specific offer reason as stated by management with evidence that managers are signaling the quality of the new investment when issuing equity. Marlin R.H. Jensen, Claire E. Crutchley, and Carl D. Hudson, Journal of Economics and Finance, Vol. 18 No.3 (Fall 1994) pp 313-329.

11 Ibid.
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