Liquidity as an Investment Style

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2014 Updates Provided By
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Research Director
Zebra Capital Management

Asset Management Forum
“Liquidity as an Investment Style”
Roger G. Ibbotson, Zhiwu Chen, Daniel Y.-J. Kim, and Wendy Y. Hu
Financial Analysts Journal May/June 2013
Liquidity as an Investment Style

CFA Institute Names Top Financial Analysts Journal Articles with Annual Graham and Dodd Awards

Best Article of 2013 Suggests Liquidity Be Included as a Benchmark Investment Style alongside Size, Growth/Value, and Momentum in Studies of Stock Returns

NEW YORK, February 20, 2014 — “Liquidity as an Investment Style,” by Roger G. Ibbotson, Zhiwu Chen, Daniel Y.-J. Kim, and Wendy Y. Hu, was selected as the best article in the prestigious Graham and Dodd Awards, a CFA Institute program honoring the top Financial Analysts Journal articles each year. The article, published in the May/June 2013 issue of the FAJ, finds that liquidity is an important indicator of long-run returns. The authors suggest that liquidity be included in future asset price studies as an investment factor or style. Making their
What is Meant by Liquidity?

Liquidity in the Financial System
  – High Savings Rates
  – Low Interest Rates
  – Easy Access to Capital

Liquidity in Trading
  – Low Transactions Costs
  – High Trading Volume
  – Low price impact for Large orders

Liquidity in Valuation
  – Pay extra price for liquid securities
  – Extra expected returns for less liquid securities
Liquidity and Valuation

Liquid securities
- Easier to trade with lower market impact costs
- Higher priced for same set of cash flows
- Desired for rapid turnover investors

Less Liquid securities
- More difficult to trade
- Lower priced for same set of cash flows
- Higher expected returns, great for longer term investors

“Don’t pay for liquidity you do not need”
The Liquidity Premium

1980 – 2013

Stocks, Bonds, Bills and Inflation
• First highlighted traditional market premiums
• Equity, value, size and liquidity premiums

What is the Liquidity Premium?
• More liquid assets are priced at a premium
• Less liquid assets are priced at a discount, thus having higher expected returns

Foundation in Academic Literature
• Thirty years of literature supporting higher returns
  - Ibbotson, Chen, Kim & Hu, 2013
  - Idzorek, Xiong, & Ibbotson, 2012
  - Pastor & Stambaugh, 2003
  - Datar, Naik & Radcliffe, 1998
  - Amihud & Mendelson, 1991
  - Ibbotson, Siegel & Diermeier, 1984
• Impetus for investments in venture capital, private equity, and other alternative investments

Growth of $1
• Data update Zebra Capital.
## Why is Liquidity a Style?

<table>
<thead>
<tr>
<th>William F. Sharpe (<em>FAJ</em> 1992)</th>
<th><strong>Liquidity</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Investment Style Criteria</strong></td>
<td></td>
</tr>
<tr>
<td>1. “Identifiable before the fact”</td>
<td>Investors prefer liquidity and therefore there is a strong economic justification “before the fact”</td>
</tr>
<tr>
<td>2. “Not easily beaten”</td>
<td>Our results show that less liquid stocks have higher returns with lower volatility than more liquid stocks</td>
</tr>
<tr>
<td>3. “A viable alternative”</td>
<td>Liquidity differs from other accepted styles with more than comparable premiums (size, value, &amp; momentum)</td>
</tr>
<tr>
<td>4. “Low in Cost”</td>
<td>Portfolios are stable and can be managed with infrequent rebalancing and low cost</td>
</tr>
</tbody>
</table>
Study Methodology

Up to 3500 U.S. stocks, 1972-2013

- Size measured by year-end capitalization, value measured by E/P ratios, momentum measured by previous year returns
- Liquidity measured by share turnover
- Matrixes independently sorted into quartiles with equally weighted returns in each cell
- Annual rebalancing

Broad U.S. stock universe ranked by size, value, momentum, liquidity

U.S. Quartile Portfolios
1972-2013

Liquidity Quartile Portfolios
1972-2013

- Low liquidity outperforms with less risk

Size Quartile Portfolios
1972-2013

- Small caps outperform, but at a higher risk

## Size vs. Liquidity

**1972-2013**

<table>
<thead>
<tr>
<th>Size</th>
<th>Micro</th>
<th>Small</th>
<th>Mid</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Q1–Q4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquidity</td>
<td>Low</td>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>16.3%</td>
<td>16.9%</td>
<td>11.1%</td>
<td>1.5%</td>
</tr>
<tr>
<td>2</td>
<td>15.9%</td>
<td>14.9%</td>
<td>12.6%</td>
<td>6.5%</td>
</tr>
<tr>
<td>3</td>
<td>14.3%</td>
<td>14.3%</td>
<td>13.1%</td>
<td>8.7%</td>
</tr>
<tr>
<td>4</td>
<td>11.8%</td>
<td>12.3%</td>
<td>11.9%</td>
<td>9.2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size Premium</th>
<th>Q1–Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.5%</td>
</tr>
</tbody>
</table>

**Within each market cap class, relatively low liquidity outperforms.**

Small-Cap Liquidity Portfolio

1972-2013

**Annualized Alpha**

<table>
<thead>
<tr>
<th>Annualized Alpha</th>
<th>Market M-RF</th>
<th>Size</th>
<th>Value</th>
<th>Momentum</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.92%*</td>
<td>0.71</td>
<td>0.77</td>
<td>0.48</td>
<td>0.01</td>
<td>78.1%</td>
</tr>
</tbody>
</table>

* t-stat = 2.28 (Statistically significant at 5% level).

Value Quartile Portfolios
1972-2013

- Value beats Growth
- Growth is the most risky

## Value vs. Liquidity

### 1972-2013

<table>
<thead>
<tr>
<th>Value</th>
<th>Low</th>
<th>High</th>
<th>Liquidity Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19.3%</td>
<td>17.5%</td>
<td>10.8%</td>
</tr>
<tr>
<td>2</td>
<td>15.4%</td>
<td>15.0%</td>
<td>12.4%</td>
</tr>
<tr>
<td>3</td>
<td>13.4%</td>
<td>10.8%</td>
<td>7.2%</td>
</tr>
<tr>
<td>4</td>
<td>11.0%</td>
<td>9.6%</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

Both liquidity and value predict returns.

Value-Based Liquidity Portfolio
1972-2013

Annualized Alpha | Market M-RF | Size | Value | Momentum | R²
---|---|---|---|---|---
5.66%* | 0.72 | 0.56 | 0.56 | -0.03 | 81.9%

* t-stat = 5.31 (statistically significant at 5% level).

Momentum Quartile Portfolios
1972-2013

## Momentum vs. Liquidity

**1972-2013**

<table>
<thead>
<tr>
<th>Mom.</th>
<th>Winners</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Liquidity Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>16.9%</td>
<td>16.1%</td>
<td>13.8%</td>
<td>9.3%</td>
<td>Q1–Q4: 7.6%</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td>Q1–Q4: 7.3%</td>
</tr>
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<td>Low</td>
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<td>10.4%</td>
<td>8.6%</td>
<td>4.0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Momentum Premium | Q1–Q4 | 5.6% | 5.7% | 5.3% | 5.3% |

The liquidity premium is consistent within each momentum quartile.

Momentum-Based Liquidity Portfolio
1972-2013

**Annualized Alpha**: 2.06%*

<table>
<thead>
<tr>
<th>Annualized Alpha</th>
<th>Market M-RF</th>
<th>Size</th>
<th>Value</th>
<th>Momentum</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.06%*</td>
<td>0.79</td>
<td>0.74</td>
<td>0.30</td>
<td>0.23</td>
<td>85.9%</td>
</tr>
</tbody>
</table>

*t-stat = 1.93 (statistically significant at 5% level, one-tailed test)

Style Premia
1972-2013

Liquidity can be expressed as a long/short or a long only factor.

<table>
<thead>
<tr>
<th></th>
<th>Annualized Alpha</th>
<th>Market M-RF</th>
<th>Size SMB</th>
<th>Value VMG</th>
<th>Momentum HML</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long/Short Liquidity Factor</td>
<td>4.28%*</td>
<td>-0.44</td>
<td>-0.40</td>
<td>+0.58</td>
<td>+0.13</td>
<td>71.4%</td>
</tr>
<tr>
<td>Low Liquidity Long Portfolio (R-RF)</td>
<td>2.30%*</td>
<td>+0.74</td>
<td>+0.56</td>
<td>+0.44</td>
<td>0.00</td>
<td>88.3%</td>
</tr>
</tbody>
</table>

*t-stats = 3.25 and 2.79 (both statistically significant at 5% level.)

Liquidity Premia - Global (USD)
Jan 2000 – Sept 2013

Source: Zebra Capital Research.
Two Reasons for Investing in Liquidity

Less Liquid stocks trade at a discount to more liquid stocks

• Buying Less Liquid stocks means that the same cash flows can be bought cheaper

Liquidity is mean reverting

• Stocks move in and out of favor; as liquidity rises (falls), valuations rise (fall)
What Happens to Low Liquidity Stocks 1 Year Forward?

- **Q1 (Low Liquidity)**: 78.07% Stay in Quartile 1, +10.74% Return
- **Q2**: 17.44% Migrate to Quartile 2, +26.43% Return
- **Q3**: 3.41% Migrate to Quartile 3, +61.86% Return
- **Q4 (High Liquidity)**: 1.08% Migrate to Quartile 4, +109.83% Return

In theory and practice, less liquid stocks outperform. But…measured by turnover, less Liquid stocks have lower risk.

Amihud [2002]

\[ \frac{1}{D_{iy}} \sum_{i=1}^{D_{iy}} \frac{|R_{iyd}|}{VOLD_{iyd}} \]

<table>
<thead>
<tr>
<th>Quartiles 1972-2013</th>
<th>Geometric Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amihud</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less Liq</td>
<td>14.74%</td>
<td>24.60%</td>
</tr>
<tr>
<td>More Liq</td>
<td>10.77</td>
<td>19.35</td>
</tr>
<tr>
<td>Turnover</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>14.87</td>
<td>19.81</td>
</tr>
<tr>
<td>Higher</td>
<td>7.64</td>
<td>27.90</td>
</tr>
</tbody>
</table>

Liquidity and Popularity

- Amihud may be a better “pure” liquidity measure
- Turnover may also capture “popularity”
- Less Popular Stocks outperform with less risk

Conclusions

Liquidity meets the Sharpe Criteria for an Investment Style
  • Strong economic justification (“before the fact”)
  • Higher long-run returns
  • Returns differ from size, value, and momentum
  • Portfolios are relatively stable over time (“low cost”)

Similar to risk, Liquidity should be managed
  • Investors should relate portfolio liquidity to time horizons
  • Changing stock liquidity creates return opportunities

The Liquidity Style Improves Your Portfolio
  • Higher Return
  • Lower Beta & Standard Deviation
  • Low Correlation of excess returns
Liquidity as an Investment Style

Appendix
Liquidity of Mutual Fund Holdings
Feb 1995 – Dec 2009

U.S. Equity Fund Styles Annual Return Quintiles

<table>
<thead>
<tr>
<th>Size</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>7.35% +2.33%</td>
<td>6.86% +1.65%</td>
<td>6.68% +1.75%</td>
</tr>
<tr>
<td>Mid</td>
<td>9.73% +3.25%</td>
<td>9.61% +3.19%</td>
<td>8.38% +3.18%</td>
</tr>
<tr>
<td>Small</td>
<td>9.91% +2.77%</td>
<td>9.29% +3.32%</td>
<td>7.77% +3.00%</td>
</tr>
</tbody>
</table>

Morningstar Style Box

## Beta vs. Liquidity

### 1972-2013

Liquidity explains outperformance more than low beta does.

<table>
<thead>
<tr>
<th>Beta</th>
<th>Liquidity</th>
<th>Q1–Q4</th>
<th>Premium Q1–Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1</td>
<td>15.3%</td>
<td>4.0%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>16.3%</td>
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<tr>
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<td>4</td>
<td>12.0%</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

Source: Zebra Capital Management
Volatility vs. Liquidity
1972-2013

Liquidity explains outperformance more than low volatility does.

Source: Zebra Capital Management