Corporate Bond Liquidity and Volatility Risk

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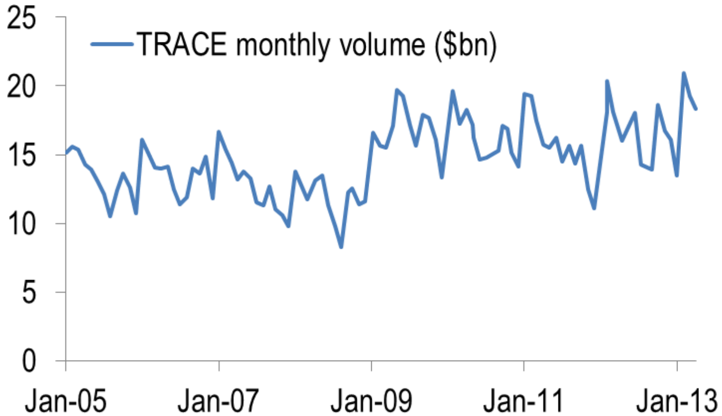
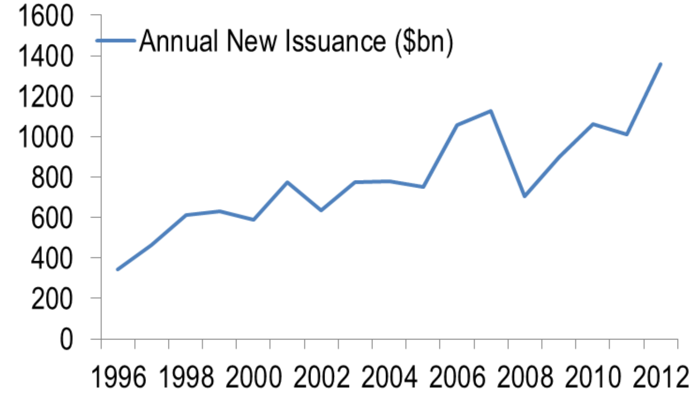
Trends in Aggregate US Corporate Bond Liquidity

Trading volume is stable, primary issuance is very healthy, and bid-ask spreads remain tight, all suggestive of high liquidity since the crisis

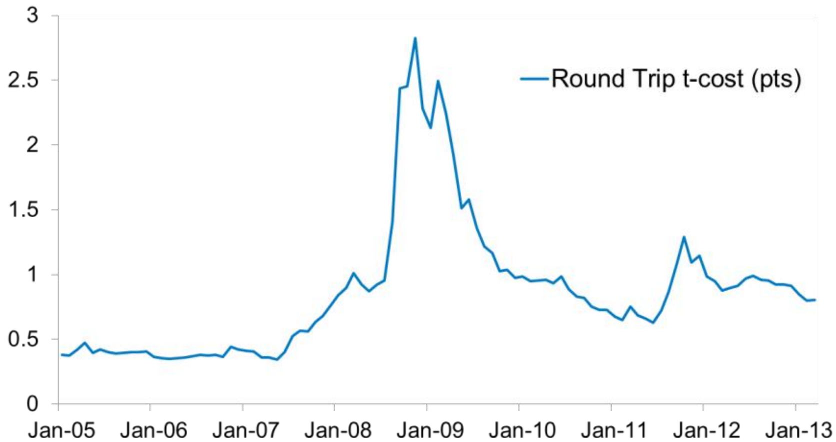
Dealer inventories have collapsed in wake of deleveraging



Source: TRACE



Source: SIFMA, NY Fed



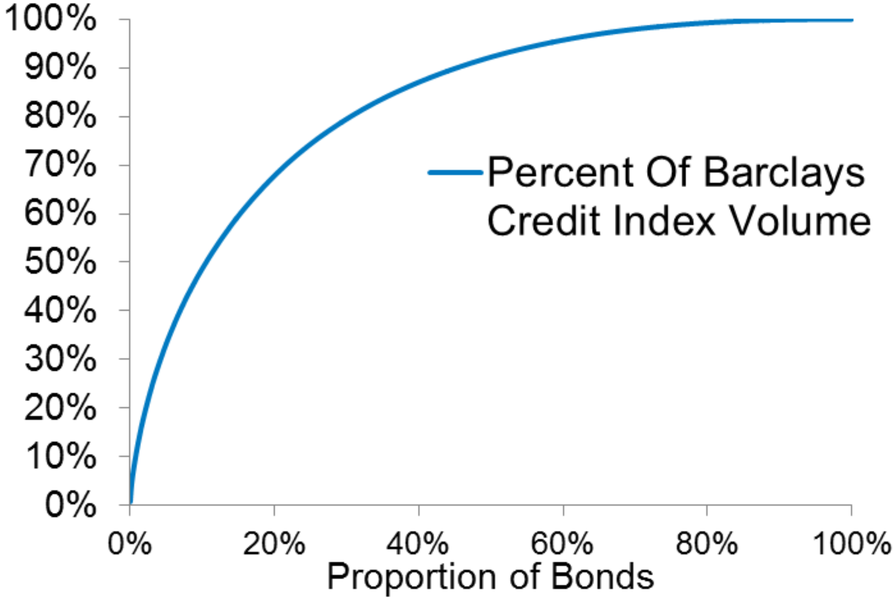
Source: Barclays

Source: NY Fed

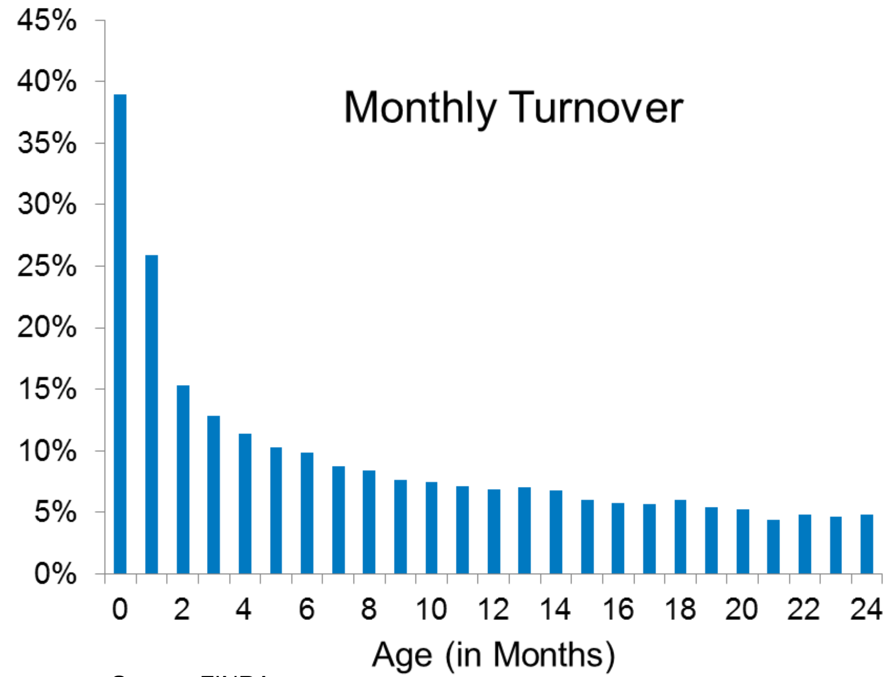
Trends in the cross-section: Volume very concentrated in a few names

20% of Barclays IG universe accounts for over 70% of trading volume

Much of this trading occurs in newly issued bonds



Source: FINRA



Source: FINRA

Trends in Cross-sectional Bond Liquidity

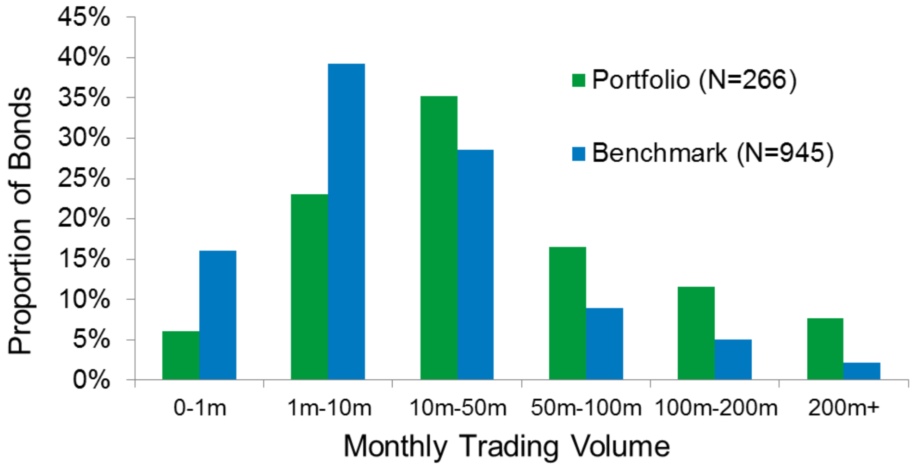
Portfolios with significant inflow or ongoing turnover can become significantly more liquid than the benchmark over time

- Portfolios that aim at close to full replication (iShares ETFs) avoid this bias

<u>Question</u>: Is there significant MTM volatility from having a different liquidity profile than the benchmark?

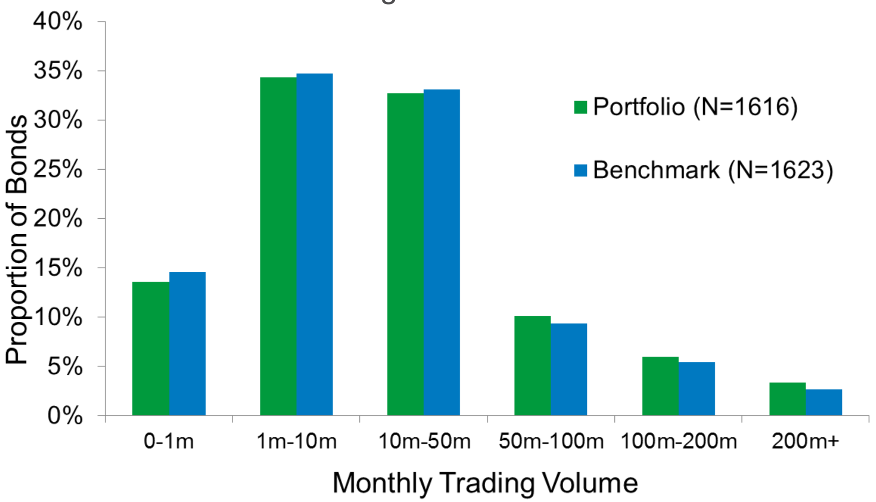
Actively managed long maturity mandate

Portfolio Avg Volume: $64 MM
Benchmark Avg Volume: $28 MM



iShares Long Maturity Credit

Portfolio Avg Volume: $35 MM
Benchmark Avg Volume: $32 MM



BlackRock Fixed-Income Risk Factor Model

Bond returns r_b are represented as the sum of an interest rate and spread return. The interest rate and spread returns are approximated using key rate and spread changes times key rate durations and spread durations respectively

$$r_b = r_{\text{Interest Rate}} + r_{\text{spread}} \approx \sum_{i=1}^{11} krd_i \cdot \Delta kr_i + spd\_dur_b \cdot \Delta OAS_b$$

Spread duration is the traditional measure of exposure to parallel shifts in credit spreads

However, credit spreads tend to widen/tighten in proportion to their spread levels

As a result, we model each corporate bond spread return as spread duration times spread level (DxS) times a % spread change. The bond's percentage spread change is then decomposed via a factor model.

$$\boxed{r_{spread} \approx spd\_dur_b \cdot OAS_b \cdot \frac{\Delta OAS_b}{OAS_b} = \underbrace{spd\_dur_b \cdot OAS_b}_{\text{DxS exposure}} \cdot \underbrace{\sum_i r_{factor\_i}}_{\text{Factor returns}}}$$

Estimating corporate spread and liquidity risk factor returns

Use trailing 1 month log volume report by TRACE as proxy for liquidity

- Log volume of bonds not covered by TRACE (e.g. 144A and RegS bonds) proxied using fitted values from econometric model

Include z-score of log volume as explanatory variable in daily cross-sectional regression of corporate bond % spread changes on bond characteristics

- Regression run separately for Investment Grade and High Yield universe

$$\frac{\Delta OAS_i}{OAS_i} = \sum_j \beta_{1,j} I_i^{industry\_j} + \sum_k \beta_{2,k} I_i^{maturity\_k} + \beta_3 I_i^{CapSec} + \beta_4 I_i^{Yankee} + \lambda z_i^{liquidity} + \varepsilon_i$$

The liquidity factor returns λ represent the daily % spread change per unit of standardized log volume controlling for other bond characteristics

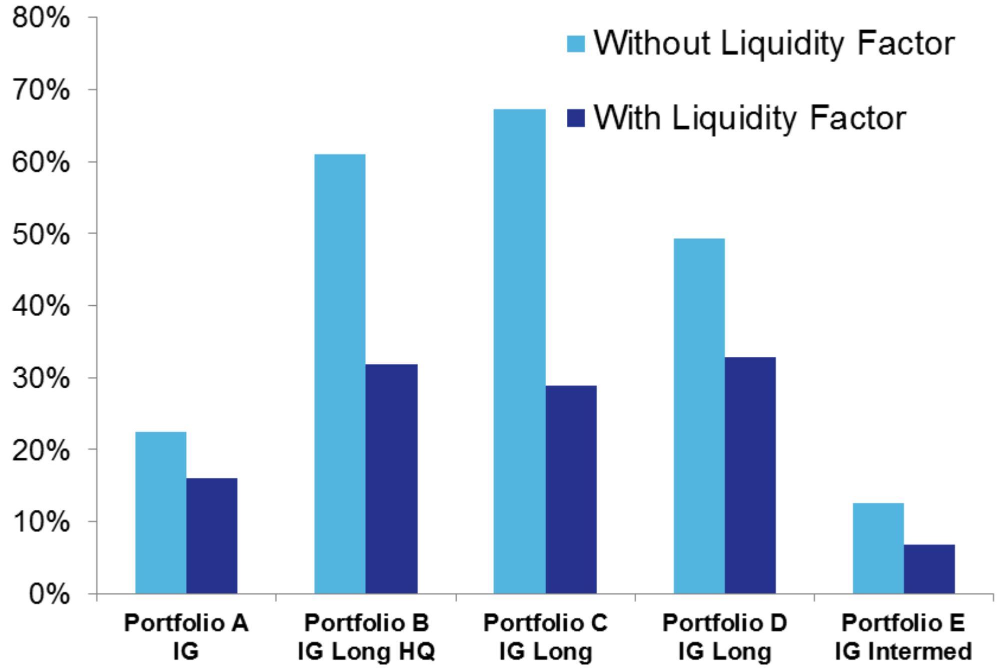
$$\text{Portfolio active } \lambda \text{ factor exposure} = \sum_i \left(DxS_{i,portfolio} - DxS_{i,benchmark} \right) \cdot z_i^{liquidity}$$

Adding liquidity risk factor improves factor model explanatory power

For many credit portfolios that focus on security selection and attempt to take little systematic risk, adding the liquidity factor has dramatically improved monthly return attribution using the factor model

On these portfolios, the liquidity factor usually is the largest contributor to ex-ante systematic active risk

Realized vs Factor Model
Monthly Active Return MSE% (2011-2012)



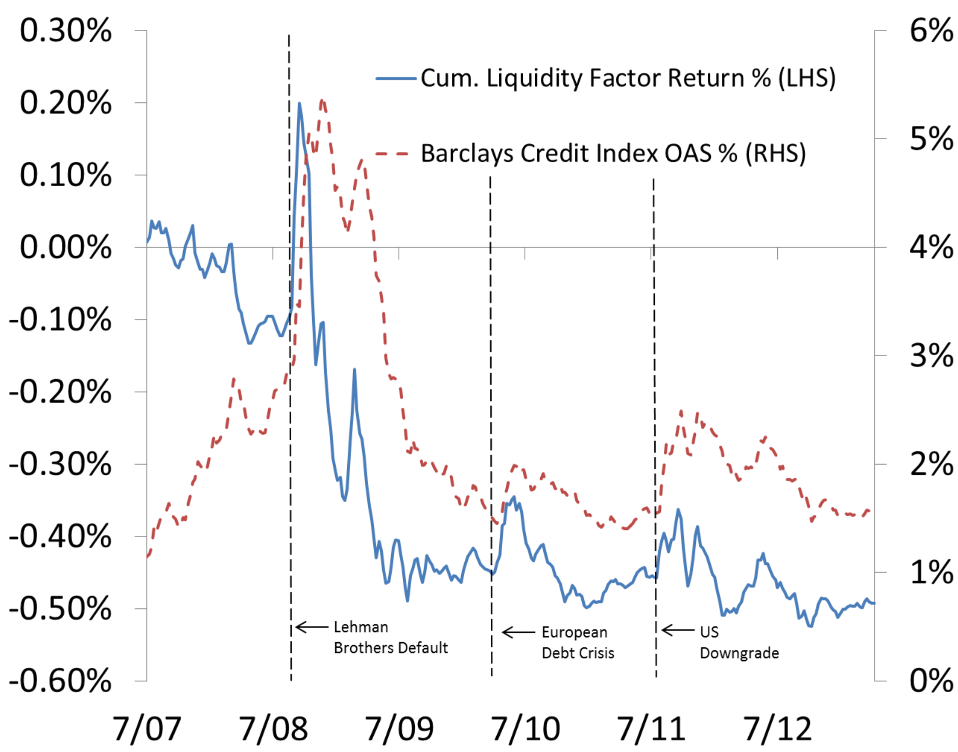
Actively managed long maturity mandate
Risk Factor Decomposition 04/13

Risk Group	Stand-alone Risk	Risk Contribution
Spreads	37	35
Investment Grade	31	26
Idiosyncratic Risk	24	14
USD Cash Bonds	19	12
US Corp Attribute IG	17	10
US Capital Security IG	5	-1
US Yankee IG	3	1
US Liquidity IG	19	11
US Corp Industry IG	11	2
US Corp Maturity IG	5	0
USD EM	11	6
Taxable Muni	17	4
USD Int Rates	12	6
Total	**42**	**42**

Liquidity factor returns experienced sharp swings over financial crisis

Investors demanded a slowly increasing liquidity premium for holding illiquid bonds during the credit crisis

Liquidity factor returns very highly correlated with market return since crisis



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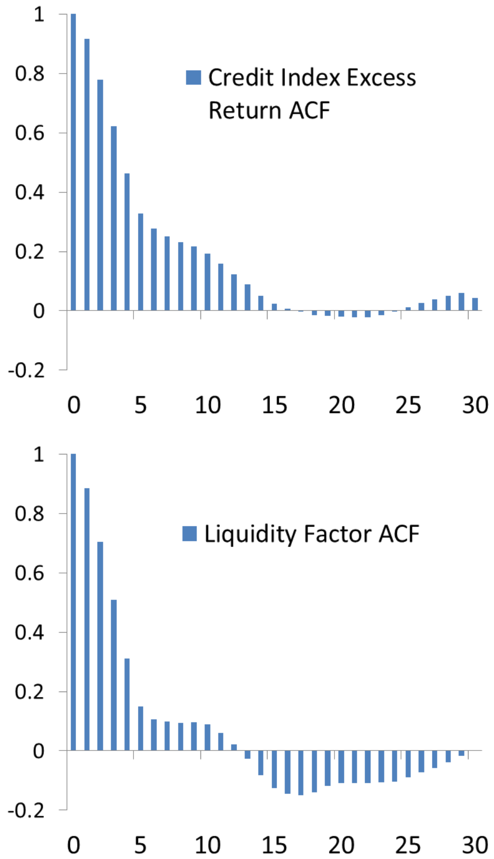
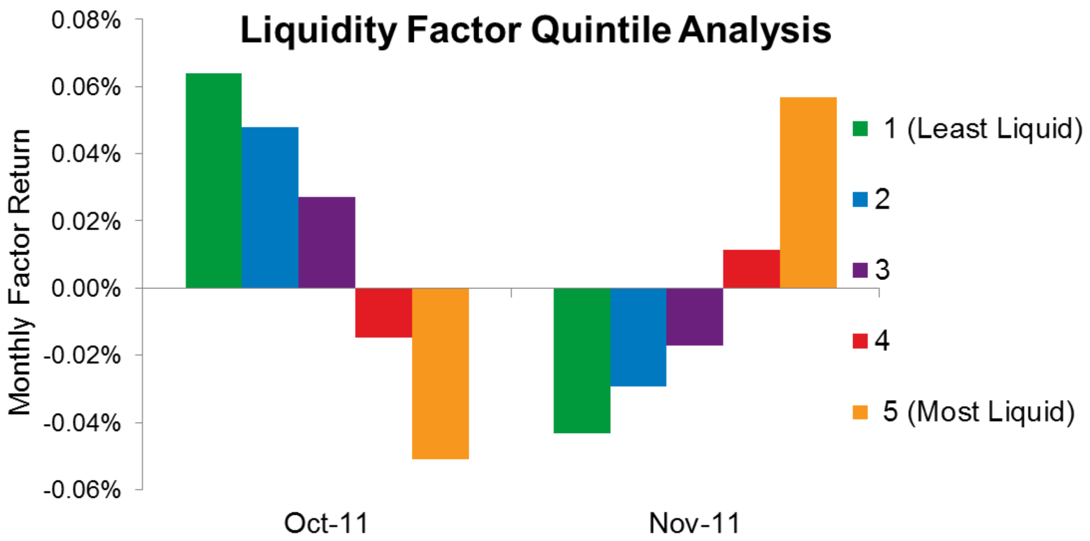
Analyzing liquidity factor returns

ACF shows persistence in liquidity factor return followed by mean reversion, suggestive of possible stale pricing effects

A decomposition of the liquidity factor return across liquidity quintiles, however, suggests factor return is not concentrated in least liquid quintiles





Final Thoughts

Even if liquidity factor return is contaminated by stale pricing, factor helps PMs understand performance and volatility relative to an illiquid benchmark

- Understanding liquidity factor exposure can help PMs get closer to market neutral
- Ideally, portfolio should be managed against a liquid benchmark

There is suggestive evidence that the factor return captures economically meaningful liquidity dynamics

- In the financial crisis, factor returns are consistent with liquidity story
- Return differential between liquid and illiquid bonds can persist for months, not consistent with stale pricing story
- Liquidity factor return is not concentrated in most illiquid quintiles, which would be expected if returns were driven by stale pricing effects

Further research is needed to have a cleaner interpretation