Identifying Liquidity Risk in Fixed-Income Mutual Funds:

A Quantitative Approach

Identifying Liquidity Risk in Fixed-Income Mutual Funds: A Quantitative Approach

When assessing bond funds for liquidity risk, qualitative and fundamental due diligence are often insufficient. In this paper, Markov Processes International (MPI) presents a quantitative approach that investors can use to quickly screen for potential liquidity issues within fund categories, prepare for future crises and support asset allocation decisions in any market environment.

The emergence of the COVID-19 pandemic, a "black swan" event, has brought bond fund illiquidity concerns to the forefront. While investors – especially those in categories such as multi-sector and enhanced core bond funds – are typically aware that actively managed products may invest in illiquid assets to seek higher returns (especially during periods of historically low yields), they may not always be aware of the specific risks that may be present in their investments, nor how these risks might be changing quickly over time.

The quantitative approach demonstrated in this paper provides a useful and pragmatic framework for investment practitioners to screen for potential concerns when selecting new products, as well as when conducting ongoing monitoring of their portfolio holdings.

I. Detecting Liquidity Risk: COVID-19 as Case in Point

When analyzing actively managed funds to get a clear picture of liquidity exposure, qualitative due diligence cannot usually detect rapid allocation changes, nor deconstruct a maze of complex holdings and derivatives to fully assess risk. It is here that analysts would normally turn to quantitative analysis, but many fixed-income specialists often consider such quant measures to be better suited to equities.

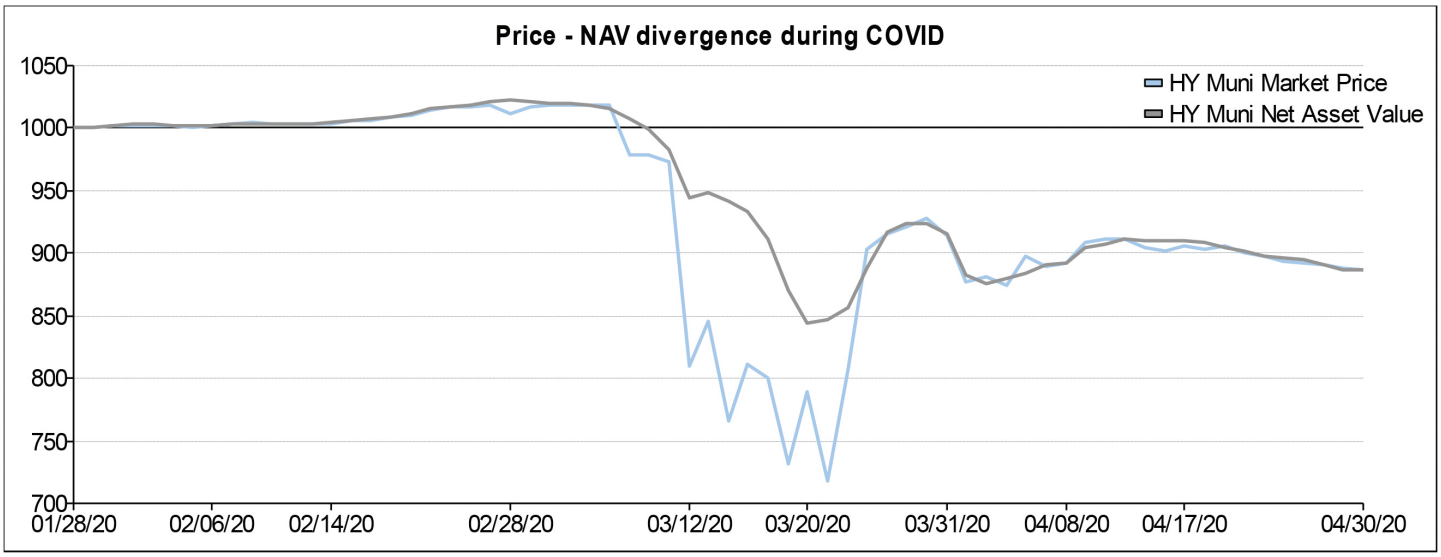
In this paper, we will demonstrate how *quick, efficient and easily understood quantitative analysis* can provide critical insights for investors and regulators, helping them to better assess ongoing risks in fixed-income products.

March 2020: Onset of the Pandemic Fuels Selling Pressure

Bond market liquidity reached a low in March 2020 amid the market realization that COVID-19 was a crisis that was likely to have deep and long-lasting economic implications. Transaction costs soared: According to the MSCI liquidity risk monitor special report,[1] transaction costs were twice as high for investment-grade and high-yield corporate bonds as during the high yield sell-off in December 2018. Price uncertainty reached extreme levels with very high variance in the prices quoted by dealers. The liquidity of other debt instruments, particularly bank loans, deteriorated more than that of corporate bonds.

[1]For more information, please visit MSCI at **https://www.msci.com/liquidity-risk-report**

This is starkly illustrated in the divergence between the market value and net asset value of a number of bond ETFs throughout the month of March. The gap can be considered an indicator of relative liquidity. NAV lags as the underlying holdings are traded less frequently, and more reliance is placed on model pricing, while market participants trading the ETF itself reflect the current consensus.



Created with MPI Analytics

The Federal Reserve quickly stepped in on March 23, announcing a purchase commitment of up to $750 billion that involved buying corporate bond ETFs and individual corporate bonds from the secondary market.[2]

Bond market liquidity has since stabilized. However, investors were still left wondering how to better screen for and identify funds that could be most susceptible to such scares.

Warning Signs

Liquidity doesn't get much focus in public market investment products until it's too late. However, prior to the COVID-19 market crisis, there were already plenty of signs of liquidity concerns in the fixed-income market.

Given the persistent, low-interest rate market environment during the past several years, bond funds have been under growing pressure to generate yields. Many fund managers expanded their scope to include riskier assets in their quest to provide higher returns.[3] Some of these assets, such as low-quality corporate bonds or non-agency mortgage securities, can be very illiquid and hard to sell in adverse market conditions.

Unlike stocks, the majority of bond trading now happens in over-the-counter (OTC) markets between investors. In the past, banks controlled most trading, making a profit for themselves while providing liquidity to investors. New regulations after the 2008 global financial crisis made banks safer, but also made them retreat from the bond-trading business. As a result, investors have found it more difficult to trade large blocks of fixed-income securities without significantly affecting prices.[4]

[2] See Federal Reserve Board announcements to Secondary Market Corporate Credit Facility (SMCCF).
[3] Bloomberg News, 'Bond funds drift into risky debt', July 2019.
[4] Kevin Pan and Yao Zeng, 'ETF Arbitrage under Liquidity Mismatch" March 2019.

The Challenges of Screening Funds for Potential Liquidity Issues

Understanding liquidity risk is important for allocators when constructing and rebalancing their portfolios. But the reality is, unlike other common risk measures such as interest-rate or credit risk, there are a lack of conventional risk measures to alert investors to liquidity red flags.

While fund holdings are publicly available, the positions are not often organized by liquidity and are not updated frequently enough to see rapid changes or shifts. Position-level liquidity analyses can be beneficial[5], but are often complex, time consuming and expensive – making it difficult to perform on a large universe of managers. Additionally, many screening systems use data that are not priced or sold daily, which can result in falsely identifying funds that are at risk or missing them entirely.

While the structural market dynamics of the COVID-19 liquidity crunch were complex and impossible for any investor to control, a straightforward quantitative screening methodology can help detect potential liquidity issues in individual funds – highlighting issues that, in certain market conditions, could put both investor capital and the financial system at risk.

II. Can Two Quant Measures Really Provide an Effective Liquidity Screen?

Quantitative screening is an essential component of any investment product analysis, and assessing exposure to illiquid assets is no exception. In this case, one can screen a vast universe of fixed-income funds for heightened liquidity risk by employing two quantitative measures: *Durbin-Watson*, and estimated exposure to illiquid factors through advanced *Returns-Based Style Analysis (RBSA)*.

It is important to recognize that quantitative measures such as these cannot conclusively tell an analyst the actual holdings or illiquid positions within a fund – such confirmation can be achieved through additional due diligence if that is the goal. However, for many investment professionals, quantitative screening can be the most efficient way to quickly identify possible risks across a large universe, or even within a single complex fund.

The Durbin-Watson Statistics on Fund Returns

Mutual funds are priced once daily at their net asset values, although many issues held in bond funds don't trade daily. Much of the data used to price underlying issues is, by necessity, from a prior period – meaning that the current price when marking to model tends to be correlated to the prior price. The more illiquid the underlying issues, the higher we assume the serial correlation (also known as autocorrelation) to be.

Durbin-Watson itself is a test statistic used to evaluate autocorrelation (the correlation between the current value and prior value) in a time series. It will have a value between zero and four, with values below two representing positive autocorrelation, above two negative autocorrelation and a value of, or around, two implying no autocorrelation. As a rule of thumb, values below one can be considered to be significant.

[5] See for instance Bloomberg Liquidity Assessment Function and the ICE Liquidity Ratio.

Exposure to Illiquid Factors, Based on MPI's Dynamic Style Analysis (DSA)

Although traditional RBSA is often not as relied on when analyzing fund behavior, *MPI's patented Dynamic Style Analysis ("DSA")* was specifically designed to work with complex investment products that employ leverage, derivatives and illiquid assets, making it ideal for fixed-income analysis. In this case, using DSA to identify the factor exposures (not actual holdings) that best explain the return movements of individual bond funds – and focusing on exposure to illiquid factors – provides a solid indicator of potential liquidity issues. In this analysis, the illiquidity factor exposures are a combination of non-agency residential mortgage-backed securities and leveraged loans.

Some broad characteristics, such as sector, age and maturity can, in aggregate, be used to consider investments that are more or less liquid than others. It seems obvious that a fund investing in intermediate-term Treasuries has less to worry about in terms of liquidity than a fund investing in, say, distressed debt. However, we're unlikely to compare two such funds as having similar risk in the first place. This screen must be taken in context of funds' mandates; in other words, assets that they may reasonably be invested in. The indicator we use is the total exposure estimate of the least liquid investments common to a given investment strategy.

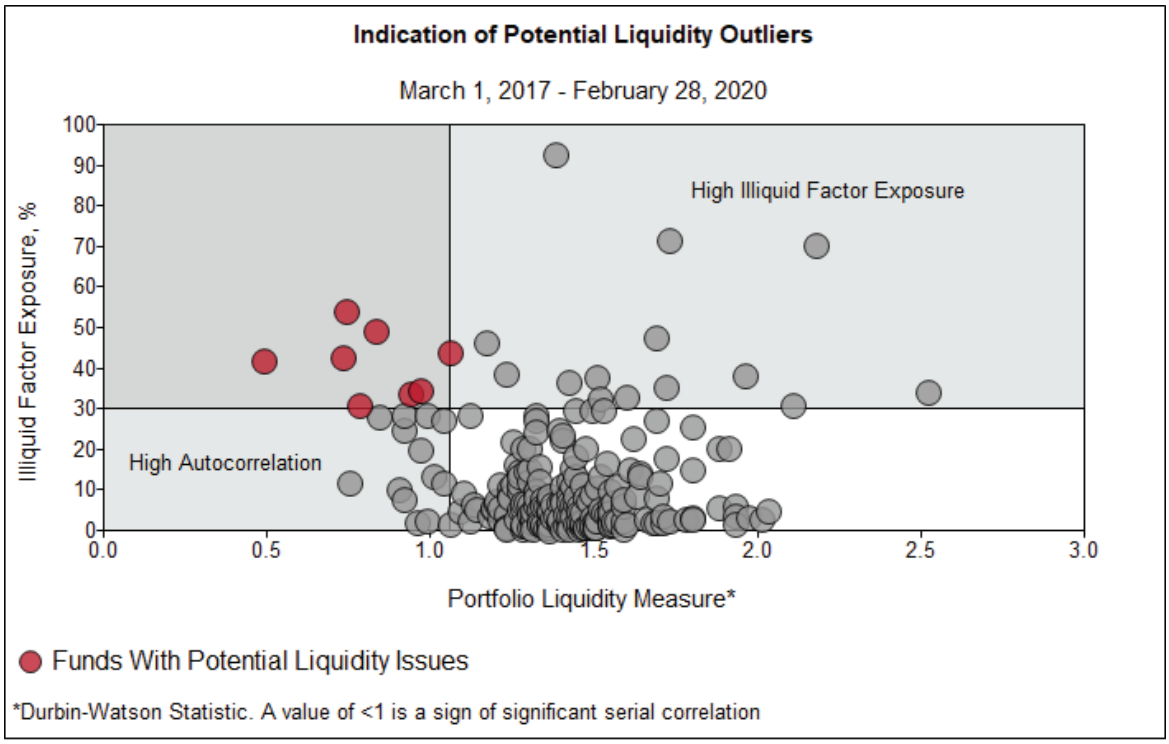
III. The Analysis

To demonstrate this proprietary MPI approach in a practical setting, we looked at 220 funds in the Morningstar multi-sector bond and intermediate core-plus bond universes with at least 36 months of returns available, from March 2017 through February 2020. The mandates of these funds go outside of the riskier sectors seen in investment-grade core bonds, but generally stop short of the go-anywhere approach of non-traditional or unconstrained bond funds.

We calculated the Durbin-Watson statistics and estimated factor exposures using a diversified set of fixed income indices[6] and our DSA model. We selected non-agency mortgages and leveraged loans as the least liquid factors for the analysis. Both sets of statistics were ranked for each fund against their peers.

Of the 220 funds evaluated, MPI flagged the 22 funds (10% of the universe) with the lowest Durbin-Watson statistics (highest serial correlation), and separately, the 22 funds (10% of the universe) with the highest returns-based factor exposure to illiquid assets. Eight funds appeared in both screens, which we identified as funds with the greatest potential of liquidity risk based on this purely quantitative screening approach. These eight funds are shown in red in the chart below.

[6] ICE BofA Treasury Index, ICE BofA Corporate Index, ICE BofA Mortgage Index, ICE BofA CMBS Index, ICE BofA Fixed Rate ABS Index, ICE BofA Municipal Bond Index, ICE BofA High Yield Index, ICE BofA Emerging Market USD Sovereign Index, Markit iBoxx US Non-Agency Mortgage Index and S&P LSTA Leveraged Loan Index.

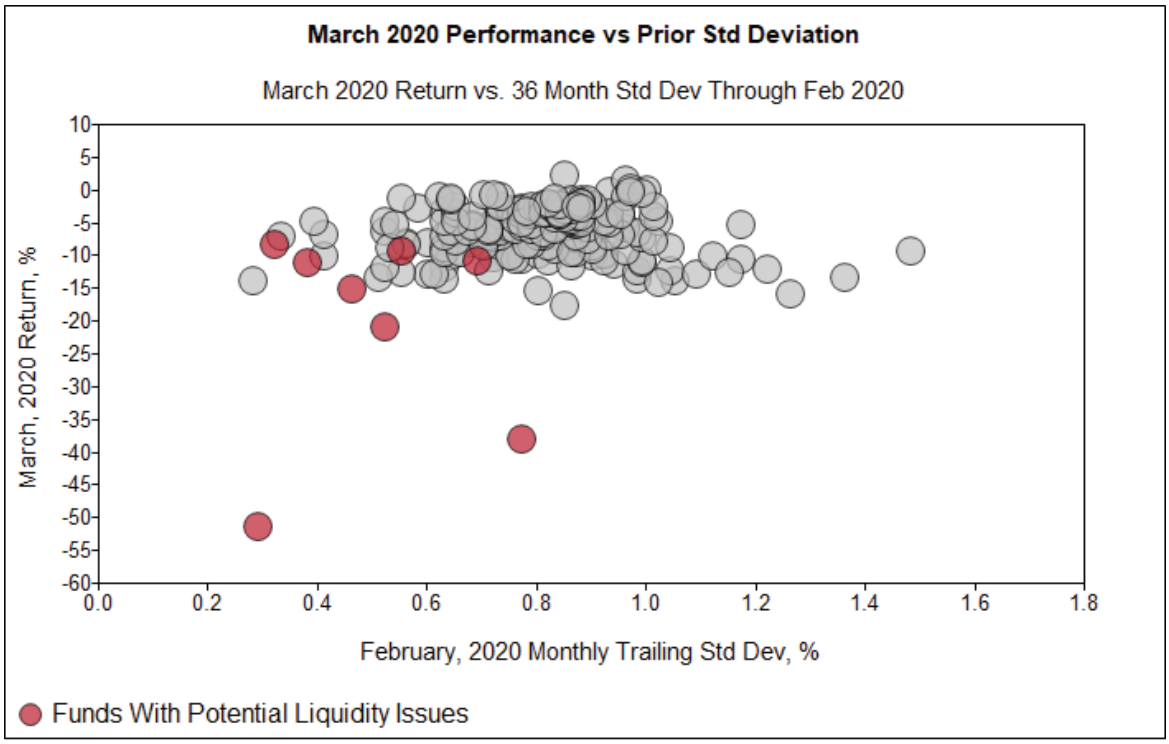


Created with MPI Analytics

Of these eight quantitative outliers, four were among the 10 worst performers in March 2020, and all eight were in the bottom third. Two of these apparent outliers, Braddock Multi-Strategy Income (BDKAX) and AlphaCentric Income Opportunities (IOFIX) dropped by 52% and 38% respectively in March, with their investments in illiquid non-agency mortgages being a significant contributing factor.

Few could have foreseen events as they unfolded in March, where it can be argued that Federal intervention narrowly prevented a real, systemic liquidity crisis. Illiquidity is a known and distinct risk in many popular investments, but the size of the risk is not always easy to measure or compare. It may be unrelated to traditional measures such as standard deviation, particularly in calm markets. This can be seen in the chart below, where we plot March fund returns vs. standard deviation of returns for the three years ending in February.

As it turned out, the combination of two simple indicators would have done a respectable job of highlighting a small group of funds worth a closer look as potentially having higher liquidity risk than their peers before the cracks started to show.



Created with MPI Analytics

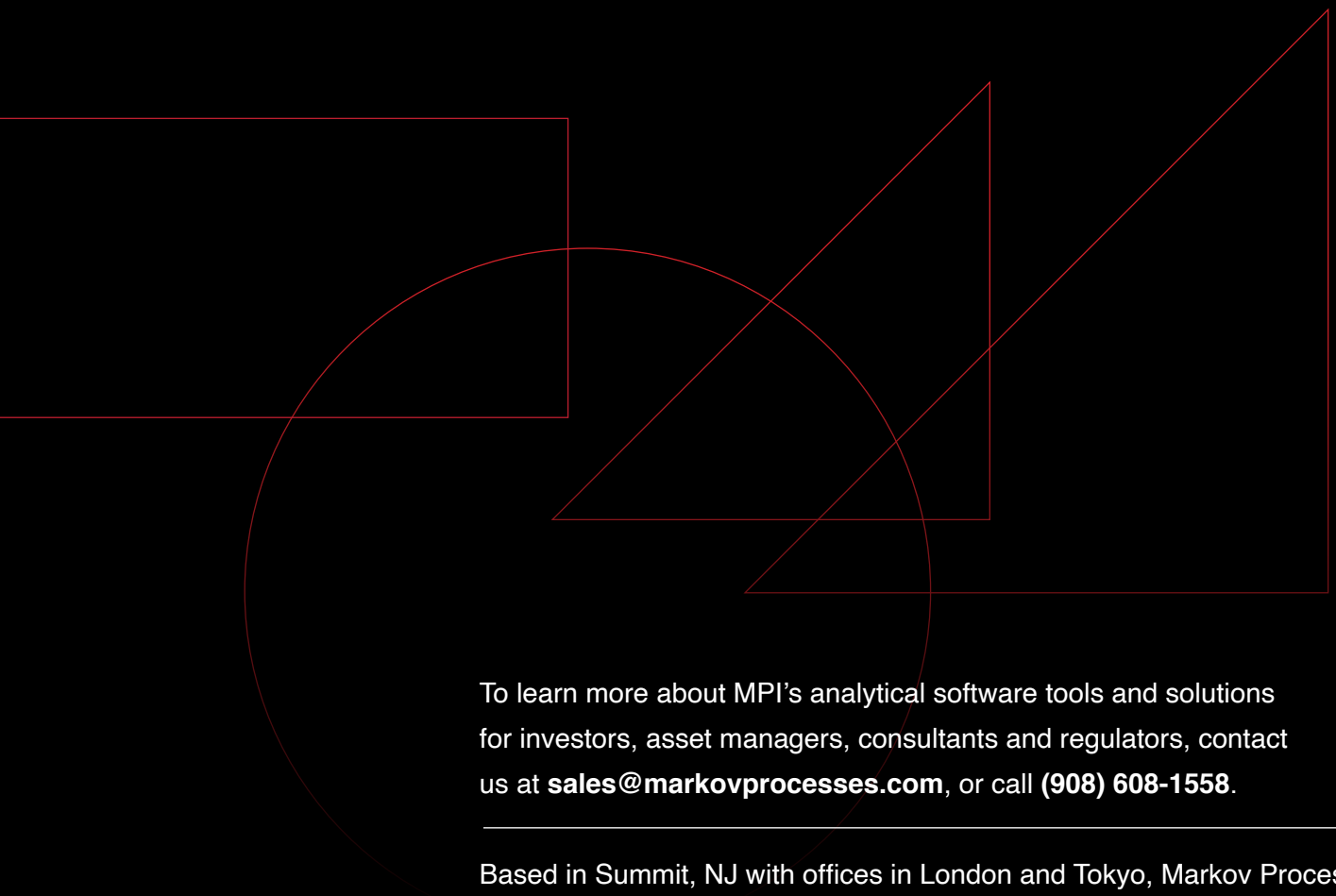
IV. Know Your Liquidity Bets, Whatever the Future Holds

The 2020 COVID-fueled market crash served as a reminder for investors, mutual fund managers and regulators of the potential dangers of liquidity risk in fixed-income funds. Active fixed-income investing always carries various risk elements; but as fund managers move into more complex or illiquid investments in search of higher yields, risk can rise exponentially. In a sudden crisis or black swan event, this could potentially put investor capital at risk or cause wider market disruptions.

Any liquidity crisis that occurs underscores the importance of screening investment products for quantitative red flags, not just in preparation for an unforeseen event, but as a critical part of routine fund selection and ongoing surveillance best practices. Conventional risk measures, qualitative and fundamental research are unlikely to identify liquidity risks in a timely manner, nor allow one to assess hypothetical shocks or stress tests with the most precise factor exposures. However, MPI's proprietary DSA model and Durbin Watson autocorrelation measure, when used in concert, can quickly screen for outliers to help fixed-income fund investors assess a given fund relative to its peers – before the next crisis hits.

Although nobody has yet invented a tool that can accurately predict pandemics and associated market crashes, a cost-efficient and effective quantitative screening process can act as an early warning system that quickly alerts allocators of increasing risk exposure, supports decision-making and helps to ensure that investments are aligned with broader organizational investment mandates.

Quantitative screening can empower fixed-income investors with deeper insight into the bets being taken by their fund managers on a daily, weekly or monthly basis – not after a crisis has already occurred.



To learn more about MPI's analytical software tools and solutions for investors, asset managers, consultants and regulators, contact us at **sales@markovprocesses.com**, or call **(908) 608-1558**.

Based in Summit, NJ with offices in London and Tokyo, Markov Processes International (MPI) is an independent provider of analytical tools and software solutions that help investors and asset managers achieve better outcomes and attract new business. Widely recognized as the leader in advanced quantitative analysis and patented modeling techniques, MPI serves wealth managers, asset managers, institutional investors, consultants and regulators with offerings that include the Stylus Pro software suite – analytical tools for fund selection, due diligence, risk analysis, portfolio construction, fund surveillance and client acquisition – as well as factor-based indices. Learn more about MPI at **https://www.markovprocesses.com.**