Liquidity Risk Principles for Asset Managers

Prepared by The GARP Buy Side Risk Managers Forum

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Introduction

Liquidity and liquidity risk management is a core part of investment processes buy-side firms engage in for benefit of their clients. Beyond every-day asset management activities, the need for constant vigilance with respect to management of liquidity risk is reinforced by periodic financial crises that have historically materialized in declines in asset liquidity and simultaneous cash liquidity demands. Distinct from other drivers of returns (or "risk factors") such as market and credit risk, liquidity risk is a driver of returns in all asset classes, mandates and vehicle structures. The form and level in which liquidity risk materializes can vary substantially. As such, the impact liquidity risk can have on investor returns will also vary. While some strategies seek to minimize exposure to liquidity risk (such as money market funds), other strategies, harvest a liquidity premium as a fundamental component of the investment objective (e.g., high yield bonds, private equity, real estate). Liquidity risk is neither bad nor good per se; but a risk that can either positively or negatively contribute to returns, depending on the effectiveness of the manager. To maximize effectiveness, investment managers should seek to understand liquidity risks present in investment opportunities as compared to potential liquidity demand of the vehicle/mandate in which those exposures are taken to enable the best management of liquidity risk factors.

Though liquidity risk can be defined broadly, much of the industry focus is on liquidity risk within many commingled vehicles where investors collectively share both the investment returns and risks associated with the strategy. Essentially, these vehicles transform cash to risk assets, risks assets to return, and finally risk assets to cash to realize a return commensurate with the investment strategy. Commingled vehicles have an explicit or implicit promise of redeemable equity, namely that cash demands made by investors are satisfied within a given timeframe. In many common regulated fund structures (such as 1940 Act mutual funds or UCITs), this timeframe is often close to one day. The general lack of cash flow predictability inherent in these vehicles' structure is fundamental to a fund's liquidity risk and presents distinct challenges with respect to liquidity management.

This paper provides education and background as an input for liquidity risk management practices for industry practitioners, fund boards, and regulators. There is no one-size-fits-all approach to assessing and managing liquidity risk. Managers should design their programs relative to what is appropriate for the investment strategies they run and the clients they serve. In other words, this is not a "how to" guide, but a compilation of topics and principles managers may consider when formulating their approach to liquidity risk. As an overarching guiding principle, investment managers have the fiduciary obligation to manage risk in the best interests of their clients, ensuring liquidity risk, like all other risks, is taken inline with client expectations and tolerances.

This paper has been written by the GARP Buy-side Risk Managers Forum, a group comprised of experienced risk management professionals from the investment management industry, aiming to provide a practitioner's view of sound liquidity risk management principles.

Definitions and Concepts

Managers should seek a common understanding within their firms of what liquidity risk means to their clients as an early step in determining an appropriate approach to managing it. The following are some basic terms used in this paper.

- **Asset and Market Liquidity:** The degree to which a financial instrument which can be converted to cash within a specified time horizon and at a reasonable cost. This conversion may be via market sale or other transaction, or via specific obligation with a financial counterparty. Market liquidity generally refers to the liquidity conditions of the overall market for which individual assets may be sold.

- **Illiquidity:** The notion of liquidity is a spectrum that can range from highly liquid to less liquid to illiquid. Illiquidity can be defined as the condition in which an asset cannot be converted to liquidity at a reasonable (or any) cost within the time horizon. Subjectively defining this criterion is necessary in order to make a binary classification to describe something as "illiquid."

- **Asset Liquidity Risk:** The risk of a liquid asset becoming less liquid (often closely linked to an entire market becoming less liquid) is defined as the potential to be unable to convert an asset into liquidity within a specified time horizon at a reasonable cost. This risk is not solely binary (illiquid vs. liquid) but is a continuum of different liquidity degrees and corresponding probabilities.

- **Fund:** Refers generally to commingled vehicles such a mutual funds or fund-like entities where assets from several investors are pooled to form a single investment vehicle. These would include regulated funds such as US 1940 act mutual funds, European Undertakings for Collective Investment in Transferable Securities (UCITs) and Alternative Investment Fund Managers Directive (AIFMD) vehicles as well as other less regulated structures such as Private Equity vehicles.

- **Fund Liquidity Risk:** The potential that a fund is unable (a) to manage flow volatility without significant impairment to other investors' interests in the fund, (b) to utilize available cash assets in accordance with the investment mandate (capacity risk), or (c) to access or otherwise generate sufficient liquidity to meet margin calls or other obligations, resulting in impairment of investors' interests.

Liquidity Risk Transparency Principles

Fundamental to sound liquidity risk management practices are procedures (both quantitative and qualitative) and metrics, that help provide insight into how a given portfolio liquidity risk might react to future market liquidity conditions. This section discusses some of the tools, metrics, and methodologies managers may utilize to gain better insight into the asset and fund liquidity risks they are managing on behalf of their clients.

Liquidity risk estimation does not lend itself to perfection.
Assessing liquidity and liquidity risk is based on estimations given general market uncertainty (current and future) and inconsistently available observable data. Liquidity estimations are heavily reliant on some type of extrapolation of historical observations. As such, the quality and precision of estimations are in part dependent on the quality and frequency of relevant observable input data and some expectation that the past is a reasonable proxy for the future. There are numerous historical examples where liquidity for an asset or asset class that has been reasonable historically can vanish with a new market shock. Thus, the predictive power of liquidity risk metrics is limited. The ability to estimate future flows with a great degree of certainty is also inherently difficult. Due to these challenges, managers are encouraged to take a holistic approach to determining the best metrics and methods to apply to their portfolios, giving balanced consideration to asset classes invested in, market conditions, investment mandate, shareholder base and any available historical data.

Asset Liquidity Transparency

The need to address asset liquidity is essentially as old as public trading of securities. There are a number of tools and processes available to assist managers in evaluating the liquidity of their portfolio assets. Some utilize quantifiable and readily available information, while others incorporate certain assumptions based on relevant factors.

Asset liquidity can be measured along the dimensions of transaction volume, time, and cost.
In understanding liquidity, managers may find it useful to consider asset liquidity in the context of volume (amount which can be transacted); time (time required to accomplish the targeted transaction volume); cost (discount or premium relative to the asset's fundamental value to consummate the transaction); and the estimated correlation between these factors. A large position may have to be bought or sold at a more significant premium/discount to market price if time is of the essence, where the same position may be bought or sold with less price impact should the transactions be done over a longer period of time with smaller incremental transactions. It is therefore important to understand the relationship between volume, time, and cost when assessing asset liquidity while accounting for the general instability and potential correlations (which may not be linear between buying and selling) between these factors over time.

Pricing information is a useful input for assessing asset liquidity.
Bid-ask spreads are a fundamental building block for assessing the cost of liquidity. A bid-ask spread is the difference between the dealer-quoted buy price and sell price. It is a good proxy of market width (cost of providing liquidity) as it reflects the dealer's demanded premium/discount for covering the cost of entering a transaction and thus contributing liquidity to the market (usually half-way between bid and ask quote). A wider spread can be a good indication that a security is less liquid and vice versa. In some cases, this data is readily available, easy to interpret, and comparable within asset classes.

Managers should be aware of some drawbacks when using bid-ask spreads as a liquidity indicator:

- Quotes are not always executable at the desired size and may provide misleading information relative to actual liquidity.
- The decentralized structure of fixed income markets makes it difficult to extract the true average bid-ask spread across dealers; spreads may vary widely between several dealers leading to different liquidity estimations for the same asset.
- The metric alone does not give insights on the market depths (the volume that can be traded at the quoted price).

Industry vendors are in various stages of developing sophisticated models to estimate liquidity costs. While the methodologies vary, many use bid-ask spreads as a starting point with other factors considered to adjust the liquidity cost estimate. When evaluating these models managers should take the reasonableness of assumptions into account as well as consider back-testing procedures to assess applicability in the context of their particular asset classes and mandates.

Valuation processes may provide good insights into asset liquidity.
Assets priced using fair value methods or assets where prices have not moved (i.e., stale prices) have a higher likelihood of having lower or inaccurate measures of liquidity. As these metrics are simple and generally readily available, managers should consider utilizing input from valuation processes into their liquidity risk management frameworks.

Transaction data is an important input for assessing asset and market liquidity.
As liquidity is ultimately about the ability to transact, high turnover volume and often-quoted high transaction sizes may give a good indication of market makers' willingness to provide liquidity and thus market width and depth. To account for different market environments, such as changing funding rates and hedging costs, the relevance of historical observations should be taken into consideration.

While transaction data can be useful to provide insight into asset liquidity, managers should consider potentially significant limitations to using transaction data:

- Data availability. While transaction data for some asset classes is readily available (most public equity markets), other markets (most fixed income markets) are decentralized, leading to lower availability of transaction data. Most fixed income transactions are done bilaterally over-the-counter between the investor (buy-side) and a dealer (sell-side), who temporarily holds an inventory of assets until re-selling the inventory position to another investor. This market convention makes fixed income data historically more difficult to obtain and results in lower transparency and thus lower reliability. Although the addition of reporting requirements such as TRACE for fixed income transactions has resulted in increased transparency in recent years, the reporting has limitations (e.g., volume caps on TRACE data.)
- Firm-specific factors. Managers should take their own firm's trading capabilities into consideration when assessing asset class liquidity and not rely solely on external data. An asset manager's sophistication, scope of trading relationships, and ability to transact in scale impact the efficiency with which trades can be executed.
- Use of proxies. Missing or incomplete transaction data does not automatically imply a market is illiquid. In the absence of data, transactions of comparable assets can be used as a reference point to model the liquidity of assets that have not traded.

For assets with the most observable trading volume data (i.e., public equities, exchange-traded/cleared derivatives, and selected fixed income markets) metrics such as average daily trading volume (ADV) in combination with average bid-ask spreads provides a good indication of the market's depth and breadth, as it can reflect how much trading the market can absorb (market depth) and what liquidity premium/discount is demanded by market participants (market breadth).

Qualitative input is useful for assessing asset and market liquidity risk.
Managers should consider how to best make use of internal and external expert opinions in their liquidity risk frameworks. While quantitative metrics can provide objective insight into any risk factor, expert opinions of practitioners are an important, and in some cases a more important, part of assessing liquidity given the highly idiosyncratic nature of liquidity. Traders and portfolio managers can and will have insights into market dynamics that are not quantifiable, such as firm trading relationships, market sentiment, or depth/breadth of internal analyst coverage.

Liquidity bucketing is one method of understanding portfolio asset liquidity risk.
Segmenting position liquidity by buckets entails an assessment of each security within a portfolio with an aggregation approach that provides a lens into the total liquidity of the fund. The results provide a baseline for comparison between funds, however are only useful if the bucketing methodology and embedded assumptions are consistent across the funds being compared. Comparison of results across firms where methodologies and assumptions differ may lead to incorrect assessments of relative liquidity for comparable funds. Managers should carefully consider the methodology used for assigning liquidity buckets and assure the output is used appropriately. While a bucketing approach provides sharp distinctions between the liquidity of securities, asset liquidity is in practice a spectrum. At the more liquid end of the spectrum, transacting to convert cash into an asset and vice versa is easy and efficient and costs relatively little. At the less liquid end of the spectrum, transactions are harder to execute and cost relatively more, potentially having significant impact to a fund's return profile.

Managers may find it useful to consider the following liquidity characteristics when determining an appropriate bucketing scheme:

- Settlement timing
- Position size and issuer size
- Maturity and date of Issue
- Asset structure
- Bid-ask spread
- Credit rating
- Number of quotes
- Average daily trading volume
- Pricing (volatility, price methodology)

Liquidity Demand Transparency

This section focuses on commingled vehicles, particularly regulated mutual fund structures but not separately managed accounts (SMAs). A commingled investment vehicle's liquidity risk is directly connected to the uncertainty of future cash flows. In the case of SMAs, liquidity demands should have a greater degree of predictability, with clear communication channels between the client and the manager on liquidity requirements/expectations. For other types of commingled vehicles (e.g., private equity), the vehicle structure should be viewed as a primary source of liquidity risk mitigation, allowing for greater predictability and control around flows. Mutual funds daily redemption demand feature makes them an accessible and attractive investment vehicle for many types of investors, however this comes with increased dilution risk as investors collectively share the burden the transaction costs, tax impacts and other effects exposing them to risks driven by the actions of other investors.

While liquidity risk management practices tend to focus on redemption risk, the ability to efficiently invest inflows from share subscriptions should also be taken into consideration. Subscription uncertainty can relate to both the quantity and the timing of additional cash inflows. As a consequence, the fund is exposed to the risk of not investing these additional inflows in a timely fashion due to insufficient/inadequate investment opportunities. Resulting under-investment or investment in assets with less attractive return prospects could lead to sub-optimal performance. Managers may address these concerns as part of their liquidity risk management framework or elsewhere in their investment risk programs.

Understand sources of liquidity demand.
For funds, flow risk is the primary concern for liquidity demand. Regulated mutual funds are distinct in this regard, as equity is readily and regularly redeemable. As such, uncertainty around future cash inflows and demands are primarily driven by redemption/subscription activities of a fund's shares. This uncertainty introduces funding risk where asset sales serve as one of a fund's redemption funding sources. Unforeseen cash demands could result in asset sales under unfavorable market conditions with negative performance implications.

Other potential sources of cash demands should also be considered in liquidity risk frameworks, including:

- Margin requirements
- Other collateral arrangements
- Committed credit lines (e.g., private debt financing)
- Distributions (e.g., coupon, principal, and dividend payments to fund investors)

Knowing a fund's investor base is helpful in understanding flow risk.
While predicting investor behavior in addition to other potential causes of cash demands is an inherently difficult endeavor, managers should seek to implement methods, both quantitative and qualitative, to better understand this exercise.

Relevant factors to consider:

- Investor diversification. A large, diversified investor base without significant concentrations of single fund holders is favorable (i.e. have less volatile cash flows) to an investor base of only a few investors with single investors comprising large percentages of a fund.
- Investor type. Investors in mutual funds can take many forms, including distributors, discretionary platforms or other types of institutions. Understanding these investors and the risks they represent is valuable in assessing potential flow volatility.
- Other factors. An investor may appear to be a concentration, however, it is important to understand the background of any single line item. For example, a discretionary wealth management

platform may have a large concentration in a single fund which is ultimately controlled by a single decision maker or this could be comprised of several hundred individual investors aggregated at the distributor level. These two scenarios would present very different redemption risk profiles, hence obtaining this level of detail can be useful.

Flow-modeling can provide valuable insight into liquidity risk.
Managers may choose to include more sophisticated methods in estimating flow risk. Commonly used and well-researched tools for market risk include Value-at-Risk-type measures (VaR) and stress testing. Each has its benefits and limitations.

• *VaR*. A fund's historical flows may provide a good indication of potential future flows. Calculating metrics such as expected worst-case flows at varying confidence intervals provides insight into the amount of cash that could be needed to be raised over a defined period of time. While applying a VaR-like approach to liquidity risk has many of the same benefits of VaR in a market risk context, there are also some of the same shortfalls to consider:

- Investors will likely not behave exactly as they have in the past.
- Fund size, investor composition, and investor concentrations are relevant factors that change over the course of a fund's life; a period of low flow volatility when a fund was larger and more diversified may underestimate risk should a fund's investor base be smaller and more concentrated later.
- New funds do not have flow history which requires reliance on similar funds' flow histories as proxies.

• *Stress testing.* Managers should consider stress testing as part of their approach to liquidity risk management. Stress testing first entails determining the severity of liquidity demand events. Managers may consider using data available in the industry, investor concentration levels, historical experience, or expert advice in determining these levels.

When utilizing more sophisticated methods for understanding potential liquidity risk, managers should assess the practical value of output.

Portfolios with highly liquid assets may require little or no modeling of investor behavior as liquidity risk will be a lower driver of return. And funds having other structural liquidity risk mitigants (e.g., in-kind ETFs) may not benefit greatly from sophisticated flow projection analysis as cash demands can be met efficiently regardless of redemptions magnitude.

Observable market data may also be useful indications of flow volatility.
Certain market statistics of a coincident or perhaps ex-ante nature can indicate potential moments of rising market turmoil that could lead to higher levels of redemptions. For example, the implied volatility reflected by the VIX index can reflect moments of market fear or price declines that could trigger investor redemptions from funds. However, times of market stress may also see liquidity increases in markets, albeit also associated with declining securities prices.

There are also commercial market and security liquidity indicators (e.g., liquidity indices) that estimate bond liquidity at the security level based on spread movements among other variables. A point in time of security or market illiquidity may not forecast a risk for subsequent redemptions and the need for liquidity at the fund level, but that may be a moment when having excess liquidity on hand could be propitious as a hedge against coincident redemptions.

Managers are cautioned against overreliance of these measurements. Drawing correlations between observable market data as a predictor of investor behavior is difficult (some may argue it is not possible). Further, any correlations that might be drawn can break down instantaneously. As such, managers are cautioned to use any such measurements with a firm understanding of underlying assumptions and limitations.

Fund Liquidity Risk Management Strategies

Like any risk, liquidity risk comes with a risk premium that can be either a source of positive returns or a source of problems. A fund may wish to take advantage of opportunities that reduce the available liquidity in the fund, while at the same time facing demands for liquidity from investors, portfolio managers, and other counterparties, each with their own associated liability time horizon. The strategies discussed in this section run the gamut from proactive to reactive. Depending on circumstances, one may be more effective than others. Portfolio managers typically use a number of these strategies in a multi-layered approach to liquidity risk management.

Liquidity management can be viewed as an asset/liability management exercise.
Investment managers may find it useful to think about liquidity risk in the context of a balance sheet. The assets side of the balance sheet (portfolio cash and positions) generally reflects primary sources of liquidity. As such, understanding liquidity risk characteristics of individual positions as well as portfolio aggregations (i.e., sector/industry, country, or market capitalization) is a significant component of a liquidity risk framework. A fund's liabilities is the other piece of the equation to understand fund liquidity risk. A fund's liabilities consist primarily of redeemable equity as well as other potential cash demands such as margin calls. A portfolio manager is tasked with finding the optimal balance between liquidity supply (assets) and liquidity demand (liabilities).

Liquidity should be a core consideration in product design.
Firms should seek to match the liquidity supplied by their portfolio assets with the expected liquidity demands of their investors and other counterparties. Liquidity varies by structure: open-end mutual funds have daily liquidity requirements; closed-end funds have no liquidity demands but may have counterparty or market-induced liquidity requirements; and private [hedge] funds can create unique liquidity provisions. While an open-end mutual fund can, theoretically, see large scale redemptions in one day, this generally does not happen.

To choose the right structure for a fund, the product development process should reflect liquidity demand projections in conditions that are firmly stressed but not catastrophic. Product developers should work with portfolio managers, legal counsel, and risk management to find the appropriate structure based on both the liquidity supply and anticipated demand. Managers should not create a liquidity arbitrage by offering liquidity on a fund that is vastly different from the assets the fund invests in. Policies regarding frequent trading help to mitigate this arbitrage.

Managers should also note what structural impediments will affect the overall liquidity of the fund, such as redemption policies, loads, or settlement. Fund of funds managers should be aware of their second-order liquidity, which is impacted by the underlying funds' liquidity. Funds that utilize derivatives, or other implicit or explicit forms of leverage, should include liquidity needs that derivatives and leverage may require in back-testing and stress tests before inception.

If allowed, distribution agreements can also be incorporated into product design. The distribution agreements may require investors to provide notice before large redemptions (or subscriptions). Further, they may also be used to define a process for redemptions in-kind.

Fund boards and others representing investor interests should be well informed on why management believes the structure of the proposed fund is right for the product and be made aware of the risks between structure of asset liquidity and client liquidity.

The dilution effect on non-redeeming or subscribing shareholders in times of liquidity stress can be minimized by establishing an anti-dilution mechanism, if circumstances allow for it. For example, swing pricing, an available tool in some jurisdictions, can mitigate the risk of dilution by allocating the cost of liquidity to those investors who are demanding liquidity by buying or selling fund shares. Managers and fund boards should be certain of their ability to establish such programs, taking into account regulatory, operational, and analytical constraints and challenges during the product design phase.

Investor disclosure and communication are simple yet powerful liquidity risk mitigants.
Meaningful disclosure of a fund's liquidity strategy doesn't just provide useful information to investors; it is a key part of liquidity risk management. An understanding of investor expectations around liquidity also plays a key role in developing a portfolio liquidity profile. A fund with a large fraction of its assets under management invested in highly liquid securities is relatively safe from both every-day and crisis liquidity risks. A fund that has substantial positions that could require extended time to liquidate, especially in a crisis, should disclose its strategy for dealing with liquidity events. Depending on circumstances, portfolio managers may feel it appropriate to more explicitly discuss liquidity risks and risk management strategies in investor disclosure documents. A portfolio manager may have a sound strategy, and justifiable reasons for certain types of positions; however, if liquidity is envisioned to be a significant driver of returns, investors should be informed of this to enable them to make risk tolerance-appropriate investment decisions. Additionally, an investor who is better informed on risk exposure in advance may be less likely to make bad decisions at the wrong time (such as demanding cash via redemption at a time when asset liquidity is in short supply). Adequate disclosure attracts predictable investor attributes which in turn provides more stable and predictable investor behavior.

Less liquid exposure should be managed, not simply avoided.
Generally speaking, portfolio managers accept varying degrees of lower liquidity in their holdings for four reasons:

1. Some assets carry a liquidity premium; they have higher expected returns for investors willing to accept lower liquidity.
2. Some economic exposures can only be obtained in less liquid instruments (e.g., long-term volatility exposures).
3. Less liquid assets can align a portfolio more closely with the manager's intentions, for example a high yield credit default index swap is more liquid than a portfolio of high yield bonds, but picking individual bond issues allows more nuanced exposures.
4. A manager's conviction in a certain position, in a large fund, may lead to a holding larger than a position size that can be readily liquidated near the current price.

Risk managers must balance the above opportunities with the risks of variation in portfolio asset liquidity, including:

1. The potential for high trading costs in order to maintain a portfolio strategy, especially if subscriptions or redemptions are volatile.
2. The opportunity costs of slow fund rebalances due to a lack of portfolio liquidity.
3. Valuation uncertainty leading to the potential for disadvantage to either subscribing or redeeming investors.
4. The appropriate degree of asset liquidity in the context of the overall portfolio

Effective portfolio cash management is core to managing liquidity risk.
There are three key decisions to be made by asset managers regarding cash management:

1. What level of cash should a fund hold?
   The proper level of free cash is determined by the investment needs of the fund, such as for settlement or margin calls, plus the potential level of redemptions. A high expected level of short-notice or no-notice redemptions requires a correspondingly high cash buffer, while scheduled cash demands can be met with asset sales. In most cases, cash comes at a high cost; investors pay asset managers to put their money to work, not to let it sit in bank or money market accounts. Therefore, in the best interests of the investors, most funds strive to be fully or near-fully invested and generally hold as little cash as is prudently necessary.

2. Cash-equivalents are instruments that are so liquid that they are effectively cash. To be called cash-equivalent, an instrument must be able to be turned into cash on demand at its marked price, and that price should have minimal volatility (e.g., shares of Apple can be turned into cash easily, but the marked price is too volatile for the shares to be considered cash-equivalent). Bank accounts, money market funds, G7 government securities, and repo transactions are certainly cash-equivalent, and other short-term instruments may be as well. For cash-equivalents,

liquidity and safety are far more important characteristics than yield. A fund should consider using a variety of cash-equivalent investments and continually monitor money market conditions closely to make sure cash

3. What are the backup plans if the fund runs out of cash?

As described above, for most funds, it is not in the investors' best interest to hold excessive cash levels. Markets and investors are unpredictable, however, and situations may arise when a fund's cash level drops below what is considered prudent. It is important to recognize this and have contingency plans in place to ensure that a fund has enough cash to meet its actual and anticipated liquidity needs. Some of the techniques used to mitigate the risk of cash shortfalls are: holding some liquid non-cash positions in the fund, arranging lines of credit, imposing redemption restrictions (including closing the fund), authorizing redemptions in-kind, and using swing pricing. Not all of these are appropriate – or even legal – for all funds depending on legal structure and jurisdiction. These types of contingency tools, which need to be thoroughly developed well before a cash crisis, are generally disclosed in a prospectus or offering document. It is essential that stakeholders understand what may happen in all foreseeable scenarios and that managers vigorously protect the interests of both redeeming and remaining shareholders, to the extent possible.

In order to avoid cash drag, in many jurisdictions managers are allowed to securitize the cash via a derivative or other transaction. For example, a US small-cap equity manager might choose to keep 10% cash on hand but also use that cash as collateral for a 10% nominal exposure to Russell 2000 futures. The idea is that the combination of cash and futures is much more liquid than the underlying stocks, but it also provides exposure to the small-cap equity market. The manager's active allocation – the selection of securities different than the market – can be made with the remaining 90% of the fund. Similarly, a fixed-income fund might keep some cash on hand and securitize that cash with a heavily traded index credit-default swap. In some cases, more heavily-traded products like exchange-traded funds (ETFs) can be used to the same effect – provide index-like exposure with high liquidity, while the rest of the fund is used for more active and possibly less liquid exposures.

Have a well-informed cash flow management strategy.

Managers should seek to manage cash flows such that investor liquidity demands are met efficiently without materially changing the portfolio's risk profile for remaining investors. In a redemption scenario, this could simply imply the liquidation of a straight slice of the portfolio reflecting the redeeming pro-rata share of the fund. In reality, it is not that simple. Managers need to balance changes in a portfolio's risk profile versus the cost of raising cash taking into consideration the impact the flow event has on both redeeming and remaining shareholders. This includes taking into account trading costs, tax implications, and other factors. Managers should consider these factors impacting the way in which a flow event is managed when designing their cash flow management strategies. Funds may be temporarily imbalanced due to liquidity management, but managers should have a concrete plan for rebalancing funds as soon as practically possible commensurate with prudent liquidity management.

Managers should also consider crisis planning in their liquidity risk frameworks. Crisis situations, although relatively rare, have the capacity to magnify fund liquidity risks: institutions and counterparties a fund relies upon for access to liquidity may be unavailable (e.g., an exchange closing); a levered fund may be unable to raise cash to meet margin calls due to increased time-to-liquidation for liquid assets during market turmoil, causing counterparties to seize and liquidate positions without regard to value; credit risk concerns about intermediaries may further limit a fund's ability to generate liquidity, by reducing the number of potential counterparties for trading; conversely, other market participants may not want to deal with a fund known to be in trouble. Managers may consider extreme, yet foreseeable, circumstances, and the appropriate action plan should such conditions arise in their liquidity risk management frameworks.

Know redemption options…and the consequences.

A key fund manager consideration is the impact subscription and redemption related transaction

costs have on a fund's share value. If not properly managed, these costs can be significant, resulting in dilution for remaining shareholders. Though generally not a great concern for the vast majority of regulated funds, fear of dilution may in turn give shareholders an incentive to avoid losses by redeeming quickly in times of market stress, taking advantage of the liquidity in a fund relative to the market. Managers should understand these risks as they reasonably pertain to the portfolios under their care. To mitigate those risks at the fund level, several mechanisms exist. They are used to allocate the costs of transactions to the departing or incoming investors, not to the long-term investors of a fund. These approaches are known as anti-dilution mechanisms.

In-kind redemptions. In some cases, funds can use in-kind transfers of securities to satisfy redemption requests which effectively passes liquidity costs on to redeeming shareholders while avoiding potentially adverse tax consequences to remaining investors. In its simplest form, a manager transfers a representative cross section of the fund's holdings of securities to the shareholder requesting the redemption. The redemption is satisfied with no transaction costs incurred by the fund. This is typically done only with institutional investors, and the right to do so is generally disclosed in advance in the prospectus or other investor documents. In addition, ETFs may also supply liquidity via in-kind exchanges. Some ETFs will take securities in exchange for shares of the ETF, or will supply securities in kind for contributions of ETF shares. When shares of the ETF are more liquid than the underlying securities, this can provide an additional liquidity tool for funds. Managers should take into account industry standards as well as their clients' ability to manage an in-kind redemption when making such a decision.

Cross-trading. In some jurisdictions, managers are able to use cross-trading (also known as "fund to fund transfers") to supply liquidity. Where allowed, cross-trading expands the collective pool by allowing a manager of a family of vehicles to exchange securities between different vehicles. If a manager has one fund experiencing outflows, and another fund investing in similar securities experiencing inflows or with cash on hand, the manager might be able to simply exchange some securities out of the debited fund and into the credited fund. While some jurisdictions allow this activity, there are significant conflicts of interest that managers should address. Should managers permit cross-trading, appropriate governance should define circumstances under which cross-trading is acceptable as well as procedures for impartially setting a fair price when used.

Liquidity or redemption fees. In some jurisdictions, fees are a mechanism that may be used to protect longer-term shareholders from the costs incurred or implied as a result of certain shareholder behaviors. In times of stress, a fund may charge fees to a redeeming shareholder in order to pay for costs associated with the provided liquidity. Fees also may be used by certain classes of funds to curtail shareholder short-term subscription and redemption behaviors. Further, some fund complexes may use such fees to deter shareholder market timing.

Swing-pricing. Swing pricing, an available tool is some jurisdictions, is a mechanism which minimizes the effect of transaction costs on the remaining investors of a fund. The fund's NAV is adjusted to take into account the transaction costs related to subscription and redemption activities. Incoming or departing investors will invest or redeem based on a transaction-cost-adjusted share price. A key parameter is the calculated swing factor, which captures the costs of fund dealing, including transaction costs, commissions, stamp duties, and the spread of the underlying asset prices. A swing factor is applied on a net capital flow basis. It can also be applied on two different bases: in full swing, the price swings every day regardless of the size of the net capital flow; or in partial swing, the price swings only if net capital flow exceeds a pre-determined threshold. This swing threshold, which is expressed as percentage of NAV, represents the level of net capital activity for which the implied cost seems material enough for the fund to trigger the levy of its swing factor.

Dual pricing. Dual pricing is a related mechanism that also minimizes the effects of transaction costs. The assets of a fund are valued on a mid-market basis. However, the redemptions and subscriptions are valued based on separate prices (bid-ask). Like swing pricing, dual pricing is applied on a net capital flow basis and is designed to pass the transaction costs to the active investors. The cost

is calculated and then added to the NAV to get the subscription share price and deducted from the NAV to get the redemption price. It is currently used for UCITS and AIF funds as well as in the UK and Australia.

Borrowing. Credit facilities and interfund lending arrangements may also be used to bring additional liquidity from outside the fund, through short term cash borrowings.

Under a credit facility, the asset manager arranges for third parties to make short term loans to the fund, often via a line of credit with a syndicate of banks. The loans are made directly to the fund which is the obligor and not the asset manager. The facility may be committed with the bank charging a fee on undrawn balances, or uncommitted. Conditions under which banks could refuse to lend (sometimes referred to as material adverse change (MAC) clauses) must be carefully negotiated. The borrowings may be secured by fund assets or unsecured, and care must be applied to make clear the seniority of lenders' claims under the lending facility vis-a-vis other creditors of the fund and the fund's shareholders. Policies and procedures should be created to assure appropriate governance of loans under the facility. Use of such facilities varies widely, with some firms keeping it as a rarely used emergency measure and others using it more frequently as a way to optimize the cost of liquidity when faced with more common forms of stress or with particular asset types, such as bank loans to cover trade settlement periods. In unleveraged funds, the facilities may be used primarily to fund redemptions. In leveraged funds, they can be used as a backup source of funding should other sources of borrowing become unavailable.

An interfund lending facility has the same objective of providing short term financing, but uses the cash balances of other funds in the same complex as the source of liquidity. Funds with extra cash can earn a return on the cash by lending it to funds that have a need for cash. Because this practice involves transactions with related parties, controls must be built into the process to assure any loan is in the best interest of both the borrowing and lending fund and any other potential conflicts of interest are managed, much the way they are in cross trading of securities among funds or accounts managed by the same asset manager. A good rule of thumb is that the rate of interest on the loan must be lower than it would be for the borrowing fund to borrow from a third party, and higher than the rate the lending fund would earn on a loan of similar risk to a third party.
In both credit facilities and interfund lending, managers need to be careful to avoid creating leverage unless that is allowed and desired (recall a fundamental goal of flow management strategies should be to avoid material changes in the portfolio risk profile). In this case, we are talking about economic leverage or exposure to the market greater than the fund's net assets. For example, bank loans can take days or even weeks to settle, but once a price is agreed, market risk is removed. Thus a bank loan fund might find some kind of borrowing useful to supply cash quickly after a price is locked in and no economic leverage is created. On the other hand, a small-cap equity manager might experience outflows but want to delay selling so as not to disturb the market. In that case, borrowing to meet redemptions will create leverage as the market exposure to the small-cap securities is still affecting the fund.

Liquidity risk management for leveraged portfolios has additional considerations.
Leveraged portfolios present unique liquidity risk issues. The primary goal of liquidity risk management in leveraged portfolios is the mitigation of the likelihood of forced selling that would re-allocate portfolio investments in unintended ways. Most obviously, the introduction of leverage implies the potential for increased return and price volatility, which in negative scenarios can have a number of knock-on effects by impacting margin or collateral requirements, the continuity of borrowing arrangements, and client redemption patterns. In a worst-case scenario, leveraged portfolios may experience forced liquidation of investments to meet these cash demands at unfavorable prices, in a way that unlevered portfolios would not.

Fund leverage may be initiated through financing (borrowing) arrangements such as bank credit facilities, direct securities issuance or repurchase arrangements (borrow cash). Additionally, economic leverage may be initiated through derivative strategies such as written CDS/CDS sell protection, written options, or other derivative strategies.

Liquidity risk factors to consider with leveraged positions and portfolios include:

- Liquidity and price volatility of the risk position (ability to exit the position and reduce leverage in an adverse market) relative to the degree of leverage employed.
- Size of liquid portfolio assets available to meet stressed margin/collateral calls in stressed markets.
- Margin/collateral call dispute resolution and cure periods.
- Financing – term.
- Financing – mark-to-market overcollateralization tests vs. alternatives (e.g., CLO par overcollateralization tests).

Most financing extended to investment funds or portfolios is conducted on a basis of market value overcollateralization (OC) of fund assets (individually or in aggregate depending on financing type) to borrowings. Specific NAV triggers are also a common feature of lending arrangements to levered funds. Additionally, leverage at the fund level (commonly employed by US closed-end funds) may define a borrowing base of eligible fund assets (based on market cap, security type, credit rating, etc.) with associated market value haircuts or advance rates. To the extent fund assets fluctuate and decline below covenanted OC or NAV levels, the fund is required to post additional collateral (if the leverage is at the individual investment level) or sell portfolio assets to reduce overall fund leverage. Similarly, derivative strategies that contain economic leverage will involve daily margin calls to collateralize the derivative's daily mark-to-market movements.

Leveraged portfolio liquidity risk mitigation techniques include:

- Determining and maintaining a minimum portfolio allocation to unencumbered cash or highly liquid assets that could be drawn upon to meet margin/collateral calls in adverse markets.
- Consideration of the liquidity of the leveraged, risky investment(s). To the degree the risk investments are themselves relatively liquid (e.g., CDX), the risk position may be able to be liquidated relatively easily to increase portfolio liquidity. Conversely, the leveraging of illiquid investments can lead to a vicious cycle if the illiquid asset is sold to raise liquidity, as the resulting price discovery may lead to further margin/collateral calls.
- Pricing transparency of the leveraged investments, that all parties agree upon, provides confidence that margin/collateral are appropriate.
- Term of financing – short-term financing may be withdrawn at the will of the lender in adverse markets, while term financing cannot. An example is overnight repo financing vs. term bank loan financing.

Liquidity Risk Governance

Asset managers should have a formal and well defined liquidity governance framework that includes involvement of the most senior management of the firm and, for funds with a board of directors, includes that board. For many regulated fund structures, an independent function is required to oversee liquidity risk. For non-regulated entities, managers should consider an independent risk function as part of their process. Policies and procedures pertaining to liquidity risk management should be well-documented and broadly understood across the platform.

A liquidity risk management framework should align to the firm's organizational framework. At a minimum, from a governance perspective, roles and responsibilities should be well defined for all aspects of the firm's liquidity risk management framework. Affected areas would include: portfolio management, trading, risk management, finance, and operations.

Liquidity Risk Forum/Committee. Managers should consider the incorporation of a liquidity risk committee as part of the liquidity risk framework. Depending on the operating structure of a particular firm, a liquidity risk committee may play a critical role in providing transparency and oversight of liquidity risk.

Portfolio Management. As liquidity risk management ultimately culminates with decisions made by portfolio managers, portfolio managers are the primary liquidity risk managers. As such, portfolio management is a fundamental input into the implementation and administration of a firm's liquidity risk management framework. The portfolio manager is able to provide perspective

on optimal management of investments to manage subscriptions and redemptions (asset flows) and to assess other liquidity demands (e.g., collateral management and other obligations).

Trading. Trading functions serve as the portfolio manager's conduit to the financial markets for trade execution, hedging and portfolio rebalancing. As such, traders can provide direct insight into liquidity measures, such as average daily trading volume, execution probabilities at various trade sizes, market depth, and execution levels. As such, traders are uniquely positioned to provide valuable insight into liquidity conditions and risks.

Risk Management. Risk management groups are critical in the ongoing independent assessment of portfolio liquidity. The risk management function can not only assess current portfolio liquidity conditions, but also the liquidity characteristics of a given portfolio over different periods and market conditions. The classification of holdings into liquidity buckets and assessment of residual portfolio characteristics after sizable redemptions also play a role in the assessment of a portfolio's liquidity. Monitoring of risk and liquidity limits and breach reporting/notification are also critical aspects of portfolio liquidity management.

Finance. Finance groups can provide constructive input for liquidity risk purposes given the close links between valuation and liquidity. The use of a range of sources, including external data feeds, to determine the pricing and mark-to-market of portfolio holdings is at the center of the liquidity management process as there tends to be a high correlation between liquidity and the level of difficulty in pricing assets.

Operations. The operations group serves a critical function for all aspects of the investment management process, and liquidity risk management is no exception. Timely, accurate, and consistent information is required to allow for informed decision making for portfolio managers, risk managers, clients, fund boards, and regulators.

Among each of these groups, well defined roles and responsibilities, effective communication, and clear escalation procedures are necessary to foster a successful approach to liquidity risk management.

Management and reporting of liquidity risk to key stakeholders should be a comprehensive and systematic capability for asset managers. Management should be able to demonstrate to fund boards, regulators, investors, and other key stakeholders that under normal and foreseeable events it can manage liquidity demands with an effective and repeatable process. For example, boards should see that firms have a systematic process for categorizing a security's liquidity, managing funding arrangements (such as liquidity lines and interfund lending), and in general responding to any situation that may potentially impact liquidity.

Portfolio managers, chief investment officers, and boards of directors should review comprehensive liquidity risk reporting on a regular basis. Most regulated funds require an independent risk manager or liquidity manager to review liquidity risk measurements and present their findings to the board of directors on a regular basis. The board and management should regularly review each fund's asset liquidity relative to normal liquidity needs as well as scenarios of worst-case redemptions. Finally, managers should tailor distribution of liquidity risk reporting to ensure that key decision makers are presented with information in a timely fashion.

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