

# Handling liquidity risk in investment funds

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Challenges of building and sustaining good liquidity risk measurement practices in financial services

February, 2021, Version 2.0  
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Public

## Purpose statement

This document is intended to capture the pain points and challenges faced while managing liquidity risk in the mutual fund industry. It also provides an overview of a solution which would aid this task in the field.

Lastly, in this context, the relevant features of Oracle Financial Services Liquidity Risk Management solution is outlined. It is intended solely to explain the versatility of the solution and its extensibility in the mutual fund industry.

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## Introduction

As of 2019, the worldwide mutual fund industry had \$55 trillion in total assets. This figure has seen a consistent increase in the past decade and is poised to grow further in the near future. The worldwide net sales, for open ended funds, which is (Subscription- Redemptions) stood at \$1.5 trillion. This figure is a direct indicator of the demand for regulated open ended mutual funds.

This rise and popularity of funds can be attributed to many reasons. In a collective investment scheme, or mutual fund, as the name suggests, money from many investors are pooled together and controlled by a fund manager. The fund manager makes decisions on where to invest these funds so as to provide a good return to the investors. In an open ended fund, the most attractive feature is that money can be deposited (Subscription) and withdrawn (Redemption) at any time with very few transaction costs. In essence, from the investor perspective, it is analogous to a savings account wherein they have all the benefits of a deposit account and a good chance of a higher return. Other benefits include risk management through a diversified portfolio, professional management of money, easy online purchases, varied investment sizes and accessibility to all.

Given these advantages, Funds are fast replacing the traditional bank deposits from the banking industry.

The fund industry and the banking industry can be compared across other aspects too. In terms of offerings, customer demographic, risk management, systemic impact etc., the industries are similar on a broad level, but differ on a deeper level. With regard to risk management, given that the banking industry is already at an advanced level, it is helpful to view the evolution of same function within the fund industry by comparison.

## Liquidity challenges of the Fund manager

Even though subscription and redemption seem smooth from the investor perspective, it is vital to take note of the redemption process from the fund manager or the investment company perspective. Every redemption request should be honored by the fund on time- this is required to be competitive in the market and a regulatory mandate as well. If the fund holds a large number of liquid securities to facilitate redemptions, then it misses out on returns. If it holds a low amount of liquid securities, then it might not be able to honor redemptions on a timely basis. A delicate balance is required between the two, giving rise to liquidity risk.

Extending the analogy, in a banking establishment, there are dedicated departments to each undertaking. For instance, the treasury department establishes and oversees risk management practices, the retail banking department is focused on building the deposits pool, the credit department looks at issuing and servicing loans etc.

In contrast to this, at an investment company, a fund manager has to solely, manage and grow returns, increase subscriptions, handle redemptions, attend to margin calls and credit lines and be responsible for overall risk management of the portfolio. It is each fund manager's onus to ensure that every risk taken is in line with the investment objectives and other controls set up by management and regulatory bodies.

## Liquidity classification

An Asset is defined to be liquid if it can be converted quickly into cash without significantly affecting prices.

This is dependent on the asset as well as the characteristics of the market.

Asset characteristics include sector, issuer, maturity etc., Market traits include depth, breadth and resiliency for that particular asset.

Liquidity risk is only one of the responsibilities of the fund manager. Measurement of liquidity is an intricate task. It requires specifics not just on the holdings, but also on the market as well. Given that measurement is intricate, management is arduous. Liquidity stress testing practices have not taken shape in most companies. On account of all these challenges, good practices on liquidity risk takes a back seat and fund managers often resort to heuristics or in-house solutions which cannot be called standard across the industry.

## Liquidity challenges of the Regulator

In 1959, the total assets held by US investment companies was 4% of its GDP. In 2019, the same measure equals 120% of the country's GDP. Given the size of the industry and prospects of its further growth in the future, liquidity risk management is a prime concern, for regulators worldwide.

For the banking industry, regulators placed higher emphasis on liquidity risk after the financial recession of 2008-2009. The Liquidity Coverage ratio (LCR) and the Net stable funding ratio (NSFR) prescribed by Basel are the minimum standard required to be maintained by all banks worldwide. Additionally, each country's regulator has its own policies, measures and metrics to manage liquidity risk in banks. These ratios and metrics are detailed and prescriptive in nature and most countries have fully implemented these measures well within the set timelines.

For the mutual fund industry, regulations are in the nascent stage. Few countries have released guidelines on liquidity risk management. These are however, at a high level - giving investment companies a lot of latitude in outlining and managing liquidity risk.

The Securities and Exchange Commission (SEC, U.S) released a Liquidity Final Rule in June 2018 wherein it requires open ended funds to classify their holdings into liquidity categories- highly liquid, moderately liquid, less liquid and illiquid which are based on the time to liquidate assets. It also asks the companies to maintain a minimum pool of liquid assets and to set thresholds on holding illiquid assets. These category assessments can vary from fund to fund, since each fund manager's criteria and measurement of liquidity differ. The results however are uniform for all the funds- four classes in order of liquidity risk. An investor or a regulator may be hindered from obtaining the right picture while comparing many funds through these liquidity categories due to the differences in assessment methods.

Securities and Futures Commission (SFC) Hong Kong emphasizes the need for regular assessments and periodic disclosure of liquidity risk undertaken by portfolio managers in its Fund Manager Code of Conduct (FMCC) guidelines. Securities and Exchange Board of India (SEBI), India has mandated each fund to hold at least 20% in liquid assets. The Monetary authority of Singapore (MAS) has released guidelines pertaining to liquidity risk management practices emphasizing that liquidity risk should be given due consideration even at the product design stage and in closed ended funds. Similar guidelines have been issued by Financial Conduct Authority (FCA), UK and International Organization of Securities Commission (IOSCO).

However, it is also to be noted that these guidelines are on a broad level and aren't as prescriptive as their counterpart for banks. This is understandable, since the fund industry is largely diverse. From liquid funds on one end of the

spectrum, to real estate funds on the other end, the assets, redemptions and other processes largely vary. Given the lack of details, compliance and oversight of funds becomes complex. Regulators will find it difficult to assess which firms are following good practices and which aren't, since there isn't a common measuring ground. This is important, given the size of the mutual funds industry and the potential systemic impact it can have on the market.

## Core principles of liquidity risk

Handling liquidity risk has a set of underlying principles which are independent of the chosen industry. Measurement, management and containment of risk are the core ideas.

The ideal solution is one which enables fund managers to effectively handle liquidity risk as well as address regulatory reporting and concerns. Such a solution would broadly have three modules:

- Asset liquidity classification
- Fund commitments forecasting
- Stress testing

### Asset Liquidity Classification

Before sorting assets into classes, most funds quantify each asset's liquidity risk for better comprehensibility. One of the popular metrics is '**Time to liquidate**' (**TTL**) measured in days. Some funds also use 'Liquidation cost' (LC) as an approach, which depends on the amount of assets a manager is trying to liquidate. In this paper, we focus on TTL as a basis of asset classification. Using TTL as a basis, liquidity classes can be configured by the user, for management and reporting purposes.

Once the outcome is determined, the next step would be to determine the criteria. The criteria vary depending on the level of classification.

It is interesting to note that assets can be classified at multiple granularities. Some assets, at a group level, can be classified as liquid or not based on characteristics such as product type, maturity, issuer, guarantor, currency etc. An example for such a basis of classification could be treasury bills.

On the other hand, some other assets need to be further examined at instrument level. A fine example for this is equities- each equity's liquidity is different depending on characteristics such as sector, bid ask spreads, price changes etc. and hence its liquidity needs to be explored at the individual instrument level.

The classification process starts at an asset group level and classifies all instruments which fit into the configured group level criteria. It then moves on to classify the remaining instruments at an instrument level with a different, finer set of criteria. This logic is understood better with Figure 1.

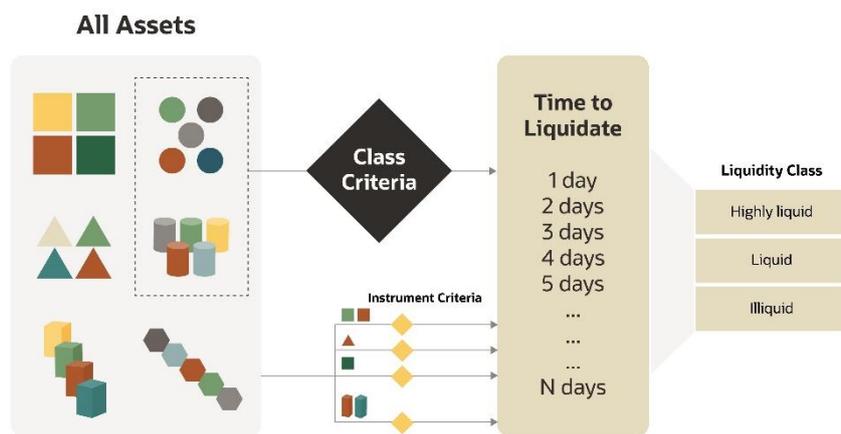


Figure 1: Asset classification at different granularities

The liquidity classes can be configured by the user. Generally, the classes are 3 or 4 in number so as to be simple and provide actionable insight.

The U.S. SEC Regulation also directs to set aside a buffer for contingencies, especially for funds dealing with illiquid assets. This buffer is called 'Highly liquid investment minimum' (HLIM) and is analogous to the High Quality Liquidity Assets (HQLA) which banks need to hold to withstand extreme liquidity shocks.

The HLIM, is the amount of liquid assets that a fund needs to carry in order to hold out against liquidity shocks, mainly in the form of redemptions. Given the diverse nature of funds in the marketplace, the HLIM size and logic is bound to vary from fund to fund. The ideology however remains the same. The buffer should be such that, it could be easily liquidated with minimal haircut in the event of a liquidity shock, and also such that, upon liquidation of this buffer, the liquidity profile of the assets for existing customers isn't altered significantly.

### Liabilities forecasting

This aspect involves estimating all of the fund's future liabilities. The major liability for most funds is redemptions

Other liabilities include margin calls, liabilities owed to banks, charges and fees owed to various associated entities and operational expenses.

In the case of banks, future contractual cash flows can be determined since they are predictable and as per contract. Practically, banks encounter different cash flows due to behavioral patterns, interest rate fluctuations, changes in markets etc., which puts together a 'Business as usual' scenario for the bank. Assumptions causing changes in cash flows are overlaid on contractual cash flows to arrive at a decent estimate for cash flows expected by the bank in the future.

In contrast to this, most of the fund's liabilities are 'open' in nature, without knowledge on when it would be realized. Most subscriptions too are open in nature. As a consequence, projecting net fund flows with reasonable accuracy is challenging.

With past data on hand, it is possible to project fund flows, timings and trends credibly with advanced machine learning techniques. For new funds, peer funds' data can be analyzed. The analysis could be done along various

### Asset Class Criteria

- Historical TTL
- Product type
- Product
- Maturity
- Domicile
- Issuer type
- Issuer
- Guarantor type
- Guarantor
- Issuer rating
- Currency
- Sector

### Instrument Criteria

- Historical TTL
- Bid ask spreads
- Turnover ratio
- Price changes
- Issuer rating
- Issue rating
- Rate of interest
- Embedded optionality
- Currency
- Maturity

dimensions depending on the fund characteristics and investment objectives. A list of variables affecting fund flows is as shown in Figure 2.

Customer variables	Fund variables	Macroeconomic variables
<ul style="list-style-type: none"> <li>• Age</li> <li>• Location</li> <li>• Disposable income</li> <li>• Risk tolerance</li> <li>• Financial goals</li> <li>• Investment horizon</li> <li>• Investment experience</li> </ul>	<ul style="list-style-type: none"> <li>• Absolute returns</li> <li>• Relative returns</li> <li>• Volatility of return</li> <li>• Dividends</li> <li>• Subscription/Redemption volumes</li> <li>• Expense ratio</li> <li>• Exit load</li> <li>• Embedded risk</li> <li>• Credit rating of underlying</li> <li>• Fund manager expertise</li> </ul>	<ul style="list-style-type: none"> <li>• Interest rates</li> <li>• Inflation</li> <li>• Exchange rates</li> <li>• Policy changes in underlying sectors</li> <li>• Economic events</li> <li>• Political events</li> </ul>

Figure 2: Factors affecting net flows in a fund.

Projection starts by identifying relevant variables and establishing a relation between the fund flows and the identified variables.

For example, if a liquid mutual fund is considered, then, absolute returns, expense ratios and credit rating of the underlying could be the most contributing factors. Investment horizon could be a variable too if multiple funds with varying holding periods are offered by the company. Demographics such as age and disposable income affect net flows in most funds although the extent of the relationship is to be determined fund wise.

The relevant variables to be chosen are dependent on the fund and the targeted demographic. The relationship could be anything from a simple regression to advanced machine learning based algorithms. Once the relation is established, this model is then used to project fund flows throughout the considered time horizon.

### Stress Testing

Once future liabilities and net fund flows are estimated, the next task would be to prepare the fund for contingencies. Stress testing fund flows has become a necessity in most mutual funds. For riskier and less liquid portfolios, it is mandatory to simulate extreme yet plausible events which might affect the portfolio adversely. This simulation and the corresponding countermeasures test the strength of the investment scheme and identifies potential weaknesses.

From a regulatory perspective too, stress testing has gained momentum. In Europe, the ESMA (Europe Securities Market Agency) has laid out guidelines for liquidity stress testing (LST) for *Undertakings for the Collective Investment in Transferable Securities (UCITS)* and *Alternate Investment Funds (AIF)*.

Stress testing of funds is an exercise which has to be tailor made for the portfolio under consideration. The main steps are outlined in figure 3.

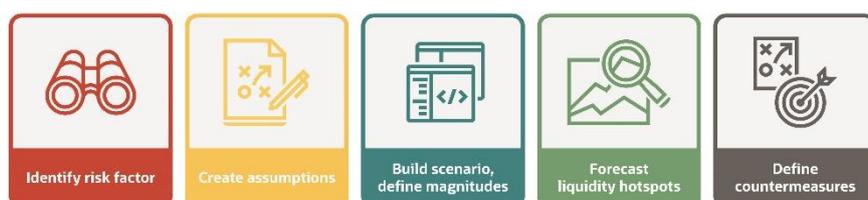


Figure 3: Stress Testing blocks

#### Incidents include

- Redemptions
- Margin calls
- Interest rate changes
- Index changes
- Asset value changes
- Credit downgrades
- Expense ratio changes
- Return variations

#### Countermeasures include

- Asset liquidation
- Rebalancing portfolio
- Exit charges
- Lock up periods
- Side pockets
- Swing pricing
- Redemption in kind
- Dilution levies

Implementation of each of these blocks are individual to the fund, its assets and its customers. In broad terms of risk management philosophy, this sequence can be followed for stress testing any type of risk.

- Identification of risk factors affecting the fund is the starting point. Risk factors pertinent to liquidity could be concentration risk, funding liquidity risk, redemption risk etc.
- Creating assumptions involves creating hypothetical incidents which challenges the fund along the risk factors chosen.
- Building scenarios involves defining severities, magnitudes, timelines and other parameters for the incidents.
- Once the scenarios are in place, they are executed so that the impact on fund flows is observed. This is superimposed on the forecasted flows to arrive at projected cash flows which reflect the results of the scenarios.
- Once the hotspots are observed, countermeasures which suit the fund can be defined, employed and modified according to the desired outcome.

The entire process of Classification, Forecasting and Stress testing is cyclical in nature, should be repeated often and this ensures that the process refines itself along the way.

### Oracle's solution for liquidity risk

Oracle's solution for banks' liquidity risk management consists of an asset classification framework, a scenario definition framework and a countermeasures framework. The extended version of the solution aims to handle liquidity challenges in investment companies as well. Figure 4 shows the utilization of the various modules within the investment company context.

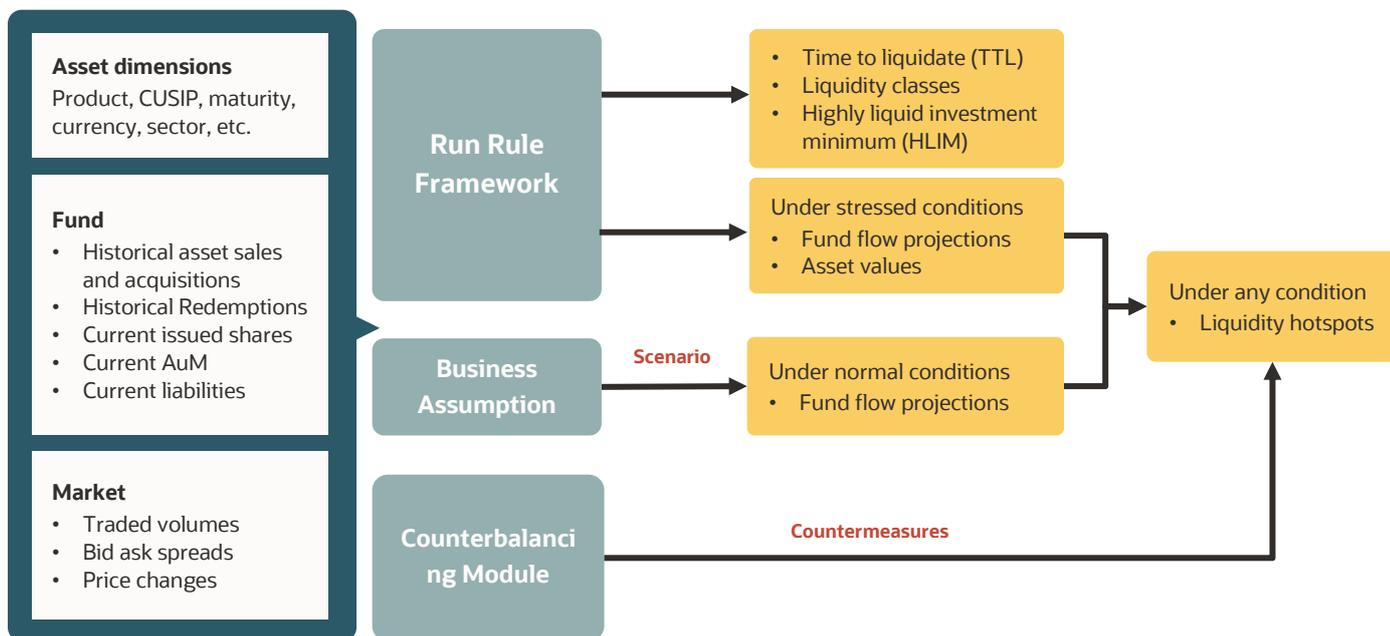


Figure 4: Oracle's Solution for Liquidity Risk Management

Together, the solution aims to measure, manage and contain liquidity risk, irrespective of industry. Some of the major benefits include:

- The ability to define computational and classification rules for sources, targets and the relation between them. Flexibility to define and edit the rules facilitates the user to dynamically manage asset classification and buffer construction.

- Capability to create business assumptions for hypothetical incidents, such as value changes, haircuts etc., through an intuitive GUI along various dimensions and measures. This enables users to engage in what-if scenarios and stress testing.
- Defining counterbalancing strategies, including sale of existing assets to cover any potential observed liquidity hotspots. Post stress testing, countermeasures provide the user with a range of options to tackle hotspots. By engaging in multiple strategies, the viable ones which fit into the business context can be selected and orchestrated.

## Oracle's edge

Oracle's industry-leading solution for liquidity risk management is an inclusive system built along the core principles of managing liquidity risk. The functionality, including classification, stress testing, countermeasures, reporting etc. are flexible and can be extended to the investment fund industry. The flexibility advantage is important since the fund industry is vastly heterogeneous.

The solution is a proven player in the banking industry with many customers across the globe implementing it and executing calculations on a daily basis. It is built for multi-jurisdictional compliance, coupled with Oracle's continuous compliance commitment helps fund houses navigate the multitude of ever-changing regulations.

Lastly, the solution is built on a uniform data model and common architecture which ensures that data from different sources are brought together, processed together and reported together. In essence, it is a single source of truth for various funds in the company and for users across the company.

## Last word

The size of the mutual fund industry is around \$55 trillion as of 2019. The world economy for the same period is close to \$133 trillion. Given that more than 40% of the world's economy is held by funds, the impact of systemic shocks, if they occur, would be catastrophic.

Liquidity guidelines for banks were released only after the Recession of 2008-09. Banks stepped up liquidity risk management practices after 2009. It is hence, reassuring to see that liquidity risk is already a focus for investment company regulators worldwide, especially given the fact that a larger percentage of household savings is moving into funds.

The need of the hour is for investment companies to take cognizance of these guidelines, stitch the core principles into their internal processes and to reinforce their existing liquidity management practices to meet the challenges of the future.

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