

Risk & Asset management | Principles for sound Liquidity Risk Management and Supervision

Speakers & Agenda



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Liquidity Stress Testing

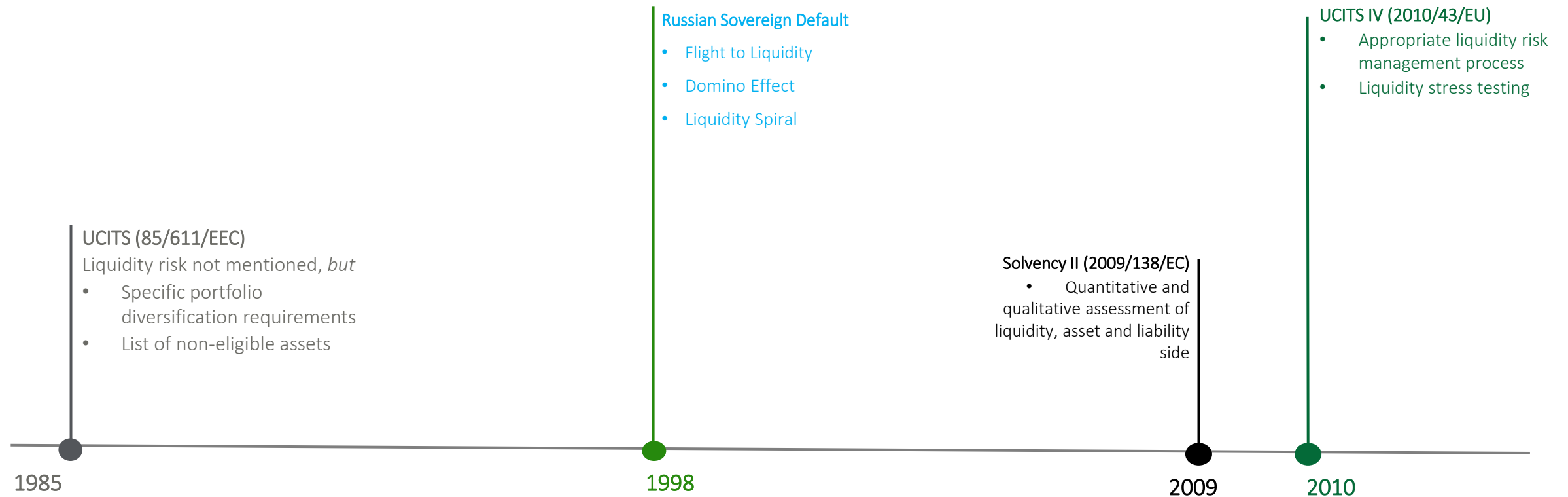
Key Takeaways and Q&A

Liquidity events

Genesis

Liquidity: the ability to convert an asset into cash with immediacy and at limited cost.

Liquidity risk: the risk that a position in a portfolio cannot be sold, liquidated or closed at **limited cost** in an adequately **short time frame** and that the ability of the to repurchase or **redeem** its units at the request of any unit-holder is thereby compromised.



Considering liquidity risk

General definition



Simulating Stress

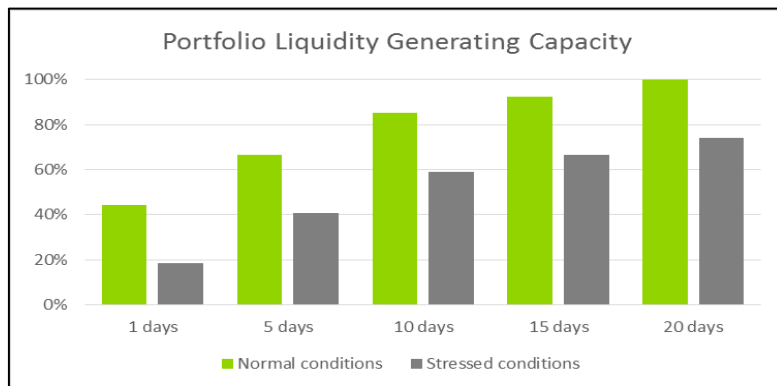
Liquidity evaporation

Managers should simulate:

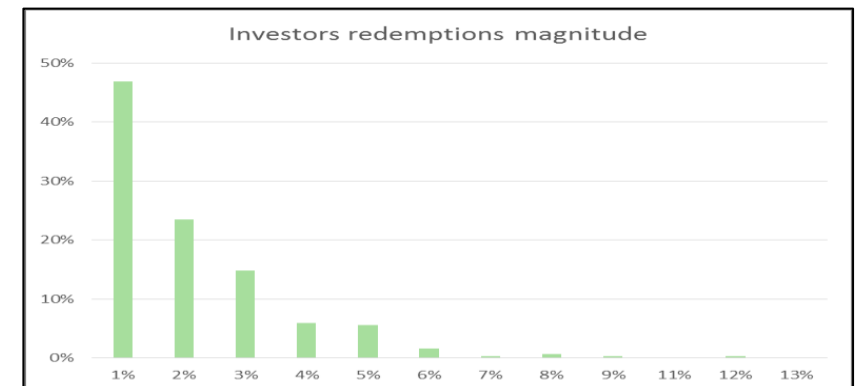
- **Increasing** time to liquidation
- **Increasing** liquidation costs
- **Increasing** price impact

Managers should consider:

- **Increasing** redemption frequency
- **Increasing** redemption magnitude
- **Decreasing** availability of other funding sources

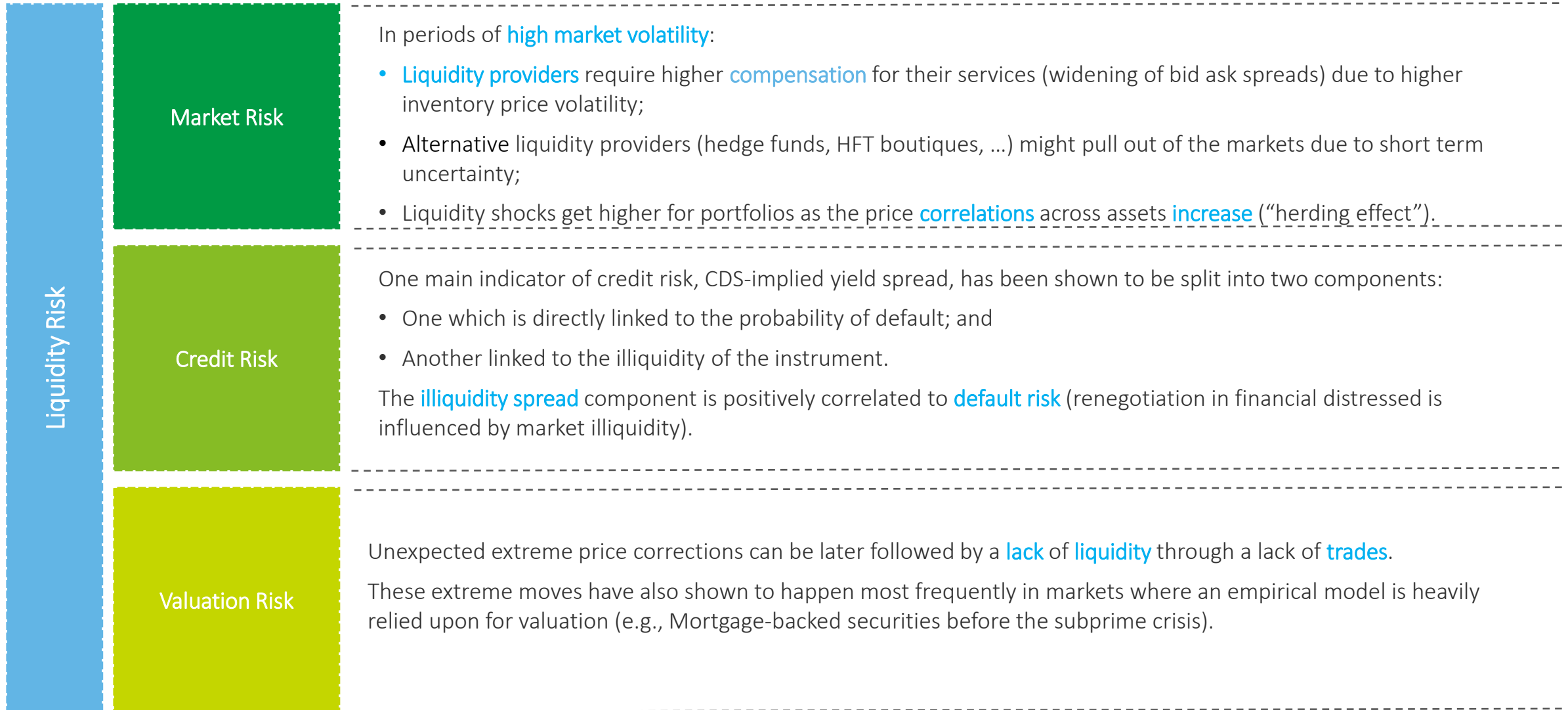


Determine the overall effect on Fund liquidity and Fund **ability to meet its obligations**



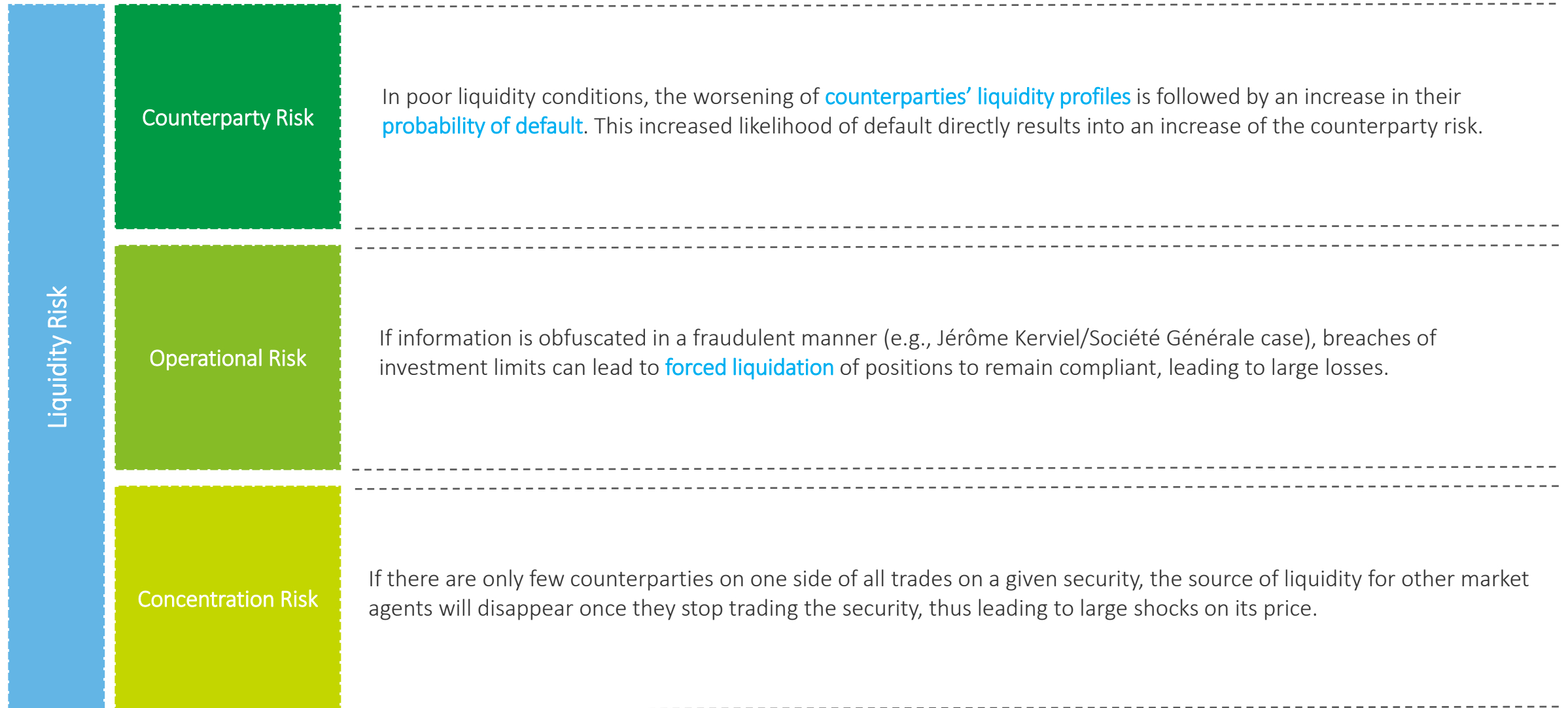
Integrated into the overall risk framework requirement

How liquidity ties in



Integrated into the overall risk framework requirement

How liquidity ties in



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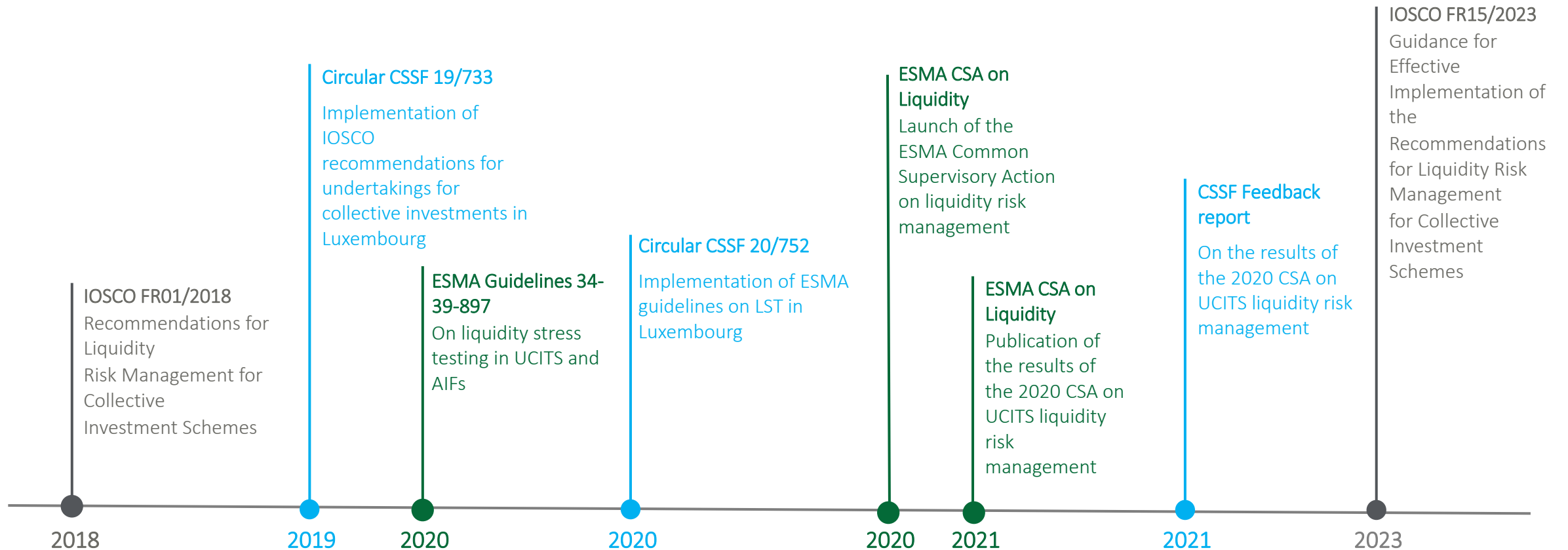
Know Your Investor

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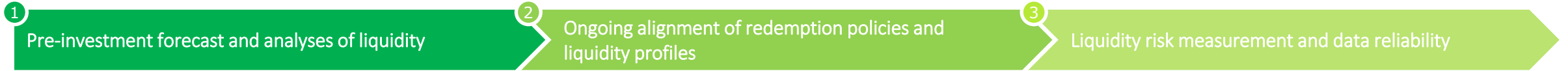
A lot of activity in the last few years

Recent regulatory milestones



CSSF on ESMA CSA – UCITS Liquidity Risk Management

Main Observation



● The CSSF highlight the needs of:

- **A clear allocation of responsibilities** at the IFM level for the assessment of liquidity in the context of pre-investment analyses
- An adequate and **documented liquidity analyses** and forecast at pre-investment level **for less liquid assets**

● The CSSF highlights the needs to adequately incorporate:

- **Redemption risk** accounting for the **investor base** and distribution channels
- **Liabilities other than redemptions** (e.g. margin calls)
- **The interaction between liquidity and valuation risk**

● The CSSF reminds that the IFM shall:

- Ensure that the **assets** in which it invests **can be handled in adequate manner by its LRM process**
- ensure that **adequate controls are in place** in order to verify the **reliability of the data used** for the ongoing liquidity assessments

4 Governance and control mechanism

● The CSSF highlights the needs of the IFM to:

- regularly **involve the compliance and internal audit functions** in the **review of the LRM processes**
- Establish, **implement** and maintain adequate **escalation processes based on internal liquidity risk limits**
- **Assess the fund liquidity risk during the product design phase and regularly report liquidity risk to the Senior Management**

5 Information to the investors in the KIID

● The CSSF expects IFM to **define** and implement a documented internal approach underlying the definition of **what is material or not in terms of liquidity risks for supporting the disclosure in the KIID.**

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The measurement problem

Context

No standard definition



Liquidity proxies rather than observations

-  Liquidity is not directly observable due to the **lack of transaction data**.
-  Accordingly, risk managers, portfolio managers and economists rely on **proxies**.
-  Significant efforts are dedicated to identify the good proxies and **measurement techniques**.

Modelling asset liquidity

Factors at asset level

Assets key liquidity risk factors

Transaction Costs

Measure how much it will cost to liquidate a position

Context:

- Depends on the asset type, liquidation horizon, and the size of the trade/order

Stressing:

- Bid-Ask spreads

Problems:

- Lack of transaction data



Price Impact

Measure the rate of price change induced by the trade of one unit of the asset

Context:

- Useful in stressed conditions

Stressing:

- The sensitivity of asset prices to trades large orders (volumes).

Problems:

- No regulatory reference

Time to liquidate

Measure how long it takes to liquidate a position without significant price impact

Context:

- Required by regulator

Stressing:

- Volumes expressing longer time to liquidate

Problems:

- Little academic evidence
- Not adapted to stressed conditions



Scoring

aggregation of indicators at the position level

Modelling asset liquidity

An illiquid perspective

- **Illiquid funds** (Private Equity & Real Estate) are characterized by a **segmented life cycle**.
- Liquidity monitoring and modelling should reflect and be adapted to these different stages.

1. Asset sourcing and management

Due to the absence of public secondary market, liquidity **cannot** be generated from the asset **sell** off.

On the other hands, illiquid assets continuously **generate cash** flows (Dividend, EBITDA, Rents,...).

The source of assets liquidity risk stems from the **volatility** of these cash flows and especially the **deviations** from initial forecasts.

2. Disposition

Alternative funds primarily invest with an **exit** in mind after several years.

As the last critical step of the investment process, the **exit timing** can significantly affect the final IRR as well as increase **liquidity risk**.

At the time of the exit, the fund needs to ensure sufficient **market appetite** for the asset to be disposed.

Monitoring tools

- 1 Deviation analysis
- 2 Scenario analysis
- 3 Stress-testing

Monitoring tools

- 1 Market watch
- 2 Reverse scheduling
- 3 Stress-testing

Modelling asset liquidity

Asset specifics – derivative instruments

Derivative instruments liquidity is derived from two main factors:

1. The **liquidity of the market it is being traded on;**

- ✓ For exchange-traded contracts, the information of current and projected Open Interest is an indicator of overall liquidity.
- ✓ The measures detailed previously can also be applied directly to these derivatives from data published by their respective exchange.

2. The **liquidity of the underlying instrument / basket of instruments.**

- ✓ One cannot assume high liquidity on an option contract for example if the **underlying instrument** is not considered liquid itself.
- ✓ A double analysis then needs to be performed in order to adequately assess the level of liquidity of a derivative instrument.

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The liability liquidity risk management framework

The three pillars

CSSF Circular 20/752
ESMA LST Guidelines V.1.12



"LST should incorporate risk factors related to investor type and concentration according to the nature, scale and complexity of the fund."



CSSF Circular 19/733
IOSCO Recommendation 13

Project future redemption risk, relying on the relevant factors:

1. Historical flows
2. Investors breakdown
3. Market and economic outlook

Understanding and addressing the interactions between the factors is pivotal.

Modelling investor redemptions and behavior

Market insights

Basic Practices

- Construction of an **historical flows database** for:
 - Gross redemptions
 - Net redemptions
- Regular computation of **descriptive statistics** of the resulting time-series.
- Ongoing **monitoring (alerts)** of the new redemptions with respect to defined thresholds.

Common Practices

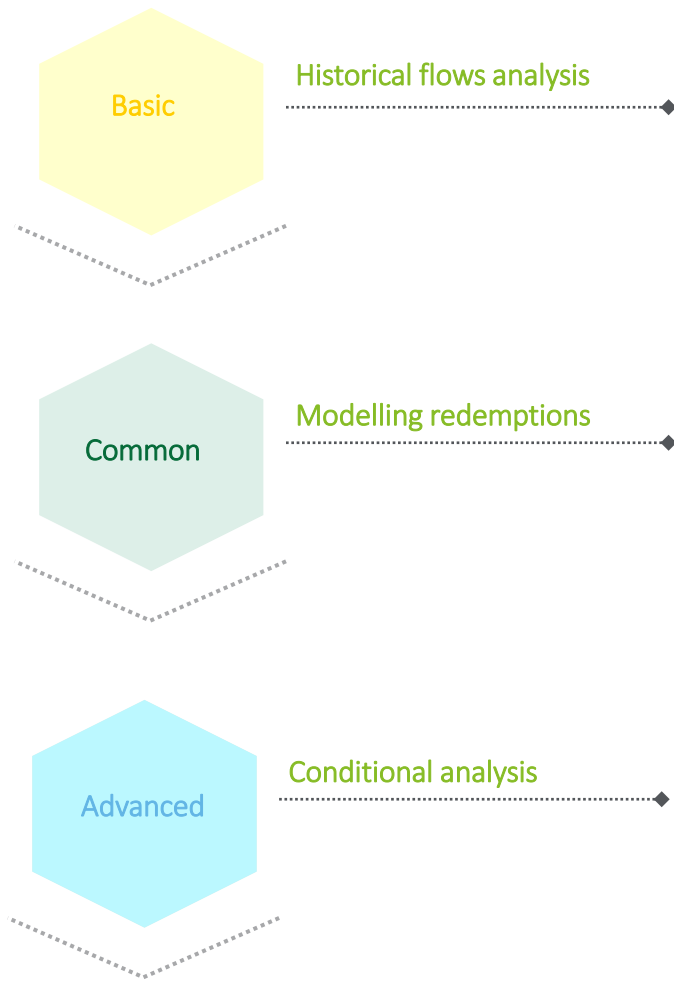
- **Modelling** the **distribution** of flows to project redemptions scenarios.
- Management Companies are modelling distributions both:
 - **non-parametrically**; and
 - **parametrically**by selecting a distribution capturing the fat tails of redemptions data, such as the Generalized Pareto.
- Negative scenarios are often projected relying on:
 - **Value-at-Risk** (sometimes also called Liquidity-at-Risk, LaR); or
 - **Expected Shortfall**.

Advanced Practices

- More advance approaches try to **condition** projected redemption distribution on **key drivers**.
- The magnitude and probability of redemptions can be made dependent on:
 - the fund **performance** (relative);
 - the past **flows**;
 - market **indicators**.
- With sufficient granularity the **flows** history can be **segregated** per **investor type** (retail vs institutional) to adjust the projections to the current investors base.

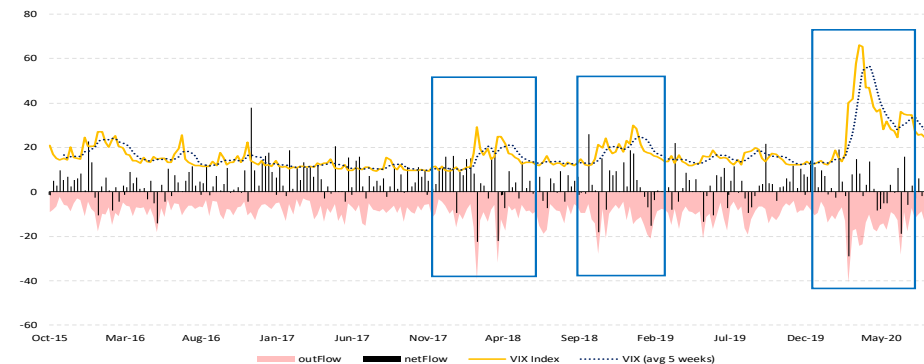
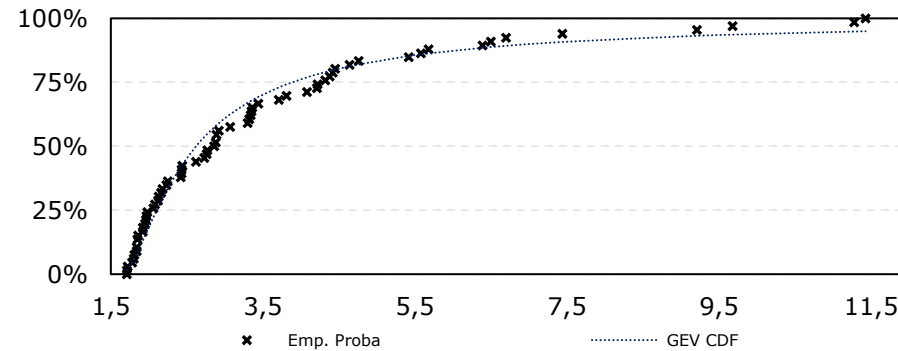
Modelling investor redemptions and behavior

Market insights illustration



$$\begin{cases}
 netFlow_t = NAV_t - [NAV_{t-1} * (1 + r_t)] \\
 netFlow_t = \sum_{k=0}^n (RED_{k,t} - SUB_{k,t}) \\
 grossFlow_t = \sum_{k=0}^n (RED_{k,t})
 \end{cases}$$

- Mean
- Std
- Min
- Q5
- Q95
- Max
- Skew
- Kurt



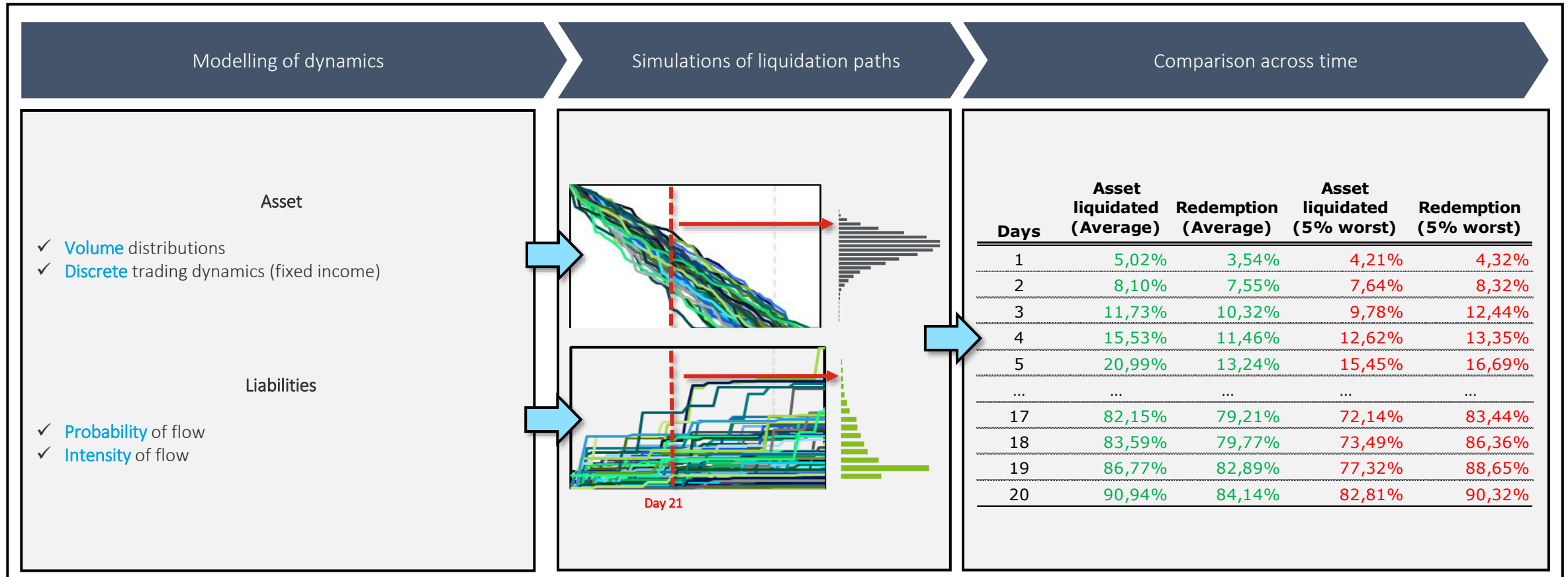
Controls

- ❖ Back-testing
- ❖ Adequacy of estimates w.r.t. historical observations
- ❖ Goodness of fit
- ❖ Robustness in stress periods
- ❖ ...

Forecasting Models for asset and liabilities liquidity

Comparison of asset and liabilities liquidity

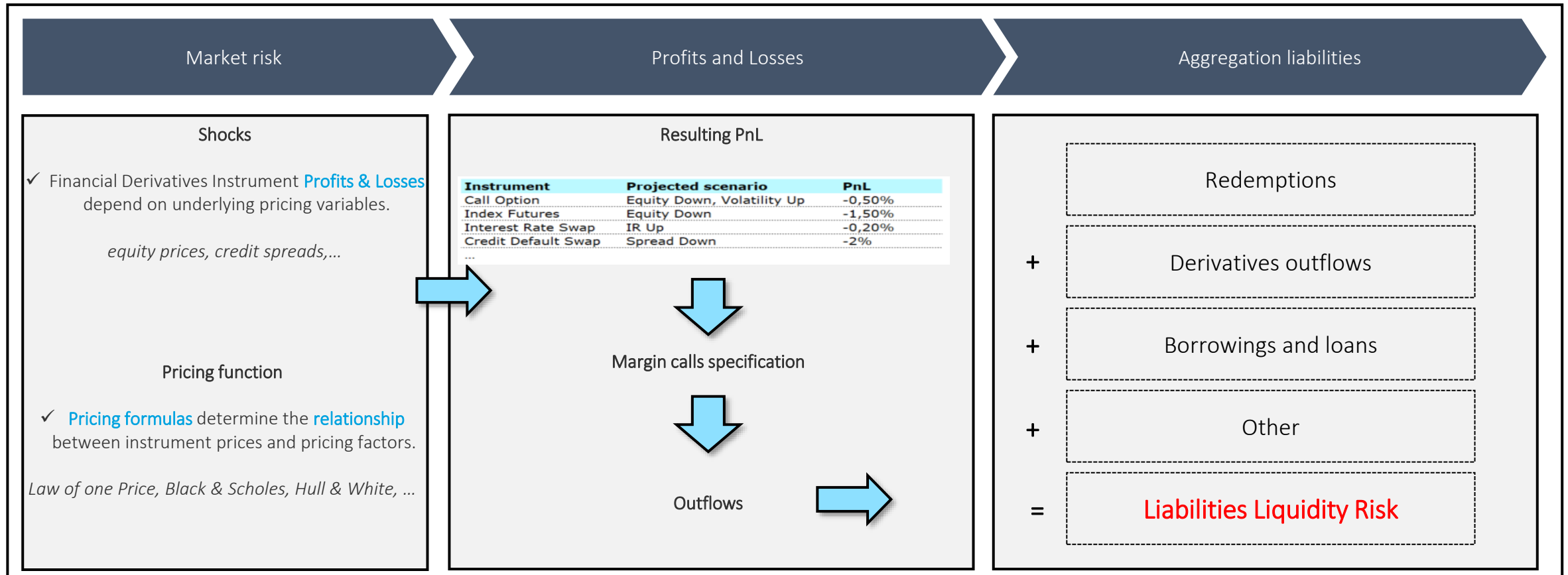
- In order to properly assess and manage the liquidity capacity of an investment fund, a manager has to be able to compare its [Asset Liquidity Profile](#) and [Liabilities Liquidity Profile](#).
- This comparison can only be done through one dimension: [Time](#). As such, the comparison exercise lends itself particularly well to [Monte-Carlo Simulations](#).



Modelling financial derivatives obligations

An interaction between market and liquidity risk

- The **loss** resulting from market risk on **derivatives** can generate **additional** obligations and **liability** liquidity (outflow) risk.
- **Margin calls** and other derivatives related outflows can be **projected** based on scenarios relying on standard market risk solutions (softwares).



An illiquid perspective

Funding risk

- Typically in funds investing in alternative investments, investors have a **contractual obligations** to contribute via a **capital commitment** that is drawn down following a specified period of notice.



The liquidity risk in this case is closely linked to funding risk.

- In case of an **investor default**, the fund may be forced to **borrow money** to fund the resulting **shortfall** or face the **costs of delay** in an acquisition causing the loss of opportunity and reputation. Most common reasons why investors could default on their capital commitment are:

Market distortions in capital calls and distributions

Over-commitment strategies

- Performing the Due Diligence and monitoring of investors
- Charging a penalty interest on the late payments
- Monitoring the investor concentration
- Monitoring the levels of called and uncalled commitment per investor

An illiquid perspective

Funding risk and ongoing costs

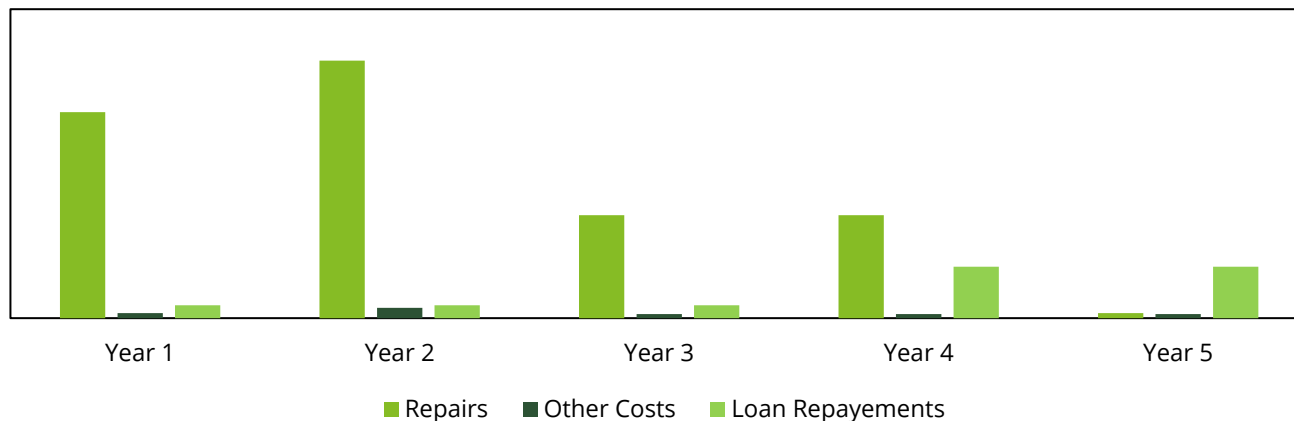
- During the stage of asset management, **additional liabilities** arise from **physical property** management costs (investment and ongoing) and **financing costs**.
- These outflows are **uncertain** (time-varying) and require ongoing monitoring in light of the initial cash flow projections.

Cost Projection - Baseline

	Year 1	Year 2	Year 3	Year 4	Year 5
Repairs	200.000.000	250.000.000	25.000.000	10.000.000	5.000.000
Other Costs	5.000.000	10.000.000	4.000.000	4.000.000	4.000.000
Loan Repayments	12.500.000	12.500.000	12.500.000	22.500.000	22.500.000

Cost Projection - Scenario 1

	Year 1	Year 2	Year 3	Year 4	Year 5
Repairs	200.000.000	250.000.000	100.000.000	100.000.000	5.000.000
Other Costs	5.000.000	10.000.000	4.000.000	4.000.000	4.000.000
Loan Repayments	12.500.000	12.500.000	12.500.000	50.000.000	50.000.000



Specific attention should be given to refinancing conditions

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Know your investor

Investors breakdown

Basic Practices

- Monitoring of the **concentration** through the **largest** investors **ownership**:
 - Top 1
 - Top 5
 - Top 10

Common Practices

- Completing largest ownership with additional descriptive statistics casting a light on the **other investors** such as:
 - Monitoring the number of investors needed to reach a given NAV percentage.
 - Monitoring concentration indices (Herfindahl-Hirschman Index, Gini Index, etc.)

Advanced Practices

- **Grouping investors** per categories of individuals with **homogeneous** redemption patterns and risk preferences.

For example, retail and institutional investors display diverging behavior with respect to:

 - Probability and magnitude of redemptions
 - Seasonality
 - Sensitivity to past performance
 - Costs

Challenge

- Distribution models relying on intermediaries may give rise to nominee accounts which do not allow for a full transparency over the investors breakdown.
- An alternative is to estimate the investors breakdown, rather than observe it, through enhanced information exchanges with the global distribution network, including

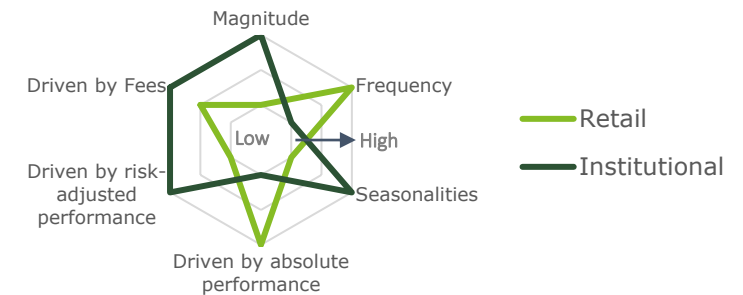
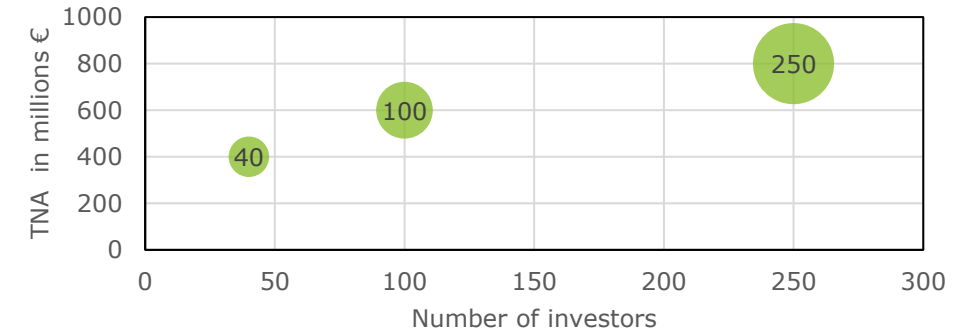
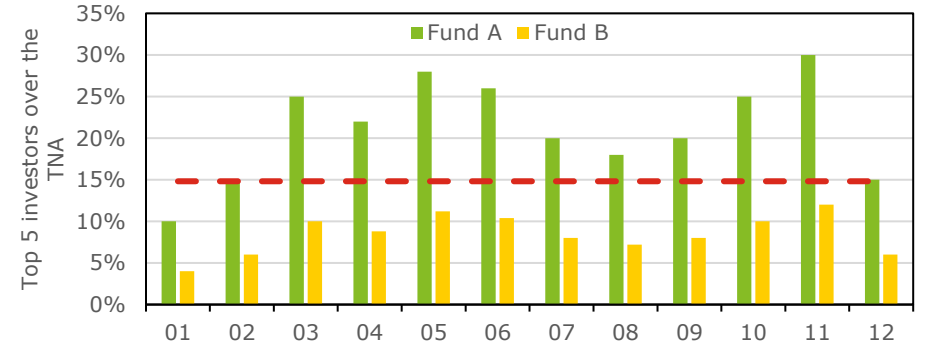
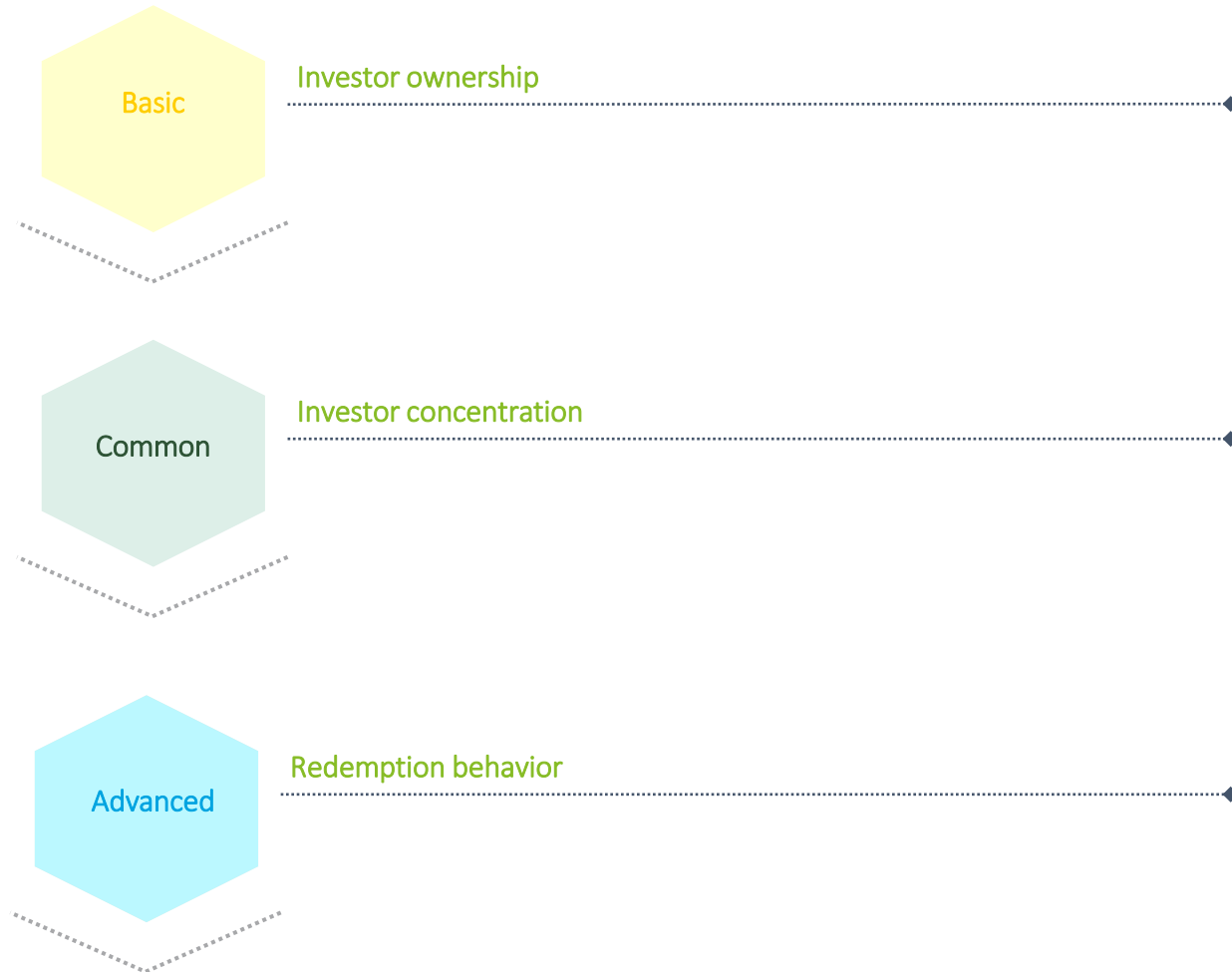
● Informal discussions

● Formal interviews/questionnaires

● Escalation of key events

Know your investor

The liability liquidity risk management framework



Know your investor

Accounting for market conditions

The Market Watch Approach

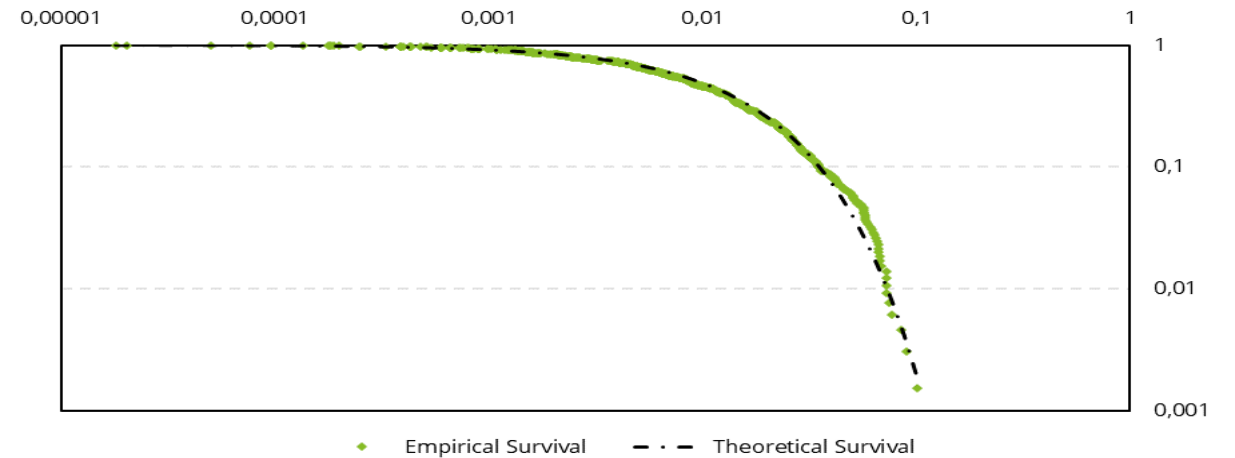
- In order to gauge the impact of the **market conditions** on projected redemptions, some market players establish a market watch by:
 - initially identifying the relevant **factors** impacting the investors redemption behavior; and
 - following the **evolution** of these indicators.

Relevant Indicators	Evolution
Fund Performance - relative	↓
Fund Redemption Trend	↑
Market Volatility - VIX	↑
ETF Flows – Asset Class	↓
Fund Recommendation Downgrade	!
....	

! Liquidity Alert !

The Aggregation Approach

- Aggregation** is more ambitious but can be achieved with:
 - conditional** flows modelling – e.g., Copulas, Logit/probit, etc – and
 - cumulative **stress test** scenarios.



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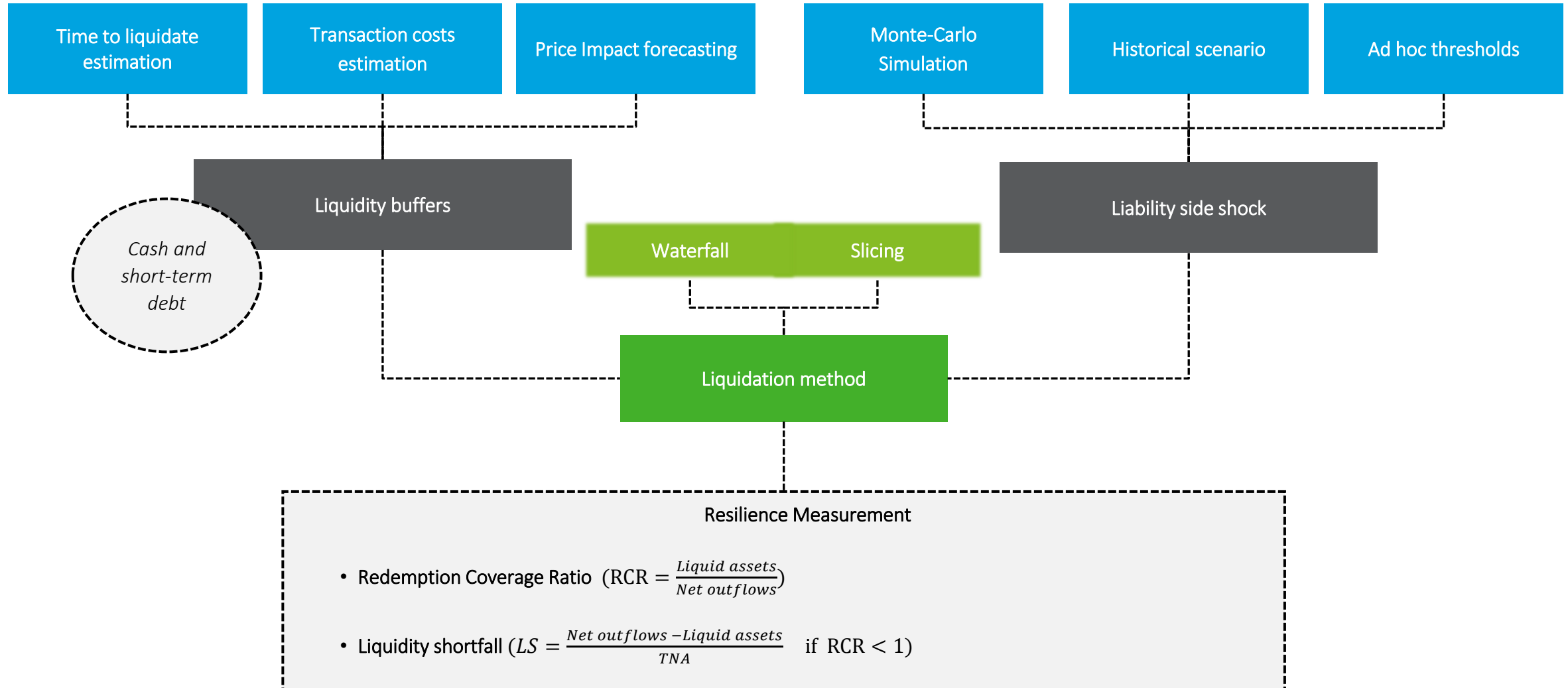
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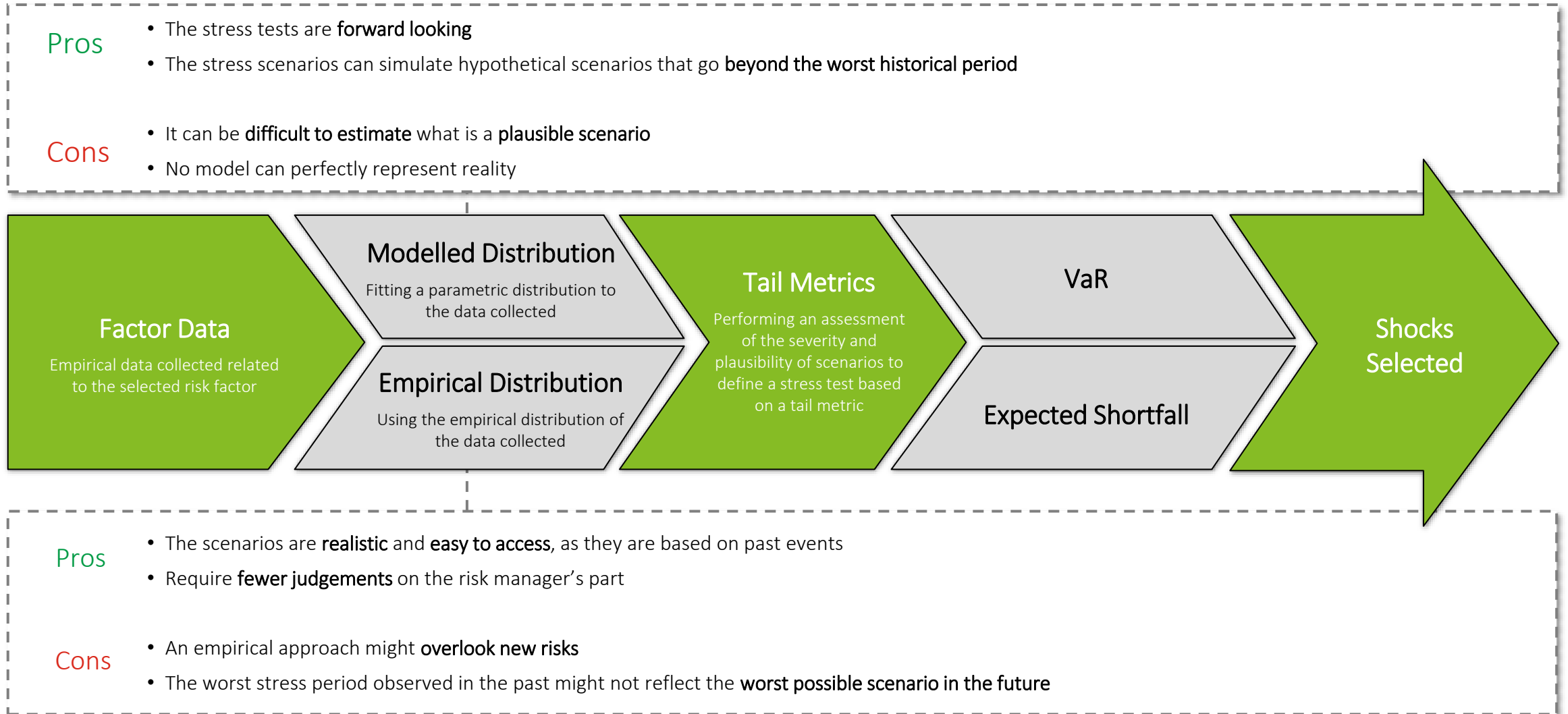
Liquidity stress-testing and aggregation

Factors affecting liquidity: asset vs liabilities



Liquidity stress-testing and aggregation

Process of calibrating a plausible parametric shock



Liquidity stress-testing and aggregation

Process of calibrating a plausible parametric shock

Liquidity stress-testing for UCITS and AIFs
(ESMA34-39-882)

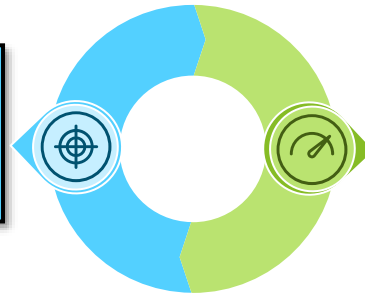
Historical scenarios could include the global financial crisis 2008-2010 or the European debt crisis 2010-2012 but should not overly rely on historical data, particularly as future stresses may differ from previous ones.

Parametric scenarios could include events such as: rising interest rates, credit spread widening, or political events.

How to define parametric scenarios?

Factor to shock:

What risk factors is the fund most exposed to?



Magnitude of shock

What is an adequate shock for this stress factor?

- The **magnitude of the shock** is pivotal to the relevance of the stress test.
- Shock selection is somewhat arbitrary, **calibration** aims at rendering it more objective through a data driven assessment of **two key criteria**:

Severity

The defined scenarios must be severe enough to **adequately test the resilience** of the fund to the relevant risk factors

Plausibility

The defined scenarios must remain plausible in order to **be relevant** for the purpose of **stress testing** the fund

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Importance of the Investor Base

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Key Takeaways

1

Asset Liquidity is characterized by three key types of Risk Factors

- **Transaction costs** measures how much it will cost to liquidate a position
- **Time to liquidate** measures how long it takes to liquidate a position without significant price impact
- **Price Impact** measures the rate of price change induced by the trade of one unit of the asset

2

Liability Liquidity is characterized by three key types of Risk Factors

- **Historical fund flows** can be used to forecast future net outflows
- **Investor breakdown** retail investors tend to be more volatile when compared with institutional ones
- **Market and economic** outlook drive investors demand for money or investment products

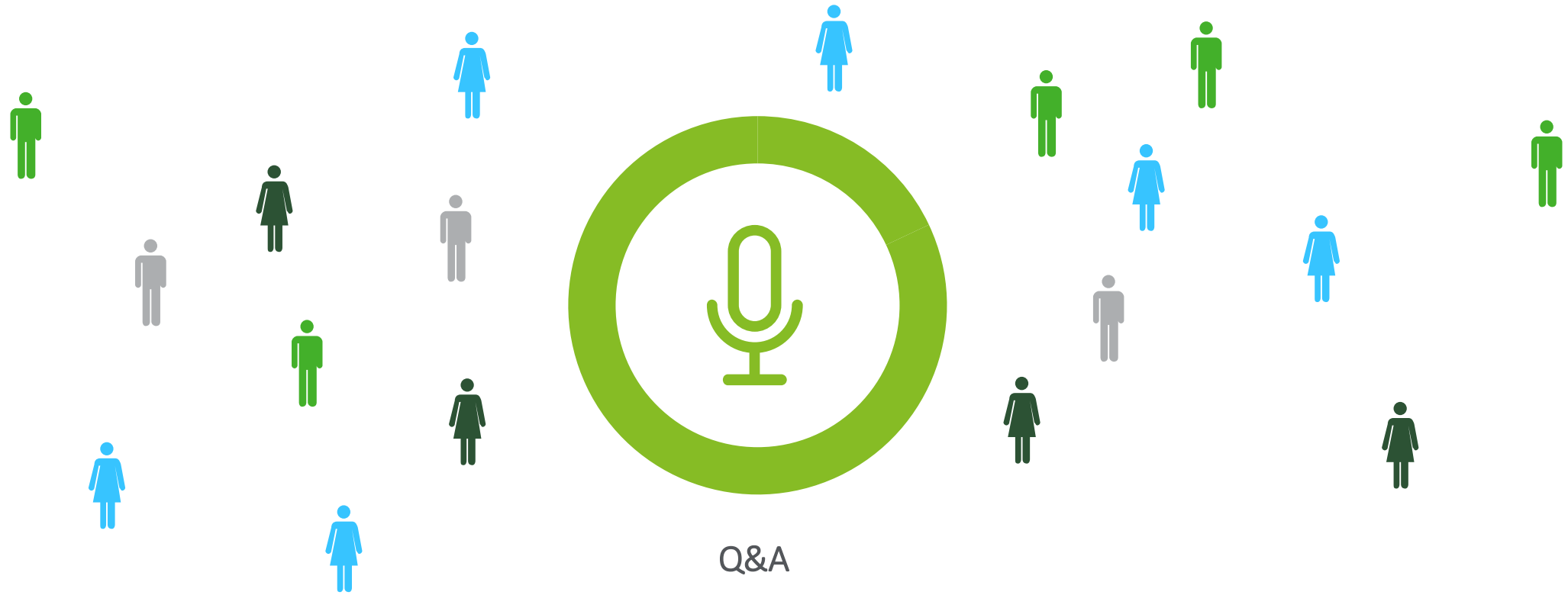
3

Liquidity Stress Testing

- Can simulate **parametric** and **historical** scenarios
- Allows to evaluate **liquidity conditions** under **stressed scenarios**
- Allows to **identify liquidity shortfalls** before they happen

Open discussion

Thank you very much for your participation



Next Link'n Learn webinar

*Date: **15/05/2024***

Topic: **Alternative
Investments | INREV
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