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and Faculty
of Actuaries

Water, water, everywhere...

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02 July 2018

Introduction | Water, Water, Everywhere…

The Rime of the Ancient Mariner

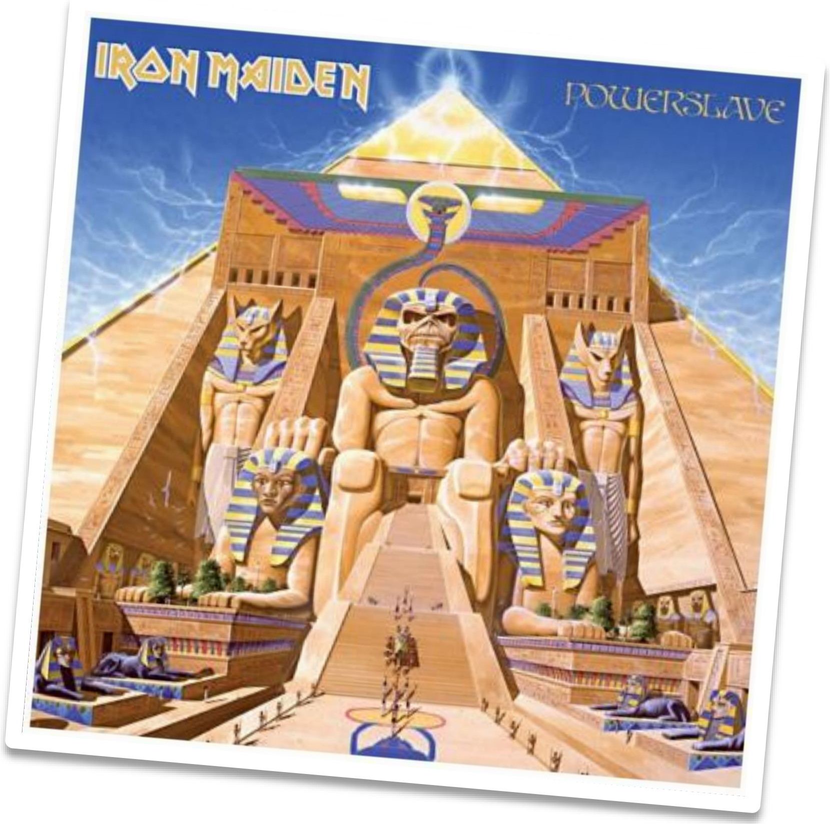
Water, water, every where,

And all the boards did shrink;

Water, water, every where,

Nor any drop to drink.

Samuel Taylor Coleridge, 1798



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Introduction | Agenda

- Liquidity **management framework**
- **Factors** driving **increasing focus**
- **Sources** and **uses**
- **Measurement** and **management**
- **Centralised** liquidity management

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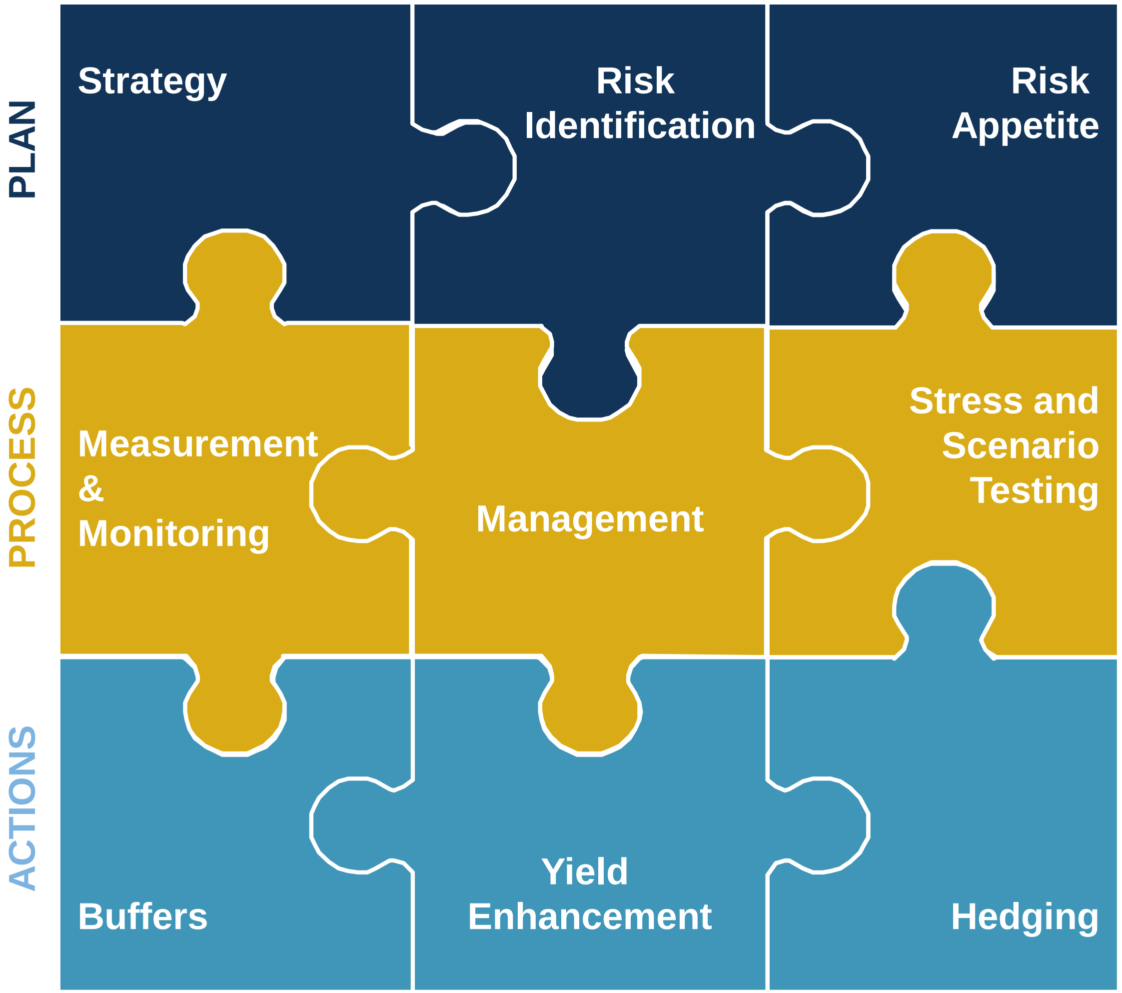
Introduction | Liquidity Framework



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Planning

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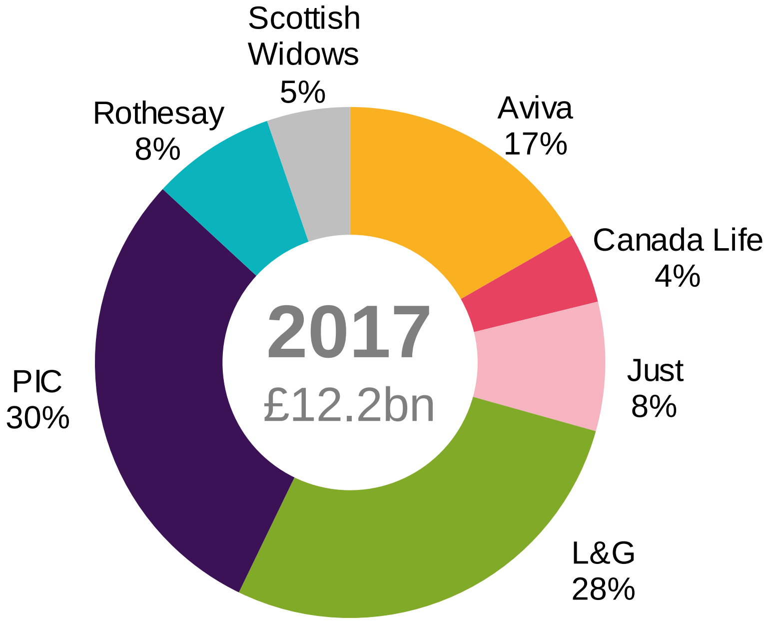
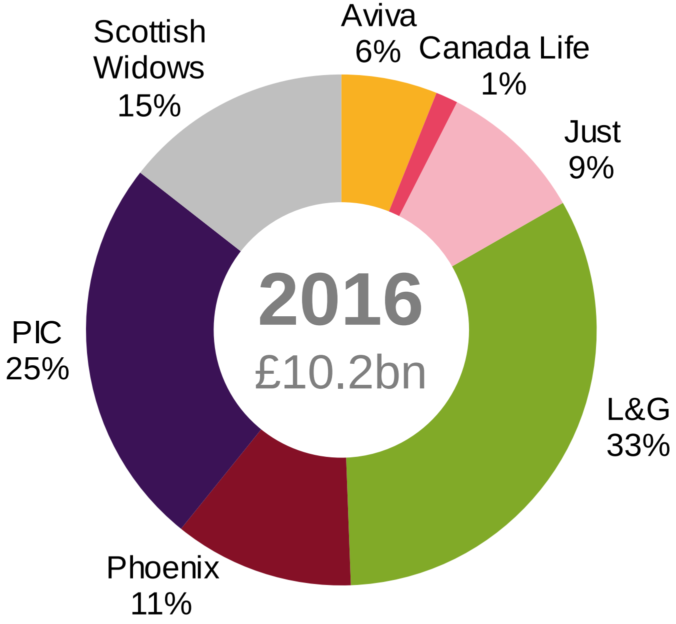
Strategy | Bulk Annuities





- Increased allocations to **illiquid credit**
- Closer matching of expected asset and liability **cash flows**
- Increased **regulatory burdens** and **market constraints**

Source: LCP, Hymans Robertson, Annual Reports

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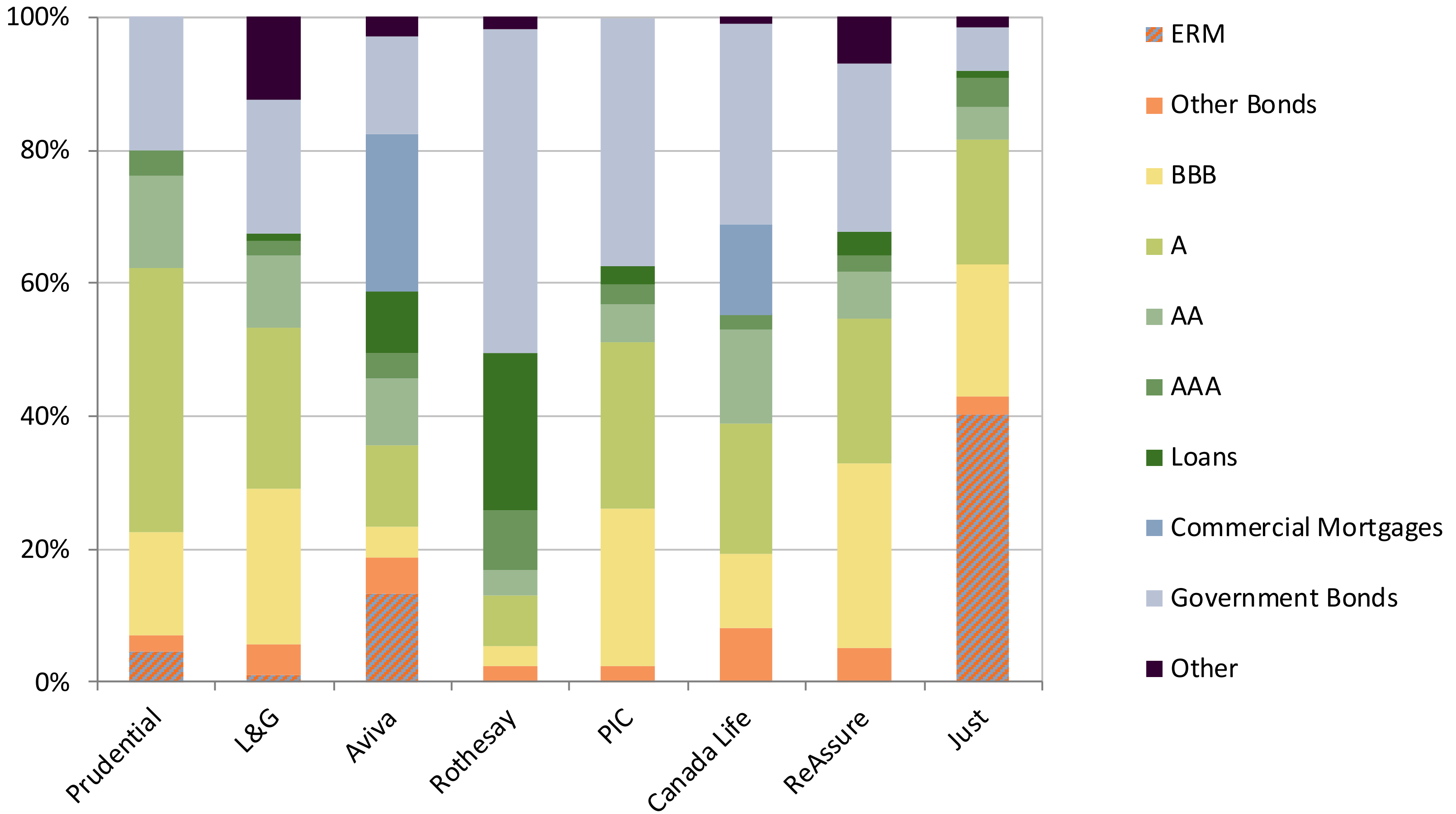
Strategy | Asset Allocation



Source: SFCRs, Annual Reports; end-Dec 2016

Constraints | Matching Adjustment

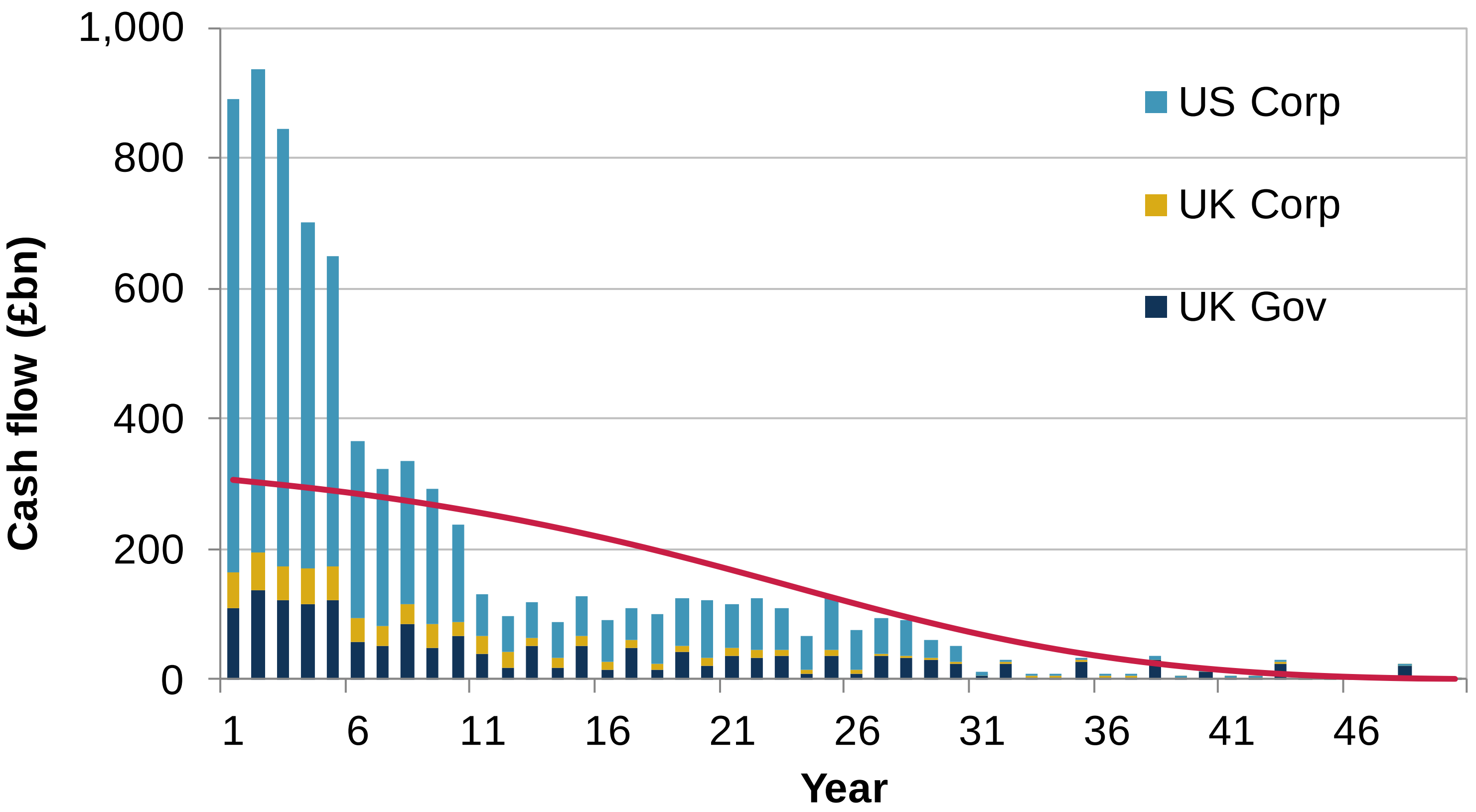
15 Oct 2014

“Stronger [MA pre-app] **liquidity plans** included”:

- **definition** of liquidity risk
- monitoring tools, including **stress and scenario testing**
- **cash flow forecasts**
- interaction with wider **liquidity management framework**

Source: PRA

Strategy | Asset Availability



Source: Bloomberg, NWM; end-Dec 2016

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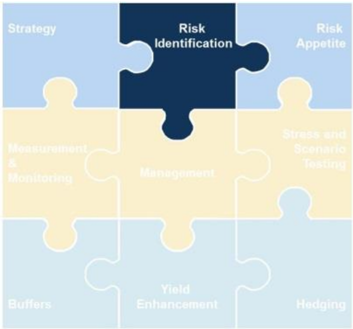
Constraints | Matching Adjustment



28 Mar 2015

The PRA's view is that the paired/grouped assets that result from using **FX forwards** to hedge non-sterling bond exposures **do not provide fixed cash flows**

Firms currently using FX forwards in their MA portfolio should explore **longer-dated cross currency swaps** or other approaches including **portfolio restructures**

Source: PRA

Currency risk is included in the PRA's 99.5th percentile VaR **cash flow test**

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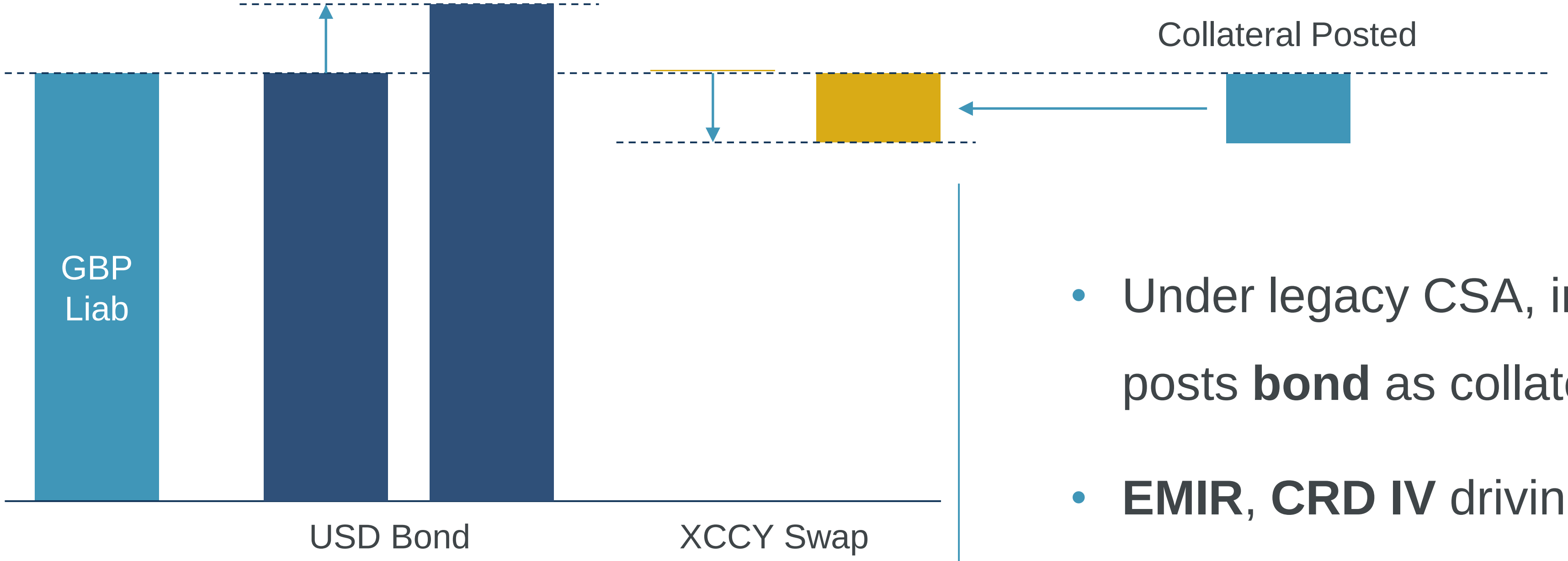
Constraints | Derivatives Markets



- Under legacy CSA, insurer posts **bond** as collateral
- **EMIR**, **CRD IV** driving move toward **cash-only** margining

Cost of collateral analysis is similar to banks' **Funding Valuation Adjustment**

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Constraints | Matching Adjustment

01 Jun 2015

Management of **collateral arrangements** should **not** undermine the requirement for MA portfolios to be "**identified**, **organised** and **managed separately** from the firm's other activities"

Requirements on the MA portfolio resulting from **collateral** or **other arrangements** that **restrict** the type of assets that can be **posted** as collateral could restrict firms' ability to **extract surplus** or to use those assets to meet **other MA liabilities**

Source: PRA

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Identification | Sources and Uses

Sources

- Cash
- Gov’t bonds / repo
- Derivative margin calls
- Securities lending
- Contingent collateral facilities
- Revolving credit facilities

Uses

- Operating out flows
- Dividends and financing costs
- Derivative margin calls
- Securities lending
- Contingent funding facilities

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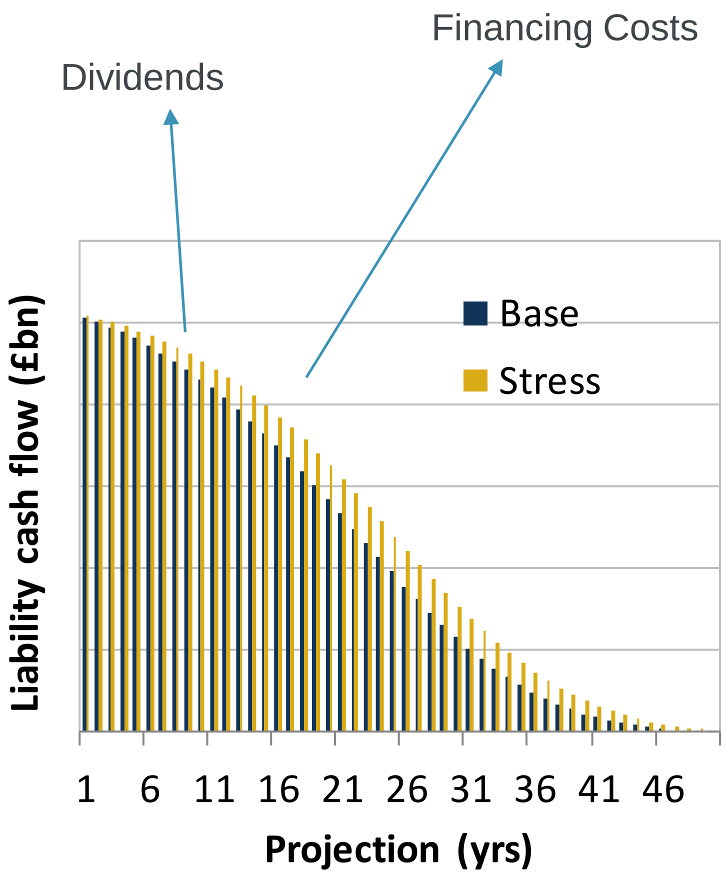
Identification | "Traditional" Exposures



- Historically, insurer liquidity evaluation has focussed on **asset vs. liability cash flows**
- **Rating agency methodology** might focus on asset vs. liability cash flows **under stress**
- MA **cash flow tests** effectively cover this off
- For products other than annuities, **lapses** can present a liquidity risk

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Identification | Contingent Exposures

Does anyone have a **liquidity problem** at the moment?

Many firms have **too much liquidity**…

Source: Conference Dinner

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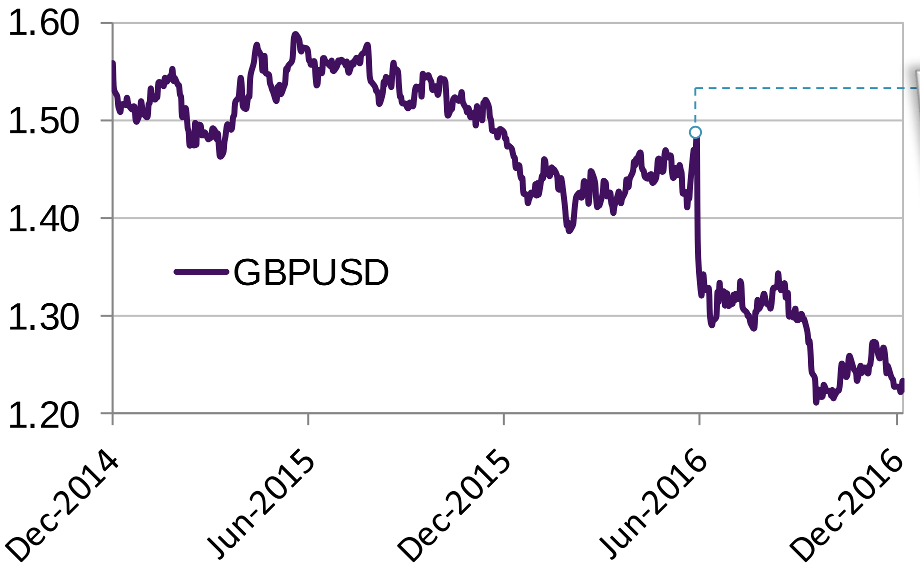
Identification | Contingent Exposures

Liquidity issues typically arise at times of **stress**:



Source: iBoxx, Bloomberg, NWM

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Process

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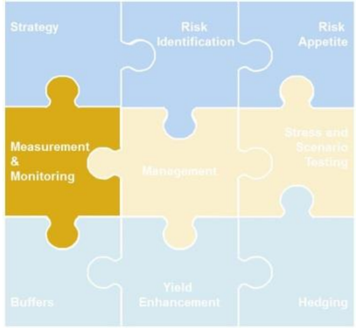
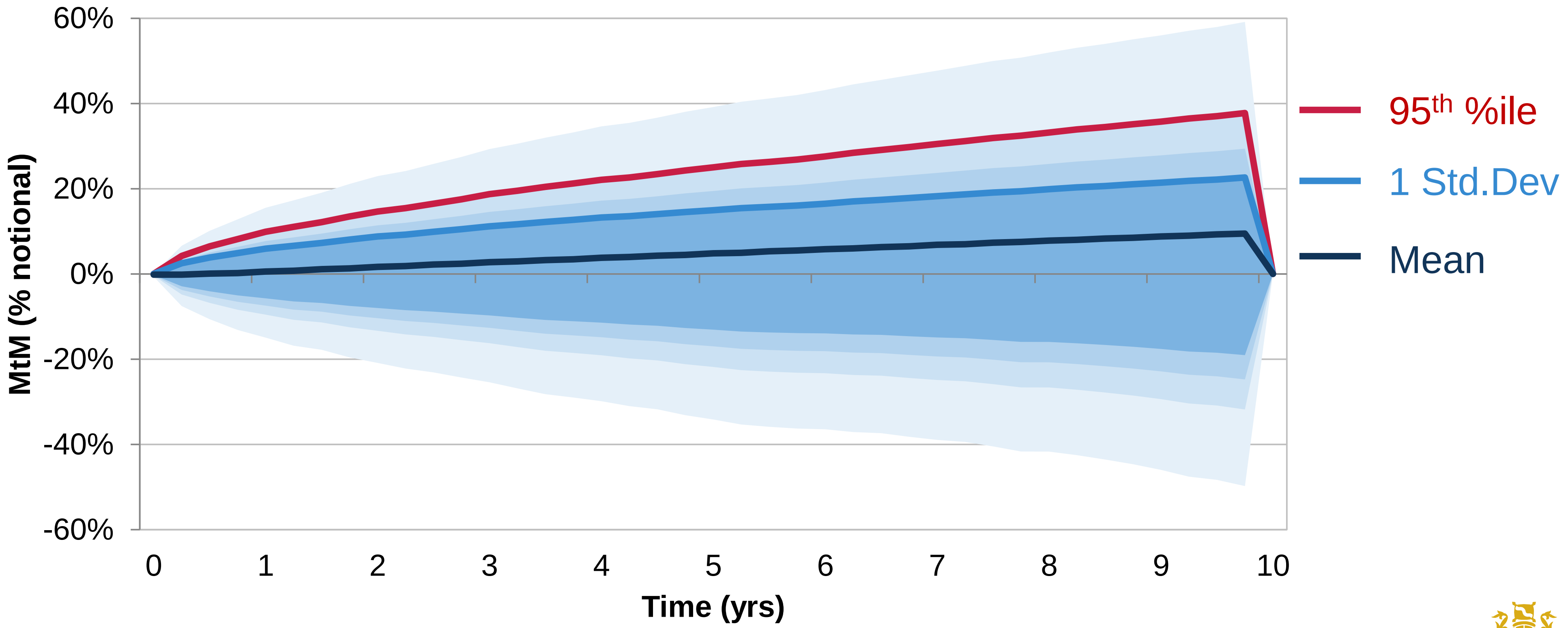


Measurement | Contingent Exposures

Distribution of projected exposure:10yr USDGBP XCCY swap



Source: NWM. Exposures based on Monte Carlo simulations calibrated to market data. Such projections are based on assumptions and are not a reliable indicator of actual future exposure

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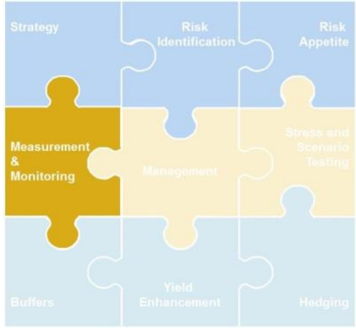
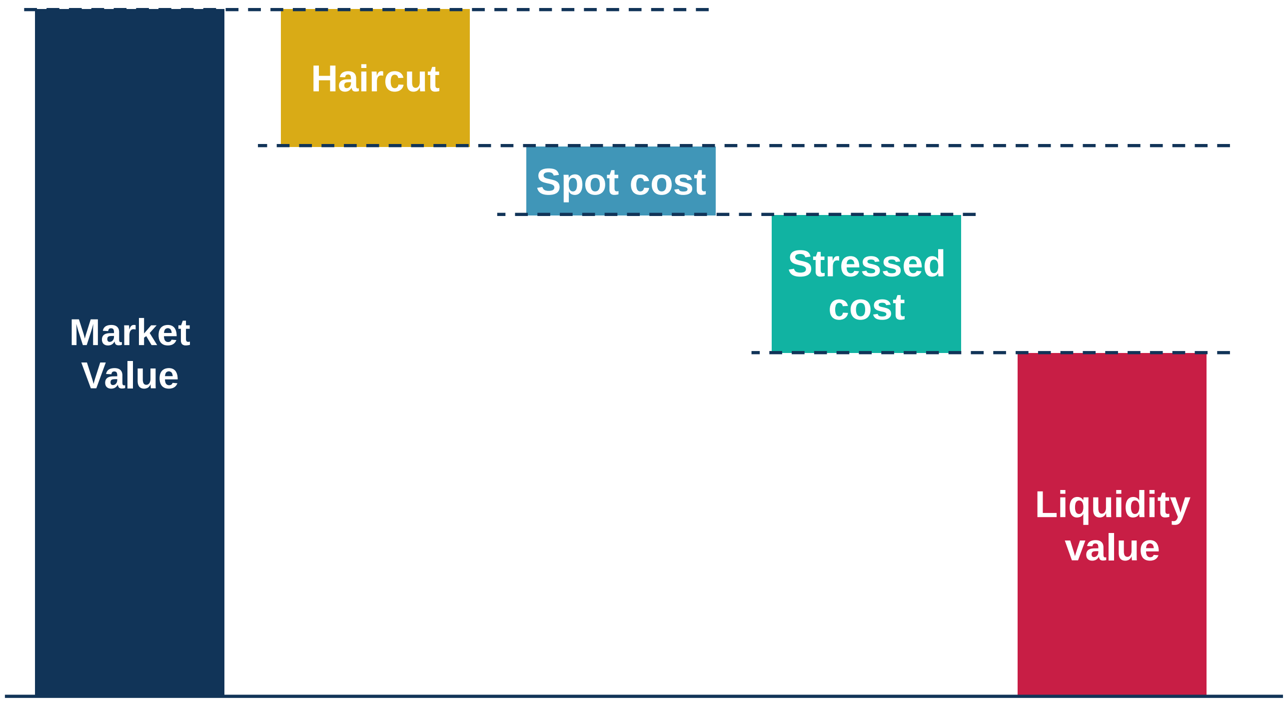
Measurement | Liquidity Value



Total **liquid resources** may exceed total **liquid assets**

Liquidity value:

- amount of liquidity that can be extracted from **any asset**
- e.g. entering into a **repurchase agreement**
- using the asset as collateral to **secure funding** against



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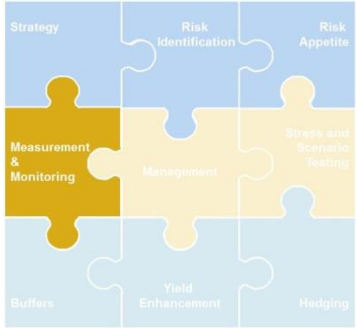
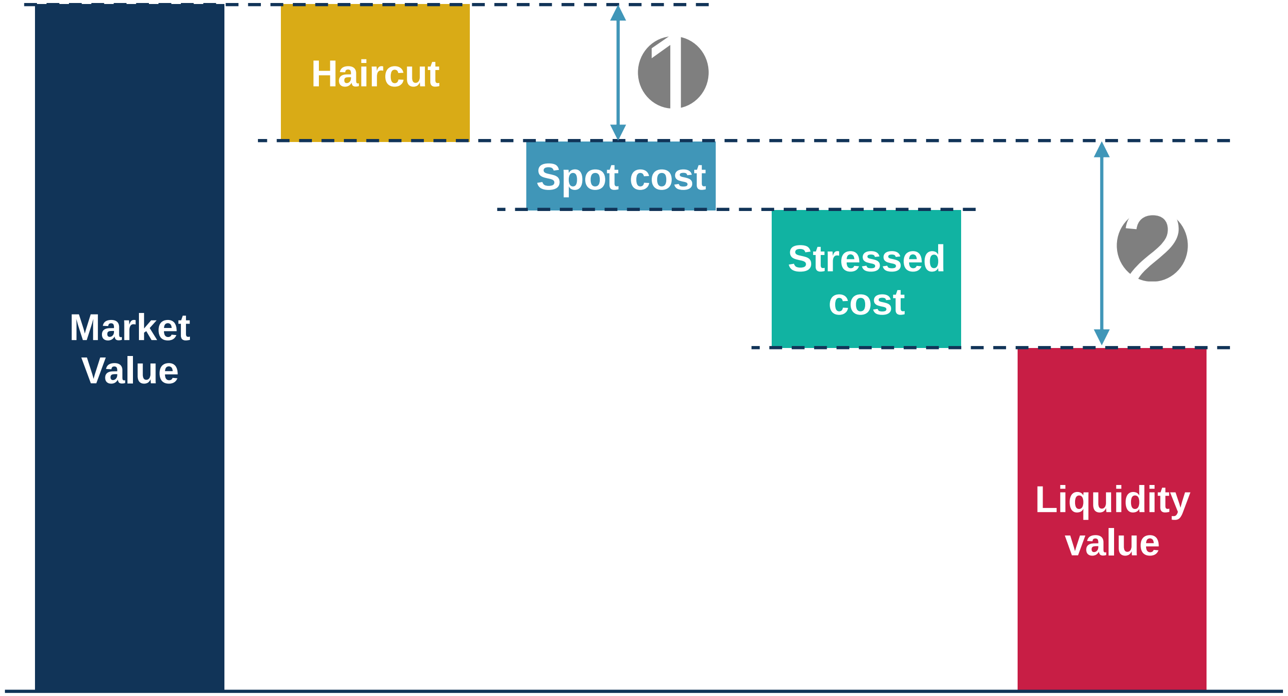
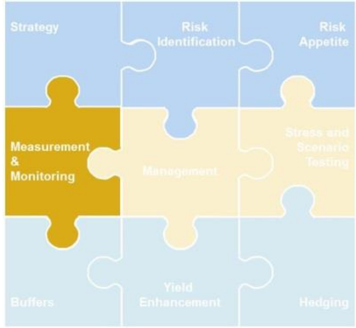
Measurement | Liquidity Value



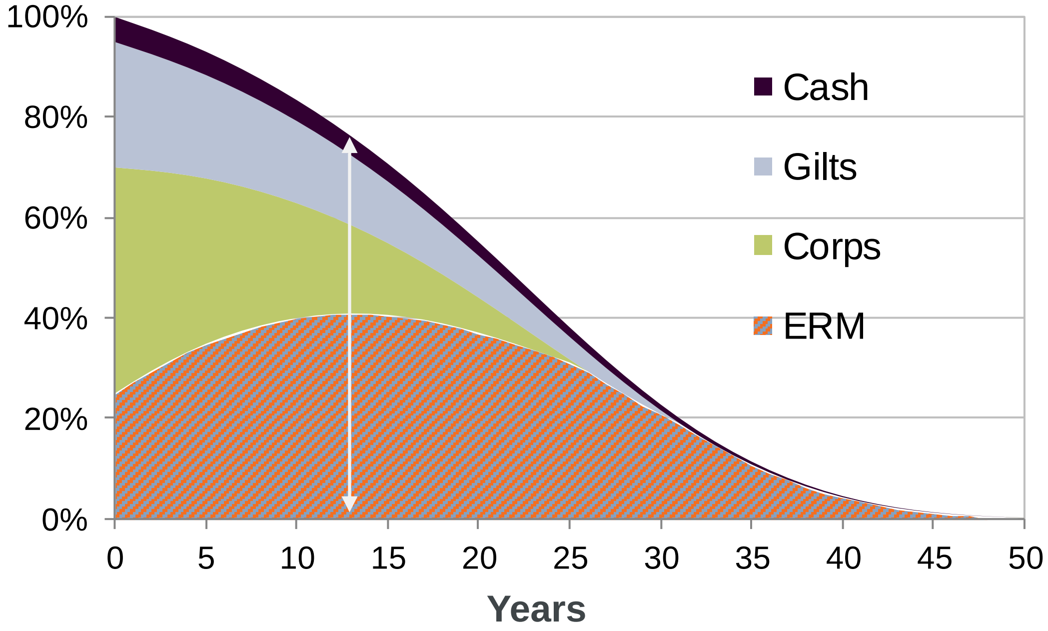
1. Amount **advanced** subject to "**haircuts**" reflecting the perceived **riskiness** of the collateral
2. **Cost of funding** linked to prevalent market conditions
3. **Term structure** reflecting the availability of funding for different terms



Measurement | Liquidity Value

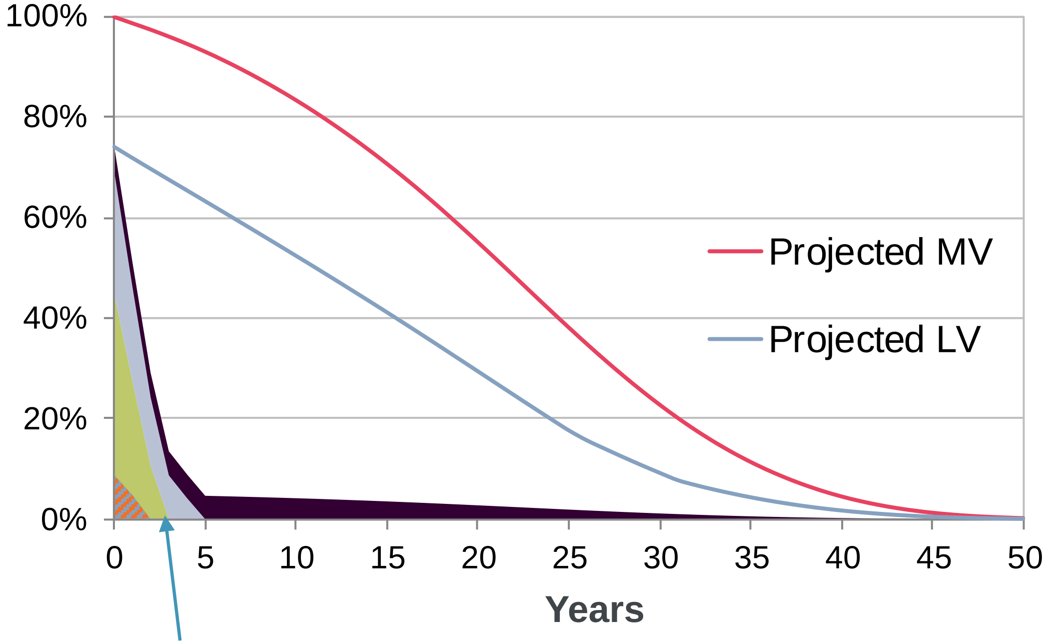


Projected Market Value



- Proportion of **illiquid assets** exceed 50% by year 13 through **organic growth** alone

Liquidity Value (time 0)



Source: NWM

- Typical **repo tenor**: 3m
- 3-5yrs+ is very rare

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Management | Options

CSA	Cash-only	Cash and Gilts	Cash, Gilts and Bonds
Liquidity Need	High	Medium	Low
Shortfall	Cash	Secured Funding	
	Securities Lending		Funding Facility
	Liquidity Facility		Senior Debt
Surplus	Funding Trades SAA	Securities Lending	

Eligible collateral

Trading costs

Investment returns

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Actions

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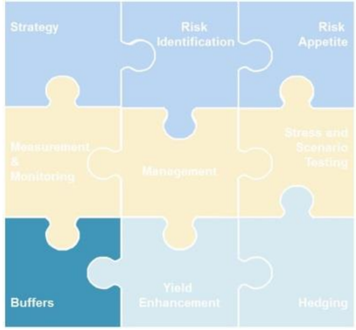
Buffers | How Big is Big Enough?



Set buffers with reference to:

- the **distribution** of **projected exposure(s)**
- liquidity **risk appetite**
- **liquidity value** of assets held
- other management options

PIC Annual Report 2017

- > £8 billion of **highly liquid assets** (c.33% of total assets)
- predominantly **gilts** and **cash**
- **collateral requirement** under extreme market moves (1 in 200 year stress scenario) is c.£4 billion

Under this assessment, many firms have **too much liquidity**

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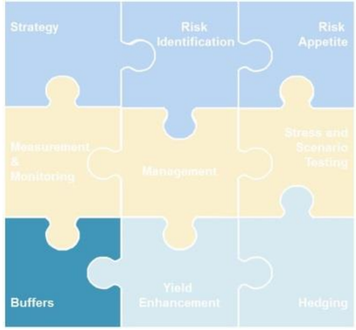
Buffers | How Big is Too Big?

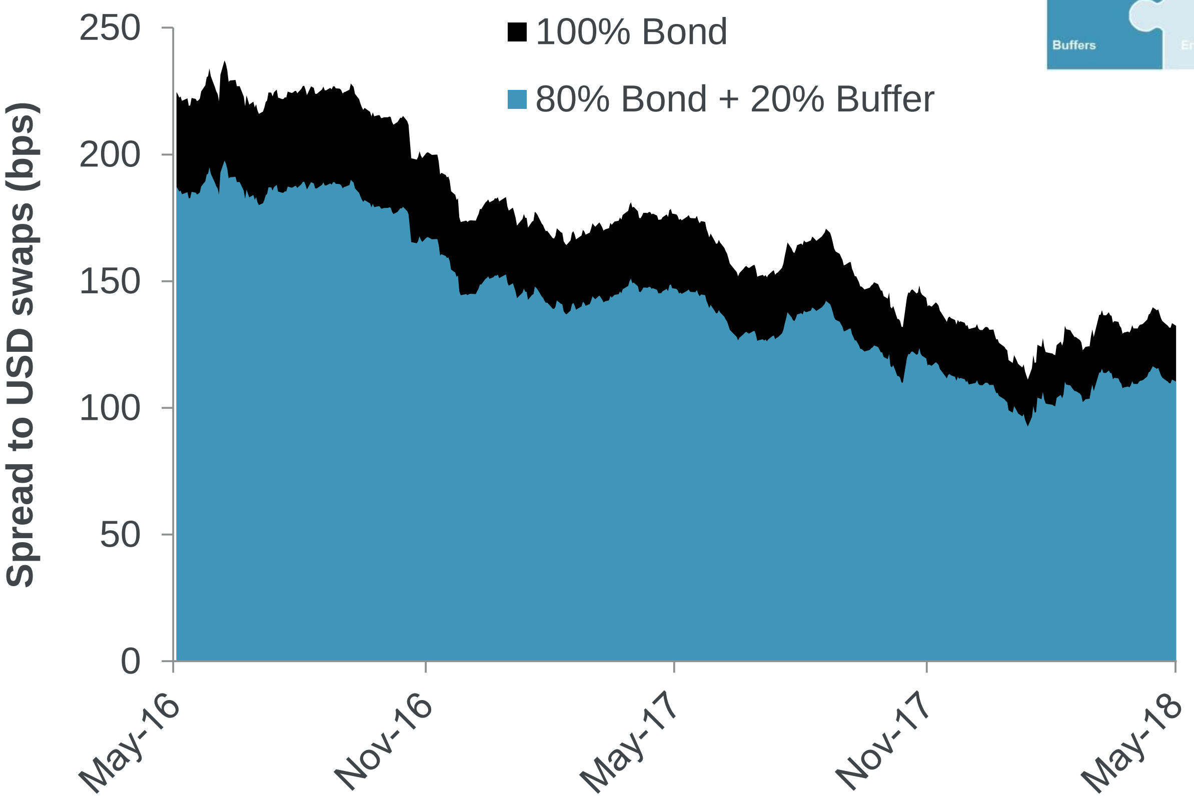


Liquid asset buffers:

- are a **drag on returns**
- should be **minimised**

Particular focus should be paid to:

- exploring **alternative sources** of liquidity
- deploying **excess** liquidity



There is a trade-off between **drag reduction** and the **cost of alternative options**

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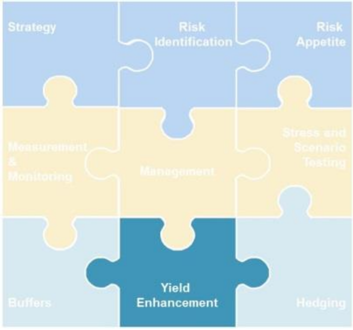
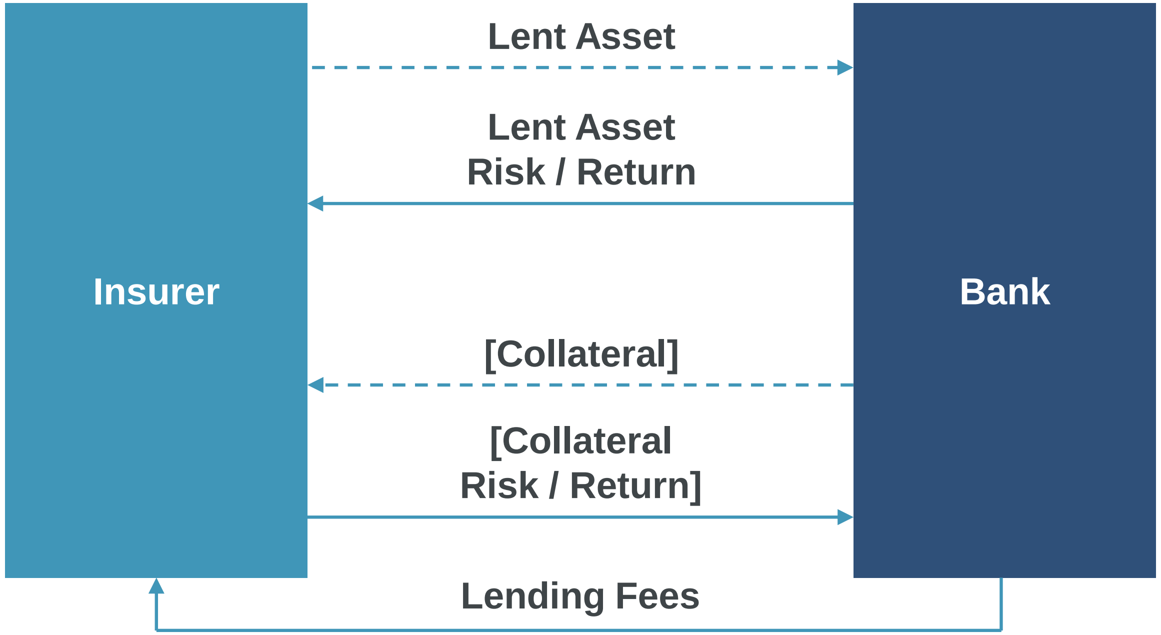
Yield Enhancement | Reducing Drag



Options for deploying **excess liquidity** include:

- **securities lending** trades
- **contingent** liquidity / funding **facilities**
- **updating SAA** / reallocating into less liquid credit

Securities Lending



Contingent exposures result in **variable** surplus / shortfall

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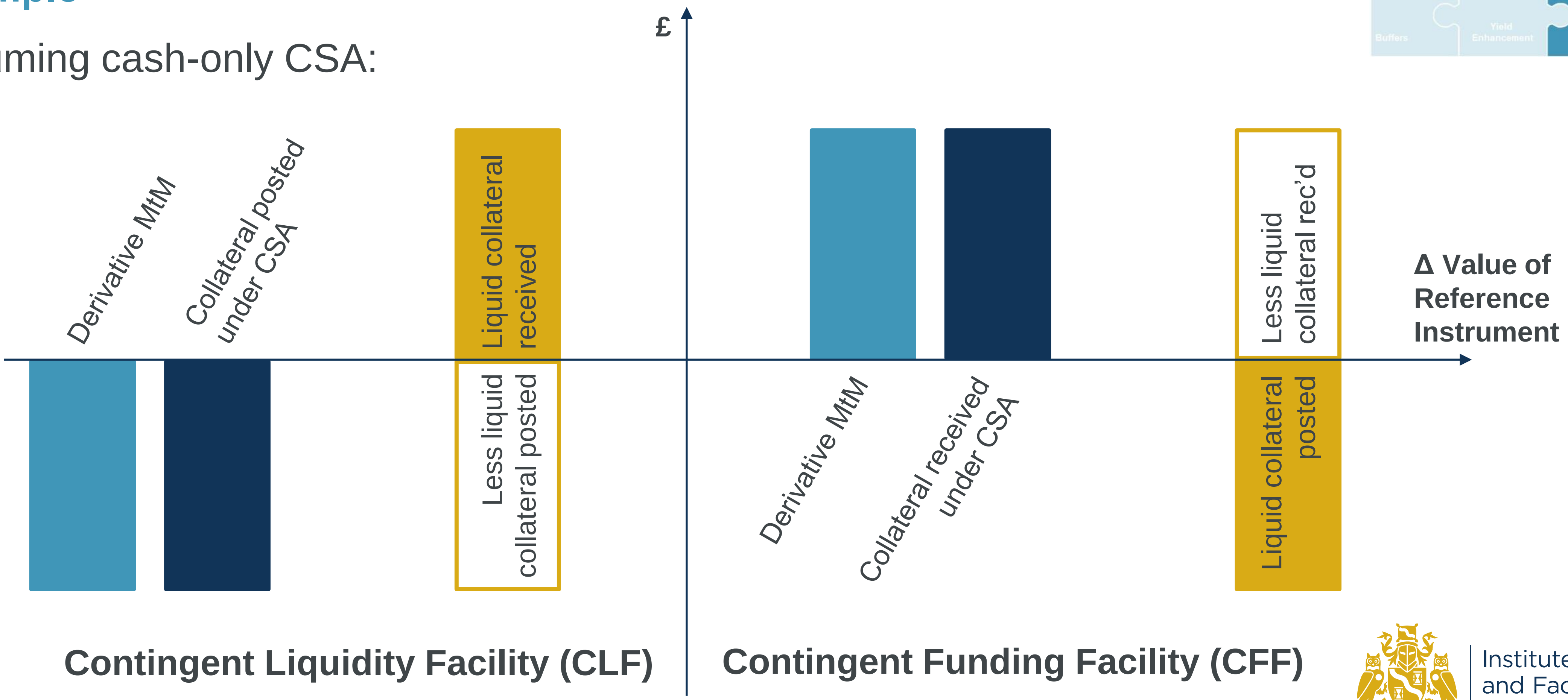
Hedging | “Outsourced” Management

Example*

Assuming cash-only CSA:



*For illustrative purposes only

Hedging | Central Liquidity Management

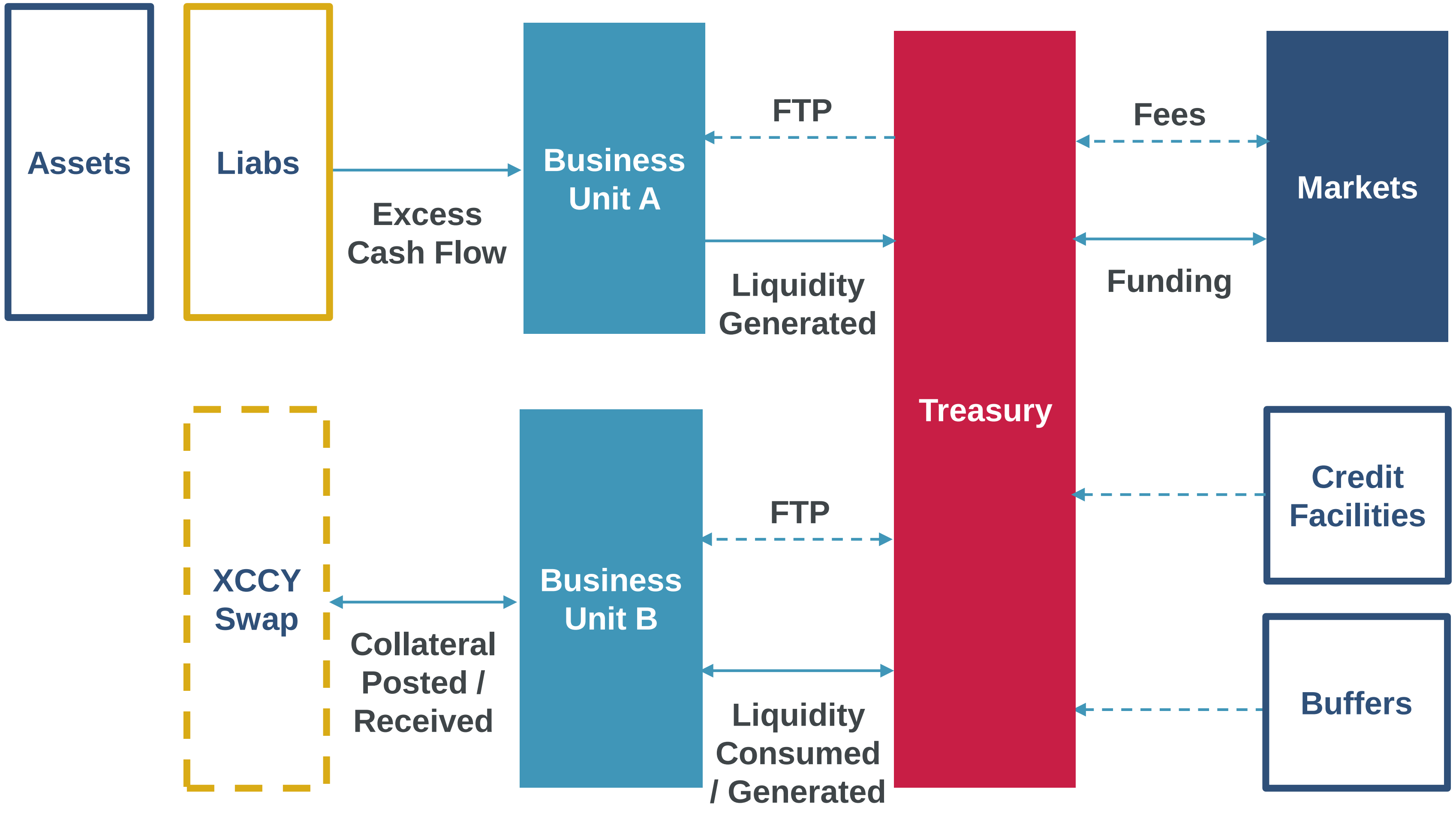
Funds Transfer Pricing (FTP)

- BUs **buy** / **sell** liquidity from central Treasury
- Identifies BUs that **generate** and those that **consume** liquidity

Treasury

- Charges BUs for cost of centrally held **liquidity buffers** (via FTP)
- Access to **revolving credit facilities** (RCFs)
- Controls group net funding requirement: **sourced from** / **lent into** market – could be **contingent** on **specific exposures**

Hedging | Central Treasury Model



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Hedging | Central Treasury Model

- Allows for **diversification** of liquidity requirement intra-group
- Single point of **market access** to trade surplus / shortfall
- Access to group-wide **liquidity facilities** and **backstops** (e.g. RCF)
- Incentivises BUs to place **greater value** on liquidity consumption / generation

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Concluding Remarks

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Concluding Remarks | Summary

- **Liquidity management** is currently a **hot topic**
- A **clear metric** for **measurement** and **risk appetite** is key
- Hedging **tail risks** may be **cost** or **operationally efficient**
- **Treasury functions** may need to become **more active**

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Questions

Comments

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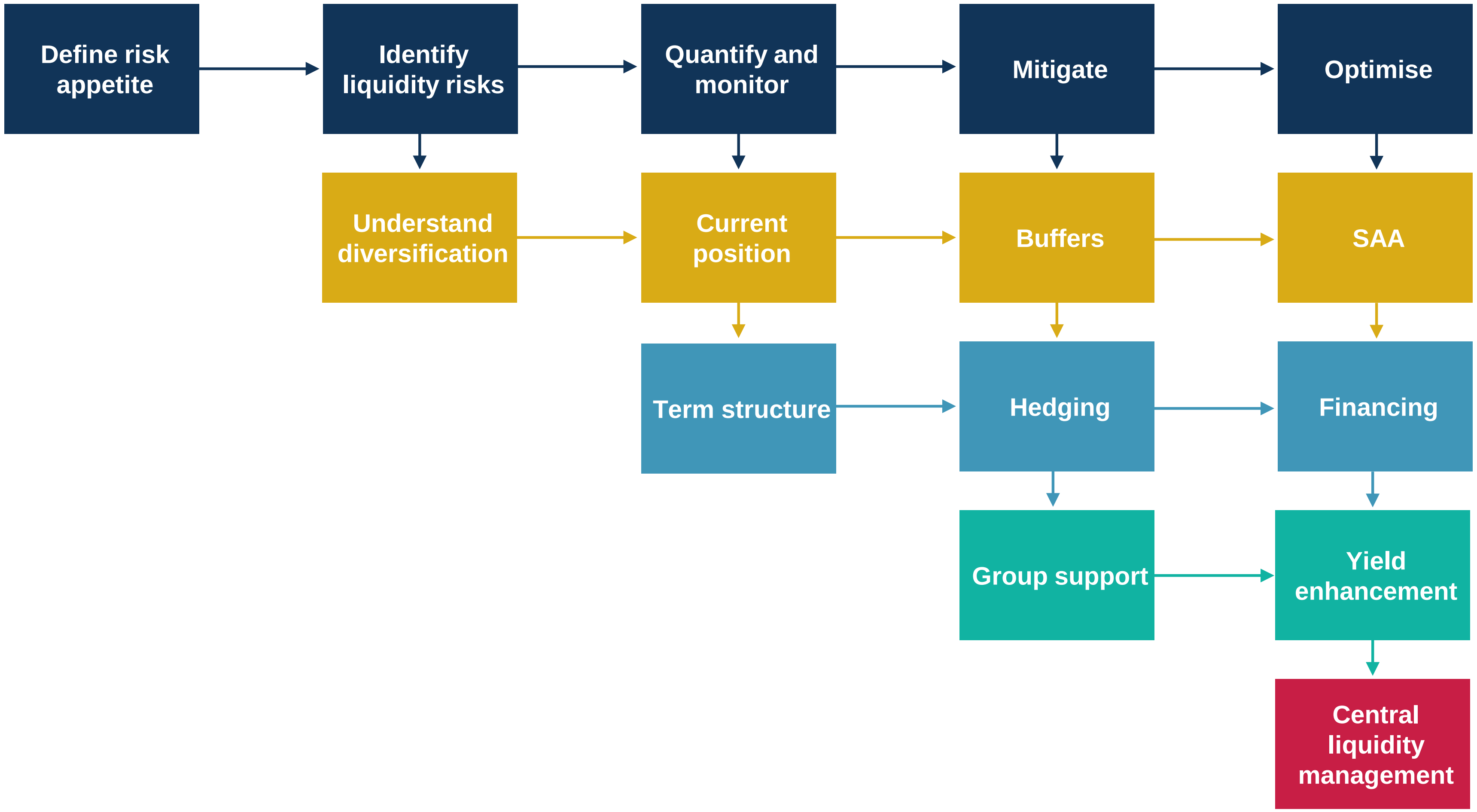
Appendix

Liquidity Framework | Self Assessment



Source: NWM

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Strategy | Asset Allocation

Illiquidity Premium

…intended to **compensate** an investor for:

- the **added uncertainty** of tying up capital for **longer periods of time**, and
- the **risk** that the illiquid asset **cannot be sold** quickly enough (within a reasonable time period) to **prevent** or **minimise** a **loss**

Source: M&G

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Constraints | Matching Adjustment

Article 77b

Assets must be **bond-like** with **cash flows** that:

- …materially **replicate** the expected cash flows of the **liabilities**
- …are **fixed** (at portfolio level), not simply “very predictable”

Source: Solvency II Directive

Solvency II | Matching Adjustment

Article 77c

[Matching Adjustment is] … equal to the difference of the following:

(i) the AER … where applied to the cash flows … results in a value that is equal to the value … of the portfolio of assigned assets;

(ii) the AER … where applied to the cash flows … results in a value that is equal to the value of the **best estimate** of the portfolio of insurance or reinsurance obligations … using the **basic risk-free interest rate term structure**

… must not include the **fundamental spread** reflecting the risks retained

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Source: Solvency II Directive

Solvency II | Matching Adjustment

Cash Flow Matching Tests

Firms should ensure compliance with the following tests:

1. **Discounted cash flow shortfall test**: must not exceed 3% of best estimate liabilities (under basic risk-free rate i.e. excluding MA)

2. **99.5th %ile VaR test**: (undiversified) for **interest rates**, **inflation** and **current risk** must not excess 1% of best estimate liabilities (under basic risk-free rate including MA)

3. **Notional swap test**: a hypothetical portfolio of interest rate swaps must be able to ensure cash flows are perfectly matched without requiring additional cash injection

Source: PRA, 09-Mar-2015

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CRD IV | Liquidity Risk

- **Liquidity** is arguably the **biggest** risk faced by banks
- Two **regulatory** metrics under CRD IV:

1

$$\text{Liquidity Coverage Ratio (LCR)} = \frac{\text{High Quality Liquid Assets (HQLA)}}{\text{30-day Net Cash Outflows}}$$

2

$$\text{Net Stable Funding Ratio (LCR)} = \frac{\text{Available Stable Funding}}{\text{Required Stable Funding}}$$

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CRD IV | NSFR Example Weights

Asset	Maturity	RSF Factor
Residential mortgages	> 1 year	65%
Corporate loans	> 1 year	85%
AAA-AA Corporate bonds	All (unencumbered)	15%
A-BBB Corporate bonds	All (unencumbered)	50%

Liability	Maturity	ASF Factor
Retail deposits	< 1 year	90-95%
Regulatory capital	All (excl. T2 < 1 year)	100%
Funding / Other capital	< 1 year	0-50%
Funding / Other capital	> 1 year	100%

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