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# Risk and Investment Conference 2013

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# Acquiring fixed income assets on a forward basis

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# Structure of Presentation

- Introduction to forward
- Pricing and Practicalities
- Examples
- Q & A



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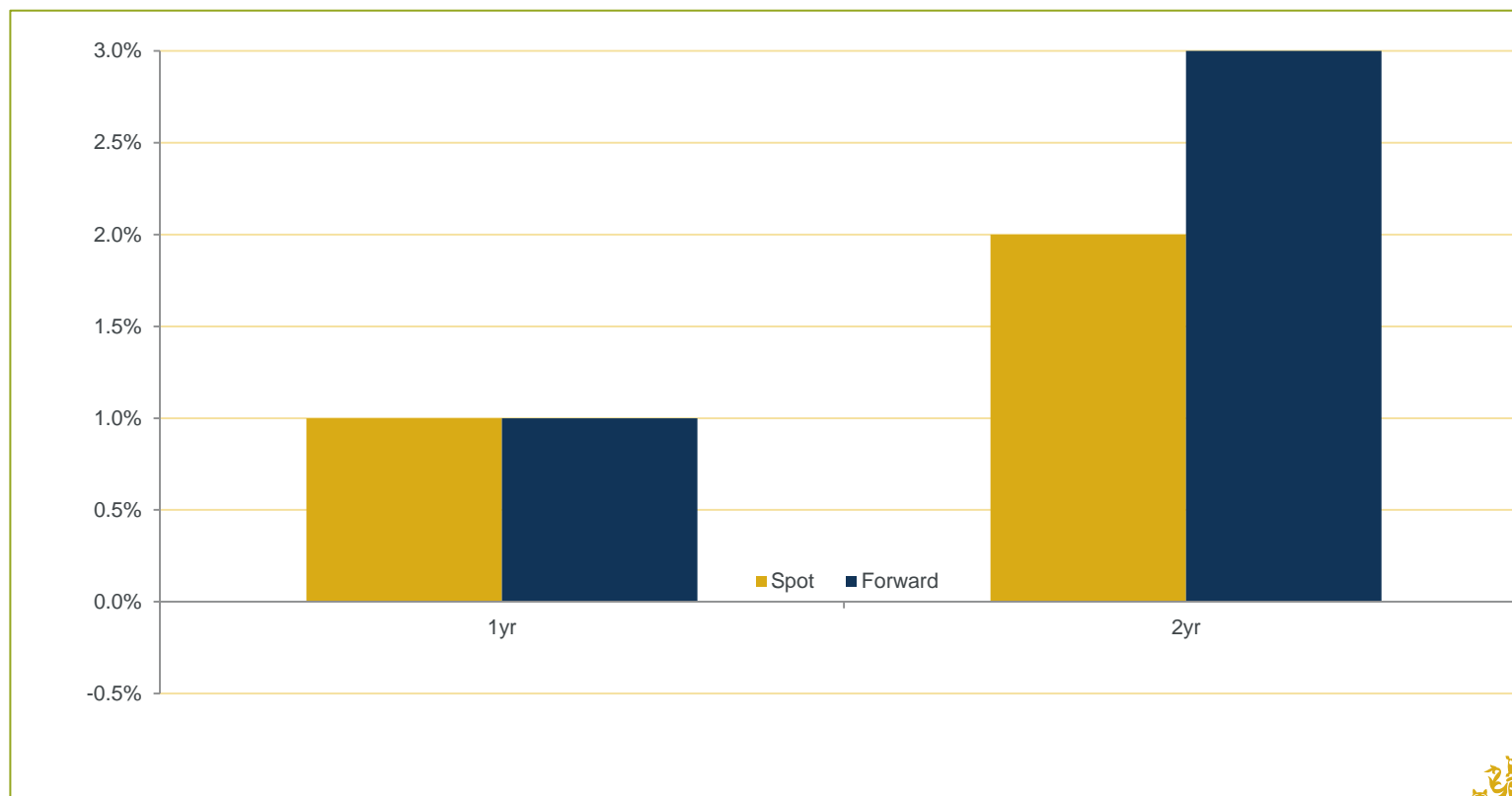
# Introduction

- Insurers and pension funds hold assets to collateralise their liabilities with capital held additionally as provision against potential losses
- Asset yields relative to liability valuation rates (asset spreads) should be an important consideration
- This needs to be balanced against their risk profile (ie. required capital treatment)
- In this presentation we consider the term structure of asset spreads and specifically decomposing into forward spreads



# Introduction

- What do we mean by forwards?



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# We consider different liability structures

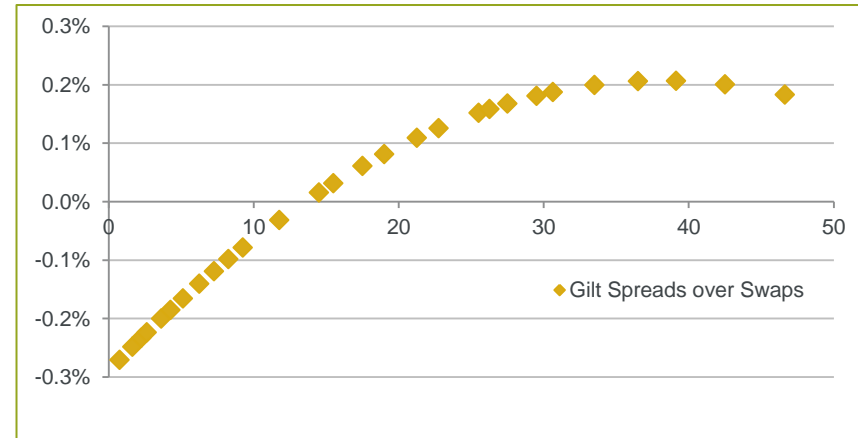
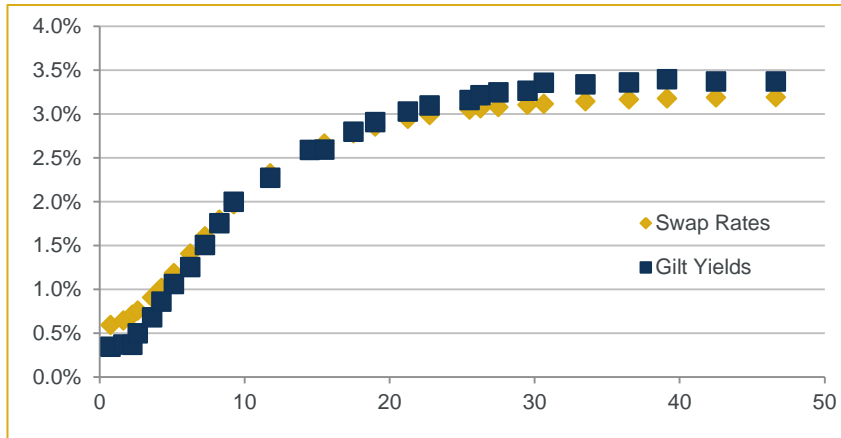
## Three sets of liabilities

- Insurance funds with exogenous valuation basis typically Libor based and Risk Based Capital requirement
- Annuity funds which is a special case within Insurance with valuation basis dependent on underlying assets held and Risk Based Capital requirement
- Pension funds which have less prescribed valuation basis and no Risk Based Capital requirement which allows a more flexible approach



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# Considering forward yields and spreads

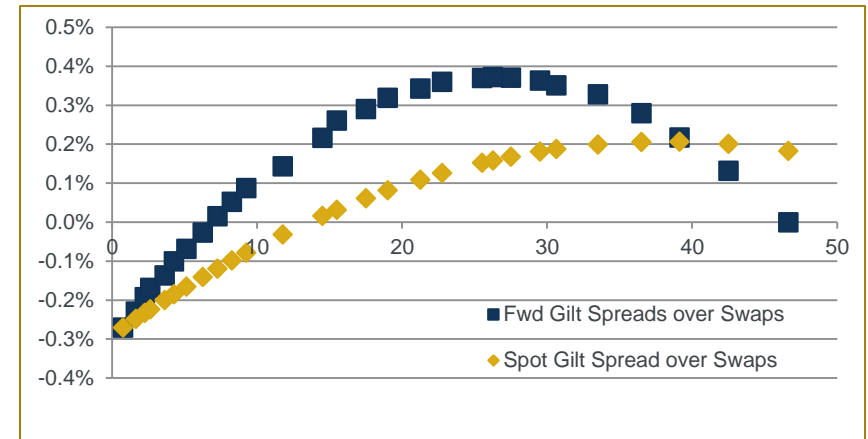
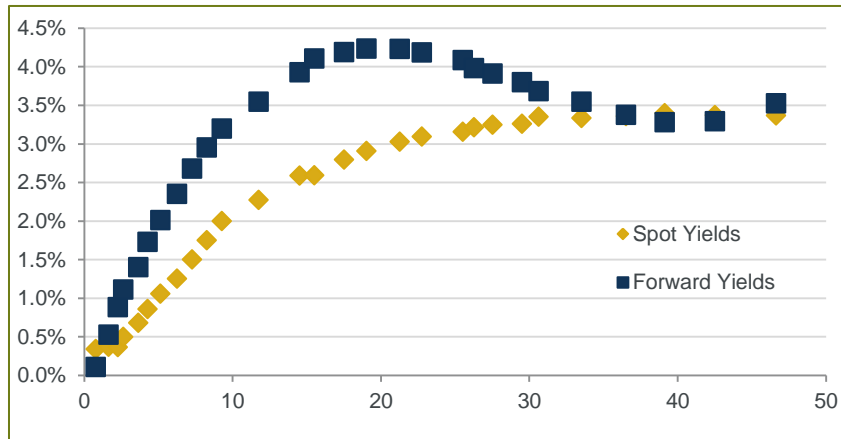


- We invest in fixed income assets for their spread and want this to be positive to avoid liabilities growing at a faster rate than the assets collateralising those liabilities
- However capital requirement for credit spread risk is an almost linear function of duration
- This pushes you into short maturities



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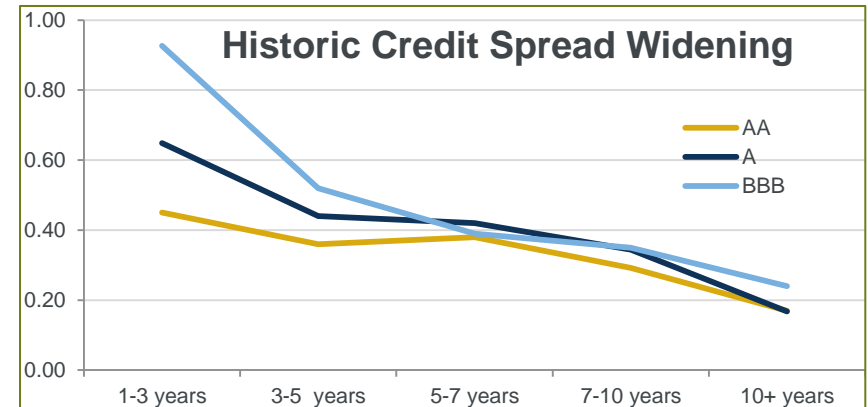
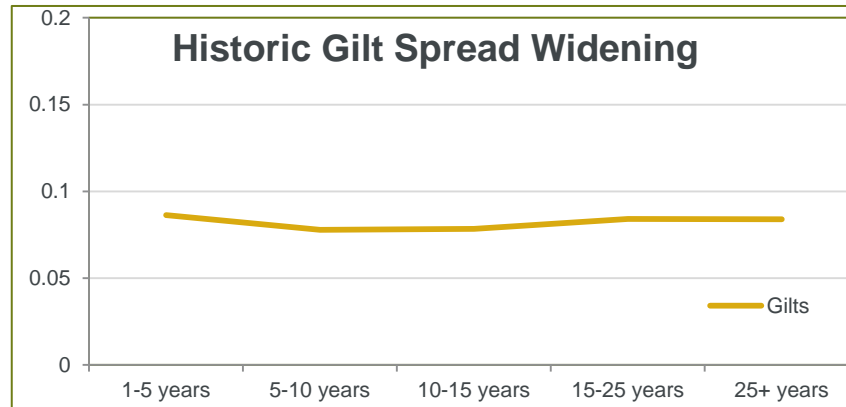
# Considering forward yields and spreads



- Credit spread curve is steep in the front and then flatten out
- Short dated credit spreads are negative
- Most capital efficient solution would be to have positive spread while still having short credit duration
- We want to have exposure to the positive forward spreads



# Considering forward yields and spreads



- Gilt spread volatility has been flat along the term structure
- Corporate bond spread volatility has been higher at the short end (where spreads are lowest)
- So even if forward spreads were equal at all maturities it would still be more efficient to take forward bond exposure for the reduction in credit spread risk (and thus the required capital to allocate to it)



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# Forward bonds – indicative levels

Underlying Bond		Forward settlement date				
		Spot	2Y	3Y	4Y	5Y
Forward GBP rates	UKT46	3.37%	3.66%	3.80%	3.91%	4.00%
	Swap rate	3.16%	3.40%	3.52%	3.61%	3.69%
	Pick-up	0.21%	0.26%	0.28%	0.30%	0.30%
Forward OAT rates	OAT38	3.09%	3.46%	3.62%	3.74%	3.83%
	Swap rate	2.41%	2.62%	2.72%	2.80%	2.86%
	Pick-up	0.68%	0.84%	0.90%	0.95%	0.97%
Forward NL rates	NL37	2.50%	2.80%	2.92%	3.00%	3.06%
	Swap rate	2.41%	2.63%	2.73%	2.82%	2.89%
	Pick-up	0.10%	0.17%	0.19%	0.18%	0.17%

Source: HSBC– 14 June 2013



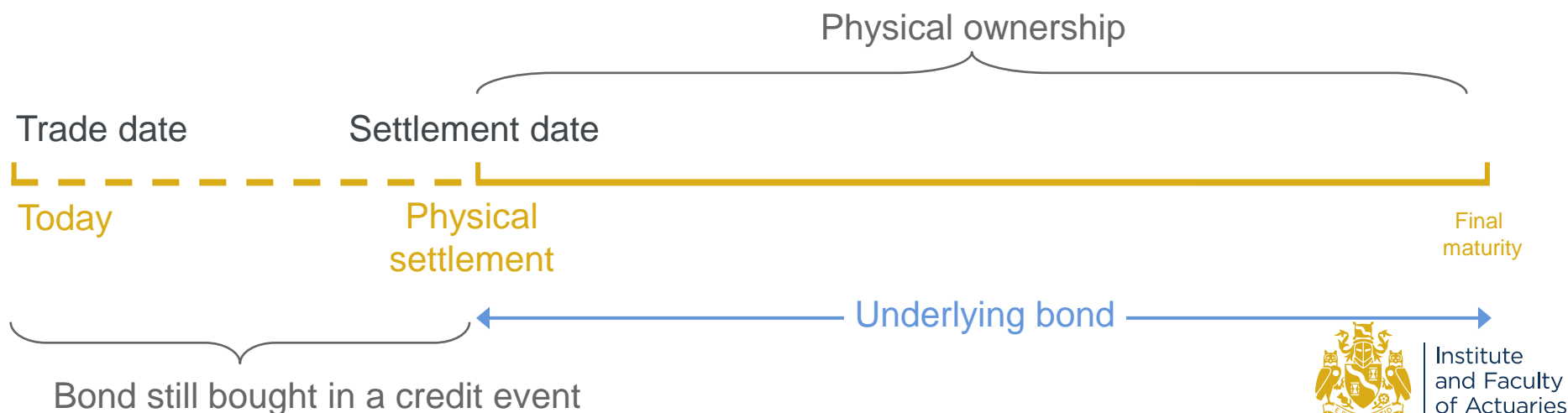
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# Forward Bond – definition

A forward bond is a forward contract.

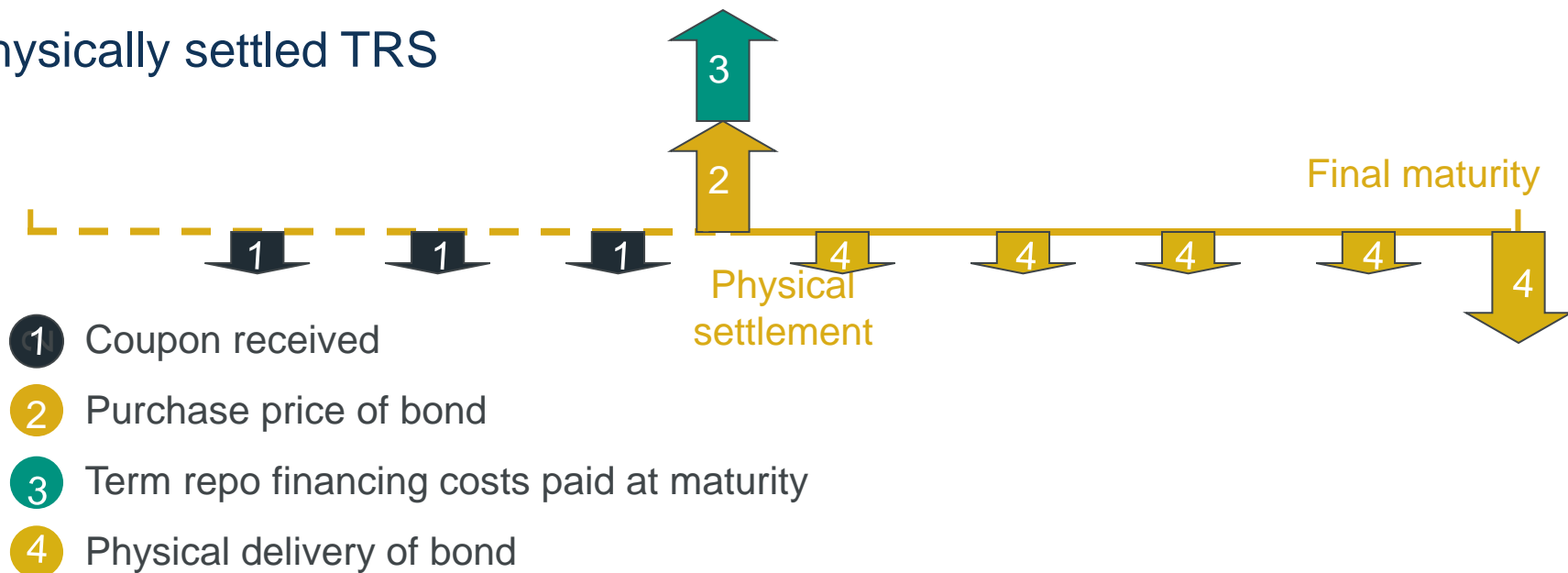
The investor commits to buy

a predetermined financial instrument for  
a predetermined delivery price at  
a predetermined future time.

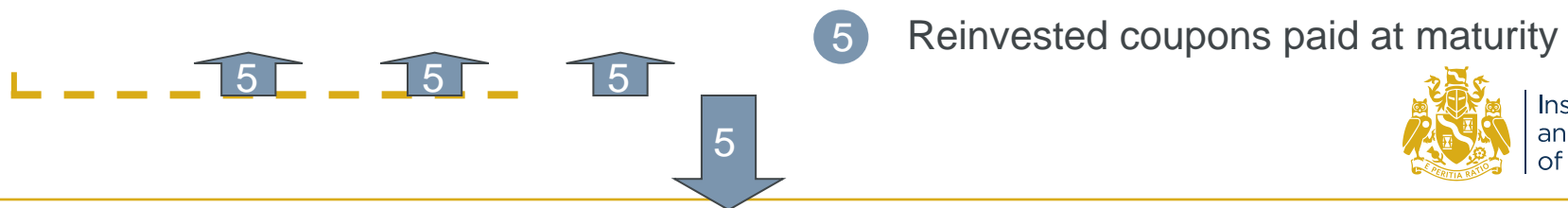


# Alternative : TRS + an additional swap

## Physically settled TRS



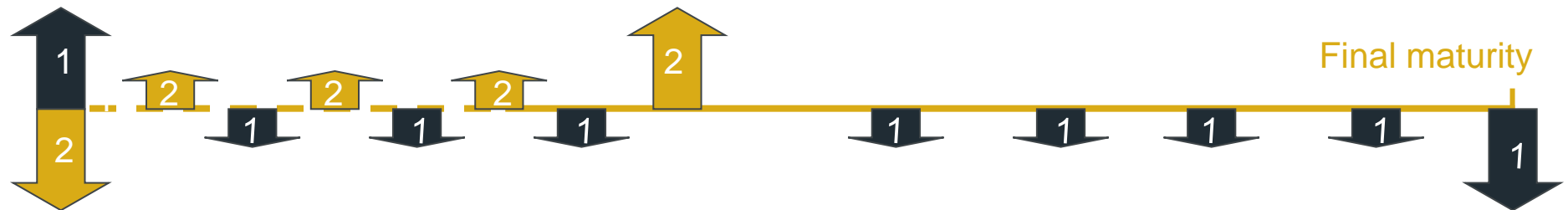
## Additional swap



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# Alternative : Repo

- Buy bond and repo
  - Pay floating under repo
  - Repo roll-over risk
  - Still receive coupons (could swap)



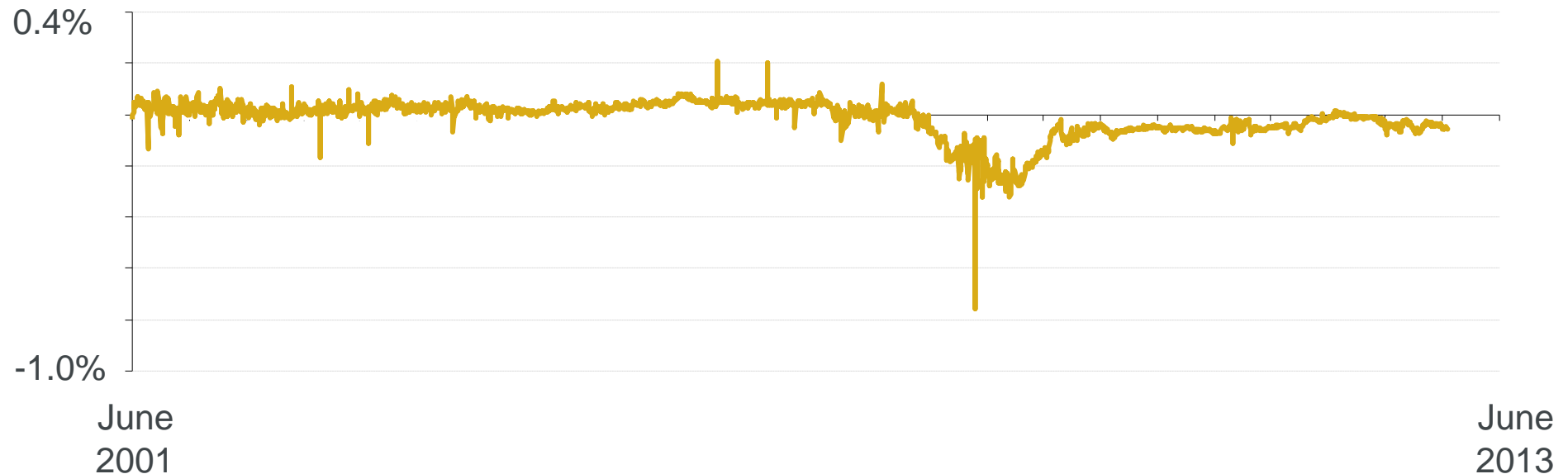
- 1 Bond bought
- 2 Bond repo'd



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# Alternative : Repo

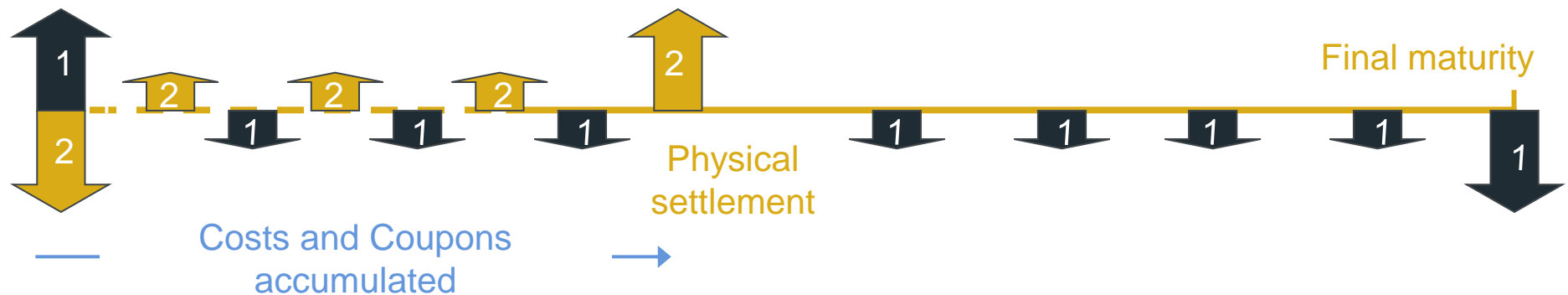
- Buy bond and repo
  - Pay floating under repo
  - Repo roll-over risk
  - Still receive coupons (could swap)



# Forward Bond – pricing

$$\text{Forward dirty price} = \text{Spot dirty price} + \text{Financing cost} - \text{Re-invested coupons}$$

1 Bank buys bond



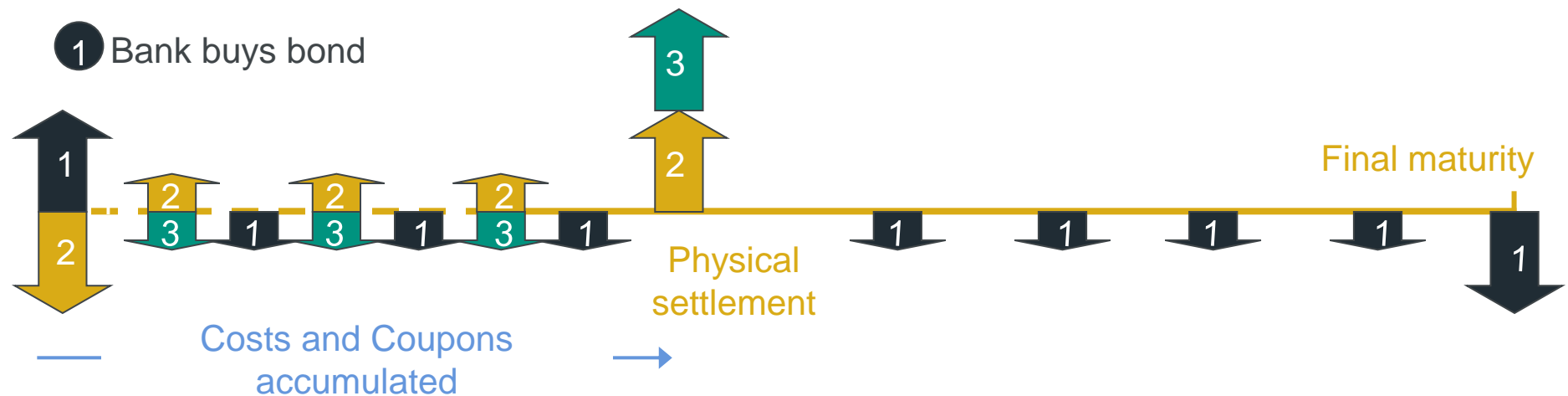
2 Bank finances purchase via term repo (bank takes roll-over risk)



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# Forward Bond – pricing

$$\text{Forward dirty price} = \text{Spot dirty price} + \text{Financing cost} - \text{Re-invested coupons}$$



- 2 Bank finances purchase via term repo (bank takes roll-over risk)
- 3 Term repo costs swapped for fixed

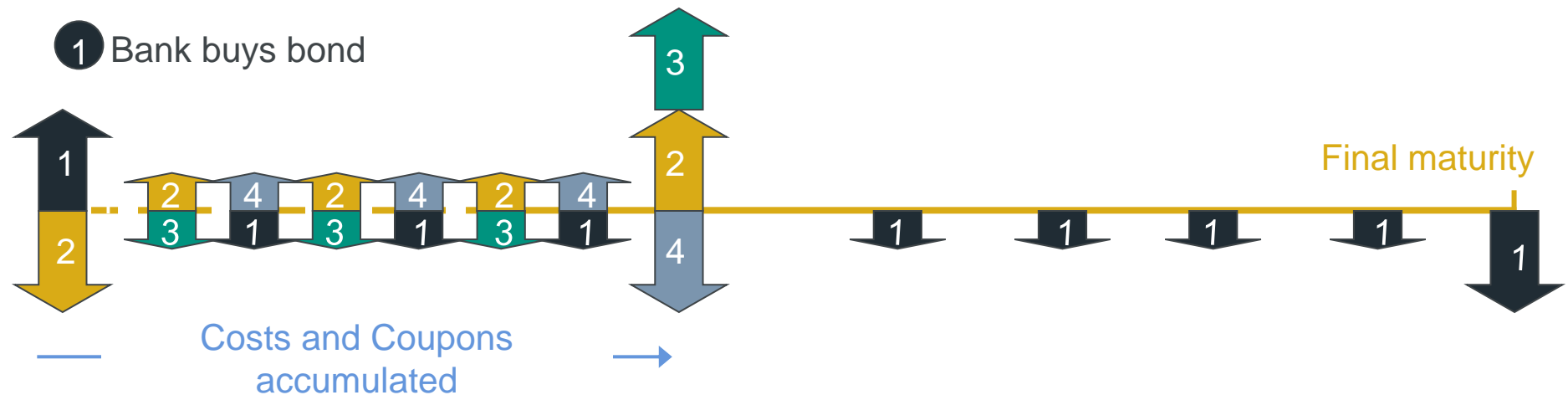


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# Forward Bond – pricing

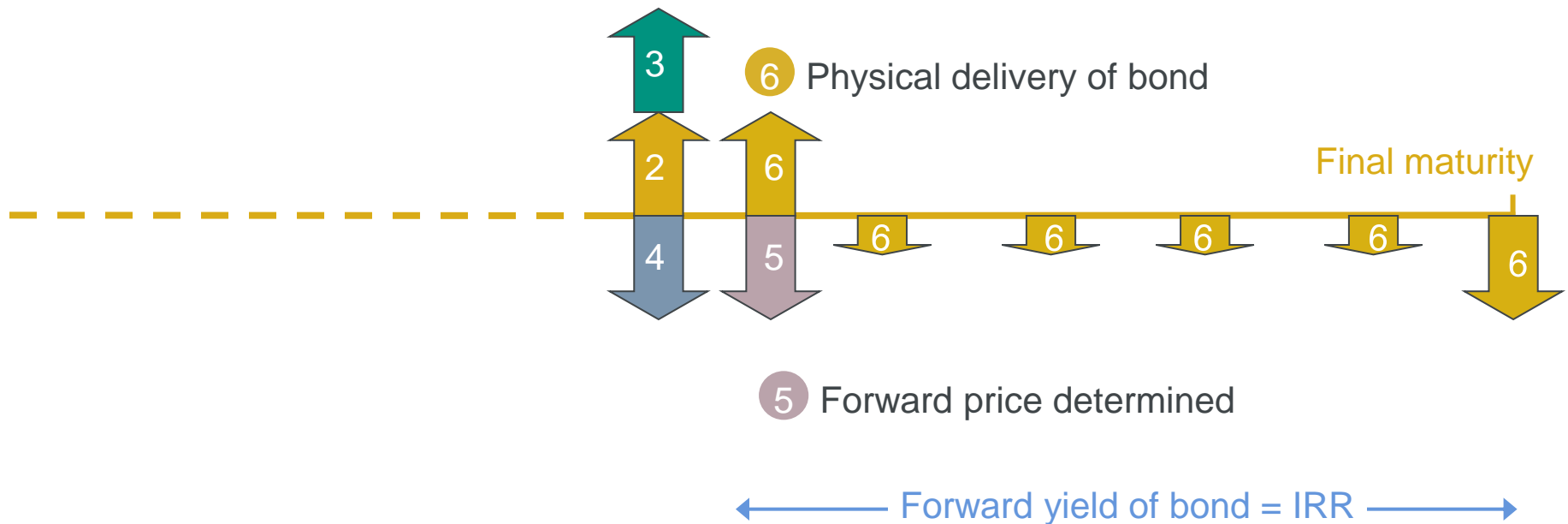
$$\text{Forward dirty price} = \text{Spot dirty price} + \text{Financing cost} - \text{Re-invested coupons}$$



- 2 Bank finances purchase via term repo (bank takes roll-over risk)
- 3 Term repo costs swapped for fixed
- 4 Bank hedges coupon reinvestment with strip of forward zero coupon SONIA swaps

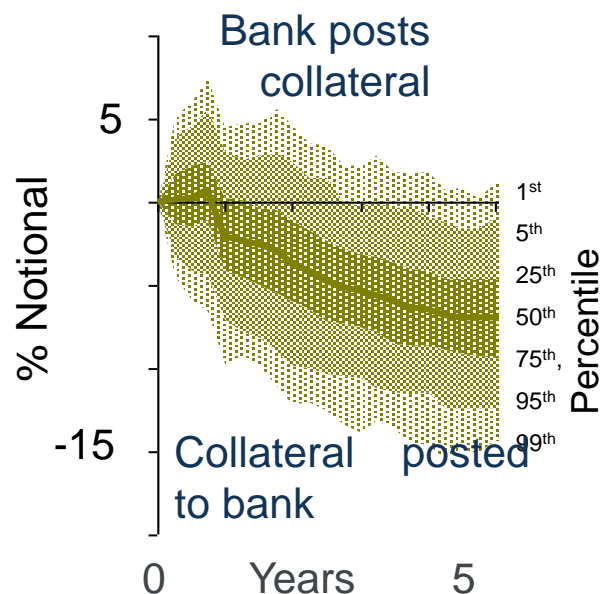
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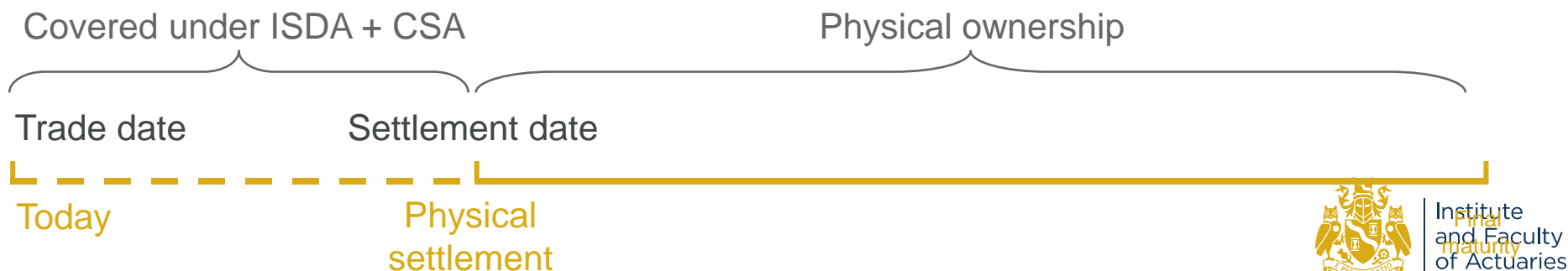


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# Counterparty risk management prior to settlement

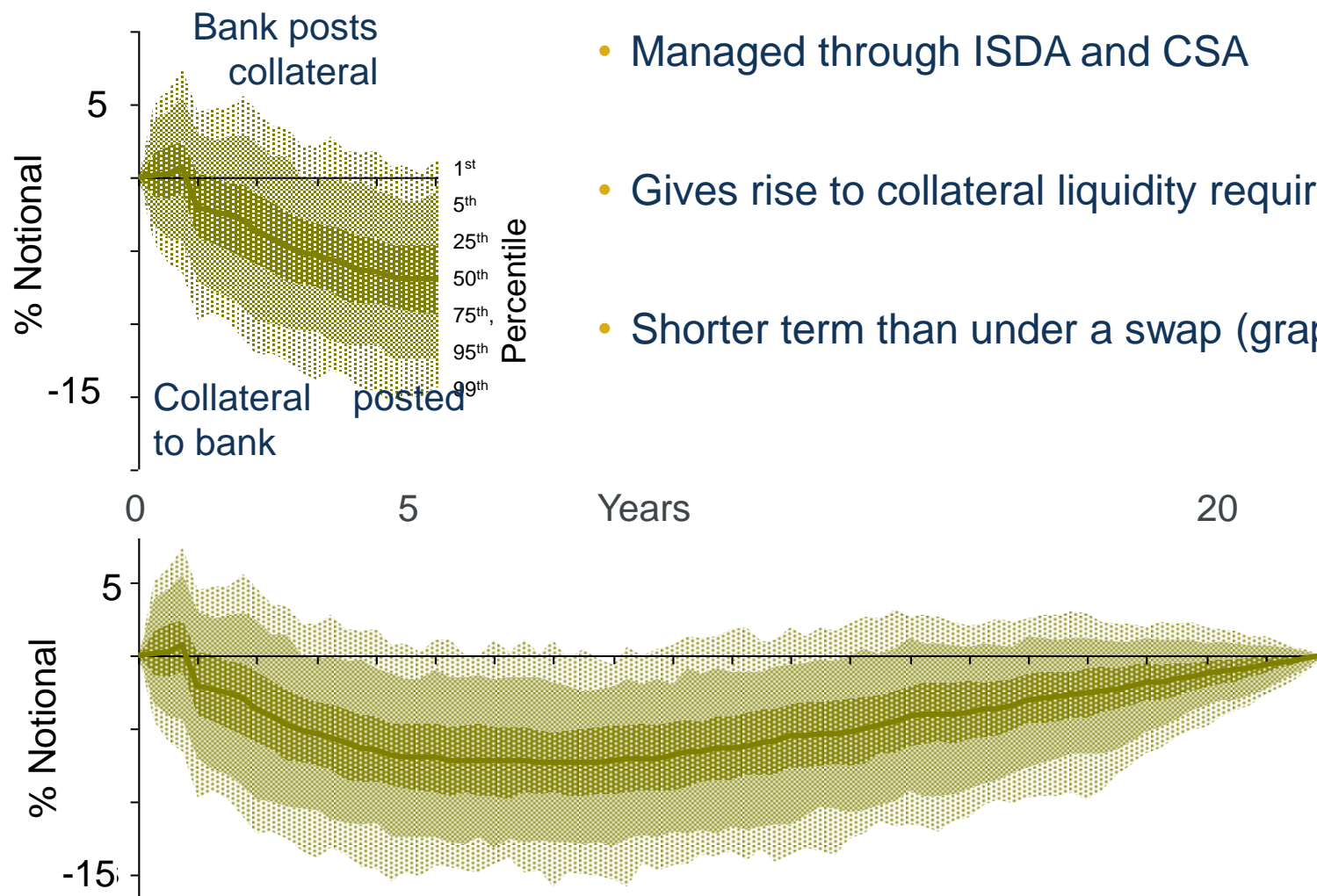


- Managed through ISDA and CSA
- Gives rise to collateral liquidity requirement



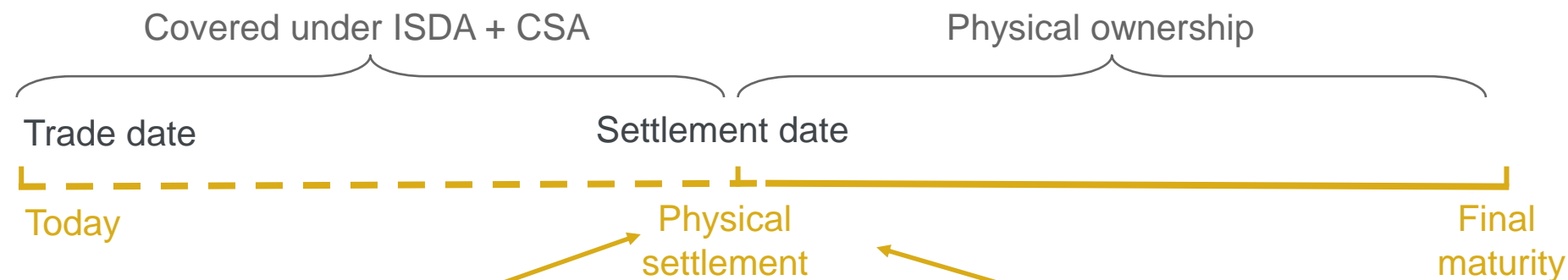
# Counterparty risk management prior to settlement

- Managed through ISDA and CSA
- Gives rise to collateral liquidity requirement
- Shorter term than under a swap (graph below)



# Forward Bonds

## Works for inflation linked bonds too



Inflation linked forward price paid

“Lock-in real yield”

The forward real yield is locked BUT the nominal price is not.

Price determined on Settlement date, includes realised cumulative inflation from Effective date to Settlement date

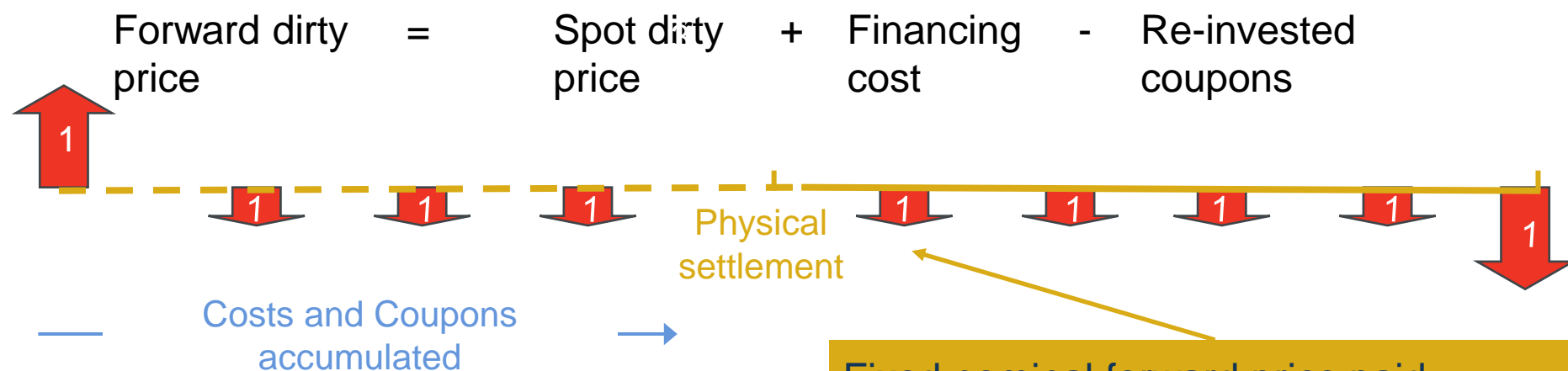
Fixed nominal forward price paid

“Lock-in proceeds”

The forward dirty price is locked BUT the forward real yield is not.

Forward real yield determined on Settlement date, based on the realised cumulative inflation from Effective date to Settlement date

# Forward Linkers – “lock-in proceeds” pricing



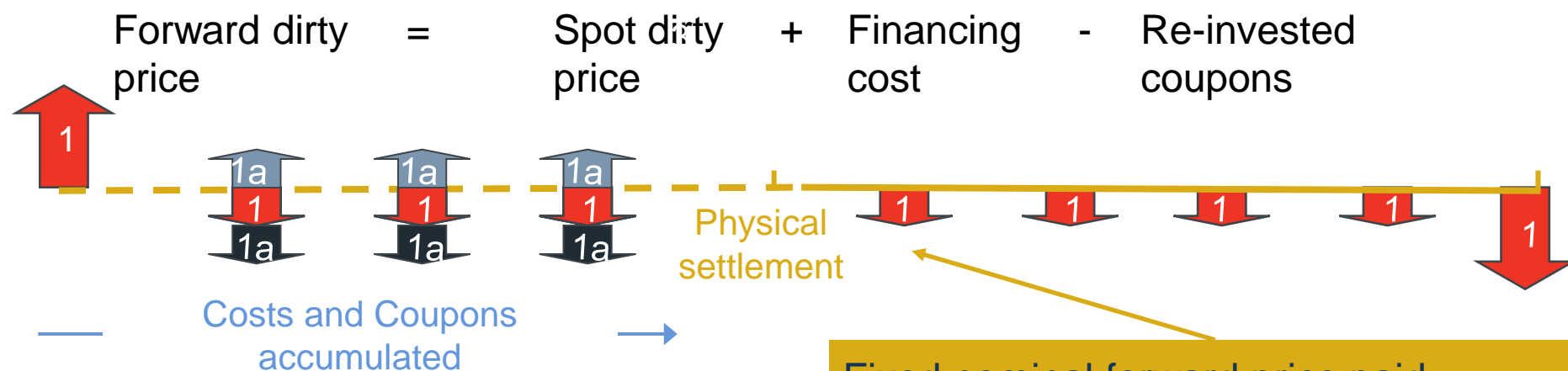
- 1 Bank buys inflation linked bond

Fixed nominal forward price paid

“Lock-in proceeds”

The forward dirty price is locked BUT the forward real yield is not.

# Forward Linkers – “lock-in proceeds” pricing



- 1 Bank buys inflation linked bond

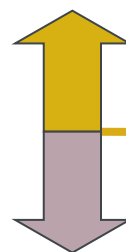
Add step “1a” and swap inflation for fixed at each coupon date

Fixed nominal forward price paid

“Lock-in proceeds”

The forward dirty price is locked BUT the forward real yield is not.

# Forward Linkers – “lock-in real yields” pricing



Final maturity

Inflation linked forward price paid

“Lock-in real yield”

The forward real yield is locked BUT the nominal price is not.

Price determined on Settlement date, includes realised cumulative inflation from Effective date to Settlement date

Inflation swap at settlement to swap nominal price for inflation linked price



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# Pension example – ‘lock-in real yield’

## Pick-up in real yield vs. Swaps

			Forward settlement date				
	Underlying UK Bond	Maturity	Spot	2Y	3Y	4Y	5Y
Forward Linker real yields	UKTi 2027	22/11/27	-0.38%	-0.10%	0.03%	0.15%	0.25%
	UKTi 2037	22/11/37	-0.12%	0.07%	0.15%	0.22%	0.27%
	UKTi 2042	22/11/42	-0.04%	0.09%	0.15%	0.20%	0.23%
Forward swap real rates		22/11/27	-0.60%	-0.36%	-0.26%	-0.16%	-0.07%
		22/11/37	-0.35%	-0.20%	-0.13%	-0.08%	-0.03%
		22/11/42	-0.31%	-0.20%	-0.16%	-0.12%	-0.10%
Pickup over swaps		22/11/27	0.22%	0.26%	0.29%	0.31%	0.32%
		22/11/37	0.23%	0.27%	0.20%	0.30%	0.31%
		22/11/42	0.27%	0.30%	0.31%	0.32%	0.33%

Source: HSBC– 14 June 2013



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# Example : German / French Duration Extension

- Forward bonds suit continental balance sheets
  - Guarantee reinvestment rate
  - Do not interfere with income statement that drives bonus rate
- Can be used to embed swaptions to protect against rates up or down

Embedding a (receiver) swaption into a forward bond

Settlement	On the Settlement Date, Counterparty B takes delivery of the Underlying on a face value equivalent to the Notional Amount and pays the Forward Price
Forward price	Maximum forward price – $[(\text{Strike} - \text{Reference rate}) \times \text{Participation \%} \times \text{DV01}]$



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# Forward bonds – indicative levels

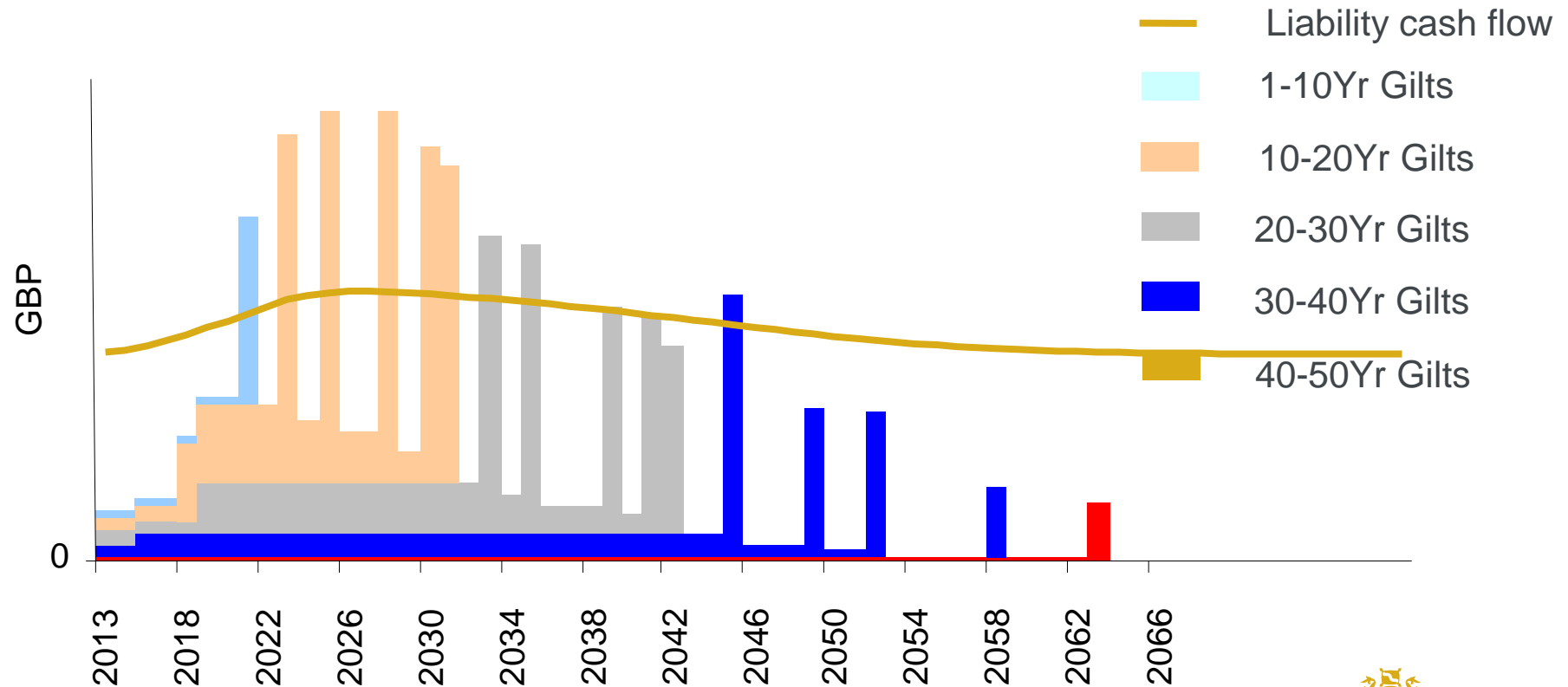
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# Example : cash flow matching deferred annuities



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# Example: Annuity fund

- Annuities are a particular case as they value liabilities at hypothecated asset yields (less default provisions, ...)
- Capital requirement for spread widening
  - although a proportion of this can be offset by higher valuation rate/lower liabilities (RBC still almost linear in duration)
- For interest rate exposure management, IRS can be replicated with going long gilts for receivers and short gilts for payers
- This is more efficient in unfunded government bond space as spread curve is upward sloping



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# Example: Annuity fund

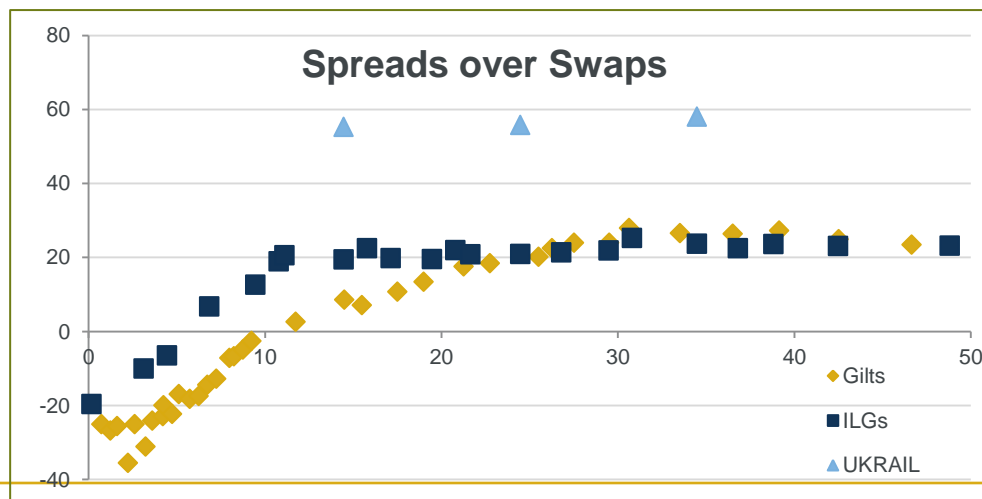
- Benefit from gilt yields being above swap rate
- And floating rate being lower than LIBOR



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# Example: Annuity fund

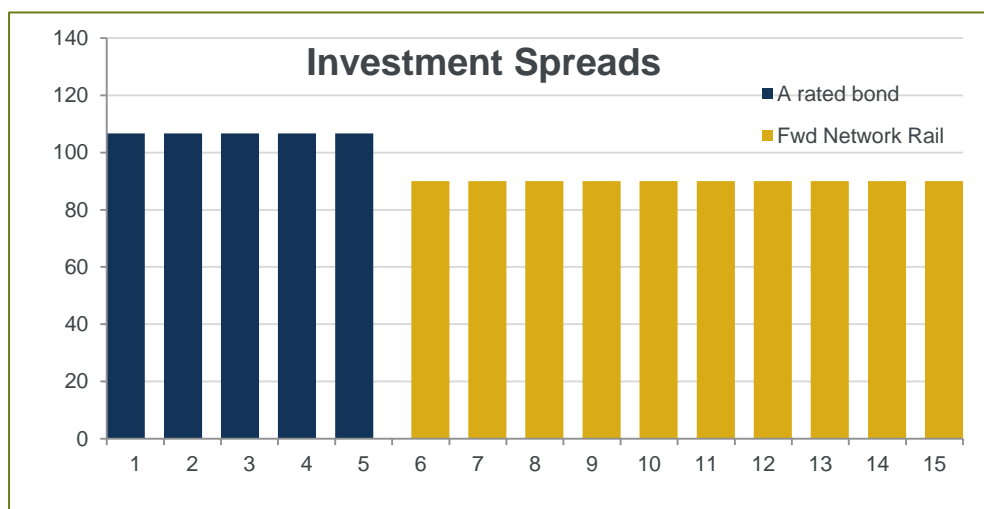
- As annuity fund liabilities are not exposed to lapses they only exposed to default losses which justifies their particular valuation treatment
- This illiquidity of liabilities can be used by considering different issuance by same guarantor, e.g. Network Rail which is guaranteed by UK Govt



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# Example: Annuity fund

- Network Rail has a real yield of 0%
  - Its IL cashflows can be swapped to 6m£L + 0.60% or 3.30% fixed
- 2018 maturity gilt has a yield of 1.30%
- This implies a forward yield of 4.42% or swaps + 90bps



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# Questions

# Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.



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