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Negative rates - the new norm, and implications for capital models

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Agenda

The low interest rates environment

Market practice of modelling interest rates

Methods to allow negative rates in models

Case study by NFU Mutual



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The low interest rates environment

02 November 2016

Forward looking events are raising uncertainties in GBP interest rates



Result of the EU referendum



Cut of base rates by Bank of England from 50bps to 25bps in August 2016



Negative rates in EUR, CHF, JPY



Possible further drop in oil price



Market turbulence caused by Asian crisis



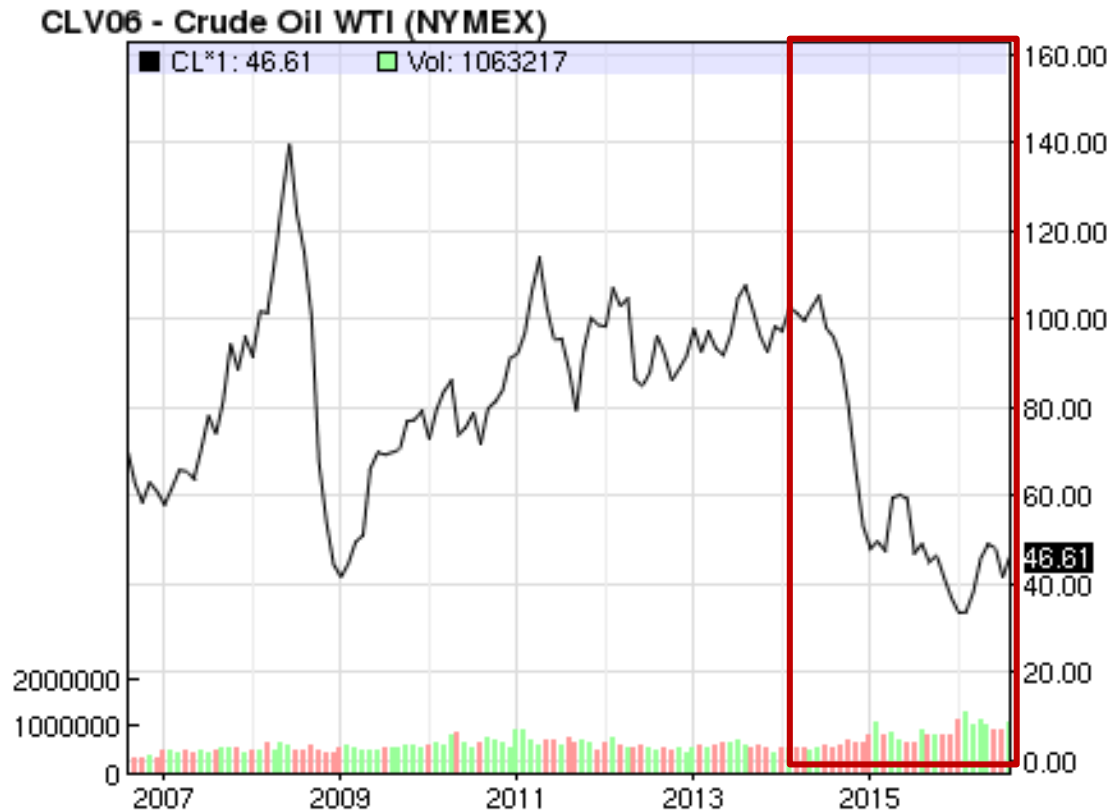
US election uncertainties

Given the uncertainties, should firms allow for negative rates in their interest rate models?

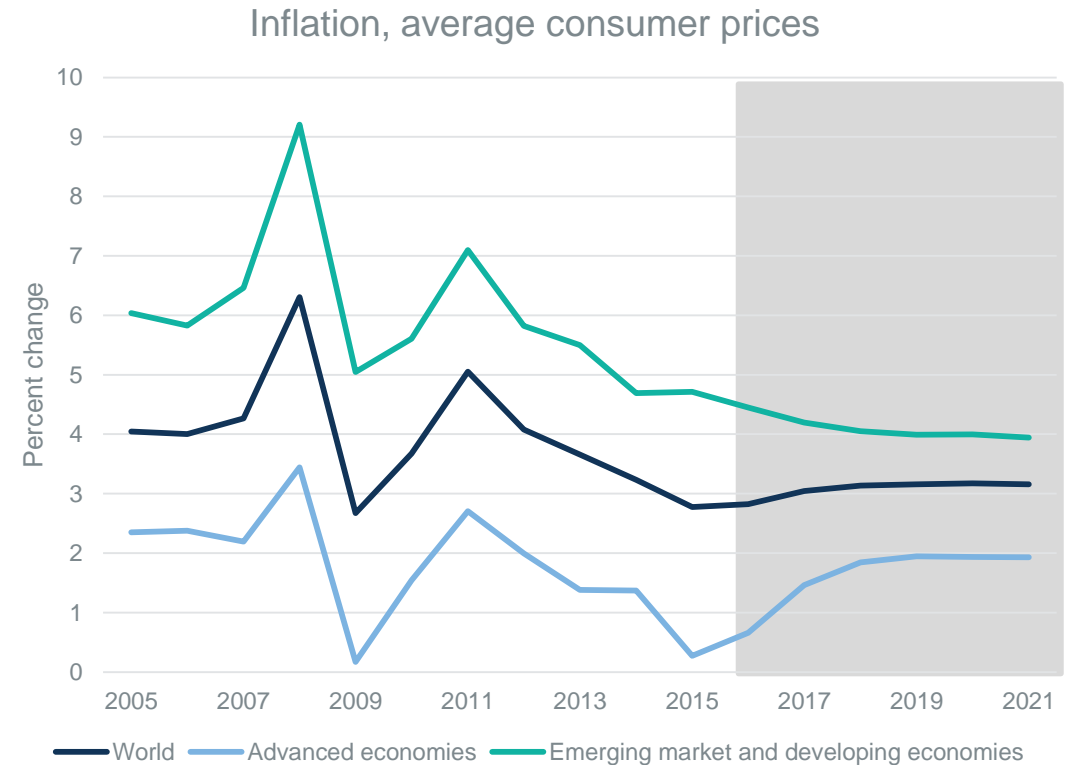


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Low oil and commodity prices have helped to drive inflation in the Advanced Economies towards zero



Source: NASDAQ



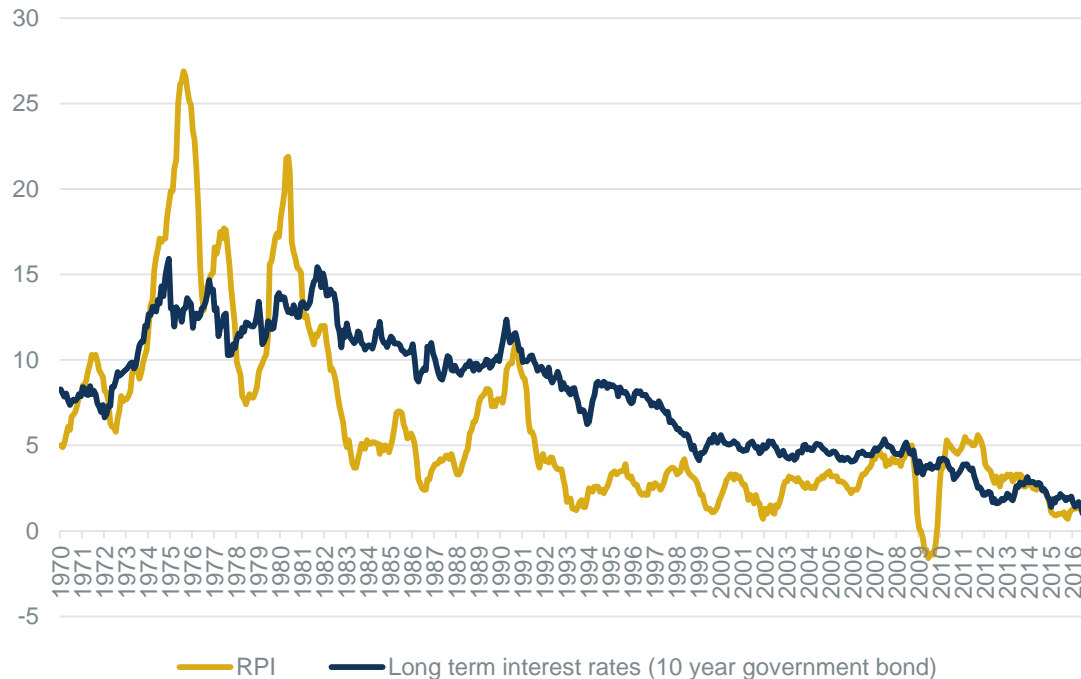
Source: IMF



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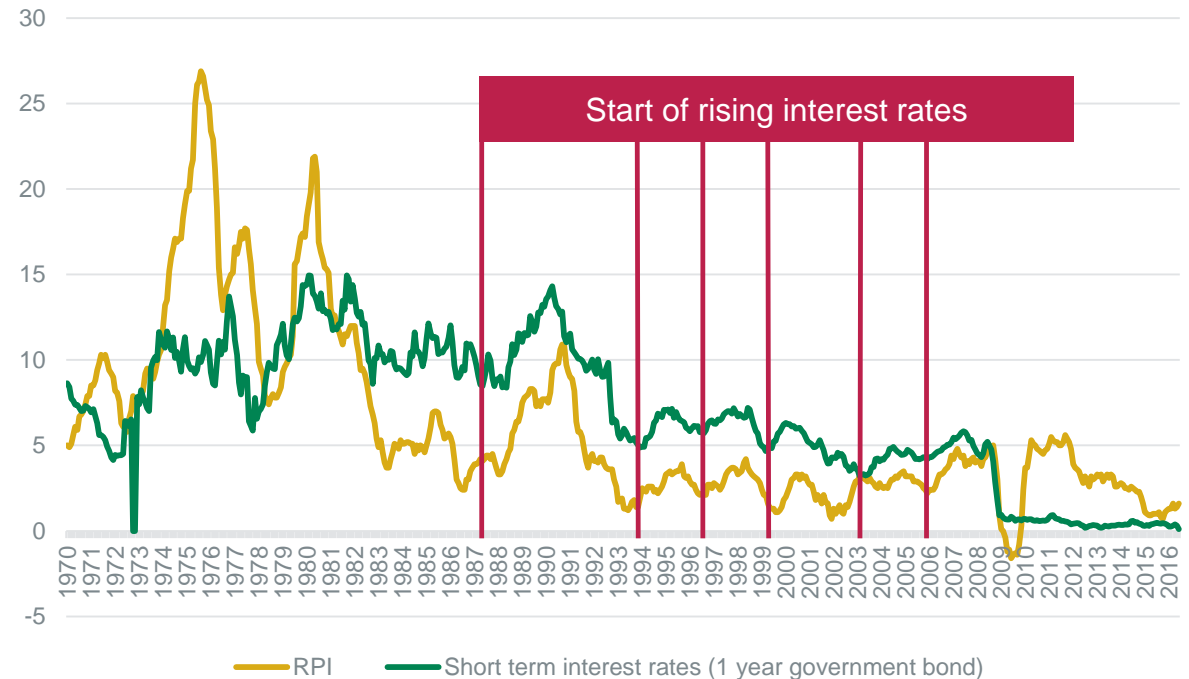
Inflation is a key driver of interest rates: short and long rates both move in the same direction with inflation

Inflation and long-term interest rates
RPI and BoE 10-year government bond yields



Source: ONS, Bank of England

Inflation and short-term interest rates
RPI and 1-year government bond yields



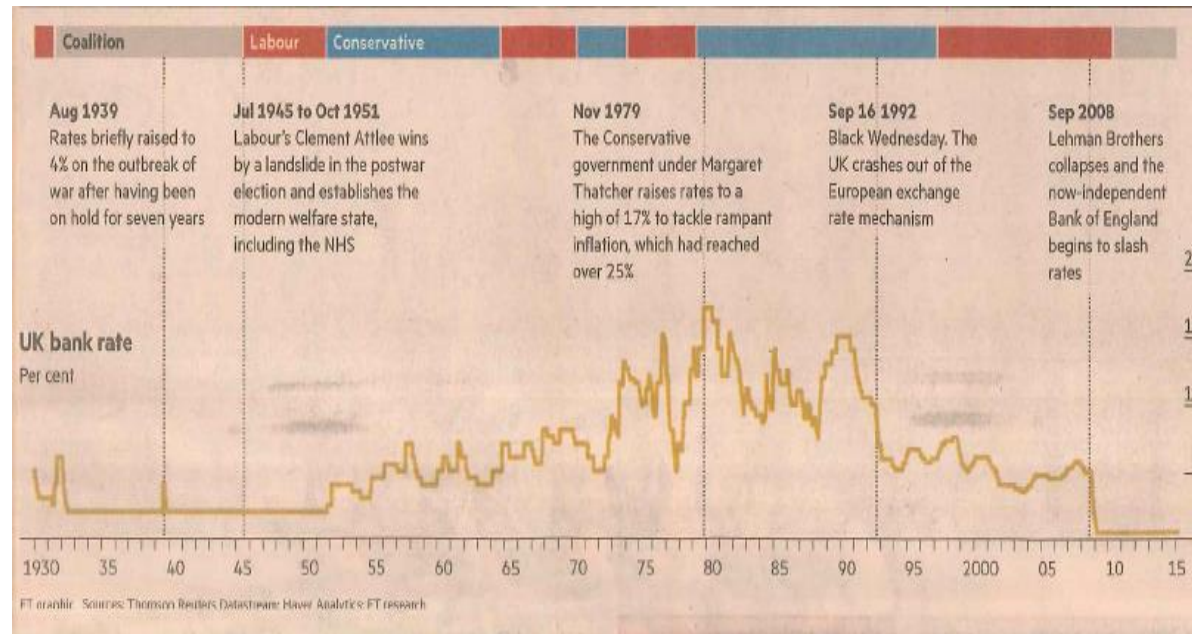
Source: ONS, Bank of England



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History suggests that the long period of very low official interest rates may have some way to run

UK Bank Rate
(per cent)

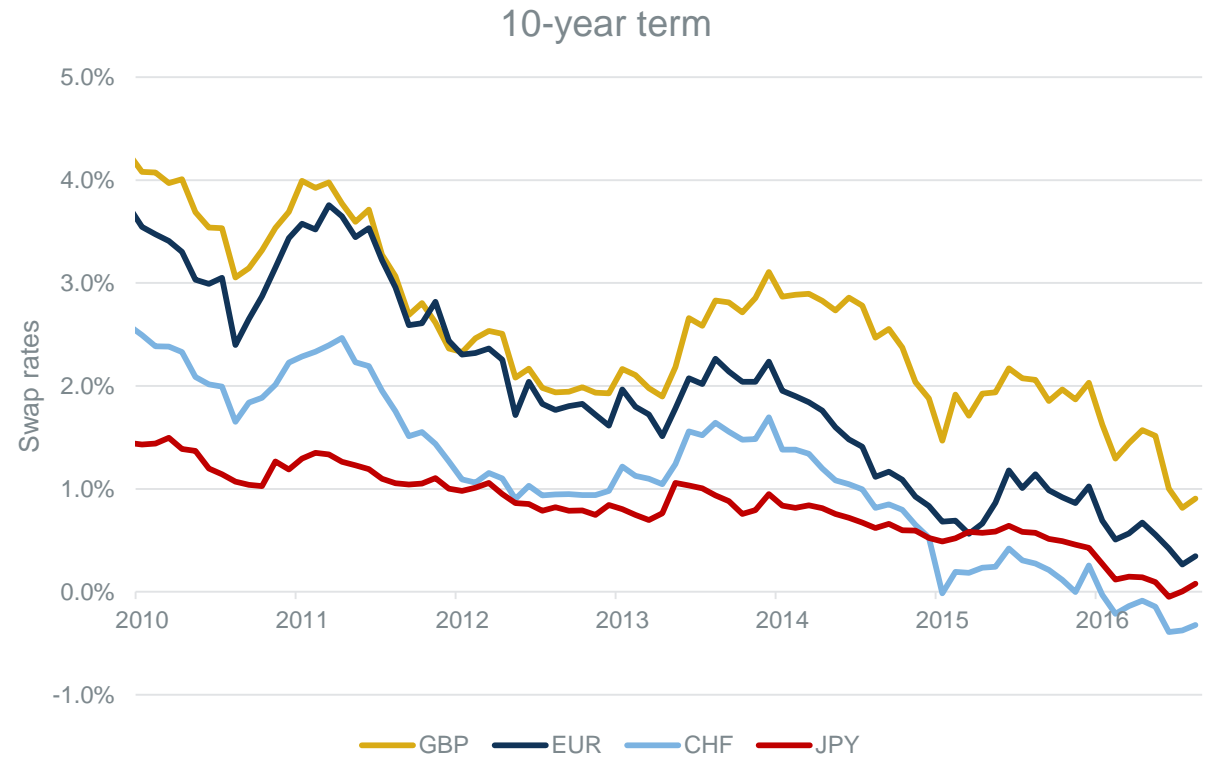
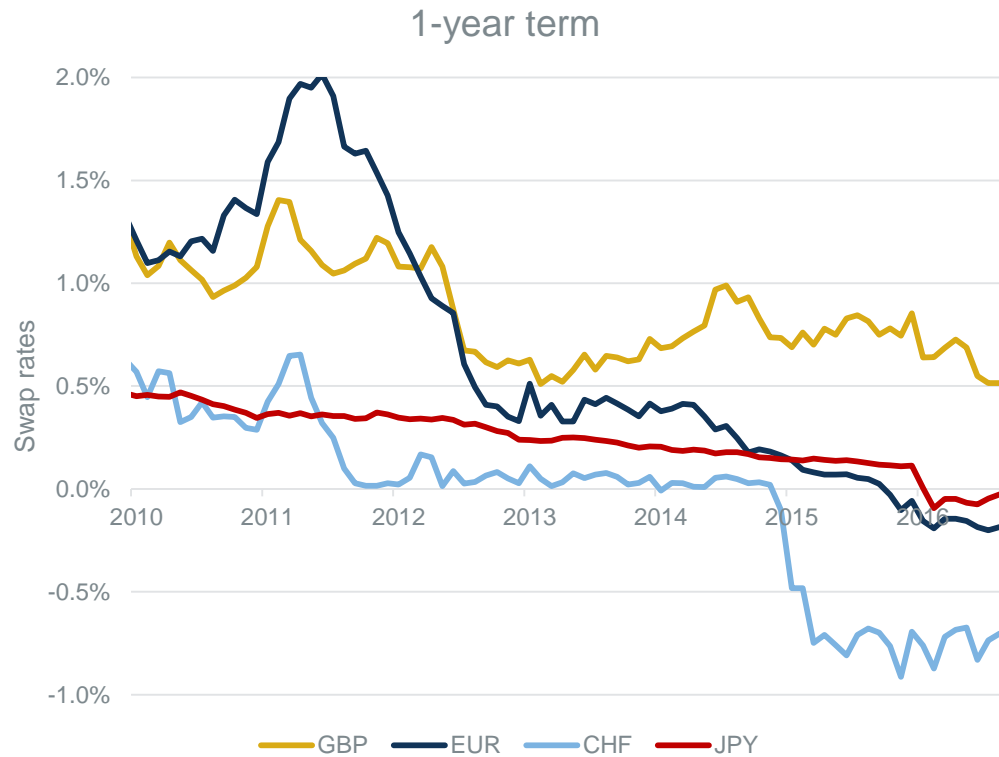


Source: FT



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Other economies have introduced negative rates



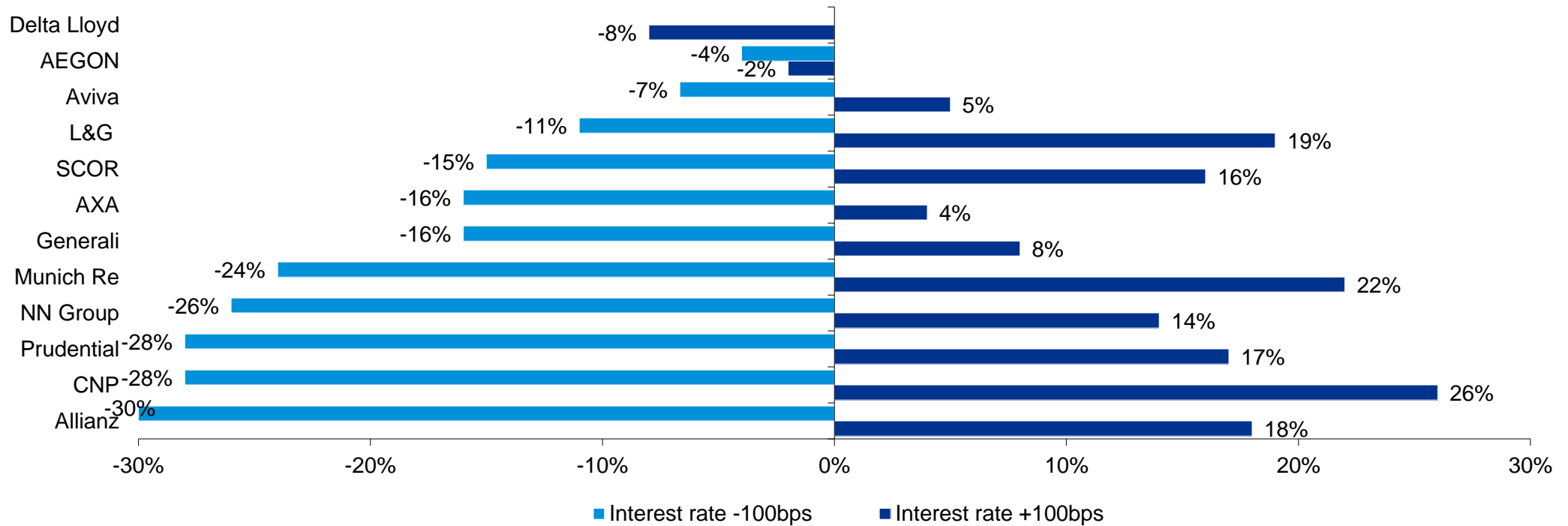
Source: Datastream



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The importance of modelling interest rates

YE15 Interest rates sensitivities to SII cover ratio (IR -100bps and IR +100bps)



Source: KPMG Solvency II Voluntary Disclosure Report



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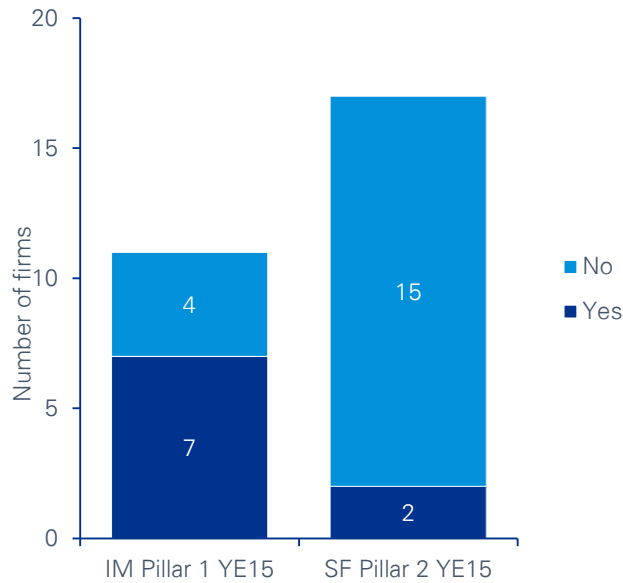
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Market practice of modelling interest rates

02 November 2016

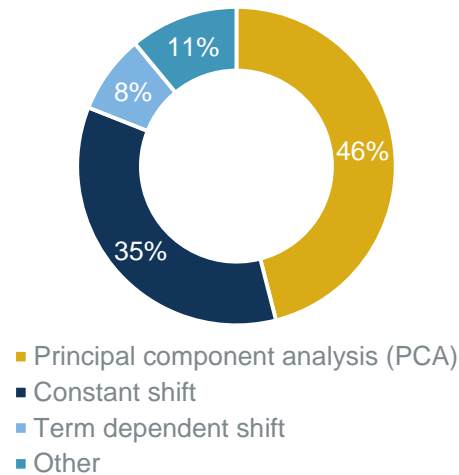
Market practice of modelling interest rates

- Do you apply any expert judgement overlays that influence the level of the yield curve under stress?

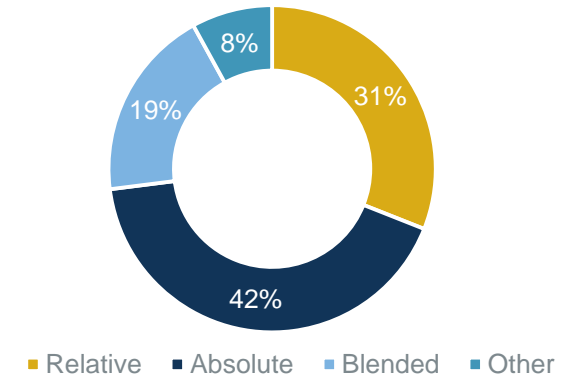


Source: KPMG Technical Practice Survey 2016

- When determining your interest stress, what method do you use?



- Do you calibrate a relative or absolute shock for the purposes of your interest rate stress calibration?



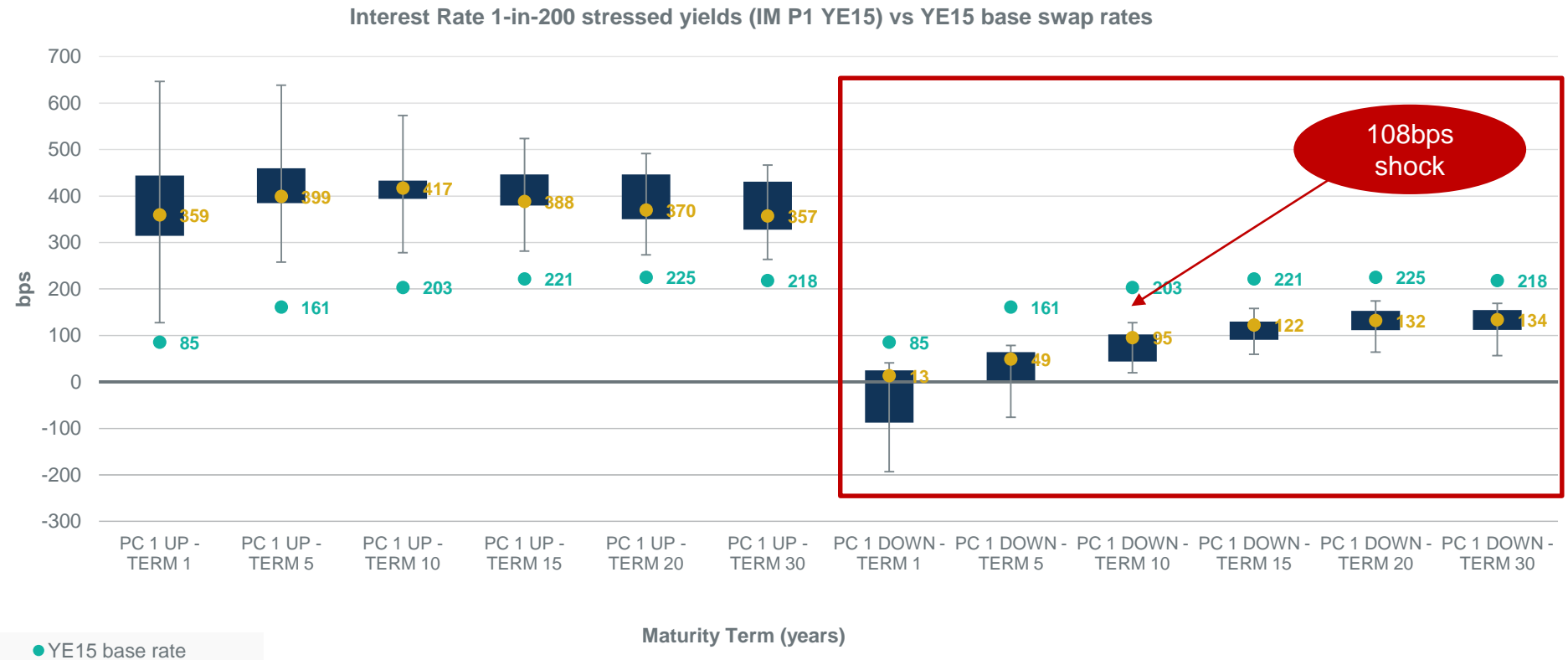
Source: KPMG Technical Practice Survey 2015



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Market practice of modelling interest rates

5 out of 11 Internal Model/Partial Internal Model firms now allow for negative rates in their interest rate models.



Source: KPMG Technical Practice Survey 2016



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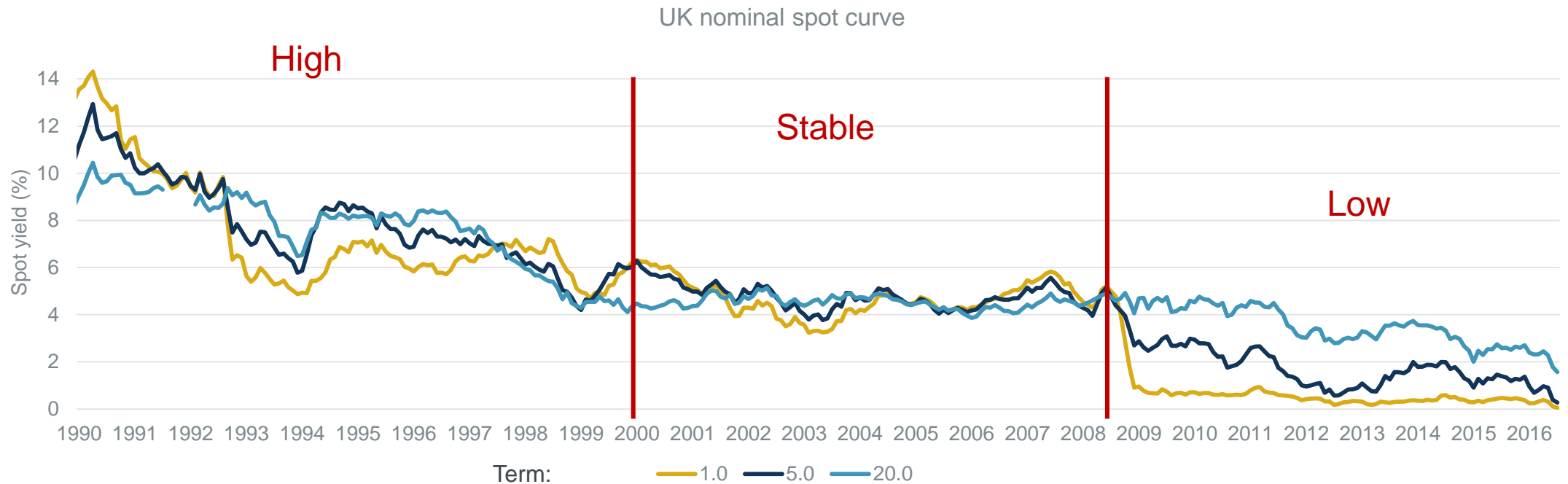
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Methods to allow negative rates in models

Expertise
Sponsorship
Thought leadership
Progress
Community
Sessional Meetings
Education
Working parties
Volunteering
Research
Shaping the future
Networking
Professional support
Enterprise and risk
Learned society
Opportunity
International profile
Journals
Supporting

Learning from the past?

Yields have dropped by more than 100bps across terms over the last year



Source: Bank of England

Gilt yields maturing in 2019 and 2020 have turned negative on 10 August 2016



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Four ways of modelling negative rates

Models that already allow for negative rates



Ho and Lee
Vasicek
Hull-White
PCA (absolute model)
Heath-Jarrow-Morton

Pure expert judgement overlay



Overlay on capital
Overlay on stresses

Blended model



Blend of relative
and absolute model

Displacement model

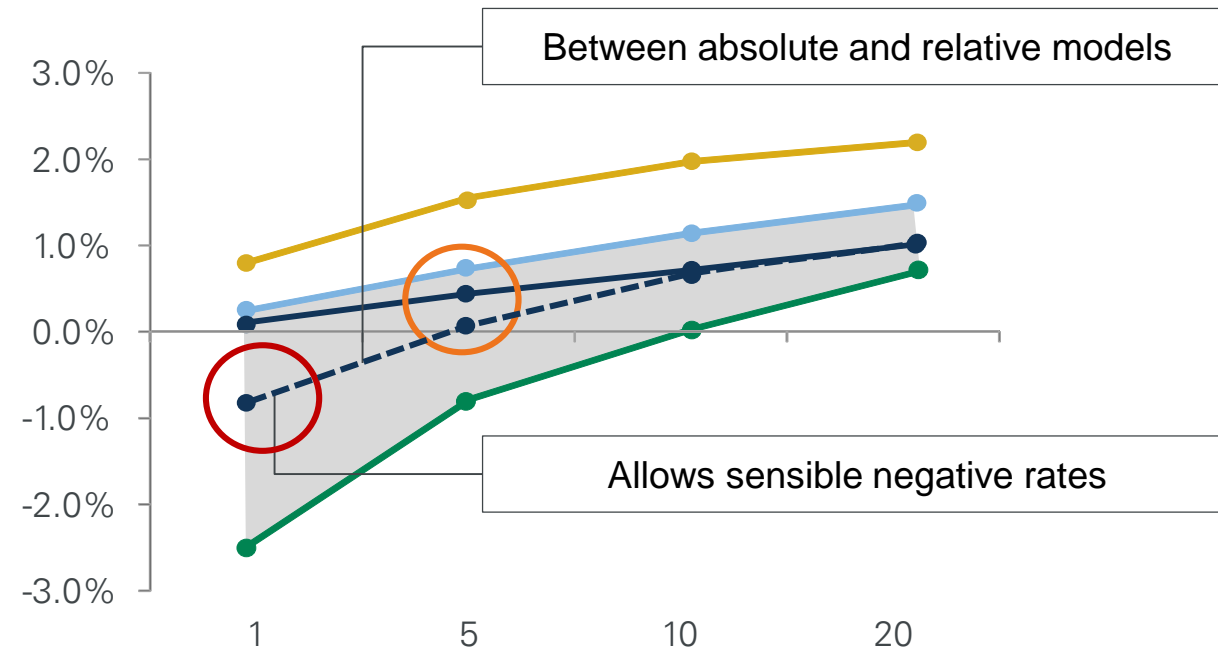


Displaced CIR
Displaced Black-Karasinski
LMM+
PCA with displacement
Shifted SABR



PCA with switching and displacement

1-in-200 Downward Shocked Spot Curve



● Base (YE15) ● Absolute ● Relative
● Switching - - ● - - Switching + Displacement

Areas of expert judgement:

Displacement

Switching threshold

So why is it better than a pure expert judgement overlay?



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Case study by NFU Mutual

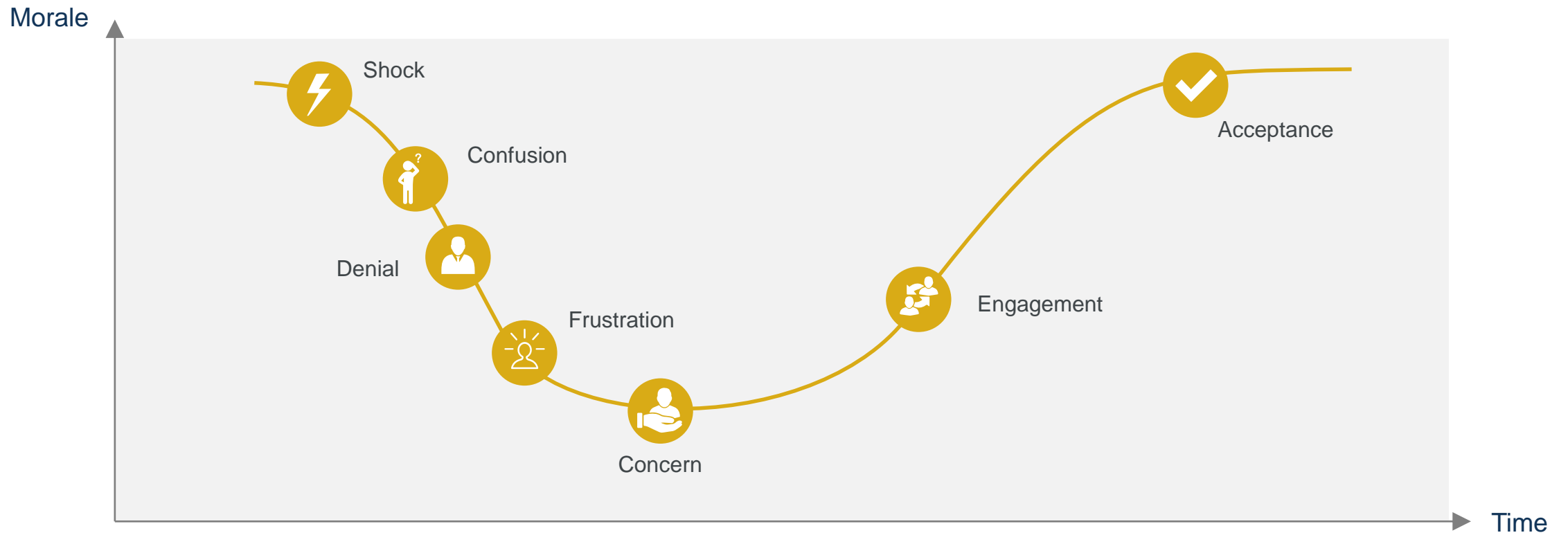
Expertise
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Cultural acceptance



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The change curve



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Benefits of PCA



Provides objective approach to more complex yield curve movements



Leading to increasing robustness



Helps communication



But no magic bullet

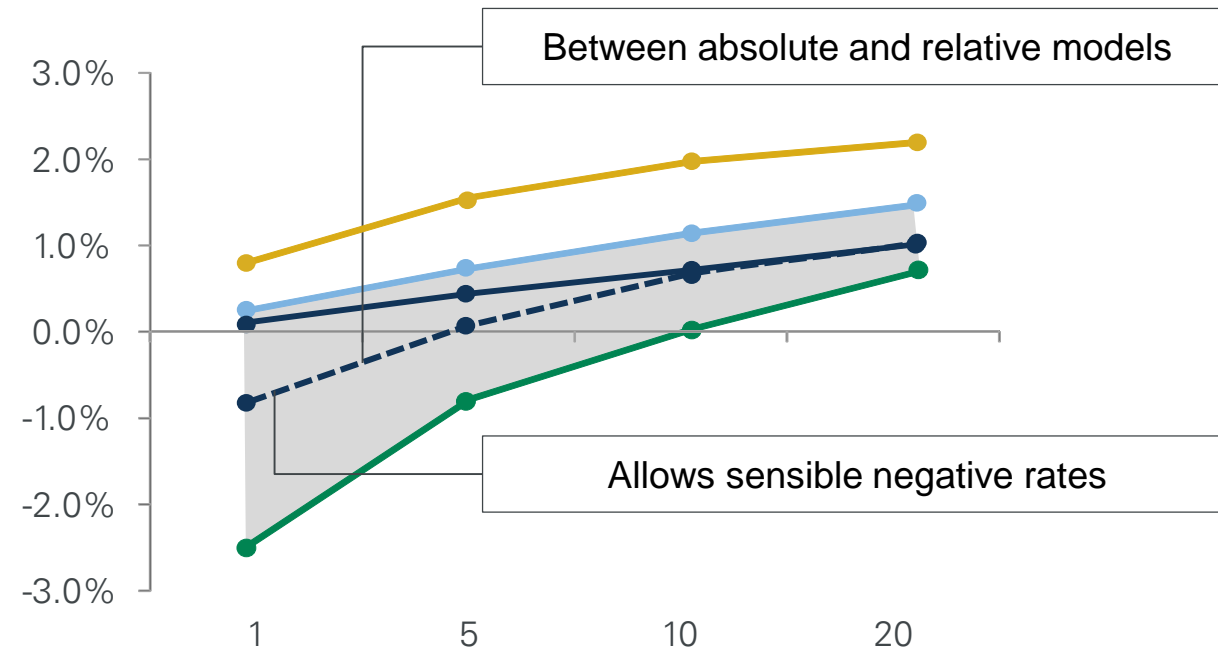
- Increased modelling complexity
- Need simplified model for day to day use
- The big questions still remain...



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Recap on PCA with switching and displacement

1-in-200 Downward Shocked Spot Curve



- Absolute too extreme when rates fall
- Relative too weak when rates fall
- Switching model is the logical solution

Areas of expert judgement:

Displacement

Switching threshold



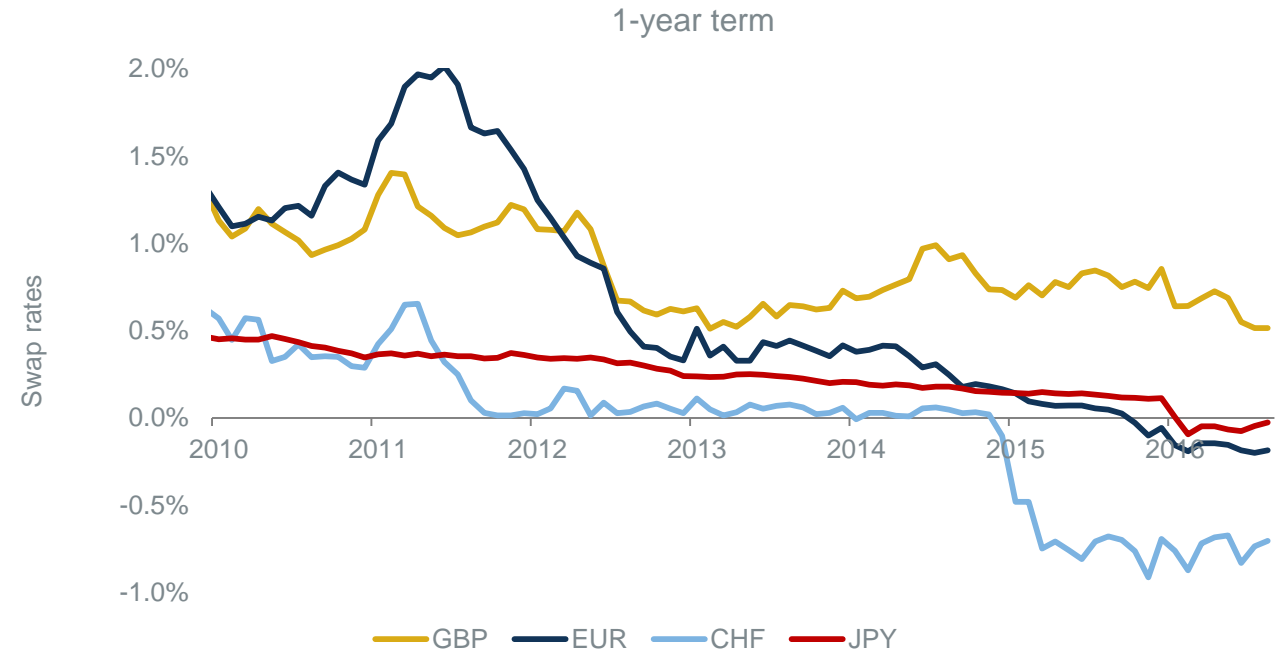
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How low can rates go?

Lack of UK data

No consensus on the answer

Look to other countries



Source: Datastream



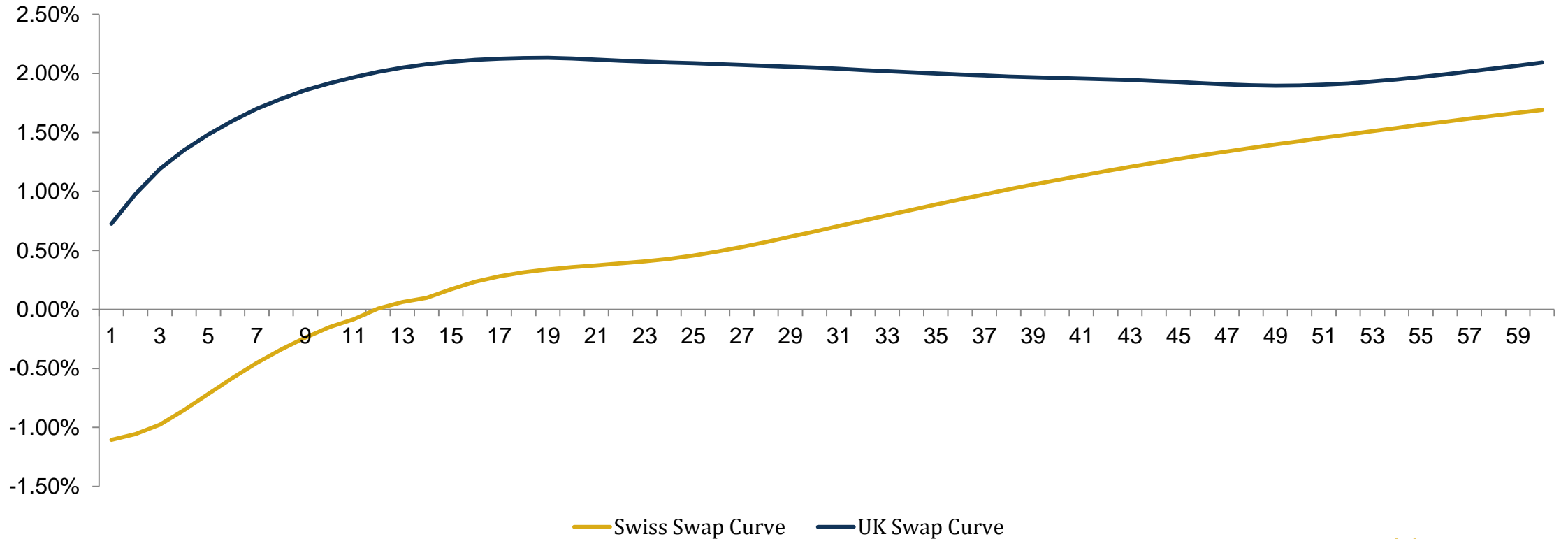
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Practical Issues

- Allow extra time to test actuarial models under negative rates
- Economic Scenario Generator
- Review interest rate correlations
- Communication critical – plan for training sessions?
- Gap widens between Internal Model and Standard Formula
- Plan ahead for stress and scenario testing work

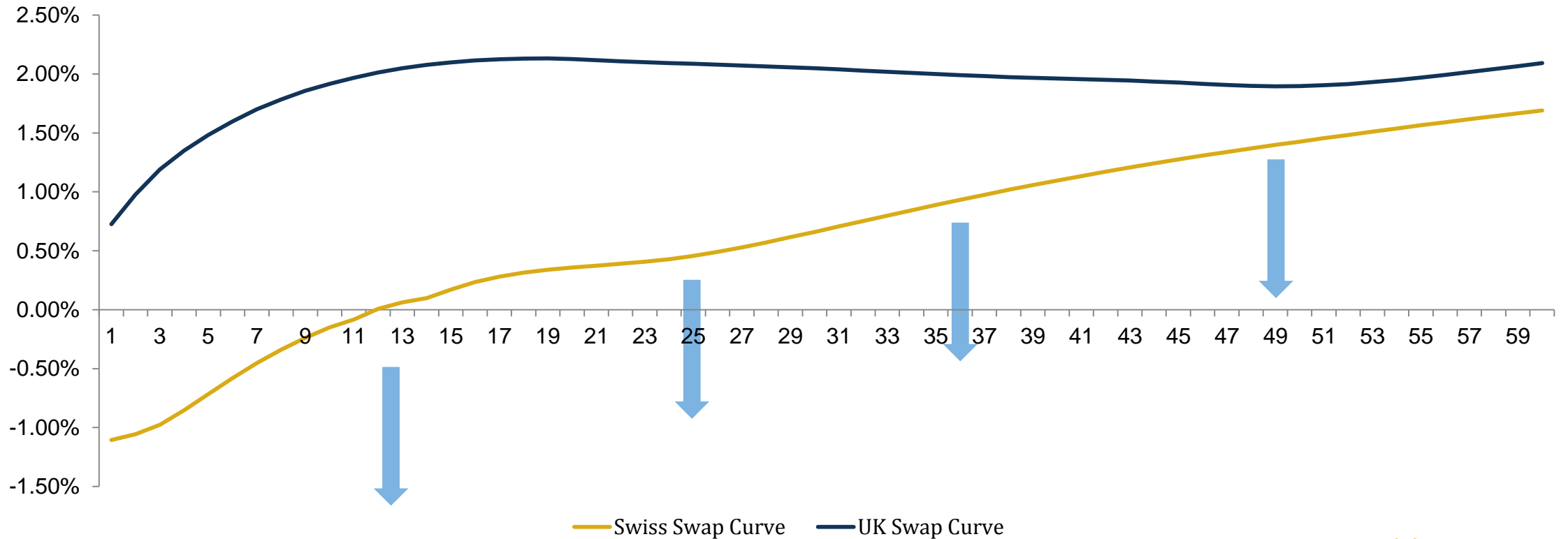


Stress and Scenario Testing – Swiss yield curve



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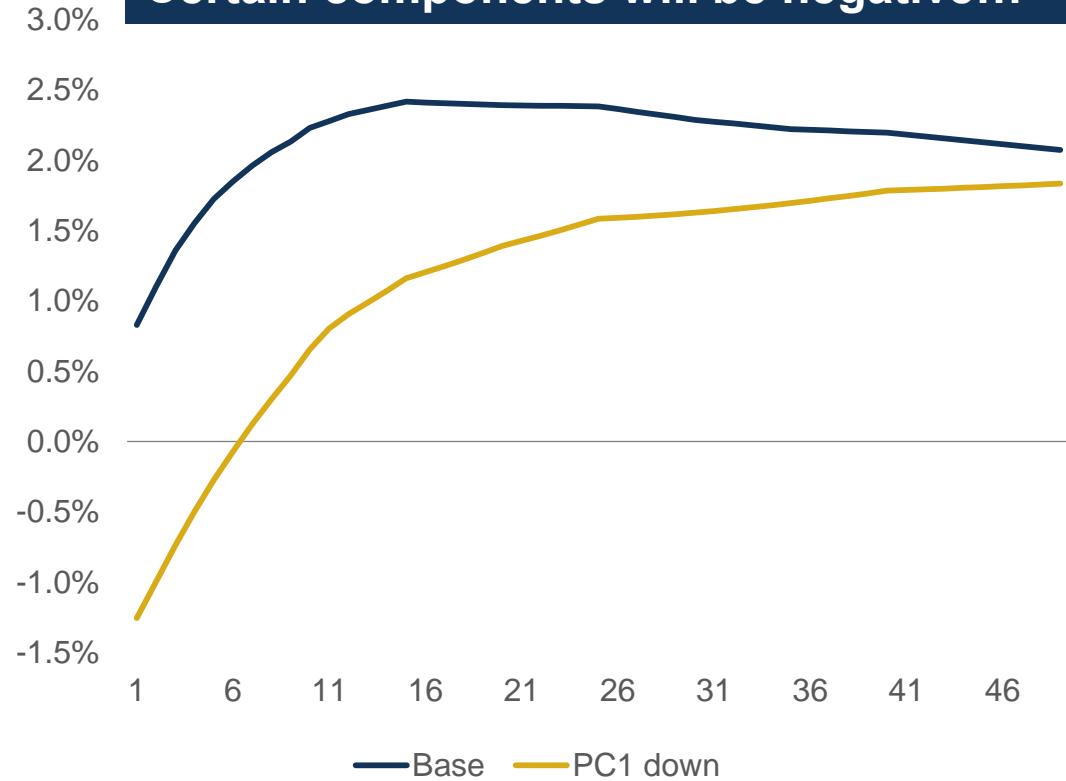
1-in-200 from the stress scenario?



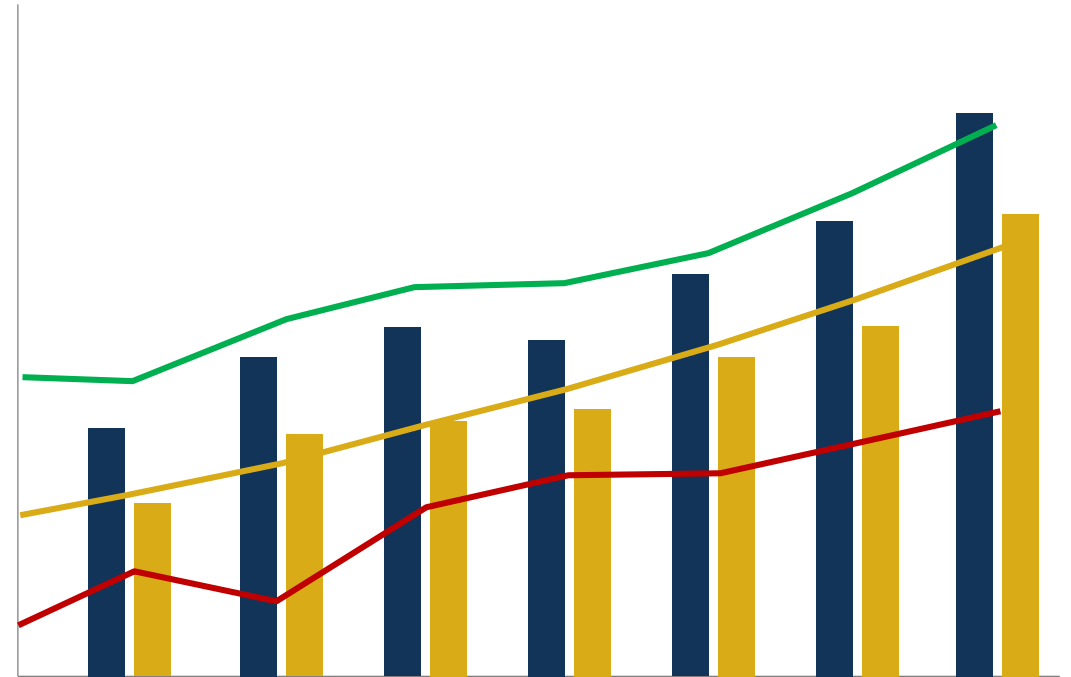
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Some good news...

Certain components will be negative...



...but diversification across terms may help



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Questions

Comments

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