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What is the Risk-Free Rate?

Seamus Creedon
(Working Party Chair)

Session A2
20 February 2009
Highlights of the Life Convention

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Working Party Colleagues:

Seamus Creedon
Iain Forrester
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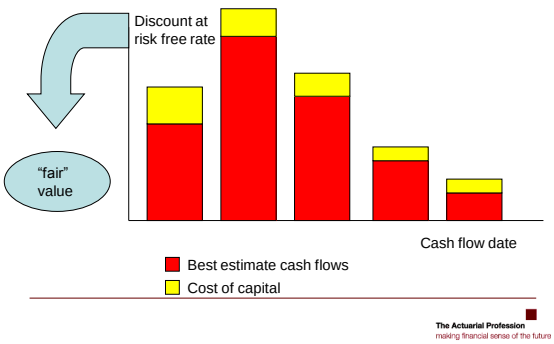
Malcolm Kemp
Antoon Pelsser
Andrew Smith
Colin Wilson

Why Risk-Free Rates Matter



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Risk Free rates pervade Actuarial Work

- CEIOPS references to “risk free rate” for discounting under Solvency II
- CFO forum “risk free” rates for market consistent embedded value
- IASB discussion paper on insurance accounting
- FSA insurance sector briefing discusses role of liquidity premium for valuing annuity liabilities
- Extensive treatment in IAA RMWG paper
- Developments in markets:
  - Widening corporate bond spreads
  - Concerns over reliability of inter-bank rates such as LIBOR
  - Widening – and narrowing - swap spreads
  - Other reference rates: SONIA, REPO

FIRM Board established working party in late 2007 to investigate…

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Session Agenda

- What are the possible references for risk-free discount rates?
- Why are bank risk free rates different from gilt risk free rates?
- What are the arguments for “illiquid” risk free rates?
- Conclusions

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Work in Progress

- The results we present here are still “under construction”
- Development in markets are moving faster than the WP’s thinking…
- We value your input & suggestions

We will not see see the H1 2007 equilibrium again….

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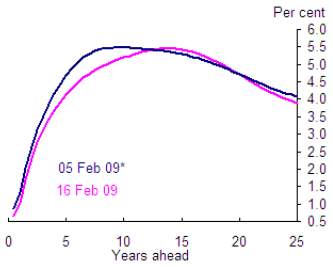
Gilt yields



Source: Bank of England

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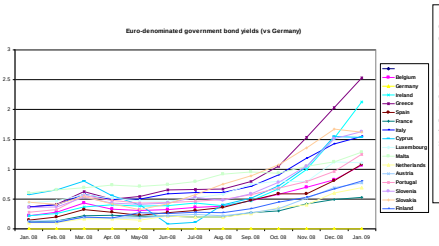
Not one single Euro yield.



Example of a risk on government debt:

Euro-denominated bonds face uncertainty in the event that an issuing government leaves the Euro zone and seek to redenominate its national debt into a national currency.

Source: ECB

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Inter-Bank Market Rates

- Term deposits between banks on unsecured basis.
- Offer-side interest rates (the bid side is called LIBID)
- Very limited secondary market.
- Data collected through a survey of a panel of commercial banks (NOT investment banks)
- Submitted rates are diverse; published LIBOR is an average.

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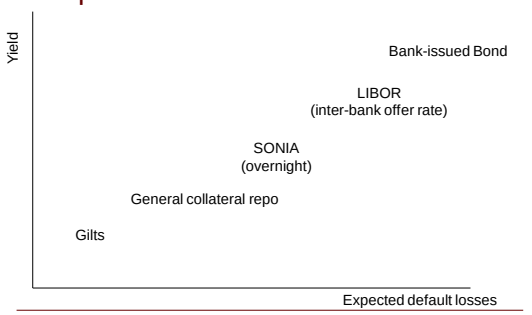
Comparison of Rates



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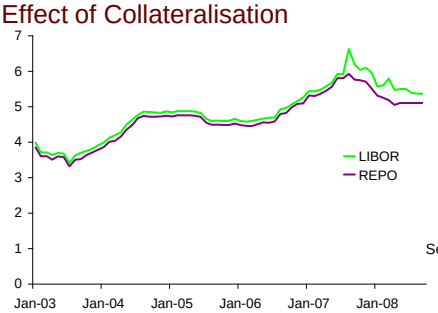
Sterling 1-month LIBOR vs REPO
Effect of Collateralisation



Source: BBA

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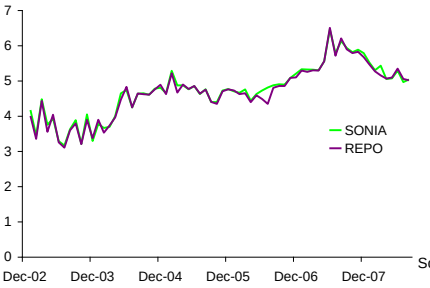
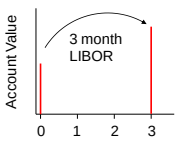
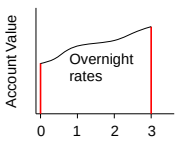
Sterling Overnight Rates
Sonia vs Repo shows little collateral effect



Source: BBA

Value of Refreshing



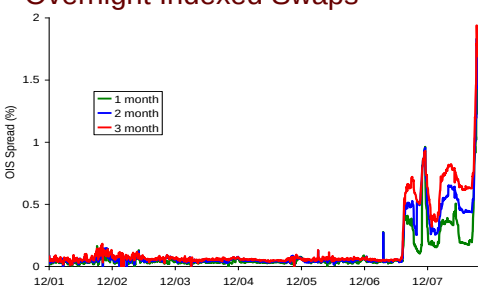


Locked in: A 3-month LIBOR deposit is with one bank, and the depositor risks loss if that bank fails.

Refreshing: The option to move deposits between banks daily. Refreshing is valuable because the investor can switch between banks to mitigate credit risk.

Overnight Indexed Swap: A derivative to swap the total return at overnight rates for a fixed rate.

The Value of Refreshing: EURIBOR vs Overnight Indexed Swaps



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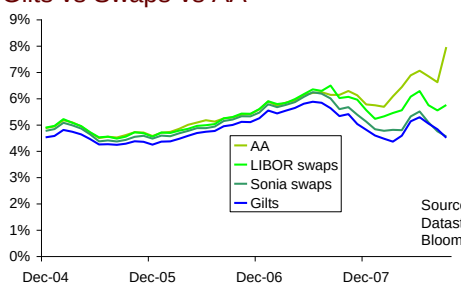
Evolution of 1-Year Sterling Rates Gilts vs Swaps vs AA



Source: Datastream, Bloomberg

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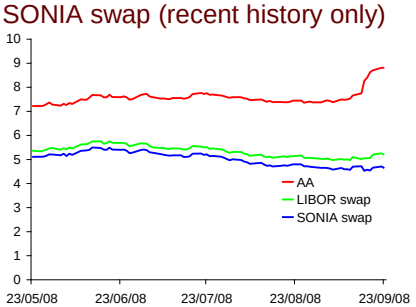
10 Year Rates: AA vs LIBOR swap vs SONIA swap (recent history only)



Source: Datastream, Bloomberg

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Latest Information on OI Swaps

- Overnight-Indexed swaps have recently begun to diverge from Repo's…
- Limited Market for O/N repo
  - Administration costs involved in rolling over every day
- Sampling Differences:
  - SONIA/EURONIA = brokered trades -> lower rates
  - EONIA = survey of trades of all panel banks

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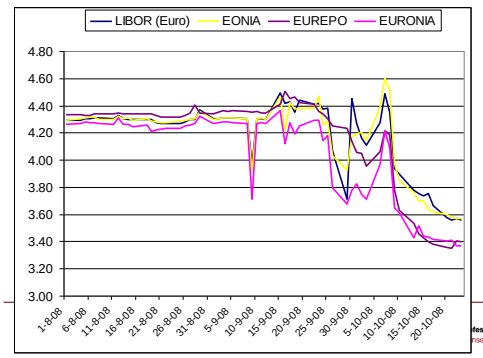
Latest Info on OI Swaps (2)



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Liquidity characteristics of liabilities

- Most life insurer liabilities and pension scheme obligations are long-term in nature.
- However, even within long-term contracts, there are significant differences in terms of liquidity:
  - Unit-Linked liabilities.
    These can be considered to be exactly as liquid as the corresponding assets.
  - Non-linked liabilities
    Annuities are highly illiquid – the timing of outflows for a large portfolio is near certain (in adverse scenarios additional assets are required)
  Others may depend on explicit/implicit terms of policyholder contract
- Investors with illiquid liabilities may take account of asset illiquidity rewards in liability pricing

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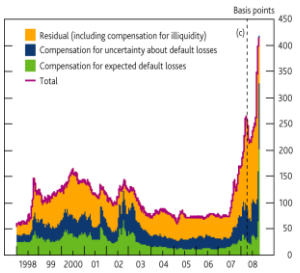
Corporate bond spreads (investment-grade)



The attached research (from B of E) does not provide a separation of the 'residual' spread into illiquidity premium and other components.

This residual may include weaknesses in the underlying Merton model for capturing the default element.

In addition, the model calibration used assumes that there is no illiquidity component in the equity return assumption.

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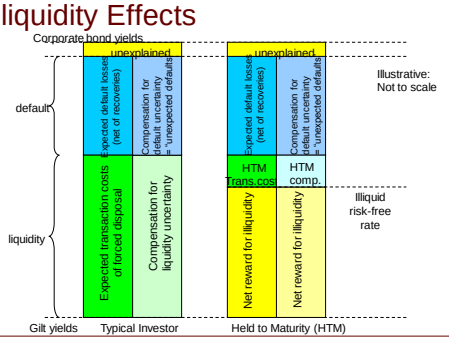
Illiquidity Effects



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Observations

- In ‘normal’ market circumstances, the element of spread attributable to illiquidity is small, particularly if allowance is made for the cost of the capital required to assume the associated credit risk
- In ‘stressed’ market circumstances, behaviours of ‘hold to maturity’ and leveraged investor clienteles diverge – with the consequence that illiquidity premium can become substantial

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Confusion over “Risk-free rate”

- Definition:
  - Yield to be earned on an asset which has no credit risk? (e.g. government bonds) or
  - A quantity not directly observable and derived from market information sources which is as far as practicable exclusive of any element of compensation for the risk of credit default or deterioration?
- “Risk-free rate” arises in a variety of contexts and studies have tended towards the latter definition

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Defining the “Risk Free” Rate

- High credit quality bonds also tend to be …
  - liquid (little scope for information asymmetry)
  - convenient to hold (low expenses for default risk management)
- So we cannot easily extrapolate to zero credit risk, positive liquidity premium, positive convenience yield

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Defining the “Risk Free”Rate (2)

- Sometimes “risk free” is taken to mean “reference rate”
  - For example, CEIOPS (QIS 4) appears to interpret “risk free” in this way
  - Requirements include deep and liquid market
  - “Risk free” not to be taken literally, even governments default sometimes
  - Used to imply gilts, now means LIBOR swaps, may in future be SONIA swaps

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Conclusions

- Risk of default is everywhere; no rates (even gilts) are completely free of risk
- Bank “risk free” rates, based on swaps, are higher than gilts mostly because of credit risk
- Illiquid investments carry an illiquidity premium, which may reduce liability transaction prices, but calibration is neither objective nor robust.
- Some sections of our working party report available at:

http://www.actuaries.org.uk/__data/assets/pdf_file/0010/134011/MarketConsistentValuation.pdf

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