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## CONTROLLING

## FINANCIAL RISK

# Using Yield Curves

## Web Meeting – 27th September 2011

Meeting Host: Joe Di Rollo

Founder & Managing Director ALMIS International Limited

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# Constructing & Using Yield Curves Webinar

- What is a yield curve

- Different markets and components

- Application

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# Yield Curve

- A line that plots interest rates, at a set point in time, having equal / similar credit qualities but different maturities – often called the term structure of interest rates

- The yield curve is used as a benchmark for other investment / lending rates

- It can be used as a discount rate to calculate present values

- It is used for interest rate risk reporting and analysis

- It is also used to predict future interest rates

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FT.com
26th September 2011

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# Comparing like with like

- Credit Risk

- Liquidity Premium

- Day basis / count convention
  - £ Gilts & Bonds          actual / actual
  - £ Money Markets          actual / 365

- Interest payment
  - Gilts – interest paid semi-annually
  - Monet markets, Repos, T Bill – interest paid at maturity
  - Derivatives – Interest terms vary
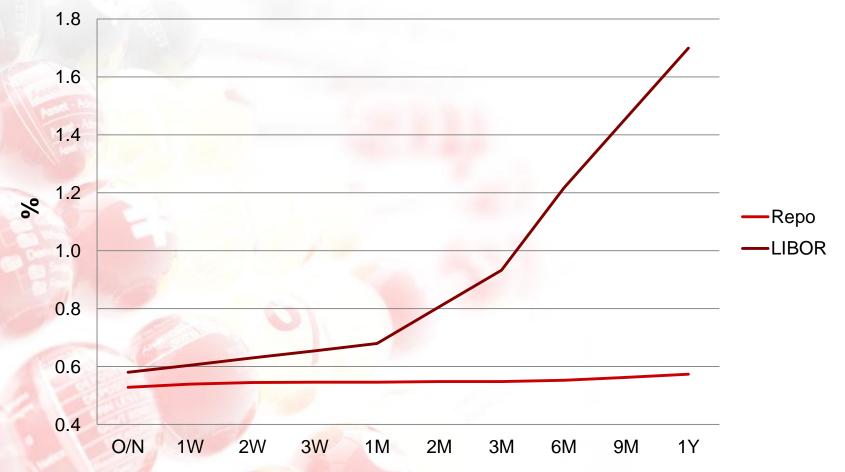
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# Interest Rate Markets for Deriving a Yield Curve

- T.Bills & Gilts
- Gilt repo – general collateral sale and repurchase agreements
- BBA LIBOR
- Short Term Futures & FRA's
- Interest Rate Swaps
  - LIBOR Swaps
  - SONIA Swaps

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# £ Repo v LIBOR Rates
## 23 Sept 2011



Source:  BBA

# Yield Curve

- Idea of a curve is to give rate for any point in time

- How do you get intermediate points?
  - Linear interpolation
  - Boot strapping
  - Cubic spline

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# Discount Rates and Forward Rates

zDCF = 1/(1+ r*days/year)

For compounding of interest – over 12 months

zDCF = 1/(1+r)^(days/year)

Forward Rates
Forward Rate = (DCFs / DCFl -1 ) * 365/t

Where:

n is the number of days to spot date
s is the start period
l is the last period
t is the term

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- 3 Month LIBOR = 0.93344%
- 6 Month LIBOR = 1.21688%

Calculate the forward 3 month LIBOR interest rate in 3 months time

# Forward Rates - Proof

- Invest £100

| | |
|---|---|
| **3 Months @ 0.93344%** | **Then another 3 Months @ ? %** |

**Same as**

**6 Months @ 1.21688%**

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# Discount Rates and Forward Rates

zDCF = 1/(1+ r*days/year)

3 Month LIBOR = 1 / (1 +( 0.93344 % * 0.25)) = 0.997672
6 Month LIBOR = 1 / (1 +( 1.21688 % * 0.5  )) = 0.993952

Forward Rate
Forward Rate = (DCFs / DCFI -1 ) * 365/t

3 Months LIBOR in 3 months time

((0.997672 / 0.993952)) – 1  * 4

=  1.4948%

# Forward Rates - Proof

- ## Invest £100

**3 Months @ 0.93344%**

**Then another 3 Months @ 1.4948%**

**Same as**

**6 Months @ 1.21688%**

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# The forward interest rate market

**Futures**

- Exchange Traded
- Liquid
- Limited size and maturity

**FRA's**

- OTC
- Illiquid
- Tailored

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# £ 3 Month LIBOR Futures
# 26 September 2010

# Liquidity Premium between 3 and 6 month LIBOR

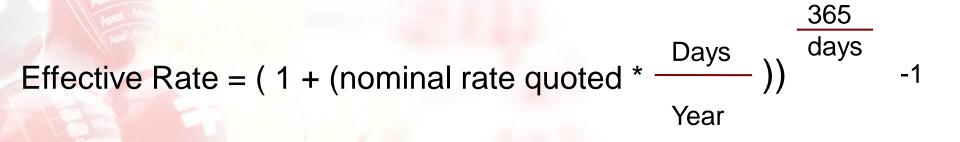- 26 September Quote
  - 3 Year Swap

    Receive 3 Month Libor pay Fixed          1.06%

    Receive 6 Month Libor pay Fixed          1.3398%

    There is currently about a 28bp 'liquidity spread' between 3 & 6 month LIBOR, and this goes out for over 5 years
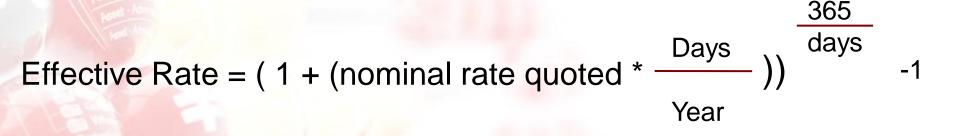
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# Effective Rate

Effective Rate = ( 1 + (nominal rate quoted * $\frac{Days}{Year}$ )) $^{\frac{365}{days}}$ -1

# Effective Rate

Effective Rate = $\left(1 + \left(\text{nominal rate quoted} * \dfrac{\text{Days}}{\text{Year}}\right)\right)^{\frac{365 \text{ days}}{}}$ -1

3 Year Pay Fix, Rec 3 Month Libor Swap Rate   1.06%

Effective Rate = ((1 + (0.0106 * 0.25)) ^ 4 ) -1
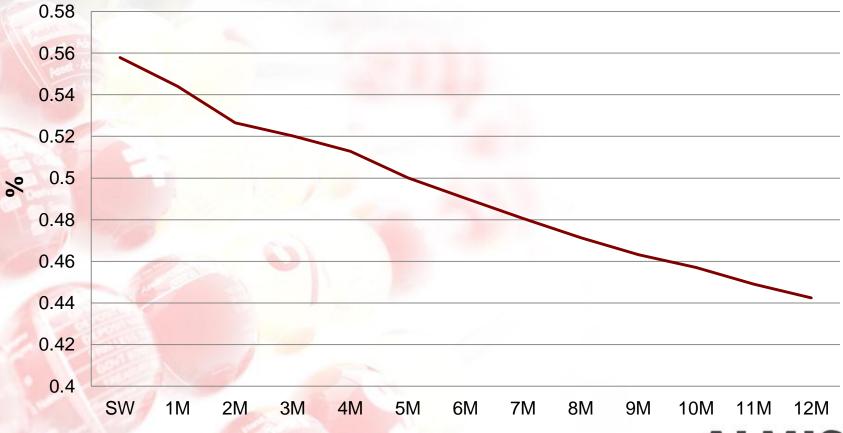= 1.06422%

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# SONIA Swaps

- SONIA is the average interest rate, weighted by volume, of unsecured overnight sterling deposit trades transacted prior to 3.30 pm on a given day between seven members of the Wholesale Money Brokers' Association

- A SONIA overnight index swap is a contract that exchanges at maturity a fixed interest rate against the geometric average of the floating overnight rates that have prevailed over the life of the contract

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# SONIA Swap Rates

**26 September 2011**

# ALMIS – (3 month LIBOR) Zero Coupon
## 26th September 2011

- O/N and LIBOR Cash up to 3 Months
- 3 Month LIBOR Futures to 18 months
- 2 – 30 yr Swaps, adjusted for 6v3 months LIBOR