

# 3M Lag Index-linked Gilts

**Gurminder Bhachu**

([gurminder.bhachu@dmo.gsi.gov.uk](mailto:gurminder.bhachu@dmo.gsi.gov.uk))

**Mark Deacon**

([mark.deacon@dmo.gsi.gov.uk](mailto:mark.deacon@dmo.gsi.gov.uk))

*United Kingdom* **Debt Management Office**

# **New Design for New Index-linked Gilts (1)**

- **All new index-linked gilts issued from July 2005 will adopt the 3 month lag structure pioneered by the Canadians in 1991**
- **This is a technical change to bring the UK into line with current best international methodology**
- **Other countries that use this design include: Canada, France, Greece, Italy, Japan, South Africa, Sweden and the USA**

# **New Design for New Index-linked Gilts (2)**

- **Formulae and other relevant information were provided in an updated version of the DMO's gilt formulae paper**  
(<http://www.dmo.gov.uk/gilts/public/technical/yldeqns.pdf>, hard copies also available)
- **Existing-style index-linked gilts (with an 8 month lag) can be re-opened**
- **Time delay between announcement and launch of first new index-linked gilt so that the market has sufficient time to carry out any systems changes**

# How are New Index-linked Gilts Different?

- Existing index-linked gilts have an 8 month indexation lag – 2 months to allow for publication of the RPI and 6 months so that the next dividend is always known at the start of the relevant dividend period for accrued interest calculations
- By doing away with the requirement to always know the next dividend payment 6 months in advance, it has been possible to shorten the lag to 3 months for new style linkers

**For index-linked gilts, semi-annual interest payments are calculated using the formula:**

$$\text{Interest Payment}_M = \frac{c}{2} \cdot \text{Index Ratio}_M$$

**where:**

**$c$  = annual coupon rate (%)**

**Index Ratio<sub>M</sub> = inflation growth factor for M<sup>th</sup>  
interest payment**

## Existing Index-linked Gilts

- The Index Ratio applied to a particular interest payment measures inflation from 8 months before the bond is first issued to 8 months before the interest payment date. The method ignores which day of the month the bond is issued on and which day of the month the interest payment is due on. **The Index Ratio changes once a month. Only two values of the Index Ratio a year are used in the calculation of the accrued interest**

## New Index-linked Gilts

- The Index Ratio applied to a particular interest payment measures inflation from approx 3 months before the bond is first issued to approx 3 months before the interest payment date. The exact length of lag depends on which day of the month the bond is issued on and which day of the month the interest payment is due on. **The Index Ratio changes every day. Each day's Index Ratio is used in the calculation of the accrued interest for that day**

# Index Ratios used for Accrued Interest

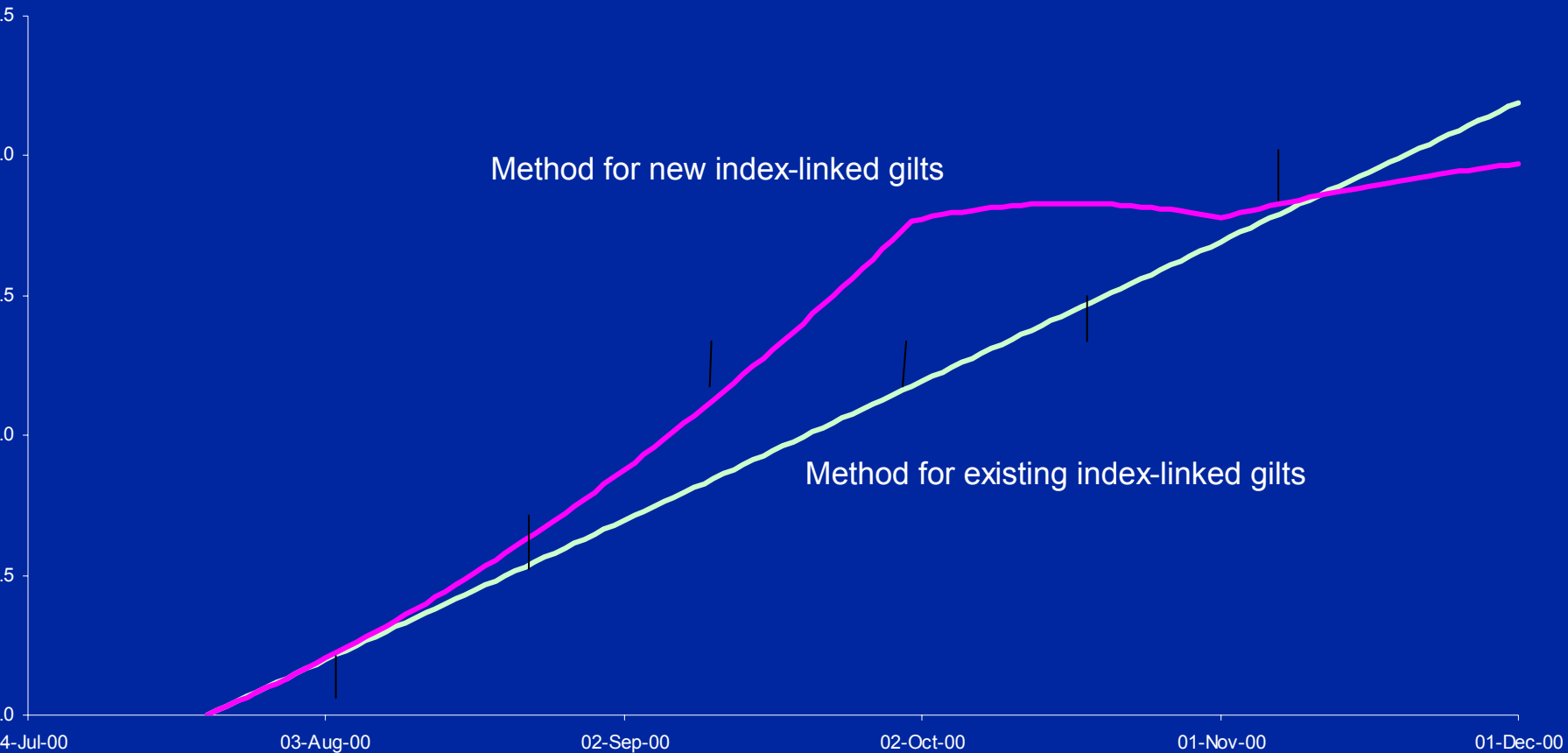


Method for new index-linked gilts

Method for existing index-linked gilts

# Accrued Interest over a Dividend Period

Note: for simplicity, example assumes no ex-dividend period



*United Kingdom Debt Management Office*



# Dividend Calculations (1)

**Example:** Calculate the (standard) dividend payment due on 17 December 2004 for a 2.5% coupon index-linked gilt issued on 5 November 2003

## Method 1 – Existing index-linked gilts

$$\text{Div on 17 Dec 04} = \frac{\text{coupon}}{2} \times \frac{\text{Ref RPI (Dec 04)}}{\text{Ref RPI (Nov 03)}}$$

$$= \frac{\text{coupon}}{2} \times \frac{\text{RPI (Apr 04)}}{\text{RPI (Mar 03)}} = \frac{2.5}{2} \times \frac{185.7}{179.9} = \text{£1.290300}$$

This dividend would have been known when the Apr 04 RPI was published i.e on 18 May 2004

# Dividend Calculations (2)

## Method 2 – New index-linked gilts

$$\text{Div on 17 Dec 04} = \frac{\text{coupon}}{2} \times \text{Index Ratio (17 Dec 04)} = \frac{\text{coupon}}{2} \times \frac{\text{Ref RPI (17 Dec 04)}}{\text{Ref RPI (5 Nov 03)}}$$

Round to 5dp  
↙

$$\text{Ref RPI (17 Dec 04)} = \text{Ref RPI (1 Dec 04)} + \frac{(17-1)}{31} \times [\text{Ref RPI (1 Jan 05)} - \text{Ref RPI (1 Dec 04)}]$$

$$= \text{RPI (Sep 04)} + \frac{16}{31} \times [\text{RPI (Oct 04)} - \text{RPI (Sep 04)}]$$

$$= 188.1 + \frac{16}{31} \times [188.6 - 188.1]$$

$$= 188.35806 \text{ (when rounded to 5dp)}$$

# Dividend Calculations (3)

## Method 2 – New index-linked gilts (continued)

$$\text{Ref RPI (5 Nov 03)} = \text{Ref RPI (1 Nov 03)} + \frac{(5-1)}{30} \times [\text{Ref RPI (1 Dec 03)} - \text{Ref RPI (1 Nov 03)}]$$

$$= \text{RPI (Aug 03)} + \frac{4}{30} \times [\text{RPI (Sep 03)} - \text{RPI (Aug 03)}]$$

$$= 181.6 + \frac{4}{30} \times [182.5 - 181.6] = 181.72000 \text{ (when rounded to 5dp)}$$

$$\text{So, dividend on 17 Dec 04} = \frac{2.5}{2} \times \frac{188.35806}{181.72000} = \text{£}1.295663$$

Round to 5dp

Round to 6dp

This dividend would have been known when the Oct 04 RPI was published i.e on 16 November 2004

# Dividend Calculations (4)

- First dividends on new index-linked gilts will typically be 'non-standard', i.e. 'short' or 'long'
- The (inflation-adjusted) dividend payments are the product of the real dividend (adjusted to take account of the non-standard length) and the Index Ratio
- It is very important to note that in this calculation the real dividend should not be rounded; it is the inflation-adjusted dividends which will be rounded (to nearest 6dp per £100 nominal)
- Formulae are provided in DMO gilt calculations document

# Accrued Interest Calculations

**Example:** Calculate the accrued interest on this gilt for settlement on 15 November 2004

## Method 1 – Existing index-linked gilts

$$\begin{aligned}\text{Accrued Interest on 15 Nov 04} &= \frac{\text{No. of days from 17 Jun to 15 Nov}}{\text{No. of days from 17 Jun to 17 Dec}} \times \text{dividend} \\ &= \frac{151}{183} \times \text{£}1.290300 = \text{£}1.064673\text{.....}\end{aligned}$$

## Method 2 – New index-linked gilts

Acc Int on 15 Nov 04 = Real accrued interest x Index Ratio

$$\begin{aligned}&= \frac{\text{No. of days from 17 Jun to 15 Nov}}{\text{No. of days from 17 Jun to 17 Dec}} \times \frac{\text{coupon}}{2} \times \text{Index Ratio (15 Nov)} \\ &= \frac{151}{183} \times \frac{2.5}{2} \times \frac{187.72667}{181.72000} = \text{£}1.065509\text{.....}\end{aligned}$$

Round to 5dp

This is the inflation-adjusted accrued interest

# Trading New Index-linked Gilts

- Existing index-linked gilts trade on an inflation-adjusted basis. This means that the price of such a gilt reflects inflation since it was originally issued e.g most linkers are currently trading at more than £200 per £100 nominal
- New index-linked gilts will trade on a real price basis i.e. the impact of inflation since the bond was first issued is effectively stripped out from the price for trading purposes (and hence will typically trade around £100 per £100 nominal)
- However, when new index-linked gilts trades are settled the settlement price will reflect accrued inflation:

$$\text{Inflation-Adjusted Dirty Price} = (\text{Index Ratio} \times \text{Real Clean Price}) \\ + (\text{Index Ratio} \times \text{Real Accrued Interest})$$

# Decision on Ex-dividend Period

- As part of the PBR consultation the DMO sought views on whether new index-linked gilts should be launched with no ex-dividend period
- The DMO decided that the existing ex-dividend period of 7 business days will be retained, but this can be reviewed again (for all gilts) in the future

# Key Distinguishing Features of New Linkers (1)

- Next dividend payment will not always be known (it will become known approx. 2-6 weeks ahead of the dividend date, and certainly before the ex-dividend date)
- Accrued interest is not calculated directly from the dividend payment
- Interest does not accrue linearly over a dividend period and could go down from one day to the next
- The yield calculation does not depend on an inflation assumption



# Key Distinguishing Features of New Linkers (2)

- Indexation is on a daily rather than a monthly basis
- New linkers will trade on a real price basis, but settle on the basis of the inflation-adjusted price
- GEMMs will be expected to contribute real clean prices for new linkers for the compilation of end-of-day GEMMA reference prices (inflation-adjusted prices are contributed for 8-month lag linkers)
- All new gilts issued from 1 April 2005 will be called 'Treasury Gilt' rather than 'Treasury Stock'. So all 8-month lag linkers are called 'Treasury Stock' and all 3-month lag linkers will be called 'Treasury Gilt'