

# A Quick Guide to Index-linked Gilts

## History

- 1981 The first index-linked gilt is issued; £1 billion nominal of 2% Index-linked Treasury Stock 1996, indexed to the (Retail Price Index) RPI with an eight month indexation lag
- 1987 The RPI is rebased from 394.5 to 100
- 2004 The DMO recommends that all new index-linked gilts should employ a three month indexation lag, rather than the standard eight month lag
- 2005 1¼% Index-linked Treasury Gilt 2055 is issued as the first index-linked gilt with a three month indexation lag
- 2010 There are 17 index-linked gilts currently in issue, making up around 22% of gilts in issue. Of these, 10 are three month lagged, 7 are eight month lagged

(Source: DMO, 14/09/10)

## What is an Index-linked Gilt?

Index-linked gilts (“linkers”) are like conventional gilts in that they are issued by the Government and pay a semi-annual coupon until maturity. However, with linkers the interest and final repayment amounts are adjusted in line with the RPI, providing an effective hedge against inflation. The headline coupon rate also tends to be lower than on a conventional gilt.

Initially, linkers employed an 8 month lag; this was comprised of 2 months for the compilation of the RPI figure, and an additional 6 months to allow the nominal amount of the next dividend to be known at the beginning of the interest accrual period. In 2005, the Treasury switched to a 3 month lag method as pioneered in the Canadian Real Return Bond market, to bring new linkers into line with international best practise and to improve their inflation protection properties.

## Calculating Interest payments

### *Eight month lagged*

The original index-linked gilts use a simple calculation for each interest payment. This involves dividing the relevant lagged RPI on the interest payment date by the gilt’s base RPI, ie the lagged RPI from the issue date. The following worked example uses 2½% Index-linked Treasury Stock 2011, issued in January 1983.

$$\text{Interest payment} = \frac{\text{Coupon (c)}}{\text{Coupon frequency (f)}} \times \frac{\text{lagged RPI for payment date (RPIdiv)}}{\text{lagged RPI for issue date (RPIbase)}}$$



c = 2.5%  
f = 2

$$\text{Dividend for July 2010} = \frac{2.5}{2} \times \frac{216.6}{81.6} = 3.3180 \text{ (rounded to 4 decimal places as required by the DMO for this particular gilt)}$$

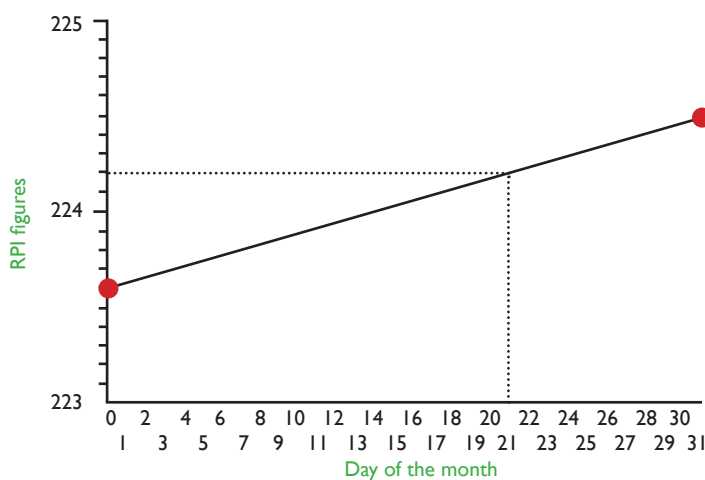
### Three month lagged

The calculations for three month lagged linkers are different because an interpolated RPI (the “Reference RPI”) is used. With eight month linkers, the relevant RPI for any day of a particular month will be the same - in the example above, the base RPI would have been the same whether the gilt was issued on the 1st or the 31st of January.

For three month linkers, the Reference RPI is calculated using straight line interpolation. On the first day of any month, the Reference RPI will be the published RPI from 3 months previously, but subsequent to that, the Reference RPI will be adjusted depending on the day of the month,

The actual formula for calculating Reference RPI is as follows:

$$\text{Reference RPI} = \text{RPI 3 months lagged to current month} + \left\{ \frac{\text{Current day of month} - 1}{\text{Days in month}} \times \frac{\text{2 month lagged RPI} - \text{3 month lagged RPI}}{\text{Days in month}} \right\}$$



On the example graph, the initial RPI is 223.6 and the RPI for the following month is 224.5. Using the graph to extract a ballpark figure suggests that the Reference RPI for the 21st day of the month is 224.2.

Applying the formula:

$$\text{Reference RPI} = 223.6 + \left\{ \frac{20}{31} \times \frac{224.5 - 223.6}{1} \right\} = 224.2478$$

Each three month lagged linker will have a base Reference RPI, calculated using the issue date, which will remain constant over the life of the gilt. In order to calculate dividend payments, a Reference RPI for the payment date is derived and then an Index Ratio calculated.

$$\text{Index Ratio for payment date} = \frac{\text{Reference RPI for payment date}}{\text{Reference RPI for issue date}}$$

Let's assume that the Reference RPI we calculated above is the Reference RPI for payment date for a hypothetical three month lagged linker. We have also calculated the Reference RPI for issue date, which is 89.2465.

$$\text{Index ratio} = \frac{224.2478}{89.2465} = 2.51268 \text{ (rounded to 5 decimal places)}$$

To calculate the dividend payment:

$$\text{Dividend payment} = \frac{\text{Coupon (c)}}{\text{Coupon frequency (f)}} \times \text{Index Ratio}$$

$$c = 2.5$$

$$f = 2$$

$$\text{Dividend payment} = \frac{2.5}{2} \times 2.51268 = 3.14085$$

## Calculating accrued interest

To calculate the accrued interest for an eight month lagged linker, you need to know the number of accrued days and the number of days in the coupon period.

Using the example above, and assuming that there are 50 days accrued:

Dividend for July 2010 = 3.3180

Days accrued = 50

Days in interest period = 186

$$\text{Interest accrued} = 3.3180 \times \frac{50}{184} = 0.9016$$

Accrued interest on three month lagged linkers is similarly calculated, but the actual coupon is used and you must utilise the Index Ratio for the settlement date. Using the previous example, and assuming 116 days accrued:

Coupon = 2.5

Days accrued = 116

Days in interest period = 184

Index Ratio = 3.14085

$$\text{Interest accrued} = \frac{2.5}{2} \times \frac{116}{184} \times 3.14085 = 2.475126$$

Thus inflation-adjusted accrued interest equals “real” accrued interest x Index Ratio.

## Price and yield calculations

Eight and three month lagged linkers are priced differently. Eight month lagged linkers trade on an inflation adjusted basis but three month lagged linkers trade on a “real clean price” basis that excludes inflation. There are two further prices which are applicable only to three month lagged linkers:

Inflation-adjusted clean price = real clean price x Index Ratio

Inflation-adjusted dirty price = Inflation-adjusted clean price + accrued interest (Index Ratio adjusted)

The inflation-adjusted dirty price is used for settlement.

Due to the complexity of the price and yield calculations, we have not examined them in detail here, but a full explanation and formulae for calculating dividends, accrued interest, yields and prices can be found at

<http://www.dmo.gov.uk/documentview.aspx?docname=/giltsmarket/formulae/yldeqns.pdf>

The DMO calculates and publishes daily Reference RPIs and daily Index Ratios for all three month lagged linkers. The figures, as well as daily reference prices and yields, can be found at

[http://www.dmo.gov.uk/index.aspx?page=About/About\\_Gilts](http://www.dmo.gov.uk/index.aspx?page=About/About_Gilts)

### Eight month lagged index-linked gilts

Gilt Name	ISIN Code	Redemption Date
2½% Index-linked Treasury Stock 2011	GB0009063578	23-Aug-2011
2½% Index-linked Treasury Stock 2013	GB0009036715	16-Aug-2013
2½% Index-linked Treasury Stock 2016	GB0009075325	26-Jul-2016
2½% Index-linked Treasury Stock 2020	GB0009081828	16-Apr-2020
2½% Index-linked Treasury Stock 2024	GB0008983024	17-Jul-2024
4 1/8% Index-linked Treasury Stock 2030	GB0008932666	22-Jul-2030
2% Index-linked Treasury Stock 2035	GB0031790826	26-Jan-2035

### Three month lagged index-linked gilts

Gilt Name	ISIN Code	Redemption Date
1¼% Index-linked Treasury Gilt 2017	GB00B0V3WQ75	22-Nov-2017
1 7/8% Index-linked Treasury Gilt 2022	GB00B1Z5HQ14	22-Nov-2022
1¼% Index-linked Treasury Gilt 2027	GB00B128DH60	22-Nov-2027
1¼% Index-linked Treasury Gilt 2032	GB00B3D4VD98	22-Nov-2032
1 1/8% Index-linked Treasury Gilt 2037	GB00B1L6W962	22-Nov-2037
0 5/8% Index-linked Treasury Gilt 2040	GB00B3LZBF68	22-Mar-2040
0 5/8% Index-linked Treasury Gilt 2042	GB00B3MYD345	22-Nov-2042
0¾% Index-linked Treasury Gilt 2047	GB00B24FFM16	22-Nov-2047
0½% Index-linked Treasury Gilt 2050	GB00B421JZ66	22-Mar-2050
1¼% Index-linked Treasury Gilt 2055	GB00B0CNHZ09	22-Nov-2055
Source: DMO website, 14/09/2010		

If you would like further information on index-linked gilts, or other fixed income products, please contact our Fixed Income team:

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