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**Using Microsoft Excel to calculate forward interest rates**

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**[Note: this note accompanies the Microsoft Excel spreadsheet that appears in the Market Software section of the website]**

From elementary no-arbitrage theory, we know that the forward interest rate can be calculated from market spot rates. As such the price of the short sterling or Eurodollar futures contract, indeed any 90-day futures contract, at any one time should reflect this no-arbitrage rate.

If we are calculating the forward rate from cash market rates we use

$$r_f = \left\{ \frac{\left[ 1 + r_l \left( \frac{n_l}{360} \right) \right]}{\left[ 1 + r_s \left( \frac{n_s}{360} \right) \right]} - 1 \right\} \frac{360}{n_f}$$

where

- $r_f$  is the forward rate
- $r_l$  is the long-term deposit rate
- $r_s$  is the short-term deposit rate
- $n_l$  is the number of days in the long term
- $n_s$  is the number of days in the short term
- $n_f$  is the number of days in the forward term.

In practice there will be some discrepancy in rates from what is suggested by the cash market Libor rates, for the following reasons:

- supply and demand
- the futures market driving prices in the cash market, rather than vice-versa
- differences in the term of actual periods under consideration.

If a market participant feels that the above do not adequately explain any rate discrepancies, it will trade according to its view.

The accompanying Excel spreadsheet shows an example used to check the market prices for the Eurodollar contract on 1 October 2004. The US dollar Libor fixings and the Eurodollar prices on that day are shown in the Table in the spreadsheet

We see that the rates calculated from the Libor rates do not match the Eurodollar price-implied forward rates shown.

We obtain closer results if we input the precise terms that relate to each Eurodollar contract, and use interpolated Libor rates for these terms. This is shown on the second set of results in the spreadsheet. The last table shows the results obtained using extrapolated rates.