

Calculation Technique

The effective interest rate (EIR) for a deal is calculated using the following formula:

$$CF(t_0) = \sum_{i \geq 1} CF(t_i) * \exp(-EIR * \Delta(t_i, t_0))$$

Here $CF(t_0)$ represents the initial cash flows for the deal (i.e. the outpayment of the nominal amount by the bank plus/minus possibly arising transaction costs, premiums/discounts or upfront payments), $CF(t_i)$ stands for the cash flows for the deal at further payment dates t_i and $\Delta(t_i, t_0)$ is the time gap between payment date t_i and deal origination date t_0 .

Hence, the EIR is calculated by implicitly solving the above non-linear equation. In the solution, this is performed by using a Newton iteration.

The above formula expresses that the EIR exactly discounts the estimated future cash payments or receipts through the expected life of a financial instrument to its net carrying amount.

The following example explains an EIR calculation (regardless of the general [challenges](#) of EIR calculations and possible effects occurring from changes in deal data).

The following deal data are considered:

Deal Data	
Deal type	Fixed rate loan
Deal start Date	19.12.2013
Maturity	03.01.2015
Next interest payment Date	03.01.2014
Principal	1.000.000
Discount	3,000
Client rate	6.00%
Margin	1.00%
Day count convention	30/360
Interest payments	quarterly

Hence, the following cash flows are relevant:

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Liquidity Cash Flows				
value date	capital	interest	discount	time gap
19/12/2013	-1,000,000.00		3,000.00	0
03/01/2014		2,333.33		0.03889
03/04/2014		15,000.00		0.28889
03/07/2014		15,000.00		0.53889
03/10/2014		15,000.00		0.78889
03/01/2015	1,000,000.00	15,000.00		1.03889

Using the EIR formula, the following equation needs to be considered:



$$997.000 = 2333,33 * e^{-EIR*0,03889} + 15.000 * e^{-EIR*0,28889} + 15.000 * e^{-EIR*0,53889} + 15.000 * e^{-EIR*0,78889} + 1.015.000 * e^{-EIR*1,03889}$$

Solving the equation leads to an approximated value for $EIR = 6.45264\%$.