Amortised Cost

The amortised cost of a financial asset or financial liability is the amount

- at which the financial asset or financial liability is measured at initial recognition,
- minus principal repayments,
- plus or minus the cumulative amortisation using the effective interest method of any difference between that initial amount and the maturity amount, and
- minus any reduction (directly or through the use of an allowance account) for impairment or un-collectability.

Calculation of Effective Interest Rate (EIR)
Posting Date 31.12.2011

$$0 = AC(t_0) + \sum_{t_n > t_0} CF(t_n) \cdot DCF(t_n)$$

Effective Interest Rate (EIR) 3,780568

$$DCF(t_n) = \exp\left(-EIR(t_0) \cdot Timegap(t_n)\right)$$

Cash Flow Type	Value Date	Amount	Timegap	DCF	Discounted Amount
Capital (3)	30.12.2011	-100.000.000,00	0,000000	1,000000	-100.000.000,00
Interest (8)	28.12.2012	3.863.333,33	0,997260	0,963000	3.720.389,12
Interest (8)	30.12.2013	3.852.777,78	2,002740	0,927080	3.571.834,93
Interest (8)	30.12.2014	3.852.777,78	3,002740	0,892686	3.439.319,97
Interest (8)	30.12.2015	3.852.777,78	4,002740	0,859567	3.311.721,31
Interest (8)	30.12.2016	3.863.333,33	5,005479	0,827592	3.197.261,96
Interest (8)	29.12.2017	3.852.777,78	6,002740	0,796970	3.070.550,08
Interest (8)	28.12.2018	3.852.777,78	7,000000	0,767482	2.956.939,03
Interest (8)	30.12.2019	3.852.777,78	8,005479	0,738856	2.846.646,93
Interest (8)	30.12.2020	3.863.333,33	9,008219	0,711371	2.748.261,43
Interest (8)	30.12.2021	3.852.777,78	10,008219	0,684979	2.639.070,69
Capital (3)	31.12.2021	100.000.000,00	10,010959	0,684908	68.490.774,97
Interest (8)	31.12.2021	10.555,56	10,010959	0,684908	7.229,58

Calculation of Amortised Cost
Posting Date 31.12.2011

$$AC(t_n) = AC(t_{n-1}) + \left(TA(t_n) - TA(t_{n-1})\right)$$

$$TA(t_n) = TA(t_{n-1}) + EC(t_{n-1})\left(e^{EIR(t_{n-1})TG(t_{n-1},t_n)} - 1\right) - ECs(t_{n-1})\left(e^{EIRs(t_{n-1})TG(t_{n-1},t_n)} - 1\right)$$

Value Date	Eff. Capital	EIR	Eff. Cap. (smooth)	EIR (smooth)	Amort. F/TC (EIR)	Tot. Amort. F/TC (EIR)	Open Amort. F/TC (EIR)	Amortised Cost
30.12.2011	-100.000.000,00	3,780568	-100.000.000,00	3,780568	0,00	0,00	0,00	-100.000.000,00
31.12.2011	-100.010.358,26	3,780568	-100.010.358,26	3,780568	0,00	0,00	0,00	-100.000.000,00
28.12.2012	-99.978.851,19	3,780568	-99.978.851,19	3,780568	0,00	0,00	0,00	-100.000.000,00
30.12.2013	-99.999.710,59	3,780568	-99.999.710,59	3,780568	0,00	0,00	0,00	-100.000.000,00
30.12.2014	-99.999.862,41	3,780568	-99.999.862,41	3,780568	0,00	0,00	0,00	-100.000.000,00
30.12.2015	-100.000.020,09	3,780568	-100.000.020,09	3,780568	0,00	0,00	0,00	-100.000.000,00
30.12.2016	-100.000.385,65	3,780568	-100.000.385,65	3,780568	0,00	0,00	0,00	-100.000.000,00
29.12.2017	-99.989.807,20	3,780568	-99.989.807,20	3,780568	0,00	0,00	0,00	-100.000.000,00
28.12.2018	-99.978.822,31	3,780568	-99.978.822,31	3,780568	0,00	0,00	0,00	-100.000.000,00
30.12.2019	-99.999.680,59	3,780568	-99.999.680,59	3,780568	0,00	0,00	0,00	-100.000.000,00
30.12.2020	-100.000.033,03	3,780568	-100.000.033,03	3,780568	0,00	0,00	0,00	-100.000.000,00
30.12.2021	-100.000.197,28	3,780568	-100.000.197,28	3,780568	0,00	0,00	0,00	-100.000.000,00
31.12.2021	0,00	3,780568	0,00	3,780568	0,00	0,00	0,00	0,00

In view of the definition of the amortised cost, the following formula is used for its calculation:

$$AC(t_0) = -CF(t_0)$$

- At further payment dates, the amortised cost equals the amortised cost of the previous payment date, plus the difference of the current cumulative total amortisation $TA(t_n)$ and the one from the previous payment date $TA(t_{n-1})$, plus possible principal repayments $PR(t_n)$:

$$AC(t_n) = AC(t_{n-1}) + \left(TA(t_n) - TA(t_{n-1})\right) + PR(t_n)$$

The cumulative total amortisation $TA(t_n)$ of payment date t_n is defined by

$$TA(t_n) = TA(t_{n-1}) + EC(t_{n-1}) * \left(exp\left(-EIR(t_{n-1}) * \Delta(t_n, t_{n-1})\right) - 1\right) - EC\mathbf{s}(t_{n-1}) * \left(exp\left(-EIR\mathbf{s}(t_{n-1}) * \Delta(t_n, t_{n-1})\right) - 1\right)$$

- The effective capital $EC(t_n)$ of payment date t_n is defined as the negative of the sum of all future cash flows discounted by the effective interest rate:

Amortised Cost

$$EC(t_n) = -\sum_{k>n} CF(t_k) * exp\,(-EIR * \Delta(t_k t_0))$$

In order to check the calculation of the effective capital in Excel exports of the calculation analyser, the following equivalent recursive formula for the effective capital is useful:

$$EC(t_0) = -CF(t_0), \quad EC(t_n) = EC(t_{n-1}) * exp\big(EIR * \Delta(t_n, t_{n-1})\big) + CF(t_n)$$

- The smoothing effective interest rate *EIRs* is calculated exaxctly like the *EIR* – only all cash flows of premiums/discounts/charges/transaction costs are ignored in the calculation.
- Analogously, the smoothing effective capital *ECs* is calculated exactly like the *EC* – only the *EIRs* are used instead of the *EIR*.

The following annuity loan is considered:

Nominal	500.000,00
Currency	USD
Annuity Amount	12.500,00
Deal Conclusion Date	13.09.2011
Capital Begin	13.09.2011
Capital Maturity	31.12.2014

Initially, there is also a charge of 5000 USD. Hence, the first cash flows for the deal are as follows:

Value Date	Cash Flow Type	Currency	Remaining Principal	Rate	Amount
13.09.2011	Capital (3)	USD	-500.000,00		-500.000,00
13.09.2011	Charge (6)	USD			5.000,00
30.09.2011	Interest (8)	USD		4,000000	944,44
30.09.2011	Capital Decrease due to Annuity (18)	USD	-488.444,44		11.555,56
31.10.2011	Interest (8)	USD		4,000000	1.682,42
31.10.2011	Capital Decrease due to Annuity (18)	USD	-477.626,86		10.817,58
30.11.2011	Interest (8)	USD		4,000000	1.592,09
30.11.2011	Capital Decrease due to Annuity (18)	USD	-466.718,95		10.907,91
02.01.2012	Interest (8)	USD		4,000000	1.607,59
02.01.2012	Capital Decrease due to Annuity (18)	USD	-455.826,54		10.892,41
31.01.2012	Interest (8)	USD		4,000000	1.570,07
31.01.2012	Capital Decrease due to Annuity (18)	USD	-444.896,61		10.929,93
29.02.2012	Interest (8)	USD		4,000000	1.433,56
29.02.2012	Capital Decrease due to Annuity (18)	USD	-433.830,17		11.066,44
02.04.2012	Interest (8)	USD		4,000000	1.494,30
02.04.2012	Capital Decrease due to Annuity (18)	USD	-422.824,47		11.005,70
30.04.2012	Interest (8)	USD		4,000000	1.409,41
30.04.2012	Capital Decrease due to Annuity (18)	USD	-411.733,88		11.090,59

Applying the calculation method described, the calculation of the amortised cost of the deal starts as follows:

Value Date	Eff. Capital	EIR	Eff. Cap. (smooth)	EIR (smooth)	Amort. F/TC (EIR)	Tot. Amort. F/TC (EIR)	Open Amort. F/TC (EIR)	Amortised Cost
13.09.2011	-495.000,00	4,623017	-500.000,00	4,046253	5.000,00	0,00	5.000,00	-495.000,00
30.09.2011	-483.566,98	4,623017	-488.443,17	4,046253	5.000,00	123,81	4.876,19	-483.568,25
01.10.2011	-483.628,23	4,623017	-488.497,32	4,046253	5.000,00	130,91	4.869,09	-483.575,35
31.10.2011	-472.969,38	4,623017	-477.624,61	4,046253	5.000,00	344,77	4.655,23	-472.971,63
30.11.2011	-462.269,96	4,623017	-466.715,68	4,046253	5.000,00	554,28	4.445,72	-462.273,23
02.01.2012	-451.706,16	4,623017	-455.926,18	4,046253	5.000,00	779,99	4.220,01	-451.606,53
31.01.2012	-440.868,37	4,623017	-444.894,26	4,046253	5.000,00	974,11	4.025,89	-440.870,72
29.02.2012	-429.990,69	4,623017	-433.826,82	4,046253	5.000,00	1.163,87	3.836,13	-429.994,04
02.04.2012	-419.291,69	4,623017	-422.916,78	4,046253	5.000,00	1.374,91	3.625,09	-419.199,38
30.04.2012	-408.281,32	4,623017	-411.731,54	4,046253	5.000,00	1.549,77	3.450,23	-408.283,65

Amortised Cost