

Effective Interest Rate – Solving the Riddle



Aptivaa has been a key representative speaker across panels of various risk events held recently such as the PRMIA Qatar chapter event, a Workshop on IFRS 9 organized by FIS for banks at Kuwait City, 3rd Banks Risk Management conference 2016 at Amman and the IFRS 9 workshop at GARP Istanbul chapter. During these interactions a number of participants have reached out to us for views on the approach for estimation of Effective Interest Rate (EIR). Also, as a part of our current engagements on IFRS 9 with several Banks, this is a question that is posed to us oftentimes.

Given the uncertainty around the subject, we thought of sharing some key insights on the subject – as to how to compute EIR for fixed or floating rate instruments, how to compute EIR for products which involves both interest income and fee income, what are the challenges which banks might face while computing EIR, what are the operational simplifications which banks might consider while computing EIR.

Before diving into the complexities of Effective interest rate, let us discuss the role of EIR and why it is required to be computed under IFRS 9.

- 1) The expected credit loss (ECL) model under IFRS 9, uses a dual measurement approach where the loss allowance is measured at an amount equal to either the 12-month expected credit losses (Stage 1) or the lifetime expected credit losses (Stages 2 and 3). The credit loss estimates based on LGD, PD and EAD should then be discounted using original EIR or credit-adjusted (for purchased or originated credit impaired asset) EIR. Here the original EIR is used to discount the cash shortfalls for arriving at the final estimate of ECL.

Further guidance from IFRS 9 section B5.5.44, states that – **ECL shall be discounted to the reporting date**, not to the expected default or some other date, using the effective interest rate determined at initial recognition or an approximation thereof. If a financial instrument has a variable interest rate, expected credit losses shall be discounted using the current effective interest rate.

- 2) For Stages 1 and 2, interest revenue is calculated on the gross carrying amount. Under Stage 3, interest revenue is calculated based on the amortized cost of the financial asset (i.e., the gross carrying amount

adjusted for the loss allowance). IFRS 9 states that the interest revenue recognition for a financial instrument measured at amortized cost shall be calculated using the Effective Interest Rate.

Understanding EIR:

Effective interest rate is the rate that exactly discounts estimated future cash payments or receipts through the expected life, or when appropriate, a shorter period of the financial asset or financial liability to the gross carrying amount of a financial asset or to the amortized cost of a financial liability.

When calculating EIR an entity shall estimate the expected cash flows by considering all the contractual terms of the financial instrument (for example, prepayment, extension and similar options) but shall not consider the expected credit losses. A shorter period is used in situations in which the variable to which fees, transaction costs, premiums or discounts is re-priced prior to the expected maturity of the instrument. For example, if a premium on a floating rate instrument was reset to market rates, then premium should be amortized to the next reset date. Otherwise, those items are amortized over the expected life of the instrument as the objective of EIR method is to allocate the **interest revenue or expense to the relevant period only**.

The calculation of EIR includes all fees, transaction costs, and all other premiums or discounts which are directly related to the acquisition of financial assets on the book of an entity. There is a presumption that the cash flows and the expected life of a group of similar financial instruments can be estimated reliably. However, in those rare cases when it is not possible to reliably estimate the cash flows or the expected life of a financial instrument, the entity shall use the contractual cash flows over the full contractual term of the financial instrument.

Transaction costs that are directly attributable to the acquisition or issue of the financial asset shall include fees and commission paid to agents (including employees acting as selling agents), advisers, brokers and dealers, levies by regulatory agencies and security exchanges, transfer taxes and duties. Expenses such as employee bonuses related to the origination of an asset, or legal costs for review of collaterals, etc. are some of the integral parts of transaction costs which banks need to consider as a part of EIR estimations. Transaction costs do not include debt premiums or discounts, financing costs or internal administrative or holding costs.

However, sourcing this level of granular details at a contract level for EIR estimation will be an operational challenge for Banks as these details are usually maintained at a portfolio or a product level (in ledger management systems) and hence allocation at a contract level is proving to be a challenge for several banks.

There is a lot of subjectivity around what type of fee needs to be included when computing EIR. IFRS 9, standard has provided some insights on this subject under section B5.4.1; **however, the description of fees for financial services may not be indicative of the nature and substance of the services provided.**

- a. Origination fees received by the bank relating to the creation or acquisition of a financial asset.
- b. Commitment fees received by the entity to originate a loan, when it is not measured at FVPL and it is probable that an entity will enter into a specific lending arrangement. These fees are regarded as compensation for an ongoing involvement with the acquisition of a financial instrument. If the commitment expires without the entity making the loan, the fee is recognised as revenue on expiry.

IFRS 9 has also provided some clarifications on those fees which are not considered as an integral part of EIR related to a financial instrument. Such fees are –

- a. Fees charged for servicing a loan,
- b. loan syndication fees received by a bank that arranges a loan and retains no part of the loan package for itself

The requirements in IFRS 15 shall be applied to the facts and circumstances of each arrangement in determining when to recognise a fee as income that an Entity might receive. Factors such as whether there is continuing involvement in the form of significant future performance obligations necessary to earn the fee, whether there are retained risks, the terms of any guarantee arrangements, and the risk of repayment of the fee, shall be considered.

Banks thus face challenges that are two fold - firstly making changes in ledger management to identify the fees at a contract level, and secondly to create a framework wherein the nature or purpose of the fees are mapped to IFRS9 criterion.

Now, before moving onto further complexities, here is a broad outline on EIR

EIR		
The EIR exactly discounts the estimated stream of future cash payments and receipts over the expected life to the carrying amount on initial recognition		
The calculation takes into account all contractual cash flows, but excludes future credit losses.	When purchasing distressed debt investments, whose purchase price reflects credit losses that have already occurred, future cash flows are estimated inclusive of such credit losses.	Only in rare cases when it is not possible to determine estimated cash flows or expected life of a financial instrument or a group of similar financial instruments, are contractual cash flows over the full contractual term used

Time value of money needs to be considered using the effective interest rate (EIR) when measuring Expected credit losses (ECL). Discounting is necessary because the original cost of the asset would have been based on the discounted contractual cash flows, and so not discounting cash flows that are now not expected to be received would overstate the loss. All Banks/FIs usually have both fixed and floating rate products for which EIR needs to be computed.

EIR for fixed rate financial Instruments:

For a fixed rate financial asset, entities are required to determine or approximate the EIR on the initial recognition of the financial asset, while for a floating-rate financial asset; entities are required to use the current EIR. Following is an illustration for computing EIR for a fixed rate asset.

Calculation of EIR: Example 1 (fixed interest rate only):

A bank gives a loan to its customer as per the following terms:

Loan Amount: CU 200,000/- (where CU is Currency unit)

Maturity: 5 years

Interest: 1st year – 6%, 2nd year – 8%, 3rd year – 10%, 4th year – 12% and 5th year 18%

The loan repayments are interest only each year and principal repayment at maturity.

Therefore, EIR for the above specimen is estimated by solving the 'x' in the following equation.

$$200,000 = 12,000 / (1+x)^1 + 16,000 / (1+x)^2 + 20,000 / (1+x)^3 + 24,000 / (1+x)^4 + (36,000+200,000) / (1+x)^5$$

The EIR for the specimen loan is 10.2626%.

Assuming the instrument is not impaired; the amortized cost for each year is calculated as follows:

Year	Amortized cost at the start of the year	EIR	Cash Flow	Amortized cost at the end of the year
	(A)	(B) = (A) * 10.2626%	(C)	(D) = (A)+ (B) – (C)
1	200,000	20,525	12,000	208,525
2	208,525	21,400	16,000	213,925
3	213,925	21,954	20,000	215,880
4	215,880	22,155	24,000	214,034
5	214,034	21,966	236,000	0

Calculation Example 2 (fixed interest rate with upfront origination fees):

A bank gives a loan to its customer as per the following terms:

Loan Amount: CU 12,000/- (where CU is Currency unit)

Maturity: 12 months

Interest: 1.25% fixed

Frequency: Monthly

Upfront fee: CU 360

Monthly Fixed EMI: CU 1083.10

The loan repayments are interest and principal payments each month.

The fee is an incremental cost that are directly attributable to the acquisition of a financial asset and hence becomes a part of EIR (deducted from the cash flow received from the lender on transaction day) and then EIR is calculated for the above illustration by solving for 'x' in the following equation.

$$11,640 = (150+933.10) / (1+x)^{30/365} + (138.34+944.76) / (1+x)^{60/365} + (1083.10) / (1+x)^{90/365} + \dots + (13.37+1069.73) / (1+x)^{365/365}$$

For the details of the calculation refer to the following table –

Payment Date	Interest Payment	Principal Payment	Upfront Fee	Outstanding Principal	Total of Principal, Interest & Fees	Total of Principal Interest
	A = D*1.25%	B	C	D	E = A+B+C	F = A+B
31-Dec-15	-	-12,000.00	360	12,000.00	-11,640.00	-12,000.00
30-Jan-16	150	933.1	-	11,066.90	1,083.10	1,083.10
29-Feb-16	138.34	944.76	-	10,122.14	1,083.10	1,083.10
30-Mar-16	126.53	956.57	-	9,165.57	1,083.10	1,083.10
30-Apr-16	114.57	968.53	-	8,197.04	1,083.10	1,083.10
30-May-16	102.46	980.64	-	7,216.40	1,083.10	1,083.10
30-Jun-16	90.21	992.89	-	6,223.51	1,083.10	1,083.10
30-Jul-16	77.79	1,005.31	-	5,218.20	1,083.10	1,083.10
30-Aug-16	65.23	1,017.87	-	4,200.33	1,083.10	1,083.10
30-Sep-16	52.5	1,030.60	-	3,169.73	1,083.10	1,083.10
30-Oct-16	39.62	1,043.48	-	2,126.25	1,083.10	1,083.10
30-Nov-16	26.58	1,056.52	-	1,069.73	1,083.10	1,083.10
30-Dec-16	13.37	1,069.73	-	-	1,083.10	1,083.10

The EIR for the specimen loan is 22.93%, based on column E in the table above. If the upfront fee is not taken into consideration, then the EIR for the loan is 16.07% based on column F in the above table.

In the above example, one should not construe that the fees is deducted upfront and is not amortized over the life of the loan. As it is the upfront fee which the customer is supposed to pay, it is deducted from the cash flow. In this case, on 31-Dec-15, the customer was supposed to receive CU 12,000 but since he paid the fees of CU 360, he finally received CU 11,640. Thus for calculation of EIR, the face value of the loan on 31-Dec-15 is 11,640 and not 12,000. Hence, EIR should be the rate which exactly discounts the future cash flows equaling to the present value of 11,640.

To help in understanding it in more detail, let us calculate the amortized cost using both the EIR 22.93% and 16.07% at a particular date by amortizing the fees and interest over the life of the loan. Let's take 3-Jan-2016 for our calculations.

Total number of cash flow instances = 13

EIR = 22.93% & 16.07%

Reference Date = 3/Jan/2016

Now, check if the first cash flow date is greater than the reference date, i.e. if 31/Dec/2015 is greater than 3/Jan/2016. If yes, then calculate 'n', else move to the second cash flow instance date.

Therefore, we proceed to check, if 31/Jan/2016 is greater than 3/Jan/2016. And, since it is greater the value of 'n' will be 28. Similarly, we need to do this for all the cash flow instances in order to amortize the fees of the loan over the life of the asset.

Therefore as per the above formula – **Total Cash inflow / (1+EIR)^{n/365}**

The cash flows for each instance using both the EIR for the above period have been highlighted below

Cash flow Instance Date	Reference Date	N	Cash inflows	Discounted cash flows @ EIR 22.93%	Discounted cash flows @ EIR 16.07%	Comments
A	B	C = A - B		D	E	
31-Dec-15	1-Jan-16	1	0	11640	12000	This is the amount of cash outflow on 31-Dec
31-Jan-16	1-Jan-16	30	1083.10	1,064.85	1,069.91	
29-Feb-16	1-Jan-16	59	1083.10	1,047.50	1,057.32	
31-Mar-16	1-Jan-16	90	1083.10	1,029.26	1,044.02	
30-Apr-16	1-Jan-16	120	1083.10	1,011.92	1,031.31	
31-May-16	1-Jan-16	151	1083.10	994.31	1,018.34	
30-Jun-16	1-Jan-16	181	1083.10	977.55	1,005.95	
31-Jul-16	1-Jan-16	212	1083.10	960.53	993.29	
31-Aug-16	1-Jan-16	243	1083.10	943.81	980.80	
30-Sep-16	1-Jan-16	273	1083.10	927.91	968.86	
31-Oct-16	1-Jan-16	304	1083.10	911.76	956.68	
30-Nov-16	1-Jan-16	334	1083.10	896.39	945.03	
31-Dec-16	1-Jan-16	365	1083.10	880.79	933.14	
Total of cash flows at 1/Jan/2016				11,646.60	12,004.67	
Income at 1/Jan/2016				6.60	4.67	This difference is on account of fee amortization

Based on the above calculation, we can derive the amortize cost at the end of 31/Dec/2016 using both the EIR and will witness the difference in net income of CU 360 only.

Now, let us proceed towards the complexities involved with EIR, such as – estimation of EIR for floating rate instruments. The EIR of a floating rate instrument changes as a result of periodic re-estimation of determinable cash flows to reflect movements in market interest rates.

For floating rate assets, the following method is used to calculate interest income for the period.

Current Rate for the period (A)	Principal receivable at maturity (B)	Amortization of a discount (C)	Amortization of transactions cost (D)	Interest Income (E)
A * B + C – D =				E

EIR for floating rate financial Instruments:

If a financial instrument has a floating rate, expected credit losses shall be discounted using the current effective interest rate. For floating rate instruments, periodic re-estimation of cash flows to reflect the movements in the market rates of interest alters the effective interest rate.

For floating rate instruments, there can be two approaches for estimation of EIR –

- 1) Approach 1 - Based on actual benchmark interest rate that is set for the current reporting period. For instance, the LIBOR rate as of the reporting date
- 2) Approach 2 - An alternative approach is to project estimated cash flows (including current expectations about future interest rates) in calculating the EIR. This would result in the EIR and the spot interest rate for the current period being different if the yield curve for the maturity of the instrument is not flat

The standard allows for the period over which the rate is calculated to be shorter than the expected life of the instrument, when appropriate. That means an instrument may have different EIRs over its life because the instrument may have multiple reset periods and an EIR is calculated for each period.

However, if the instrument is recognised at an amount equal to the principal receivable or payable on maturity, then this periodic re-estimation does not have a significant effect on its carrying amount. Therefore, for practical reasons, in such cases, the carrying amount is usually not adjusted at each repricing date, because the impact is generally insignificant.

Calculation Example 3: (floating rate financial instrument)

The EIR is calculated as initial recognition of a financial asset or a financial liability:

Suppose a firm issue at par a financial liability with:

- A principal of 100;
- A contractual interest rate of 12 month LIBOR plus 1%; and
- A maturity of three years.

12-month LIBOR at initial recognition of the liability is 2% and is used to set the first annual coupon. 12-month LIBOR is expected to be 3% in Year 2 and 4% in Year 3.

Approach	Calculation of initial EIR
Approach 1	The initial EIR is calculated as 3% per annum – i.e. 12-month LIBOR at initial recognition plus the margin at 1%
Approach 2	The initial EIR is calculated as approximately 4% per annum – i.e. the IRR of the following cash flows: Expected coupons of 3, 4 and 5 and Principal repayable at maturity of 100.

Having understood the estimation of EIR for both fixed and variable rate instruments, it would be essential to note some of the key aspects related to EIR, such as – If a bank reclassifies a financial asset out of the amortized cost measurement category and into the FVOCI measurement category, the EIR and estimates of ECL are not adjusted as a result of the reclassification. Only the gain or loss (if any) arising from a difference between the previous amortized cost of the financial asset and fair value is recognised in other comprehensive income.

Under IFRS 9, for financial assets which are purchased or originated credit-impaired, the EIR which is used to discount the future cash payments or receipts to amortized cost is needs to be Credit-adjusted. The difference between Credit Adjusted EIR and normal EIR is that, when calculating the former, an entity shall estimate the expected cash flows by considering all contractual terms of the financial asset (for example, prepayment, extension, call and similar options) expected credit losses..

IASB has also noted the operational challenges with estimation of EIR and allows for approximation, under

scenarios such as where the fee income is very low and is assumed to get offset by the interest expenses. However, to use such approximations banks would have to prove such scenarios to auditors.

EIR for Non-fund based facilities:

Non fund based facilities are generally granted by Banks under two scenarios – First, an off balance sheet facility is provided to an existing customer who already has a fund based facility (working capital loan etc.) with the Bank. In the second scenario, the customer would not have any existing relationship with the Bank and a non-fund based facility is provided with adequate collateral coverage.

In the first scenario where an entity already having a fund based facility is provided with non-fund based facility, the EIR of the resulting asset (guarantee, letter of credit etc.) shall be applied and if this is not determinable as of initial recognition, then the current rate corresponding to EIR of the fund based facility shall be used. If the non-fund based facility has a fee component attached to it, Banks will have to decide whether to include the same for arriving at the EIR or not. The standard doesn't have any specific guidance in this matter. If the EIR of a fund based facility is used as proxy for non-fund based, the fee component of the non-fund based facility would not reflect appropriately in the proxy EIR. This is the shorting coming of using fund based EIR as proxy and Banks will have to take a call if they want to go ahead with this assumption.

In the second scenario, the current rate representing the cash flow shall be used. In our opinion, a risk free rate adjusted for the credit risk premium shall be good approximation for EIR.

Summary

Practically Banks find it challenging to compute EIR for each facility. In the event of limited data availability, following table sets out different options that can be thought of as an approximation/proxy for EIR:

Facility type	EIR / Approximations
Fixed rate financial instrument	<ul style="list-style-type: none"> Effective interest rate at Initial recognition In the event of unavailability of transaction cost and fees to compute EIR, contractual interest rates shall be considered. Banks shall use the contractual interest rates provided the impact of using it is minimal as compared to using EIR.
Floating rate financial instrument	<ul style="list-style-type: none"> Current effective interest rates Contractual interest rate as proxy for actual EIR
Purchased or originated credit impaired asset	<ul style="list-style-type: none"> Credit adjusted effective interest rate determined at initial recognition
Non fund based facilities	<ul style="list-style-type: none"> Current effective interest rates Current risk free rate adjusted for credit risk premium. The credit risk premium can be assumed to equivalent to $PD \times LGD$ for the facility Fund transfer pricing (FTP) + Credit risk premium Usage of the same EIR as that of the corresponding fund based facility of the borrower

To summarize, in order to meet IFRS 9 requirements to estimate EIR, a bank that has cash flow engines to estimate future cash flows may choose any of the approaches for the floating rate instruments. For fixed rate instruments the estimation of EIR is much simpler, however, identification of fees which is an integral part of EIR would still remain a challenge for banks. It should also be noted that there should be consistency between interest rate used to book interest income (which is also the basis of cash flows projections) and interest rates used to discount the expected cash losses.



Feel free to send your IFRS-9 related queries to:

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