



BANGKO SENTRAL NG PILIPINAS

**OFFICE OF THE DEPUTY GOVERNOR
SUPERVISION AND EXAMINATION SECTOR**

MEMORANDUM NO. M-2011-040

To : ALL BANKS

Subject : Effective Interest Rate Calculation Models for All Types of Loans

Relative to the implementation of Circular No. 730 dated 20 July 2011 on updated rules in implementing the Truth in Lending Act to enhance loan transaction transparency, Effective Interest Rate (EIR) calculation models illustrative of common loan features are presented herewith (Annexes A-E) for guidance. It is understood, however, that an EIR calculation model, founded on established principles of discounted cash flow analysis, for a loan should be based on the actual features thereof. A bank shall be solely responsible for the propriety and accuracy of its EIR calculation model. However, for purposes of determining compliance with Circular No. 730, the BSP's determination of the reasonableness and accuracy of an EIR calculation model prevails.


NESTOR A. ESPENILLA, JR.
Deputy Governor

28 July 2011

Att.: A/S

Illustration 1

**EFFECTIVE INTEREST CALCULATION MODEL
FIXED EQUAL AMORTIZATION CASE**

	A	B	C	D	E	F	G
1	Loan Amount		120,000.00				
2	Monthly Installment		11,001.60				
3	Contractual Rate (Monthly)		1.50%				
4	Other Charges		3.00%				
5	No. of Monthly Installment		12				
6							
7	Installment	Gross			Other		O/S
8	<u>Period</u>	<u>Loan</u>	<u>Principal</u>	<u>Interest</u>	<u>Charges</u>	<u>Cash flows</u>	<u>Balance</u>
9		120,000.00					120,000.00
10	0				3,600.00	116,400.00	120,000.00
11	1		9,201.60	1,800.00		(11,001.60)	110,798.40
12	2		9,339.62	1,661.98		(11,001.60)	101,458.78
13	3		9,479.72	1,521.88		(11,001.60)	91,979.06
14	4		9,621.91	1,379.69		(11,001.60)	82,357.15
15	5		9,766.24	1,235.36		(11,001.60)	72,590.91
16	6		9,912.74	1,088.86		(11,001.60)	62,678.17
17	7		10,061.43	940.17		(11,001.60)	52,616.74
18	8		10,212.35	789.25		(11,001.60)	42,404.39
19	9		10,365.53	636.07		(11,001.60)	32,038.86
20	10		10,521.02	480.58		(11,001.60)	21,517.85
21	11		10,678.83	322.77		(11,001.60)	10,839.01
22	12		10,839.01	162.59		(11,001.60)	-
23		TOTAL	120,000.00	12,019.19	3,600.00		

$$\text{Monthly Installment} = \text{PMT}(C3, C5, -C1)^* - 1 = \underline{\underline{11,001.60}}$$

(using Excel PMT Function)

$$\text{Effective Annual Interest Rate (EIR)} = (1 + \text{IRR}(F10:F22))^{12} - 1 = \boxed{26.71\%}$$

(using Excel IRR Function)

$$\text{Effective Monthly Interest Rate (MIR)} = \text{IRR}(F10:F22) = \boxed{1.99\%}$$

(using Excel IRR Function)

Illustration 2

**EFFECTIVE INTEREST CALCULATION MODEL
FIXED PRINCIPAL AMORTIZATION CASE**

	A	B	C	D	E	F	G
1	Loan Amount		120,000.00				
2	Monthly Installment		10,000.00				
3	Contractual Rate (Monthly)		1.50%				
4	Other Charges		3.00%				
5	No. of Monthly Installment		12				
6							
7	Installment	Gross			Other		O/S
8	Period	Loan	Principal	Interest	Charges	Cash flows	Balance
9		120,000.00					120,000.00
10	0				3,600.00	116,400.00	120,000.00
11	1		10,000.00	1,800.00		(11,800.00)	110,000.00
12	2		10,000.00	1,650.00		(11,650.00)	100,000.00
13	3		10,000.00	1,500.00		(11,500.00)	90,000.00
14	4		10,000.00	1,350.00		(11,350.00)	80,000.00
15	5		10,000.00	1,200.00		(11,200.00)	70,000.00
16	6		10,000.00	1,050.00		(11,050.00)	60,000.00
17	7		10,000.00	900.00		(10,900.00)	50,000.00
18	8		10,000.00	750.00		(10,750.00)	40,000.00
19	9		10,000.00	600.00		(10,600.00)	30,000.00
20	10		10,000.00	450.00		(10,450.00)	20,000.00
21	11		10,000.00	300.00		(10,300.00)	10,000.00
22	12		10,000.00	150.00		(10,150.00)	-
23		TOTAL	120,000.00	11,700.00	3,600.00		

Effective Annual Interest Rate (EIR) = $(1 + \text{IRR}(F10:F22))^{12} - 1$ = 26.91%
(using Excel IRR Function)

Effective Monthly Interest Rate (MIR) = $\text{IRR}(F10:F22)$ = 2.01%
(using Excel IRR Function)

Illustration 3

EFFECTIVE INTEREST CALCULATION MODEL
FIXED EQUAL AMORTIZATION CASE WITH GRACE PERIOD

	A	B	C	D	E	F	G
1	Loan Amount		120,000.00				
2	Monthly Installment		11,001.60				
3	Contractual Rate (Monthly)		1.50%				
4	Other Charges		3.00%				
5	No. of Monthly Installment		12				
6	<i>(2 months grace period on principal and interest payments)</i>						
7	Installment	Gross			Other		O/S
8	<u>Period</u>	<u>Loan</u>	<u>Principal</u>	<u>Interest</u>	<u>Charges</u>	<u>Cash flows</u>	<u>Balance</u>
9		120,000.00					120,000.00
10	0				3,600.00	116,400.00	120,000.00
11	1					-	120,000.00
12	2					-	120,000.00
13	3		9,201.60	1,800.00		(11,001.60)	110,798.40
14	4		9,339.62	1,661.98		(11,001.60)	101,458.78
15	5		9,479.72	1,521.88		(11,001.60)	91,979.06
16	6		9,621.91	1,379.69		(11,001.60)	82,357.15
17	7		9,766.24	1,235.36		(11,001.60)	72,590.91
18	8		9,912.74	1,088.86		(11,001.60)	62,678.17
19	9		10,061.43	940.17		(11,001.60)	52,616.74
20	10		10,212.35	789.25		(11,001.60)	42,404.39
21	11		10,365.53	636.07		(11,001.60)	32,038.86
22	12		10,521.02	480.58		(11,001.60)	21,517.85
23	13		10,678.83	322.77		(11,001.60)	10,839.01
24	14		10,839.01	162.59		(11,001.60)	(0.00)
25		TOTAL	98,482.15	11,533.84	3,600.00		

$$\text{Monthly Installment} = \text{PMT}(C3, C5, -C1)^* - 1 = \underline{\underline{11,001.60}}$$

(using Excel PMT Function)

$$\text{Effective Annual Interest Rate (EIR)} = (1 + \text{IRR}(F10:F22))^{12} - 1 = \boxed{19.68\%}$$

(using Excel IRR Function)

$$\text{Effective Monthly Interest Rate (MIR)} = \text{IRR}(F10:F24) = \boxed{1.51\%}$$

(using Excel IRR Function)

Illustration 4

EFFECTIVE INTEREST CALCULATION MODEL
CASE: PERIODIC INTEREST PAYMENT, BALLOON PAYMENT AT MATURITY

	A	B	C	D	E	F	G
1	Loan Amount		120,000.00				
2	Monthly Installment		1,800.00	(Interest Only)			
3	Contractual Rate (Monthly)		1.50%				
4	Other Charges		3.00%				
5	No. of Monthly Installment		12				
6							
7	Installment	Gross			Other		O/S
8	Period	Loan	Principal	Interest	Charges	Cash flows	Balance
9		120,000.00					120,000.00
10	0				3,600.00	116,400.00	120,000.00
11	1			1,800.00		(1,800.00)	120,000.00
12	2			1,800.00		(1,800.00)	120,000.00
13	3			1,800.00		(1,800.00)	120,000.00
14	4			1,800.00		(1,800.00)	120,000.00
15	5			1,800.00		(1,800.00)	120,000.00
16	6			1,800.00		(1,800.00)	120,000.00
17	7			1,800.00		(1,800.00)	120,000.00
18	8			1,800.00		(1,800.00)	120,000.00
19	9			1,800.00		(1,800.00)	120,000.00
20	10			1,800.00		(1,800.00)	120,000.00
21	11			1,800.00		(1,800.00)	120,000.00
22	12		120,000.00	1,800.00		(121,800.00)	-
23		TOTAL	120,000.00	21,600.00	3,600.00		

Effective Annual Interest Rate (EIR) = $(1 + \text{IRR}(F10:F22))^{12} - 1$ = 23.58%
(using Excel IRR Function)

Effective Monthly Interest Rate (MIR) = $\text{IRR}(F10:F22)$ = 1.78%
(using Excel IRR Function)

Illustration 5

EFFECTIVE INTEREST CALCULATION MODEL
FIXED EQUAL AMORTIZATION CASE
(WEEKLY INSTALLMENTS QUOTED IN MONTHLY EFFECTIVE RATE)

	A	B	C	D	E	F	G
1	Loan Amount		10,000.00				
2	Weekly Installment		788.00				
3	Contractual Rate (Monthly)		1.50%				
4	Weekly Compounding Rate		0.35%				
5	Other Charges		3.00%				
6	Term (Weeks)		13				
7	Period/Year		52				
8	Installment	Gross			Other		O/S
9	<u>Period</u>	<u>Loan</u>	<u>Principal</u>	<u>Interest</u>	<u>Charges</u>	<u>Cash flows</u>	<u>Balance</u>
10		10,000.00					10,000.00
11	0				300.00	9,700.00	10,000.00
12	1		753.38	34.62		(788.00)	9,246.62
13	2		755.99	32.01		(788.00)	8,490.63
14	3		758.61	29.39		(788.00)	7,732.02
15	4		761.23	26.76		(788.00)	6,970.78
16	5		763.87	24.13		(788.00)	6,206.91
17	6		766.51	21.49		(788.00)	5,440.40
18	7		769.17	18.83		(788.00)	4,671.24
19	8		771.83	16.17		(788.00)	3,899.41
20	9		774.50	13.50		(788.00)	3,124.91
21	10		777.18	10.82		(788.00)	2,347.72
22	11		779.87	8.13		(788.00)	1,567.85
23	12		782.57	5.43		(788.00)	785.28
24	13		785.28	2.72		(788.00)	(0.00)
25		TOTAL	10,000.00	243.98	300.00		

Weekly Installment = $\text{PMT}(\text{Contractual Rate}, \text{Term}, -\text{Loan Amount}) * -1$
(using Excel PMT Function)

Effective Annual Interest Rate (EIR) = $(1 + \text{IRR}(\text{F10:F24}))^{52} - 1$ = 50.46%
(using Excel IRR Function)

Effective Monthly Interest Rate (MIR) = $(1 + \text{IRR}(\text{F10:F24}))^{13/3} - 1$ = 3.46%
(using Excel IRR Function)