

## Ch 6

## Mortgage additional concepts analysis and applications

1. lender is willing to make 80% first loan mortgage, at 12%, for 25 years.
2. The Same lender is willing to lend 90% for 25 years at 13%

|        | Loan amount                           | Loan constant | PMT (Monthly)                                 |
|--------|---------------------------------------|---------------|-----------------------------------------------|
| at 13% | 90000<br>(90% x 100000)               | .0112784      | 1015.06<br>(90000 x .0112784)                 |
| at 12% | 80000<br>(80% x 100000)               | .0105322      | 842.58<br>(80000 x .0105322)                  |
|        | 10000<br>↓<br>الفرق بين 90000 - 80000 |               | 172.48<br>←<br>ناتج الفرق<br>1015.06 - 842.58 |

$$10000 \rightarrow PVA$$

$$12 \times 172.48 \rightarrow PMT_{annually}$$

\* بما انه معظمنا نفس السنة 25 لكن مرة  
ال Interest 12% او مرة 13% فبدي اطلع ال Interest  
على PVA وال PMT الى طاحتهم  
عن طريق القانون

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$$2069.76 = PMT$$

$$PV_A = PMT (PVIFA i, n)$$

$$\frac{10000}{2069.76} = \frac{2069.76}{2069.76} (PVIFA i, 25)$$

$$4.83 = (PVIFA i, 25)$$

طالعاً سنة 25 بدورة 4.83 وبمعدل Interest 20%

$$i = 20\%$$

**Example:** Consider if \$1600 origination Fee, interest 12% is charged on the 90000 loan.

and 2700 Fee, interest 13% is charged on the 90000, How does this affect the incremental Cost of Borrowing?

answer:

| Loan         | Net disbursed                       | loan constant | PMT                                      |
|--------------|-------------------------------------|---------------|------------------------------------------|
| at 13% 90000 | 90000 - 2700<br>= 87300             | 0.0112784     | 1015.06                                  |
| at 12% 80000 | 80000 - 1600<br>= 78400             | 0.0105322     | 842.58                                   |
|              | 8900<br>ناتج الفرق<br>87300 - 78400 |               | 172.48<br>ناتج الفرق<br>1015.06 - 842.58 |

(PVA)  $\Delta$



$$PVA = 8900$$

$$PMT = 172.48 \times 12$$
$$= 2069.76$$

$$n = 25$$

$$PVA = PMT (PVIFA i, 25)$$

$$\frac{8900}{2069.76} = \frac{2069.76}{2069.76} (PVIFA i, 25)$$

$$4.30 = (PVIFA i, 25)$$

$$i = 23\%$$

\* Incremental Borrowing Cost versus second mortgage: 0

80000 → First mortgage.

10000 → second mortgage.

\* Different in maturity % 25-30

|               | Loan  | 1-25<br>Pmt                                                  | 25-30  |
|---------------|-------|--------------------------------------------------------------|--------|
| 13%, 30 years | 90000 | 495.58<br>بطلها من القانون<br>$90000 = PMT (PVIFA 13\%, 30)$ | 495.58 |
| 12%, 25 years | 80000 | 842.58<br>بطلها من القانون<br>$80000 = PMT (PVIFA 12\%, 25)$ | 0      |
|               | 10000 | 153<br>ناتج الفرق<br>$995.58 - 842.58$                       |        |

$90000 - 80000$  ناتج الفرق

$995.58 - 842.58$

$$153 \times 12 = 1836$$

← pmt annually

على القانون

$$PV_A = PMT (PVIFA i, n)$$

$$10000 = \frac{1836}{1836} (PVIFA i, 25)$$

$$5.45 = (PVIFA i, 25)$$

$$i = 18\%$$



## \* Loan Refinancing & إعادة تمويل

**example &** Assume a borrower made mortgage loan 5 years ago for  $\$80,000$  at  $15\%$  interest rate for 30 years, after 5 years interest rate fell and new mortgage loan available for at  $14\%$  for 25 years, suppose that the prepayment penalty  $2\%$  must be paid on the existing loan and the origination fees  $\$2,500$  and the origination  $\$25$  closing cost if the new loan is made Should the borrower refinance?

□ Calculate Cost of Finance ?

answer: Prepayment Penalty =  $2\% \times 78,759.30$   
 $= 15,751.86$

← بجيب هاد الرقم

$$PVA = PMT (PVIFA i, n)$$

$$80,000 = PMT (PVIFA 15\%, 30)$$

$$PMT = 1,2184.015$$

$$PVA = 1,2184.015 (PVIFA 15\%, 25) \rightarrow 6.46415$$

$$PVA = 78,759.30$$

|   |                           |                                                        |
|---|---------------------------|--------------------------------------------------------|
|   | Pre payment Penalty       | 15751.86                                               |
| + | origination Fees          | 2500                                                   |
| + | Closing Cost              | 25                                                     |
|   | Total Cost of Refinancing | <span style="border: 1px solid black;">18276.86</span> |

2 Calculate monthly payment, existing Loan  
(80000, 15%, 30).

answer  $\rightarrow 80000 = PMT (PVIFA 15\%, 30)$

$$\frac{80000}{6.56598} = PMT \cdot \frac{6.56598}{6.56598}$$

$$PMT = 12184.015 \div 12$$

$$PMT_{monthly} = 1015.33$$

3 Calculate monthly payment, new Loan  
(78759.30, 14%, 25).

answer  $\rightarrow 78759.30 = PMT (PVIFA 14\%, 25)$

$$PMT = 11459.35 \div 12$$

$$PMT_{monthly} = 954.945$$

$$* 1015.33 - 954.95 = 60.38$$

$$* 12$$

$$\begin{array}{r} 724.56 \\ - 18276.86 \\ \hline -17552.3 \end{array}$$

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