# Chapter 8

## ✳ Bond Valuation Process

① Present Value of Bond $= \dfrac{C}{(1+K)^1} + \dfrac{C}{(1+K)^2} + \dots \dfrac{C+Par}{(1+K)^n}$

(coupon & Par)

(yield)

② PV using $\underset{\text{Interest Factor}}{PVIF_S} = C(1+K)^{-n} + \dots C+Par(1+K)^{-n}$

## ✳ Future Value of an Annuity

① $FVA_{\text{ordinary}} = P \times \dfrac{[(1+i)^n - 1]}{i}$ ← ما عليه أو سنة غيرها، التكاثر

└→ لا يكون ال r متساوية طول السنوات

└→ بتكون ال Payment آخر كل سنة

✳ مثال : IF Par = 1,000 , CP = 100 , N = 3 , K = 0.12

→ Annual Pmt @ beg of each Year :

$CF_1 = $ Time 0 → PV = 100

$CF_2 = $ Time 1 → $100 / (1+0.12)^1$

$CF_3 = $ Time 2 → $100 / (1.12)^2$

$CF_4 = $ Time 3 →

## ✳ Semiannual :   C/2       K/2       2n

① $PV = \dfrac{C/2}{(1+K/2)^1} + \dfrac{C/2}{(1+K/2)^2} + \dots \dfrac{C/2 + Par}{(1+K/2)^{2n}}$

└→ يعني إذا لسنتين هون بيكون ($4 = 2*2$)

**$*$ PV of Bond = PV of $\overset{\text{PVIFA}}{\underline{\text{Coupon Pmts}}}$ + $\overset{\text{PVIF}}{\underline{\text{PV of Principle}}}$**

$n = 30$, Par $= 1,000$, CoupR $= 10\%$, $K = 0.09$  $\quad : \underline{\text{جدول}} *$

$\quad \rightarrow$ PV of Coupoun Pmts $= C (1+K)^{-n}$

$\qquad\qquad\qquad\qquad = 100 (1+0.09)^{-30}$

$\text{PVIFA} = \dfrac{1-(1+r)^{-n}}{r} \left[\begin{array}{l} = 100 \dfrac{(0.27)}{} \nwarrow \\[2mm] = \dfrac{1-(1.09)^{-30}}{0.09} \end{array}\right.$

$\qquad\qquad\qquad \rightarrow = 1,027.36$

$\rightarrow$ PV of Principle $= P (\underline{\text{PVIF}}) \nearrow (1+K)^{-n}$

$\qquad\qquad\qquad = 1,000 (1.09)^{-30}$

$\qquad\qquad\qquad = 75.4$

$\rightarrow$ PV $= 1,027.4 + 75.4 = 1,102.8$

**$*$ Sensitivity of Bond Prices (Elasticity):**

$\text{II} \quad P^e = \dfrac{\Delta P}{\Delta K} \longrightarrow = \dfrac{P_2 - P_1}{P_1}$

بالعادة سالب

**$*$ Duration $= \sum \dfrac{C * t}{(1+K)^t} \div \sum \dfrac{C}{(1+K)^t}$**

**$*$ Duration for Portfolio $= \sum\limits_{j=1}^{m} W_j \, Dur_j$**

\* Modified duration $Dur^* = \dfrac{Dur}{1+K}$

\* $\% \Delta P = -Dur^* * \Delta y$