1) 3-year Govt. Bond

2) Pays every 6 months

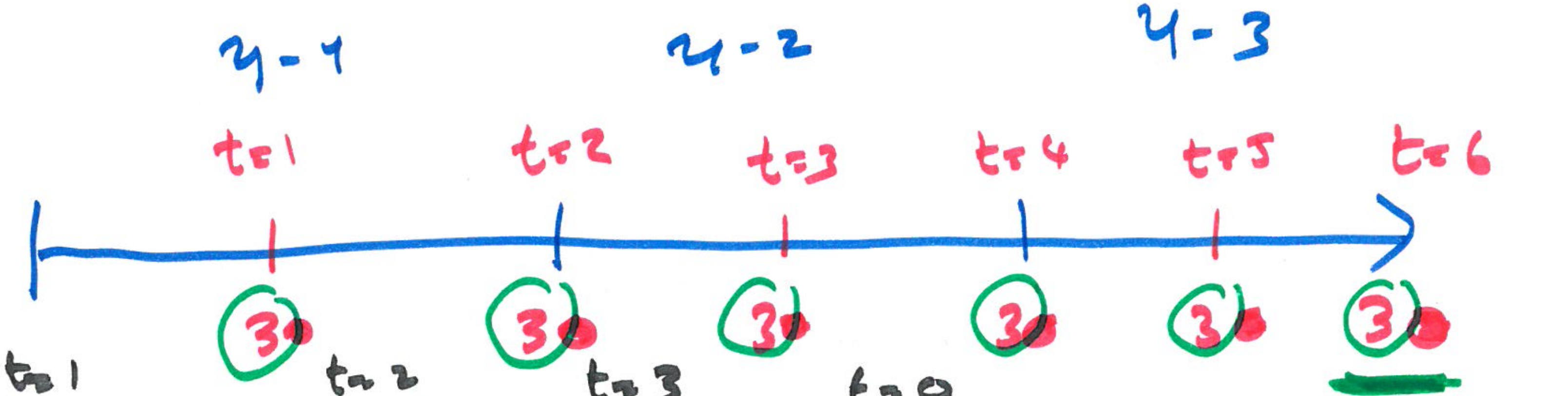
3) $c\% = 6\%$ ✓

4) $r\% = 4\% \Rightarrow 2\%$

5) $FV = 100 \Rightarrow 3\% \times 100$

$\boxed{\text{fair Price}}$

Coupon Bond



+ FV = 100

$$P = \frac{3}{1.02} + \frac{3}{(1.02)^2} + \frac{3}{(1.02)^3} + \frac{3}{(1.02)^4} + \frac{3}{(1.02)^5} + \frac{3}{(1.02)^6} + \frac{100}{(1.02)^6}$$

t=1 t=2 t=3 t=0

1

$$P = 3\underbrace{\left[\frac{1}{1.02} + \frac{1}{(1.02)^2} + \dots + \frac{1}{(1.02)^6}\right]}_{\cong \,PVAF(2\%,6)} + \underbrace{\frac{100}{(1.02)^6}}_{PVF(2\%,6)} \left(= 100 \cdot \frac{1}{(1.02)^6}\right)$$

PVF : Present Value factor

PVAF : $\longrightarrow$ Annuity factor

$$P = 3\,\underbrace{[PVAF(2\%,6)]}_{5.601} + 100\,\underbrace{[PVF(2\%,6)]}_{0.888}$$

$$3 \times 5.601 \quad + \quad 100 \cdot (0.888)$$

$$16.803 \quad + \quad 88.8$$

$$\begin{array}{r} 88.8 \\ 16.803 \\ \hline 105.603 \end{array}$$

$P = \$\ 105.603$ → fair Price to be traded in the market!

2

$C\% = 2 \rightarrow$ Each period you get \$1.

$$P = PVAF(2\%, 6) \cdot 1 + 100 \cdot PVF(2\%, 6) = 94.48$$

$t=1$	$t=2$	$t=3$	$t=4$	$t=5$	$t=6$
1	1	1	1	1	1 + 100

$C\% = 4 \Rightarrow$ Each period $\Rightarrow$ \$2.

$t=1$	$t=2$	$t=3$	$t=4$	$t=5$	$t=6$
2	2	2	2	2	2 + 100

$$P = PVAF(2\%, 6)(2) + 100 \cdot PVF(2\%, 6) \Rightarrow 100$$

Case 1 $\quad > \quad C\% = 2\% \rightarrow P = 94.48 < FV.\ 100$

Bond : discounted price

Bond Sold at discount//

Case 2 $\quad r = 4\% \quad = \quad C\% = 4\% \rightarrow P = 100 = FV = 100$

Bond Sold at Par

Case 3 $\quad < \quad C\% = 6\% \rightarrow P = 105.603 > FV = 100$

Bold sold at premium

Sum:

$$\boxed{\begin{array}{lllll} r & > & C & \longrightarrow & P < FV \\ r & = & C & \longleftrightarrow & P = FV \\ r & < & C & \longrightarrow & P > FV \end{array}}$$

Interest rate Risk

Movement in Market interest rate causing Price to be Volatile and hence affecting the RER of Bond.

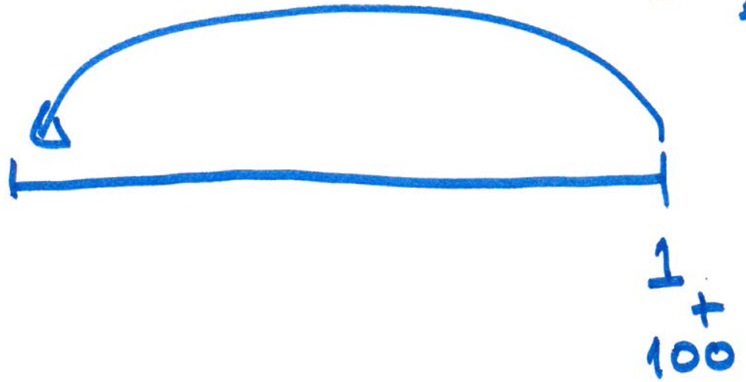
Today

2-year Bond

Next year.

Become 1-year Bond

1 period = 1 year



$$\Rightarrow P_{t=2} = \frac{1}{1.02} + \frac{100}{(1.02)}$$

$$P_{t=2} = 99.01$$

(b)

$$RER = \frac{99.01 + 1 - 100}{100}$$

$$= \frac{100.01 - 100}{100} = \frac{.01}{100} \times 100$$

$$= \underline{.01\%}$$

1 basis points

Losing money in terms of "Cap loss"

Lucky ⇒ current yield

outnumbered

the loss

⇒ + RER_c

$$RER_{t=1} \Rightarrow \frac{P_{t=2} + \text{Coupond} - P_{t=1}}{P_{t=1}}$$

$c\% = 1\%$

$r = 1\%$

$c = r$

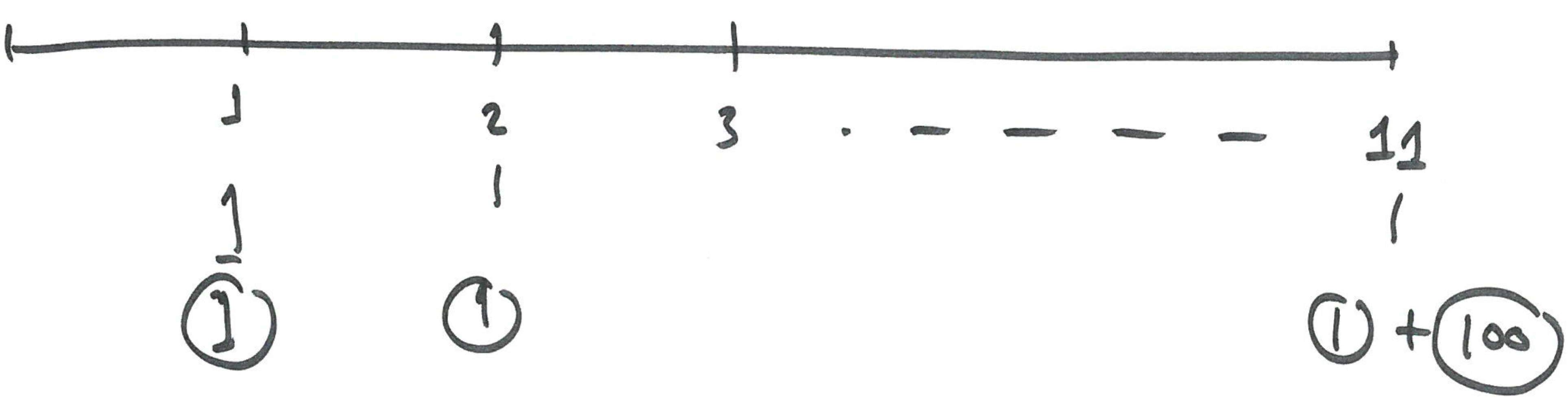
year 1 — year 2 — FV=100

1	1 + 100	$\left.\right\}$ $\underline{\underline{\text{CF}}}$

Bond market at t=1

$$\underline{P_{t=1}} = \frac{1}{1.01} + \frac{1}{(1.01)^2} + \frac{100}{(1.01)^2}$$

$$P_{t=1} = FV = \underline{\underline{100}}$$



$$P^{11}_{t=1} = 1[PVAF(1\%, 11)] + 100[PVF(1\%, 11)]$$

$$1\,(10.368) + 100\,(0.896)$$

$$10.368 + 89.6$$

$$P^{11\text{-yr Bond}}_{t=1} \Rightarrow \underline{\$\,99.968} \approx 100 \quad \text{B/C} \quad \boxed{r\% = c\%} \quad P = FV$$

$$P_{t=2}^{10\text{-y Bond}} = 1\,(PVAF(2\%,10)) + 100 \cdot PVF(2\%,10)$$

$$= 1 \cdot (8.983) + 100 \cdot (0.820)$$

$$= 8.983 + 82.0$$

$$= 90.983$$

$$\underline{\underline{RER}} = \frac{90.983 + 1 - 100}{100} = \frac{-9.1}{100}$$

$$\approx -9.1\,\%$$

from the investment //

$\uparrow 2\%$

RER $= 0.01\%$; ; TTM = 2 yr.

$= -9.1\%$; $\uparrow 2\%$; TTM = 11 yr

→ Price is more volatile for the long-term Bond