Module 2.5

slide 8

$$PV = \frac{5000}{(1+.042)^{10}} = \frac{5000}{1.5089581} = 3,313.55$$

$$PV = \frac{5000}{(1+.021)^{20}} = \frac{5000}{1.5153566} = 3,299.55$$

slide 11

$A = 10,000/yr$
$r = .09/yr$
$n = 8 \text{ yrs}$

$$PV = 10000\left[\frac{1-(1+.09)^{-8}}{.09}\right]$$

$$= 10000\left[\frac{1-.501867}{.09}\right]$$

$$= 10000\,(5.534819)$$

$$= 55,348.19$$

slide 12

$$PV = 50000\left[\frac{1-(1+.06)^{-20}}{.06}\right]$$

$$= 50000\left[\frac{1-.3118047}{.06}\right]$$

$$= 50000\,[11.4699212]$$

$$= 573,496.06$$

$$\text{After Taxes}_{.34+.06} = 573,496.06\,(.60)$$

$$= 344,097.64$$

10/12/09 10/12/10 10/12/11

slide 17

30 30 30 30
1000

$28.985507 \leftarrow \dfrac{30}{(1+.035)^1}$

$28.005321 \leftarrow \dfrac{30}{(1+.035)^2}$

$27.058281 \leftarrow \dfrac{30}{(1+.035)^3}$

$897.585495 \leftarrow \dfrac{1030}{(1+.035)^4}$

981.634604

slide 18

$C = 30$/half-yr
$r = .035$/half-yr
$n = 4$ half-yr periods

$$PV = C\left[\frac{1-(1+r)^{-n}}{r}\right] + \frac{F}{(1+r)^n}$$

$$= C\left[\frac{1-(1+r)^{-n}}{r}\right] + F(1+r)^{-n}$$

$$= 30\left[\frac{1-(1+.035)^{-4}}{.035}\right] + 1000(1+.035)^{-4}$$

$$= 30\left[\frac{1-.87144223}{.035}\right] + 1000(.87144223)$$

$$= 110.192376 + 871.442228$$

$$= 981.634604$$

$$\times 150{,}000 = 147{,}245{,}190.60$$

slide 19

$F = 1000$
$r = .047$/half-yr
$n = 30$ half-yr periods

$$PV = \frac{F}{(1+r)^{-n}}$$
$$= \frac{1000}{(1+.047)^{30}}$$
$$= \frac{1000}{3.96643599}$$
$$= 252.1155016$$

slide 20

$F = 5{,}000$
$r = .029$/half-yr
$n = 5/6$ half-yr periods

$$PV_{10/15/09} = \frac{F}{(1+r)^{n}}$$
$$= \frac{5000}{(1+.029)^{5/6}}$$
$$= \frac{5000}{1.0241089}$$
$$= 4{,}882.293221$$

FINA 4000, inClass1, October 14, 2009

1. Consider an annuity that makes 5 payments of \$4,000, each two years apart, with the first two years from now. Assume that the discount rate to use is 12%/year. Draw a timeline and compute the PV of this annuity.

0	2	4	6	8	10
	4000	4000	4000	4000	4000

A = 4000 every two-yrs

$r = (1+.12)^2 - 1$

$= 1.2544 - 1$

$= .2544$/ two-yrs

n = 5 two-yr periods

$$PV_0 = 4000\left[\frac{1-(1+.2544)^{-5}}{.2544}\right]$$

$$= \boxed{10{,}660.80}$$

2. What is the PV of an annuity that makes 5 payments of \$5,000, each one year apart, with the first 4 years from now. Assume that the discount rate to use is 9%/year. Draw a timeline and compute the PV of this annuity.

0	1	2	3	4	5	6	7	8
				5000	5000	5000	5000	5000

$$PV_3 = 5000\left[\frac{1-(1+.09)^{-5}}{.09}\right]$$

$$= 19{,}448.256$$

$$PV_0 = \frac{PV_3}{(1+.09)^3} = \boxed{15{,}017.62}$$

3. Consider an annuity with 7 payments of \$3,000, each six months apart, with the first fifteen months from now. Assume that the discount rate to use is 8%/year. Draw a timeline and compute the PV of this annuity.

10/14/09	1/14/10		1/14/11		1/14/12		1/14/13		1/14/14
			3000	3000	3000	3000	3000	3000	3000

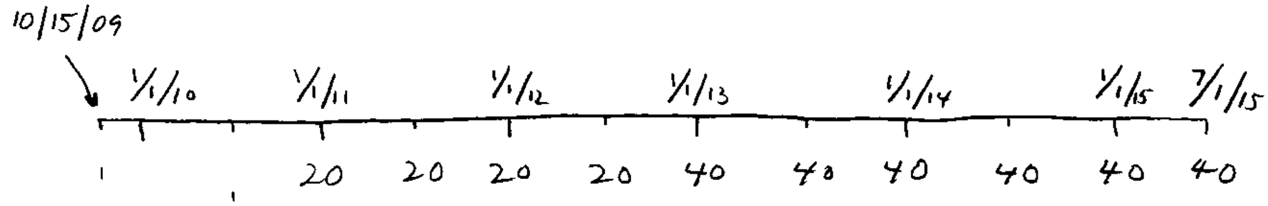
$\xleftarrow{9\text{ mos}}\!\!\rightarrow$

$$PV_{7/14/10} = 3000\left[\frac{1-(1+.04)^{-7}}{.04}\right]$$

$$= 18{,}006.164$$

$$PV_{10/14/09} = \frac{PV_{7/14/10}}{(1+.04)^{3/2}} = \frac{18{,}006.164}{1.060596} = \boxed{16{,}977.40}$$

Slide 23



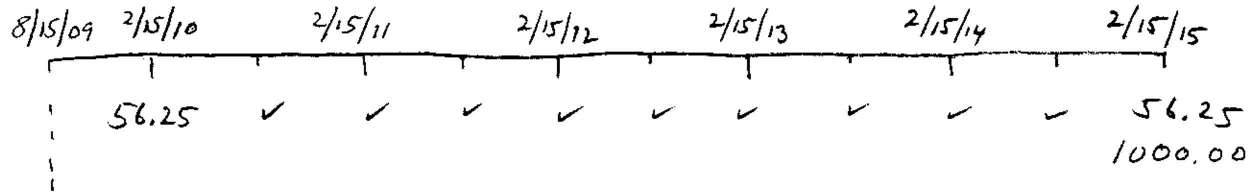
$572.913209 \leftarrow \dfrac{1000}{(1+.05)^{11\,5/12}}$

$155.876228 \leftarrow \dfrac{40\left[\dfrac{1-(1.05)^{-6}}{.05}\right]}{(1+.05)^{5\,5/12}}$

$66.182702 \leftarrow \dfrac{20\left[\dfrac{1-(1.05)^{-4}}{.05}\right]}{(1+.05)^{1\,5/12}}$

$\overline{794.972139}$

slide 24



$$PV_{8/15/09} = 56.25\left[\frac{1-(1.013)^{-11}}{.013}\right] + 1000\,(1.013)^{-11}$$

$$= 56.25\left[\frac{1-.867553}{.013}\right] + 1000\,[.867553]$$

$$= 573.087 + 867.553$$

$$= 1{,}440.64$$

$$PV_{10/15/09} = PV_{8/15/09}\,(1.013)^{1/3}$$

$$= 1{,}440.64\,(1.004315)$$

$$= 1{,}446.85$$

slide 25

$$\text{Accrued Interest} = \frac{136\,(25)}{181}$$

$$= 18.784530$$

If full price were 1,230.91, what would be reported in the media

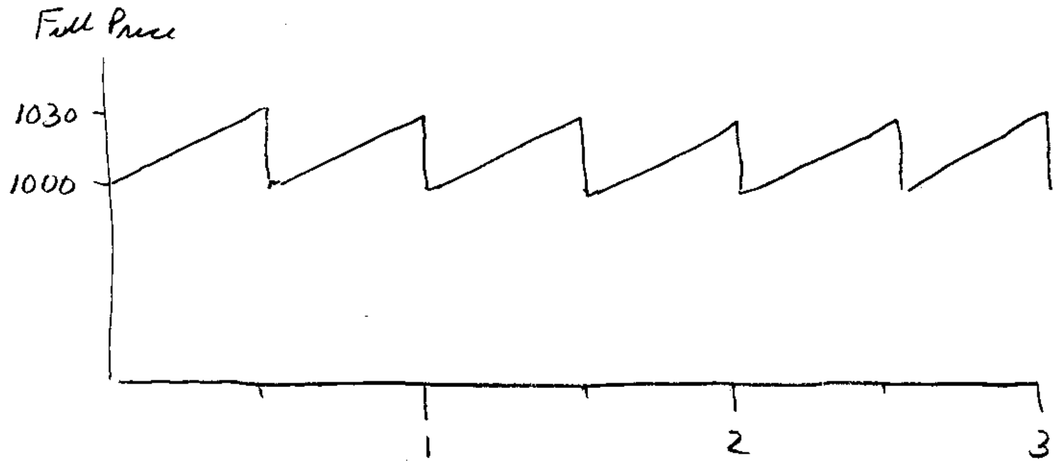
$$\text{Clean Price} = \text{Full Price} - \text{Accrued Interest}$$

$$= 1{,}230.91 - 18.78$$

$$= 1{,}212.13$$

$$\boxed{121.213}$$

slide 26



But Clean Price always 1000

slide 27

$$\text{Cost} = 2000\,(\text{Clean Price} + \text{Accrued Interest})$$
$$= 2000\left(1236.831 + \frac{164(40)}{184}\right)$$
$$= 2000\,(1236.831 + 35.652)$$
$$= 2000\,(1272.483)$$
$$= 2{,}544{,}966$$

$$(2000)\frac{40}{184} = 434.78$$

slide 28

$$\text{Clean Price} = \text{Full Price} - \text{Accrued Interest}$$
$$= 995.47 - \frac{173(25)}{184}$$
$$= 995.47 - 23.50$$
$$= 971.97$$

slide 31 $r = .034$ yield-to-maturity = 6.8%

slide 32 $r = .04118$ realized yield = 8.236%