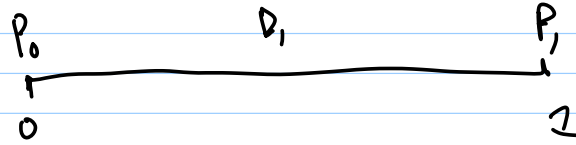


## Econ 422 Lec 9

Note Title

8/3/2010

### Stock Price Valuation



Holding period return =  $r =$

$$\frac{P_1 + D_1 - P_0}{P_0} = r \quad (\text{aka total return})$$

$$= \underbrace{\frac{P_1 - P_0}{P_0}}_{\text{Capital gain}} + \underbrace{\frac{D_1}{P_0}}_{\text{Dividend Yield}}$$

### Stock Price Valuation

$$P_0 = \frac{P_1}{1+r} + \frac{P_1}{1+r} = \text{PV of cash flows}$$

After recursive substitution

$$P_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \dots$$

= dividend discount model!

Assumptions about Future path of dividend,

(1) Constant dividend  $D_1 = D_2 = \dots = D$

$$\Rightarrow P_0 = \frac{D}{r}$$

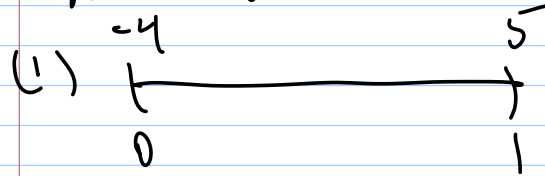
(2) Growing dividend

$$D_1 = D(1+g), \quad D_2 = D(1+g)^2, \quad D_3 = D(1+g)^3, \quad \dots$$

$$\Rightarrow P_0 = \frac{D}{r-g}$$

Q: What determines  $g$ ?

NPV and IRR



$$\text{NPV}(r) : -4 + \frac{5}{1+r} = 0$$

Solve for  $r$  s.t.  $\text{NPV}(1) = 0$   
determines  $r = \text{IRR}$

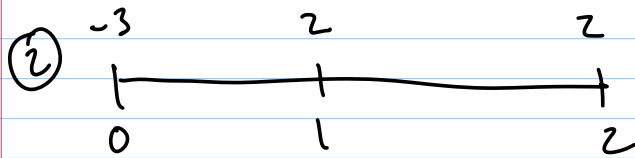
$$\frac{5}{1+r} = 4 \Rightarrow 1+r = \frac{5}{4}$$

$$\Rightarrow r = \frac{5}{4} - 1$$

$$= 0.25$$

$$= \text{IRR}$$

$$-4 + \frac{5}{1.25} = 0$$



$$NPV(r) : -3 + \frac{2}{1+r} + \frac{2}{(1+r)^2}$$

Find  $r$  s.t.  $NPV(r) = 0$

Need to solve quadratic equation - See spreadsheet

Sketch of soln:

$$-3(1+r)^2 + 2(1+r) + 2 = 0$$

$$\Rightarrow -3[1+2r+r^2] + 2 + 2r + 2 = 0$$

$$\Rightarrow -3r^2 - 6r - 3 + 2 + 2r + 2 = 0$$

$$\Rightarrow -3r^2 - 4r + 1 = 0$$

Now use quadratic equation to find roots.