

Stocks and Bonds

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Advanced Financial Management

Julio A. Crego







Key takeaways

Value stocks using Dividend Discount Models.

02 Understand the tradeoffs between dividend payments and reinvestment in the firm. Computation of the Present Value of Growth Opportunities.

O Bond valuation and its relationship with yield curve and yield to maturity.

04 Understand the sensitivity of bond prices to changes in interest rates. Application of the Duration formula.



Dividend Discount Models

If we continue to reinvest/hold the stock forever then

$$P_0 = \frac{E_0[D_1]}{(1+r)} + \frac{E_0[D_2]}{(1+r)^2} + \frac{E_0[D_3]}{(1+r)^3} + \cdots$$

We are assuming constant required return: same *r* in the future

Key takeaways:

- Prices will be greater when expected dividends are greater
- Prices will be lower when the expected return required by investors (r) rises
- Prices take implicitly the capital gains into account



Stocks – Important formulae

Return from holding a stock

Stock prices, earnings and dividends

 EPS_t

$$ROE_t = \frac{BV_{t-1}^{ps}}{BV_{t-1}^{ps}}$$

$$Inv_t = b \times EPS_t$$
 $Div_t = p \times EPS_t$

$$g = ROE. b = ROE. (1-p)$$

$$BV_t = BV_{t-1} + Inv_t$$

$$r = \frac{E_0 [D_1]}{P_0} + \frac{E_0 [P_1 - P_0]}{P_0}$$

Dividend Capital gain yield



Consider a firm that pays a dividend of 100 next year and maintains the same dividend yearly. The price of the firm today is 500€. The firm does not face any uncertainty (dividends are always the same, and the discount rates are as well)

- a) What is the firm's annual return from today until the minute after next year's dividend payment? Divide the return in capital gains and dividend yield.
- b) What is the firm's annual return from today until six months from now? Divide the return in capital gains and dividend yield.
- c) Plot the firm's stock price for the next 5 years.



As the majority shareholder of a firm that has just reported an EPS of 100 with a payout ratio of 10%, you are considering replacing the current CEO with a younger, AI-specialist CEO. This new CEO leverages advanced technologies and can increase the firm's return on equity (ROE) from the current 15% to 16%. The discount rate is 20%.

You seek to determine:

- a) The stock price under both the incumbent and the new CEO.
- b) The maximum salary you can offer the new CEO next year without lowering the stock price, given that the current CEO earns a salary of 20. Assume the CEO's salary grows at the same rate as the firm cashflows.
- c) The maximum salary you can offer the new CEO without lowering the stock price if the payout ratio increases to 80%. Assume the CEO's salary grows at the same rate as the firm cashflows and the current CEO earns 20.



Coupon bonds

T-year coupon bond

- Bondholder receives a coupon payment at regular intervals until maturity. These payments could be made, annually, semi-annually or quarterly.
- These coupon payments are usually the same at every payment date.
- Coupon rate is expressed as an APR (annual proportional rate)
- At T, the bondholder receives both a coupon payment and the face value





Yield curve

- Financial markets quote different interest rates for different maturities.
- Term structure of interest rates is the relationship between the investment term and the interest rate
- The plot of this relationship is the yield curve



Bond valuation



 y: average return the investor receives from holding the bond.





Dependence of bond prices on interest rates

Bond price as a function of the YTM (c=2%, FV=5000, T=3Y OR T=10Y)



Duration

Macaulay Duration of the bond: measure the sensitivity of prices to yields as the percentage change in price for a 1% change in yields. This is the elasticity of the bond price w.r.t. yields.

$$D = \frac{1}{P} \sum_{t=1}^{T} t \frac{C_t}{(1+y)^t}$$

 Intuition: It is computed by calculating the weighted time until each payment of the bond



Firm A generates a net income of 1000 and has a payout ratio of 100%. The firm has issued 100 shares. The firm also has a 5-year bond issued that pays a coupon of 5% and has a face value of 1000. This bond is held by Mr. BH. The discount rate for the bond and the equity of the firm is 10%.

- a) What is the price of the firm shares?
- b) What is the price of the firm bond?
- c) What is the duration of the bond?
- d) Consider the bond is convertible; that is, Mr. BH can give the bond back to the firm in exchange of 10 newly issued shares (110 in total). Should Mr. BH convert?



Consider country A issues two bonds, both of them with a maturity of two years. The first one is a coupon bond with a coupon of 5% and a face value of 100. The second one is an inflation-adjusted bond with a 3% coupon and a face value of 100. An inflation-adjusted bond pays as cashflows the cashflow of the equivalent coupon bond multiplied by inflation. For instance, in this case, the last cashflow of the bond is $(1 + \pi)^2 103$ where π is the annual inflation rate. The standard coupon bond trades at 93 and the inflation-adjusted bond at 95. Assume discount rates are the same for both years and inflation is also constant.

- a) What is the yield of the (standard) coupon bond?
- b) What is the real yield of the inflation-adjusted coupon bond?
- c) What is the expected inflation?