

Valuation formulas

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1. Asset valuation

$$\text{Present value of the investment} = \sum_{t=1}^N \frac{CF_t}{(1+i)^t}$$

where CF_t is the cash flow at the end of period t ;
 i is the discount rate; and
 N is the number of periods;

2. Stock valuation

A. General formulation

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r_e)^t}$$

where P_0 is price of a share of stock today;
 D_t is the dividend at the end of period t ;
 r_e is the required rate of return; and
 t indicates the period.

B. Perpetuity

$$P_0 = \frac{D}{r_e}$$

C. Dividend valuation model

$$P_0 = \frac{D_0(1+g)}{(r_e - g)} = \frac{D_1}{(r_e - g)}$$

D. Two-stage dividends

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r_e)^t} = \left[\sum_{t=1}^{N_1} \frac{D_t}{(1+r_e)^t} \right] + \frac{D_{N_1+1}}{(1+r_e)^{N_1}} = \left[\sum_{t=1}^{N_1} \frac{D_0(1+g_1)^t}{(1+r_e)^t} \right] + \frac{D_{N_1}(1+g_2)}{(1+r_e)^{N_1}}$$

PV of all dividends = PV of 1st stage dividends + PV of 2nd stage dividends

where N_1 is the length of first stage
 g_1 is the growth of dividends in the first stage
 g_2 is the growth of dividends in the second stage

3. Bond valuation

$$V = \left[\sum_{t=1}^N \frac{C_t}{(1+r_d)^t} \right] + \frac{M}{(1+r_d)^N}$$

where V is the value of the bond;
 C_t is the coupon payment at the end of period t ;
 M is the maturity value; and
 r_d is the yield [Note: for semi-annual coupons, r_d is the six-month yield].