AP/ADMS 3530 3.00 Finance

Midterm Exam Formula

Time Value of Money

$$FV = \text{Investment} \times (1+r)^t$$

$$PV = \frac{\text{Future Value}}{(1+r)^t}$$

$$\text{PV of a perpetuity} = \frac{C}{r}$$

$$\text{PV of a growing perpetuity} = \frac{C_1}{r-g}$$

$$\text{PV of an annuity} = C \times \left[\frac{1}{r} - \frac{1}{r(1+r)^t}\right]$$

$$= C \times \left[\frac{1-(1+r)^{-t}}{r}\right]$$ (easier to calculate)

$$\text{FV of an annuity} = C \times \left[\frac{(1+r)^t - 1}{r}\right]$$

$$\text{PV of a growing annuity} = \frac{C_1}{r-g} \times \left[1 - \left(\frac{1+g}{1+r}\right)^t\right]$$

$$\text{FV of a growing annuity} = \frac{C_1}{r-g} \times \left[(1+r)^t - (1+g)^t\right]$$

$$\text{Annuity factor} = \left[\frac{1}{r} - \frac{1}{r(1+r)^t}\right]$$

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

(lower version is easier to calculate)

PV of an annuity due = (1 + r) × (PV of an annuity)

FV of an annuity due = (1 + r) × (FV of an annuity)

$$1 + \text{Real rate} = \frac{1 + \text{Nominal rate}}{1 + \text{Inflation rate}}$$

$$\text{APR} = \text{Period Rate} \times m$$

$$\text{EAR} = (1 + \text{Period Rate})^m - 1$$

$$\text{Period Rate} = (1 + \text{EAR})^{\frac{1}{m}} - 1$$

where m = number of periods per year

Bonds and Stocks

Price of a bond = PV (Coupons) + PV (Face Value) = $\mathbf{C} \times \left[\frac{1}{r} - \frac{1}{r(1+r)^t}\right] + \frac{\text{Face Value}}{(1+r)^t}$

Current yield = $\frac{\text{Annual coupon payment}}{\text{Bond price}}$

Yield to maturity (YTM) = interest rate for which the present value of the bond's payments equals the price

Rate of return = $\frac{\text{Coupon income} + \text{Price change}}{\text{Investment}}$

Dividend yield = $\frac{\text{Dividend payment}}{\text{Stock price}}$

Price earnings (P/E) ratio = $\frac{\text{Stock price}}{\text{Earnings per share}}$

Sustainable growth rate: g = ROE × Plowback ratio

Dividend discount model: $P_0 = \frac{DIV_1}{1+r} + \frac{DIV_2}{(1+r)^2} + \ldots + \frac{DIV_H}{(1+r)^H} + \frac{P_H}{(1+r)^H}$

where H is the horizon date, and P_H is the expected price of the stock at date H

Constant-growth dividend discount model: $P_0 = \frac{DIV_1}{r-g}$,
where $DIV_1 = DIV_0 \times (1+g)$

Expected rate of return: $r = \frac{DIV_1}{P_0} + g$, or $r = \frac{DIV_1}{P_0} + \frac{P_1 - P_0}{P_0}$