

Indhold

Kapitel 4 (BD) - Time value of money	6
(4.4) Present value of a cash flow stream	6
(4.1) Future value of a cash flow	6
(4.2) Present value of cash flow	6
(4.7) Present value of perpetuity	6
(4.11) Present value of a growing perpetuity (IRR).....	6
Perpetuity payment.....	6
Present value of an annuity (IRR)	7
Future value of an Annuity	7
(4.12) Present value of a growing annuity (IRR).....	7
Loan or Annuity payment.....	7
(4.6) NPV - Net present value.....	7
Kapitel 7 (BD) - Project selection with ressource constraints	7
Profitability index	7
Kapitel 8 (BD) - Fundamentals of capital budgeting	8
(8.2) Unlevered net income.....	8
(8.5) Free cash flow (FCF)	8
(8.3) Net working capital (NWC).....	8
Taxable scrap value	8
FCF - Termination/continuation value.....	8
Kapitel 9 (BD) - Valuing stocks	9
Total return.....	9
Enterprise value (EV)	9
Dividend-Discount model	9
(9.6) Constant Dividend Growth model	9
(9.12) Earnings growth rate.....	9
Dividend-discount model with constant long-term growth.....	10
(9.16) Total payout model	10
Discounted free cash flow model	10
Kapitel 5 (BKM) - Risk, Return, and the historical record	11
5.10 - Holding period return (HPR).....	11
Effective annual rate (EAR).....	11
Annual Percentage rates	11

The flow-to-equity method (FTE)	45
Project-based WACC formula	45
Levered value of a project with a constant interest coverage policy.....	46
Levered value with permanent constant debt	46
Value of interest tax shield with annually adjustment of debt	46
Chapter 20 (BD) - Options markets: Introduction.....	47
Put-call parity theorem.....	47
Payoff to call investor (holder)	47
Payoff to put investor	48
Payoff to call writer	48
Payoff to put writer	48
Chapter 21 (BD) - Option valuation.....	49
Binomial model.....	49
Black-Sholes - call option.....	49
Black-Scholes - Put option	50
Implied volatility.....	50
Delta / hedge ratio - Call option	50
Delta / hedge ratio - put option	51
Minimum value of a call option.....	51
Maximum value of a call option	51
Variables that effect the value of a <i>call option</i>	52
Variables that effect the value of a <i>put option</i>	52

$$g = \text{Retention rate} \cdot \text{return on new investment}$$

↕

$$\text{Return on new investment} = \frac{g}{\text{retention rate}}$$

Hvor:

$$\text{Change in earnings} = \text{New investment} \cdot \text{return on new investment}$$

$$\text{new investment} = \text{earnings} \cdot \text{retention rate}$$

Hvor retention raten er den del af overskuddet der ikke bliver udloddet som udbytte.

BD. 318-319

Dividend-discount model with constant long-term growth

$$P_0 = \frac{Div_1}{r + r_E} + \frac{Div_2}{(1 + r_E)^2} + \dots + \frac{Div_N}{(1 + r_E)^N} + \frac{1}{(1 + r_E)^N} \cdot \left(\frac{Div_{N+1}}{r_E - g} \right)$$

BD. 321

(9.16) Total payout model

$$P_0 = \frac{PV(\text{Future total dividends and repurchases})}{\text{Shares outstanding}_0}$$

BD. 323

Discounted free cash flow model

$$V_0 = PV(\text{Future free cash flow of the firm}) \quad (9.21)$$

↕

$$V_0 = \frac{FCF_1}{1 + r_{wacc}} + \frac{FCF_2}{(1 + r_{wacc})^2} + \dots + \left(\frac{1 + g_{FCF}}{r_{wacc} - g_{FCF}} \right) \cdot FCF_N$$

FCF_N = Free cash flow år N - sidste år inden *perpetuity*.

r_{wacc} = *Weighted average cost of capital*

g_{FCF} = Growth rate of free cash flow

V_0 = Enterprise value in year 0

$$P_0 = \frac{V_0 + \text{Cash}_0 - \text{Debt}_0}{\text{Shares outstanding}_0} \quad (9.22)$$

BD. 325

Covariance

$$\text{Cov}(r_D, r_E) = (E(r_D) - r_D) \cdot (E(r_E) - r_E)$$

Eller:

$$\text{Cov}(r_D, r_E) = \rho_{DE} \cdot \sigma_D \cdot \sigma_E$$

Eller:

$$\text{Cov}(r_D, r_E) = \beta_i \cdot \sigma_M^2$$

Correlation

$$\rho_{DE} = \frac{\text{Cov}(D, E)}{\sigma_D \cdot \sigma_E}$$

Minimum variance

If $\rho = -1$ a perfectly hedged position can be obtained. Use the following formula below to find the weights that drive standard deviation to zero if $\rho = -1$. However, if $\rho > -1$ then the following formula will give the weights for the portfolio with minimum variance.

$$w_E^{\min} = \frac{\sigma_D^2 - \sigma_{ED}}{\sigma_E^2 + \sigma_D^2 - 2\sigma_{ED}}$$

$$w_D^{\min} = \frac{\sigma_E^2 - \sigma_{ED}}{\sigma_E^2 + \sigma_D^2 - 2\sigma_{ED}} = 1 - w_E$$

σ_{ED} = Covariance mellem E og D

Hvis korrelationen er -1 = hedget portefølje:

$$w_E = \frac{\sigma_D}{\sigma_D + \sigma_E}$$

$$w_D = 1 - w_E$$

HUSK formlerne for de særtilfælde hvor korrelationen er enten 1 eller -1. De står ovenfor.

Weights of the optimal risky portfolio, P

The objective is to find the weights w_D and w_E that result in the highest slope of the CAL. Thus, the highest risk-reward ratio. The problem can be formulated as:

$$\text{Max Sharpe ratio} = \text{Max } S_p = \frac{E(r_p) - r_f}{\sigma_p}$$

Which can be solved - for two risky assets - by the following formula

$$w_D = \frac{(E(r_D) - r_f) \cdot \sigma_E^2 - (E(r_E) - r_f) \cdot \rho_{DE}}{(E(r_D) - r_f) \cdot \sigma_E^2 + (E(r_E) - r_f) \cdot \sigma_D^2 - (E(r_D) - r_f + E(r_E) - r_f) \cdot \rho_{DE}}$$

$$w_E = 1 - w_D$$

Hvor:

D = debt

Chapter 16 (BKM) - Managing Bond portfolios

Macaulay's duration (16.1)

To deal with the ambiguity of the "maturity" of a bond making many payments, we need a measure of the average maturity of the bond's promised cash flows. Macaulay's equation is a measure of the effective duration of the bond, commonly referred to as the duration.

$$D = \sum_{t=1}^T t \cdot w_t$$

Macaulay's duration equals the weighted average of the times to each coupon or principal payment, with weights related to the "importance" of that payment to the value of the bond.

Uses of duration:

1. It is a simple summary statistic of the effective average maturity of the portfolio
2. It is an essential tool in immunizing portfolios from interest rate risk.
3. Duration is a measure of interest rate sensitivity of a portfolio

Where:

t = time until each of the bond's payment

w_t = weight (described below)

T = total amount of periods of the bond

Weight for Macaulay's duration

The weight applied to each payment time in the duration formula above, is the proportion of the total value of the bond accounted for by that payment. That is the present value of the payment divided by the bond price. The total of all the weights should equal 1 because the sum of the cash flows discounted at the yield to maturity equals the bond price.

$$w_t = \frac{\frac{CF_t}{(1+y)^t}}{\text{Bond price}}$$

Tælleren er nutidsværdien af pengestrømmen i tidspunkt t , udregnet ved hjælp af YTM.

Where:

y = The bond's yield to maturity

$\frac{CF_t}{(1+y)^t}$ = The present value of the cash flow in period t

Modified duration

$$D^* = \frac{D}{(1+y)}$$

Hvor Y = YTM inden ændringen.

income are the same ($\tau_i = \tau_e$) this formula reduces to $\tau^* = t_c$. But when equity income is taxed less heavily ($\tau_i > \tau_e$), then τ^* is less than τ_c (and can even be negative).

Where:

$\tau_c =$ Corporate tax rate

$\tau_e =$ Personal tax rate on equity

$\tau_i =$ personal tax rate on interest income

Effective tax disadvantage when interest exceeds limits for tax write-off

To receive the full tax benefits of leverage, a firm need not use 100% debt financing. A firm receives a tax benefit only if it is paying taxes in the first place. That is, the firm must have taxable earnings. In addition, in many countries there is a maximum limit on how much of their interest payments they can deduct from their taxes. Typically some % of EBIT or EBITDA.

Thus, no corporate tax benefit arises from incurring interest payments that regularly exceed the income limit. And, because interest payments constitute a tax disadvantage at the investor level, investors will pay higher personal taxes with excess leverage, making them worse off.

We can quantify the tax disadvantage for excess interest payments by setting $\tau_c = 0$ in the equation for τ^* (assuming there is no reduction in corporate tax for excess interest payments).

$$\tau_{ex}^* = 1 - \frac{(1 - \tau_e)}{(1 - \tau_i)} = \frac{\tau_e - \tau_i}{(1 - \tau_i)} < 0$$

Where:

$\tau_c =$ Corporate tax rate

$\tau_e =$ Personal tax rate on equity

$\tau_i =$ personal tax rate on interest income

Value of levered/unlevered firm with constant growth

$$V^L = \frac{FCF}{WACC - g}$$

$$V^U = \frac{FCF}{r^U - g}$$

Growth factor of value of levered/unlevered firm:

$$g = WACC - \frac{FCF}{V^L}$$

$$g = r^U - \frac{FCF}{V^U}$$