Formula Sheet
Corporate Finance

A = L + SE

$$MB = \frac{MVE}{BVE}$$

$$DE = \frac{TD}{TE}$$

$$DA = \frac{TD}{TA}$$

$$ICR = \frac{EBIT}{IE}$$

EV = MVE + D - C

$$EPS = \frac{NI}{SO}$$

$$OM = \frac{OI}{TS}$$

$$NPM = \frac{NI}{TS}$$

$$CR = \frac{CA}{CL}$$

$$QR = \frac{CAEI}{CL}$$

$$ARD = \frac{AR}{ADS}$$

$$ROE = \frac{NI}{BVE}$$

$$P/E = \frac{MC}{NI} = \frac{SP}{EPS}$$

RE = NI – D

NPV = PV(ACF)

P(S) = PV(CF)

$$R = \frac{GAEY}{IC}$$

P(C) = P(A+B) = P(A)+P(B)

$$E(R) = \frac{E(GAEY)}{IC}$$

$r_s = r_f + RP_s$

$$FV_t = C \times (1+r)^n$$

$$PV_t = \frac{C_n}{(1+r)^n}$$

$$PV_t = \sum_{n=0}^{N} \frac{C_n}{(1+r_n)^n}$$

$$FV_t = PV \times (1+r)^n$$

$$PV_t = \frac{C}{r}$$

$$PV_t = \frac{C}{r}\left(1 - \frac{1}{(1+r)^N}\right)$$

$$FV_t = \frac{C}{r}\left((1+r)^N - 1\right)$$

$$PV_t = \frac{C}{r-g}$$

$$PV_t = \frac{C}{r-g}\left(1 - \left(\frac{1+g}{1+r}\right)^N\right)$$

$$FV_t = \frac{C}{r-g}\left((1+r)^N - (1+g)^N\right)$$

$$NPV = PV + PMT \times \frac{1}{RATE}\left(1 - \frac{1}{(1+RATE)^{NPER}}\right) + \frac{FV}{(1+RATE)^{NPER}} = 0$$

$$C = \frac{P}{\frac{1}{r}\left(1 - \frac{1}{(1+r)^N}\right)}$$

$$r(t) = (1+r)^n - 1$$

$$r(t) = \frac{APR}{k}$$

$$1 + EAR = \left(1 + \frac{APR}{k}\right)^k$$

$$r_r = \frac{r - i}{1 + i} \approx r - i$$

$$r_{AT} = r - (\tau \times r) = r(1 - \tau)$$

$EVA_n = C_n - rI_{n-1} - D_n$

$$PI = \frac{NPV}{RC}$$

$$IT = EBIT \times \tau_C$$

$$UNI = EBIT \times (1 - \tau_c) = (R - E - D)(1 - \tau_c)$$

$$NWC = CA - CL = C + AR + I - AP$$

$$FCF = UNI + D - CE - \Delta NWC$$

$$FCF = (R - E - D) \times (1 - \tau_c) + D - CE - \Delta NWC$$

$$FCF = (R - E) \times (1 - \tau_c) - CE - \Delta NWC + \tau_c \times D$$

$$CG = SP - BV$$

ATCF = SP – (τ_C x CG)

MACRS Depreciation Rate for Recovery Period

Year	3 years	5 years	7 years	10 years	15 years	20 years
1	33.33	20.00	14.29	10.00	5.00	3.750
2	44.45	32.00	24.49	18.00	9.50	7.219
3	14.81	19.20	17.49	14.40	8.55	6.677
4	7.41	11.52	12.49	11.52	7.70	6.177
5		11.52	8.93	9.22	6.93	5.713
6		5.76	8.92	7.37	6.23	5.285
7			8.93	6.55	5.90	4.888
8			4.46	6.55	5.90	4.522
9				6.56	5.91	4.462
10				6.55	5.90	4.461
11				3.28	5.91	4.462
12					5.90	4.461
13					5.91	4.462
14					5.90	4.461
15					5.91	4.462
16					2.95	4.461
17						4.462
18						4.461
19						4.462
20						4.461
21						2.231

$$CPN = \frac{CR \times FV}{NCPR}$$

$$P = \frac{FV}{(1 + YTM_n)^n}$$

$r_n = YTM_n$

$$P = \frac{CPN}{y}\left(1 - \frac{1}{(1+y)^N}\right) + \frac{FV}{(1+y)^N}$$

$$P = \frac{CPN}{1 + YTM_1} + \frac{CPN}{(1 + YTM_2)^2} + \cdots + \frac{CPN + FV}{(1 + YTM_n)^n}$$

$$P = \frac{Div_1 + P_1}{1 + r_E}$$

$$r_E = \frac{Div_1 + P_1}{P_0} - 1 = \frac{Div_1}{P_0} + \frac{P_1 - P_0}{P_0} = \frac{Div_1}{P_0} + g$$

$$P = \frac{Div_1}{1 + r_E} + \frac{Div_2 + P_2}{(1 + r_E)^2}$$

$$P = \frac{Div_1}{1 + r_E} + \frac{Div_2}{(1 + r_E)^2} + \cdots + \frac{Div_N}{(1 + r_E)^N} + \frac{P_N}{(1 + r_E)^N}$$

$$P = \sum_{n=1}^{\infty} \frac{Div_n}{(1 + r_E)^n}$$

$$P_0 = \frac{Div_1}{r_E - g}$$

$$CE = NI \times RONI$$

$$NI = E \times RR$$

$$g = RR \times RONI$$

$$P_N = \frac{Div_{N+1}}{r_E - g}$$

$$P = \frac{Div_1}{1 + r_E} + \frac{Div_2}{(1 + r_E)^2} + \cdots + \frac{Div_N}{(1 + r_E)^N} + \frac{1}{(1 + r_E)^N}\left(\frac{Div_{N+1}}{r_E - g}\right)$$

$$P_0 = \frac{PV(FTDAR)}{SO_0}$$

EV = MVE + D – C

$$FCF = EBIT \times (1 - \tau_C) + D - CE - \Delta NWC$$

$$V_0 = PV(FFCF)$$

$$P_0 = \frac{V_0 + C_0 - D_0}{SO_0}$$

$$V_0 = \frac{FCF_1}{1 + r_{WACC}} + \frac{FCF_2}{(1 + r_{WACC})^2} + \cdots + \frac{FCF_N}{(1 + r_{WACC})^N} + \frac{V_N}{(1 + r_{WACC})^N}$$

$$V_N = \frac{FCF_{N+1}}{r_{wacc} - g_{FCF}} = \left(\frac{1 + g_{wacc}}{r_{wacc} - g_{FCF}}\right) \times FCF_N$$

$$P/E = \frac{P_0}{EPS_1} = \frac{Div_1/EPS_1}{r_E - g} = \frac{DPR}{r_E - g}$$

$$\frac{V_0}{EBITDA_1} = \frac{FCF_1/EBITDA_1}{r_{wacc} - g_{FCF}}$$

$$E[R] = \sum_R p_R \times R$$

$$Var(R) = \sum_R p_R \times (R - E(R))^2$$

$$SD(R) = \sqrt{Var(R)}$$

$$R_{t+1} = \frac{Div_{t+1}}{P_t} + \frac{P_{t+1} - P_t}{P_t}$$

$$1+R_L = (1+R_{S1})\,(1+R_{S2})\,(1+R_{S3})\ldots.$$

$$\overline{R} = \frac{1}{T}\sum_{t=1}^{T} R_t$$

$$Var(R) = \frac{1}{T-1}\sum_{t=1}^{T}\left(R_t - \overline{R}\right)^2$$

$$SE = \frac{SD}{\sqrt{N}}$$

$$CAR = [(1 + R_1) \times (1 + R_2) \times \cdots \times (1 + R_T)]^{1/T} - 1$$

$$MRP = E[R_{Mkt}] - r_f$$

$$E[R] = r_f + \beta \times (E[R_{Mkt}] - r_f)$$

$$x_i = \frac{MVi}{\sum_j MV_j}$$

$$R_P = \sum_i x_i R_i$$

$$E(R_P) = \sum_i x_i E(R_i)$$

$$Cov(R_i, R_j) = E[(R_i - E[R_i])(R_j - E[R_j])]$$

$$Cov(R_i, R_j) = \frac{1}{T-1}\sum_t \left(R_{i,t} - \overline{R}_i\right)\left(R_{j,t} - \overline{R}_j\right)$$

$$Corr(R_i, R_j) = \frac{Cov(R_i, R_j)}{SD(R_i)SD(R_j)}$$

$$Var(R_p) = x_1^2 Var(R_1) + x_2^2 Var(R_2) + 2x_1 x_2 Cov(R_1, R_2)$$

$$Var(R_p) = x_1^2 SD(R_1)^2 + x_2^2 SD(R_2)^2 + 2x_1 x_2 Corr(R_1, R_2) SD(R_1) SD(R_2)$$

$$Var(R_P) = \sum_i x_i Cov(R_i, R_P)$$

$$Var(R_P) = \sum_i \sum_j x_i x_j Cov(R_i, R_j)$$

$$Var(R_P) = \frac{1}{n}(\text{AVIS}) + \left(1 - \frac{1}{n}\right)(\text{ACBS})$$

$$SD(R_P) = \sum_i x_i \times SD(R_i) \times Corr(R_i, R_P)$$

$$\sum_i x_i \times SD(R_i) \times Corr(R_i, R_P) < \sum_i x_i \times SD(R_i)$$

$$E(R_{xP}) = (1 - x)r_f + xE(R_P) = r_f + x(E(R_P) - r_f)$$

$$SD(R_{xP}) = \sqrt{(1-x)^2 Var(r_f) + x^2 Var(R_P) + 2(1-x)xCov(r_f, R_P)}$$

$$SD(R_{xP}) = xSD(R_P)$$

$$\text{SR} = \frac{E(R_P) - r_f}{SD(R_P)}$$

$$\beta_i^P = \frac{SD(R_i) \times Corr(R_i, R_P)}{SD(R_P)} = \frac{Cov(R_i, R_P)}{Var(R_P)}$$

$$r_i = r_f + \beta_i^P \times \left(E[R_P] - r_f\right)$$

$$E(R_i) = r_i \equiv r_f + \beta_i^{Eff} \times \left(E[R_{Eff}] - r_f\right)$$

$$\beta_i^{Eff} = \frac{SD(R_i) \times Corr(R_i, R_{Eff})}{SD(R_{Eff})}$$

$$r_i = r_f + \beta_i^{Eff} \times \left(E[R_{Eff}] - r_f\right)$$

$$E(R_{xCML}) = r_f + x\left(E[R_{Mkt}] - r_f\right)$$

$$SD(R_{xCML}) = xSD(R_{Mkt})$$

$$E(R_i) = r_i = r_f + \beta_i \times \left(E[R_{Mkt}] - r_f\right)$$

$$\beta_i = \beta_i^{Mkt} = \frac{SD(R_i) \times Corr(R_i, R_{Mkt})}{SD(R_{Mkt})} = \frac{Cov(R_i, R_{Mkt})}{Var(R_{Mkt})}$$

$$\beta_P = \sum_i x_i \beta_i$$

$$\alpha_s = E[R_s] - r_s = E[R_s] - \left(r_f + \beta_s\left(E[R_{Mkt}] - r_f\right)\right)$$

$$MV_i = N_i \times P_i$$

$$x_i = \frac{MV_i}{\sum_j MV_j}$$

$$(R_i - r_f) = \alpha_i + \beta_i(R_{Mkt} - r_f) + \varepsilon_i$$

$$E(R_i) = r_i = r^* + \beta_i \times \left(E[R_{Mkt}] - r^*\right)$$

$$ABSi = \frac{2}{3}\beta_i + \frac{1}{3}(1.0)$$

$$r_{Mkt} = \frac{Div_1}{P_0} + g$$

E = A – D

E + D = U = A

$$\frac{E}{E+D}R_E + \frac{D}{E+D}R_D = R_U = R_A$$

$$R_E = R_U + \frac{D}{E}(R_U - R_D)$$

$$r_E = r_U + \frac{D}{E}(r_U - r_D)$$

$$E(R_E) = E(R_U) + \left(\frac{D}{E}\right)\left(E(R_U) - E(R_D)\right)$$

$$r_{WACC} = \left(\frac{E}{D+E}\right)r_E + \left(\frac{D}{D+E}\right)r_D = r_U = r_A$$

$$\beta_U = \frac{E}{E+D}\beta_E + \frac{D}{E+D}\beta_D$$

$$\beta_E = \beta_U + \frac{D}{E}(\beta_U - \beta_D)$$

$$\beta_E = \left(1 + \frac{D}{E}\right)\beta_U$$

ND = D – CRFS

ITS = CTR x IP

$CF^L = CF^U$ + ITS

$V^L = V^U$ + PV(ITS)

PV(ITS) = τ_C x D

$V^L = V^U + \tau_C D$

$r_{AT} = r_D(1- \tau_C)$

$$r_{WACC} = \left(\frac{E}{E+D}\right)r_E + \left(\frac{D}{E+D}\right)r_D(1-\tau_C)$$

$$r_{WACC} = \left(\frac{E}{E+D}\right)r_E + \left(\frac{D}{E+D}\right)r_D - \left(\frac{D}{E+D}\right)r_D\tau_C$$

$$\tau^* = 1 - \frac{(1-E(\tau_c))(1-\tau_e)}{(1-\tau_i)}$$

$V^L = V^U + \tau^* D$

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

$V^L = V^U$ + PV(ITS) – PV(FDC)

$V^L = V^U$ + PV(ITS) – PV(FDC) – PV(ACD) + PV(ABD)

$$(P_{cum} - P_{ex})(1-\tau_g) = Div(1-\tau_d)$$

$$P_{cum} - P_{ex} = Div\left(1 - \tau_d^*\right)$$

$$\tau_d^* = \left(\frac{\tau_d - \tau_g}{1 - \tau_g}\right)$$

$$P_{cum} = P_{ex} + Div_0\left(\frac{1 - \tau_d}{1 - \tau_g}\right)$$

$$P_{retain} = P_{cum} \times \left(1 - \tau_{retain}^*\right)$$

$$\tau_{retain}^* = 1 - \frac{(1 - \tau_c)(1 - \tau_g)}{(1 - \tau_i)}$$

C = max(S – K,0)

P = max(K – S,0)

S + P = PV(K) + C

P = C – S + PV(K)

S + P = PV(K) + PV(Div) + C

P = C – S + PV(K) + PV(Div)

$S_u\Delta + (1+r_f)B = C_u$

$S_d\Delta + (1+r_f)B = C_d$

$$\Delta = \frac{C_u - C_d}{S_u - S_d}$$

$$B = \frac{C_d - S_d\Delta}{1 + r_f}$$

C = SΔ + B

$$C = S \times N(d_1) - PV(K) \times N(d_2)$$

$$d_1 = \frac{\ln\left[\frac{S}{PV(K)}\right]}{\sigma\sqrt{T}} + \frac{\sigma\sqrt{T}}{2}$$

$$d_2 = d_1 - \sigma\sqrt{T}$$

$$P = PV(K)\left[1 - N(d_2)\right] - S\left[1 - N(d_1)\right]$$

$S^x = S - PV(Div)$

$S^x = S/(1+q)$

$\Delta = N(d_1)$

$B = -PV(K)N(d_2)$

$\Delta = -[1-N(d_1)]$

$B = PV(K)[1-N(d_2)]$

$$C = S \times N(d_1) - K \times e^{-r \times T} \times N(d_2)$$

$$d_1 = \frac{\ln\left(\frac{S}{K}\right) + \left(r + \frac{\sigma^2}{2}\right) \times T}{\sigma\sqrt{T}}$$

$$d_2 = d_1 - \sigma\sqrt{T}$$

$$r_f = e^r - 1$$

$$r = ln(1 + r_f)$$

$$\beta_{option} = \frac{\Delta S}{\Delta S + B}\beta_S$$

$$\beta_D = (1 - \Delta)\frac{A}{D}\beta_U = (1 - \Delta)\left(1 + \frac{E}{D}\right)\beta_U$$

$$\beta_U = \frac{\beta_E}{\Delta\left(1 + \frac{D}{E}\right)}$$

$\Delta = N(d_1)$