Financial Management Homework 3
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(Due on 18 Nov)

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Question 1. You are given the following information for Company A:

Long-term debt outstanding:	$300,000
Current yield to maturity (r_{debt}):	8%
Number of shares of common stock:	10,000
Price per share:	$50
Book value per share:	$25
Expected rate of return on stock(r_{equity}):	15%

Calculate Company A's cost of capital. Ignore taxes.

$V_{debt} = \$300,000 \quad V_{equity} = 10,000 \times \$50 = \$500,000 \quad V_{total} = \$800,000$

$W_{debt} = 0.375 \quad W_{equity} = 0.625$

$WACC = W_{debt} \times r_{debt} + W_{equity} \times r_{equity} = 12.375\%$

Question 2. Consider the following information about Stocks I and II:

State of Economy	Probability of State of Economy	Rate of Return if State Occurs	
		Stock I	Stock II
Recession	.15	.11	-.25
Normal	.55	.18	.11
Exuberance	.30	.08	.31

The market risk premium is 7.5 percent, and the risk-free rate is 4 percent.
a. Which stock has the most systematic risk?
b. Which one has the most unsystematic or total risk?
c. Which stock is "riskier"? Explain.

$\bar{R_i} = R_F + \beta_i(\bar{R_m} - R_f)$

$\Rightarrow \beta_i = \dfrac{\bar{R_i} - R_f}{\bar{R_m} - R_f}$

a. $ER_I = 0.15 \times 0.11 + 0.55 \times 0.18 + 0.3 \times 0.08 = 0.1395$

   $ER_{II} = 0.15 \times (-0.25) + 0.55 \times 0.11 + 0.3 \times 0.31 = 0.116$

   $\beta_I = \dfrac{ER_I - R_f}{R_m - R_f} = \dfrac{0.1395 - 0.04}{0.075} \doteq 1.327 \qquad \beta_{II} = \dfrac{ER_{II} - R_f}{R_m - R_f} \doteq 1.013$

   $\beta_I > \beta_{II}$, stock I has the most systematic risk.

b. $\sigma_I^2 = 0.15 \times (0.11 - 0.1395)^2 + 0.55 \times (0.18 - 0.1395)^2 + 0.3 \times (0.08 - 0.1395)^2 \approx 0.002095$

   $\sigma_{II}^2 = 0.15 \times (-0.25 - 0.116)^2 + 0.55 \times (0.11 - 0.116)^2 + 0.3 \times (0.31 - 0.116)^2 \approx 0.031404$

   $\sigma_I^2 < \sigma_{II}^2$, stock II has the most total risk.

c. systematic cannot eliminate by diversified investment, so stock I is riskier at diversified investment

Question 3. Epsilon Corp. is evaluating an expansion of its business. The cash-flow forecasts for the project are as follows:

Years	Cash Flow ($ millions)
0	-100
1-10	+15

The firm's existing assets have a beta of 1.4. The risk-free interest rate is 4% and the expected return on the market portfolio is 12%. What is the project's NPV?

$$r = r_f + \beta \times (r_m - r_f) = 4\% + 1.4 \times (12\% - 4\%) = 15.2\%$$

$$PV = C \times \left[\frac{1-(1+r)^{-n}}{r}\right] = 15 \times \left[\frac{1-(1+0.152)^{-10}}{0.152}\right] \approx 74.711$$

$$NPV = PV - 100 \doteq -25.289$$

Question 4. The total market value of the common stock of the Company ABC is $6 million, and the total value of its debt is $4 million. The treasurer estimates that the beta of the stock is currently 1.5 and that the expected risk premium on the market is 6%. The Treasury bill rate is 4%. Assume for simplicity that the firm's debt is risk-free and the company does not pay tax.

a. What is the required return on the company's stock?
b. Estimate the company cost of capital.
c. What is the discount rate for an expansion of the company's present business?
d. Suppose the company wants to diversify into the manufacture of rose-colored spectacles. The beta of unleveraged optical manufacturers is 1.2. Estimate the required return on ABC 's new venture.

a. $r_E = r_f + \beta_E (r_m - r_f) = 4\% + 1.5 \times (10\% - 4\%) = 13\%$

b. $WACC = \left(\frac{E}{V} \times r_E\right) + \left(\frac{D}{V} \times r_D\right) = \left(\frac{6}{10} \times 13\%\right) + \left(\frac{4}{10} \times 4\%\right) = 9.4\%$

c. The discount rate for a project equals the company's WACC.
   Then, the discount rate = 9.4%.

d. $\beta_U = 1.2 \qquad \beta_L = \beta_U \times \left(1 + \frac{D}{E}\right) = 1.2 \times \left(1 + \frac{4}{6}\right) \approx 2.0$

$r_{New\ venture} = r_f + \beta_L \times (r_m - r_f) = 4\% + 2.0 \times 6\% = 16\%$.

Question 5. Shadow Corp. has no debt but can borrow at 6.5 percent. The firm's WACC is currently 9.8 percent, and the tax rate is 35 percent.

a. What is the company's cost of equity?
b. If the company converts to 25 percent debt, what will its cost of equity be?
c. If the company converts to 50 percent debt, what will its cost of equity be?
d. What is the company's WACC in part (b)? In part (c)?

a. $r_E^{Unlevered} = WACC_{Unlevered} = 9.8\%$

b. Use MM Proposition II (with taxes).

$r_E^L = r_E^V + (r_E^V - r_D) \times \frac{D}{E} \times (1-T_c) = 9.8\% + (9.8\% - 6.5\%) \times \frac{1}{3} \times (1-0.35) = 10.515\%$

c. $\frac{D}{E} = 1.$ $r_E^L = 9.8\% + (9.8\% - 6.5\%) \times 1 \times (1-0.35) = 11.945\%$

d. $WACC = (\frac{E}{V} \times r_E^L) + (\frac{D}{V} \times r_D \times (1-T_c))$

$WACC_b = (0.75 \times 10.515\%) + (0.25 \times 6.5\% \times 0.65) = 8.9425\%$

$WACC_c = (0.5 \times 11.945\%) + (0.5 \times 6.5\% \times 0.65) = 8.085\%.$

Question 6. Compute the present value of interest tax shields generated by these three debt issues. Consider corporate taxes only. The marginal tax rate is $T_c = .35$.

a. A $1,000, one-year loan at 8%.
b. A five-year loan of $1,000 at 8%. Assume no principal is repaid until maturity.
c. A $1,000 perpetuity at 7%.

a. annual interest payment $1000 \times 8\% = 80$
  one year tax shield $80 \times 0.35 = 28$
  $PV = \frac{28}{1+0.08} = 25.926$

b. $PV = 28 \times [\frac{1-(1+0.08)^{-5}}{0.08}] = 111.796$

c. annual interest payment $1000 \times 7\% = 70$
  annual tax shield $70 \times 0.35 = 24.5$
  $PV = \frac{24.5}{0.07} = 350.$