LISBON SCHOOL OF ECONOMICS & MANAGEMENT
UNIVERSIDADE DE LISBOA

Corporate Investment Appraisal

Masters in Finance

2017-2018

Fall Semester

Clara C Raposo

Problem Set 6: Cost of Capital & Capital Structure I
To check at home

1. **Estimate the Equity Cost of Capital (r_E)**

   Suppose that MCDONALD'S stock has a beta of 0.35. If the riskless interest rate is 4% and the expected return of the market portfolio is 9%, what is MCDONALD'S's cost of equity?

   According to the CAPM:

   $4\% + 0.35 \times (9\%-4\%) = 5.75\%$

2. **Estimate the Cost of Debt (r_D)**

   In mid-2009, Company XYZ had 5-year bonds outstanding in the market, with BBB rating and yield to maturity of 4.25%. If the annual probability of these bonds defaulting is 1.5%, and the expected loss in case of default is 40%, what is your estimate of the expected return for these bondholders?

   Considering ytm y=4.25%, probability of default p=0.015 and expected loss L=40%:

   $y-p \times L = 4.25\% - 1.5\%(.40) = 3.65\%$

3. **Estimate the Cost of Debt (r_D)**

   In mid-2009, Company ZZZ had issued 5-year bonds, with rating CCC and yield to maturity of 17.5%. In the same period, US Treasury bonds with the same maturity had a yield of 3%. Suppose that the risk premium of the market

portfolio is 5%, and that you are convinced that ZZZ's bonds have a beta of 0.3. If the expected loss in these bonds in case of default is 60%, what is the annual default probability consistent with the presented yield to maturity?

According to the CAPM:

Rd = 3% + .3(5%) = 4.5%

According to the adjusted yield, we would reach an implied probability of default:
4.5% = y – pL = 17.5% – p(.60)
p = (17.5% – 4.5%)/.60 = 21.666%

4. **Modigliani-Miller Proposition I and Homemade Leverage**

Suppose MM's scenario of the 1958 article. Company ABC has no debt, and company XYZ has debt of 4000, for which it pays interest of 10% per year. Both companies have identical projects that generate annual free cash flows (FCFF) of 600 or of 1000. Both companies pay out all their net income as dividends.

a) Fill the table showing how much shareholders and bondholders would receive in each scenario.

		ABC		XYZ
FCF	Debt Payments	Equity Dividends	Debt Payments	Equity Dividends
$600	0	600	400	200
$1,000	0	1000	400	600

b) Suppose you hold 10% of ABC's shares. What alternative portfolio could you hold in order to obtain the exact same cash flows?

Unlevered Equity = Debt + Levered Equity.
Buy 10% of XYZ's debt and 10% of XYZ's equity. Receive cash flows from each item:
(40,40) + (20,60) = (60,100).

c) Suppose now that you hold 10% of XYZ's shares. If you could get a loan at an annual rate of 10%, what alternative investment would deliver the same cash flows?

Levered Equity = Unlevered Equity + Borrowing.

Borrow $400, buy 10% of ABC's shares, receiving (60,100) –(40, 40) = (20, 60)

5. **Modigliani-Miller Proposition II**

HHH Enterprises is currently an unlevered firm, with an expected return of 10%. It considers a recapitalization through which the firm would get a loan to repurchase its own stock.

a) Suppose HHH borrows so that its debt-equity ratio is 0.75. With this level of debt, the cost of debt would be 7%. What is the expected return for shareholders after this transaction?

$r_e = r_u + d/e(r_u - r_d) = 10\% + 0.75(10\% - 7\%) = 12.25\%$

b) If however the debt-equity ratio reaches 1.50, debt will involve more risk and creditors will demand an annual return of 8%. What is the expected return to shareholders, in this case?

$r_e = 10\% + 1.50(10\% - 8\%) = 13\%$

6. **Modigliani-Miller Proposition II**

Suppose that Microsoft has no debt and that its equity cost of capital is 9.5%. The average debt-to-value ratio in the software industry is 14%. What would Microsoft's equity cost of capital be if it chose a level of debt similar to the industry average, with a cost of debt of 6%?

$$r_E = r_U + \frac{D}{E}(r_U - r_D)$$
$$r_E = 0.095 + \frac{0.14}{0.86}(0.095 - 0.06)$$
$$= 0.1007$$
$$= 10.07\%.$$

7. **Modigliani-Miller Propositions I and II**

MMM Corp. is a company with 10 million shares outstanding and debt with a market value of $100 million. The current stock price is $70. MMM's equity cost of capital is 8%. The company has just announced that it will issue $300 million new debt. This amount will be used to retire current debt, and the remaining $200 million will be spent in an immediate dividend. Assume perfect capital markets.

a) Estimate the price of a share immediately after the announcement, but before the transaction is completed.

MM => no change, $70

b) What share price do you expect at the end of the transaction?

Initial Enterprise Value = 70 × 10 + 100 = 800 million

New Debt = 300 million

E = 800 – 300 = 500

Share Price = 500/10 = $50

c) Suppose that the current debt is risky, with an expected return of 4.5%, but that the new debt is riskier and involves an expected return of 5.25%. Estimate the equity cost of capital of MMM after the transaction.

Ru = (700/800) × 8% + (100/800) × 4.5% = 7.5625%
Re = 7.5625% + 300/500(7.5625% – 5.25%) = 8.95%