ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Principles of Finance

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Assignment 7

Instructions

- Assignments should be done in groups of 2 to 3 students.
- You should remain with the same group through the entire course.
- Submit on Moodle only one copy of solutions per group.
- For each assignment you can get a maximum of 100 points.
- All assignments turned in late will not be graded (zero points).

Due date
The due date is indicated on Moodle.

A) Capital structure in a perfect market

1. Acort Industries owns assets that will have an 80% probability of having a market value of \$50 million in one year. There is a 20% chance that the assets will be worth only \$20 million. The current risk-free rate is 5%, and Acort's assets have a cost of capital of 10%. (12 points)

   (a) If Acort is unlevered, what is the current market value of its equity?

   (b) Suppose that Acort also has debt with a face value of \$20 million due in one year. According to MM, what is the value of Acort's equity in this case?

   (c) What is the expected return of Acort's equity without leverage? What is the expected return of Acort's equity with leverage?

   (d) What is lowest possible *realized* return of Acort's equity with and without leverage?

2. Assume that Rose Corporation's (RC) EBIT is not expected to grow in the future and that all earnings are paid out as dividends. RC is currently an all-equity firm. It expects to generate EBIT of $5 million over the next year. Currently RC has 10 million shares outstanding and its stock is trading for a price of $5 per share. RC is considering borrowing $3 million at a rate of 5% and using the proceeds to repurchase shares at the current price of $5. (12 points)

   (a) What is RC's EPS prior to any borrowing?

   (b) What is RC's equity cost of capital prior to any borrowing?

   (c) What is the number of outstanding shares following the borrowing of $3 million and the subsequent share repurchase?

   (d) What is RC's EPS following the borrowing of $3 million and the subsequent share repurchase? What is RC's share price following the borrowing of $3 million and the subsequent share repurchase?

3. Indell stock has a current market value of $120 million and a beta of 1.50. Indell currently has risk-free debt as well. The firm decides to change its capital structure by issuing $30 million in additional risk-free debt, and then using this $30 million plus another $10 million in cash to repurchase stock. With perfect capital markets, what will be the beta of Indell stock after this transaction? (6 points)

B) Capital structure with frictions

4. Big Blue Banana (BBB) is a clothing retailer with a current share price of $20 and with 30 million shares outstanding. Suppose BBB announces a plan to lower its corporate taxes by borrowing $81 million and using the proceeds to repurchase shares. (12 points)

   (a) What is the share price of BBB after this announcement, assuming perfect capital markets?

   (b) Suppose BBB pays corporate taxes of 35% and that shareholders expect the change in debt to be permanent. Assuming that capital markets are perfect except for the existence of corporate taxes, what is the share price of BBB after this announcement?

   (c) Suppose BBB pays corporate taxes of 35% and that shareholders expect the change in debt to be permanent. Assume that capital markets are perfect except for the existence of corporate taxes and financial distress costs. What is the present value of BBB's financial distress costs if the price of BBB rises to $20.5 per share following the announcements?

5. Blue Ltd. is going to pay an unlevered free cash flow of $300 every year forever, starting at the end of this year. Suppose the company borrows today risk-free debt worth $2,000 and keeps it permanently (the firm is targeting the level of debt instead of the leverage ratio). The risk-free rate is 4%. The expected market return is 11%. The firm is in the 35% tax bracket. Consider also the following information about Blue Ltd. comparable firms. (20 points)

   a) Determine the unlevered cost of capital of Blue Ltd.

	Red Ltd.	Black Ltd.	Yellow Ltd.
β_E	1.2	1.4	1.1
β_D	0	0	0
$\frac{D}{D+E}$	0.3	0.5	0.6
Market cap.	250	400	350

b) Compute the firm value and the equity value by means of the APV approach.

c) Show that using the weighted average cost of capital, r_{WACC}, you reach the same firm value as with the APV approach, assuming that the firm leverage is the one implied by the value of equity computed in question b). *Hint: The unlevered cost of capital with a fixed debt schedule is*

$$r_A = \frac{E}{E + D_s} r_E + \frac{D_s}{E + D_s} r_D,$$

where $D_s \equiv D(1 - \tau_C)$ is the value of debt net of the present value of tax shields.

6. XYZ Inc. has a debt to equity ratio of 0.5, \$20,000 of debt with an interest rate of 5%, 10,000 shares outstanding, a 10% expected return on assets, and a 30% tax rate. Assuming a constant amount of debt: (26 points)

   (a) Compute the value of the firm and its share price.

   (b) Compute the expected return of equity.

   (c) Compute the weighted average cost of capital of the company.

   (d) What are the expected amounts distributed annually to shareholders and debt holders?

   (e) What are the expected earnings before taxes? What are the expected earnings before interests and taxes?

   Assume now that the company decides to increase its debt by \$10,000 to repurchase stocks. Assume that the interest rate on debt remains unchanged:

   (f) Compute the total value of the firm when the repurchase plan is announced. What is the value of equity and debt?

   (g) What is the share price upon this announcement? How many shares can the company buy-back with the proceeds of the debt issuance?

   (h) Compute the net earnings of the company after the share-repurchase.

   (i) Compute the debt to equity ratio and the weighted average cost of capital after the share-repurchase. Compare the $\frac{D}{E}$ and WACC after and before the share repurchase. Did the company make the right decision to modify its capital structure?

7. A levered company has a total value of 160. Its debt-to-equity ratio is $\frac{1}{3}$, and is assumed to maintain a constant dollar amount of debt in the future. The company faces bankruptcy costs in the form of $K(D) = \frac{D}{10} + \frac{D^2}{500}$, and has a tax rate of 30%. (12 points)

(a) Compute the value of equity and debt.

(b) What would have been the value of this company if it was not levered?

(c) What is the optimal capital structure of the company?

(d) What will be the total firm value if the company decides to restructure to its optimal capital structure? What will be its debt to equity ratio?