Question Book for Lecture Note 9

Capital Structure Decision

Self-Test Problems

(ST–1) Optimal Capital Structure

The Rogers Company is currently in this situation: (1) EBIT = $4.7 million; (2) tax rate, T = 40%; (3) value of debt, D = $2 million; (4) r_d = 10%; (5) r_s = 15%; (6) shares of stock outstanding, n = 600,000; and stock price, P = $30. The firm's market is stable and it expects no growth, so all earnings are paid out as dividends. The debt consists of perpetual bonds.

a. What is the total market value of the firm's stock, S, and the firm's total market value, V?
b. What is the firm's weighted average cost of capital?
c. Suppose the firm can increase its debt so that its capital structure has 50% debt, based on market values (it will issue debt and buy back stock). At this level of debt, its cost of equity rises to 18.5% and its interest rate on all debt will rise to 12% (it will have to call and refund the old debt). What is the WACC under this capital structure? What is the total value? How much debt will it issue, and what is the stock price after the repurchase? How many shares will remain outstanding after the repurchase?

(ST–2) Hamada Equation

Lighter Industrial Corporation (LIC) is considering a large-scale recapitalization. Currently, LIC is financed with 25% debt and 75% equity. LIC is considering increasing its level of debt until it is financed with 60% debt and 40% equity. The beta on its common stock at the current level of debt is 1.5, the risk-free rate is 6%, the market risk premium is 4%, and LIC faces a 40% federal-plus-state tax rate.

a. What is LIC's current cost of equity?
b. What is LIC's unlevered beta?
c. What will be the new beta and new cost of equity if LIC recapitalizes?

Problems

EASY PROBLEMS 1–6

(15–1) Break-even Quantity

Shapland Inc. has fixed operating costs of $500,000 and variable costs of $50 per unit. If it sells the product for $75 per unit, what is the break-even quantity?

(15–2) Unlevered Beta

Counts Accounting has a beta of 1.15. The tax rate is 40%, and Counts is financed with 20% debt. What is Counts's unlevered beta?

(15–3) Premium for Financial Risk

Ethier Enterprise has an unlevered beta of 1.0. Ethier is financed with 50% debt and has a levered beta of 1.6. If the risk-free rate is 5.5% and the market risk premium is 6%, how much is the additional premium that Ethier's shareholders require to be compensated for financial risk?

(15–4) Value of Equity after Recapitalization

Nichols Corporation's value of operations is equal to $500 million after a recapitalization (the firm had no debt before the recap). It raised $200 million in new debt and used this to buy back stock. Nichols had no short-term investments before or after the recap. After the recap, w_d = 40%. What is S (the value of equity after the recap)?

(15–5) Stock Price after Recapitalization

Lee Manufacturing's value of operations is equal to $900 million after a recapitalization (the firm had no debt before the recap). Lee raised $300 million in new debt and used this to buy back stock. Lee had no short-term investments before or after the recap. After the recap, w_d = 1/3. The firm had 30 million shares before the recap. What is P (the stock price after the recap)?

(15–6) Shares Remaining after Recapitalization

Dye Trucking raised $150 million in new debt and used this to buy back stock. After the recap, Dye's stock price is $7.50. If Dye had 60 million shares of stock before the recap, how many shares does it have after the recap?

INTERMEDIATE PROBLEMS 7–8

(15–7) Break-even Point

Schweser Satellites Inc. produces satellite earth stations that sell for $100,000 each. The firm's fixed costs, F, are $2 million, 50 earth stations are produced and sold each year, profits total $500,000, and the firm's assets (all equity financed) are $5 million. The firm estimates that it can change its production process, adding $4 million to investment and $500,000 to fixed operating costs. This change will (1) reduce variable costs per unit by $10,000 and (2) increase output by 20 units, but (3) the sales price on all units will have to be lowered to $95,000 to permit sales of the additional output. The firm has tax loss carryforwards that render its tax rate zero, its cost of equity is 16%, and it uses no debt.

a. What is the incremental profit? To get a rough idea of the project's profitability, what is the project's expected rate of return for the next year (defined as the incremental profit divided by the investment)? Should the firm make the investment?
b. Would the firm's break-even point increase or decrease if it made the change?
c. Would the new situation expose the firm to more or less business risk than the old one?

(15–8) Capital Structure Analysis

The Rivoli Company has no debt outstanding, and its financial position is given by the following data:

Assets (book = market)	$3,000,000
EBIT	$500,000
Cost of equity, r_s	10%
Stock price, P_0	$15
Shares outstanding, n_0	200,000
Tax rate, T (federal-plus-state)	40%

The firm is considering selling bonds and simultaneously repurchasing some of its stock. If it moves to a capital structure with 30% debt based on market values, its cost of equity, r_s, will increase to 11% to reflect the increased risk. Bonds can be sold at a cost, r_d, of 7%. Rivoli is a no-growth firm. Hence, all its earnings are paid out as dividends. Earnings are expected to be constant over time.

a. What effect would this use of leverage have on the value of the firm?
b. What would be the price of Rivoli's stock?
c. What happens to the firm's earnings per share after the recapitalization?
d. The $500,000 EBIT given previously is actually the expected value from the following probability distribution:

Probability	EBIT
0.10	($ 100,000)
0.20	200,000
0.40	500,000
0.20	800,000
0.10	1,100,000

Determine the times-interest-earned ratio for each probability. What is the probability of not covering the interest payment at the 30% debt level?

Challenging Problems 9–11

(15–9) Capital Structure Analysis

Pettit Printing Company has a total market value of $100 million, consisting of 1 million shares selling for $50 per share and $50 million of 10% perpetual bonds now selling at par. The company's EBIT is $13.24 million, and its tax rate is 15%. Pettit can change its capital structure either by increasing its debt to 70% (based on market values) or decreasing it to 30%. If it decides to *increase* its use of leverage, it must call its old bonds and issue new ones with a 12% coupon. If it decides to *decrease* its leverage, it will call its old bonds and replace them with new 8% coupon bonds. The company will sell or repurchase stock at the new equilibrium price to complete the capital structure change.

The firm pays out all earnings as dividends; hence its stock is a zero-growth stock. Its current cost of equity, r_s, is 14%. If it increases leverage, r_s will be 16%. If it decreases leverage, r_s will be 13%. What is the firm's WACC and total corporate value under each capital structure?

(15–10) Optimal Capital Structure with Hamada

Beckman Engineering and Associates (BEA) is considering a change in its capital structure. BEA currently has $20 million in debt carrying a rate of 8%, and its stock price is $40 per share with 2 million shares outstanding. BEA is a zero-growth firm and pays out all of its earnings as dividends. The firm's EBIT is $14.933 million, and it faces a 40% federal-plus-state tax rate. The market risk premium is 4%, and the risk-free rate is 6%. BEA is considering increasing its debt level to a capital structure

with 40% debt, based on market values, and repurchasing shares with the extra money that it borrows. BEA will have to retire the old debt in order to issue new debt, and the rate on the new debt will be 9%. BEA has a beta of 1.0.

a. What is BEA's unlevered beta? Use market value D/S when unlevering.
b. What are BEA's new beta and cost of equity if it has 40% debt?
c. What are BEA's WACC and total value of the firm with 40% debt?

(15–11)
WACC and Optimal Capital Structure

Elliott Athletics is trying to determine its optimal capital structure, which now consists of only debt and common equity. The firm does not currently use preferred stock in its capital structure, and it does not plan to do so in the future. To estimate how much its debt would cost at different debt levels, the company's treasury staff has consulted with investment bankers and, on the basis of those discussions, has created the following table:

Market Debt-to-Value Ratio (w_d)	Market Equity-to-Value Ratio (w_s)	Market Debt-to-Equity Ratio (D/S)	Bond Rating	Before-Tax Cost of Debt (r_d)
0.0	1.0	0.00	A	7.0%
0.2	0.8	0.25	BBB	8.0
0.4	0.6	0.67	BB	10.0
0.6	0.4	1.50	C	12.0
0.8	0.2	4.00	D	15.0

Elliott uses the CAPM to estimate its cost of common equity, r_s. The company estimates that the risk-free rate is 5%; the market risk premium is 6%, and the company's tax rate is 40%. Elliott estimates that if it had no debt, its "unlevered" beta, b_U, would be 1.2. Based on this information, what is the firm's optimal capital structure, and what would be the weighted average cost of capital at the optimal capital structure?