UNIVERSITY OF TORONTO

Fundamentals of Accounting and Finance (JRE 300)
Practical: Finance Lecture 5

1. **Business Cycles, Systematic Risk, and Cost of Equity**

Your firm operates in a procyclical industry — when the economy booms, your sales and earnings rise sharply, but in recessions they fall. The market returns 8% and the risk-free rate is 2%.

You are comparing two capital structures:

- Capital Structure A is 100% equity-financed. Its beta is 1.5.
- Capital Structure B has 50% debt and 50% equity, with interest payments fixed at $20 million per year (corresponding cost of debt is 3%).

Suppose a recession starts, and EBIT falls from $60 million to $30 million.

(a) Under which capital structure does the firm see a larger percentage drop in dividends? Calculate the percent drop in dividends as the economy enters a recession for each capital structure. Explain why this happens.

(b) Explain how this relates to equity beta. Why does adding debt increase the risk of equity?

(c) Use the Miller-Modigliani result to calculate the cost of equity for the firm under Capital Structure B.
Hint: what was the original cost of equity under Capital Structure A?

(d) What is the beta of the equity of the firm under Capital Structure B? Is this in line with your answer to part (b)?

(e) How would the firm's ability to finance future investments using retained earnings differ between Capital Structure A and Capital Structure B across the business cycle (meaning as the economy fluctuates between good times and recessions)?

2. **Project Financing and NPV**

A company is evaluating the construction of a new battery plant. The project requires an upfront investment of $300 million and will produce perpetual annual EBIT of $40 million. The corporate tax rate is 30% and the unlevered cost of capital is 10%.

(a) Calculate the NPV of the project under an all-equity financed structure.

The company instead considers financing the project through a capital structure that is equal parts debt and equity. The interest rate on the debt is 5% and the total debt outstanding would be $150 million.

(b) Calculate the new cost of equity under this capital structure.

(c) Compute the WACC under the new capital structure.

(d) Recalculate the NPV of the project under this financing plan using the WACC you calculated in part (c).

(e) Is there a real effect of choosing different financing streams? In finance, we use the term *real* to mean production-based outcomes. Hint: compare your answers to (a) and (d) and the implications for if the battery plant should be built.

3. Capital Structure and Equity Beta

An unlevered firm has a beta of 0.9. The expected return on the market is 10% and the risk-free rate is 3%. There are no corporate taxes. The firm is considering levering up to a capital structure of 65% equity and 35% debt. The interest expense on debt is 4%.

(a) Calculate the firm's cost of equity when it is unlevered.

(b) Calculate the firm's new cost of equity under the levered capital structure.

(c) Why has the cost of equity increased? Explain this in terms of accounting fundamentals: what does the debt obligation mean about the likelihood of cash flows to equity holders? Focus especially on *economic downturns*.

(d) Based on your answer to (c), what do you expect to happen to the beta of the firm's equity after the firm levers up its capital structure? Explain in terms of *systematic risk*.

(e) Use the CAPM to calculate the new beta of the firm's equity after it has levered up. Does this align with your expected answer from (d)?

(f) What does the equity beta from your answer in (e) imply about the beta of the firm's debt? Hint: remember that the beta of an overall firm doesn't change as financing changes. Does the firm's debt beta make sense? Explain in terms of *systematic risk* and *financial distress*.

4. **Capital Structure and Equity Risk**

A company is 100% equity-financed and its stock has a historical beta of 3.

(a) The president of the country in which the company is headquartered threatens to cause a recession, and the stock market is down 5% as a result. What is the expected change in the return of this company?

(b) What happens to the equity beta if the company decides to lever up to a capital structure of 75% equity, 25% debt? What would the expected change be in the return of the company after the President's announcement?

(c) What happens to the equity beta if the company decides to lever up to a capital structure of 25% equity, 75% debt? What would the expected change be in the return of the company after the President's announcement?

(d) If you were a shareholder in the company, which capital structure do you prefer of (a)-(c)? Hint: don't just look at the downside risk analyzed in (a)-(c).

5. Capital Budgeting and CAPM

Recall the Capital Asset Pricing Model (CAPM):

$$\mathbb{E}[r_i] = r_f + \beta_i \mathbb{E}[r_m - r_f]$$

A company that is 75% equity financed and 25% debt financed. The corporate tax rate is 37.5%. The company's stocks have a β of 1.5, the risk-free rate is 4%, and the expected market risk premium is 6%. The yield on the company's corporate debt is 8%.

Recall that

$$\text{WACC} = \%\text{ equity} \times \text{cost of equity} + \%\text{ debt} \times \text{after-tax cost of debt}$$

(a) Calculate the company's cost of equity.

(b) Calculate the company's (after-tax) cost of debt.

(c) Calculate the company's weighted-average cost of capital (WACC).

The managers of the company are considering investing in a project that would cost \$5.25 million dollars up front, and then would pay back the following cash flows in the following years:

Year	Cash Flow
1	\$1,250,000
2	\$2,500,000
3	\$2,750,000

(d) If the project will be equity-financed, should the managers do the project?

(e) If the project will be debt-financed, should the managers do the project?

(f) If the project will be financed with the same debt-equity ratio as the firm, should the managers do the project?

(g) Explain why the results of how the project should be financed make sense, noting that the IRR of the project is 10.18%. Mention the terms *opportunity cost*, *equity-holders*, and *debt-holders*.

