

FIN325 - Homework 5

Due : Tuesday April 6th by upload to Canvas, pdf only

Problem 1 (35pts)

An untaxed corporation is thinking of building a plant at a cost of \$1M and operating it for 3 years. 80% of the facility is depreciable in straight line over 39 years. No other investment will be necessary. The plant produces widgets. Each year the market can absorb any quantity of widgets at a unit price of \$10. The plant can produce 10,000 widgets per year. The inventory requirement is 10% of sales and there is no hoarding. The variable cost of production is \$3 per unit. There is no other cost. The plant will sell for \$1M in 3 years while the inventory will sell for market value. WACC is 10%. What is the project's NPV?

Problem 2 (35pts)

Consider a project whose EBIT, each period and for ever, is either \$50M or \$100M. There is a 20% chance that EBIT is \$50M each period. The project is financed in part by an interest-only perpetuity with face value D with an interest rate of 7%. The rest of the financing is equity. Investment is \$20M each period, as is depreciation. The company pays $\tau = 30\%$ in income taxes. Equity holders require a 10% return when $D = 0$.

1. What is the value of the corporation when $D = 0$? (In other words, what is V^U ?)
2. What is the highest possible face value (D_{max}) of the perpetuity such that the perpetuity is risk free?
3. For face values D ranging from 0 to D_{max} plot on one chart the expected return on equity and WACC.
4. Produce the same graph for the case where $\tau = 0$. What is the main qualitative difference between this chart and the chart you plotted in the previous step?
5. Assume now that τ is back to 30% and that the corporation has the option to go bankrupt. Expected costs associated with bankruptcy are $0.0005(D)^2$. This includes any and all loss in debt tax shield. Plot the corporation's value against $\frac{D}{E}$.
6. What is the corporation's optimal capital structure (approximately)?

Problem 3 (30pts)

Estimate the WACC of a publicly traded company of your choice. We will be lenient here since this is difficult to do in practice and tough assumptions have to be made but, for full credit, do make an effort to explain clearly how you approximated each element of WACC.

A few pointers (how I would do it):

- For the cost of debt, use data on the current yield of corporate bonds with similar rating as your company. Don't worry about the "second decimal" of the rating. So, for instance, think of A3 (or A-) as an A rating and look up what A-rated bonds are yielding. You can use FRED's ICE BofA index effective yield data. (Pick a corporation with a semi-recent rating for this to make sense.)
- For the cost of equity,
 1. Estimate your company's beta
 2. Use historical data on r_F and $(r_M - r_F)$ from the Fama-French data base to forecast what these values are going to be over the next few years. You can use simple averages or a regression approach.
- Use current values as a proxy for the target capital structure. (I.e. assume that today's capital structure is the target capital structure. If you can improve on that naive approach, go ahead of course, we will study ways to do this in chapter 4.)
- For the effective tax rate use the ratio of income taxes to EBIT over the past year (ttm, that is)
- If the company has preferred stocks outstanding, make sure to include them in your calculation of WACC and use their stated return as their expected return.