

## FIN325 - Homework 5

Due : Thursday, December 2nd by upload to Canvas, pdf only

### Problem 1 (20pts)

Consider a corporation whose expected EBIT is \$10M each year and for ever. Depreciation equals investment. The tax rate on EBIT is 30%. The corporation has only one piece of debt, a fully amortizing 30-year bond with fixed yearly payments and an interest rate of 10%. After the bond expires, the corporation plans to remain debt-free. Investors would require a 15% return from an unlevered investment in this corporation. The market value of the corporation is \$51M. What is the face value of the debt? Use an APV approach given the fact that the capital structure is not stable.

### Problem 2 (20pts)

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  $\tau$  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 (20pts)

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.)
- Measure  $D$  at book value, measure  $E$  at market value (use market capitalization). This may give you a very different debt-equity ratio from Yahoo finance since they use the book value of  $E$ .
- 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.

**Problem 4 (20pts)**

A corporation has the option to prepay (call) a bond with 4 years to maturity, \$50M in remaining principal, a 10% yearly rate, fixed and YEARLY payments. It can replace this bond with a 4 year bond with the same remaining payment structure. Prepayment penalties are \$750,000. The corporation faces a tax rate of 30% on its EBIT. How low must the yearly rate on the new bond be to justify calling the old bond (ignoring the option value of waiting to refi but taking into account the loss in interest tax shield)?

**Problem 5 (20pts)**

A corporation has the following portfolio of debt liabilities on its books. All are fixed rate coupon bonds with yearly payments. What is the current market value of the corporation's total debt? What are the corporation's WACR, WAMR and WARM?

Maturity (years)	Face (M)	Rate (contract)	Rate (market)
1	100	1.90%	2.50%
2	100	2.25%	2.60%
3	0	NA	2.65%
4	230	2.50%	2.70%
5	120	4.25%	3.25%