

## Final exam practice questions

1. Consider a corporation whose EBIT, each period and for ever, is either \$50M or \$100M, with equal probability. The corporation is financed in part by an interest-only perpetuity with face value  $D$  and 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  $D = 0$ .
  - (a) What is the highest value  $D_{max}$  such that debt is risk-free?
  - (b) At the current capital structure, the present value of the debt-tax shield represents 10% of the value of the corporation. What is the current capital structure?
  - (c) The probability that this corporation will go bankrupt becomes positive. The present value of costs associated with the risk of bankruptcy is well approximated by  $0.0006 (D)^2$ . What is the optimal debt-to-equity ratio of the corporation (approximately)?
2. An untaxed corporation is going to generate cash-flows for one final period. In this final period, given its current assets, absent any new investment, it will generate either \$80M or \$100M, each with equal probability. Existing debt holders are owed \$90M. The corporation can add a new project at a cost of \$10M. The project would generate net cash-flows  $X$  in the final period with probability one. Investors into this new project require an expected return of 5%. Existing debt-holders have priority over any remaining share-holders next period. How high must be  $X$  to justify investing into the new project?
3. The following table shows recent quarterly data for overall debt and the market value of equity for corporation X.

Quarter	$D$	$E$
1	10.1	6.0
2	11.9	7.0
3	14.1	8.0
4	14.9	8.3
5	15.0	8.7
6	14.0	8.6

Corporation X has a target capital structure  $\left(\frac{D}{V}\right)^*$  where  $V = D + E$ . Use a regression approach to jointly estimate  $\left(\frac{D}{V}\right)^*$  and the quarterly speed of adjustment towards  $\left(\frac{D}{V}\right)^*$ .

4. 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 a only one piece of debt, a fully amortizing 30-year bond with fixed yearly payments, a face value of \$10M, 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. Use an APV approach to calculate the market value of the corporation.
5. Consider a corporation that can sell as many widgets as it wants each year and for ever for \$10 per unit. The variable cost of producing each widget is \$7 per unit. The corporation can produce 10,000 unit per year, and there is a 10% inventory requirement. The corporation starts with zero inventory. COGS is computed on a first-in-first-out basis. There are not other production costs or investment required, and there is no depreciation. The corporation is taxed at a rate of 35% on its EBIT. WACC is 8%, and is the appropriate discount rate. What is the market value of the corporation? (You can assume that cash flows have fully converged and are constant from year 20 on.)
6. A corporation has a bond on its books with \$100M in remaining principal, 8 years to maturity, fixed yearly payments, and an interest rate of 11%. It has the option to replace the bond at a cost of \$1M with a new bond with the same terms but a lower rate. The corporation is taxed at 30%. The new rate is the right discount rate both for gross savings and for tax implications. Below what new rate is the option to refinance in the money?
7. Consider a corporation whose expected EBIT each year and for ever is \$100M. Depreciation equals investment each year. The corporation has a 40 year, fully amortizing bond on its books with a rate of 10% and a face value of \$200M. Payments rise each year by 1%. Investors would require a return of 15% from an unlevered investment in this corporation. The corporation faces a tax rate of 30% on its EBIT. Using the APV principle, calculate the market value of this corporation.
8. A corporation has the following portfolio of debt liabilities on its books. All are fixed rate coupon bonds with yearly payments.

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%

What are the weighted average remaining maturity, the weighted average contract rate, and the weighted average market rate of this corporation's debt portfolio?

- Consider an investment project whose continuation value at date 1 is either \$100M or \$80M. The projects can be scrapped (instead of operated) at date 1 for a salvage value of \$85M. Without the salvage option the project has market value \$90M. The risk-free rate is 0%. What is the value of the option to scrap?
- Consider the following closing price data for corporation X. There was no stock split during this period.

Date	Closing price	Adjusted closing price
12/10	110	110
12/9	109	104
12/ 8	108	?

When did the stock go ex-dividend ? What is the value of the dividend? What's the missing value?

- Take the Myers and Majluf numerical example we discussed in chapter 5. Below what cost of the new project does the invest-no-matter-what-news-incumbents-receive equilibrium become sustainable?