Solutions

Exam 2 Practice Problems – SHOW work, do not submit (so you can use it to study)
Solutions are posted, please check your work

Q0:

Which of the following resources can you use during the exam? Choose all that apply

a) Calculator
b) Phone
c) Excel
d) One page of notes
e) Two pages of notes (double-sided sheet)
f) Financial calculator
g) Book
h) Internet
i) Your friend

Q1: Give an example for:

- Sunk Cost - anything already paid & can't be recovered E.g. SAT prep cost
- Opportunity Cost - e.g. living in a house instead of renting it out
- Erosion - e.g. Starbucks opening a new location & attracting old customers from old location
- Are financing costs included in NPV calculation? - No. wacc
- Incremental cash flows

↳ CFs that arise because of the project, if the project is taken.

65% debt

Q2: A company has 35% equity. Its cost of debt is 2.6% and its cost of equity is 5.3%. The tax rate is 21%.
A) What is the firm's wacc?

$$wacc = w_D c_D (1-t) + c_E w_E$$

$$= 0.65 \cdot 0.026 (1-0.21) + 0.35 \cdot 0.053 = 3.19\%$$

B) What advantages and disadvantages of debt are there?

(+) Tax savings, often cheaper

(-) Bankruptcy | financial distress costs

C) when a private firm want to raise money by issuing equity to the public for the first time, what is that process called?

IPO

D) When the cost of debt increases, what happens to the wacc? Does that matter for investment decisions?

$c_D \uparrow$

wacc $\uparrow$

NPV $\downarrow$ $\Rightarrow$ fewer investments

E) When the tax rate increases, what happens to the wacc? Does that matter for investment decisions?

tax $\uparrow$

wacc $\downarrow$

NPV $\uparrow$ $\rightarrow$ more investments

Q3: A $1,000 bond pays semi-annual coupons for 10 years. Its quoted coupon rate is 4% (quoted as APR), and its YTM is 2.5% (quoted as APR).

a) What is the bond's price?

$$20 \cdot \left[\frac{1 - \frac{1}{1.0125^{20}}}{0.0125} \right] + \frac{1,000}{1.0125^{20}} = \$1,131.99$$

b) What is this bond called? (Discount/ Premium/ Par?)

Premium, b/c coupon rate > YTM

c) What would the YTM be for a par bond?

2% semi-annual, 4% APR

d) What would a YTM be for a discount bond?

$\angle$ 2.5% APR

e) You expect prices to decrease. This implies you expect YTMs to ....

increase

f) One year has passed and the YTM is now 3% (quoted as APR). what is the new price?

$$20 \cdot \left[\frac{1 - \frac{1}{1.015^{18}}}{0.015} \right] + \frac{1,000}{1.015^{18}} = \$1,078.36$$

t	0	1	2	3	∞
D	2	2.80	3.64	4.37	$g = 1\%$

$$2 \xrightarrow{1.4} 2.80 \xrightarrow{1.3} 3.64 \xrightarrow{1.2} 4.37$$

Q4: A stock just paid a $2 dividend. Dividends are paid annually and the next one is paid at t =1. You expect the $2 dividend to increase by 40% this year until t=1, then by 30% over the next year until t=2, and by 20% in the year after until t=3. After that, you expect dividends to constantly increase by 1% forever. If the discount rate is 8.2%, what is the price?

$$PV = \frac{2.8}{1.082} + \frac{3.64}{1.082^2} + \frac{\frac{4.37}{0.082-0.01}}{1.082^2} = \$\underline{57.54}$$

Q5: A company would like to build a new factory. It expects an initial cost of $2 million at t=0, and revenues of $1.2 million in year 1. The CFO forecasts that these revenues will grow consistently at a rate of 3% every year for 4 years. After that, the factory needs to be decommissioned. The discount rate is 4.1%.

How did the company come up with these cash flows? e.g. Market analysis

What tools can the company use to check what happens if their cash flows and discount rates are not correct? Sensitivity analysis, NPV profile

What is the NPV?

t	0	1	2	3	4	5
CF	-2	1.2	1.24	1.27	1.31	1.35

$$\frac{1.2}{1.041} + \frac{1.2 \cdot 1.03}{1.041^2} + \frac{1.2 \cdot 1.03^2}{1.041^3} + \frac{1.2 \cdot 1.03^3}{1.041^4} + \frac{1.2 \cdot 1.03^4}{1.041^5} - 2 =$$

or

$$1.2 \cdot \left[\frac{1-\left[\frac{1.03}{1.041}\right]^5}{0.041-0.03}\right] - 2$$

$$= 5.64 - 2 = 3.64$$

What is the PI?

$$\frac{5.64}{2} = 2.82$$

What is the payback period?

t	CF	ΣCF
0	-2	-2
1	1.2	-0.8
2	1.24	0.44

$$1\text{ year} + \frac{0.8}{1.24} = 1.65\text{ years}$$

What is the discounted payback period?

t	CF	DCF	ΣDCF
0	-2	-2	-2
1	1.2	1.15	-0.85
2	1.24	1.14	0.29
3	1.27		

1 to 2 years

Assuming a max. payback period of 3 years, under which rules would the firm take the project?

All of them

$PV(\text{Revenue}) - PV(\text{cost}) = 0$

$$\frac{2.9}{(1+r)^4} - 1.3 = 0$$

Q6: Winter Real Estate buys and sells plots of land. The firm found a plot that costs $1.3 million right now, and estimates that the plot can be sold in 4 years for $2.9 million.

What is the IRR of this project? $1.3 = \frac{2.9}{(1+r)^4}$

If the internally set rate of return is 7.8%, should the firm take the project? Yes

$$1.3(1+r)^4 = 2.9$$

$$(1+r)^4 = 2.23 \Rightarrow 1+r = \sqrt[4]{2.23}$$

$$r = 22.2\%$$

Q7: You can choose between to bank accounts. One offers a return of 1.5%, compounded daily. The other one offers 1.6%, compounded quarterly. Comparing EARs, which bank account do you choose?

$$EAR_1 = \left[1 + \frac{0.015}{365}\right]^{365} - 1 = 1.511\%$$

$$EAR_2 = \left[1 + \frac{0.016}{4}\right]^{4} - 1 = 1.61\% \rightarrow \text{2nd}$$

Other concepts – does not need to be completed in class.

- Differences between stocks and bonds?
    - Bonds must be paid back (debt), stocks do not(equity)
    - Bonds do not give ownership usually, stocks do
    - Stocks have voting rights, dividends (if paid); can buy and sell
    - Bonds can be bought and sold; get coupon payments
- Name & explain 3 forms of efficient market hypothesis
- Know highlighted IPO slides:
    - What is the term used when firms cannot raise money?
    - Downsides of IPO
    - Tradeoff of debt: Bankruptcy vs. tax savings
    - Arbitrage
- Know stock market concepts:
    - Reading Yahoo Finance info: Ticker, firm, market cap, current price, etc.
    - Stock market vs. economy
    - Stock exchanges vs. indexes
    - Trading too much