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MB.
(84)

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1. *(10 points)* You are considering to invest on Project A and/or Project B which have profitability indices of 1.2 and 1.5 respectively. The cash increments of A over B has a profitability index of 0.8. (Assume you do not have a budget constraint.)

$A - B = 0.8$

   a) If A and B are not mutually exclusive(you can pick A, B, or both), which project(s) should you take on?

If mutually
Excluse

(10)

Both

→ As¹ both have a PI greater than 1
Hence both are good to choose, and
hence choose both.

   b) If A and B are mutually exclusive, which project(s) should you take on?

If Not
Mutually
Exclusive

B

→ As incremental PI of A−B = 0.8(<1)
So A is less profitable than B, making
B our better Choice

2. *(20 points)* Your firm is considering a project with a five-year life and an initial cost of $120,000. You already spent $15,000 on market research before starting the project. The firm expects to sell 2,100 units per year at a price of $20 per unit. Market rate is 12%. The firm will have the option to abandon this project after three years at which time it expects it could sell the project for $50,000. At what level of sales (quantity per year) should the firm be willing to abandon this project?

(20)

Sunk Cost = 15,000

PV of 50,000 = 35589

⇒ Lets calculate B£

42,000   42,000   42,000 +$ 20K   20K
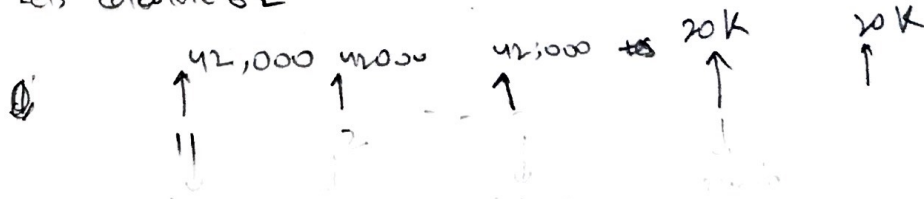
$$NPV_{(selling)} = -120,000 + \frac{42000}{1.12} + \frac{42000}{1.12^2} + \frac{42000}{1.12^3} + \frac{50000}{1.12^3}$$

$$NPV_{(produce)} = -120,000 + \frac{42000}{1.12} + \frac{42000}{1.12^2} + \frac{42000}{1.12^3} + \frac{20K}{1.12^4} + \frac{20K}{1.12^5}$$

⇒ find K for which $\frac{50000}{1.12^3} = \frac{2\cdot K}{1.12^4} + \frac{2\cdot K}{1.12^2}$

⇒ $2500 = \frac{K}{1.12} + \frac{K}{1.12^2}$ ⇒ K = 1479.2

ANS = 1479 (Approx)
products per year for
next 2 years

3. *(20 points)* A 20-year bond with a $1,000 face value that is issued exactly two years ago just distributed its second coupon. The current yield on this bond is 11.05%. What would be the capital gains yield of this bond during the last year of its lifetime if the market rate now and in the future is 12%?

Capitol going yield : YTM - Current Yield

[Annual Coupon payment = x]

Current Yield = 11.05% (After 2 years of investment)

$\frac{x}{0.12}\left(1 - \frac{1}{(1.12)^{18}}\right) + \frac{1000}{(1.12)^{18}} = 0.1105$ ✓

$\frac{x}{7.98x + 41.87} = 0.1105$

$\Rightarrow x = 4.6265 + 0.9822 = \boxed{39.138}$ ✗ with YTM = 12%.

math error

$\Rightarrow$ Capitol going yield = 12% - 4.22% = $\boxed{7.78\%}$ ✗

ANS

current yield in last year = $\frac{39.138}{\frac{39.138}{1.12} + \frac{1000}{1.12}} = 4.22\%$

4. *(25 points)* Default Bond Question: Consider two bonds currently trading in the market, one by company A and the other by company B. Assume that neither bond carries any risk other than the default and interest-rate risk.

Company A: 1-year, x% coupon, $1,000 face value bond issued today with a default risk of 20% in which case only half of all the promised payments are expected to be made.

Company B: 30-year, x% coupon, $1,000 face value bond issued exactly two years ago with two of its coupons are already distributed, including the one distributed just today.

Market conditions: Average return you can get in the market is 10%. Investors expect a 0.5% higher yield per year (a total of 10.5% yield per year) to hold longer term bonds.

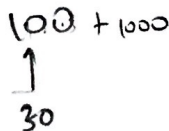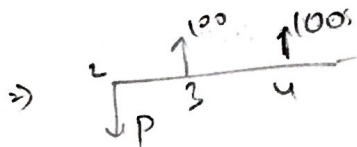a) If company A's bond is selling for $900 today, how much would you pay for company B's bond?

A → price = $900

$\Rightarrow$ 900 (1.1) = 0.2(500(1+x)) + 0.8(1000(1+x))

$\Rightarrow$ 990 = 100 + 800(1+x) $\Rightarrow$ $\frac{990}{900} = 1+x$

(1+x)

$\Rightarrow \boxed{x = 10\%}$

(10)

For B → coupon = 100

100 100

2 3 4 ... 30   100 + 1000

↓P

$\Rightarrow P = \frac{100}{0.105}\left(1 - \frac{1}{(1.105)^{28}}\right) + \frac{1000}{(1.105)^{28}}$ $\Rightarrow \boxed{P = 955.29}$

ANS

b) If you purchased company B's bond and your friend purchased company A's bond and immediately learned that company A would not default, what is the yield you are expecting and the yield your friend is expecting?

Yield my friend is expecting

$\Rightarrow 900 = \dfrac{1000 + 100}{X} \Rightarrow x0$ | Yield = 22.22 %.

Yield I am expecting would not change

Hence   My yield = 10.5 %

(10)

c) Can you tell if the extra yield that is demanded by the investors went up or down if the bond is selling for $900 exactly a year later after the third coupon is distributed and the market rate is still at 10%?

(B)

$\Rightarrow 900 = \dfrac{1000}{(1+x)^{27}} + \dfrac{100}{X}\left(1 - \dfrac{1}{(1+x)^{27}}\right)$

For X = 10.5% , P = 955.59

Since the price went down, yield should go up, hence the extra yield demanded should go up.

Eg → for yield = 11%, price = 914.5

As →

5. (15 points) Ozark Inc. has the following cost information on its new project.

Equipment: $700 (good for 5 years)   Dep = 140
Annual Fixed cost: $200 per year
Per Unit Variable cost: $3 per unit
Opportunity Cost(discount rate): 12%
Quantity that will be produced and sold (per year): 85
Tax rate: 34%

(8)

a) What is the financial break-even price? → P

$(85p - 3(85) - 200 - 140)(0.66) - \text{Financing cost} = 0$ ← (F.C)

F.C = C - 140

C = 194.18   → F.C = 54.18

$\Rightarrow (85p - 3(85) - 200 - 140)(0.66) = 54.18$

$\Rightarrow 85p = 677.1$

$\Rightarrow \boxed{p = 7.965}$ $\boxed{\text{Ans} \rightarrow p = 7.96}$

b) If the Ozark's opportunity cost were to be <u>1% per month</u> what would be the financial break-even price?

Converting 1%. per month to annual rate, we get. $r = 12.6825\%$.

Now calculating financing cost at this rate, we get

⓻

$c = 197.48 \Rightarrow c - Dep = 57.48$

$\Rightarrow \dfrac{(85p - 3185) - 200 - 140)}{0.66} = 57.48 \Rightarrow \boxed{P = 8.025}$. Ans

6. (5 points) Is the following statement TRUE or FALSE? Explain with a few sentences:

"A longer term bond would be more open to inflation risk, reinvestment risk, as well as, liquidity risk."

✗ |TRUE|

③

because if your money is blocked for a longer time, the money is more likely to be affected by inflation. Also the money is blocked for longer so less liquidity, and what if you dont get desired price during reinvestment.

7. (5 points) Is the following statement TRUE or FALSE? Explain with a few sentences:

" If the current yield of a bond is lower than its coupon rate, then the <u>market rate should</u> be lower <u>than its</u> coupon rate."

$2\% , 7\% \quad \dfrac{Annual\ coupon\ Pay.}{Price\ of\ Bond.} \quad \dfrac{100}{1000} = 10\% = coupon\ rate$
$\qquad \downarrow \quad \uparrow \qquad \qquad \qquad = market\ rate$

True

④ (+1)

Lower current yield implies price of the bond is higher than face value. ✓

If we are charging a higher price for the bond, the market rate should be lower than the coupon rate.