Indicative Exercises

- 1.

- You have agreed to receive the following cash flows for the next 3 years : 35000$, 45000$, and 55000$, respectively.

- If the appropriate discount rate is 3%, what is the Present Value of these cash flows?

$$PV = \frac{CF_1}{1+r} + \frac{CF_2}{(1+r)^2} + \ldots + \frac{CF_n}{(1+r)^n}$$

$$PV = \frac{35000}{(1+0.03)^1} + \frac{45000}{(1+0.03)^2} + \frac{55000}{(1+0.03)^3} = 126730\$$$

- 2.

- Find the **current market price** of a bond that has a coupon rate of 10%, a Par Value of $1000, and pays coupons annually, matures in 5 years.

- The appropriate discount rate is 10%.

- P_0 = $100 / (1+0.1)$
  + $100 / (1+0.1)^2$
  + $100 / (1+0.1)^3$
  + $100 / (1+0.1)^4$
  + $1100 / (1+0.1)^5$
  = 1000

- 3.

- Stock XX is paying an annual dividend of 2 Euro and we expect to sell it for 10 Euro in one year.

- If the appropriate discount rate is 20%, what is the Present Value of the stock (i.e. the stock's fair, fundamental value)?

- $P_0 = [D_1 / (1 + r_1)] + [P_1 / (1 + r)]$

- $P_0 = [2 / (1 + 0.2)] + [10 / (1 + 0.2)]$

- $P_0 = 10$ Euros

- 4.

- Stock XY pays a dividend of 5 Euros. The appropriate discount rate is 10% and the firm is not expected to grow in the future, thus the dividend will remail constant for ever.
- What is the **fair value** of the stock ?
- What if the appropriate discount rate becomes 15%;
- What if the appropriate discount rate becomes 5%;

- No Growth Dividend Model $$P_0 = \frac{Div_1}{r_E}$$

- r = 10% $P_0 = 5 / 0.10 = 50$ Ευρώ
- r = 15% $P_0 = 5 / 0.15 = 33,3$ Ευρώ
- r = 5% $P_0 = 5 / 0.05 = 100$ Ευρώ

- 5.

- A client of yours plans to include stock AB in her portfolio.
- The stock pays a dividend of 1 Euro and the appropriate discount rate is 9%.
- Your analysis team has estimated that AB will grow at a constant growth rate of 3%, for the foreseeable future (and thus the dividend will grow at a constant 3% for ever)

- If the current market price for stock AB is 13 what would you recommend to your client?

- What if the discount rate was 7%;

- What if the discount rate was 14%;

- $P0 = D1 / (r - g)$ and $D1 = D0 (1 + g)$

- $P0 = 1 (1+0.03) / (0.09- 0.03) = 17.16$ Euro

- Undervalued - RECOMMEND **BUY**

- If discount rate = 7%;
- P0 = 1 (1+0.03) / (0.07- 0.03) = 25.75
- Undervalued - RECOMMEND BUY
- If Discount rate = 14%;
- P0 = 1 (1+0.03) / (0.14- 0.03) = 9.36
- Overvalued - RECOMMEND SELL (No BUY)

- 6.

- Stock AC has Earnings Per Share (EPS) of 0.8 Euro and Dividend Per Share (DPS) of 0.3 Euro.
- Its Return on Equity (ROE) is 14%, and the appropriate discount rate is 10%. The stock price is 10 Euros.
- If we assume a constant growth rate in dividends is the stock correctly valued ?

- Constant Growth Model: $P0 = D1 / (r - g)$ and $D1 = D0 (1 + g)$ and $g = ROE * b$ [where $b = 1 – (D/E)$]

- $b = 1 – (D/E) = 1 – (0.3/0.8) = 0.625$

- $g = ROE * b = 0.14 * 0.625 = 0.0875$

- $D1 = D0 (1 + g) = 0.3 (1+0.0875) = 0.32625$

- $P0 = D1 / (r - g) = 0.32625 / (0.10 – 0.0875) =$ **26.1 Euro UNDERVALUED**

- 7.

- An investor buys a bond 30 days after the last payment of coupons at a price of 96.4%. The Par Value is 100 Euros and the coupon rate is 7,3%. Coupon payments take place annually. What is the dirty price ?
- clean price = dirty price - accrued interest
- dirty price = clean price + accrued interest

- Accrued Interest (AI) is estimated as: **AI = C (Z/N)**
- Z = Days since last coupon payment to the deal
- N = Days of interest period
- C = Coupon payment

- AI = C (30 / 360) = 7.3 (0.0833) = 0.60 Ευρώ

- **Dirty Price: 96.4 + 0.60 = 97 Euros**

- 8.

- You have a zero-coupon bond with a Par Value of 1000 Euros that matures in 2 years and the discount rate is 10%.

- What should be the price of this bond in the market ?

- This bond has a single cash flow, and I want its Present Value: $$PV = \frac{FV}{(1+r)^n}$$

- P0 = P / (1+r)^n

- P0 = 1000 / (1+0.1)^2

- P0 = 826.44 Euros

- 9.

- We are considering a one-year investment that will yield the following free cash flows :
- 300 Euros with probability 20%
- 600 Euros with probability 60%
- 900 Euros with probability 20%

- What is the mean expected free cash flow and its standard deviation ?

FCF	p_i	FCF x p_i
300	0,2	300 x 0,2 = 60
600	0,6	600 x 0,6 = 360
900	0,2	900 x 0,2 = 180
		E(FCF) = μ = 600

- Variance and Standard Deviation of expected returns

$$\sigma = \sqrt{\sigma^2}$$

$$\sigma^2 = \sum_{i=1}^{n} p_i [r_i - E(r_i)]^2$$

FCF_i	μ	$(FCF_i - \mu)$	$(FCF_i - \mu)^2$	$p_i \times (FCF_i - \mu)^2$
300	600	-300	90.000	0,2 x 90.000
600	600	0	0	0,6 x 0
900	600	300	90.000	0,2 x 90.000
				$\sigma^2 = 36.000$
				$\sigma = 189,7$

- 10.

- You invest now 1000 and will get 1350 in 2 years (n=2)
- What is your **annual rate of return ?**

- First, you want the **Annual HPR = HPR $^{1/n}$**

→ HPR = END VALUE / START VALUE = 1350 / 1000 = 1.35

Annual HPR = 1.35 $^{1/2}$ = 1.16118

→ Then you need the **Annual HPY = HPR – 1 =** 1.16118 – 1 = 0.16118 or 16.118%

- 11.
- You create various portfolios with Stock 1, Stock 2, and Stock 3
- The stocks have the following expected returns:
- $E(r_1)=10\%$, $E(r_2)=20\%$, $E(r_3)=30\%$
- What is the expected portfolio return if you invest 25% in stock 2 and 75% in stock 3 ?
- What is the expected portfolio return if you invest 50% in stock 2 and 50% in stock 3?
- $E(r_P) = w_2\, E(r_2) + w_3\, E(r_3) = (0{,}25)\ (0{,}2) + (0{,}75)\ (0{,}3) = 0{,}275$
- $E(r_P) = w_2\, E(r_2) + w_3\, E(r_3) = (0{,}5)\ (0{,}2) + (0{,}5)\ (0{,}3) = 0{,}275$

- 12.

- Stock A has an expected return of 5% and risk of 8%
- Stock B has an expected return of 10% and risk of 12%
- If you were to choose between the two to invest, which would you prefer?

- One way to find out is to Calculate risk per unit of expected return

- Coefficient of Variation (CV) = Standard Deviation / Expected Return

- Stock A = 0.05/0.08 = 1.6

- Stock B = 0.1 / 0.12 = 1.2

- I would choose stock B

- 13.

- Assume that the market portfolio is composed of only two assets stock A and stock B (w = 50% each)
- We expect (annual basis)
- $E(r_A) = 23\%$ $\sigma_A = 40\%$
- $E(r_B) = 13\%$ $\sigma_B = 24\%$
- $E(r_M) = 18\%$ $\sigma_M = 30\%$
- $\beta_A = 1.28$ $\beta_B = 0.72$
- Rf = 10%

- **Are the stocks fairly valued ?**

- **CAPM:** $\mathbf{E(r_i) = r_f + \beta_i\ [\ E(r_M) - r_f\ ]}$
- $E(r_A) = 0.1 + 1.28\ [\ 0.18 - 0.1\ ] = 0.2024$
- $E(r_B) = 0.1 + 0.72\ [\ 0.18 - 0.1\ ] = 0.1580$

- A: Required: 20.24% Expected: 23% UNDERVALUED
- B: Required: 15.80% Expected: 13% **OVERVALUED**

- 14. A capital market security is a security that has a maturity of:
  (a) up to a year (b) above a year

- 15. The Capital Market Line plots measures risk with:
  (a) standard deviation (b) beta (c) duration (d) convexity

- 16. A bond where the issuer has the right to call back the bond from investors before maturity is a:
  (a) callable bond (b) securitized bond (c) catastrophe bond (d) none of the above

- 17. We often call “value” stocks, stocks that a high ratio of:
  (a)price to book (b) book to price (c) price to sales (d) price to earnings