

Financial Management Homework 2

Instructor Dr. Tao Yuan

(Due on 28 Oct)

Name: 何稀

Student No.: 231098288

Question 1. A 10-year U.S. Treasury bond with a face value of \$1,000 pays a coupon of 5.5% semiannually. The reported yield to maturity is 5.2%. What is the present value of the bond?

$$\text{Coupon payment } C = 1000 \times \frac{5.5\%}{2} = 27.5$$

$$\text{Number of periods } N = 10 \times 2 = 20.$$

$$\text{Periodic yield } r = \frac{5.2\%}{2} = 0.026$$

$$PV = C \times \frac{1 - (1+r)^{-N}}{r} + F \times (1+r)^{-N} = \$1023.16$$

Question 2. A mutual fund manager Diana Sauros produced the following percentage rates of return. Rates of return on the market are given for comparison. Assume risk-free rate is 3%.

	2010	2011	2012	2013	2014
Ms. Sauros	+24.9	-0.9	+18.6	+42.1	+15.2
S&P 500	+17.2	+1.0	+16.1	+33.1	+12.7

- Calculate the arithmetic average return and standard deviation of Ms. Sauros's mutual fund.
- Calculate her sharp ratio.
- Did she do better or worse than the market by these measures?

$$a. \quad \bar{R}_S = \frac{1}{5} \sum_{i=1}^5 R_{Si} = 19.98 \quad S_S = \sqrt{\frac{1}{5-1} \sum_{i=1}^5 (R_{Si} - \bar{R}_S)^2} = 15.61$$

$$\bar{R}_{S\&P} = \frac{1}{5} \sum_{i=1}^5 R_{S\&P i} = 16.02 \quad S_{S\&P} = \sqrt{\frac{1}{5-1} \sum_{i=1}^5 (R_{S\&P i} - \bar{R}_{S\&P})^2} = 11.51$$

$$b. \quad SR_S = \frac{\bar{R}_S - r_f}{S_S} = \frac{19.98 - 3}{15.61} = 1.088$$

$$SR_{S\&P} = \frac{\bar{R}_{S\&P} - r_f}{S_{S\&P}} = \frac{16.02 - 3}{11.51} = 1.131$$

- For the average return, she did better than the market.
But for the Sharp Ratio, she did worse than the market.

Question 3. A six-year government bond makes annual coupon payments of 5% and offers a yield of 3% annually compounded.

- Suppose that one year later the bond still yields 3%. What return has the bondholder earned over the 12-month period?
- Now suppose that the bond yields 2% at the end of the year. What return did the bondholder earn in this case?

a. $C = 1000 \times 5\% = 50$

$$P_0 = \sum_{t=1}^6 \frac{50}{(1.03)^t} + \frac{1000}{(1.03)^6} = 1108.35$$

$$P_1 = 50 \times \frac{1 - (1.03)^{-5}}{0.03} + 1000 \times (1.03)^{-5} = 1091.59$$

earning $E = P_1 + C - P_0 = \$33.24$

$$HPR = \frac{E}{P_0} = 3\%$$

b. $P'_1 = 50 \times \frac{1 - (1.02)^{-5}}{0.02} + 1000 \times (1.02)^{-5} = 1141.41$

$$E' = P'_1 + C - P_0 = \$43.06$$

$$HPR' = \frac{E'}{P_0} = 7.49\%$$

Question 4. Phoenix Corp. faltered in the recent recession but is recovering. Free cash flow has grown rapidly. Forecasts made in 2016 are as follows.

(\$ millions)	2017	2018	2019	2020	2021
Net income	1.0	2.0	3.2	3.7	4.0
Investment	1.0	1.0	1.2	1.4	1.4
Free cash flow	0	1.0	2.0	2.3	2.6

Phoenix's recovery will be complete by 2021, and there will be no further growth in free cash flow. That is, the free cash flow after 2021 will be 2.6 forever.

- Calculate the PV of free cash flow, assuming a cost of equity of 9%.
- Assume that Phoenix has 12 million shares outstanding. What is the price per share?
- If the 2016 net income is \$1 million, what is Phoenix's P/E ratio?

a. $TV_{2021} = \frac{2.6}{0.09} = 28.8889$

$$PV_{2016} = \sum_{t=1}^5 \frac{FCF_t}{(1.09)^t} + \frac{TV_{2021}}{(1.09)^5} = 24.495 \text{ (million \$)}$$

b. $P_0 = \frac{24.495}{12} = \$2.04125 \approx \$2.04$

c. $EPS = \frac{1.0}{12} = 0.0833$

$$P/E = \frac{P_0}{EPS} = 24.5$$

Question 5. Consider Pacific Energy Company and U.S. Bluechips Inc., both of which reported earnings of \$630,000. Without new projects, both firms will continue to generate earnings of \$630,000 in perpetuity. Assume that all earnings are paid as dividends and that both firms require a return of 11 percent.

- What is the current PE ratio for each company?
- Pacific Energy Company has a new project that will generate additional earnings of \$100,000 each year in perpetuity. Calculate the new PE ratio of the company.

a. $P = \frac{E}{r} = \frac{630000}{0.11} = 5727273$
 $P/E = \frac{P/N}{E/N} = \frac{P}{E} = \frac{1}{r} = 9.09.$

b. $E' = 630000 + 100000 = 730000$
 $P' = \frac{E'}{r} = 6636364$
 $P/E' = \frac{1}{r} = 9.09$

Question 6. Ebenezer Scrooge has invested 60% of his money in share A and the remainder in share B. He assesses their prospects as follows:

	A	B
Expected return (%)	15 <i>26</i>	20 <i>21 ✓</i>
Standard deviation (%)	20	22
Correlation between returns	0.5	

- What are the expected return and standard deviation of returns on his portfolio?
- How would your answer change if the correlation coefficient were 0 or -.5?
- Is Mr. Scrooge's portfolio better or worse than one invested entirely in share A?

a. expected return $E_p = w_A r_A + w_B r_B = 0.6 \times 0.15 + 0.4 \times 0.2 = 17\%$
 $Var(p) = w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2w_A w_B \sigma_A \sigma_B \rho = 0.032704$
 $\sigma_p = \sqrt{Var(p)} = 18.08\%$

b. when $\rho = 0$, $Var(p) = 0.022144$ $\sigma_p = 14.88\%$
 when $\rho = -0.5$, $Var(p) = 0.011584$ $\sigma_p = 10.76\%$

c. invest entirely in A: $E_A = 15\%$ $\sigma_A = 20\%$
 all $\sigma_p < \sigma_A$ and $E_p > E_A$, so his portfolio is better.