EC5321: Investment & Portfolio Management

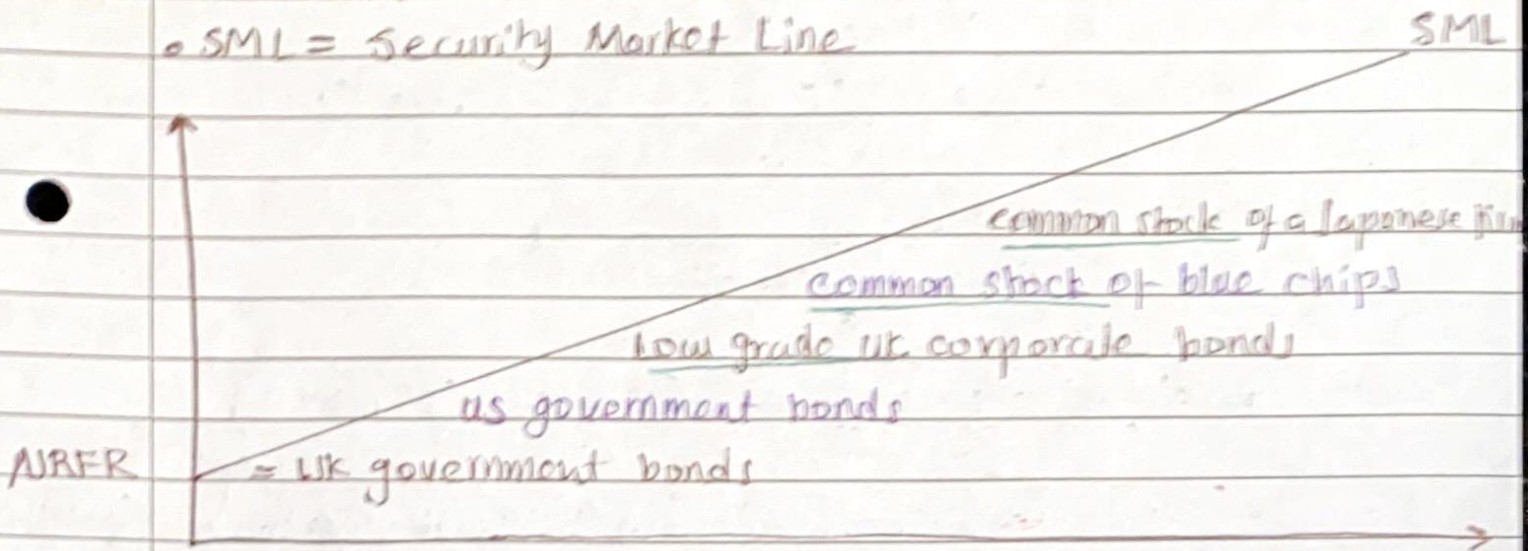
21/01/21

(1)

Answers for Problem Set for seminar 1

1. According to the Capital Asset Pricing model (CAPM)
- all securities are located on the Security Market Line (SML)
  - with securities' risk on the horizontal axis &
  - securities' expected return on it's vertical axis.

- NRFR = Nominal Risk-Free Rate
- SML = Security Market Line



➡ UK goverment bonds
- have the lowest risk & required rate of return simply because they virtually have no default risk at all.

➡ US government bonds
- are perceived to be default risk-free but expose the UK investor to exchange rate risk.

➡ low grade corporate
- contain business, financial, & liquidity risk but should be lower on risk than equities.

➡ Japanese stocks
- are riskier than US stocks due to exchange rate risk.

2. Use the Fished equation

RRFR = [(1+NRFR)/(1+Rate of Inflation)]-1

where;

RRFR = The Real Risk Free Rate

NRFR = Nominal Risk-Free Rate

To derive the more commonly seen version, where we neglect very small values: RRFR ≈ NRFR - Rate of Inflation

$$RRFR = \left[\frac{(1+NRFR)}{(1+\text{Rate of Inflation})}\right] - 1$$

$$RRFR = \frac{1+NRFR}{1+\text{Rate of Inflation}} - 1$$

(1+RRFR) x (1+Rate of Inflation) = (1+NRFR)

1 + RRFR + Rate of Inflation + (RRFR x Rate of Inflation) = 1 + NRFR

(Very small values)

Then, as RRFR x Rate of Inflation is very small & approaches zero,

- It can be dropped from the equation & re-arranging the equation gives:

$$RRFR \approx NRFR - \text{Rate of Inflation}$$

page 51 in the book PDF · #5

3. During the past five years, you owned two stocks that had the following annual rates of return:

year	Stock T	Stock B	HPR for stock T
1	0.19	0.08	1.19
2	0.08	0.03	1.08
3	-0.12	-0.09	0.88
4	-0.03	0.02	0.97
5	0.15	0.04	1.15
	HPY	HPY	

a) compute the arithmetic mean annual rate of return for each stock.

- which stock is most desirable by this measure?

$$\text{Arithmetic Mean (AM)} = \sum_{i=1}^{n} \frac{HPY_i}{n}$$

where,

- ΣHPY = is the sum of all the annual HPYs
- HPY = Holding period yield = HPR − 1
- HPR = Holding period return = $\frac{\text{Ending value of invest}}{\text{Beginning value of invest}}$

$$AM_T = \frac{(0.19)+(0.08)+(-0.12)+(-0.03)+(0.15)}{5} = \frac{0.054}{5}$$

$$AM_B = \frac{0.08+0.03-0.09+0.02+0.04}{5} = \frac{0.08}{5} = 0.016$$

Stock T is more desirable because the arithmetic mean annual rate of return is higher.

b) ~~Compute the arithmetic mean annual rate of return for~~ Compute the standard deviation of the annual rate of return per each stock.

-By this measure, which is the preferable stock?

Standard deviation $\sigma = \sqrt{\frac{\sum_{i=1}^{n} [R_i - E(R_i)]^2}{n}}$

R_i = Possible Return & $E(R_i)$ = Expected Return.

where, $MA_T = 0.054$

sum of derivation squared = $(0.19-0.054)^2 + (0.08-0.54)^2 + (-0.12-0.054)^2 + (0.15-0.054)^2$

$= 0.01350 + 0.00068 + 0.03028 + 0.00708 + 0.00922$

$= 0.06574$

$\therefore \sigma_T^2 = \frac{0.06574}{5} = 0.01315$

$\sigma_T = \sqrt{0.01315} = 0.11467$

$\Sigma_B = (0.08-0.016)^2 + (0.03-0.16)^2 + (-0.09-0.016)^2 + (0.02-0.016)^2 + (0.04-0.016)^2$

$= 0.00410 + 0.00020 + 0.01124 + 0.00002 + 0.00058$

$= 0.01614$

$\sigma_B^2 = \frac{0.01614}{5} = 0.00323$

$\sigma_B = \sqrt{0.00323} = 0.05681.$

Stock B is preferable as it has the smallest standard-deviation.

3. c) Compute the coefficient of variation for each stock. By this relative measure of risk, which stock is preferable?

Coefficient of Variation = $\frac{\text{Standard Deviation}}{\text{Expected Return}}$.

$CV_T = \frac{0.11466}{0.054} = 2.123$ $CV_B = \frac{0.05682}{0.016} = 3.5513$

→ By this measure, T would be preferable. because it has a largest coefficient of variation

d) compute the geometric mean rate of return for each stock.
- Discuss the difference between the arithmetic mean return & the geometric mean return for each stock.
- Discuss the differences in the mean returns relative to the standard deviation of the return per each stock.

$GM = [\pi HPR]^{1/n} - 1$

Geometric Mean (GM) = $\pi^{1/n} - 1$

where; π = Product of the HRs

	HPR
1	0.19+1 = 1.19
2	0.08+1 = 1.08
3	-0.12+1 = 0.88
4	-0.03+1 = 0.97
5	0.15+1 = 1.15

HPY = HPR − 1

∴ HPR = HPY + 1

$GM_T = [(1.19)(1.08)(0.88)(0.97)(1.15)]^{1/5} - 1$

$= [1.26160]^{1/5} - 1$

$= 1.04757 - 1$

$= 0.04757$ ≤

$GM_B = [(1.08)(1.03)(0.91)(1.02)(1.04)]^{1/5} - 1$

$= [1.073883]^{1/5} - 1 = 1.01435 - 1 = 0.01435$ ≤

Stock T has more variability than stock B. The greater the variability of returns, the greater the difference between the arithmetic & geometric mean returns.

From book page 52 #6

4) You are considering acquiring shares of common stock in the Madison Beer Corporation. Your rate of return expectations are as follows:

Possible Rate of Return	Probability
-0.10	0.30
0.00	0.10
0.10	0.30
0.25	0.30

Compute the expected return [E(Ri)] on you investment in Madison Beer.

$E(R_{MBC}) = (0.30)(-0.10) + (0.10)(0.00) + (0.30)(0.10) + (0.30)(0.25)$

$= (-0.03) + 0.000 + 0.03 + 0.075$

$= 0.075$ 4

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5)

Possible Rate of Return	Probability
-0.60	0.05
-0.30	0.20
-0.10	0.10
0.20	0.30
0.40	0.20
0.80	0.15

Compute the expected return [E(Ri)]

$E(R_{LCC}) = (0.05)(-0.60) + (0.20)(-0.30) + (0.10)(-0.10) + (0.30)(0.20)$

$+ (0.20)(0.40) + (0.15)(0.80)$.

$= (-0.03) + (-0.06) + (-0.01) + (0.06) + 0.08 + 0.12$

$= 0.16$ 4.

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6) which one is risk?

The LCC presents greater risk as an investment because the range of possible returns is much wider.