Unit IV: -

Portfolio return and risk. Harry Markowitz’s Portfolio theory

Two Securities

Portfolio Return: Rp=w1\*R1+w2\*R2

Portfolio Risk:

Three Securities

Portfolio Return: Rp=w1\*R1+w2\*R2+W3\*R3

Portfolio Risk:

1. Calculate Portfolio Returns and Risk from the following Data

|  |  |  |
| --- | --- | --- |
| Stock | Returns | Risk |
| A | 15% | 8% |
| B | 20% | 12% |
| Correlation AB | 1 | |

Assume the weights as equal.

Sol:-

W1=0.50

W2=0.50

R1=15%

R2=20%

Stddev1=0.08

Stddev2=0.12

Portfolio Return

Rp=w1\*R1+w2\*R2

Rp= 0.50\*15+0.50\*20=

7.5+10=17.5

Rp=17.5%

Portfolio risk

0.10\*100=

Std DevP= 10%

|  |  |
| --- | --- |
| R | 6% |
| Risk | 3.00% |

Sec A

Sec B

|  |  |
| --- | --- |
| R | 12% |
| Risk | 4.40% |

Cov=12.16

Correlation = Cov/ Std1\*Std2

12.16/3\*4.40

Correlation=0.92

Sol:-

W1=0.50

W2=0.50

R1=6

R2=12

Std dev1=0.03

Std Dev2=0.044

Rp=9%

=3.62%

Portfolio Return: Rp=w1\*R1+w2\*R2

Portfolio Risk:

Portfolio A

W1=0.90

W2=0.10

R1=20%

R2=15%

Rp=19.5%

/21.2

Portfolio B

W1=0.10

W2=0.90

Rp=15.5%

Portfolio C

W1=0.50

W2=0.50

Rp=7.5%

Three Securities

Portfolio Return: Rp=w1\*R1+w2\*R2+W3\*R3

Portfolio Risk:

1. The SAL & GAL Corporation have the following Risk and Return Status

Rs=15% Rg=17% Rc=16%

Std Dev S=30% Std Dev g=25% Std devc= 22%

Psg=0.50; Psc=0.60; Pgc= 0.40

W1=0.33

W2=0.33

W3=0.33

Sol:

Portfolio Return: Rp=w1\*R1+w2\*R2+W3\*R3

0.33\*15+0.33\*17+0.33\*16

4.95+5.61+5.28=15.28

RP=15.28

Portfolio Risk:

: 30%

Sol:-

Mim Risk Portfolio

X2=1-X1

1. The SAL & GAL Corporation have the following Risk and Return Status

Rs=15% Rg=17%

Std Dev S=30% Std Dev g=25%

Psg=0.50

X1=0.31

X2=1-X1

1-0.31=0.69

1. Two assets A and B have the following Risk & Return Status

Ra=22

Rb=20

Std Dev a =15

Std Dev b=18

Correlation =-1

Determine Min risk Portfolio

Sol:-

X1= -1.1

X2=1-(-1.1) =2.1

1. The SAL & GAL Corporation have the following Risk and Return Status

Rs=15% Rg=17% Rc=16%

Std Dev S=30% Std Dev g=25% Std devc= 22%

Psg=0.50; Psc=0.60; Pgc= 0.40

Mim Risk Portfolio

Sol:

**Sec s and Sec g**

X1=0.31

X2=1-X1

1-0.31=0.69

SEC s and SEC c

X2=1-X1=1-0.071=

SEC g and SEC c

CAPM/SML

Assumptions

Rp= Rf+β(Rm-Rf)

Rf= Risk Free Rate of Return.

Beta= Systematic Risk= Correlation market and company\* std of company/Std deb of Market

Rm= Return on Market

1. If risk premium is 8 % and Risk free rate of return is 7 % Calculate Returns according to CAPM Model

Sol:-

Rp= Rf+ Risk Premium

7+8=15%

1. Assume yourself as portfolio manager and with the help of the following details find out the Securities that are Overpriced and Underpriced in terms of the CAPM.

Given Rf=8%; Rm=15% and Expected Returns and Betas are as follows

|  |  |  |
| --- | --- | --- |
| Stock | Expected Returns | Beta |
| JIO | 14% | 0.75 |
| TATA | 16% | 1.2 |
| Aditya Birla | 12% | 1.6 |
| Samsung | 20% | 1.5 |
| LG | 10% | 0.8 |

CAPM

Rp=Rf+B(rm-Rf)

1. Assume yourself as portfolio manager and with the help of the following details find out the Securities that are Overpriced and Underpriced in terms of the CAPM.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Security | Expected Return | Beta | CAPM=Rf+B(Rm-Rf) | OP/UP |
| A | 33% | 1.7 | 8+1.7(15-8)=19.9 | UP |
| B | 14% | 1.4 | 17.8 | OP |
| C | 18% | 1.1 | 15.7 | UP |
| D | 12% | 0.95 | 14.65 | OP |
| E | 21% | 1.05 | 15.35 | UP |
| Nifty(Rm) | 15% | 1 |  |  |
| T Bills (Rf) | 8% | 0 |  |  |

1. The board way investment Co.. manages equity consisting of five stocks with the following market value and beta

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Stock | Market value | Beta | Weights | Bp |
| A | 300000 | 1.3 | 0.30 | 0.39 |
| B | 250000 | 1.2 | 0.25 | 0.30 |
| C | 200000 | 0.9 | 0.20 | 0.18 |
| D | 150000 | 0.5 | 0.15 | 0.075 |
| E | 100000 | 1.6 | 0.10 | 0.16 |
|  | 1000000 |  | Bp | 1.105 |

Rf=9% and Rm=16. What is the portfolio expected returns

Rp= Rf+B(Rm-Rf)

9+1.105(16-9)=

9+7.735=16.74%

CML

APT

Assumptions

1. The investor has homogenous expectations.
2. The investors are risk averse and utility maximizers
3. Perfect Competition.

Lo= Rf

Bi=Beta

L1=Arbitrage pricing line

Ri= Returns

1. Given the values of Rf=7%; Beta=0.82; Arbitrage line =8% Calculate the return using APT

Sol:

=13.56%

1. Calculate the Returns using Multifactor APT

|  |  |  |
| --- | --- | --- |
| Factor | L | b |
| Interest rate risk | 9 | 0.90 |
| Purchasing Power Factor | 9 | 1.8 |
| Management factor | 1.3 | 1.6 |
| Market Risk | 8 | -1.75 |

If Rf=5%

5+9\*0.90+9\*1.8+1.3\*1.6+8\*-1.75=

5+8.1+16.2+2.08-14=17.38%