Portfolio performance measures

1. **Sharpe's ratio:**

   - Sharpe's measure: $\frac{(r_p - r_f)}{\sigma_p}$, r_p is the portfolio return, r_f is the risk free rate. σ_p is the portfolio standard deviation.
   - Returns is adjusted for the risk-free rate.
   - Risk is total risk of the portfolio returns.
   - It is an ordinal measure: it ranks different portfolios by their return-risk performance.
   - The higher the Sharpe's measure, the higher it's rank in performance.

2. **Treynor's measure.**

   - $\frac{(r_p - r_f)}{\beta_p}$

   - Higher Treynor's measure → higher the portfolio performance ranking.

3. **Jenson's Alpha**

   - Jensen's measure:

     $\alpha_p = \bar{r}_p - [r_f + \beta_p * (\bar{r}_m - \bar{r}_f)]$

     Where $\bar{r}_p$ = Expected total portfolio return, β_p is the beta of the portfolio. r_f is the risk free rate and $\bar{r}_m$ is the expected market return.

   - The larger the Jensen's measure (also called the Alpha of the portfolio), the higher the rank in the portfolio performance.

4. **Information Ratio:** $\frac{(\alpha_p)}{(\sigma_{e_p})}$, where α_p is Jensen's measure for the portfolio. σ_{e_p} is called the "tracking error" of the portfolio.

   - The larger the Information Ratio, the higher the rank in the portfolio performance.

Examples

1. Suppose the risk-free return is 4%. The beta of a managed portfolio is 1.2, the alpha is 1%, and the average return is 14%. Based on Jensen's measure of portfolio performance, you would calculate the return on the market portfolio as
A. 11.5%
B. 14%
C. 15%
D. 16%
E. None of these is correct

Answer: 1% = 14% − [4% + 1.2(x − 4%)]; x = 11.5%.

2. You want to evaluate three mutual funds using the information ratio measure for performance evaluation. The risk-free return during the sample period is 6%, and the average return on the market portfolio is 19%. The average returns, residual standard deviations, and betas for the three funds are given below.

	Average return	Residual standard deviation	Beta
Fund A	20%	4%	0.8
Fund B	21%	1.25%	1.0
Fund C	23%	1.20%	1.2

The fund with the highest information ratio measure is _____.
A. Fund A
B. Fund B
C. Fund C
D. Funds A and B are tied for highest
E. Funds A and C are tied for highest

Information ratio = $\alpha P/\sigma(eP)$; A: $\alpha P = 20 - 6 - .8(19 - 6) = 3.6$; 3.6/4 = 0.9; B: $\alpha P = 21 - 6 - 1(19 - 6) = 2.0$; 2/1.25 = 1.6; C: $\alpha P = 23 - 6 - 1.2(19 - 6) = 1.4$; 1.4/1.20 = 1.16.

3. You want to evaluate three mutual funds using the Sharpe measure for performance evaluation. The risk-free return during the sample period is 6%. The average returns, standard deviations and betas for the three funds are given below, as is the data for the S&P 500 index.

	Average return	Standard Deviation	Beta
Fund A	24%	30%	1.5
Fund B	12%	10%	0.5
Fund C	22%	20%	1.0
S&P 500	18%	16%	1.0

The fund with the highest Sharpe measure is _____.
A. Fund A
B. Fund B
C. Fund C
D. Funds A and B are tied for highest
E. Funds A and C are tied for highest

A: (24% − 6%)/30% = 0.60; B: (12% − 6%)/10% = 0.60; C: (22% − 6%)/20% = 0.80; S&P 500: (18% − 6%)/16% = 0.75.

4. You want to evaluate three mutual funds using the Sharpe measure for performance evaluation. The risk-free return during the sample period is 5%. The average returns, standard deviations and betas for the three funds are given below, as is the data for the S&P 500 index.

	Average return	Standard Deviation	Beta
Fund A	23%	30%	1.3
Fund B	20%	19%	1.2
Fund C	19%	17%	1.1
S&P 500	18%	15%	1.0

The investment with the highest Sharpe measure is _____.
A. Fund A
B. Fund B
C. Fund C
D. the index
E. Funds A and C are tied for highest

A: (23% − 5%)/30% = 0.60; B: (20% − 5%)/19% = 0.789; C: (19% − 5%)/17% = 0.824; S&P 500: (18% − 5%)/15% = 0.867.

5. (6-9) The following data are available relating to the performance of Reliance mutual Fund and the market portfolio:

	Reliance	Market Portfolio (BSE-30)
Average return	20%	11%
Standard Deviation of Returns	44%	19%
Beta	1.8	1.0%
Residual standard deviation	2.0%	0.0%

The risk-free return during the sample period was 3%.

6. What is the Sharpe measure of performance evaluation for Reliance mutual fund?
A. 1.33%
B. 4.00%
C. 8.67%
D. 38.6%
E. 37.14%

S = (20% − 3%)/44% = 0.386, or 38.6%.

7. What is the Treynor measure of performance evaluation for Reliance mutual fund?
A. 1.33%
B. 4.00%
C. 8.67%
D. 9.44%
E. 37.14%

(20% − 3%)/1.8 = 9.44%.

8. Calculate the Jensen measure of performance evaluation for Reliance mutual fund.
A. 2.6%
B. 4.00%
C. 8.67%
D. 31.43%
E. 37.14%

$\alpha P = 20\% - [3\% + 1.8(11\% - 3\%)] = 2.6\%$.

9. Calculate the information ratio for Reliance mutual fund.
A. 1.53
B. 1.30
C. 8.67
D. 31.43
E. 37.14

$\alpha P = 20\% - [3\% + 1.8(11\% - 3\%)] = 2.6\%$, 2.6%/2.00% = 1.3.