Elton, Gruber, Brown, and Goetzmann
Modern Portfolio Theory and Investment Analysis, 7th Edition
Solutions to Text Problems: Chapter 25

Chapter 25: Problem 1

Using standard deviation as the measure for variability, the reward-to-variability ratio for a fund is the fund's excess return (average return over the riskless rate) divided by the standard deviation of return, i.e., the fund's Sharpe ratio. E.g., for fund A we have:

$$\frac{\bar{R}_A - R_F}{\sigma_A} = \frac{14-3}{6} = 1.833$$

See the table in the answers to Problem 5 for the remaining funds' Sharpe ratios.

Chapter 25: Problem 2

The Treynor ratio is similar to the Sharpe ratio, except the fund's beta is used in the denominator instead of the standard deviation. E.g., for fund A we have:

$$\frac{\bar{R}_A - R_F}{\beta_A} = \frac{14-3}{1.5} = 7.833$$

See the table in the answers to Problem 5 for the remaining funds' Treynor ratios.

Chapter 25: Problem 3

A fund's differential return, using standard deviation as the measure of risk, is the fund's average return minus the return on a naïve portfolio, consisting of the market portfolio and the riskless asset, with the same standard deviation of return as the fund's. E.g., for fund A we have:

$$\bar{R}_A - \left(R_F + \frac{\bar{R}_m - R_F}{\sigma_m} \times \sigma_A \right) = 14 - \left(3 + \frac{13-3}{5} \times 6 \right) = -1\%$$

See the table in the answers to Problem 5 for the remaining funds' differential returns based on standard deviation.

Chapter 25: Problem 4

A fund's differential return, using beta as the measure of risk, is the fund's average return minus the return on a naïve portfolio, consisting of the market portfolio and the riskless asset, with the same beta as the fund's. This measure is often called "Jensen's alpha." E.g., for fund A we have:

$$\bar{R}_A - \left(R_F + \left(\bar{R}_m - R_F\right) \times \beta_A\right) = 14 - \left(3 + \left(13 - 3\right) \times 1.5\right) = -4\%$$

See the table in the answers to Problem 5 for the remaining funds' Jensen alphas.

Chapter 25: Problem 5

This differential return measure is the same as the one used in Problem 4, except that the riskless rate is replaced with the average return on a zero-beta asset. E.g., for fund A we have:

$$\bar{R}_A - \left(\bar{R}_Z + \left(\bar{R}_m - \bar{R}_Z\right) \times \beta_A\right) = 14 - \left(4 + \left(13 - 4\right) \times 1.5\right) = -3.5\%$$

The answers to Problems 1 through 5 for all five funds are as follows:

Fund	Sharpe Ratio	Treynor Ratio	Differential Return Based On Standard Deviation	Differential Return Based On Beta and R_F	Differential Return Based On Beta and $\bar{R}_Z$
A	1.833	7.333	–1%	–4%	–3.5%
B	2.250	18.000	1%	4%	3.5%
C	1.625	13.000	–3%	3%	3.0%
D	1.063	14.000	–5%	2%	1.5%
E	1.700	8.500	–3%	–3%	–2.0%

Chapter 25: Problem 6

Looking at the table in the answers to Problem 5, we see that Fund B is ranked higher than Fund A by their Sharpe ratios. Solving for the average return that would make Fund B's Sharpe ratio equal to Fund A's we have:

$$\frac{\bar{R}_B - R_f}{\sigma_B} = \frac{\bar{R}_B - 3}{4} = 1.833$$

or

$$\bar{R}_B = 10.33\%$$

So, for the ranking to be reversed, Fund B's average return would have to be lower than 10.33%.