CheggSolutions - Thegdp

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# Calculation of Stock Performance Metrics

## Given Data

Risk-free rate ($r_f$): 4%

Market's average return ($r_m$): 12%

**Stock A:**

- Index model regression: $1\% + 1.2(r_m - r_f)$
- $R^2$: 0.689
- Residual standard deviation ($\sigma_e$): 12.2%
- Standard deviation of excess returns ($\sigma$): 23.5%

**Stock B:**

- Index model regression: $2\% + 0.8(r_m - r_f)$
- $R^2$: 0.493
- Residual standard deviation ($\sigma_e$): 21%
- Standard deviation of excess returns ($\sigma$): 28.7%

## Calculation of Following Statistics

### i. Alpha

$\alpha = \text{Constant term in the regression equation}$

**For Stock A:**

$\alpha_{A} = 1\%$

**For Stock B:**

$\alpha_{B} = 2\%$

The alpha is the intercept of the regression line, representing the stock's return independent of the market return.

### ii. Information Ratio

$\text{Information Ratio} = \frac{\alpha}{\sigma_e}$

**For Stock A:**

$\text{Information Ratio}_{A} = \frac{1\%}{12.2\%} = \frac{0.01}{0.122} = 0.0819672 \approx 0.0820$

**For Stock B:**

$\text{Information Ratio}_{B} = \frac{2\%}{21\%} = \frac{0.02}{0.21} = 0.0952381 \approx 0.0952$

The Information Ratio measures the alpha in relation to the residual risk.

### iii. Sharpe Ratio

$\text{Sharpe Ratio} = \frac{E(r) - r_f}{\sigma}$

First, calculate $E(r)$ (Expected return):

- $E(r_A) = 1\% + 1.2 \times (12\% - 4\%) = 1\% + 1.2 \times 8\% = 1\% + 9.6\% = 10.6\%$
- $E(r_B) = 2\% + 0.8 \times (12\% - 4\%) = 2\% + 0.8 \times 8\% = 2\% + 6.4\% = 8.4\%$

**For Stock A:**

$\text{Sharpe Ratio}_{A} = \frac{10.6\% - 4\%}{23.5\%} = \frac{6.6\%}{23.5\%} = \frac{0.066}{0.235} = 0.2808511 \approx 0.2809$

**For Stock B:**

$\text{Sharpe Ratio}_{B} = \frac{8.4\% - 4\%}{28.7\%} = \frac{4.4\%}{28.7\%} = \frac{0.044}{0.287} = 0.1533016 \approx 0.1533$

The Sharpe Ratio assesses the excess return per unit of risk.

### iv. Treynor Measure

$\text{Treynor Measure} = \frac{E(r) - r_f}{\beta}$

Where $\beta$ is the slope of the regression equation.
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For Stock A:

$\beta_{A} = 1.2$

$\text{Treynor Measure}_{A} = \frac{10.6\% - 4\%}{1.2} = \frac{6.6\%}{1.2} = \frac{0.066}{1.2} = 0.055$

For Stock B:

$\beta_{B} = 0.8$

$\text{Treynor Measure}_{B} = \frac{8.4\% - 4\%}{0.8} = \frac{4.4\%}{0.8} = \frac{0.044}{0.8} = 0.055$

The Treynor Measure evaluates performance adjusted for systematic risk.

Recommendation based on Circumstances

This is the only risky asset to be held by the investor.

Recommendation: Stock A would be preferable given it has a higher Sharpe ratio. This ratio measures risk-adjusted returns and is more relevant when considering a single stock investment.

This stock will be mixed with the rest of the investor's portfolio, currently composed solely of holdings in the market-index fund.

Recommendation: Stock A should be selected due to its higher alpha, indicating potentially higher abnormal returns when combined with the market-index portfolio.

This is one of many stocks that the investor is analyzing to form an actively managed stock portfolio.

Recommendation: If the goal is to integrate stocks with superior performance indicators, Stock A emerges as a better option again due to its higher information ratio, suggesting better performance per unit of residual risk.

Final Solution

The calculated statistics for each stock and the recommendations for each investment context were derived:

Metric	Stock A	Stock B
Alpha (%), α	1.0000	2.0000
Information Ratio	0.0820	0.0952
Sharpe Ratio	0.2809	0.1533
Treynor Measure	0.0550	0.0550

Stock A is preferable for sole asset holdings and mixed portfolios due to higher Sharpe ratio and alpha. Stock A also holds better for actively managed portfolios hinted by its higher information ratio.

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