Security Analysis & Portfolio Management

UNIT – 4

Q: Write a detailed note on portfolio performance evaluation.

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Ans:

Portfolio managers and investment analysts have to continuously evaluate their performance to identify the sources of strengths and weaknesses. The portfolio performance is evaluated by measuring and comparing the portfolio return and associated risk.

There are mainly three major methods of assessing performance:
1. Return per unit of Risk
2. Differential Return'
3. Components of Performance

1. Return per Unit of Risk: This measure assesses the performance of a fund in terms of return per unit of risk. According to this measure, funds that provide the highest return per unit of risk would be adjudged as the best performers and the funds that provide the lowest return per unit of risk would be the poorest performers.

There are two methods of determining the return per unit of risk:

i. Reward to variability ratio developed by William Sharpe, and

ii. Reward to volatility ratio developed by Jack Treynor

2. Differential Return: Another method to measure the performance of a fund is the differential return measure. This method was developed by Michael Jensen. The basic objective of this technique is to calculate the return that should be expected for the fund (given the realised risk of the fund) and then comparing the calculated return with the actually realised return.

3. Components of Performance: E. Fama has provided an analytical framework to have a detailed break-down of the performance of the fund. This break down is done in the following three ways:

(i) Stock Selection: Overall performance of the fund can be examined in terms of superior or inferior stock selection, and the normal return associated with a given level of risk. Thus,

Total Excess Return = Selecting + Risk

(ii) Market Timing: If investors want to maximise their returns, they must not only purchase the right security but must also know the right time to purchase and sell. To generate superior performance better than the market average, markets have to be timed correctly. Market timing implies assessing correctly the direction of the market, either bull or bear and positioning the portfolio accordingly.

(iii) Cash Management Analysis: Cash management analysis is used to assess the degree to which variations in the cash percentage around the long term average have affected the fund performance.

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Q: Discuss Sharpe's Reward to Variability Ratio.

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Ans.:

Sharpe procedure involves first subtracting from each portfolio's net average return ($\overline{R}p$) an estimate of the risk free rate (T) over the evaluation period. The difference can be viewed as risk premium or reward for investing in assets with more than zero risk. Then each portfolio's risk premium is divided by its standard deviation of annual returns (∂p), estimated over the evaluation period. Standard deviation is a measure of the portfolio's total risk or variability. The resulting value (Sp) is the ratio of reward per unit of variability :-

$$Sp = \frac{(\overline{R}p) - R_f}{\partial p}$$

$$= \frac{Reward}{Total\ Risk}$$

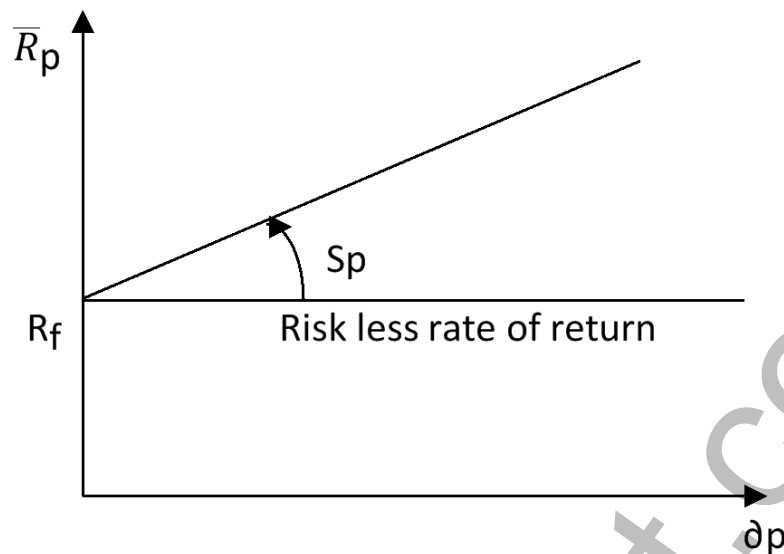$$= \frac{Risk\ Premium}{Standard\ Deviation}$$

Where, Sp = Sharpe's Index

$\overline{R}p$ = Average return from the portfolio

R_f = Risk less rate of return

∂p = Total risk of the portfolio

Sp is Sharpe's index, known as the reward to variability ratio, and can be used for comparing portfolios in different risk classes. This method ranks all portfolios on the basis of S_p. If one portfolio has higher S_p than another, the first one is the better performer.

The following figure gives a graphic representation of Sharpe's index. Larger the value of Sp the better is the performance of the portfolio.

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Sharpe's Index

Example:

If the average return of a portfolio is 15%, Standard Deviation is 3% and risk free rate of return is 6%, then

$$S_P = (15 - 6)/\ 3 = 3$$

ADVANTAGES

1) Simplicity: An advantage of the Sharpe ratio is that it's easy for investors to grasp and calculate. Calculation of this ratio merely needs the values of risk-free rate, return on portfolio and standard deviation figures.

2) Comparison: The Sharpe ratio standardizes the relationship between risk and return and therefore can be used to compare different portfolios.

3) Ranking: Sharpe measure helps in ranking of portfolios.

4) Can be used for non-diversified portfolios: Since the standard deviation of returns is the risk measure, the Sharpe Index is appropriate for all types of portfolios, whether fully diversified or not.

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LIMITATIONS

1) Cannot be used to make future estimations: This ratio depends on past data. In a highly stable environment, the past return and standard deviation may be a good predictor of future. However, in today's dynamic markets, the future rarely replicates the past.

2) Standard Deviation: Another challenge when using the Sharpe ratio is that the risk may be hard to quantify by using just the standard deviation. The Sharpe ratio is a meaningful measure of portfolio performance when the risk can be adequately measured by standard deviation. In many cases, standard deviation, as a measurement of risk, can be misleading.

3) Difficulty in interpreting the results of Sharpe Ratio when comparing Sharpe ratio of different portfolios: Because it is a dimensionless ratio, people find it difficult to interpret Sharpe Ratios of different investments. For e.g. how much better is an investment with a Sharpe Ratio of 0.5 than one with a Sharpe Ratio of – 0.2?

4) Does not quantify the value added: Sharpe ratio does not quantify the value added. It is a ranking criterion only.

Q: Discuss Treynor's Reward-To- Volatility Ratio.

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Ans.:

Treynor's measure is the measure of portfolio's excess return per unit of portfolio's beta coefficient (β). Treynor's reward-to-volatility ratio, denoted as Tp for portfolio P, utilises a portfolio's beta to measure its risk and is defined as:-
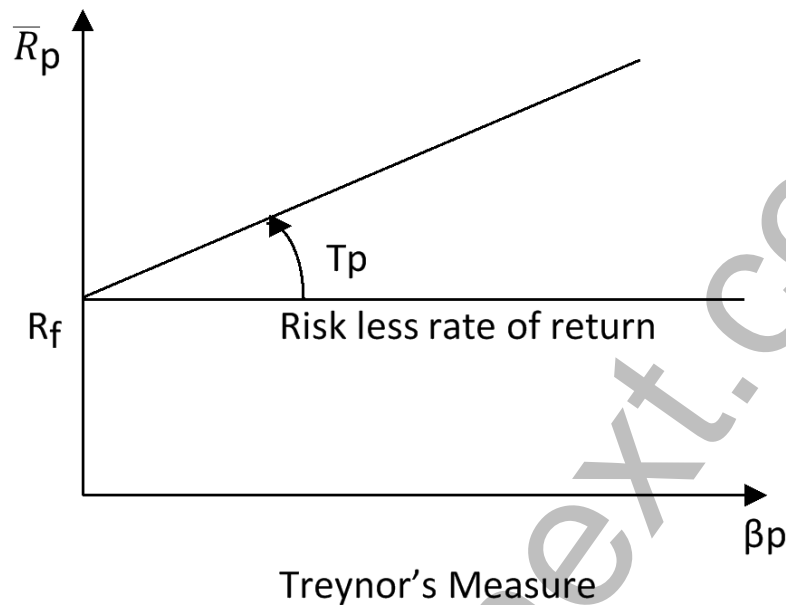
$$T_p = \frac{(\overline{R}_p) - R_f}{\beta_p}$$

$$= \frac{\text{Reward}}{\text{Volatility}}$$

$$= \frac{\text{Risk Premium}}{\beta_p}$$

Where βp is the portfolio beta

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The Treynor's measure relates a portfolio's excess return to non-diversifiable or systematic risk (as measured by the portfolio's volatility or beta coefficient).

Treynor's Measure

Example:

If the average return of a portfolio is 18%, beta coefficient is 3 and risk free rate of return is 6%, then

$$T_P = (18 - 6)/ 3 = 4$$

Q: Discuss Jensen's Differential Return Model in detail.

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Ans.:

Jensen's measure of portfolio performance is based on the capital asset pricing model (CAPM). The basic version of the CAPM is expressed by the equation:-

$$E (\overline{R}_p) = R_f + \beta_p [E (\overline{R}_m) - R_f]$$

Where,

$E (\overline{R}_p))$ = Expected return of a portfolio

R_f = Risk free interest rate

$E (\overline{R}_m)$ = Expected return of a market index

β_p = Beta of a portfolio

Jensen's approach to evaluating portfolio performance involves two steps. First, using equation (above), the expected return of a given portfolio is calculated on the basis of β_p, $\overline{R}_m$, and R_f. Second, the actual realised return of the portfolio is compared with the calculated or predicted return. The greater the excess of realised return over the calculated return, the better the performance of the portfolio.

Jensen measure reflects the difference between the return actually earned on a portfolio and the return the portfolio was supposed to earn, given its beta as per the capital asset pricing model.

Thus, the Jensen measure (α_p) is:-

Average Return on Portfolio – [Risk free Return + Portfolio Beta (Average return on market portfolio – Risk free return)]
A positive value is considered good and a negative value bad.

Jensen's Model
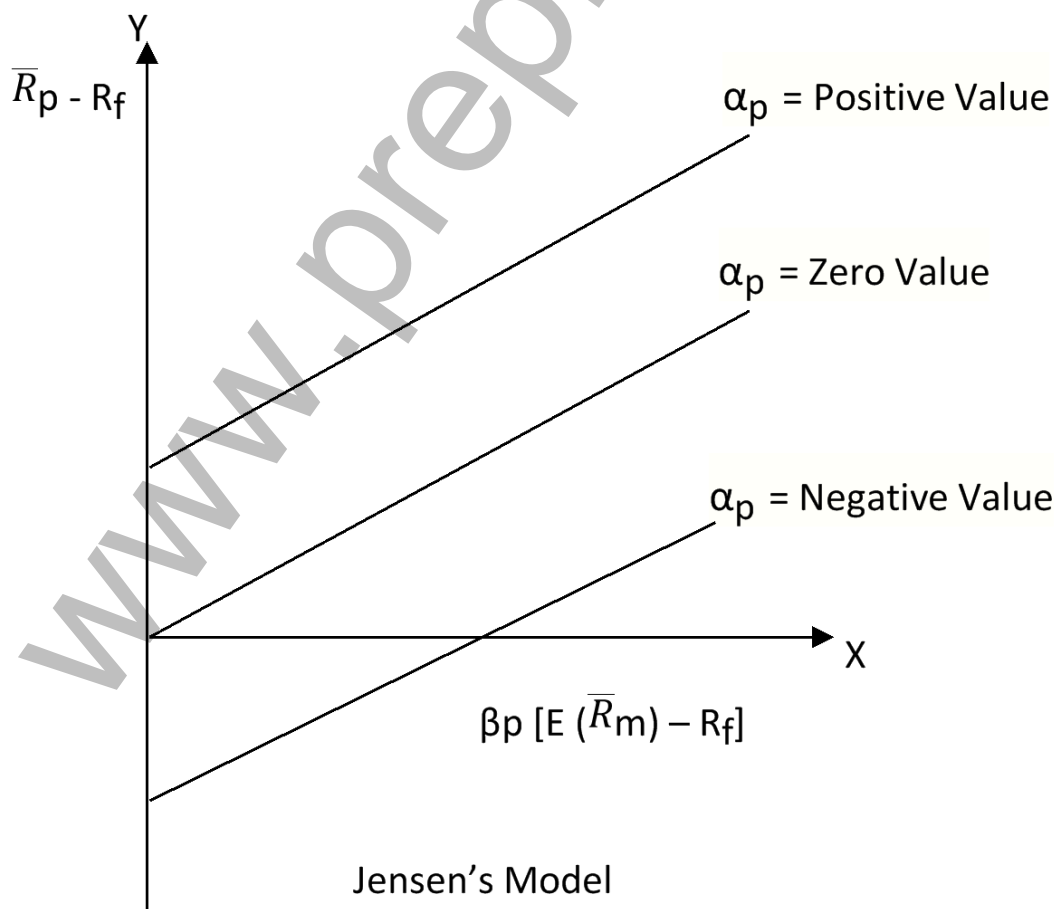
The figure shows three lines showing negative, neutral and positive values. The negative line shows that the management of the performed portfolio is inferior. The positive line shows the superior quality of management of funds. The neutral value shows that the performance of the fund is similar to the performance of the market portfolio.

LIMITATIONS

1) Jensen model uses a market surrogate instead of the true market portfolio.

2) This model relies heavily on the validity of CAPM. If in estimating the measures, the analyst assumes the wrong form of the CAPM in the market place, he will get biased measure of performance, usually in favour of low risk portfolios.

3) This measure is unable to statistically distinguish luck or chance from skill except over very long period of time.

Q: Differentiate between the Sharpe and Treynor indexes of portfolio performance? *(www.prepnext.com)*

Ans.:
Both Sharpe ratio and Treynor ratio measure risk adjusted returns. However, there are a few differences between them. A few of these differences are discussed below:

1) Measure of Risk: The Sharpe measure uses the standard deviation of returns as the measure of risk, while the Treynor measure uses Beta to measure Risk

2) Assumption: Trenor measure assumes a completely diversified portfolio leaving systematic risk as the relevant risk. There is no such assumption of complete diversification in Sharpe measure.

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3) Calculation of Ratio (Formula): Sharpe and Treynor ratios have a similar numerator – the excess returns, but differ in terms of risk adjustment. Sharpe ratio includes standard deviation in its denominator while Treynor ratio includes beta in its denominator.

$\quad$ ***Sharpe's ratio*** (Sp) for portfolio P is defined as:-

$$Sp \quad = \frac{(\overline{R}p) - T}{\partial p}$$

$$= \frac{Reward}{Total\ Risk} \quad = \quad \frac{Risk\ Premium}{Standard\ Deviation}$$

$\quad$ ***Treynor's reward-to-volatility ratio*** (Tp) for portfolio P, utilises a portfolio's beta to measure its risk and is defined as:-

$$Tp \quad = \frac{(\overline{R}p) - T}{\beta p}$$

$$= \frac{Reward}{Volatility} \quad = \quad \frac{Risk\ Premium}{\beta p}$$

Where βp is the portfolio beta

In other words, Sharpe ratio measures how much excess returns a fund has generated relative to the total risk it is exposed to. On the other hand, Treynor ratio measures how much excess returns a fund has generated relative to the market risk it is exposed to.

4) Suitability for Sector specific funds: When one has to evaluate the funds which are sector specific, Sharpe ratio would be more meaningful. This is due to the fact that unsystematic risk would be present in sector specific funds. Hence, a truer measure of evaluation would be to judge the returns based on the total risk.

5) Suitability for Diversified Funds: In well- diversified funds, the element of unsystematic risk is not present. So, when the fund is not fully diversified, Sharpe ratio would be a better measure of performance and when the portfolio is fully diversified, Treynor ratio would be more appropriate.

6) As Treynor's ratio ignores unsystematic risk and considers systematic risk only, it is more suitable for investors who are only interested in whether they beat the market.

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Sharpe's Measure Vs. Treynor's Measure

The Sharpe measure relates a portfolio's excess return to total risk (as measured by the portfolio's variability or standard deviation), while the Treynor measure relates a portfolio's excess return to non- diversifiable or systematic risk (as measured by the portfolio's volatility or beta coefficient). However, if diversified portfolios are compared, the rankings will be quite similar whichever method is used. The Sharpe measure uses the standard deviation of returns as the measure of risk, while the Treynor measure employs beta (systematic risk). The Sharpe measure, therefore, implicitly evaluates the portfolio manager on the basis of return performance, but also takes into account how well diversified the portfolio was during the period. If a portfolio is perfectly diversified (does not contain any unsystematic risk), the two measures would give identical rankings because the total variance of the portfolio would be a systematic variance. If a portfolio is poorly diversified, it is possible for it to have a high ranking on the basis of Treynor measure, but a much lower ranking on the basis of Sharpe measure. Any difference should be directly attributable to the poor diversification of the portfolio. Therefore, the two measures provide complementary but different information and both measures should be derived.

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