and return criteria. They are compared against the objective norms to assess the relative performance of the portfolio.

4.2 Otherwise equivalent (OE) benchmark portfolio

The first major goal of portfolio management is to derive rates of return that equal or exceed the returns on a naively selected portfolio with equal risk. **The second goal** is to attain complete diversification relative to a suitable benchmark.

We essentially compare the return of our owned and managed portfolio over a particular period with that of the return of a benchmark portfolio.

The benchmark portfolio should represent a feasible investment alternative to your portfolio that is being compared and evaluated. In reality, it is difficult to identify such a benchmark portfolio. So, often, such a portfolio is known as an otherwise equivalent (OE) benchmark portfolio. An OE benchmark portfolio requires that it should have all characteristics of the portfolio that you own and manage.

Creating an Otherwise Equivalents (OE) portfolio

The names and weights of securities comprising the benchmark portfolio need to be clearly delineated. It is investable as the option is available to forgo active management and simply hold the benchmark. It is possible to calculate the return on the benchmark on a reasonably frequent basis. It is reflective of current investment opinions. The investor has current investment knowledge of the securities that make up the benchmark. It is better to create the benchmark well in advance, i.e., prior to the start of an evaluation period. If a benchmark does not possess all of these properties, it is considered flawed.

4.3 Portfolio Risk

Specific types of portfolio risks

Portfolio theory makes an important distinction between two types of risks:

i) **Unsystematic risk**:

The measure of risk associated with a particular security; also known as diversifiable risk. This risk can be mitigated by holding a diversified portfolio of many different stocks in many different industries.

ii) Systematic risk (market risk):

Systematic risk is faced by all investors due to market volatility. This risk cannot be diversified away. This is the type of risk most people are referring to when they casually use the term "risk" when discussing investments.

Some additional risks faced by all investments include:

iii) Liquidity risk

The arithmetic average of successive one-period returns is obviously not equal to the true rate of return. The true rate of return is given by the geometric mean return defined above; that is,

[(2.0) (0.5)] -1.0 = 0.

The **geometric mean** of two numbers, say 2 and 8, is just the square root of their product, that is, which is 4. As another example, the geometric mean of the three numbers 4, 1, and 1/32 is the cube root of their product (1/8), which is 1/2, that is, $\sqrt{4*1*1/32}$.

A geometric mean is often used when comparing different items. For example, the geometric mean can give a meaningful "average" to compare two companies which are each rated at 0 to 5 for their environmental sustainability, and are rated at 0 to 100 for their financial viability.

c) Holding Period Return/Yield (HPR)

The one period rate of return, r, for a mutual fund may be defined as the change in the per unit net asset value (NAV), plus its per unit cash disbursements (D) and per unit capital gains disbursements (C) such as bonus shares. It may be calculated as:

$R_p = [(NAV_t - NAV_{i-1}) + D_t + C_t] / NAV_{i-1}$

Where

NAV_t = NAV per unit at the end of the holding period.

NAV_{i-1}= NAV per unit at the beginning of the holding period.

D_t = Cash disbursements per unit during the holding period.

C_t = Capital gains disbursements per unit during the holding period.

This formula gives the holding period yield or rate of return earned on a portfolio. This may be expressed as a percentage.

The total return received from holding an asset or portfolio of assets over a period of time, generally expressed as a percentage. Holding period return/yield is calculated on the basis of total returns from the asset or portfolio – i.e. income plus changes in value. It is particularly useful for comparing returns between investments held for different periods of time.

Holding Period Return (HPR) and annualized HPR for returns over multiple years can be calculated as follows:

Holding Period Return = Income + (End of Period Value – Initial Value) / Initial Value

Annualized HPR = $\{[(\text{Income} + (\text{End of Period Value} - \text{Initial Value})] / \text{Initial Value} + 1\}^{1/t} - 1$

where t = number of years.

Returns for regular time periods such as quarters or years can be converted to a holding period return through the following formula:

$E_t(R_{m,t})$ is the annualized mean return on the market portfolio considered over period;
R_f is a proxy for the riskless rate;
$\hat{\rho}_p$ is a function of the slope of the portfolio return function;
$\hat{\delta}p$ is a parameter that depends on the convexity of the portfolio return function;
Two year data of weekly series is considered.

Example: Treynor-Mazuy Measure

The annualized mean return ($E_t(R_{p,t})$) on the fund considered over the period is 20%, the annualized mean return on the market portfolio $E_t(R_{m,t})$ considered over period is 18%, R_f is a proxy for the riskless rate is 10%, $\hat{\rho}_p$, a function of the slope of the portfolio return function is 1.5; and $\hat{\delta}_p$, a parameter that depends on the convexity of the portfolio return function is .02. Then $TM_{p,t}$ is calculated as:

$TM_{p,t}$ = [20% – 10%] –{1.5 [18% – 10%]} + .02 [18% – 10%]^2}
= [10%]- {1.5*8%}+.02[8^2]
= 10% - 12% + 1.28% = -0.72%

5.6.7 The Merton–Henriksson Market Timing Measure

The Merton-Henriksson Measure **gives the excess return obtained by the manager that cannot be replicated by a mix of options and market portfolio.** That represents the excess returns that have been economized by the manager because of its market timing ability.

5.6.8 Formula: The Merton–Henriksson Market Timing Measure

$HM_{p,t} = [\ E_t(R_{p,t}) - R_f] - \{\hat{\beta}_{1,p}\ [\ E_t(R_{m,t}) - R_f]\} - \hat{\beta}_{2,p}\ \text{Max}\ [\ 0,\ Rf - E_t(R_{m,t})]$

Where:
$E_t(R_{p,t})$ is the annualized mean return on the fund considered over period;
$E_t(R_{m,t})$ is the annualized mean return on the market portfolio considered over period;
R_f is a proxy for the riskless rate;
$\hat{\beta}_{1,p}$ is a function of the slope of the portfolio return function;
$\hat{\beta}2_{,p}$ is the cost of option saved by the manager.
Two year data of weekly series is considered.

Successful timing implies higher betas when the market subsequently goes up, or lower betas when it goes down, leading to the convex relation.

5.6.9 Multibeta /multi-factor Models

A multi-factor model is a financial model that **employs multiple factors in its computations to explain market phenomena and/or equilibrium asset prices**. The multi-factor model can be used to explain either an individual security or a portfolio of securities. It does so by comparing two or more factors to analyze relationships between variables and the resulting performance. They are generally extensions of the single-factor capital asset pricing model (CAPM).

Categories of Multi-Factor Models