CHAPTER III

RESEARCH METHODOLOGY

3.1 CONTINUOUSLY COMPOUNDED RATE OF RETURN

Assumption from the Capital Asset Pricing Mode (CAPM) derived by Sharpe, Linter and Mossin is that all investor have horizon periods of identical length. It implies that all trading in the market takes place only at the beginning and the end of the horizon period. Clearly this is not realistic as trading in the market takes place almost continuously and investors therefore have different and overlapping horizon periods.

Jensen (1969) showed that the CAPM holds for any arbitrary length of time as long as the returns are expressed in terms of the proper compounding interval. This horizon interval is instantaneous i.e. the interval is infinitesimally small and that the natural logarithm form of the returns provides a very good approximation of reality.

Method for calculating the rates of return based on continuously compounded which was adopted by Jensen (1968) are shown in equations 3.1, 3.2 and 3.3 below.

$$R_{j,t} = \log_e \frac{NA_{j,t} + D_{j,t}}{NA_{j,t-1}} \tag{3.1}$$

$$R_{m,t} = \log_e \frac{I_t + DI_t}{I_{t-1}} \tag{3.2}$$

$$R_{f,t} = \log_e (1 + r_{f,t}) \quad (3.3)$$

where

$R_{j,t}$ = The monthly continuously compounded rate of return of the jth unit trust during the month t

$NA_{j,t}$ = The net asset value for unit trust j at the end of month measured by the managers bid price (repurchase price)

$D_{j,t}$ = Dividend per unit paid by unit trust j during month t

$R_{m,t}$ = The estimated monthly continuously compounded rate of return on the market portfolio m for month t

Various Benchmark being used in this research to determine the sensitivity of the ranking of unit trust performance with various benchmark. Bechmarking is important because we couldn't compare without having a comparable denominator.

I_t = Level of the KLSE Composite Index (CI) at the end of month t (in first study)

= Level of the EMAS Index (EI) at the end of month t (in second study)

DI_t = Estimate of dividends received by the market portfolio m in month t (obtained from gross dividend yield records of the KLSE CI and market capitalisation figures) expressed in the same scale as the level of the KLSE CI using the original base value of the CI on 3rd January 1977 of RM4,250,789,182.00 (in first study)

= Estimate of dividends received by the market portfolio m in month t (obtained from gross dividend yield records of the KLSE EI and market capitalisation figures) expressed in the same scale as the level of the KLSE EI using the original base value of the EI on 2nd January 1984 of RM37,661,400,000.00 (in second study)

$R_{f,t}$ = The monthly continuously compounded risk free rate of interest for month t

$r_{f,t}$ = The yield to maturity rate of the 90 day Treasury Bill for month t as the proxy for the riskless rate of interest

3.2 RISK MEASUREMENT

Two method are used to measure the risk in this research study. The first method using the standard deviation of historical returns as shown in equation 3.4.

$$\sigma_j = \left[\sum_{t=1}^{N} \frac{(R_{j,t} - \overline{R_j})^2}{N - 1} \right]^{0.5} \tag{3.4}$$

where

$R_{j,t}$ = Rate of return of the jth unit trust at time t

$\overline{R_j}$ = Mean of the rate of return for the jth unit trust

N = Number of observations

Second method to measure the risk using beta coefficient (β_j) of the unit trust. β_j can be obtained from the slope of the characteristic line (equation 3.5). This line

line can be obtained by regressing the monthly returns of the unit trust with respect to the monthly returns of the market portfolio m.

$$R_{j,t} = \alpha_j + \beta_j R_{m,t} + e_{j,t} \tag{3.5}$$

where

α_j = Regression intercept

β_j = Slope of characteristic line

$R_{j,t}$ = Return on unit trust in month t

$R_{m,t}$ = Return on market portfolio m in month t

$e_{j,t}$ = Regression's unexplained residual return in month t, $E(e_{j,t}) = 0$

3.3 INVESTMENT PERFORMANCE MEASUREMENT

The investment performance measurement to be used for evaluating and ranking the performance of the unit trust funds in this study are the Adjusted Sharpe Index, Treynor Index, Jensen's Alpha and the Adjusted Jensen's Alpha. This method incorporates both the rate of return and the risk.

Another investment performance measurement uses Micropal System which starts analyzing and ranking the local unit trust performance since January, 1996. This method only concentrates on the return achieved through out a period and ignore the risk incurred by the fund. This is the disadvantage of this method compared to Sharpe Index, Treynor Index and Jensen's Alpha.

3.3.1 Tracking Fund Performance Using MICROPAL System

Since Jan 1996, Malaysia unit trust performance are analyzed by independent fund analysis company, Micropal Asia Ltd, for the Federation of Unit Trust Managers. The unit trust performance tables are tabulated on The Edge Magazine every fortnightly. In preparing the tables, Micropal looks at the past performance of funds. Its approach is that it focuses attention on relative performance. Funds are categorized within their appropriate investment category against peers with similar objectives (for example, equity funds, state funds, balanced funds, fixed interest funds, Islamic Syariah funds) and compare with an appropriate benchmark (where available - examples are equity funds with KLSE Composite Index, and Islamic Syariah funds with RHB Islamic Index).

The time periods shown includes three months, six months, one year, three years and five years up to the latest valuations available for each of the funds, with performance calculated using the Ringgit as the base currency. This enables the investor to compare the performance of the funds in these different time periods and allows for comparisons between funds on a like-for-like basis.

Accoding to Micropal Asia general manager, Mr. David O'Dwyer,

- Buying a fund that is top over a given period will invariably result in chasing yesterday's winners. It is not necessarily the case that this fund will continue to be the best in that sector or indeed the best sector to invest in;
- Read the performance tables ongoing and look at the funds doing consistently well over both the longer time as well as the shorter time period. Remember that the performance table shows performance over three months, six months, one year, three years and five years. The shorter time will illustrate how the fund manager is performing in the current market conditions, the more important longer term track performance shows the long term track record;

- Consistency of performance is the key to successful investment in unit trusts;
- Make a decision to buy or sell a fund only when you have fully analyzed the situation;
- Talk to the professionals whose business is to advise on investments. This sort of consultancy should identify what is your "risk profile" and what your long term investment goals are; and
- Be proactive, not reactive, in your investment decisions.

Mr. O'Dwyer advises, investment in a fund should be taken as part of the overall personal investment portfolio. This will help you to fully realize the potential presented by mutual fund investment.

3.3.2 Method of calculation of the performance table in Micropal system

The formula used for calculation of fund performance are shown in equation 3.6, 3.7 and 3.8.

- Rate of price return $= \dfrac{\text{Offer price of fund in current year}}{\text{Adjusted Offer price in base year}}$ (3.6)
  (After the adjustment of bonus issue/split)

- Rate of income return $= \dfrac{\text{Gross dividend payment within the period}}{\text{Offer price on ex-dividend date}} + 1$ (3.7)

- Total return = {(Price return * Series of income return) - 1} * 100% (3.8)

(All the prices are in weekly or monthly basis and hence the performance calculation is based on weekly or monthly one. The dealing offer price is usually equal to the valuation price on last working day).

Please refer to Appendix B for the example of calculation using formula above.

3.3.3 Sharpe Index and Adjusted Sharpe Index

The Sharpe Index (SI) is defined in equation 3.9 and the index measures the risk premium of the portfolio relative to the total risks in the portfolio.

$$SI = \frac{\text{Risk Premium}}{\text{Total Risk}} = \frac{\overline{R_j} - \overline{R_f}}{\sigma_j} \qquad (3.9)$$

where

$\overline{R_j}$ = Average return of unit trust j

$\overline{R_f}$ = Average riskless rate of return

σ_j = Standard deviation of return of unit trust j

The Sharpe Index was found to be biased by Miller and Gehr (1978). The bias was found to be a function of the number of return intervals (K) in the evaluation period and this was corrected by Jobson and Korkie (1981) using the Adjusted Sharpe Index (ASI) given in equation 3.10.

$$ASI = \frac{SI \times K}{(K + 0.75)} \qquad (3.10)$$

3.3.4 Treynor Index

The Treynor Index (TI) is given in equation 3.11.

$$TI = \frac{\text{Risk Premium}}{\text{Systematic Risk}} = \frac{\overline{R_j} - \overline{R_f}}{\beta_j} \qquad (3.11)$$

where

β_j = Beta coefficient obtained from the slope of the characteristic line of the unit trust

3.3.5 Jensen's Alpha and Adjusted Jensen's Alpha

Jensen restated the original characteristic line of equation 3.5 in risk premium form instead of the return. Equation 3.12 defines the Jensen's characteristic line in risk premium form.

$$R_{j,t} - R_{f,t} = A_j + B_j (R_{m,t} - R_{f,t}) + U_{j,t} \qquad (3.12)$$

where

A_j = Jensen's Alpha of unit trust j obtained from the regression intercept

B_j = Regression slope coefficient

$U_{j,t}$ = Residual risk premium for jth unit trust at time t which is unexplained by the regression, $E(U_{j,t}) = 0$.

Jensen's Alpha cannot be used to rank the performance of different asset unless it is risk adjusted by dividing by B_j as defined in equation 3.13.

$$\text{Adjusted Jensen's Alpha } (AA_j) = \frac{A_j}{B_j} \qquad (3.13)$$

3.4 DEGREE OF RISK DIVERSIFICATION OF UNIT TRUSTS

The benefit of investing in unit trusts is the reduction of portfolio risk through diversification by holding a large number of securities. The degree of risks diversification of a fund is measured by the Coefficient of Determination, R^2 of the regression equation 3.5. The closer the R^2 value to 1.0, the higher the degree of diversification. The R^2 is theoretically the proportion of the total variance of the returns of a portfolio explained by the market portfolio.

3.5 CONSISTENCY OF PERFORMANCE USING VARIOUS METHOD

The objective of this study is to evaluate how the consistency of performance of unit trust with the various performance measure such as Adjjusted Sharpe Index, Treynor Index and Adjusted Jensen's Alpha. The unit trusts are ranked annually using the Adjusted Sharpe Index, Treynor Index and the Adjusted Jensen Alpha from the period 1984 to 1996. Thereafter to determine the consistency of performance over time, Spearman Rank Correlation (R_S) as shown in equation 3.14. The test of significance of R_S is carried out using the t statistic given by equation 3.15.

$$R_S = 1 - \frac{6 \Sigma d^2}{n(n^2-1)} \qquad (3.14)$$

$$t = \frac{R_S(n-2)^{0.5}}{(1-R_S^2)^{0.5}} \text{ with (n-2) degrees of freedom} \qquad (3.15)$$

where

d = Difference between rankings of Method 1 and Method 2

n = Number of paired rankings in the data series

3.6 EVALUATION OF FUNDS' ADHERENCE TO THEIR OBJECTIVES

Unit trust funds can be classified according to the different risk categories that cater for investors with different risk tolerance level. The stated objectives of unit trust funds provide the investor with qualitative guide posts to follow before committing their fund investment decision. These objectives in particular indicate the risk and return that can be expected from a fund and are communicated to the investing public in advertisements, brochures and prospectuses.

Coates (1978) stated qualitatively six type of fund objectives as shown in Table 3.1 below :

Table 3.1 : Objectives of Unit Trust Funds

Fund Objective	Definition
1. Income Funds	Funds that provide as liberal a current income from investment as possible
2. Balanced Funds	Funds that minimize risk and at the same time retain some possibilities for long term growth and current income
3. Income-Growth Funds	Funds that place slightly more emphasis on current income than on growth
4. Growth-Income Funds	Funds that emphasize growth more than current income
5. Growth Funds	Funds that view income as only a secondary or incidental objective
6. Maximum Capital Gains Funds	Funds that pay low or no dividends and invest in risky stocks

A quantitative definition based on the empirical findings of McDonald (1974) is given in Table 3.2 below.

Table 3.2 :
Relationship between Beta value and Traditional Fund Objectives

Fund's stated Objective	Beta Value
Income	0.55
Balanced	0.68
Income-Growth	0.86
Growth-Income	0.90
Growth	1.01
Maximum Capital Gains	1.22

One can determine whether investment managers adhere to the fund's stated objectives by comparing the historical beta value of the fund with those defined in Table 3.2 above.

3.7 FORECASTING ABILITY OF INVESTMENT MANAGERS

Following the method used by Jensen (1968), estimates of the systematic risk B_j of the fund can be obtained by regressing the fund's risk premium against the market portfolio's risk premium using equation 3.16.

$$R_{j,t} - R_{f,t} = B_j (R_{m,t} - R_{f,t}) + e_{j,t} \tag{3.16}$$

If the manager is a superior forecaster he will tend to systematically select securities which will realize $e_{j,t} > 0$. Hence his portfolio will earn more than the "normal" risk premium for its level of risk.

Allowance for such forecasting ability can be made by simply not constraining the estimating regression to pass through the origin. That is we allow for the possible existence of a non zero constant in equation 3.16 by using equation 3.17 as the estimating equation.

$$R_{j,t} - R_{f,t} = A_j + B_j (R_{m,t} - R_{f,t}) + U_{j,t} \tag{3.17}$$

where the new error term $U_{j,t}$ will have $E(U_{j,t}) = 0$

Thus if the unit trust manager has an ability to forecast security prices, the intercept A_j in equation 3.17 will be positive ($A_j > 0$). This represents the average incremental rate of return on the portfolio per unit time which is due solely to the manager's ability to forecast future security prices. In contrast, a naive "buy and hold" strategy can be expected to yield a zero intercept ($A_j = 0$). In addition, if the manager is not doing as well as the naive buy and hold strategy, A_j will be negative ($A_j < 0$).