

## **CHAPTER 2**

### **LITERATURE REVIEW**

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This literature review begins with the study on the risk and returns of the unit trust funds and what investment strategies used by the funds managers in order to achieve a good fund performance. It is important as it help to understand the underlying concept of the funds returns. Secondly, this literature review will study the fund performance in general and the factors that is affecting the performance. These factors are such as it funds characteristics and investment style. Besides, one of the factors in macro level such as monetary control policy has also been studied. With this, it helps to justify the performance comparison solely based on the funds returns. Lastly, the various performance evaluation techniques have was been studied in order to select the correct method to evaluate the funds performance.

#### **2.1 Risk and Returns of Unit Trust Funds**

Elton, Gruber, and Green, (2007) stated Individuals often make all of their unit trust fund investments within one family of trust funds. Many investors like to confine their fund holdings to a single fund family either for simplicity or through restrictions placed by their retirement savings plan. The study has shown that the unit trust fund returns are more closely correlated within than between fund

families. As a result, restricting investment to one fund family leads to a greater total portfolio risk than diversifying across fund families.

The study has examined the sources of this increased correlation and finds that it is due primarily to common stock holdings. Besides, it is also more generally related to families having similar exposures to economic sectors or industries.

Fund families also show a propensity to focus on high or low risk strategies, which leads to a greater dispersion of risk across restricted investors. An investor considering adding an additional fund, either in the same family or outside the family, would need to believe there is a difference in returns by using the same Sharpe ratio.

Although there are certain levels of risk associated with the particular fund family, but its risk level can actually be altered as the result of the potential agency conflict between unit trust fund investors and unit trust fund companies (Chevalier and Ellison, 1997). According to the study, investors would like the fund company to use its judgment to maximize risk-adjusted fund returns. However, on the other hand, a fund company would prefer to maximize its value as it has an incentive to take actions that increase the inflow of investments.

This study uses a semi-parametric model to estimate the shape of the flow-performance relationship for a sample of growth and income funds observed over

the 1982-92 period. The shape of the flow-performance relationship creates incentives for fund managers to increase or decrease the riskiness of the fund that are dependent on the fund's year to date returns. The study shows that the fund managers do alter the riskiness of fund portfolios at the end of the year which is consistent with these incentives.

## 2.2 Investment Strategies of Unit Trust Funds

Grinblatt, Titman, and Wermers (1995), which focus on the behaviour of institutional managers, show they have a tendency to buy stocks based on the past performance. They tend to buy and sell the same stocks at the same time in excess of what one would expect from pure chance. The average level of herding and momentum in investing was statistically significant but not particularly large. However, there was a significant degree of cross-sectional dispersion across funds in their tendency to buy past winners and to trade with the herd.

Besides, this study also shows that the tendency of individual funds to buy past winners and herding was shown to be highly correlated with fund performance over period of study. On average, those funds following momentum strategies realised significant excess performance while contrarian funds realised virtually no performance. The relation between a fund's tendency to go with the herd and its performance was less convincing and it largely disappeared after controlling for the fund's tendency to buy past winners.

This provides useful info about the extent to which unit trust funds are able to profit from their security analysis efforts. The positive relation between momentum trading and performance suggests that the positive performance of unit trust funds observed may have been at least partially generated by a simple trading rule rather than by superior information.

The investment strategy might change from time to time when new fund manager replace the previous fund manager. The results from Wu, Dangi, and Zechner (2006) show that product market forces introduce strong incentives to replace poorly performing managers of open ended funds, even if it is costly to do so. The study develops a continuous time model in which a portfolio manager is hired by a management company. On the basis of observed portfolio returns, all agents update their beliefs about the manager's skills. In response, investors can move capital into or out of the unit trust fund, and the management company can fire the manager.

The analysis in the study rationalises several empirically documented findings, such as the positive relation between manager tenure and fund size, the decreasing probability and performance sensitivity of manager replacement over manager tenure, and the increase of portfolio risk before manager replacement followed by a subsequent risk decrease. The analysis predicts that the critical performance threshold that triggers firing increases significantly over a

manager's tenure and that management replacement are accompanied by capital inflows when a young manager is replaced but may be accompanied by capital outflows when a manager with a long tenure is fired.

### 2.3 Overall Fund Performance

In general, the literature suggests that managers of domestic funds have poor timing ability and poor overall performance. Sharpe (1966) and Jensen (1968) have evaluated the overall performance of the unit trust funds with their own techniques in the early stage. Ippolito (1989) has examined the relationship between the investment performance and its fund characteristics. Treynor and Mazuy (1966) have studied the market timing ability of unit trust fund managers.

The findings from Kao, Cheng and Chan (1998) show the international fund managers have good selection and overall performance. The fund managers of Pacific, Foreign and World funds have good selectivity and overall performance. However, managers of European funds under perform those of other fund groups. Besides, the selection ability and the market timing ability of international unit trust fund managers are negatively correlated. However, Cumby and Glen (1990) which was the earliest studies on the U.S. based international funds, did not found any superior overall performance. The most recent study from Droms and Walker (1994) which applied the Jensen's performance index also did not detect above average performance for the international funds.

Besides, a study by Kahn and Andrew (1995) which investigating the persistence of unit trust fund performance indicates that investors cannot pick the future winners solely based on the past performance. The study used style analysis to separate fund total returns to style and selection components. Performance was defined in terms of total returns, selection returns, and information ratios. For each fund type, two out-of-sample periods were established to investigate persistence of performance from one period to the next using regression analysis and contingency tables. The result from this study supported that the persistence only for available on fixed-income fund performance.

Chen, Jegadeesh and Wermers (2000) showing that the stocks widely held by the unit trust funds do not outperform the general population of stocks. However, stocks purchased by funds have significantly higher returns than stocks they sell, for large stocks as well as small stocks, and for value stocks as well as growth stocks. Besides, growth-oriented funds exhibit better stock selection skills than income-oriented funds. However, the study only found weak evidence that unit trust funds with the best past performance have better stock selection skills than funds with worst past performance.

Any superior information that unit trust funds might possess is fairly short lived. The stocks that they buy outperform the stocks they sell for only the first year following the trades. The fact that unit trust funds often hold stocks longer than

one year indicates that they often avoid selling stocks from their portfolios because of transaction cost considerations, or that they have only limited abilities in finding new, under priced stocks to buy.

Chen, Jegadeesh and Wermers (2000) has took a different approach and examine the performance of the individual stocks held in fund manager portfolios compare to earlier studies which generally stated that the net returns of the active fund manager industry does not outperform a passive benchmark. The study report results consistent with fund managers having the ability to choose stocks that outperform their benchmarks before any expenses are deducted. As this result stands in direct contrast to the long-standing evidence from traditional performance studies, which suggest fund managers do not possess superior information, it is somewhat controversial and has not been without criticism. Chen, Jegadeesh and Wermers (2000) also argue an examination of the trades as opposed to the holdings of each fund manager is a more powerful metric to determine the existence of superior information.

However, Pinnuck (2003) shows the performance of stocks held by U.S. unit trust funds were found they realize abnormal returns. The study employing a unique dataset that examine the performance of the monthly stock holdings and trades of a sample of Australian fund managers. When stock holdings are observable, performance measures can be constructed that are more precise than traditional fund manager performance measures. It is found that the stocks held by fund



managers realize abnormal returns consistent with some stock selection ability across fund managers. Examining the performance of their individual trades, it is found that the stocks they buy realize abnormal returns whereas for sell trades are found no evidence of abnormal returns. Overall, the results suggest fund managers have the ability to select stocks that realize positive abnormal returns thus providing out-of-sample support for this phenomenon.

The findings from Kosowski, Timmermann et al. (2006) were also differing from many past studies. The study was using a new bootstrap statistical technique to assess the performance of the unit trust funds in U.S. from 1975 to 2002. The bootstrap approach shows that there is a sizable minority of fund managers are able to select stock well and provide returns which enough to more than cover their costs. Besides, the superior alphas of these managers also persist.

#### 2.4 Performance and Fund Characteristics

The study done by Droms and Walker (1994) is using the Treynor method for the comparison and measure the investment performance of International Unit trust Fund. Droms and Walker (1994) are examining the relation between investment performance and asset size, expense ratios, portfolio turnover and load / no-load status. It explores the extent to which International Equity Funds earn excess risk adjusted returns when compared with three benchmarks: U.S. equity market returns, non-U.S. equity market returns and world equity markets. The study

results find that no reward for paying a load fee when investing in unit trust funds. Since load charges are employed solely to compensate salespersons and do not contribute to investment performance, this result is consistent with market efficiency. Unit trust funds in the aggregate, whether load or no-load, earn comparable returns. The data do not support the common marketing argument that load funds result in incentives for better investment performance.

Accordingly Rao (2000), the expense ratio is the percentage of fund assets paid for operating expenses and management fees, including administrative fees, and all other asset-based costs incurred by the fund, except brokerage costs. Fund expenses are reflected in the funds NAV. Sales charges are not included in the expense ratio. The expense ratio is useful because it shows that actual amount that a fund takes out of its assets each year to cover its expenses. Investors should note not only the current expense-ratio figure, but also the trend in these expenses. It could prove useful to know whether a fund is becoming cheaper or more costly. As for the turnover ratio is a measure of the funds trading activity which is computed by taking the lesser of purchase or sales and dividing by average monthly assets. A low turnover figure would indicate a buy and hold strategy. High turnover would indicate in the investment strategy involving considerable buying and selling of securities.

The study from Malkiel (1995) was related to the returns from investing in equity unit trust funds. Yearly returns from the equity unit trust funds from 1971 to 1991

were used in the calculation. The study tends to confirm the original Jensen conclusion that unit trust fund managers do not outperform the market in general. The positive average alphas that we have found for fund pre-expense returns appear to offer some confirmation of the findings of Ippolito (1989) that unit trust funds do earn gross returns sufficient to cover the management expenses. Moreover, the unit trust investors generally do not find getting their money's worth from the expenditures incurred in the management of unit trust funds, even when expenditure data is limited to funds spent for investment advice. It is also agreed by the study from Grinblatt and Titman (1994) that found evidence of abnormal returns and persistence of performance using five year investment returns, but such persistence does not seem strong enough to be useful in forming investment strategies.

Study from Dahlquist, Engstrom and Soderlind (2000) which examine the relationship between fund performance and fund attributes in the Swedish also confirm that good performance occurs among small equity funds, low fee funds. The results from the study show that the performance is negatively related to the management fee, where the unit trust funds which incur a high management fee will tend to under perform relative to low management fee funds. However, the high fee funds generally were performed better than low fee funds before the management fees are deducted. This suggests that the high fees or expensive management fees may generate good performance but it is not enough to cover the management fees. Besides, the study also found that actively managed

equity funds were performed better than passively managed funds. Large equity funds will tend to perform less well than small equity funds.

While the purchase decisions of unit trust fund investors are often linked to fund performance, academic research points to the fact that past unit trust fund returns are poor predictors of future returns in the long run. Furthermore, investment returns represent one of the unpredictable aspects of investing, and, in general, most previous studies with few exceptions have found either negative performance or no performance for average unit trust funds. It is also consistent with the previous findings from Kim (1975) that unit trust funds are generally achieved a poor performance record. It may be observed with or without adjusting for the difference in risk assumed by the funds and benchmark portfolios. If zero costs were assumed for generation of the standards, virtually all unit trust funds were outperformed by their benchmark portfolios. When a liberal cost allowance was made for the diversification services offered by the unit trust funds, on the basis of the returns per unit risk, almost 90% of the unit trust funds were outpaced by their benchmark portfolios. It also indicates that the big losers will turned out to be the unit trust funds that assumed high level of risk.

Based on the study done in Malaysia context, Low (2008) that based on a sample of 65 Malaysian unit trust funds pointed out that management expense ratio is negatively and significantly correlated with fund size, fund family, beta, and fund objective. Fund expenses are important determinants of fund returns.

Besides, these expenses constitute a continual drain on fund performance. It is becoming more relevant than ever for investors to know the factors that could influence fund expense ratio. The data used include management expense ratio of the fund, investment objective, fund size, age, portfolio turnover ratio, the number of funds under management, and the beta of the fund. The results show that larger funds have lower expense ratios than smaller funds due to economies of scale. The findings seem to suggest that while costs are an important consideration for investors in choosing a fund, in general, investors often overlook fund-operating expenses when buying unit trust funds. It also suggested that frequent portfolio turnover will leads to high expense ratio. Therefore, large funds tend to trade less frequently.

## 2.5 Fund Performance and Investment Style

The investment style of a unit trust fund is not always clear for investors not acquainted with its manager or the philosophy of the fund family it belongs to. Due to the large number of unit trust funds these days, it is almost impossible for an investor to grasp all information regarding their investment styles. Although the investment style of a unit trust fund potentially has many dimensions, its sensitivities to risk factors are the most relevant for investors.

The investment style, which based on the investment objective, it is conclude that there is no significant difference between two different styles. According to

Fernandez and Carlos (2008), style analysis is a widely used methodology in the literature on performance and enables comparison to be made between the efficiency of funds with different investment objectives. It analyzes a sample of unit trust funds with different investment objectives. Style analysis was an appropriate method for performance measurement. The study has used the multifactor regression model with style benchmarks to obtain the annual financial performance of Spanish unit trust funds. The sample period analysed is from 30 June 1998 to 30 June 2001, with the total sample of 2,064 funds, out of which only 13 are marketed as ethical and solidarity funds. Thus the study carried out two comparative analyses on the ethical investment fund and conventional fund performance. In the latter case the bootstrap method was used.

The results obtained indicate that in aggregate the funds do not outperform the market, a finding which supports the efficient markets theory. Besides, the study also found that the aggregate results weighted by assets are better than those obtained with equal weights, which points to possible economies of scale. On the other hand, there are differences between the performance of individual funds, doubtlessly due to the diversity of fund managers and a possible evolution of the fund industry to a more competitive market.

The study from Swinkels, L., and Sluis, P. J., (2006) which focus on the estimation of unit trust fund styles by return-based style analysis, found that often the investment style is assumed to be constant through time. Alternatively, time

variation is sometimes implicitly accounted for by using rolling regressions when estimating the style exposures. The former assumption is often contradicted empirically, and the latter is inefficient due to its ad hoc chosen window size. The Kalman filter was used to model time-varying exposures of unit trust funds explicitly. This leads to a testable model and more efficient use of the data, which reduces the influence of spurious correlation between unit trust fund returns and style indices.

Several stylised examples indicate that more reliable style estimates can be obtained by modeling the style exposure as a random walk, and estimating the coefficients with the Kalman filter. The differences with traditional techniques are substantial in these stylized examples. The results from the empirical analyses indicate that the structural model estimated by the Kalman filter improves style predictions and influences results on performance measurement.

Besides, the ability to diversify also does not guarantee the fund will perform better. As highlighted by the Kaushik (2008), the study results show that the average small holding fund does not outperform the S&P 500 index. Actively managed unit trust fund performance has shown that the average well-diversified unit trust fund underperforms passive market benchmarks after adjusting for risk, expenses and trading costs. The underperformance found is largely explained by unit trust fund expenses and transactions costs, and to a lesser extent the underperformance of non-stock holdings. Fund managers who manage portfolios

with few holdings are conjectured to have a better understanding of those stocks and, therefore, are more informed to deliver higher returns compared with managers of large-holding, more diversified portfolios. This would be the result of following the Warren Buffett investment style. The obvious expected benefit to this structure would be higher returns, lower transactions costs and perhaps expenses, because there will be fewer stocks to trade and fewer stocks to research. On the other hand, a smaller number of holdings imply less diversification and higher idiosyncratic risk.

Therefore, based on the literature reviews, it shows that the equity funds that may incur higher cost the other type of funds due to more complicated investment environment and situation when managing the investment funds that invest in stock market. These funds will expose to greater volatility and the investors might generally expect for higher returns. Although, the equity funds able to generate better returns due to bigger opportunities and ability of diversification, but it is perceived to be underperformed after include management fees and calculate the risk-adjusted returns.

## 2.6 Fund Performance and Monetary Control Policy

The academic research has touted the benefits of international portfolio diversification arguing the U.S. investors could improve their risk-returns profiles by purchasing international equities. The potential benefits of international



diversification have resulted in increased individual investor interest in international unit trust funds. However, Johnson, Buetow, and Jensen (1999) suggest that these benefits may be less than previous studies indicate. Specifically, during restrictive US monetary policy periods, international unit trust funds indexes provide lower excess returns than domestic counterparts. Additionally, the correlations between international and domestic unit trust funds are higher during restrictive monetary policy periods. These findings suggest that the investors adopt a tactical asset allocation strategy that reduces these effects during restrictive environments.

Study from Bello (2009) also show that the federal funds premium, the market risk premium, and the lagged mutual-fund-risk premium all emerge as the best and most consistent predictors of unit trust returns. The default-risk premium and term premium are found to be good but less consistent as predictors of unit trust fund. This study use common indicators of business and monetary conditions, the lagged mutual-fund-risk premium, and the market-risk premium, to predict mutual-fund returns for a time horizon of one-month. In isolation, each of the five predictors significantly forecast mutual-fund returns from April 1991 to March 2006. The indicator of monetary conditions, i.e. the federal funds premium, is found to have the strongest forecast power. Multivariate analyses confirm that the five predictors are indeed strong forecasters of unit trust fund returns.

Similarly to Jensen and Johnson (1995), Jensen, Mercer, and Johnson (1996), investigate the relation between stock and bond returns and the alternative indicators of monetary conditions, including changes in the federal funds rate, the federal funds premium, the term premium, et cetera. Jensen, Mercer and Johnson (1996) find that the behaviour of business conditions proxies is affected by monetary policy and that monetary developments are associated with security return patterns. They investigate the impact of monetary influences on security returns in the presence of three business conditions proxies including dividend yield, default premium and term premium. The study show that expected stock and bond returns move together across changing business conditions and that the three variables are all related similarly to both stock and bond returns. It is argued that these relations depend on the monetary environment.

Jensen and Johnson (1995) challenge that monetary stringency affects required returns. Similarly, Jensen, Mercer, and Johnson (1996) find that term premium, default premium, and dividend yield can forecast expected returns. They also find that default premium and term premium are significantly higher when the Federal Reserve is following an expansive monetary policy than during restrictive policy, and that stock and bond returns are significantly higher during expansive policy and negative during restrictive periods.

## 2.7 Performance Evaluation Techniques

Besides the Morningstar, many studies on measuring the performance of the unit trust funds were based on Jensen's measure (1968), Sharpe (1966) and Treynor (1965). Jensen's measure assumes that the relevant risk is systematic risk and measures excess returns at a given level of systematic risk. The Sharpe ratio assumes that the relevant risk is total risk and measures excess returns per unit of total risk. The Treynor measure assumes that the relevant risk is systematic risk and measures excess returns per unit of systematic risk. Jensen's measure is using the below equation:

$$R_{jt} - RFR_t = \alpha_j + \beta_j[R_{mt} - RFR_t] + e_{jt}$$

The  $\alpha_j$  indicates whether a manager has superior ( $\alpha_j > 0$ ) or inferior ( $\alpha_j < 0$ ) ability in market timing or stock selection, or both. As suggested above, Jensen defines superior (inferior) performance as a positive (negative) difference between a manager's actual returns and his CAPM-based required returns. For poorly diversified funds, Jensen's rankings would more closely resemble Treynor's. For well-diversified funds, Jensen's rankings would follow those of both Treynor and Sharpe. By replacing the CAPM with the APT, differences between funds' actual and required returns or alphas could provide fresh evaluations of funds.

According to Amin and Kat (2003), Jensen's measure was introduced in Jensen (1968) and equals the intercept of the regression,  $(R_h - R_f) = \alpha + \beta (R_i - R_f) + e_h$ ,

where  $R_y$  is the fund returns,  $R_f$  is the risk-free rate, and  $R_i$  is the total returns on the market index. Like the Sharpe ratio, Jensen's measure is rooted in the CAPM. According to the CAPM, in equilibrium all (portfolios of) assets with the same beta will offer the same expected returns. Any positive deviation therefore indicates superior performance. Jensen's measure also has a more practical interpretation for comparing the fund returns, through the fund beta, with the returns on an investment benchmark portfolio.

If the average fund returns is significantly higher than one would expect given the fund beta and the average benchmark returns, we speak of superior performance. The above reasoning is easily extended to the case of multiple benchmarks, which can be justified in an APT context. The benchmark portfolios can be fairly standard, such as in Sharpe (1992), for example, but they can also be explicitly constructed to capture observed non-linearities. One way to extend the span of one or more benchmarks from purely linear to non-linear is to include a number of ordinary put or call options on those benchmarks into the return-generating process.

The study from Grinblatt and Titman (1994) highlighted that using Jensen's measure to evaluating portfolio performance has been the subject of a great deal of controversy. The controversies are such as benchmark efficiency, timing, and statistical power. The benchmark efficiency is that the CAPM approach to performance evaluation requires the use of a benchmark portfolio. Performance

evaluation with these methods is likely to be sensitive to the benchmark choice. In particular, benchmarks that are mean-variance inefficient provide erroneous inferences. The well-known size and dividend-yield biases, documented in tests of the CAPM, provide one set of recipes for managers who wish to game an evaluation with CAPM-based benchmarks. As for the timing controversy is that there is a statistical bias in Jensen's evaluation technique that arises whenever an evaluated portfolio successfully times the market. This bias can result in successful timers generating negative performance numbers, even in large samples. The final source of controversy which is the statistical power are refer to the portfolio returns are noisy, which makes it difficult to detect abnormal performance when it exists.

The study from Amin and Kat (2003) also stated although that over the years much academic work has been done in this area, practitioners typically use either one of two performance measures: the Sharpe ratio and Jensen's measure. The first measure was introduced in Sharpe (1966) and is calculated as the ratio of the average excess returns and the returns standard deviation of the fund that is being evaluated. As such it measures the excess returns per unit of risk. Assuming all asset returns to be normally distributed, the CAPM tells us that in equilibrium the highest attainable Sharpe ratio is that of the market index. A ratio higher than that therefore indicates superior performance.

In more general terms, the market index's Sharpe ratio represents the set of returns distributions that is obtained when statically combining the market index with cash. With the market index being highly diversified, these distributions offer the highest achievable expected returns for every possible standard deviation. If a fund produces a returns distribution with an expected returns lower than that of a similar (in terms of standard deviation) distribution from this set, the fund is deemed to be inefficient and the other way around.

According to Douglas (2007), the application of the Sharpe index to rank the unit trust funds and hedge funds were very useful since the implicit pairwise comparisons in these orderings have little inferential value on their own. The pairwise comparisons of the funds' Sharpe index are made using the two-sample statistic. The Sharpe index is a measure of risk-adjusted performance. It measures the average excess returns of a stock or fund relative to its volatility as measured by its standard deviation. Thus, Sharpe index will provide a measure of returns per unit of volatility.

Sharpe index not only will score higher for higher returns but also will score higher (lower), all else equal, under less (more) volatility. Many thousands of times every week, around the globe, the performance of funds and fund managers is ranked according to their Sharpe index. It is a widely done in practice that the unit trust funds are ranked by Sharpe index. Besides, Reilly and Drzyeimski (1974) stated that Sharpe index has shown that a stock's unique risk

such as in terms of its price variability can be diversified away in any reasonably efficient portfolio.

Treynor (1965) divided a fund's excess returns or returns less risk-free rate by its beta. For a fund that is not completely diversified, Treynor's "T" value will understate risk and overstate performance. Sharpe (1966) divided a fund's excess returns by its standard deviation. Sharpe's value will produce evaluations very similar to Treynor's for funds that are well diversified.

## 2.8 Survivorship Bias

While measuring for the performance of the unit trust funds, it is important to note that there will be a survivorship bias which is an important concern for unit trust funds. According to the study done by Capocci, Corhay and Hubner (2005) either surviving or dissolved funds, the yearly returns of unit trust funds can experience very high returns when the stock market is having a sharp positive returns. However the returns will gradually reduce in the subsequent years but mostly due to the negative returns of the dissolved funds.

According to Fung, W., and Hsieh (2000), typically, unit trust data sold by database suppliers only contain information for funds that are still operating. The same is true of Morningstar's unit trust fund database. The rationale appears to

be based on the assumption that subscribers to these data services are only interested in funds that accept new capital.

Databases that contain only the funds that are still in operation will create some potential biases. It is common practice to separate between the "surviving" funds and "defunct" funds. Surviving funds are refers to the funds that are still operating and reporting information to the database sellers at the end of the data sample. Defunct funds are refer to the funds that have left the database due to various reasons such as bankruptcies, liquidations, mergers, name changes, and voluntary stoppage of information reporting. If the funds become defunct due to poor performance, then the historical performance of surviving funds will have an upward-biased measure of the experience of a typical unit trust funds investor, who would have invested in both surviving and defunct funds.

This survivorship bias has also been well documented in the unit trust fund literature such as Malkiel (1995) and Brown, Goetzmann, Ibbotson and Ross (1992). According to Malkiel (1995), the commonly employed data sets of unit trust fund returns typically show the past records of all funds currently in existence. It is because investors are not interested in the records of funds that no longer exist. This creates the possibility of significant biases in the returns figures calculated from most of the data sets employed in the literature. A unit trust fund that accepts very high risk will have a high probability of failure. If,



however, that fund survives, this implies that the fund took a large bet and won. High returns will tend to persist, since funds whose bets were unsuccessful will tend to drop out of the sample.

Unit trust funds that have taken bets against the market that proved to be unsuccessful do not tend to survive. It is very difficult to sell a unit trust fund to the public that has a poor record. Unit trust fund complexes will typically allow the fund to suffer a painless death by merging the fund into one of the more successful funds in the complex, thereby burying the fund's bad record with it. Thus, there will be a tendency for only the more successful funds to survive, and measures of the returns of such funds will tend to overstate the success of unit trust fund management.

Study from Brown, Goetzmann, Ibbotson and Ross (1992) show that the truncation by survivorship gives rise to an apparent persistence in performance where there is dispersion of risk among money managers. Standard risk-adjustment technology, which adjusts for single factor  $\beta$  risk, may not suffice to correct for this effect. A numerical example shows that this effect can give rise to a substantial probability that statistical tests based on risk-adjusted returns data will give rise to the false inference that there is in fact dependence in security returns.