Portfolio Performance Evaluation: Investment Corporation of Bangladesh

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Abstract

The number of mutual funds which are professionally managed is increasing in the financial arena. With time the importance of portfolio performance measurement tools are really booming since investors will always like to choose fund managers on a comparative basis. The influence of traditional portfolio measurement tools are also waning with the enhanced level of competition. This very research paper had evaluated the ICB fund manager's performance on a timeline basis based on the traditional techniques of measuring the performance of portfolio. It was revealed that the performance of the ICB portfolio is satisfactory if not extraordinary. Much of the underperformance can be attributed to the structural rigidity of the organization.
Keywords: Sharpe index, Treynor index, Jensen Alpha, Fama decomposition, NAV

Introduction

The Investment Corporation of Bangladesh (ICB) was established on October 1, 1976 under "The Investment Corporation of Bangladesh Ordinance, 1976" (XL of 1976). The establishment of ICB was a major step in a series of measures undertaken by the Government to accelerate the pace of industrialization and to develop a well organized and vibrant Capital market particularly securities market in Bangladesh. ICB caters the need of institutional support to meet the equity gap of the companies. In view of the national policy of accelerating the rate of savings and investment to foster self-reliant economy, ICB assumes an indispensable and pivotal role. This very research paper has tried to evaluate the performance of the portfolio managed by ICB in terms of various traditional portfolio performance measurements like Sharpe index, Treynor index, Jensen Alpha and Fama decomposition. The researcher has also tried to sort out the relationship between the NAV of the mutual fund and the stock market performance of the mutual fund. The researchers had largely constrained their analysis to the capital gain portion of the return and the stock market performance of the portfolio manager.

Literature review

There are several ways to proceed for portfolio return calculation, depending on the area that we are seeking to evaluate. There are different methods that allow capital movements to be taken into account by introducing the basic formula for calculating the return on a portfolio. In the setting of performance measurement, the frequency to which the portfolio is evaluated is also an important choice (Blake and Timmermann, 1998). In recent years it has become more and more commonplace for investment performance attribution analysis to be carried out with a daily observation periodicity. It explains that the justification given for changing to daily observation frequency from longer periods (such as months) is that these analyses are believed to be better equipped to accurately reflect the actual investment returns on a fund and such beliefs are based on a series of operational, mathematical and statistical assumptions that are demonstrably false (DiBartolomeo, 2003).

Applying typical attribution methods to daily data leads to analytical conclusions that are highly biased and unreliable and details this argument. For example, manager evaluation is normally performed using time-weighted returns (TWR) that are computed to remove the effect of cash flows. There is chance of information lost by using a TWR, and the more frequently the TWR is calculated, the more information may be lost. In that case, daily analysis can be regarded as less useful than monthly analysis (Darling and MacDougall, 2002). High frequency monitoring may have the positive effect of reducing perverse manager behavior such as end-of-year window dressing and tournament-induced changes in risk levels. However, more frequent investment performance monitoring also influences the distribution of observed excess returns (Dimson and Jackson, 2001). Performing industry-standard attribution procedures on a daily basis may lead to analytical conclusions that are likely to be biased and unreliable, leading to inappropriate management actions with respect to investment portfolios. These measures evaluate funds' risk-adjusted returns, without any reference to a benchmark (DiBartolomeo and Witkowski, 1997).

IRR equation analytical approximation method for calculating the internal rate of return, using linear separation of performance measurement methods into money-weighted and time-weighted rates of return is somewhat artificial. In fact, the time-weighted rate of return presently adopted as the CFA Institute standard is derived from the money-weighted rate of return as a particular approximation (Chestopalov and Beliaev, 2004). High-frequency monitoring sometimes danger is the way it might be used by investors who do not understand how to interpret such figures. Judgments about manager skill may be distorted by frequent monitoring. So it is important that investors recognize the impact of high frequency monitoring on the frequency with which they observe seemingly extreme performance events (Marsh, 1991).

This ratio measures the return of a portfolio in excess of the risk-free rate, also called the risk premium, compared to the total risk of the portfolio, measured by its standard deviation. It is drawn from the capital market line, and not the Capital Asset Pricing Model (CAPM). It does not refer to a market index and is not therefore subject to criticism concerning the fact that the market portfolio is not observable (Roll, 1977). Since this measure is based on the total risk of the portfolio, made up of the market risk and the unsystematic risk taken by the manager, it enables the performance of portfolios that are not very diversified to be evaluated. This ratio has been subject to generalizations since it was initially defined. It thus offers significant possibilities

for evaluating portfolio performance, while remaining simple to calculate. The most common variation on this measure is replacing the risk-free asset with the benchmark ratio. The measure is then called the information ratio (Sharpe, 1994).

This ratio is drawn directly from the CAPM. All the indicators measure the relationship between the return on the portfolio, above the risk free rate, and its systematic risk. Calculating this indicator requires a reference index to be chosen to estimate the beta of the portfolio. The results can then depend heavily on that choice, a fact that has been criticized by Roll. The Treynor ratio is particularly appropriate for appreciating the performance of a well-diversified portfolio as it only considers the systematic risk for calculation. It is also for this reason that the Treynor ratio is the most appropriate indicator for evaluating the performance of a portfolio that only constitutes part of the investor's assets (Treynor, 1965). Treynor's index states that beta is a composite measure generated by combining the expected asset returns from the traditional CAPM and the mean-lower partial moment CAPM. The argument is that valuable information missing from one model may be captured by the other model. A taste has been incorporated on U.S.-based international funds and found that the composite beta is a statistically significant and meaningful parameter. They also ranked the performance of the funds using the Treynor index with three models (the CAPM, the mean-lower partial moment CAPM and a combination of the two), but their sample, which was made up of 15 funds, was too small to test whether the difference in ranking obtained with the different models was significant (Srivastava and Essayyad,1994).

Jensen's alpha is defined as the differential between the return on the portfolio in excess of the risk-free rate and the return explained by the market model. The statistical significance of alpha can be evaluated by calculating the t-statistic of the regression, which is equal to the estimated value of the If the alpha values are assumed to be normally distributed, a t-statistic greater than two indicates that the probability of having obtained the result through luck, and not through skill, is strictly less than 5%. In this case, the average value of alpha is significantly different from zero. Alpha divided by its standard deviation. This value is provided with the results of the regression (Jensen, 1968). The Jensen measure is subject to the same criticism as the Treynor measure where the result depends on the choice of reference index. In addition, when managers practice a market timing strategy, which involves varying the beta according to anticipated movements in the market, the Jensen alpha often becomes negative, and does not then reflect the real performance of the manager (Henriksson and Merton, 1981).

In this version of the CAPM was developed because two of the model's assumptions were called into question: the existence of a risk-free asset, and therefore the possibility of borrowing or lending at that rate, and the assumption of a single rate for borrowing and lending Black states that CAPM theory was still valid without the existence of a risk-free asset, and developed a version of the model by replacing it with an asset or portfolio with a beta of zero. Instead of lending or borrowing at the risk-free rate, it is possible to take short positions on the risky assets (BlacK, 1972).When any manager thinks that he possesses particular stock-picking skills, he can attempt to construct a portfolio with a higher return for the fixed level of risk. This measure is called total risk alpha (TRA) who notice that both this measure and the Jensen alpha can be

easily manipulated by means of leverage (Scholtz and Wilkens, 2005).The non-parametric version of the model is older, and does not use the CAPM. It was developed by Merton (1981) and uses options theory. The principle is that of an investor who can split his portfolio between a risky asset and a risk free asset, and who modifies the split over time, according to his anticipations on the relative performance of the two assets. If the strategy is perfect, the investor only holds stocks when their performance is better than that of the risk-free asset and only holds cash in the opposite case (Merton, 1981). The Jensen measure has been subject to numerous criticisms, the main one being that a negative performance can be attributed to a manager who practices market timing present a decomposition of the Jensen measure in three terms: a term measuring the bias in the beta evaluation, a timing term and a selectivity term. As we mentioned above, this comes from the fact that the model uses an average value for beta, which tends to overestimate the portfolio risk, while the manager varies his beta between a high beta and a low beta according to his expectations for the market (Grinblatt and Titman, 1989).

Methodology

The core objective of this research paper was to evaluate the portfolio performance of the ICB over an extended seven years time frame starting from 2004's July to 2011's June. Since the core focus was to evaluate the portfolio performance of ICB portfolio different performance measurement techniques like Treynor's composite performance measure, Sharpe's portfolio performance measure, Jensen's alpha, Fama proposed decomposition technique have been used by the researchers. Moreover, as per the research objectives we have tried to associate the net asset value of ICB with the stock market performance of ICB to understand the phenomenon how the shareholders are incorporating the portfolio performance in stock market terminology.

Portfolio's performance was reflected in the return earned by the portfolio managers of the ICB. For calculating the return the researcher had went for the market value based return using the year beginning market value of the portfolio and the year end market value of the portfolio. Shares, debentures, preference shares – had been the ingredients of the portfolio – financial instruments which could be bought and sold readily. Since ICB is a government agency and had to take unwanted (from profit-making sense) market making initiatives, only tracking the market portfolio position will certainly fail to provide the researcher a true picture of portfolio performance. That is why, as an alternative mechanism the researchers had gone for the NAV based performance evaluation over the seven years time frame. Certainly it is a much better measurement of portfolio performance since it tracks the cash management, treasury functionality of the fund along with the capital market performance. The NAV of the firm had been calculated by extracting the total market value of all the asset classes less the value of the liability and then dividing the subtracted value by the number of shareholdings. As a portfolio return proxy the researchers had went for the percentage change in the NAV that had been at the beginning of the year and at the end of the year. Now, the researchers want to focus on the portfolio performance measurement techniques.

Treynor's measurement for portfolio evaluation calculates T value for each of the portfolio – where T refers to the division result of excess return earned by the particular portfolio by the

systematic risk level of the portfolio. The underlying assumption is that the evaluated portfolio is completely diversified and most importantly systematic risk level is the most relevant risk measure. Regardless of the investor's risk preference – larger the T value – larger will be the slope and better will be the performance of the portfolio manager. If the portfolio has a higher T value than the case with the market portfolio than the portfolio will be plotted above the security market line (SML) revealing superior performance in risk adjusted sense. For calculating the extent of systematic risk measurement in the ICB portfolio the researchers had opted for the beta of ICB portfolio for the seven years. The excess return is the difference between the actual return of the portfolio and the historical risk free rate – which was basically the 91- day T-bill rate for the relevant time horizon. Academically going, the beta (measurement of systematic risk in the well diversified portfolio) for the market portfolio was considered to be 1. For calculating the beta for ICB portfolio the researchers had to use the month-end price for ICB and the month-end DSE General Index value (as a proxy for the market portfolio). By calculating the monthly unrealized return of the ICB stock and for the index the researchers calculated the covariance and the variance of the market return.

Sharpe's measurement for portfolio evaluation calculates S value for each of the portfolio – where S refers to the division result of excess return earned by the particular portfolio by the total risk level of the portfolio. The underlying assumption is that the evaluated portfolio is not completely diversified and most importantly both systematic risk level and unsystematic risk level are relevant risk measure. Regardless of the investor's risk preference – larger the S value – larger will be the slope and better will be the performance of the portfolio manager. If the portfolio has a higher S value than the case with the market portfolio than the portfolio will be plotted above the capital market line (CML) revealing superior performance in risk adjusted sense. For calculating the extent of total risk measurement in the ICB portfolio the researchers had opted for the standard deviation of ICB portfolio for the seven years. The excess return is the difference between the actual return of the portfolio and the historical risk free rate – which was basically the 91- day T-bill rate for the relevant time horizon. Academically going, the standard deviation (measurement of total risk in the well diversified portfolio) for the market portfolio was considered to be varying. For calculating the standard deviation for ICB portfolio and the market portfolio the researchers had to use the month-end price for ICB and the month-end DSE General Index value (as a proxy for the market portfolio). By calculating the monthly unrealized return of the ICB stock and for the index the researchers calculated the standard deviation for the market and for ICB.

The historical realized return for a portfolio should be a linear function of the historical risk-free rate and the realized risk premium earned by that very portfolio which actually depends on the systematic risk level of that portfolio with minute adjustments reflected in the error term. As per Jensen measurement is concerned - an intercept will be unexpected for a regression based time series model if the portfolio was in equilibrium. A positive and significant alpha or intercept in the regression model will be an indication for superior portfolio performance on the portfolio manager's perspective in terms of stock selection and market timing. On the other hand, a negative and significant alpha or intercept in the regression model will be an indication for inferior portfolio performance on the portfolio manager's perspective in terms of stock selection and market timing. In a nutshell, alpha in Jensen measurement is an indication of the extent of

rate of return of the portfolio which can solely be attributable to the portfolio manager's ability in deriving the risk-adjusted above-average return. For calculating the alpha the researchers had to form a regression using the ICB portfolio's realized excess return as the dependent variable and the realized systematic risk adjusted market risk premium as the independent variable. For calculating the beta for ICB portfolio the researchers had to use the month-end price for ICB and the month-end DSE General Index value (as a proxy for the market portfolio). By calculating the monthly unrealized return of the ICB stock and for the index the researchers calculated the covariance and the variance of the market return. Market return referred to the yearly enhancement enjoyed by the DSE General Index. The excess return is the difference between the actual return of the ICB portfolio and the historical risk free rate – which was basically the 91-day T-bill rate for the relevant time horizon. The significance of the Alpha had been tested in a 5% level of significance.

Fama had suggested a breakdown for tracking portfolio performance which is finer from every perspective. Here, the overall excess return earned by a portfolio is tracked down into two major segments – the return which is due to the risk consumption purpose and the return generated for the portfolio manager's stock selection skill. By multiplying the market risk premium by the respective beta – the researcher derived risk adjusted return for ICB – the return for assuming the systematic risk reflected in the manager's target risk exposure. Since ICB did not provide portfolio management service at the retail level, there was no concept like investor's selected target beta level. Later on, selectivity based return was decomposed into two segments– return as a compensation for the loss of diversification and the return generated for the stock selection skill by the ICB portfolio managers.

Later on, for checking out stock market investor's belief regarding the portfolio management skill of the ICB portfolio managers – the researchers had gone for regression analysis where ICB - NAV had been the independent variable and ICB – stock price had been used as the dependent variable. Academically, the value for the regression co-efficient should be 1 or closer to 1 – an indication of proper market pricing. Regression co-efficient significantly above 1 is an indication of market overvaluation and regression co-efficient significantly below 1 is an indication of market undervaluation. The significance of the regression co-efficient had been tested in a 5% level of significance.

Analysis

At the very first phase of the analysis, the researcher will like to put light on the conventional measurement of portfolio performance like the Sharpe and Treynor index. As it had been previously mentioned higher the Treynor index better is the performance of the portfolio manager from a risk adjusted return basis; very much the same case is true in case of the Sharpe measure since higher the Sharpe index for a portfolio better had been the performance of that portfolio manager. It had been widely evident from the below mentioned summarized table that ICB portfolio manager had been at his best during 2010-11 and the performance had been the worst during 2009-10 as reflected in the respective Treynor index. During 2010-11, for one extra unit of risk, the portfolio manager had been able to extra around the same amount of excess return for the firm; during 2009-10, the facts had been almost the opposite. On the other hand, as

per Sharpe index the performance had been really at the very best for ICB during 2009-10 and 2006-07 had been the biggest gloomy days for the mutual fund operator. During, 2009-10, for each extra unit of risk intake the portfolio manager had been successful in deriving around 1.40 unit of excess return or risk premium for the fund; whereas during 2006-07 it would have been better for the firm by not consuming the risk. Such deviation in the result as per Sharpe and Treynor index can largely be attributed to the difference in the way risk has been defined as per both the model. Whereas Treynor index assumes a completely diversified portfolio things are not the almost the contrary in case of the Sharpe measure – since Sharpe measure considers both systematic and unsystematic risk in its definition of the risk.

Year	ICB – Portfolio return	Risk-free rate	Excess return	Beta	Standard deviation	Treynor index	Sharpe index
2004-05	40%	5.04%	34.96%	0.613	41.05%	0.570	0.85
2005-06	-6.36%	5.19%	-11.55%	0.545	21.44%	-0.212	-0.54
2006-07	-71.36%	7.20%	-78.56%	-0.861	91.06%	0.912	-0.86
2007-08	25.26%	7.58%	17.68%	3.540	193.52%	0.050	0.09
2008-09	32.57%	7.66%	24.91%	1.190	94.41%	0.209	0.26
2009-2010	128.07%	7.75%	120.32%	-1.082	86.47%	-1.112	1.39
2010-11	70.69%	6.50%	64.19%	0.641	47.92%	1.001	1.34

Portfolio performance status surely changed a bit when the NAV based return had been used instead of the stock market performance dominated return that had been previously used. NAV would be a better choice for the firm a medium to evaluate the portfolio performance since due to the statutory obligation to act as a market maker the fund had to be too much indulged in the buying and selling venture focusing lesser on the longer run vision for that very firm. Moreover, NAV will be a better measurement of the portfolio performance since it depicts the portfolio performance all over the asset classes. According to the results represented in the below mentioned table the ICB portfolio manager had performed the best during 2008-09 where for adding the extra amount of risk in the portfolio the manager had been successful in generating only .68 unit of extra return. On the other hand, the last financial year – 2010-11 had been the gloomiest year since the firm's portfolio manager had failed to garner any real impact by assuming the extra layer of risk during that year. The poor show could highly be attributable to the market-making duty performed by ICB in the much turbulent time in the life of the Dhaka Stock Exchange and Chittagong Stock Exchange. As far as, Sharpe index is concerned with the best year had been the 2008-09 and the worst performance did incur during 2010-11. According to the results represented in the below mentioned table the ICB portfolio manager had performed the best during 2008-09 where for adding the extra amount of risk in the portfolio the manager had been successful in generating only .85 unit of extra return. On the other hand, the last financial year – 2010-11 had been the gloomiest year since the firm's portfolio manager had failed to garner any real impact by assuming the extra layer of risk during that year. The result

presented by the Sharpe and Treynor index had largely been symmetrical and both of these indices had depicted the superior performance during the days when the stock markets had been booming and damped performance during the days when the stock market was engulfed with rumor based volatility.

Year	ICB -NAV	NAV based return	Excess return	Treynor index	Sharpe index
2004-05	241.23	6.09%	1.05%	0.017	0.026
2005-06	278.94	15.63%	10.44%	0.192	0.487
2006-07	320.86	15.03%	7.83%	-0.091	0.086
2007-08	386.86	20.57%	12.99%	0.037	0.067
2008-09	728.17	88.23%	80.57%	0.677	0.853
2009-2010	528.06	-27.48%	-35.23%	0.326	-0.407
2010-11	413	-21.79%	-28.29%	-0.441	-0.590

Now, it is the perfect time to go for a comparative performance analysis rather than going for a stand-alone based performance analysis of ICB. ICB had never tried to follow a benchmark – not its indenture allows it to do so. Still, any successful portfolio manager should be able to beat the overall market performance on a year-to-year basis and this had to be done for long run. Now, the researcher will try to track ICB's performance in line of the market performance. It is easily depicted in the following chart that there is no real fixed pattern of comparative performance. It had been widely evident from the study that, as per the Treynor Index, ICB's portfolio manager had been successful in beating the market (depicted in the return of DSE General index) during 2004-05, 2006-07, 2008-09 and 2010-11; on the other had the market had performed far better during 2005-06, 2007-08 and 2009-10 than the case with ICB. It had been widely evident from the study that, as per the Sharpe Index, ICB's portfolio manager had been successful in beating the market (depicted in the return of DSE General index) during 2005-06 and 2010-11; on the other had the market had performed far better during 2004-05, 2006-07, 2007-08, 2008-09 and 2009-10 than the case with ICB. Moreover, the researchers had failed to pinpoint any relationship between the stock market performance and ICB portfolio performance.

Year	ICB – Treynor index	Market– Treynor index	ICB – Sharpe index	Market– Sharpe index
2004-05	0.570	.33	0.85	.89
2005-06	-0.212	-.11	-0.54	-.63
2006-07	0.912	.53	-0.86	2.41
2007-08	0.050	.26	0.09	1.32
2008-09	0.209	.09	0.26	.31
2009-2010	-1.112	1.11	1.39	3.61
2010-11	1.001	-.04	1.34	-.08

After, the performance analysis on a comparative basis and on a stand-alone basis – the researchers do feel that it is the perfect time for attributing the performance as per Fama decomposition methodology. The beta or the measurement of the systematic risk had always

varied in a significant extent for the firm – which is largely a depiction of higher stock market volatility and the same interpretation can be made for the return that had been derived by the manger for taking out the desired risk. Since ICB does not provide any sort of retail services there is no indication for investors chosen risk level for the portfolio manager in order to follow. More importantly at times the beta and the return for risk taking had been negative for the firm which is largely a depiction of portfolio insurance device. During 2008-09, the highest level of return had been achieved by the firm for taking on the systematic risk and during 2009-10; such return had been the lowest – to be more specific on a negative tone. The loss of diversification had been offsetted by extracting positive diversification effect for majority of the time frames. According to Fama, the performance of the portfolio manager can be easily attributed in his or selectivity based return – the return extracted for superior market timing and stock selection related skills. It had been widely evident that during the last financial year – 2011-11 the performance of the portfolio manager had largely been the best as per the net selectivity figure and had been the worst during 2006-07 as far as net selectivity figure goes.

Year	Excess return of ICB	Portfolio Beta	Risk-free rate	Market return	Market risk - premium	Return for risk taking	Selectivity	Diversification	Net selectivity
2004-05	34.96%	0.61	5.04%	32.89%	27.85%	17.08%	17.88%	-30.46%	48.34%
2005-06	-11.55%	0.54	5.19%	-11.30%	-16.49%	-8.98%	-2.57%	-74.14%	71.57%
2006-07	-78.56%	-0.86	7.20%	52.78%	45.58%	-39.26%	-39.30%	275.45%	-314.75%
2007-08	17.68%	3.54	7.58%	25.85%	18.27%	64.68%	-47.00%	-173.74%	126.74%
2008-09	24.91%	1.19	7.66%	9.03%	1.37%	1.63%	23.28%	-114.57%	137.85%
2009-2010	120.32%	-1.08	7.75%	111.14%	103.39%	-111.89%	232.21%	398.75%	-166.54%
2010-11	64.19%	0.64	6.50%	-3.56%	-10.06%	-6.45%	70.64%	-74.70%	145.33%

As per as Jensen Alpha is concerned for a successful portfolio manager it needs to be positive and most importantly it has to be statistically significant. During the whole period of time 2004-11, the ability of the ICB portfolio manager to extract beyond the box performance had been quite beyond the box but on a 5% scale of significant the firm has certainly failed to produce the significantly extra-ordinary performance. So, on an average the ICB portfolio manager is doing a satisfactory job if not completely gratifying.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.266	.247		1.076	.331
	Systematic risk adjusted risk premium	-.394	.479	-.345	-.822	.448

a. Dependent Variable: ICB excess return

Academically the regression co-efficient between the NAV and stock price of ICB needs to approximate 1 – meaning that for 1 unit increase in the NAV the firm's share value will increase by 1 monetary unit and vice versa. In case of Bangladesh the regression coefficient using the last seven years data stood up to 50 and the co-efficient is also significant in statistical term. So, the investors are over- biased about ICB's performance and they are consistently putting too much confidence over the performance potentialities of ICB portfolio managers.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-12971.066	7529.601		-1.723	.146
	ICBNAV	50.742	23.805	.690	2.132	.006

a. Dependent Variable: ICB price

Conclusion

It had been evident from the study that the portfolio performance of ICB managers in terms of Sharpe and Treynor index had not been completely gratifying. The portfolio manager had failed to beat the market on a consistent manner in the longer- run. The portfolio manager had been able to generate superior stock timing and stock selection skills represented in the sustainably significant net selectivity. Even though the alpha of ICB had been on a moderate tone – the firm's management had been more than capable in communicating the performance to the general investors.

References

1. Blake, D. & Timmermann A. (1998) 'Mutual Fund Performance: Evidence from the UK' *European Finance Review*. Vol.2. 57-77.
2. Chestopalov, I. & Beliaev, S. (2005) 'A Simplified Method for Calculating the Money-Weighted Rate of Return' *Journal of Performance Measurement*. Vol. 9, No. 2.
3. DiBartolomeo, D. (2003) 'Just Because We Can Doesn't Mean We Should – Why Daily Observation Frequency in Performance Attribution is Not Better' *Journal of Performance Measurement*. Vol. 7, No.3.
4. Darling, R. & MacDougall A. (2002) *Using Performance Statistics: Have the Measurers Lost the Plot?*. WM Company.
5. Dimson, E. & Jackson, A. (2001) 'High-Frequency Performance Monitoring' *Journal of Portfolio Management*. Vol. 28, No.1.
6. DiBartolomeo, D. & Witkowski, E. (1977) 'Mutual Fund Misclassification: Evidence Based on Style Analysis' *Financial Analysts Journal*. Vol. 53. 32-43.
7. Grinblatt, M. & Titman, S. (1989) 'Mutual Fund Performance: an Analysis of Quarterly Portfolio Holdings' *Journal of Business*. Vol. 62, No.3. 393-416.
8. Grinblatt, M. & Titman, S. (1989) 'Portfolio Performance Evaluation: Old Issues and New Insights, *Review of Financial Studies*. Vol. 2. 393-421.
9. Henriksson, R. & Merton, R. (1981) 'On Market Timing and Investment Performance II: Statistical Procedures for Evaluating Forecasting Skills' *Journal of Business*. Vol. 54, No.4. 513-533.
10. Jensen, M. (1968) 'The Performance of Mutual Funds in the Period 1945-1964' *Journal of Finance*. Vol. 23. 389-419.
11. Marsh, P. (1991) 'Fund Managers and Quarterly Performance Measurement' *Short Termism on Trial*. London: IFMA.
12. Merton, R. (1981) 'On Market Timing and Investment Performance I: an Equilibrium Theory of Value for Market Forecasts, *Journal of Business*. Vol. 54, No. 3.
13. Roll, R. (1977) 'A Critique of the Asset Pricing Theory's Tests' *Journal of Financial Economics*.. 129-176.
14. Sharpe, W. (1966) 'Mutual Fund Performance' *Journal of Business*. 119-138.
15. Srivastava, S. & Essayyad, M. (1994) 'Investigating a New methodology for Ranking International Mutual Funds' *Journal of Economics and Finance*. Vol.18, No. 3.
16. Scholtz, H. & Wilkens, M. (2005) 'A Jigsaw Puzzle of Basic Risk-adjusted Performance Measures' *Journal of Performance Measurement*.
17. Treynor, J. & Black, F. (1973) 'How to Use Security Analysis to Improve Portfolio Selection' *Journal of Business*. Vol. 46, No.1. 61-86.
18. Treynor, J. (1965) 'How to Rate Management of Investment Funds' *Harvard Business Review*. Vol. 43. 63-75.