

*Full Length Research Paper*

# Validity of efficient market hypothesis: Evidence from UK mutual funds

M. Jibrán Sheikh and Umara Noreen\*

COMSATS Institute of Information Technology, Islamabad, Pakistan.

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**This research is geared towards analysing performance of the fund managers and their market timing abilities. For the purpose of this study, sample of 50 U.K. mutual funds were selected in random. Their returns from the beginning of 1990 to the end of 2008 were used for hypotheses testing. Financial Times All Share Index was taken as a benchmark. Two widely accepted performance measurement techniques were employed, that is, Jensen alpha measure and Treynor and Mazuy market timing hypothesis. Based on the results, it is concluded that the fund managers lacked the ability to predict the market movement on consistent bases. They were unable to outperform the market or in simple words, they could not “beat the market”. Any chance of outperforming the market is merely a random chance and this cannot be done on consistent bases. An interesting thing to note is that fund managers also lacked market timing abilities which supports the efficient market hypothesis proposed by Fama. Present research has strong implications for existing and potential fund managers and individual investors in terms of measuring the performance of mutual funds.**

**Key words:** Efficient market hypothesis, Jensen alpha, Treynor and Mazuy, gamma measure, market timing ability.

## INTRODUCTION

In the last two decades, there has been a substantial growth in empirical studies in which academics have examining performance of mutual funds. This includes establishing whether performances of the funds have been predictable over time. U.S Mutual funds have been the main focus of these empirical studies. Grinblatt and Titman (1992), Hendricks et al. (1993), Goetzmann and Ibbotson (1994), Malkiel (1995), Brown and Goetzmann (1995) Elton et al. (1996) and Carhart (1997) among many others, have concluded that past performances of mutual funds are very good indicator of their future performances. The main reason could be that mutual fund managers employ same investment strategies over and over as suggested by Gruber (1996).

Brown et al. (1999) had examined U.S hedge funds while Christopherson et al. (1998, 1999) and Carhart (1997) examined the results of U.S pension funds. There are various rationales for studying the

performance of these funds. Two main reasons are to find out if a mutual fund manager, in general, poses superior skills when it comes to investment. Another is to evaluate the market timing abilities of the fund managers. Carhart (1997) suggests that, almost similar findings with reference to four factor model, as fees of mutual funds, are usually dependent upon the size of assets under the control of the fund. Gruber (1996) suggests that funds with good and consistent past performance achieve higher growth rate as they receive higher revenues in terms of fees. This notion is also backed by Sirri and Tufano (1998).

Fama (1972) further explained and described the components of investment performance. Merton (1972) came up with mutual fund theorem and explained that for a given portfolio, the efficient frontier portfolio provides the highest expected returns based upon given standard deviation.

In the analysis of fund managers' ability, after theoretical studies proposed by significant researchers, the empirical studies have been tested for the performance of mutual fund, such as Chen et al. (1987), Lehman and Modest (1987), Cumby and Glen

\*Corresponding author. E-mail: [umaranoreen@gmail.com](mailto:umaranoreen@gmail.com).

(1990), Malkiel (1995) and Chen and Knez (1996). Since Jensen (1968), many researchers have conducted research in order to examine the performance of the mutual funds and focus of most of these researches has been US mutual funds. The reason is simply the scale and resources controlled by these funds. None the less, researchers have also conducted similar researches on like Dahlquist et al. (2000) who analysed Swedish mutual funds; Otten and Bams (2002) who analyzed U.K., French and German mutual funds; and Blake and Timmermann (1998) who analyzed U.K. mutual funds, all came up with mixed conclusion. Most academics like Carlson (1970), McDonald (1974), Firth (1977) and Lehmann and Modest (1987) and Annuar et al (1997), who examined the Malaysian mutual fund, after conducting their research, concluded that the performance of the mutual funds are not superior to market if the expenses are deducted from their profits. According to Hendricks et al. (1994), Brown and Goetzmann (1995) and Gruber (1996), mutual funds showed persistence performance over short term horizon.

Performance evaluations of mutual funds outside U.S.A have been fairly limited in the past. Brown et al. (1999) and Allen and Tan (1999) conducted research on U.K pension funds and unit trusts (UK unit trusts are equivalent to open-ended US mutual funds). Impact of the attrition on unit trust in U.K was examined by Lunde et al. (1999).

This paper uses the methodologies of Jensen (1965) alpha measure and Treynor and Mazuy (1969) regression estimation technique. These two measures are the basic performance measures. But they have not received much attention recently. One of the main reasons could be that academics and researchers prefer many other techniques which are constantly being developed. This begins by revisiting both of the performance measures one by one. Amongst other thing they would also help us to explore the efficient market hypotheses proposed by Eugene Fama that is if it is still relevant or has it lost its relevance in today's market conditions. The main reason is that it has recently come under huge criticism by Merton (1972) and Roll (1977) institutional investors and academics. Due to this, most of the finance professionals consider it as outdated and irrelevant with reference to the current market situations. Mainly, it is due to changes in investment techniques and different strategies employed by fund managers in order to extract abnormal gains from markets. Many empirical models have been proposed in an attempt to evaluate the performance of mutual funds; Markowitz (1952) explained the Markowitz's frontier in the "theory of portfolio selection". This was further developed in the form of CAPM to measure the risk and return characteristics. In order to explain the ability of fund manager to predict the efficient portfolio returns, Treynor (1965) and Sharpe (1966) used the ratio analysis to determine the excess returns per unit of risk under taken by the fund managers. Jensen (1968) came

up with "alpha" model in order to explain the ability of fund manager to beat the market by selecting the undervalued stocks via his empirical study. Jensen showed the market timing ability of the manager can be shown as correlation between his forecasting and ability to realize returns. This was supported by empirical study under taken by Jensen.

## MATERIALS AND METHODS

Primary data consisting monthly returns of 50 mutual funds returns, over a period of 19 years, ranging from 1990 to 2008 was taken. The bench mark for comparison is Financial Times All Share (FTA) Index. The monthly returns are computed and matched against benchmark for this study. As mentioned previously, few researchers have proved the persistence performance of fund managers over the short term. Present study was gauged to take in to considerations the persistence over long-term period as compared to Jensen who took 10 years period.

The research has used Jensen alpha, simple to apply, and one of the most effective performance measures. Michael Jensen defines alpha as a measure to investigate and determine whether mutual funds managers had ability to outperform market. Jensen based his model on capital asset pricing model (CAPM). According to CAPM portfolios, expected return will increase with its systematic risk (beta) according to the formula. Alpha takes into account the systematic risk as explained by CAPM:

$$E(R_J) = R_F + \beta_J [E(R_M) - R_F]$$

As it is evident under the assumptions of CAPM, the capital market line is the line in risk-return space passing through points for the risk-free asset and the market portfolio.

According to Jensen (1966), the analyst or portfolio manager can earn higher returns by judging the future prices of securities using the CAPM, for a given level of risk. He further extended CAPM equation to include error term, so the forecasting ability of the manager can be determined. As proposed in Jensen alpha model, the risk premium is equal to  $\beta_j [R_{Mt} - R_{Ft}] + e_{jt}$ . The risk premium is equal to  $\beta_j [R_{Mt} - R_{Ft}]$  plus error term, as long as assumptions of CAPM hold valid:

$$R_{jt} - R_{Ft} = \alpha_j + \beta_j [R_{Mt} - R_{Ft}] + e_{jt}$$

If we follow the afore equation, the only problem is that in the equation, it is assumed that risk level being considered, remains constant throughout the period in question. However, in real world, this does not hold true because managers have option of changing composition of their portfolios, thus changing the risk level. They can do it by changing the asset distribution of their portfolio, moving from risky assets to less risky assets and by changing the composition of bonds and shares, etc. Fact of the matter is that managers change these compositions in order to outguess the market and to gain some extra ordinary returns on their portfolio.

This measure is vital for assessing the forecasting ability of the fund manager and for this we need to measure the estimation of standard error. The reason being that least square regression supplies the estimate of intercept term  $\alpha_j$  in sample distribution. According to Jensen (1965), this distribution is actually t-distribution in which degree of freedom is  $n_j - 2$ . This information is used for estimation of statistical significance of performance measure. This brings important issue into light, which is manager's "forecasting ability". This required a model which can integrate forecasting or market timing of portfolio manager and selectivity ability (his ability to choose individual securities).

In order to resolve these issues, Jensen's (1965) purposed this model. Jensen demonstrated that the model can be effectively

**Table 1.** Summary statistics.

Statistical results	Alpha	Beta	R <sup>2</sup>
Average	-0.0009433	0.837417668	0.568319719
Median	-0.0008238	0.916939031	0.576070824
Maximum	0.003686	1.147496737	0.952799987
Minimum	-0.0091500	0.086656392	0.055921821

Source: This research.

used to measure portfolio managers "forecasting" or "timing" abilities thus measuring level of his success, assuming that managers retains given level of risk. Jensen also argued that positive  $\alpha$  represents managers ability to outperform the market by anticipating movement of market using different tools and vice versa. However, this model had many critics over the time and researchers like Roll (1977) argued that this model could not be tested empirically, as it was based upon CAPM equilibrium model and all risk assets market portfolio is un-identifiable.

#### Treynor and Mazuy (1966) regression estimation technique

Treynor and Mazuy (1966) evaluated ability of fund manager in terms of predicting the price movements and stock selectivity ability. In continuation with Jensen model, Treynor and Mazuy introduced another explanatory factor Gamma in order to determine timing ability of the fund manager deduce following equation:

$$R_{jt} - R_{Ft} = \alpha_j + \beta_j [R_{Mt} - R_{Ft}] + \gamma_j [R_{Mt} - R_{Ft}] + e_{jt}$$

In this equation,  $\gamma_j$  (gamma) represents the market timing ability of the fund manager. Superior market timing and selection abilities can only be verified when the values of  $\gamma_j$  and  $\alpha_j$  are positive and significant.

## RESULTS AND DISCUSSION

Table 1 presents summary statistics of the frequency distributions of the regression estimates of equation parameters for all 50 mutual funds using available samples data for each fund in the period 1990 to 2008. Table 1 presents the median, mean, extreme values and R<sup>2</sup> of all the 50 funds.

According to the table average intercept ( $\alpha$ ) is -0.0009433. The maximum values of 0.003686 and with minimum value of -0.0091500. The average values  $\beta$  is 0.837417668, indicating that on average these funds pose less risky assets than general market portfolio. Based upon adjustment is needed in these returns of mutual funds with appropriate risk factor when comparing with market returns. Otherwise the results would be biased against the mutual funds.

The average value of R<sup>2</sup> comes to 0.5668319719, which indicates that equation can be rationally applied to most of mutual funds data. Summary of results is presented in Histogram. The observations are organized from lowest to highest  $\alpha$  basis and estimates range from -0.0091500 and a maximum value of 0.003686.

The average value calculated for  $\alpha$  is -0.0091500 which indicates that on average the funds earned approximately 0.91% less per year than expected return at given level of their systematic risk. The results suggest that more than half funds achieved alpha, but the performance of most of the funds is insignificant, especially when we include the costs which were ignored earlier.

Another aspect of the results suggests that the funds achieved negative alpha, which applies those managers, could not even recover their commission and research expenses. But according to Jensen's , model the random selection of securities and strategy of buy and hold, the performance should not be less than zero that is  $\alpha < 0$ .

These results suggest that mutual funds managers were unable to beat the market. In other words it applies that most of time managers were unable to predict the market prices of securities and even if they do they were unable to extract extra ordinary gains. As the average  $\beta$  of mutual funds is 0.837417668; which applies that mutual funds hold less risk than average market portfolio and negative alpha suggest that managers lack market timing abilities along with efficient and most profitable portfolio selection. Even when managers were able to produce positive alpha even with well diversified portfolio, the returns were negligible above the market returns. This stresses their underperformance.

The mentioned test is slightly biased towards mutual funds considering the fact that in practice these funds have to keep certain cash balances in order to meet random outflows thus they lack ability to invest 100% of funds in portfolio.

In order to come to certain conclusion we have to take into account following t-statistic test, which stress upon significance of the above results.

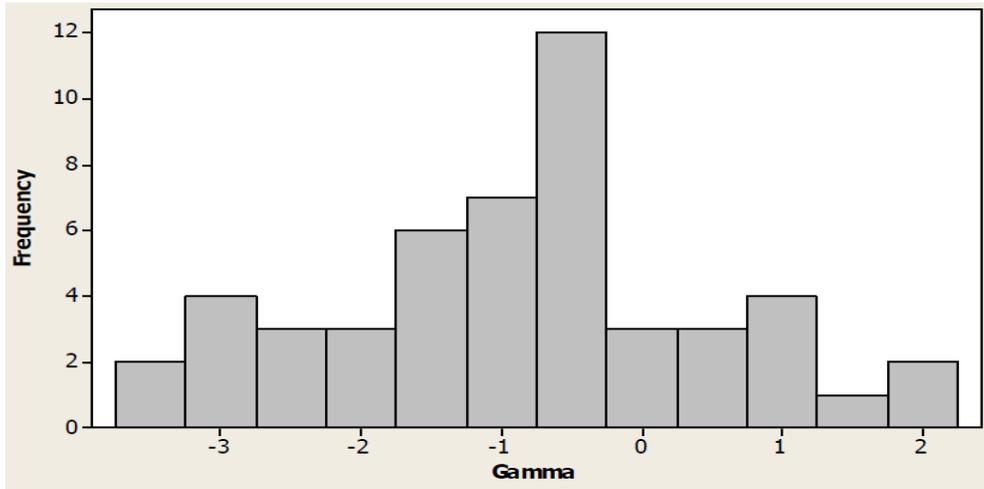
#### T-statistics test

For the T-test, 95% confidence interval is used to test the significance of the estimates. In the worst case scenario the fund managers would spend their resources by selecting the random portfolio which have lack significant Alpha and their market timing. This would lead to failure of their investment strategy. This is the case for most of the funds which have been

**Table 2.** Average results of market timing and selectivity performance of the mutual funds.

	$\beta$	$\gamma$	t-statistics $\gamma$	A	t-statistics $\gamma$
Average	-0.1929	-0.82414	Insignificant	-0.0134571	Insignificant

Source: This research.



**Figure 1.** Market timing ability of fund managers.

analyzed. The failure of this stage is reflected in insignificant forecasting ability and market timing ability.

Although, many funds have been able to obtain positive Alpha but this is not significant enough to have any positive effect on the returns, as returns resulting from this are almost negligible.

An interesting fact was that only 2 funds had positive significant performance measures at the 5% level. However, before concluding about the superior performance of these funds, one should keep in mind that even if all of 50 mutual funds have true zero  $\alpha$ , because of merely random chance we would expect to find 6 to 7% or about 7 or 8 mutual funds yielding significant t-values at 5% level. Therefore, the results should be interpreted by considering the whole frequency distribution of t-values estimates. After accounting for whole distribution the results show that on average the results are insignificant from t-distribution point of view.

The empirical results suggest that most of time the ability of fund managers to predict the future prices of securities is at best a “random chance” which is reflected in the results. Although, 54% of the funds showed positive alpha but on average the value came to be less than 1% showing the inability of managers to beat the market even when risk faced by them was less than ordinary market portfolio and they had well diverse portfolio as well. Taking other factors as earlier mentioned into account these results clearly state inability of managers to predict market movements and

market timing is almost absent on average.

**Treynor and Mazuy (1966) regression estimation technique**

In continuation with Jensen model, Treynor and Mazuy introduced another explanatory factor Gamma in order to determine timing ability of the fund manager deduce following equation:

$$R_{jt} - R_{Ft} = \alpha_j + \beta_j [R_{Mt} - R_{Ft}] + \gamma_j [R_{Mt} - R_{Ft}]^2 + e_{jt}$$

In this equation,  $\gamma_j$  (gamma) represents the market timing ability of the fund manager. Superior market timing and selection abilities can only be verified when the values of  $\gamma_j$  and  $\alpha_j$  are positive and significant.

Table 2 shows that the average market timing performance of the mutual funds is negative across benchmark market portfolio and selectivity performance is positive on average, however, both results are statistically insignificant. However, the t-statistics require to be treated cautiously because it is assumed that selectivity and timing coefficients across trusts are independent. This could not be necessarily the case because of the influences of residual cross-correlations between mutual funds in the regression models.

Figure 1 shows that only 13 funds have positive Gammas and out of them only two have significant statistic. Moreover, out of 37 negative Gamma’s fund,

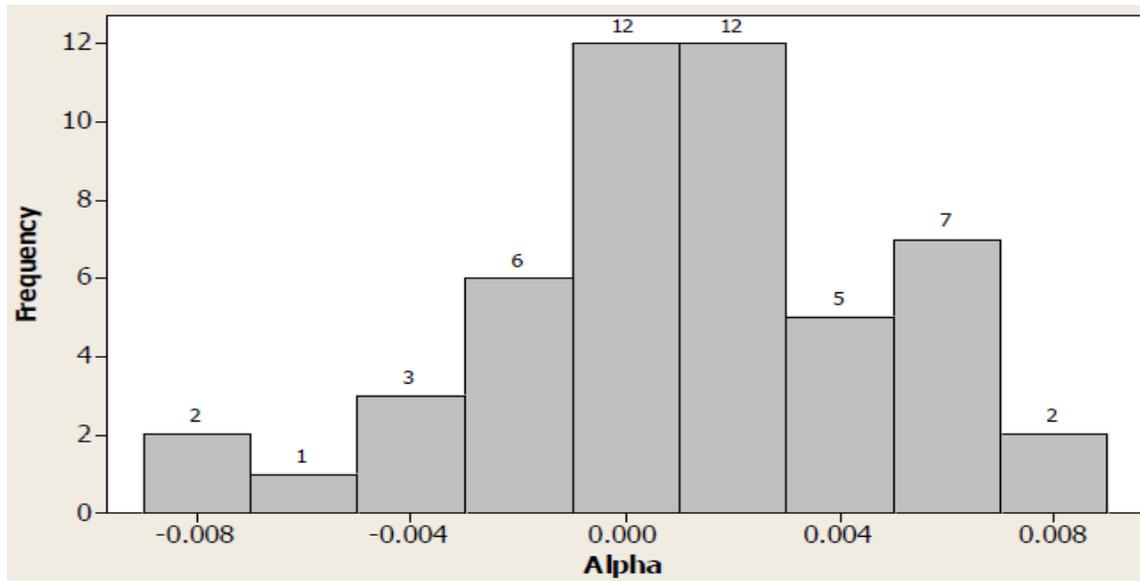


Figure 2. Fund manager's selectivity abilities.

27 funds have significant negative Gammas. On the whole, the results suggest that mutual funds managers do not have any market timing abilities.

The results from Figure 2 reveal that there are 25 funds with positive  $\alpha$ , however, after accounting for statistical significance, none of the mutual funds have significant positive alpha (means outperform the market from selectivity performance point of view). This applies that the fund managers would not have earned any significant profits. These results are consistent with the finding of most researchers. Likewise, out of 22 negative alpha funds, only 3 have significant negative alpha (means underperform the market from selectivity performance point of view). As mentioned earlier that the overall results provide the evidence of statically insignificant positive alpha, it means that mutual fund managers do not have any selectivity ability consistent with our earlier results of Jensen's alpha model.

The results show that majority of mutual funds fail to register any significant market timing ability even if they manage to, and at the best, it is just a random chance. If we analyze the funds on individual basis we can see that funds have to fulfil two conditions that is have positive Alpha and positive Gama in order to outperform the market. Some funds manage to achieve that but this out performance has to be significant that is the alpha and Gama has to be significant.

The result of this study is in line with Kon (1983), Lehmann and Modest (1987), Cumby and Glen (1990), and Connor and Korajczyk (1991). Their study also showed that there was clear evidence of negative selection ability of the fund managers. While Chang and Lewellen (1984), Henriksson (1984), Bello et al. (1990) and Janjigian (1997) Bollen and Busse

(2001) contradict these claims and via their research provide evidence in favour of selectivity ability, Lee and Rahman (1990) research support the notion of superior micro- and macro-forecasting ability of fund managers but on individual level not on aggregate. But in this case, the second notion is clearly rejected based upon the results. The main reason is the use of performance measures being applied and the time scale involved in the study.

When it comes to market timing abilities of fund managers, the results of this research are in line with Merton (1981), Henriksson and Merton (1981), Kon (1983), Henriksson (1984), Chang and Lewellen (1984), Lehmann and Modest (1987), Grinblatt and Titman (1989b), Cumby and Glen (1990), Connor and Korajczyk (1991), Chen et al. (1992), Coggin et al. (1993), Kao et al. (1998), and Volkman (1999), who held that managers possess inferior market timing abilities. This notion was further enforced by Coggin et al. (1993) when they conducted their research on US pension funds and they came to a conclusion that although some managers showed positive market timing ability but on average market timing was negative. This was similar to the conclusion held by Kon (1983), Lehmann and Modest (1987) and Lee and Rahman (1990). The results of this research also back their claim. All of these researchers revealed that these conclusions were not affected by benchmark portfolio or estimation model.

## Conclusion

The empirical results from Jensen alpha measure showed that at the best, managers ability to outperform the market by selecting efficient portfolio is random

chance. The results are an almost replica of the original results obtained by Jensen only time and scale of the study were different. These results clearly illustrated inability of fund managers to predict market movements and to select portfolio which would result in positive significant gains.

The outcome was not so different from the aforementioned results when Treynor and Mazuy (1966) type regression method was applied to same data. The benchmark was same as well. Outcome suggested that fund managers lacked market timing ability as well as ability to predict market movements. The only difference was the fact that most of the funds showed neither outstanding performance nor very poor performance as positive and negative outcomes were not significant in general. Since the returns did not include the fee charged by funds, if this and other general economic factors are considered, it is safe to conclude that market predicting abilities and market timing abilities at the best random chance.

This study concludes with the fact that efficient market hypothesis proposed by Fama in 1970 is verily intact that security prices maintains a state of continuous equilibrium and that skilled managers are not able to pick the undervalued stocks or forecast the market movements to produce abnormal returns.

Like any other study, this study is also not without limitations. First, it only analyses the performance of mutual fund managers and their ability to earn extra ordinary returns based upon the available information and using their skills and techniques. We have excluded the fee charged by these fund managers as it would have shifted the main focus of the research. Furthermore, the paper does not analyse the behavioural aspects such as why people invest in these funds when they fail to achieve above market returns.

For future research, it is suggested that researchers should focus on the wider implications of this research such as behavioural aspect which could include fundamental question, why do investors both institutional and individuals invest in these funds and what effects would the inclusion of fee have on such results would they further distort or clarify the notion.

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