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Evaluating the Management Effectiveness in Market and Volatility Timing of Mutual Funds in Pakistan

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Abstract

This paper investigates the timing abilities of Pakistani mutual funds for 55 open-end mutual funds on monthly data over the period of 2007-2014. The results conclude that Pakistani mutual funds, in general exhibit marketing and volatility timing skills which means they have the ability to alter their portfolios in anticipation of market movements. The results suggest that mutual funds perform effectively in timing the market, and by utilizing this superior information, mutual funds are capable of adjusting their investment according to market conditions.

Key words: Mutual fund performance; market timing; volatility timing.

1. Introduction

Over the past few decades, mutual funds have been able to attract many researchers. The reasons are their ability of risk-diversification and increased returns, attributable to manager's professional approach. Mutual fund is a shared venture where small investors pool up their money. The fund is professionally run by a fund manager, acting as an agent for the investors. He scrutinizes the market movements, government rules/regulations and their relationship to the investment and then forecast the expected earnings of the

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funds. As a result, it leads to increase in the income going to the pockets of the small investors and also reduces the unsystematic risk-exposure. The decision regarding mutual funds investment is comprised of two steps. The first stage comprises of the choice of fund for investment by individual investor. The second stage comprises of the fund manager's choice to select assets that make part of the fund. In this way, the small investors hold the portfolio of stocks indirectly through the fund manager.

This whole process of selecting a mutual fund appears to be glossy if return on investment is the only concern. But the risks involved with mutual funds cannot be ignored. The performance of mutual fund depends on the fund manager's decision relating to asset allocation and market and volatility timing.

In recent past, mutual funds have gained tremendous popularity among investors all over the world. Only in the United States, there were 9,520 mutual funds operating in with combined assets of $15.65 trillion[1] by 2015. In developing countries, mutual fund investment is slowly becoming a good investment choice for small investors.

In Pakistan Mutual funds were introduced in 1962, when NIT (National Investment Trust) public offering was carried out. NIT was the first open-ended mutual fund. Then the inception of the Investment Corporation of Pakistan (ICP) in 1966 led the way for the establishment of a number of closed-ended mutual funds. The industry has undergone tremendous growth and by November, 2015 the number of funds has increased to 181. The mutual fund industry has shown marvellous progress with net assets growing to Rs.291 billion by November 2015[2]. These facts incite the idea to investigate whether Pakistani managers possess the timing abilities that may be the reason behind such quick growth of the mutual funds market.

[1] http://www.statista.com/
[2] As per Mutual Funds Association Pakistan's website http://www.mufap.com.pk

As the mutual fund industry is growing in Pakistan, the role of a fund manager is also gaining importance. It is vital to investigate whether fund managers of Mutual Funds are adding value to the portfolios they control or whether they are just adding excessive transaction costs attributable to their active management. Hence, the performance of a mutual fund is also reliant upon the manager's forecasting abilities.

Market timing is the capacity of fund managers to increase their portfolio proportion, in risky assets, during periods of high expected returns (Chunhachinda and Tangprasert, 2004). Fund managers having more information about market behaviour should perform better than those having less information. A number of studies by renowned researchers', e.g., Treynor and Mazuy (1966), Henriksson (1984), Christensen (2005) Tschanz (2010) explore the evidence of market timing ability of mutual fund managers. The Pakistani stock market being highly volatile should compensate fund managers by offering a variety of opportunities to time the market. Therefore, it is essential to examine whether fund managers possess the market timing ability or not.

In addition to market timing, mutual fund managers can also time volatility which helps in decreasing the proportion of risky assets in periods of high volatility (Chunhachinda and Tangprasert; 2004). Chang (1990) demonstrated that a manager's forecasting ability has an impact on the fund's performance. A fund manager having the ability to forecast market trends can thus alter the proportion of the market portfolio. A fund manager who possesses timing ability will also divert the risk of the project from more-risky to less-risky.

The present study attempts to evaluate the management effectiveness, of market and volatility timing, of selected mutual funds in Pakistan. Section two highlights the relevant literature review on market and volatility timing. The data and research methodology used in this study are discussed in section three, respectively. Section four presents empirical results of this study and section five concludes the study.

2. Literature Review

There is a large body of empirical literature on mutual fund performance and volatility, however very few studies have been done for developing markets. This study reviews the relevant empirical literature on mutual funds and market and volatility timing.

2.1 Literature Review on Market Timing

Treynor and Mazuy (1966) using a sample of 57 developing countries fails to find any evidence that fund managers can outguess the market, irrespective of the fund type or size. Sharpe (1975) investigates the potential gains from market timing and its relationship with manager's ability to make correct predictions of market conditions. Using data ranging from 1929 to 1972, he finds out that the benefit is only marginal, while it can be significant if the manager can accurately predict the market. Bollen and Busse (2001) investigate the daily returns of 230 US mutual funds ranging over ten years (1985-1995). They conclude that using daily data, mutual funds produce significant coefficients for market timing. Chunhachinda and Tangprasert (2003) find week evidence of market timing abilities in Thailand mutual fund industry. Christensen (2005) targeting 47 Danish mutual funds fails to provide any evidence of timing abilities (selectivity and market) among the funds for the sample period 1996 to 2003. Tschanz (2010) conducts a comparative study on local (US equity) versus foreign (UK Equity) mutual funds for the year 1998-2003. He finds that UK funds possess better timing abilities as compared to US funds. Cuthbertson et.al (2010) applies nonparametric methodology to investigate the market timing ability of UK mutual funds. The study made use of UK equity and balanced funds over the period 1998-2002. The study concludes that on average funds do not possess the timing ability. They also check the impact of publicly available variables. They conclude that even after controlling the publicly available information, little evidence of market timing ability based on private timing signals exists. Bhuvaneswari & Selvam, (2011), after studying 21 Indian mutual funds from 2002 to 2007 reports that a few funds demonstrate market timing ability but

overall the industry fails to provide such evidence. Ang & Lean (2013) concludes that there exist positive market timing skills but poor stock selectivity skills when they studied 188 SRI fund managers in Luxembourg for the period 2001-2011. Munoz.et.al (2013) analyse the US and European 'socially responsible mutual funds for the period 1994-2013. The funds possess poor stock-picking ability and market timing ability. Francis et.al (2014) focus on monthly data for the period from 1995 to 2009 on Australian managed funds. They find that the top-ranked funds possess the timing abilities. Elmessearya (2014) using a data of 35 Egyptian funds, find poor market and selectivity skills. Hassan (2014) study the Pakistan mutual fund market and analyse the stock and market timing ability for the period 2007 to 2012. He fails to find any support for the timing abilities. Goo et al., (2015), using 144 open-end domestic mutual funds examine the Taiwan industry from 2004 to 2009, and find no evidence of stock selection and timing abilities.

2.2 Literature Review on Volatility timing

It was Busse (1999), who for the first time investigates the presence of volatility timing skill among fund managers. He constructed a simple model that aimed at finding whether the fund managers time volatility counter-cyclically. He finds that 80 percent of the fund sample, for the period 1985-1995, can time volatility counter-cyclically. Fleming.et.al. (2001) finds evidence of volatility timing. Johannes et. al. (2002) concludes that volatility timing strategy performs better than market timing. Chunhachinda and Tangprasert (2003) find only 12 percent funds possess volatility timing abilities in the Thailand mutual fund industry when monthly data is used. Holmes and Faff (2004) using market timing model of Treynor and Mazuy (1966) developed a cubic model. Results provide empirical support about the existence of volatility timing skills among Australian multi-sector funds for the period 1990-1999. Marquering and Verbeek (2004) prove the presence of significant volatility timing at monthly frequency for the period 1996 to 2001. Yong and Liang (2007) confirms the presence of volatility timing skills both at the aggregate and the fund level, using a sample of 221 hedge

funds from 1994-2005. Legacy and Bu (2010) find the existence of volatility timing ability in bear market funds from 2000-2008. Tschanz (2010) conducts a comparative study on local (US equity) versus foreign (UK Equity) mutual funds for the year 1998-2003. They confirm the existence of volatility timing among the fund but find that it is more profound in US. Bolong (2011) find little evidence of volatility timing in emerging market hedge funds using the Busse model (1999) and the Holmes and Faff (2004) cubic model covering 541 funds from the 1980 and 2009. Bodson et.al (2012), using a sample of 2,780 mutual funds from 1970 to 2010, find that on average 13 percent of mutual funds exhibit volatility timing.

3. Methodology and Data

This section focuses on elucidating the models and data regarding market and volatility timing skills which have led to the undertaking of this research.

3.1 Sample Selection and Data Source

This study uses monthly data of 55 open-end mutual funds for the period 2007-2014. Using Javid and Ahmad (2008), this study considers only those companies which remain listed throughout the sample period. The data is mainly extracted from Mutual funds Association of Pakistan (MUFAP) official website, Karachi Stock Exchange (KSE), bulletins of State Bank of Pakistan, Securities and Exchange Commission of Pakistan (SECP), concerned individuals and Business Recorder. Panel data analysis is used to investigate the existence of market and volatility timing.

Stock data is extracted from DataStream. Following Griffin.et.al (2010) "stocks that represent cross listings, duplicates, mutual funds, unit trusts, certificates, notes, rights, preferred stock, and other non-common equity" are removed. The timing abilities are supposed to be established only for actively managed funds; this study includes only non-index funds (Kader & Qing, 2007) and considers only equity, income, Islamic equity, balanced and

aggressive income funds. Index funds duplicate the performance of a benchmark index, so they are removed from the sample (Cao et al., 2012).

The mutual funds NAV (Net Asset Value) are picked from the MUFAP (Mutual Funds Association of Pakistan) website. For mutual fund returns, the following formula is used:

$$R_{Pt} = (NAV_{t} - NAV_{t-1}) / NAV_{t-1} \quad (1)$$

where NAV_t is the net asset value[3] of mutual fund i at time t. Similarly the market portfolio (KSE here) can be estimated as follows:

where R_{mt} and R_{mt-1} represent the closing market index values on time t and t-1. (2)

$$R_{mt} = LN [R_{mt} - R_{mt-1}]$$

3.2 Methodological Framework

3.2.1 Capital Asset Pricing Model

Treynor and Mazuy (1966) models are used to determine the market timing skills of fund managers. This section first presents the theoretical foundation of market timing skills using Capital Asset Pricing Model (CAPM) and then extends the model by relating it to market timing skill and volatility timing skill.

CAPM is a single time period model as it assumes that the investors make decisions for only one time period. This assumption is vague as the investors re-adjust their portfolio composition from time to time. Fama and French (1992) introduce an extension to CAPM, known as the Fama and French (FF) Three Factor Model (1992). They claim that two classes of

[3]NAV is estimated by adding up the closing market value of all funds and other assets, deducting all liabilities and dividing by total number of shares outstanding.

$$R_{Pt} - R_{ft} = \alpha_P + \beta_1 (R_{mt} - R_{ft}) + \varepsilon_{it}$$

stocks perform better than the market as a whole: (i) small size firms and (ii) stocks with a low price-to-book ratio. So they introduce an extension to CAPM model by adding two variables, size and book-market value. Carhart (1997) suggests that taking momentum factor has a significant impact on portfolio returns and thus modified three-factor model by adding the momentum factor. The extended model takes the following form:

$$R_{Pt} - R_{ft} = \alpha_P + \beta_1 (R_{mt} - R_{ft}) + \varepsilon_{it} \tag{3}$$

$$R_{Pt} - R_{ft} = \alpha_P + \beta_1 (R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 MOM_t + \varepsilon_{it} \tag{4}$$

Equation 3 describes the CAPM model. The $R_{p,t}$ is the portfolio return at period *t,* $Rf_{,t}$ is the risk-free rate (t-bills) at period *t,* $R_{m,t}$ is the return on the market at period t. α_P measures the return on a portfolio having zero covariance with the return on the benchmark. β_1 is the regression coefficient measuring the risk or market sensitivity. In equation (4) SMB[4], HML[5]and MOM[6] represent the size and book-to market momentum portfolios respectively.

3.2.2 Selectivity and Market Timing Skills

The traditional market timing models have come out of Jensen alpha (named after Michael Jensen: 1967) which is a useful performance measure for investors. Jensen alpha compares the performance of a fund in relation to a benchmark. A positive Jensen alpha shows that the mutual fund has outperformed the market, while a negative alpha shows the opposite to be true. Jensen alpha can be further divided into two elements. One covers selectivity skills whereas the second looks at asset allocation skills. These

[4] SMB = [1/3(Small Low+ Small Medium+ Small High)- 1/3 (Big Low+ Big Medium+ Big High)]
[5] HML= [1/2(Small High+ Big High)-1/2(Small Low+ Big Low)]
[6] MOM= [½(Small Winner + Big Winner) – ½ (Small Looser + Big Looser)

two skills regulate the fund manager's performance which at the end is related to the fund return. The skill in any one of the above-mentioned elements may lead to a positive alpha.

Following the Jensen alpha's results, Treynor and Mazuy (1966) develop the models to investigate the market timing skill. They claim that the managers can alter their portfolios using their skill to predict the market. They can adjust the risky equity holdings of the fund in reaction to an expected up (down) market. As a result, the β fluctuates over time and remains longer stationary. Hence, the relationship between mutual fund return and market return remains no longer linear. Treynor and Mazuy (1966) amend the CAPM model by integrating the square return term into the basic model. The model thus takes the following form

$$R_{Pt} - R_{ft} = \alpha_P + \beta_1 (R_{mt} - R_{ft}) + \eta_i (R_{mt} - R_{ft})^2 + \varepsilon_{it} \qquad (5)$$

where η represents the market timing ability and all other variables remain the same as in equation (1). The negative coefficient of the squared term represents that mutual funds lack the ability to predict the market. Manager having market timing ability will increase η during the up market and vice versa. Treynor and Mazuy (1966) find that a positive η shows that the portfolio's returns are more receptive towards large positive market returns. A significant positive η confirms the presence of market timing ability.

Grinblatt and Titman (1989) state that the choice of the benchmark can also affect the results of the performance tests. Goetzmann et al. (2000) claim that the Fama French model offers less biased timing results. So, following Fama French (1992) and Carhart (1997), size (SMB), book-to-market value (HML) and momentum (MOM) factors are included to the model.

$$R_{Pt} - R_{ft} = \alpha_P + \beta_1 (R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 MOM_t + \eta_i (R_{mt} - R_{ft})^2 + \varepsilon_{it} \qquad (6)$$

This study extends the Treynor and Mazuy model by incorporating the

Fama–French and Carhart (1997) factors, based on Francis et al. (2014), who argue that these variables improve return timing coefficients by minimizing measurement bias.

The variables remain the same as in Equation 4 and 5. A significant positive β_2 depicts that the size effect exists i.e. the small size portfolio generates more return than the large size portfolio. A significant negative β_2 designates that size effect does not exist. However, an insignificant β_2 means that both small and large size fail to add any significant return to the portfolio. A positive significant β_3 confirms that value effect exists. Value portfolio is estimated by the high book-to-market ratio portfolio. When value effect exists, it means that the portfolio return is generated more by the high book-to-market portfolio than the low book-to-market portfolio. A negative significant β_3 indicates that return of the portfolio is accounted more by low book-to-market portfolio, i.e. the growth effect exists, i.e. A positive significant β_4 shows that momentum strategy is adding more value to the portfolio. Whereas, a negative significant β_4 depicts that the past loser portfolio adds more positive return than the past winner portfolio.

3.2.3 Volatility Timing

For volatility timing, this study employs the Busse (1999) one index model. Busse started with CAPM single index model, given by equation (1).

$$R_{Pt} - R_{ft} = \alpha_P + \beta_1(R_{mt} - R_{ft}) + \varepsilon_{it} \tag{7}$$

where R_p represents the simple excess return over risk free assets (t-bills) on portfolio p in period t, R_{mt} is the market return (KSE-100) in period t. Busse (1999) defined market beta as "a linear function of the difference between market volatility and its time-series mean":

$$\beta_{i\bar{}t} = \quad \mathrm{B}_i + \lambda_i(\sigma_{mt} - \overline{\sigma}_m) \tag{8}$$

Substituting beta into the original CAPM model, the CAPM yields the

following form of the Busse Model:

$$R_{Pt} - R_{ft} = \alpha_P + \beta_i (R_{mt} - R_{ft}) + \lambda_i (\sigma_{mt} - \overline{\sigma}_m)(R_{mt} - R_{ft}) + \varepsilon_{it} \quad (9) \qquad (9)$$

where σ_m is the market volatility during period *t*, $\overline{\sigma}_m$ is the average period volatility. λ_i is the coefficient of the volatility term. The sign of the coefficient will determine the existence of volatility timing. The negative value of λ_i will confirm the existence of volatility timing, indicating that during high volatility periods the portfolio return should behave in the opposite direction of the market and vice versa.

The above model is further extended by adding the momentum factor of Carhart (1997). The extended model is being expressed as follows:

$$R_{Pt} = \alpha_P + \beta_1 (R_{mt} - R_{ft}) + \gamma_i (\sigma_{m,t} - \sigma_m)(R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 MOM_t + \varepsilon_{it} \qquad (10)$$

(10)

All variables are the same as explained above. The γ_i is the coefficient of the volatility term.

4. Empirical Results and Discussion

4.1 Descriptive Statistics

This section presents the details of descriptive statistics of all the variables used in the study for the time period 2007-14.

Table 1 present means, maximums, minimums, standard deviations, skewness, kurtosis. It has 4893 observations in total. The negative means return values of RP indicate that mutual funds are providing loss to its investors. On average, the mean return of firms in the sample is - 0.11

percent and ranges from -83.1 percent to 33 percent. On average, the RM, indicates that the systematic risk is 0.8 percent. The systematic risk ranges from -0.44.9 percent to 18 percent. The positive skewness (SMB, RM2, TV) indicates the fat tails on the right hand side of the distribution. Whereas the negative skewness (RP, RM, HML, MOM) represents the fat tails on the left side of the distribution. The Kurtosis value (not equal to 3) for all variables also indicates that the data is not normally distributed.

Table 1
Descriptive Statistics

Variables	Definitions	Obs	Mean	Max	Min	Std.Dev.	Skewness	Kurtosis
RP	Return of Portfolio	4893	-0.001	0.330	-0.85	0.073	-2.22	22.148
RM	Return of Market	4893	0.011	0.268	-0.45	0.091	-1.62	10.170
SMB	Size Portfolio	4893	-0.01	0.083	-0.11	0.041	0.196	2.555
HML	Book-Market Portfolio	4893	-0.02	0.095	-0.15	0.046	-0.48	3.499
MOM	Momentum Portfolio	4893	0.00	0.186	-0.28	0.065	-1.50	8.280
RM2	Market Timing coefficient	4893	0.008	0.210	2.69E-08	0.024	6.491	51.015
TV	Volatility Timing coefficient	4893	0.004	0.240	-0.08	0.014	8.627	112.654

Note: Descriptive statistics of all variables are reported. Definitions of the variables are provided in column 2.

4.2 Regression Results and Discussion

Before elaborating the results of this study, it is proper to discuss the validity of the estimation technique. Following Mansor & Bhatti (2014), panel data regression is employed. There are 55 (Appendix 1) mutual funds for the time period 2007 to 2014, therefore panel data is more appropriate as this techniques takes into account both cross-section and time variability into account. Further the model can be estimated with fixed effect and random

effect. The panel data regression method removes the econometric problems related to the normal regression analysis i.e. heteroskedasticity and auto-correlation problems. The panel data regression analysis permits analysis of the data collected over time and same units and then analysis is carried over these two dimensions. Hence, the observations of the study would largely increase as compared to employing time series regression on the same data. For panel data, the fixed effect and random effect model is used and Hausman test supports fixed effect model. The results for fixed effect model are reported in this study.

4.2.1 Market Timing Model

To investigate market timing ability of the fund managers the analysis starts from the Treynor and Mazuy (1966) model, then variables of Fama and French (1993) and Carhart (1997) are added. The results are reported in

Table 2
Results of Market Timing Model

	Model 1	Model 2	Model 3
Variables	Single-Factor	Three-Factor	Four-Factor
α_p	-0.012***	-0.013***	-0.013***
	(-12.894)	(-12.124)	(-11.93)
β_{1t}	0.532***	0.544***	0.537***
	(5.267)	(4.977)	(4.185)
β_{2t}		0.066**	0.064**
		(2.977)	(2.943)
β_{3t}		-0.070**	-0.064**
		(-3.180)	(-2.875)
β_{4t}			-0.022
			(-1.602)
η	0.629***	0.624***	0.624***
	(15.783)	(14.953)	(14.958)
R^2	0.348	0.3519	0.3521

Note: This table reports the estimates of market timing ability of Pakistani mutual funds for the period 2007-2014, based on multi-factor model of Eq (6). The coefficient α_p measures the performance. While β_1, β_2, β_3 and β_4 represent the market excess return, size factor, book-to-market factor, momentum factor respectively. The coefficient η represents the market timing ability. The results in the parenthesis report the (t-values). The *** indicates significance at 1%, ** at 5% and * at 10% respectively.

Table 2.

The results of model 1 by Treynor and Mazuy (1966) model show that α_p is negative and statistically significant suggesting that the managers lack the stock-picking ability. However, systematic risk is positive and statistically significant at 1 percent. The market timing coefficient is positive and statistically significant confirming that fund managers possess the timing ability. But the R^2 indicates that 34.8 percent of the variation in the dependent variable is explained by the independent variables. This indicates that model 1 should be further extended by adding size, book to market value and momentum factors i.e. model 2 and 3 respectively.

With the Fama-French (1993) three-factor model the coefficient of market timing coefficient has improved a little, confirming that the managers possess timing ability to a little extent. The explanatory power of the model has also improved a little. This is consistent with Kader & Qing (2007) who found that taking size and value effect improves the explanatory power of the model, while investigating portfolio performance in Hong Kong.

After adding the momentum factor, α_p still remains negative and statistically significant suggesting that the managers lack the selectivity skills. These findings are consistent with Hassan (2014) who shows that Pakistani mutual fund managers have no stock selection timing ability as a whole.

The systematic risk has a positive and significant effect. The size portfolios also show a statistically significant positive relationship with portfolio returns. However, book to market sorted portfolio exhibit a significant negative relationship**.** This finding is in line with Drew and Veeraraghavan (2001) for the Asian region in which high book-to-market stocks caused higher returns than low book-to-market stocks. The momentum has shown a negative and statistically insignificant impact confirming that it fails to impact portfolio returns. An improvement in R^2 has

been recorded (35.12 percent), showing that the model is able to explain the variations.

When the marketing timing coefficients under different models are compared, the results of the four-factor model proved to be somewhat improved as compared to other models. The coefficients 0.629, 0.624, and 0.624 represent the marketing timing under single-factor, three-factor and four-factor model respectively. The market timing coefficient remains positive and statistically significant but the R^2 value has also improved. This result is in agreement with Busse (1999), Chunhachinda & Tangprasert (2003) who find little evidence of market timing ability when using monthly or lower frequency data. Bollen and Busse (2001) claim that the chances to find timing ability increase when higher frequency data is used.

The results show that α_p has conserved its behaviour and is still negative and statistically significant confirming that the managers lack selectivity skills. The systematic risk remains positive and statistically significant. The positive η sign proves the existence of market timing skill among the mutual fund managers of Pakistan during the period 2007-2014. It shows that the managers have the skill to alter the portfolios in reaction to market exposure. These results are in agreement with Busse for US (1999), Tschanz for US vs. UK (2010), Kaur for India (2013), Francis for Australia (2014)).

4.2.2 Volatility Timing Model

This study employs single- factor, three-factor and four-factor model to explore volatility timing ability among fund managers and the results are reported in Table 3.

With the single factor model, the intercept is negative and significant showing that the managers do not possess the stock-picking ability. The systematic risk has a positive and significant effect. The negative and significant volatility timing coefficient suggests that fund managers possess timing ability.

Table 3
The Results of Volatility Timing Model

	Model 1	Model 2	Model 3
Variables	Single-factor	Three-factor	Four-factor
α_p	-0.005***	-0.009***	-0.009***
	(-5.432)	(-8.290)	(-8.054)
β_{1t}	0.444***	0.479***	0.470***
	(4.478)	(4.851)	(4.683)
β_{2t}		-0.029	-0.030
		(-1.316)	(-1.378)
β_{3t}		-0.174***	-0.168***
		(-7.893)	(-7.507)
β_{4t}			-0.027*
			(-1.910)
γ_i	-0.242**	-0.324***	-0.333***
	(-3.766)	(-4.963)	(-5.091)
R^2	0.31	0.32	0.33

Note: This table 4.3 reports the estimates of volatility timing ability of Pakistani mutual funds for the period 2007-2014, based on multi-factor model of Eq (10). The coefficient α_p measures the performance. While β_1, β_2, β_3 and β_4 represent the market excess return, size factor, book-to-market factor, momentum factor respectively. The coefficient γ represents the volatility timing ability. The results in the parenthesis report the (t-values). The *** indicates significance at 1%, ** at 5% and * at 10% respectively.

With the three-index model, the magnitude of the volatility timing coefficient has shown little improvement. The four-index model shows that managers lack selectivity skills. It also shows that volatility timing alone cannot fully explain the fund's abnormal performance but security selection also contributes to it. The market beta also shows a positive effect. The size portfolio has a negative but insignificant coefficient, suggesting that the size portfolio has no impact. The negative coefficient of the value portfolio suggests that managers are more inclined towards growth stocks. The momentum has also shown a significant negative impact at 1 percent. Volatility timing coefficient has undergone a little improvement to -0.333 and is still significant at 1 percent. It is in line with Bolong (2011), Yang (China; 2009) and confirms volatility, whereas Huang (China, 2012) confirms little evidence of volatility. The R^2 has increased to 33 percent, depicting that the model has improved in explaining the variations.

When comparing the volatility timing coefficients, the results of the four-factor model proved to be stronger than previous models. The negative sign confirmed the existence of volatility timing skill among the fund managers (Busse, 1991; Chunhachinda, 2003) during the period 2007-2014. A negative volatility timing coefficient suggests that the funds have the ability to decrease their market exposure if the market is predicted to be highly volatile. The small magnitude of volatility timing coefficient shows a weak presence of volatility timing. The results are in agreement with Francis (2014) who found that funds provide investors with volatility hedge.

The ability to time market volatility has economic implications also. If the results from the Carhart-factor model are considered, the timing coefficient λ is -0.33 and the average beta is 0.47. If the fund manager has the potential to forecast market volatility to be 5 percent higher than the average market, he will thus reduce market exposure by 0.0435 (-0.33× 0.05), approximately 1.65 percent of the average market beta. In other words, funds with good volatility timing would be more sensitive to the market when the market is less volatile, while they would be less sensitive to the market when the market is more volatile (Shen et.al, 2013).

4.2.3 Robustness Test

For robustness, this study also used the Quadratic Market model (Holmes and Faff, 2004) to investigate the timing abilities of the Pakistani mutual fund industry. Holmes and Haff (2004) developed a cubic model based on the market timing model of Treynor and Mazuy (1996) for investigating the volatility timing skill of Australian mutual fund managers. They proved that volatility timing ability is reflected by a market exposure that is impacted by market volatility. This can be done by specifying a time-varying beta for any given fund consisting of mean beta and a component that depends on the squared excess market returns. So by adding a time-varying beta component, they come up with their cubic market model:

$$r_{it} = \alpha_i + \beta_i r_{mt} + \gamma_i r^2_{mt} + \delta_i r^3_{mt} + \varepsilon_{it} \quad (11) \quad \textbf{(11)}$$

Where r_{it} is excess return above the risk free rate as in Equation 1, α_i represents the fund's security ability. β_i represents sensitivity to the market, γ_1 represent the fund's market timing ability and a positive coefficient shows the existence of market timing ability. δ_i represents volatility timing ability, a negative coefficient is a sign of existence of volatility timing ability.

Table 4
Quadratic Cubic Model

α_p	β_i	γ_i	δ_i	R^2
-0.012***	0.535***	0.613***	-0.062	34.81
(-12.681)	(39.043)	(9.587)	(-0.331)	

Note: This table reports the estimates of market timing and volatility timing ability among various mutual funds categories, based on Eq (11). The coefficient α_p measures the performance. While β_1 represent the market excess return. γ_i represents the market timing coefficient. δ_i represents the volatility timing coefficient. The results in the parenthesis report the (t-values). The *** indicates significance at 1%, ** at 5% and * at 10% respectively.

Table 4.4 presents the results of timing abilities under Holmes & Faff (2004) cubic model. The funds shows statistically significant negative alpha at 1%. For the systematic risk, the funds exhibit statistically significant positive coefficient at 1 percent. Looking at market timing ability, the funds possess statistically significant positive coefficient at 1 percent. Though negative coefficient has been found for volatility timing but it is statistically not significant.

5. Conclusions and Implications

This study examines the manager's market and volatility timing ability of Pakistani mutual fund industry for the period 2007 to 2014. As the industry is still in its infancy age, so this study is limited to a total of 55 open end funds. This study employs Treynor and Mazuy (1966) model and Busse (1999) models to examine market timing volatility and timing skill respectively. The results suggest significant market timing coefficient for the managers, confirming that managers possess timing ability.

The results reveal significant volatility timing coefficient at the portfolio level, indicating that managers are capable enough to reduce their market exposure when the market is expected to be more volatile. In a nutshell, the results suggest that the mutual funds perform effectively in timing the market volatility. With superior information, mutual funds are capable of adjusting their investment according to the market condition (Treynor and Mazuy, 1966).

The implication that emerges from these results is that mutual funds perform effectively in timing market volatility. Mutual funds are capable of adjusting their investment according to the market condition by utilizing superior information.

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Appendix 1

The following table presents the names of mutual funds used in this study.

Table 1

S.No	Fund Names
1.	AKD Aggressive Income Fund (Formerly: AKD Income Fund)
2.	AKD Opportunity Fund
3.	Al Ameen Islamic Income Fund (Formerly: United Islamic Income Fund Growth)
4.	Al Ameen Shariah Stock Fund (Formerly: UBL Shariah Stock Fund)
5.	Al Meezan Mutual Fund
6.	Alfalah GHP Income Multiplier Fund
7.	Alfalah GHP Islamic Fund
8.	Alfalah GHP Value Fund
9.	Askari Asset Allocation Fund
10.	Askari High Yield Scheme
11.	Atlas Income Fund
12.	Atlas Islamic Stock Fund
13.	Atlas Stock Market Fund
14.	BMA Chundrigar Road Savings Fund
15.	Crosby Dragon Fund
16.	Faysal Asset Allocation Fund
17.	Faysal Balanced Growth Fund
18.	Faysal Income & Growth Fund
19.	Faysal Savings Growth Fund
20.	First Habib Income Fund
21.	HBL Multi Asset Fund
22.	HBL Stock Fund
23.	HBL_income_return
24.	IGI Aggressive Income Fund
25.	IGI Income Fund
26.	JS Aggressive Asset Allocation
27.	JS Fund of Funds

28.	JS Growth Fund
29.	JS Income Fund
30.	JS Islamic Fund
31.	JS Large Cap Fund
32.	JS Value Fund
33.	KASB Income Opportunity Fund
34.	KASB Income Opportunity Fund with Contingent Back End Load
35.	MCB Dynamic Cash Fund
36.	Meezan Balanced Fund
37.	Meezan Islamic Fund
38.	Meezan Islamic Income Fund
39.	MetroBank Pakistan Sovereign Fund (Perpetual)
40.	NAFA Income Opportunity Fund
41.	NAFA Islamic Aggressive Income Fund
42.	NAFA Islamic Asset Allocation Fund (Formerly: NAFA Islamic Multi Asset Fund)
43.	NAFA Multi Asset Fund
44.	NAFA Stock Fund
45.	NAMCO Balanced Fund
46.	National Investment Unit Trust
47.	Pakistan Capital Market Fund
48.	Pakistan Income Fund
49.	Pakistan Int'l Element Islamic Asset Allocation Fund
50.	Pakistan Stock Market Fund
51.	Pakistan Strategic Allocation Fund
52.	PICIC Energy Fund
53.	Unit Trust of Pakistan
54.	United Growth & Income Fund
55.	United Stock Advantage Fund