

Selectivity and Market Timing Performance of Mutual Funds in Emerging Markets: An Evidence from India

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Abstract

This study focuses on the performance of Indian equity mutual funds in terms of selectivity and market timing. A total of 1248 equity mutual funds are examined using the traditional Treynor and Mazuy (1966) and Henriksson and Merton (1981) models (in short TM Model and HM Model). We employed the generalized auto regressive conditional heteroscedasticity (GARCH) model introduced by Bollerslev (1986) in addition to these traditional models. With the exception of the TM Model, the remaining three models reveal that the fund managers exhibit superior stock selection abilities in a significant percentage of schemes. All four models, however, demonstrated that Indian mutual fund managers had poor market timing skills.

Key Words: Mutual Funds, Selectivity, Market Timing, GARCH.

1. Introduction

Mutual Funds have become an important tool for mobilizing the savings of individuals and institutions. Over the past decades, the mutual fund industry has seen immense growth and has become a significant player in the Indian capital market. The average asset under management (AUM) of India's mutual fund industry has shown three fold growth from ₹ 26.33 trillion as on October 31, 2019 to ₹67.26 trillion as on October 31, 2024 in a span of five years. The total number of accounts or folios under equity, hybrid and solution oriented schemes as on December 31, 2023 stood at 216.5 million, wherein the maximum investment is from retail segment (www.amfiindia.com/indian-mutual). Though India's mutual fund AUM to gross domestic product (GDP) ratio is just 15 percent against the global average of 75 percent, the country's mutual fund industry has the potential to grow exponentially.

The performance of mutual funds has been a widely debated topic right from the introduction of Jensen model of mutual fund performance in 1964. This subject is extremely relevant to the investing community, both retail and institutional, as the investment decisions and strategies are mainly guided by the funds' historical performance. Performance analysis of the funds is equally helpful for mutual fund managers as this can be utilized as a barometer for the managers' decision making ability. This is because the profitability of any fund is directly linked to the decision

making capacity of fund managers, right from portfolio construction to portfolio revision, market timing ability, and so on. Further, this topic is relevant to the research community and academicians as various time-tested performance models can be developed and evaluated for the benefit of investors, mutual fund companies and others. Ultimately, information on the mutual fund performance is highly essential for the regulating agencies like central bank, mutual fund regulators, stock exchanges, stock market regulators, insurance regulators, etc.

This study focuses on the performance of Indian mutual funds concentrating on the equity mutual funds. In comparison to other studies conducted in India on mutual fund performance, this study is significantly different. Firstly, this study analyzes all equity funds covering the time period of ten years from 2011 and 2020. This time frame is critical in the context of the Indian capital market. During the initial years of the study period, the global stock market was still recuperating from the 2008 financial crisis. Following a decline due to the financial crisis, the influx of foreign funds into the Indian mutual fund industry gradually resumed. In the mid of this decade 2011-2020, there were significant political changes that took place in Indian politics. With a commanding majority, the new coalition, known as the National Democratic Alliance (NDA), formed the government at the center. The administration's stability was further demonstrated in 2019 when, for the first time in many years, the same coalition was re-elected with a larger majority of seats than in the previous term. This government implemented numerous new programs and initiatives, including the Goods and Services Tax (GST), demonetization, privatization of the government-owned businesses, raising the cap on foreign investment in certain industries and many more. These measures affect a number of economic sectors, including mutual funds, directly and indirectly. Above all, towards the end of the decade the world experienced a heavy blow when the SARS-COV-2 virus spread over the world and caused a deadly pandemic. Emerging countries like India were compelled to endure the death blow from the virus due its severe impact on millions of people and businesses. All the above mentioned events significantly impacted the Indian economy and so did the mutual fund industry. The time period chosen for this study is therefore quite pertinent.

The present study is organized as follows, section two deals with the literature review, and section three explains data and methodology, while results are discussed in section four, section five concludes.

2. Literature Review

The mean variance framework for constructing efficient portfolios of Markowitz (1952) led to the development of the capital asset pricing models (CAPM) of Sharpe (1966), Lintner (1965) and Mossin (1966). These two sets of significant contributions paved the way for the development of various portfolio/mutual fund performance measurement methods. Treynor (1965), Sharpe (1966), and Jensen (1968) are the pioneers in the portfolio/mutual fund performance analysis. These CAPM based measures are categorized as return-based traditional models of portfolio analysis.

Jensen (1968) examined the selectivity ability of 115 mutual funds with an alpha indicator he had developed. He found that mutual fund managers failed in proper stock selection. Treynor and Mazuy (1966) (henceforth TM model) established a quadratic regression method in order to measure the market timing ability of fund managers. Out of a sample 57 open-end funds, only one fund demonstrated significant market timing ability. Subsequently, many studies were conducted using the TM model.

Fama (1972) categorized the overall performance of mutual funds into 'macro forecasting' or 'market timing' and 'micro forecasting' or 'stock selection'. Since then, it is common practice to divide the portfolio performance into two components, stock selection and market timing. These initial efforts of Sharpe (1966), Treynor and Mazuy (1968), Jensen (1967, 1968) on mutual fund performance laid the foundation to a series of studies in the areas of market timing and

stock selection skills of fund managers. The subsequent studies either extended the pioneer models or deviated from them. Further, the majority of studies are concentrated on the US markets. However, a good number of studies are conducted in developed economies of Europe and Asia. Off late, the researchers of emerging economies too are focusing on the issue of mutual fund performance.

Some of the significant studies in the US include Merton (1981), Henriksson and Merton (1984), Grant (1977), Kon and Jen (1978, 1979), Kon (1983), Bhattacharya and Pfleiderer (1983), Jagannathan and Korajczyk (1986), Lee and Rahman (1990), Coggin et al. (1993) Kao et al. (1998) Bollen and Busse (2001) and Chen et al. (2010). Merton (1981) developed a non-parametric framework for examining the market forecasting ability wherein the knowledge of distribution of stock or market returns is not essential. Applying this model, Henriksson and Merton (1984) (hereafter HM model) investigated 116 mutual funds along with a parametric model and found there is absence of significant marketing timing skill in the fund managers. Grant (1977) segmented the risk or the variance of return in order to demonstrate a 'potential cost of timing' decisions. He argued that the Jensen (1968) alpha measure will be downward biased if the performance measure focuses only on micro forecasting or security selection skills.

Kon and Jen (1979) proposed a switching regression methodology for measuring the market timing performance which includes the non-stationary risk level of funds. Kon (1983) extended this methodology and argued that, this methodology avoids the downward bias of the least square model of Jensen (1968). The extended model was applied on 37 mutual funds having monthly data. It was found that the sample funds did not show any timing ability. Considering Fama (1972) and Jensen (1972) as base models, Chang and Lewellen (1984) addressed the issue of stationery portfolio risk levels which permits a more 'complete appraisal' of the factors of performance. Neither skillful market timing nor clever security selection abilities were evident in the sample funds. Jagannathan and Korajczyk (1986) demonstrated that with the parametric techniques of market timing and stock selectivity like the HM model can show spurious results when applied to option-like securities. They argued that, when the market portfolio or benchmark index contains option-like (risky) securities, portfolios with greater concentration of option-like securities will show positive timing performance and vice versa.

Lee and Rahman (1990) argued that the conventional performance models fail to separate the aggressiveness of a fund manager from the quality of the information he possesses. They applied the modified TM model developed by Bhattacharya and Pfleiderer (1983) on a sample of 93 US mutual funds. This study reported that there was some evidence of greater forecasting ability among fund managers. Coggins et al. (1993) employed both the TM model and Bhattacharya and Pfleiderer (1983) models on the monthly returns of 71 US equity pension funds. In addition, this study considered the heteroscedastic disturbance terms. They found that regardless of the choice of benchmark index portfolio or estimation model, the selectivity coefficient is positive and timing measure is negative. Further, this study found some evidence that the selectivity and timing are sensitive to the choice of benchmark index.

As far as international mutual funds, Kao et al (1998) applied the Merton (1981) and HM model on 97 US based international funds. It is found that the international fund managers are poor market timers. Romacho and Cortez (2006) observed a distance effect on stock selection performance. That is, fund managers who invest in domestic funds perform better than those who invest in international markets. However, the domestic fund managers show poor market timing skill when compared to international fund managers.

Bollen and Busse (2001) for the first time considered the daily return frequency to analyze the mutual fund performance. Further, this study compared the result of daily returns with the monthly returns to see whether the daily data changes

inference regarding timing ability of the fund managers. It was concluded in this study that using daily data is more powerful than the low frequency data.

As far as the Indian mutual fund managers are concerned, Deb et al. (2007) applied an unconditional and conditional TM model and HM model for the monthly and weekly data. It was revealed from this study that like many of the US based and other studies, Indian managers are poor market timers. Chopra et al (2011) studies 37 diversified equity funds by employing the Jensen (1968) and HM model. In line with Deb et al (2007) this study concluded that there is no stock selection and market timing skill among fund managers. Based on conditional and unconditional TM and HM models, Dhar and Mondal (2014) found that out of 80 sample funds only six funds exhibit market timing ability. Absence of market timing is found even after including a control variable for the public information. According to Pandey (2019) research, fund managers from private sector in India are more efficient in stock selection and have more aggressive skills in terms of stock selection and market timing than public sector managers. Alam and Ansari (2020) investigated the timing abilities of Indian fund managers from two perspectives: liquidity timing and volatility timing and found evidence of liquidity timing in a sample of 183 equity funds at both the portfolio and individual level but no clear evidence was found. In terms of volatility timing.

Agarwal and Pradhan (2018) applied a multifactor version of TM and HM models. Deviating from most of the Indian and foreign study results, this study found that Indian mutual fund managers possess significant stock selection ability and they exhibit significant timing skills when monthly return frequencies are used.

The above literature review reveals that the majority of the empirical studies on market timing and stock selection ability of the fund managers do not show significant timing and selection skill. These results are evident in the studies conducted in the developed economies as well as a few emerging economies. In addition, these results are persistent across the models, data sets, data frequency and the benchmark market portfolios. However, the number of studies in the emerging economies are slant, and those existing studies suffer from a few drawbacks. First, only a limited number of mutual funds are considered for the timing and selection ability. Therefore, the results of these studies cannot be generalized. Second, except Agarwal and Pradhan (2018), other studies have not considered the problems of using time series in any regression model. The factors like autocorrelation, serial correlation, heteroscedasticity in the residuals are not given any importance in the studies conducted in the emerging economies like India. Alam and Ansari (2020) examined the timing skills of Indian fund managers for a sample of 183 equity funds for the period 2000 to 2018 but found no evidence of market return timing skills and volatility timing skills among fund managers. Suvarna (2022) used the conditional TM and HM model to examine the selection and timing skills of fund managers and found that less than 25 percent of the funds in the sample display the managerial skills as per TM model and only 6 percent as per the HM model which means that fund managers are poorly skilled in attaining the stock selection and market timing skills. Therefore, this study intends to fill the gap in the existing literature by inclusion of adjustments for time series problems. We compare the results of timing and selectivity before inclusion of adjustments for these properties and after. In addition, this study includes all the equity mutual funds that are operating in India for the last ten years. Hence, this study is significant in terms of the number of mutual funds included for the study, and therefore the results are more robust.

3. Data and Methodology

The daily net asset value (NAV) data of mutual funds is collected from the Association of Mutual Funds of India (AMFI)'s website. When the study was initiated there were 40 asset management companies (AMC) with more than one thousand mutual fund schemes. However, this study focuses on equity mutual funds for a few reasons. The important reason is since equity mutual funds are investing their funds in equity shares, and share prices are highly volatile and also the returns are heavily dependent on market forces, the fund managers need to be more skillful in terms of timing and stock selection. In the initial stage, we have collected NAV data of all equity mutual funds. However, in the data cleaning process we removed 23 mutual fund schemes as these mutual fund schemes were launched very recently and hence they do not have a reasonable number of observations. We excluded those funds which are very young and do not possess at least 500 or minimum two years' observations. Hence, our final sample includes 1248 mutual funds. To the best of our knowledge this is the first study in India which considered such a big number of mutual funds. Our sample period consists of ten years from 2011 to 2020 and in line with Agarwal and Pradhan (2018), our sample is free from survivorship bias as we included all the funds that ever existed over the sample period.

The risk-free rate has been collected from the website of the Reserve Bank of India (RBI). The weekly auction data of 91-day Treasury Bills (TB) is converted into daily data for the calculation purpose. Further, we have used the Sensex, the sensitivity index of The BSE Ltd. (formerly The Bombay Stock Exchange of India Ltd.) as the benchmark index or as a proxy for the market portfolio. The BSE Sensex is the basket of 30 largest and most active companies. Table 1 provides the details of final sample.

5. Methodology:

Jensen's net selectivity model is one the widely used mutual fund performance models. Though Jensen did not limit his model to a stock selection model, Fama (1972) decomposed this model for stock selection and market timing. Various fund performance models have been developed following Jensen's selectivity model. Two such models are Treynor and Mazuy (1966), and Henriksson and Merton (1981) models (in short TM Model and HM Model). Treynor and Mouzy (1966) extended Jensen's (1965) single index model by including a quadratic term in the basic alpha model. According to the TM model, portfolio returns are a nonlinear function of market returns. If the portfolio managers exhibit market timing skills, they increase investment in high beta stocks in anticipation of price rise in near future. Similarly, when a market rally is predicted, funds will be shifted to safer, low beta securities. Therefore, as per the TM model the security market line (SML) will curvature if market timing exists. The quadratic form of the TM model can be expressed as follows,

$$R_i - R_f = \alpha + \beta(R_m - R_f)t + \gamma(R_m - R_f)^2 + \varepsilon_{pt} \text{ ----- 1}$$

Henriksson and Merton (1981) proposed a different approach to market timing. They argue that the market timer allocates capital between risk-free assets and equities based on future excess market returns estimates. Market timer has to estimate the excess market return over the risk-free return. If the market return is equal to or greater than the risk-free return it is termed as an up (bull) market. In such cases, the market timer would select high beta securities. If the market return is less than the risk-free return it is called a down (bear) market and he would choose low beta securities. As a result, a successful market timer is said to choose a high up market beta and a low down market beta. Henriksson and Merton (1981) proposed the following regression equation using a dummy variable to formally express such a relationship:

$$R_i - R_f = \alpha + \beta(R_m - R_f)t + \gamma[D(R_m - R_f)t] + \varepsilon_{pt} \text{ ----- 2}$$

In the equation (2) C is the dummy variable having a value of 1, if the market return is equal to or higher than the risk free return (up market), or 0 otherwise (down market). If the gamma coefficient, γ is positive and statistically significant in both equation 1 and 2, the fund managers possess market timing abilities. The positive and significant alpha, α coefficients in the two equations above imply that fund managers have stock selecting abilities.

In this study, we further evaluate the time series characteristics of the data, departing from the traditional stock selection and market timing models. Our analysis shows that the variables we utilize have a significant time-varying and clustering characteristics. Additionally, the series distribution exhibits leptokurtosis with significant GARCH and ARCH effects. The TM and HM models are therefore extended by accounting for the impact of auto-regressive conditional Heteroscedasticity (ARCH) in the variables. We use the generalized auto-regressive conditional Heteroscedasticity (GARCH) model proposed by Bollerslev (1986). The time-varying conditional volatility is a function of its own past lag one term plus the past innovations, according to this model. The GARCH (1, 1) model is specified as,

$$R_i - R_f = \alpha + \beta(R_m - R_f)t + \gamma(R_m - R_f)^2 + \varepsilon_{pt}, \varepsilon_{pt}|\varphi_{t-1} \sim N(0, \sigma^2)$$

$$R_i - R_f = \alpha + \beta(R_m - R_f)t + \gamma[D(R_m - R_f)t] + \varepsilon_{pt}, \varepsilon_{pt}|\varphi_{t-1} \sim N(0, \sigma^2)$$

$$\sigma_t^2 = \omega + b\varepsilon_{t-1}^2 + g\sigma_{t-1}^2$$

Equation 3 and 4 are the mean equation and 5 is the variance equation.

6. Results and Discussion:

Table 2: Summary of Selectivity and Timings results

Model Name	Selectivity Coefficient (Alpha)		Market Timing Coefficient (Gamma)	
	Positive Coefficient	Negative Coefficient	Positive Coefficient	Negative Coefficient
TM	285***	17***	10***	736***
	125**	23**	2**	34**
	84*	22*	4*	25*
HM	706***	1***	1***	929***
	132**	3**	3**	90**
	64*	6*	0*	39*
TM GARCH	353***	83***	44***	886***
	106**	14**	8**	71**
	76*	20*	3*	23*
HM GARCH	709***	0***	1***	940***
	131**	3**	3**	90**
	64*	6*	0*	39*

(Note: *** indicates significant at 1 percent level and * indicates significant at 10 percent level)

Source: Author's calculations

Table 2 summarizes the stock selection and market timing skills of Indian fund managers using four different models. The figures in the table indicate the number of mutual fund schemes have significant coefficients that are either positive or negative. The TM Model and the HM Model give outcomes that show differences with regard to the stock selection ability. Table 3 in the appendix presents Indian mutual fund managers' stock selection and market timing skills in relation to various asset management firms. The four sub columns under the stock selection column show the quantity and percentage of schemes amongst AMCs as per the four models. In the market timing column, the results of HM and HM GARCH models are intentionally excluded as only four schemes are having significant and positive gamma (market timing) values. As per the TM model, majority of the Indian fund managers do not seem to be engaged in stock selection activity. However, when the GARCH framework is applied to the TM model, nearly 43 percent of the fund managers demonstrate superior stock selection ability. This result is unique and provides scope for the debate on model superiority. As suggested by Agarwal and Pradhan (2018), it is always recommended to confirm the results with the help of multiple well established models. As per the HM model, nearly 72 percent of the schemes are exhibiting stock selection ability. The alpha coefficient of the HM model is positive and statistically significant at one percent level in 706 out of 1248 (57 percent) mutual fund schemes. It is a clear indication of superior stock picking ability among Indian mutual fund managers.

As far as the market timing is concerned, all four models show that the majority of the mutual fund schemes are having negative and statistically significant gamma values. The conventional unconditional TM and HM models does not display the market timing ability in 795(64 percent) and 1058 (85 percent) schemes respectively. Only 16 (1.3 percent) schemes under TM and 4(0.03 percent) schemes under HM model show positive and statistically significant gamma values. The GARCH fitted TM and HM models reveal that in 55 (79 percent) and 4 (0.03 percent) respective mutual fund schemes, the fund managers demonstrated superior market timing ability. However even after fitting GARCH, HM model did not show any changes with respect to the market timing abilities. Hence, based on the aforementioned results and related discussions one can conservatively conclude that Indian mutual fund managers have stock selection and but not timing capabilities. At this point, it is crucial to examine which asset management companies' (AMCs) schemes exhibit stock selection and timing abilities. So the schemes/ AMCs are categorized into two sets of groups. The first set of category is based on age of the mutual fund schemes. Under this criteria, the mutual fund schemes are divided into two groups such as old funds and new funds. Old funds are those funds which were launched before 2015 and have more than 1500 observations. Whereas new funds are those funds which are launched after 2015 and have less than 1500 observations. The Appendix Table 4 demonstrates the number of old and new schemes that each AMC possesses in its basket and their performance in terms of stock selection and market timing. It is evident from the Appendix Table 4 that as per the HM model, majority of the schemes are depicting the stock selection ability under old schemes and new schemes. It is further evident from the table that new funds are more active in terms of stock picking exercise. When we fit GARCH to the HM model, the similar result is obtained. Therefore, fitting GARCH to the conventional HM model did not yield significant change in the result. In case of market timing ability, out of four different models, TM and TM

GARCH models produced significantly positive gamma values but HM and HM GARCH models failed to produce superior market timing abilities..

Based on the number of schemes, we have categorized the AMCs as small, medium and big AMCs. Small AMCs are those AMCs with twenty or less mutual fund schemes, medium-sized AMCs are those with twenty one to forty schemes, and big AMCs are those with more than forty schemes. Hence, there are eleven, nineteen and nine AMCs in small, medium and big AMCs categories respectively. Small AMC group covers eleven percent of schemes, the medium group involves forty six percent of schemes and the big group covers forty four percent of total schemes under study. The results are presented in appendix Table 3. It is evident that, in the small sized AMC category, four AMCs out of eleven AMCs displaying 100 percent schemes possessing stock selection ability under the HM model. These AMCs are Motilal Oswal Asset Management Co. Ltd (Eleven schemes), Baroda Asset Management Co. Ltd (Two schemes)ITI Asset Management Ltd. (Eight schemes), PGIM Asset Management Ltd. (Three schemes) and Quantum Asset Management Pvt. Ltd (Four schemes). Similarly, more than fifty percent of schemes of five AMCs have a significantly positive stock selection coefficient. The funds of Indiabulls Asset Management Co. Ltd., IIFL , PPFAS and Shriram Asset Management Co Ltd are the worst performers in this category with zero percent performance. As far as the TM model is concerned, seven out of eleven AMCs fail to exhibit stock selection ability in small size category as their stock selection coefficients are statistically insignificant. Overall, the stock picking skills are very poor in small AMCs according to the TM model.

The medium sized AMCs are not too impressive with regard to stock selection skills when the TM model is applied. As one can witness from appendix Table 3, a maximum of 100 percent of schemes are depicting stock selection skill in the case of Canara Mutual Fund Asset Management Ltd. Union Asset Management Company Ltd. and Principal Asset Management Ltd. are next in the group with eighty two and seventy three percent schemes having stock picking skills.

6. Conclusion:

This study has examined the market timing and stock selection ability of Indian mutual fund managers. A total of 1248 equity mutual funds over the period of ten years are considered for this study. The conventional models of stock selection and market timing i.e. Treynor and Mazuy (1966) and Henriksson and Merton (1981) are applied. Deviating from other studies, we applied the GARCH framework after thorough checking of the ARCH effect in the time series data. The TM Model and the HM Model provide contradictory results in terms of stock selection abilities and market timing abilities. According to the TM model, only thirty nine percent of Indian fund managers participate in stock selection activities. However, when the GARCH framework is applied to the TM model, nearly 43 percent of the fund managers demonstrate superior stock selection ability. The HM model revealed that nearly 72 percent of the schemes exhibit stock selection capabilities, which is superior to the TM results. Further, all four models demonstrate that the majority of mutual fund schemes do not have positive and statistically significant gamma values, which indicate the absence of market timing ability among fund managers. The proportion of funds with timing ability in the wrong direction is more those having a perfect timing ability. It is a clear evidence of perverse market timing abilities among the equity fund managers who are timing in the wrong direction. With a very few exceptions, managers were unable to time the market and do not seem to engage in timing practices. However, stock selection capacity is far more apparent. According to the study, fund managers are more likely to focus on stock selection rather than market timing in order to generate superior returns.

When the fund manager demonstrates skills in one form of capability, he exhibits weakness in the other. It is unable to demonstrate skills and power in both stock selection and market timing at the same time. This result is consistent with

previous research and is most likely proof of mutual fund managers' concentration on their operation specialization. Therefore, it is difficult to conclude whether Indian fund managers possess both selection and timing abilities. To gain confidence of the public, there is a need to improve both abilities to generate superior returns. There is a need to avoid the perverse market timing and also its negative impact on the generated returns.

However, the present study contributes to the existing research by examining the capability of the Indian fund managers in stock selection and market timing which play a vital role in the success of a mutual fund.

Further studies can be done on the issue by including conditional TM and HM models. Analysis can also be done by decreasing the time period into weekly, monthly, quarterly, half yearly and yearly.

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Appendix

Table 2: Results of stock selection and market timing models.

Name of the AMC	Number of schemes included for study	Stock Selection				Market Timing	
		HM	TM	HM GARCH	TM GARCH	TM	TM GARCH
ICICI Prudential AMC Ltd.	82	56 (68)	9 (11)	3 (4)	37 (45)		5 (6)
Nippon Life India Asset Management Ltd	74	53 (72)	3 (4)	10 (14)	38(51)	7(7)	9 (12)
Aditya Birla Sun Life AMC Ltd	72	51 (71)	4(6)	1 (1)	28 (37)	3(10)	3 (4)
SBI Funds Management Private Limited	66	57 (86)	2(4)	4 (6)	38 (51)	37 (56)	
UTI Asset Management Co Ltd	52	38 (73)	19(42)	2 (4)	33 (46)	23 (44)	5 (10)
DSP Investment Managers Pvt. Limited	45	36 (80)	1(2)		37 (56)		
Sundaram Asset Management Co. Ltd	44	34 (77)	2(5)		19 (43)	19 (43)	3 (7)
Franklin Templeton Asst Mgmt Pvt Ltd	43	27 (63)	13(24)	3 (7)	25 (63)		2 (5)
IDBI Asset Management Limited	40	25 (63)	5 (10)		15 (38)	8 (20)	
Invesco Asset Management Pvt. Ltd	40	29 (73)	19 (48)		20 (54)	19 (48)	2 (5)
Kotak Mahindra AMC Ltd	40	37 (93)	4(10)		10 (29)	25 (63)	
L&T Investment Management Ltd	40	32 (80)	2(5)		12 (41)	1(1)	1 (3)
HDFC AMC Limited	37	24 (65)	22(60)	1 (3)	4 (14)	20 (54)	2 (5)
Quant Money Managers Limited	34	28 (82)	15(44)		9 (32)	10 (29)	
Taurus AMC Limited	29	20 (69)	15 (32)	1 (3)	9 (35)	4 (4)	1 (3)
Essel Finance Wealth Zone Pvt. Ltd.	28	21 (75)	10(36)		16 (64)		1 (4)
IDFC AMC Limited	28	22 (79)	1(4)		9 (38)	9 (32)	2 (7)
Mirae Asset Investment Manager Pvt. Ltd.	28	25 (89)	23(82)	25 (35)	5(21)	22 (79)	
Canara Robeco AMC. Ltd.	26	22 (85)	26(100)	1 (4)	9(35)		
Axis AMC Limited	25	22 (88)	13(52)	2 (8)	15 (68)	2 (4)	
HSBC Asset Management Private Ltd	24	17 (71)	3(13)	1 (4)	12 (60)		2 (8)

Table 3: Age-wise performance of mutual funds

Name of the AMC	A	B	C	D	E	F	G	H	I	J	K	L
Aditya Birla Sun Life AMC Ltd	6	5	65 (90)	7 (10)	48 (74)	2 (29)	50 (77)	2 (29)	32 (49)	1 (14)	3 (5)	3 (43)

Axis Asset Management	1	19	6	18	4	18	4	16		4
Company Ltd.	9	6	(76)	(24)	(95)	(67)	(95)	(67)	(84)	(67)
					1		1			1
Baroda Asset Management India Ltd.	1	18	1	11	(100)	11	(100)	2	2	(100)
	8	1	(95)	(5)	(61)	)	(61)	)	(11)	(11)
					4		4		4	
Baroda BNP Paribas AM India Pvt. Ltd.	1	16	4	10	(100)	10	(100)	8	(100)	1
	6	4	(80)	(20)	(63)	)	(63)	)	(50)	(6)
					6		6			6
BOI AXA Investment Mngers Private Ltd	1	13	6	9	(100)	9	(100)	5	2	(100)
	3	6	(68)	(32)	(69)	)	(69)	)	(38)	(33)
Canara Robeco AMC Ltd.	2	22	4	19	3	19	3	9		3
	2	4	(85)	(15)	(86)	(75)	(86)	(75)	(41)	(75)
					8		8			8
DSP Investment Managers Pvt. Ltd.	3	37	8	26	(100)	26	(100)	20	2	(100)
	7	8	(82)	(18)	(70)	)	(70)	)	(54)	(25)
Edelweiss Asset Management Ltd.	1	13	9	12	8	12	8	10	3	1
	3	9	(59)	(41)	(92)	(89)	(92)	(89)	(77)	(33)
Essel Finance Wealth Zone Pvt. Ltd.	2	3	25	2	19	2	19		4	21
	3	5	(11)	(89)	(67)	(76)	(67)	(76)	(16)	(84)
Franklin Templeton Asst Mgt Pvt. Ltd	4	42	1	27		27		20		2
	2	1	(98)	(2)	(64)		(64)		(48)	(5)
HDFC Asset Management Company Ltd.	3	33	4	24		24		20		2
	3	4	(89)	(11)	(73)		(73)		(61)	(6)
HSBC Asset Management(India) Pvt. Ltd	2	(100)		13		13		9		2
	4	)		(54)	4	(54)	4	(38)		(8)
ICICI Prudential AMC Ltd.	5	2	58	24	50	6	50	6	37	5
	8	4	(71)	(29)	(86)	(25)	(86)	(25)	(64)	(9)
IDBI Asset Management Ltd.	1	2	12	28	9	16	9	16	5	3
	2	8	(30)	(70)	(75)	(57)	(75)	(57)	(42)	(11)
				28						
IDFC Asset Management Company Ltd.	2	(100)		22		22		9		2
	8	)		(79)		(79)		(32)		(7)

[illegible]

						9		9		9		9	
Principal	Asset	1	13	9	12	(100	12	(100	6	(100	2	(100	
Management Pvt. Ltd.		3	9	(59)	(41)	(92))	(92))	(46))	(15))
				34									
Quant Money Managers		3	(100		28		28		10				
Ltd.		4	)		(82)		(82)		(29)			
					4		4					6	
Quantum	Asset		4	6	(100	2	(100	2	4			(100	
Management Co Pvt. Ltd.		4	6	(40)	(60)	)	(33)	)	(33)	(100))	
						4		4		4		4	
SBI Funds Management		6	62	4	53	(100	53	(100	33	(100		(100	
Pvt. Ltd.		2	4	(94)	(6)	(85)	)	(85)	)	(53)))	
					5								
Shriram	Asset				(10							3	
Management Co Ltd			5		0)							(60)	
						6		6				6	
		3	38	6	28	(100	28	(100	16	3	3	(100	
Sundaram AMC Ltd		8	6	(86)	(14)	(74))	(74))	(42)	(50)	(8))
Tata Asset Management		2	4	27	48	25	24	25	24	13	15		24
Pvt. Ltd.		7	8	(36)	(64)	(93)	(50)	(93)	(50)	(48)	(31)		(50)
Taurus	Asset				29								
Management Company		2	(100		20		20		12		1		
Ltd.		9	)		(69)		(69)		(41)		(3)	
Union Asset Management		1	1	12	16	10	4	10	4	4	6		10
Co. Pvt. Ltd.		2	6	(43)	(57)	(83)	(25)	(83)	(25)	(33)	(38)		(63)
					52								
UTI Asset Management		5	(100		38		38		23		5		
Co Ltd		2	)		(73)		(73)		(44)		(10)	

(Notes- A: No. of Old Schemes, B: No. of New Schemes, C: Old Scheme Percentage D: New schemes percentage, E: HM alpha (Old Schemes), F: HM Alpha (New Schemes), G: HM GARCH alpha (Old Schemes), H: HM GARCH alpha (New Schemes), I: TM GARCH alpha (Old Schemes), J: HM GARCH alpha (New Schemes), K: TM GARCH Gamma (Old Schemes), L: TM GARCH Gamma (New Schemes))

Table 4: AMC size-wise performance analysis

Name of the AMC	Total	Stock Selection				Market Timing		
		HM	TM	HM GARCH	TM GARCH	HM	TM	TM GARCH
Panel A: Big Sized AMCs								
ICICI Prudential AMC Limited	82	56 (68)	9 (11)	56 (68)	37 (45)		3 (4)	14 (17)
Tata AMC Limited	75	49 (65)	23 (31)	49 (65)	28 (37)			24 (32)
Nippon Life India Asset Management Ltd	74	53 (72)	3 (4)	53 (72)	38 (51)		10 (14)	9 (12)
Aditya Birla Sun Life AMC Ltd	72	50 (69)	4(6)	50 (72)	33 (46)		1 (1)	6 (8)
SBI Funds Management Private Limited	66	57 (86)	2(4)	57 (86)	37 (56)		4 (6)	4 (6)
UTI Asset Management Co Ltd	52	38 (73)	28(54)	38 (73)	23 (44)		2 (4)	5 (10)
DSP Investment Managers Private Limited	45	34 (76)	19(42)	34 (76)	22 (49)			8 (18)
Sundaram Asset Management Company Ltd	44	34 (77)	21(51)	34 (77)	19 (43)			9 (20)
Franklin Templeton Asst Mgmt Pvt Ltd	43	27 (63)	1(2)	27 (63)	20 (47)		3 (7)	2 (5)
Panel B: Medium Sized AMCs								
IDBI Asset Management Limited	40	25 (63)	5 (10)	25 (63)	8 (20)			25 (63)
Invesco Asset Management (India) Private Ltd	40	29 (73)	19 (48)	29 (73)	19 (48)			6 (15)
Kotak Mahindra Asset Management Co Ltd	40	37 (93)	4(10)	37 (93)	25 (63)			8 (20)
L&T Investment Management Ltd	40	32 (80)	2(5)	32 (80)	15 (38)			5 (13)
HDFC Asset Management Company Limited	37	24 (65)	22(60)	24 (65)	20 (54)		1 (3)	2 (5)
Quant Money Managers Limited	34	28 (82)	15(44)	28 (82)	10 (29)			0 (0)
Taurus Asset Management Company Limited	29	20 (69)	15(32)	20 (69)	12 (41)		1 (3)	1 (3)
Essel Finance Wealth Zone Private Limited	28	21 (75)	10 (36)	21 (75)	4 (14)			21 (75)
IDFC Asset Management Company Limited	28	22 (79)	1(4)	22 (79)	9 (32)			2 (7)
Mirae Asset Investment Managers Private Limited	28	25 (89)	6(21)	25 (89)	22 (79)			16 (57)
Union Asset Management Co. Pvt. Ltd.	28	14 (50)	23(82)	14 (50)	10 (36)			10 (36)
Canara Robeco Asset Management Co. Ltd.	26	22 (85)	26(100)	22 (85)	9 (35)		1 (4)	3 (12)
Axis Asset Management Company Limited	25	22 (88)	9(36)	22 (88)	16 (64)		2 (8)	4 (16)
HSBC Asset Management(India)Private Ltd	24	17 (71)	15(63)	17 (71)	9 (38)		1 (4)	6 (25)
JM Financial Asset Management Limited	24	13 (54)	13(54)	13 (54)	5 (21)	4 (17)	8 (33)	5 (21)
LIC Mutual Fund Asset Management Limited	24	15 (63)	3(13)	15 (63)	7 (29)		2 (8)	7 (29)
Edelweiss Asset Management Limited	22	20	4(18)	20 (91)	13 (59)			9 (41)

		(91)					
Mahindra Manulife Invt. Mgt. Pvt. Ltd.	22	8 (36)	2(9)	8 (36)	0 (0)	2 (9)	20 (91)
Principal Asset Management Private Limited	22	21 (95)	16(73)	21 (95)	15 (68)		11 (50)

Panel C: Small Sized AMCs

BNP Paribas Asset Mgt. India Pvt. Ltd.	20	14 (70)		14 (70)	12 (60)		1 (5)
Baroda Asset Management India Limited	19	12 (63)	2 (63)	12 (63)	2 (11)	3 (16)	3 (16)
BOI AXA Investment Mngrs Private Ltd	19	15 (79)		15 (79)	7 (37)	2 (11)	6 (32)
Indiabulls Asset Management Company Ltd.	17	1 (6)		1 (6)	0 (0)		5 (29)
Motilal Oswal AMC. Ltd	17	17 (100)	11(65)	17 (100)	9 (53)		7 (41)
PGIM India Asset Management Private Limited	11	8 (73)	3(27)	8 (73)	5 (45)		2 (18)
Quantum Asset Management Co Pvt. Ltd.	10	6 (60)	4(40)	6 (60)	4 (40)		6 (60)
ITI Asset Management Limited	8	8 (100)		8 (100)	4 (50)		8 (100)
Shriram Asset Management Co Ltd	5				0 (0)		3 (60)
IIFL Asset Management Limited	4	4 (100)		4 (100)	4 (100)		
PPFAS Asset Management Pvt. Ltd	4	4 (100)		4 (100)	3 (75)		2 (50)

Note: The numbers in the parenthesis indicate the percentage. HM GARCH result column is excluded as only one mutual fund scheme is having significant and positive gamma value.