Market Timing Abilities of Mutual Fund Managers – An Empirical Study

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Abstract

Purpose : The present study applied the unconditional Treynor–Mazuy (TM) and Henriksson–Merton (HM) models and evaluated the market timing abilities of 58 top 5-star rated funds from Australia for the period from July 31, 2019, to July 31, 2021, which has been considered as the pandemic period for the study, which enabled the investors to analyze and compare the market timing skills of fund managers for better investment decisions through the application of the market timing models.

Methodology : For the selected fund's net asset values (NAV), Australian 10-year bond yield and ASX index points were collated. Subsequently, the NAV returns were regressed against the market premium and quadratic factors (as independent variables) of the TM and Henrikson–Merton (HM) models, respectively. The coefficients of these independent variables were tested for their statistical significance. Based on the *p*-values and positive or negative values of these coefficients, the presence or absence of market timing abilities of fund managers was identified.

Findings : The findings indicated the absence of market timing in most funds during the COVID-19 period based on the market timing models, which were developed by TM and HM models.

Practical Implications : The study enabled investors to make a rational decision in regard to investing in mutual funds during abnormal times. It also provided insights to fund managers in regard to their portfolio decisions during such abnormal market times.

Originality : The USA, Europe, and China have been the main subjects of market timing studies. Few studies on Australian finances were conducted during the pandemic, according to the literature assessment. We found that when markets are extremely turbulent, fund managers churn their portfolios and demonstrate greater capabilities. This information would be useful to both domestic and international investors.

Keywords : **market timing, Treynor–Mazuy Model, Henriksson–Merton Model, mutual funds**

JEL Classification Codes : G10, G12, G15

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The performance evaluation of mutual funds has been one of the most significantly researched areas in the world of finance, along with the analysis of fund managers' skills through different theoretical models. Since equities markets offer higher returns than other traditional financial products, investors have been

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more interested in making investments in them. Nonetheless, investors who lack technical expertise are directed into mutual funds in order to benefit from higher risk-adjusted returns. Because of this, the worldwide mutual fund sector has expanded; according to PwC (n.d.), global assets under management (AUM) will increase from US$84.9 trillion in 2016 to US$145.4 trillion by 2025. An investor's persistent challenge is to choose the right fund and trust the fund manager based on his/her skills. According to Bandi and Gupta (2019), stock selection and market timing proficiency are two abilities that are critical to a fund manager's success. The term "market-timing" approach was defined by Prigent (2007) as a method of timing market entry points that are correlated with the beta, which is larger when the market is bullish and smaller when the market is bearish.

The paper aims to analyze active Australian fund managers' market timing ability and whether fund managers were able to navigate these market cycles during COVID-19 (the period from July 31, 2019, to July 31, 2021, is considered a pandemic period for the study) by adjusting their betas and portfolios. The literature review and a large amount of research are focused on global funds and funds of USA and Europe; whereas limited research was found for Australian markets; hence, this study aims to cover the top 58 funds based on the past two years' returns as of July 31, 2021, with the application of Treynor–Mazuy (TM) model and Henriksson–Merton (HM) model.

The top 58 Australian mutual funds, with a total AUM of Australian Dollars (A$) $504.616 billion as of July 31, 2021, are the subject of this paper's analysis. The 5-star ratings provided by Investing.com are used to determine the performance of the top 58 funds, two of which were removed from the top 60 owing to inadequate data. The paper aims to fill the research gap of back-testing market cycles by analyzing the Australian fund managers' market timing and stock selection abilities in view of the COVID-19 pandemic and whether they have been able to predict or forecast the recovery or downtrend of the financial markets based on their domestic and global portfolios. The ongoing research on market timing capabilities is a result of the ever-evolving market cycles and the global testing of fund managers' market timing prowess. In addition to offering viewpoints on their stock selection practices, the study provides fund managers with insights into how to change their beta during abnormal events, should they recur.

Literature Review

Treynor and Mazuy (1966) were pioneers in research on the market timing ability of funds. In their paper, they suggested a simple method of testing the presence of the market timing ability of investment managers. Using parametric and non-open-ended tools, Henriksson (1984) evaluated 116 open-ended mutual funds based on monthly net asset values (NAV). Their study period was from 1968 to 1980, and their findings indicated a strong non-stationarity and absence of market timing for all the funds. Comer (2006) examined the market timing of hybrid mutual funds based on the TM and the multifactor TM model (MFTM). The sample included flexible mutual funds (with fixed income and money market instruments), balanced mutual funds, and asset allocation funds. The sample consisted of balanced and flexible funds for the period from 1981 to 1991 and for the equity funds from 1992 to 2000. The results indicated a lack of market timing from MFTM for the 1981–1991 period, whereas the TM indicated the presence of market timing for the 1992–2000 period. Lee and Lee (2012) examined the market timing of bond market funds in Taiwan using the TM model, HM model, TM-ARMAX (1,0,0)-GARCH (1,1) model, and the HM-ARMAX (1,0,0)-GARCH (1,1) model which indicated that bond funds did not reflect market timing, security section, and systematic risk in all the models except HM model where positive market timing was evidenced for the HM model based on 32 bond funds for the period from 2001 to 2010.

Furthermore, Olbryś (2012) identified the presence of auto-regressive conditional heteroscedasticity (ARCH) effects in the market timing models of Polish funds and hence applied the generalized auto-regressive conditional heteroscedasticity (GARCH (p, q)) for error estimation. Further, results indicated no statistical evidence of outperformance by fund managers and weak stock selection for the 15 selected funds from 2003 to 2010. Da Costa

et al. (2019) studied 30 funds from the Brazilian markets from 2005 to 2015. They analyzed the fund performance based on market timing, capital asset pricing, and factor models. Their evaluation indicated that stock selection ability can be linear to periods of market upswings.

Pandow (2017) attempted to study the existence of stock selection and timing performance of mutual fund managers in India by applying the traditional Henriksson and Morton model and Jenson and Fama's model over 5 years for 40 diverse mutual fund schemes in India; their findings revealed that fund managers in India need to be more consistent and that there was presence of selection skills but no progressive market timing competency in the Indian context. The academic literature on this topic is rich and spans several decades. Some of the more important studies that demonstrated a lack of superior performance by money managers were Brown and Goetzmann (1995), Chang and Lewellen (1984), Cumby and Glen (1990), Eun et al. (1991), Jensen (1968), and McDonald (1974) which suggested that, although some mutual funds may exhibit superior performance on a gross return basis, they fail to do so net of expenses. Rompotis (2011) found that in the case of exchange-traded funds (ETFs), there needed to be more market timing skills among active ETF managers in the sample under study (nine pairs of USA, passive ETFs, and active ETFs).

In general, the evidence shows that after considering all fund expenses, managers do not have the stock-picking ability (Carhart, 1997; Elton et al., 2012). The results are more controversial for market timing, with some authors pointing to evidence of positive managerial timing (Bollen & Busse, 2001; Ferson & Schadt, 1996) while many others pointing to the lack of this ability (Elton et al., 2012; Treynor & Mazuy, 1966).

Objectives of the Study

The study uses empirical research based on the secondary data and applies the TM & HM models.

(1) To examine if fund managers can predict market movements using the TM and HM models for the period ending March 31, 2019–2021.

(2) To assess fund managers' stock selection skills for the period of March 31, 2019–2021, using the HM and TM models.

Hypotheses

The hypotheses are:

- **H01 :** Fund managers do not possess market timing abilities based on the TM model.
- **Ha1 :** Fund managers possess market timing abilities based on the TM Model.
- **H02 :** Fund managers do not possess market timing abilities based on the HM model.
- **Ha2 :** Fund managers possess market timing abilities based on the HM model.
- **H03 :** Fund managers do not possess stock selection skills based on the TM model.
- **Ha3 :** Fund managers possess stock selection skills based on the TM model.
- **H04 :** Fund managers do not possess stock selection skills based on the HM model.
- **Ha4 :** Fund managers possess stock selection skills based on the HM model.

Data and Sample

Data

The data for the NAVs, risk-free rate yields, and benchmark returns were collated from Investing.com and Yahoo Finance and computed accordingly. The Australian 10-year bond yield and the ASX index have been taken as the surrogates for the analysis's risk-free rate and market benchmark.

Sample

This research includes 58 of Australia's top-ranked active mutual funds (Appendix A). Investing.com's 5-star ratings and the performance of the top 48 funds with a total AUM of Australian Dollars (A$) $504.616 billion—which were determined based on the highest returns of the funds—are the basis for the paper's analysis of the existence of market timing and stock selection abilities based on the TM and HM models on these funds. This period was selected as it was COVID-19 duration and would have brought about a significant challenge to fund managers. We took into consideration NAV daily statistics. According to Bollen and Busse (2001) and Goetzmann et al. (2000), daily data are thought to be more potent and successful than monthly tests for assessing market timing.

Methodology

The methodology of the study is discussed herewith. The daily NAVs were collated for the sampled funds for July 31, 2019, to July 31, 2021, wherein the pre-COVID, COVID, and recovery from COVID durations have been considered. Daily matching values for the risk-free rate and benchmark were also compiled. Subsequently, the discreet daily returns were computed for the funds and the benchmark. The Australian 10-year bond yield was compiled for the same period.

Returns

$$HPR\ of\ fund\ (Rp) = \{P_1 - P_0)\} / P_0 \quad \ldots\ldots (1)$$

$$HPR\ of\ Benchmark\ (Rm) = \{I_1 - I_0)\} / I_0 \quad \ldots\ldots (2)$$

where,
P_0 = Current NAV; P_0 = Prior day NAV; I_1 = Current index value; I_0 = Prior day index value.

After comparing the returns, the regression inputs for the TM and the HM models were computed.

TM and HM Models

Over time, multiple models have been suggested in the literature to test the fund managers' market timing abilities. However, the two fundamental models of TM and HM are applied largely. Though variations of these models (conditional TM and HM models) have been developed, the current study uses the traditional form of evaluating fund performance regarding market timing and stock selection abilities of Australian mutual fund managers.

The models are briefly explained below:

Treynor–Mazuy Model (TM) (Unconditional)

In their study, Treynor and Mazuy (1966) extended the original linear market model (based on excess returns) by adding a quadratic term to explain the market timing as follows:

$$(Rp–Rf), = \alpha + \beta * (Rm - Rf) + \gamma * (Rm - Rf)^2 + \varepsilon_p \quad \ldots\ldots (3)$$

where,
Rp = Return on the fund,
Rf = Risk-free return,
Rm = Return on the market portfolio,
ε_p = Random or error term, and α, β, and γ are considered as parameters (coefficients) of the model.

According to TM, the gamma (γ) parameter acts as an indicator for market timing. If it is positive (greater than zero), it indicates the presence of market timing. However, if the fund manager cannot time the market correctly, the estimated amount associated with gamma (γ) will not significantly differ from zero.

The TM model argues that if the fund manager is not focused on market timing but is concentrating on stock selection, then the average beta of time would be near constant. However, if the fund manager aims to time the market in response to changes in the external market environment, the fund manager would change the beta up or down in response to the external changes. The plots of these excess portfolio returns and the excess market returns would be above or below their linear relationship, leading to a curvature of scatter points. TM models capture this curvature by adding a quadratic term $(Rm - Rf)^2$ to the linear model as the second independent variable. The coefficient of this quadratic term is gamma (γ) and is an indicator for the interpretation of market timing (manifestation or absence).

Henriksson–Merton Model (HM) (Unconditional)

Henriksson and Merton (1981) suggested an alternative to the TM model. In their approach, they propose that fund managers seek excess market returns. To seek these returns, their model assumed that managers who aim to time the market have to predict (in an up-market) if the benchmark return would be greater than the risk-free yields *(Rm > Rf)* or (in a down market) if the benchmark return would be lower than the risk-free yields *(Rm < Rf)*. Based on their forecast, the beta would have to be adjusted accordingly. A higher beta would be chosen if markets are expected to do well, and a lower one would be chosen if a downtrend is expected.

The model is represented as below:

$$[Rp - Rf] = \alpha + \beta * (Rm - Rf) + \gamma * [D*(Rm - Rf)^2] + \varepsilon_p \ldots\ldots\ldots\ldots (4)$$

where;
Rp = Return on the fund,
Rf = Risk-free return,
Rm = Return on the market portfolio,
D = Dummy variable,
ε_p = Random or error terms α, β, and γ are considered as parameters (coefficients) of the model.

Here, the dummy variable *(D)* takes the value of 1 in a bullish market, that is, when the return on the market is greater than the risk-free rate (*Rm > Rf*) and 0 in the case of a bearish market, which is when the return on the

market is lower than the risk-free rate (*Rm* < *Rf)*. Here, the parameter γ would indicate the variation in the betas, i.e., in an upmarket, the beta would be β, and in a down market, the beta would be β – γ. A positive γ would indicate the presence of market timing, and a negative γ would indicate the absence of market timing.

Irrespective of the market timing skill, stock selection is also important; the "α" in both equations represents the stock selection ability of the fund manager. The unconditional model is covered in the paper, and the fund manager adjusts the beta to better time the market by utilizing information that is available in both the public and private domains.

After gathering the data and the inputs for each fund, regression was carried out, and the regression equations were constructed to identify the relevant parameters. For both the TM and HM models, if the gamma (γ) was positive, it indicated the presence of market timing by a fund manager. If γ was negative, it indicated the absence of market timing. The gammas (γ) were collated for both models, and a summary table was prepared. Furthermore, the alphas were also tabulated, and the existence or absence of stock selection abilities was identified. Finally, the statistical reliability of γ was tabulated based on the *p*-value of the γ co-efficient.

Data Analysis and Discussion of Research Results

A positive gamma indicates that fund managers could anticipate the impact of COVID-19, and a negative gamma indicates that they could not predict the impact of COVID-19 on their portfolios. Based on the regression output using the TM model, 34 funds reflected the presence of market timing as the γ was greater than zero, whereas 24 funds lacked market timing due to negative γ. The alpha was positive for 25 funds, indicating positive stock selection abilities, and 33 funds showed a lack of stock selection abilities. The results are tabulated in Appendix B.

In the case of the HM model, the market timing was positive for 44 funds (γ > 0), whereas 14 funds lacked the market timing (γ < 0). Stock selection was largely skewed towards the negative side as only nine funds had a positive alpha (α), and 49 funds showed an absence of the stock selection ability of fund managers (α < 0) under the HM model (Table 1). The results are tabulated in Appendix C.

Of the sampled funds, the data shows the number of funds whose gamma (γ) is statistically significant, that is, *p*-values < 0.05 (Appendix D).

Table 1. ***Summary of Regression Coefficients***

Model	Alpha	Beta	Gamma
TM positive	25	32	24
TM negative	33	26	34
Total Funds	**58**	**58**	**58**
HM positive	9	14	44
HM negative	49	44	14
Total Funds	**58**	**58**	**58**

Table 2. ***Number of Funds where γ (Market Timing Ability) is Statistically Significant***

No. of Funds Statistically Significant : TM *p*-value < 0.05	No. of Funds Statistically Significant : HM *p*-value < 0.05
22	38

Table 3. ***Number of Funds with Positive Gamma (γ) and p-value Less than 0.05***

For TM Model Positive γ and *p*-value < 0.05	For HM Model Positive γ and *p*-value < 0.05
25 Funds	19 funds

In the case of the TM model, we reject the null hypothesis (H01) for 22 funds and in the case of the HM model, we reject the null hypotheses (H02) for 38 funds (Table 2); in other words, market timing exists for these funds. The number of funds that should have a positive gamma (γ) as well as a statistically significant *p*-value (less than 0.05) would be the funds that have managed the market timing much better than their peers. The details are listed in Appendix E. The summary is shown in Table 3.

In the case of the TM model, we reject the null hypothesis (H01) for 25 funds, and in the case of the HM model, we reject the null hypotheses (H02) for 19; in other words, market timing exists for these funds, and these are statistically significant as well (*p*-value <0.05). The study indicates that regarding funds managers' successful market timing, 25 of the 58 sampled funds reflect positive market timing and are statistically validated as the *p*-values are less than 0.05 using the TM model. In the case of the HM model, 19 out of the 58 sampled funds reflect market timing and are found to be statistically validated as the *p*-values are less than 0.05 using the HM model. This shows that less than 50% (approx.) of the fund managers could not time the market during the duration related to COVID-19. The Anova of the three coefficients α, β, and γ under the TM model are given in Table 4.

The *p*-value is greater than 0.05, indicating that under the TM model, there is no statistically significant difference between group means of the intercept and coefficient. This indicates that fund managers were effectively selecting the right stocks (α) as well as timing the market efficiently (γ) to minimize their losses during the pandemic as per the TM model. However, in the case of the HM model, the results are different (Table 4).

The *p*-value is less than 0.05, indicating that the alternate hypothesis (Ha4) is accepted (Table 5), which indicates that under the HM model, there is a statistically significant difference between group means of the intercept and coefficient. This indicates that fund managers were either effectively selecting the right stocks (α) or were timing the market efficiently (γ) to minimize their losses during the pandemic, as per the TM model, which indicates that the alternate hypothesis (Ha3) is accepted, indicating the presence of stock selection or market timing abilities of fund managers.

Table 4. ***ANOVA of the Three Coefficients as per the TM Model***

Anova : Single Factor		**TM Model**				
SUMMARY						
Groups	**Count**	**Sum**	**Average**	**Variance**		
Alpha	58	–0.0139	–0.0002	3.6E–07		
Beta	58	0.0236	0.00041	0.00622		
Gamma	58	3.55246	0.06125	4.04448		
ANOVA						
Source of Variation	**SS**	***df***	**MS**	***F***	***p*-value**	***F*-crit.**
Between Groups	0.14467	2	0.07234	0.05357	0.9478	3.0488
Within Groups	230.89	171	1.3502			
Total	231.035	173				

Table 5. ***ANOVA of the Three Coefficients as per the HM Model***

Anova : Single Factor			**HM Model**			
SUMMARY						
Groups	**Count**	**Sum**	**Average**	**Variance**		
Alpha	58	–0.0359	–0.0006	7.2E–07		
Beta	58	–3.1639	–0.0545	0.00708		
Gamma	58	9.12799	0.15738	0.25912		
ANOVA						
Source of Variation	**SS**	***df***	**MS**	***F***	***p*-value**	***F*-crit.**
Between Groups	1.407	2	0.70359	7.92899	0.0005	3.0488
Within Groups	15.17	171	0.08874			
Total	16.58	173				

Conclusion and Implications

Due to the need to continuously modify their betas to account for shifting economic cycles, market timing is a critical competency for any fund manager. As an illustration, fund managers continuously adjusted their beta to maximize the risk-return trade-off throughout the time leading up to, during, and immediately following the COVID-19 pandemic. The paper aims to explore the existence or absence of market timing abilities of fund managers from July 31, 2019, to July 31, 2021, which coincided with the COVID-19 period. The market timing is studied using the unconditional TM and HM models. Both the models are applied to the daily NAVs of 58 Australian funds, and it is observed that a large number of fund managers needed help to time the market pre-, during, and after COVID-19. Literature suggests that the findings of the current study are in line with the global findings as well.

Overall, 25 funds under the TM model and 19 funds under the HM model have positive gamma and are statistically significant. The limitation of the study is that it relates to the COVID-19 period only, which can be considered an abnormal event for humankind; a longer duration can be considered to evaluate the market timing skills of the fund managers. The scope for further research is to cover a broader sample size of funds and a greater number of countries to get a global perspective. Additionally, the study sheds light on the market timing abilities of fund managers themselves. Using these models, fund managers can also reflect on the choices they make about the additions and deletions from their portfolios. Based on fund managers' styles and abilities, these models would enable investors to make logical selections.

Limitations of the Study and Scope for Future Research

The study is based on Australian funds during the COVID-19 period, which is relative to short-term decision-making due to an abnormal event in the short run. The findings are to be read in accordance with the current economic scenario of the Australian economy, which may be subject to change in the future. This is an event-based study, and more research can be done to compare international fund managers among nations and find out which funds performed better in the COVID-19 scenario. Additional fund types, such as debt funds, ETFs, and gold funds, could be included in the analysis.

Authors' Contribution

Dr. Akshay Damani, Muskaan Sethia, and Nivid Mehta conceived the idea of authoring the research paper based on market timing together. In addition to developing the qualitative and quantitative designs for the empirical investigation, they collaborated to complete the literature review. By employing pertinent keywords, publications from the JSTOR, Scopus, and ProQuest databases were sourced for the literature study. The authors took on the task of applying the pertinent models to the sample. It was a team effort.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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Appendix

Appendix A. ***List of Funds and Assets Under Management : 31.7.21 (in Australian $ Billions)***

	Assets Under Management				
Sr. No.	**Name of the Fund**	**AUM (A$ billions) as of 31.3.21**	**Sr. No.**	**Name of the Fund**	**AUM (A$ billions) as of 31.3.21**
1	Allan Gray Australia Equity A	2.48	30	Dimensional Australian Core Equity Trust	3.54
2	Amp Capital Enhanced Index International Share	7.97	31	Dimensional Global Bond Trust	2.20
3	Amp Capital Future Directions Balanced Fund-Class A	4.24	32	Dimensional Global Core Equity Trust	4.59
4	Ardea Real Outcome Fund	9.94	33	Fidelity Australian Equities Fund	5.68
5	Arrowstreet Global Equity Fund	5.22	34	Fsi Wholesale Geared Share	44.16
6	Bentham Global Income Fund	2.26	35	Ishares International Equity Index Fund	168.45
7	Bentham Professional Syndicated Loan Fund	2.26	36	Janus Henderson Australian Fixed Interest Fund-Inst.	3.47
8	Cfs Fc Esup-cfs Index Aus Share Sel	5.07	37	North Index Balanced	5.21
9	Cfs Fc Esup-first-choice Fixed Intr Sel	4.49	38	North Index Growth	2.82
10	Cfs Fc Esup-first-choice Growth Select	3.95	39	North Index High Growth	2.38
11	Cfs Fc Esup-first-choice M-index Div Sel	2.09	40	Pimco Australian Bond Fund	1.99
12	Cfs Fc Esup-first-choice Moderate Select	5.5	41	Pimco Australian Bond Fund Wholesale Class	2.80
13	Cfs Fc Esup-fsi Geared Share Select	3.76	42	Pimco Diversified Fixed Interest Fund	4.70
14	Cfs Fc Psup-fsi Geared Share	3.76	43	Pimco Diversified Fixed Interest Fund Wholesale Class	4.10
15	Cfs Fc W Pen-first-choice W Fixed Int	4.49	44	Realindex Australian Share-class A	2.81
16	Cfs Fc W Pen-first-choice W Growth	3.95	45	Realindex Global Share-class A	1.75
17	Cfs Fc W Pen-first-choice W M-index Bal	2.86	46	Russell Global Opportunities Fund Class A	1.11
18	Cfs Fc W Pen-first-choice W Moderate	5.5	47	Strategic Australian Equity Fund	2.52
19	Cfs Fc W Pen-first-choice Ws Multi-index Diversified	2.86	48	T. Rowe Price Global Equity Fund- I Class	5.91
20	Cfs Fc W Pen-fsi W Geared Share	3.76	49	Vanguard Australian Property Securities Index Fund	6.42
21	Cfs Fc W Pen-real index W Aus Shr	2.81	50	Vanguard Australian Shares Index Fund	27.35
22	Cfs Fc W Psup-cfs W Index Aus Bond	4.9	51	Vanguard Conservative Index Fund	3.47
23	Cfs Fc W Psup-first-choice W Fixed Int	4.49	52	Vanguard High Yield Australian Shares Fund	3.24
24	Cfs Fc W Psup-first-choice W Growth	3.95	53	Vanguard Index International Shares Fund	28.16
25	Cfs Fc W Psup-first-choice W M-index Bal	2.86	54	Vanguard International Property Securities Index Fund	2.36
26	Cfs Fc W Psup-first-choice Ws Multi-index Diversified	2.09	55	Vanguard International Shares Index Fund	28.16
27	Cfs Fc W Psup-fsi W Geared Share	3.76	56	Vanguard International Shares Index Fund (hedged)	8.09
28	Cfs Fc W Psup-real index W Aus Shr	2.81	57	Walter Scott Global Equity Fund	4.67
29	Cfs Mif-geared Share	3.76	58	Walter Scott Global Equity Fund (hedged)	4.67
				TOTAL (of all 58 funds)	**504.616**

Appendix B. ***Market Timing and Stock Selection Ability Based on TM Model : Findings***

Sr. No.	Name of the Fund	Alpha	Beta	Gamma	Market Timing Ability (TM)	Stock Selection Ability (TM)
1	Allan Gray Australia Equity A	0.0008	0.1174	–2.4588	No	Yes
2	Amp Capital Enhanced Index International Share	0.0002	–0.1421	–3.0193	No	Yes
3	Amp Capital Future Directions Balanced Fund - Class A	0.0001	–0.0472	–0.7627	No	Yes
4	Ardea Real Outcome Fund	–0.0001	0.0392	0.6903	Yes	No
5	Arrowstreet Global Equity Fund	0.0001	–0.0550	–1.3025	No	Yes
6	Bentham Global Income Fund	–0.0002	0.0622	0.7881	Yes	No
7	Bentham Professional Syndicated Loan Fund	0.0001	0.0667	0.4986	Yes	Yes
8	Cfs Fc Esup-cfs Index Aus Share Sel	–0.0005	0.0477	1.0891	Yes	No
9	Cfs Fc Esup-first-choice Fixed Intr Sel	–0.0003	0.0192	0.9425	Yes	No
10	Cfs Fc Esup-first-choice Growth Select	–0.0005	0.0423	0.9218	Yes	No
11	Cfs Fc Esup-first-choice M-index Div Sel	–0.0004	0.0482	0.6244	Yes	No
12	Cfs Fc Esup-first-choice Moderate Select	–0.0004	0.0329	0.7839	Yes	No
13	Cfs Fc Esup-fsi Geared Share Select	–0.0013	0.0724	3.8070	Yes	No
14	Cfs Fc Psup-fsi Geared Share	–0.0012	0.0754	3.7604	Yes	No
15	Cfs Fc W Pen-first-choice W Fixed Int	–0.0003	0.0189	1.0660	Yes	No
16	Cfs Fc W Pen-first-choice W Growth	–0.0006	0.0471	1.0804	Yes	No
17	Cfs Fc W Pen-first-choice W M-index Bal	–0.0005	0.0764	0.8751	Yes	No
18	Cfs Fc W Pen-first-choice W Moderate	–0.0005	0.0362	0.9079	Yes	No
19	Cfs Fc W Pen-first-choice Ws Multi-index Diversified	–0.0004	0.0545	0.7115	Yes	No
20	Cfs Fc W Pen-fsi W Geared Share	–0.0013	0.0732	3.7457	Yes	No
21	Cfs Fc W Pen-real index W Aus Shr	–0.0004	0.1045	0.5184	Yes	No
22	Cfs Fc W Psup-cfs W Index Aus Bond	–0.0002	–0.0138	0.6268	Yes	No
23	Cfs Fc W Psup-first-choice W Fixed Int	–0.0003	0.0167	0.9502	Yes	No
24	Cfs Fc W Psup-first-choice W Growth	–0.0005	0.0431	0.9379	Yes	No
25	Cfs Fc W Psup-first-choice W M-index Bal	–0.0004	0.0691	0.7619	Yes	No
26	Cfs Fc W Psup-first-choice Ws Multi-index Diversified	–0.0004	0.0485	0.6427	Yes	No
27	Cfs Fc W Psup-fsi W Geared Share	–0.0013	0.0732	3.7457	Yes	No
28	Cfs Fc W Psup-real index W Aus Shr	–0.0003	0.0946	0.4371	Yes	No
29	Cfs Mif-geared Share	0.0005	–0.2106	–2.4731	No	Yes
30	Dimensional Australian Core Equity Trust	0.0002	–0.0059	–1.5831	No	Yes
31	Dimensional Global Bond Trust	–0.0024	–0.0601	2.2793	Yes	No
32	Dimensional Global Core Equity Trust	0.0002	–0.1109	–3.0108	No	Yes
33	Fidelity Australian Equities Fund	0.0002	–0.0529	–1.4143	No	Yes
34	Fsi Wholesale Geared Share	–0.0011	0.1585	5.3283	Yes	No
35	Ishares International Equity Index Fund	0.0003	–0.1262	–3.4555	No	Yes
36	Janus Henderson Australian Fixed Interest Fund-Inst.	–0.0001	0.0010	0.7970	Yes	No

37	North Index Balanced	0.0001	–0.0522	–1.0725	No	Yes
38	North Index Growth	0.0001	–0.0634	–1.4866	No	Yes
39	North Index High Growth	0.0002	–0.0743	–2.0774	No	Yes
40	Pimco Australian Bond Fund	–0.0002	–0.0022	1.0226	Yes	No
41	Pimco Australian Bond Fund Wholesale Class	–0.0002	–0.0032	1.0187	Yes	No
42	Pimco Diversified Fixed Interest Fund	–0.0002	0.0048	1.0606	Yes	No
43	Pimco Diversified Fixed Interest Fund Wholesale Class	–0.0002	0.0093	1.0139	Yes	No
44	Realindex Australian Share-class A	0.0000	0.1589	0.9101	Yes	Yes
45	Realindex Global Share-class A	–0.0021	–0.0101	0.7208	Yes	No
46	Russell Global Opportunities Fund Class A	0.0006	–0.0842	–2.6502	No	Yes
47	Strategic Australian Equity Fund	0.0002	–0.0213	–1.0780	No	Yes
48	T. Rowe Price Global Equity Fund- I Class	0.0002	–0.0059	–1.5813	No	Yes
49	Vanguard Australian Property Securities Index Fund	–0.0004	0.0296	3.8327	Yes	No
50	Vanguard Australian Shares Index Fund	0.0001	–0.1024	–1.2721	No	Yes
51	Vanguard Conservative Index Fund	0.0001	–0.0213	–0.2627	No	Yes
52	Vanguard High Yield Australian Shares Fund	0.0005	–0.0238	–2.4887	No	Yes
53	Vanguard Index International Shares Fund	0.0004	–0.1317	–3.4157	No	Yes
54	Vanguard International Property Securities Index Fund	0.0001	–0.1689	–0.3841	No	Yes
55	Vanguard International Shares Index Fund	0.0003	–0.1371	–3.3155	No	Yes
56	Vanguard International Shares Index Fund (hedged)	0.0003	–0.0679	–2.1707	No	Yes
57	Walter Scott Global Equity Fund	–0.0003	0.0312	–1.1924	No	No
58	Walter Scott Global Equity Fund (hedged)	0.0001	0.0450	–1.4170	No	Yes

Appendix C. ***Market Timing and Stock Selection Ability Based on HM Model : Findings***

Sr. No.	Name of the Fund	Alpha	Beta	Gamma	Market Timing Ability (HM)	Stock Selection Ability (HM)
1	Allan Gray Australia Equity A	0.0005	0.0988	–0.0438	No	Yes
2	Amp Capital Enhanced Index International Share	0.0001	–0.1241	–0.1220	No	Yes
3	Amp Capital Future Directions Balanced - Class A	–0.0001	–0.0688	0.0127	Yes	No
4	Ardea Real Outcome Fund	–0.0002	0.0214	0.0506	Yes	No
5	Arrowstreet Global Equity Fund	0.0001	–0.0477	–0.0518	No	Yes
6	Bentham Global Income Fund	–0.0004	0.0241	0.0873	Yes	No
7	Bentham Professional Syndicated Loan Fund	–0.0002	0.0223	0.0891	Yes	No
8	Cfs Fc Esup-cfs Index Aus Share Sel	–0.0009	–0.0242	0.1529	Yes	No
9	Cfs Fc Esup-first-choice Fixed Intr Sel	–0.0005	–0.0148	0.0854	Yes	No
10	Cfs Fc Esup-first-choice Growth Select	–0.0008	–0.0038	0.1048	Yes	No
11	Cfs Fc Esup-first-choice M-index Div Sel	–0.0006	0.0136	0.0765	Yes	No
12	Cfs Fc Esup-first-choice Moderate Select	–0.0007	–0.0036	0.0846	Yes	No
13	Cfs Fc Esup-fsi Geared Share Select	–0.0025	–0.1352	0.4614	Yes	No

14	Cfs Fc Psup-fsi Geared Share	–0.0024	–0.1286	0.4541	Yes	No
15	Cfs Fc W Pen-first-choice W Fixed Int	–0.0005	–0.0202	0.0975	Yes	No
16	Cfs Fc W Pen-first-choice W Growth	–0.0009	–0.0064	0.1219	Yes	No
17	Cfs Fc W Pen-first-choice W M-index Bal	–0.0008	0.0263	0.1101	Yes	No
18	Cfs Fc W Pen-first-choice W Moderate	–0.0007	–0.0068	0.0992	Yes	No
19	Cfs Fc W Pen-first-choice Ws Multi-index Diversified	–0.0006	0.0163	0.0853	Yes	No
20	Cfs Fc W Pen-fsi W Geared Share	–0.0024	–0.1302	0.4526	Yes	No
21	Cfs Fc W Pen-real index W Aus Shr	–0.0008	0.0431	0.1180	Yes	No
22	Cfs Fc W Psup-cfs W Index Aus Bond	–0.0003	–0.0387	0.0607	Yes	No
23	Cfs Fc W Psup-first-choice W Fixed Int	–0.0005	–0.0178	0.0863	Yes	No
24	Cfs Fc W Psup-first-choice W Growth	–0.0008	–0.0030	0.1054	Yes	No
25	Cfs Fc W Psup-first-choice W M-index Bal	–0.0007	0.0252	0.0963	Yes	No
26	Cfs Fc W Psup-first-choice Ws Multi-index Diversified	–0.0006	0.0137	0.0775	Yes	No
27	Cfs Fc W Psup-fsi W Geared Share	–0.0024	–0.1302	3.7457	Yes	No
28	Cfs Fc W Psup-real index W Aus Shr	–0.0007	0.0414	0.1019	Yes	No
29	Cfs Mif-geared Share	–0.0006	–0.3554	0.1658	Yes	No
30	Dimensional Australian Core Equity Trust	–0.0003	–0.0547	0.0330	Yes	No
31	Dimensional Global Bond Trust	–0.0031	–0.1840	0.2756	Yes	No
32	Dimensional Global Core Equity Trust	0.0000	–0.1094	–0.0942	No	No
33	Fidelity Australian Equities Fund	–0.0003	–0.1028	0.0400	Yes	No
34	Fsi Wholesale Geared Share	–0.0027	–0.1073	0.6047	Yes	No
35	Ishares International Equity Index Fund	0.0004	–0.0879	–0.1689	No	Yes
36	Janus Henderson Australian Fixed Interest Fund-Inst.	–0.0003	–0.0298	0.0755	Yes	No
37	North Index Balanced	–0.0002	–0.0729	0.0018	Yes	No
38	North Index Growth	–0.0001	–0.0840	–0.0109	No	No
39	North Index High Growth	–0.0001	–0.0862	–0.0435	No	No
40	Pimco Australian Bond Fund	–0.0005	–0.0441	0.1009	Yes	No
41	Pimco Australian Bond Fund Wholesale Class	–0.0004	–0.0431	0.0976	Yes	No
42	Pimco Diversified Fixed Interest Fund	–0.0005	–0.0393	0.1058	Yes	No
43	Pimco Diversified Fixed Interest Fund Wholesale Class	–0.0005	–0.0321	0.0998	Yes	No
44	Realindex Australian Share-class A	–0.0004	0.0856	0.1497	Yes	No
45	Realindex Global Share-class A	–0.0027	–0.1073	0.6047	Yes	No
46	Russell Global Opportunities Fund Class A	0.0006	–0.0554	–0.1287	No	Yes
47	Strategic Australian Equity Fund	–0.0002	–0.0665	0.0424	Yes	No
48	T. Rowe Price Global Equity Fund- I Class	–0.0003	–0.0547	0.0330	Yes	No
49	Vanguard Australian Property Securities Index Fund	–0.0019	–0.2124	0.5195	Yes	No
50	Vanguard Australian Shares Index Fund	–0.0003	–0.1573	0.0528	Yes	No
51	Vanguard Conservative Index Fund	–0.0001	–0.0394	0.0222	Yes	No
52	Vanguard High Yield Australian Shares Fund	0.0001	–0.0523	–0.0283	No	Yes
53	Vanguard Index International Shares Fund	0.0004	–0.0984	–0.1595	No	Yes
54	Vanguard International Property Securities Index Fund	–0.0009	–0.3117	0.2260	Yes	No

55	Vanguard International Shares Index Fund	0.0003	–0.1100	–0.1461	No	Yes
56	Vanguard International Shares Index Fund (hedged)	0.0001	–0.0830	–0.0409	No	Yes
57	Walter Scott Global Equity Fund	–0.0003	0.0482	–0.0646	No	No
58	Walter Scott Global Equity Fund (hedged)	0.0000	0.0415	–0.0374	No	No

Appendix D. *p-values of Sampled Funds for the TM and HM Models*

Sr. No.	Name of the Fund	TM model *p*-value of γ	HM model *p*-value of γ
1	Allan Gray Australia Equity A	0.0333	0.7638
2	Amp Capital Enhanced Index International Share	0.0000	0.0000
3	Amp Capital Future Directions Balanced Fund - Class A	0.1431	0.8471
4	Ardea Real Outcome Fund	0.0012	0.0600
5	Arrowstreet Global Equity Fund	0.1795	0.6719
6	Bentham Global Income Fund	0.0000	0.0001
7	Bentham Professional Syndicated Loan Fund	0.0902	0.0167
8	Cfs Fc Esup-cfs Index Aus Share Sel	0.1533	0.1115
9	Cfs Fc Esup-first-choice Fixed Intr Sel	0.0000	0.0000
10	Cfs Fc Esup-first-choice Growth Select	0.0339	0.0556
11	Cfs Fc Esup-first-choice M-index Div Sel	0.0464	0.0527
12	Cfs Fc Esup-first-choice Moderate Select	0.0162	0.0394
13	Cfs Fc Esup-fsi Geared Share Select	0.0172	0.0219
14	Cfs Fc Psup-fsi Geared Share	0.0197	0.0253
15	Cfs Fc W Pen-first-choice W Fixed Int	0.0000	0.0000
16	Cfs Fc W Pen-first-choice W Growth	0.0290	0.0506
17	Cfs Fc W Pen-first-choice W M-index Bal	0.0768	0.0772
18	Cfs Fc W Pen-first-choice W Moderate	0.0146	0.0146
19	Cfs Fc W Pen-first-choice Ws Multi-index Diversified	0.0438	0.0552
20	Cfs Fc W Pen-fsi W Geared Share	0.0200	0.0257
21	Cfs Fc W Pen-real index W Aus Shr	0.5605	0.2925
22	Cfs Fc W Psup-cfs W Index Aus Bond	0.0000	0.0007
23	Cfs Fc W Psup-first-choice W Fixed Int	0.0000	0.0000
24	Cfs Fc W Psup-first-choice W Growth	0.0326	0.0566
25	Cfs Fc W Psup-first-choice W M-index Bal	0.0830	0.0820
26	Cfs Fc W Psup-first-choice Ws Multi-index Diversified	0.0415	0.0509
27	Cfs Fc W Psup-fsi W Geared Share	0.0200	0.0257
28	Cfs Fc W Psup-real index W Aus Shr	0.5811	0.3068
29	Cfs Mif-geared Share	0.2322	0.5251
30	Dimensional Australian Core Equity Trust	0.1041	0.7880
31	Dimensional Global Bond Trust	0.4397	0.4581
32	Dimensional Global Core Equity Trust	0.0005	0.3886

33	Fidelity Australian Equities Fund	0.1359	0.7378
34	Fsi Wholesale Geared Share	0.0023	0.0060
35	Ishares International Equity Index Fund	0.0000	0.1238
36	Janus Henderson Australian Fixed Interest Fund - Inst.	0.0002	0.0050
37	North Index Balanced	0.0568	0.9803
38	North Index Growth	0.0292	0.8995
39	North Index High Growth	0.0077	0.6588
40	Pimco Australian Bond Fund	0.0000	0.0000
41	Pimco Australian Bond Fund Wholesale Class	0.0000	0.0000
42	Pimco Diversified Fixed Interest Fund	0.0000	0.0000
43	Pimco Diversified Fixed Interest Fund Wholesale Class	0.0000	0.0000
44	Realindex Australian Share-class A	0.3161	0.1902
45	Realindex Global Share-class A	0.8130	0.7682
46	Russell Global Opportunities Fund Class A	0.0057	0.2879
47	Strategic Australian Equity Fund	0.2753	0.7338
48	T. Rowe Price Global Equity Fund- I Class	0.1045	0.7880
49	Vanguard Australian Property Securities Index Fund	0.0025	0.0011
50	Vanguard Australian Shares Index Fund	0.1906	0.6667
51	Vanguard Conservative Index Fund	0.3570	0.5369
52	Vanguard High Yield Australian Shares Fund	0.0222	0.8369
53	Vanguard Index International Shares Fund	0.0001	0.1569
54	Vanguard International Property Securities Index Fund	0.7147	0.0873
55	Vanguard International Shares Index Fund	0.0317	0.7483
56	Vanguard International Shares Index Fund (hedged)	0.0001	0.1773
57	Walter Scott Global Equity Fund	0.0736	0.4422
58	Walter Scott Global Equity Fund (hedged)	0.1153	0.7416

Appendix E. ***Funds with Positive Market Timing and p-values Less than 0.05 for TM and HM Models***

Sr. No.	Name of the Fund	Gamma	Market Timing Ability (T - M)	Funds with Statistically Significant : TM *: p*-value < 0.05	For TM Model Positive γ and *p*-value < 0.05
4	Ardea Real Outcome Fund	0.6903	Yes	0.0012	Significant
6	Bentham Global Income Fund	0.7881	Yes	0.0000	Significant
9	Cfs Fc Esup-first-choice Fixed Intr Sel	0.9425	Yes	0.0000	Significant
10	Cfs Fc Esup-first-choice Growth Select	0.9218	Yes	0.0339	Significant
11	Cfs Fc Esup-first-choice M-index Div Sel	0.6244	Yes	0.0464	Significant
12	Cfs Fc Esup-first-choice Moderate Select	0.7839	Yes	0.0162	Significant
13	Cfs Fc Esup-fsi Geared Share Select	3.8070	Yes	0.0172	Significant
14	Cfs Fc Psup-fsi Geared Share	3.7604	Yes	0.0197	Significant
15	Cfs Fc W Pen-first-choice W Fixed Int	1.0660	Yes	0.0000	Significant

16	Cfs Fc W Pen-first-choice W Growth	1.0804	Yes	0.0290	Significant
18	Cfs Fc W Pen-first-choice W Moderate	0.9079	Yes	0.0146	Significant
19	Cfs Fc W Pen-first-choice Ws Multi-index Diversified	0.7115	Yes	0.0438	Significant
20	Cfs Fc W Pen-fsi W Geared Share	3.7457	Yes	0.0200	Significant
22	Cfs Fc W Psup-cfs W Index Aus Bond	0.6268	Yes	0.0000	Significant
23	Cfs Fc W Psup-first-choice W Fixed Int	0.9502	Yes	0.0000	Significant
24	Cfs Fc W Psup-first-choice W Growth	0.9379	Yes	0.0326	Significant
26	Cfs Fc W Psup-first-choice Ws Multi-index Diversified	0.6427	Yes	0.0415	Significant
27	Cfs Fc W Psup-fsi W Geared Share	3.7457	Yes	0.0200	Significant
34	Fsi Wholesale Geared Share	5.3283	Yes	0.0023	Significant
36	Janus Henderson Australian Fixed Interest Fund - Inst.	0.7970	Yes	0.0002	Significant
40	Pimco Australian Bond Fund	1.0226	Yes	0.0000	Significant
41	Pimco Australian Bond Fund Wholesale Class	1.0187	Yes	0.0000	Significant
42	Pimco Diversified Fixed Interest Fund	1.0606	Yes	0.0000	Significant
43	Pimco Diversified Fixed Interest Fund Wholesale Class	1.0139	Yes	0.0000	Significant
49	Vanguard Australian Property Securities Index Fund	3.8327	Yes	0.0025	Significant

Sr. No.	**Name of the Fund**	**Gamma**	**Market Timing Ability (H - M)**	**Funds with Statistically Significant : HM : *p*-value <0.05**	**For HM Model Positive γ and *p*-value <0.05**
6	Bentham Global Income Fund	0.7881	Yes	0.0001	Significant
7	Bentham Professional Syndicated Loan Fund	0.4986	Yes	0.0167	Significant
9	Cfs Fc Esup-first-choice Fixed Intr Sel	0.9425	Yes	0.0000	Significant
12	Cfs Fc Esup-first-choice Moderate Select	0.7839	Yes	0.0394	Significant
13	Cfs Fc Esup-fsi Geared Share Select	3.8070	Yes	0.0219	Significant
14	Cfs Fc Psup-fsi Geared Share	3.7604	Yes	0.0253	Significant
15	Cfs Fc W Pen-first-choice W Fixed Int	1.0660	Yes	0.0000	Significant
18	Cfs Fc W Pen-first-choice W Moderate	0.9079	Yes	0.0146	Significant
20	Cfs Fc W Pen-fsi W Geared Share	3.7457	Yes	0.0257	Significant
22	Cfs Fc W Psup-cfs W Index Aus Bond	0.6268	Yes	0.0007	Significant
23	Cfs Fc W Psup-first-choice W Fixed Int	0.9502	Yes	0.0000	Significant
27	Cfs Fc W Psup-fsi W Geared Share	3.7457	Yes	0.0257	Significant
34	Fsi Wholesale Geared Share	5.3283	Yes	0.0060	Significant
36	Janus Henderson Australian Fixed Interest Fund - Inst.	0.7970	Yes	0.0050	Significant
40	Pimco Australian Bond Fund	1.0226	Yes	0.0000	Significant
41	Pimco Australian Bond Fund Wholesale Class	1.0187	Yes	0.0000	Significant
42	Pimco Diversified Fixed Interest Fund	1.0606	Yes	0.0000	Significant
43	Pimco Diversified Fixed Interest Fund Wholesale Class	1.0139	Yes	0.0000	Significant
49	Vanguard Australian Property Securities Index Fund	3.8327	Yes	0.0011	Significant

About the Authors

Dr. Akshay Damani is an Associate Professor (Finance) with 20 years of teaching experience in Finance and Accounting. He has also published over 20 papers in various journals enlisted in Scopus and ABDC.

Muskaan Sethia has been a financial research analyst working in the area of investments for the last few years. She has undertaken various projects in varied areas of finance, including mutual funds.

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