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Persistence and Domiciled Mutual Fund Managers Performance: Evidence for South Africa

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Abstract

This paper presents an overview of the South African domiciled mutual fund industry and studies mutual fund performance using a survivorship bias-free sample of 2,843 share class of funds. 4-factor asset-pricing model is used to measure performance, and an additional two factors from the recent framework have been considered [1,2]. This study is able to provide further evidence on the performance of open-end mutual fund managers in a notable emerging market, South Africa. This paper investigates whether mutual fund managers' inability in developed markets to beat the market, which has been widely proved, also holds in less developed markets. Furthermore, we examine if South African fund managers exhibit persistence in performance. The negative net alpha for South African domiciled mutual fund managers shows that they underperform their respective market benchmarks and are not able to add value. Lastly, consistent with results in developed markets, for all portfolios with different magnitudes, the paper reveals a persistence in performance; however, the effect is attributed to "icy-hands" rather than "hothands."

Keywords: Mutual Funds Performance, Persistence, Fama-French 5-Factors, Carhart 4-Factors, South African Domiciled Funds, Fund Industry

1. Introduction

In developed economies, many studies revealed that mutual fund managers are not able to beat the market. Studying the fund market could give an excellent spot for researchers interested in testing the theory of market efficiency. This theory, [3], states that asse prices reject all available information. A direct implication is that since market prices should only react to new information, it is impossible to "beat the market" consistently on a risk-adjusted basis. In Malkiel and Fama's influential 1970 review paper, he categorized empirical tests of efficiency into "weak-form," "semistrong-form," and "strong-form" tests. Following the literature, the hypothesis to be evaluated in this study is "market efficiency doesn't hold under semi-strong hypothesis." The semi-strong efficiency hypothesis contends that security prices have factored in the publicly available market and that price changes to new equilibrium levels reject that information.

The vast majority of empirical studies focus on the developed financial markets, particularly the USA. They show that the alpha's

equal to the fees charged. [4] focus on the European market and shows that adding back management fees led most countries under study to significantly out-perform at an aggregate level. However, most European studies focus on individual countries, which makes it difficult to reach conclusions across countries. For example, using the local innovative slacks-based manager efficiency index (SMEI), [5] identifies locally developed but globally inefficient Spanish fund managers according to the level of management specialization. With the context stated above, analyzing mutual fund performance in emerging markets would allow testing whether the research consensus on the inability of mutual funds in developed markets to beat the market also holds in less developed markets [6].

on the estimated models are significantly negative, by the amount

The evidence against emerging market mutual fund managers' performance is limited. [7] analyzing 796 funds across 27 emerging economies, and substantial underperformance versus benchmarks in crisis, recession, recovery and growth. [8] reveal

a positive relation between risk-adjusted performance and legal/ capital markets development, which emerging economies lack [8]. Overall, some studies indicate emerging market funds underperform benchmarks, although evidence is not extensive [9; 1; 10; 11; 12; 6; 13; 8; 14; 15; 7; 16; 17; 18].

On the other hand, many studies of emerging market mutual funds based on mature markets document an out-performance [19-22]. And also [23–29]. However, [30] examine local versus foreign mutual fund performance in a developed market, the United States, and fund no difference. Furthermore, various factors can induce variability between equity funds and flow-performance relationships. [31] analyzes Indonesian equity funds, funding that asset allocation, stock selection, and risk level affect performance, rejecting manager activities and market conditions. [32] study sources of convexity in Asian flow-performance curves, showing a positive association between flows and performance in Pakistan's market.

This paper examines the performance of South African domiciled mutual funds, providing new evidence on emerging market funds managed within an emerging market. Unlike other studies analyzing mature market funds investing in emerging markets, it looks at funds managed within South Africa, which has developed mutual funds relative to other African economies. Given the recent high equity market returns in South Africa and Africa, studying this fast-growing emerging market is valuable. Studies on South African mutual fund performance are limited, with only a few examining performances. [33] evaluated 11 funds from 1974-1981 using ratios but may have had survivorship bias. [34] analyzed just 11 equity funds from 2009-2014, also with potential survivorship bias. As [35] notes, such biases can severely influence results, as shown by [36]. Overall, existing studies like [33] & [34] have small samples and possible biases.

This paper makes four contributions compared to prior South African mutual fund studies. First, it uses a longer time series and survivorship bias-free dataset. Second, it measures performance with advanced models - Carhart 4-factor plus two additional Fama-French factors [2]. Third, it tests persistence across all fund types, unlike studies restricted to equity. Fourth, it improves on [6] by adding the two Fama-French factors [2] to the Carhart Model [6]. Section 2 contains the empirical methodology. Section 3 presents the description and summary statistics. Section 4 analyzes and presents the main results; at last, section 5 concludes.

2. Methodology

2.1 The Fama and French Model

The analysis begins by estimating the Carhart Model [1] followed by the model [2] that incorporates two additional factors profitability and investment - beyond the Carhart factors. Formally, we estimate:

bonds, the BEASSA All Bond Index¹ is used as Morningstar

suggests. The JP Morgan Government Bond Index is used for

international bonds, following [6]. Though the bond factor may not be significant for all funds, it accounts for riskier bond

investments not reflect in the risk-free rate. Appropriate domestic

Further, following the recent contribution on multifactor asset

pricing by, we consider two additional factors [2]. Profitability

(RMW), the return difference between portfolios of high and low

profitability stocks, and Investment (CMA), the return difference

between portfolios of low and high investment (conservative and aggressive) firms. [2] use these factors to explain cross-sectional

stock return variations. By incorporating the RMW, CMA, and

Carhart factors, this study examines whether they can explain

$$[R_t - R_{ft} = \alpha_0 + \beta_0 (R_{mt} - R_{ft}) + \beta_1 SMB_t + \beta_2 HML_t + \beta_3 MOM_t + \epsilon_t]$$
(1)

where;

 R_{t} = the fund return in month t;

 \vec{R}_{θ} = the risk free return in month t;

 α_0^{J} = Carharts alpha measure;

 \vec{R}_{mt} = the market return in month t;

 SMB_t = the difference in return between a small cap portfolio and a large cap portfolio at month t;

 HML_t = the difference in return between a portfolio of high bookto-market stocks and of low book-to-market stocks at month t; MOM_t = the difference in return between a portfolio of past 1-year winners and a portfolio of past 1-year losers at time t; ϵ_t = error term.

Following [9], this paper includes a bond factor to evaluate bond funds, as some invest in higher-yielding, riskier bonds not captured by the risk-free rate. Though the bond index was significant for under 50% of funds in their analysis, we consider the sensitivity of bond fund returns to a government bond index. For domestic

mestic Hence, with the additional two factors, we estimate:

mutual fund returns.

and international bond benchmarks are utilized.

$$\left[R_t - R_{ft} = \alpha_0 + \beta_0 \left(R_{mt} - R_{ft}\right) + \beta_1 SMB_t + \beta_2 HML_t + \beta_3 MOM_t + \beta_4 RMW_t + \beta_5 CMA_t + \epsilon_t\right]$$
(2)

where;

 RMW_t = average return on the two robust profitability portfolios minus the average return on the two weak profitability portfolios, CMA_t = average return on the two conservative investment portfolios minus average return on the two aggressive investment portfolios and the remainders are defined as in Eq. (1). The profitability (RMW) and investment (CMA) factors are constructed similarly to HML, sorting on profitability and investment, respectively. As [2] note, RMW, and CMA represent average profitability and investment factors for small and big stocks. The estimation uses both the Generalized Method of Moments (GMM) [38] and rolling ordinary least squares (OLS) for robustness to check if parameters are stable over the sample. Rolling

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¹http://www.fundsdata.co.za/fundpaedia/Benchmarks.htm?load=1)&load=1

OLS can also capture structural breaks [39]. OLS diagnostics like multicollinearity, autocorrelation, heteroskedasticity, and normality tests are performed, but (GMM) is robust to such issues (Results can be provided on request). Factors for the Carhart 4-factor model, along with additional profitability and investment factors, are obtained from Data stream. For internationally oriented funds in South Africa, risk factors come from Fama and French website. Local factors for JSE investments follow Fama and French procedures. Detailed information is available on request.

3. Data

All fund returns are net of expenses, from separate account investments, and obtained from Morningstar. The characteristics of individual funds, such as type, style, age, size, and fees also come from Morningstar. However, stock market data like returns, market capitalization, book-to-market, net income, and bond market excess returns are extracted from Data stream, as explained in Section 2. The fund and stock data are survivorship bias controlled, covering March 2000 - December 2017 in monthly percentage excess returns. The sample is restricted to South African domiciled open-ended mutual funds with at least 24 months of data. The data includes funds closed during the sample period to avoid overestimating average performance by excluding dead funds, as noted by [36]. South African domiciled open-end mutual funds grew from 1 in 1948 to 11 in 1995, 200 in 2005, and 561 in 2015. Following Morningstar data availability, I consider share classes rather than funds since classes of the same fund offer different fees, loads, and investment minimums. The number of share classes also grew, from 118 in 2000 to 486 in 2005 and 2,380 in 2015. The data mitigates survivorship bias by including dead funds and share classes, as pointed out by [36].

3.1 Fund Classifications

[6] suggest classifying funds based on their nature of investment and characteristics. Based on Regional Focus and Investment strategy, Table 1 presents funds classification (asset allocations) according to ASISA'S fund classifications guideline.

3.2 Descriptive Statistics

Following the framework in [6], equally weighted portfolios were constructed from six components categorized by investment strategy (equity, bond, mixed) and region of sale (local, international). Only funds with at least 24 months of returns are included, analyzing 2,843 share Classes³ in total. Table 2 shows descriptively that just under 50%.

3.3 Fund Excess Return Descriptive Summary

Table 3 shows a descriptive analysis of the excess monthly fund returns. Except for domestic bonds and equity, the rest display an average excess return, which is negative over the sample period. Furthermore, rolling estimates are computed to account for parameter stability over time. If the parameters change at some point during the sample, then the rolling estimates should capture this instability. The details of the rolling estimates are presented in the next section.



Figure 1: Number of Share Class of Funds

Fund	Asset Allocation
Domestic Equity	Atleast 80% in SA and 80% in Equity
Domestic Bond	Atleast 80% in SA, Exclusively in bond
Domestic Mixed	Atleast 80% in SA, Mix
International Equity	Atleast 70% outside SA, 80% in Equity
International Bond	Atleast 70% outside SA, Exclusively in bond
International Mixed	Atleast 70% outside SA, Mix

Table 1: ASISA's Fund Classification for South African Domiciled Funds

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²ASISA stands for Associations for Savings and investment South Africa ³Share classes of the same fund offer different fees, loads, and minimums.

Category	Number	Net	Average	Average	Average	Outstandin
	of share	Asset	Size	management	age in	shares
	class of	(in	(in	fee	years	(in millions)
	Funds	millions	millions	(%)	2	
		USD)	USD)			
Domestic Equity	677	44,218	267	1.06	7.65	151
Domestic Bond	333	31,922	616	0.91	9.27	401
Domestic Mixed	1,540	81,171	263	1.10	7.51	191
International Equity	136	5,724	267	1.08	7.53	115
International Bond	23	149	35	1.12	8.21	18
International Mixed	134	7,347	208	1.17	9.19	225
Overall	2,843	175,533	1,891	1.07	8.26	1,103

Summary statistics of 2,843 share class of funds. The net asset value and the average size is given in US Dollars (USD). The net asset is recorded in millions of dollars and represents the fund's total asset base, net of fees and expense

 Table 2: Summary Statistics South African Mutual Fund, Jan 1998 - Dec 2017

Portfolio	Obs.	mean	Std.dev	Min	Q25	Q75	Max
Domestic Equity	210	0.334	5.652	-14.782	-3.370	4.186	16.923
Domestic Bond	210	0.136	3.925	-10.396	-2.246	2.366	12.266
Domestic Mixed	210	-0.037	11.160	-32.092	-6.662	7.796	26.362
International Equity	210	-0.065	2.803	-7.400	-2.083	1.745	8.387
International Bond	210	-0.064	0.652	-2.460	-0.497	0.308	2.084
International Mixed	210	-0.101	3.030	-8.092	-2.182	1.809	8.718

Table 3: Summary statistics for excess monthly percentage return

4. Result

4.1 Risk-Adjusted Performance

The generalized method of moments (GMM) [38] and rolling ordinary least squares (OLS) results are quantitatively similar. Regarding the rolling OLS, multicollinearity is not evident based on variance inflation factors. The Breusch-Pagan test indicates heteroskedasticity in most model residuals. The Breusch-Godfrey test shows autocorrelation, mainly for domestic funds. Most residuals are normally distributed according to the Jarque-Bera test. The *dfuller* test indicates all variables are stationary. The *swald* test suggests no structural breaks, except for a few Carhart Model with international funds. The rolling estimation may capture those breaks. Finally, robust standard errors are used to correct heteroskedasticity and autocorrelation. The main model estimation results are reported in the results section (4).

Table 4 summarizes the results from applying the standard 4-factor Carhart Model [1] and the 5-factor Fama-French Model FF-5; [2] to equity, bond, and mixed funds. The prevailing result across all six equally weighted portfolios indicates underperformance, with negative alphas for both the Carhart and FF-5 models. Similar underperformance has been found in other studies [9; 1; 10; 11; 12; 6; 13; 8; 14; 15; 7; 16; 17].

Type of fund	Model	$\alpha_{\rm L}$	RmRf _L	SMB_L	HML	MOML	$Bond_{L}$	RMW _L	CMAL	R^2	R_{-1}^2
Dom. Equity	Carhart	-0.025**	0.001**	-0.001	0.001	0.010	-0.004			0.05	0.19
	FF-5	-0.029**	0.001	-0.001	0.002^{*}	0.000	0.003^{*}	-0.005***	0.001	0.08	0.19
Dom. Bond	Carhart	-2.051**	0.031	-0.068**	0.078	0.009**	-0.314*			0.06	0.21
	FF-5	-2.353	0.023	-0.107	0.140	-0.033	0.234***	-0.362***	0.049**	0.09	0.19
Dom. Mixed	Carhart	-6.297***	0.121**	-0.137	0.159	0.045	-0.900***			0.06	0.18
	FF-5	-6.946***	0.093	-0.243	0.284	-0.065	0.569	-1.006**	0.207	0.08	0.19
Type of fund	Carhart	α _G	RmRf _G	SMB_G	HML _G	MOM _G	$\operatorname{Bond}_{\operatorname{G}}$	RMW _G	CMA _G	R^2	R_{-1}^2
Dom. Equity	FF-5	-0.258	-0.034**	0.702***	0.175**	0.084	0.005**			0.24	0.01
	Carhart	-0.429**	0.008	0.756***	0.133	0.060	0.423***	0.004^{**}	-0.199	0.29	0.02
Dom. Bond	FF-5	-0.080**	-0.079**	0.143***	0.052***	0.017	0.001**			0.52	0.05
	Carhart	-0.113***	-0.070^{***}	0.155***	0.031	0.011	0.068^{***}	0.001*	-0.015	0.55	0.05
Dom. Mixed	FF-5	-0.302	-0.125	0.752***	0.243**	0.101*	0.006^{*}			0.30	0.01
	Carhart	-0.458***	-0.084*	0.803***	0.166	0.077	0.357**	0.005^{**}	-0.141	0.34	0.01

The paper considers local factors for domestic funds and international factors for international funds. The subscript L and G underneath the factors depict the term local and global, respectively. RMRF is the difference between the return on the market benchmark and the risk-free rate. SMB is the difference in return between a small-cap portfolio and a large-cap portfolio. HML is the difference in return between a portfolio of high book-to-market stocks and one of low book-to-market stocks. MOM is the difference in return between a stock portfolio of past 1-year winners and a portfolio of past 1-year losers. RMW is the difference between the returns on diversi ed portfolios of stocks with robust and weak pro tability, and CMA is the difference between the returns on diversified portfolios of the stocks of low and high investment rms, which we call conservative and aggressive.

*** statistical Significant at the level of 1%.

** statistical significant at the level of 5%.

* statistical significant at the level of 10%.

Table 4: Standard Carhart 4-factor and FF-5 model estimation

The SMB results differ for domestic and foreign funds. The negative sign for domestic funds shows a preference for big stocks, while the significant positive value for international funds indicates a preference for small stocks. This aligns with [4], which found that European funds favor small stocks. However, [6] showed Polish international mixed funds prefer big stocks with negative SMB. The information advantage justification for domestic over foreign investors is not supported here. Column 6 of Table 4 shows both domestic and international funds prefer higher book-to-market (value) stocks, indicated by the positive HML sign. In other words, funds are exposed to value rather than growth stocks. As [40] note, managers classify high book-to-market, earnings-price, or cash flow-price ratio firms as value stocks. Except for domestic bonds and mixed funds in the FF-5 model, which follow a contrarian strategy, South African funds employ a momentum strategy per the positive MOM in the Carhart Model. The significantly positive RMW for international funds shows a preference for high profitability stocks, indicating funds exhibit higher profitability than the market. The negative sign depicts a preference for weak profitability stocks. Like the HML sign, domestic funds' positive CMA highlights a preference for conservative investment (small) stocks. However, international funds show a negative CMA, indicating a tendency toward aggressive investment (big) stocks, displaying a less aggressive portfolio than the market overall.

Domestic equity funds have a significant -0.025% monthly alpha after adjusting for a slightly lower market beta (0.001) and bigcap preference (SMB -0.001). Adding the FF-5 factors (CMA & RMW) marginally improves the model but with a lower market beta and insignificant change in the negative alpha versus the Carhart Model. International equity funds exhibit a small-cap preference (SMB 0.702 and 0.756), which is inconsistent with the literature suggesting domestic investors' informational advantage, especially in small caps, over foreign investors who prefer larger companies with less asymmetry. Mixed domestic portfolios dominate, with significantly negative performance (-6.297% monthly) and low beta and bond exposure. Their poor performance is exceptionally worse than other funds in both Carhart and FF-5 models, with FF-5 slightly improving explanatory power but nearly identical negative alpha, low market beta, and big-cap exposure as Carhart.

International funds across all groups exhibit negative Carhart and FF-5 alphas, with results close to domestic funds' underperformance. Both local and international funds provide low and negative alphas. With relatively higher R², international bond funds have negative α for both Carhart and FF-5 models . Unlike equity and mixed, bond funds offer an inverse market beta, although unlikely to invest in equities6. The bond factor is significantly positive for international bonds, as expected. In summary, fund managers underperform benchmarks, unable to generate positive risk-adjusted returns. This aligns with reviewed literature and, which found negative Jensen alpha for 9 of 10 South African equity funds studied [34]. Table 4 final column (\mathbb{R}^2 ,) shows the coefficient of determination using lagged fund returns as the dependent variable7. For domestic funds, R² doubled, while the opposite holds for international. In both Carhart and FF-5 models, South African open-end mutual fund managers cannot out-perform benchmarks and deliver positive risk-adjusted performance.

4.2 Rolling Estimates

Rolling Carhart alpha estimates in Figures 2 and 4 show domestic and international funds, respectively. FF-5 rolling estimates appear in Figures 3 and 5. Rolling over 24-month windows assesses parameter constancy. Instability in Carhart and FF-5 alphas is evident for most funds except international bonds and

mixed, indicating time-varying parameters. Carhart and FF-5 rolling alphas behave similarly over time within each fund group. International bond and mixed funds show high overlap in rolling alphas (Figures 4 and 5), indicating consistency between models. Overall, the rolling estimation output captures this instability.



Figure 2: Domestic Funds rolling coecient estimates of Carhart model

(*Carh.DE.alpha = Carhart's domestic equity alpha, Carh.DB.alpha = Carhart's domestic bond alpha, and Carh.DM.alpha = Carhart's domestic mixed alpha)*



Figure 3: Domestic Funds rolling coecient estimates of FF-5 model

(FF5.DE.alpha = Fama's domestic equity alpha, FF5.DB.alpha = Fama's domestic bond alpha, and FF5.DM.alpha = Fama's domestic mixed alpha)



Figure 4: International Funds rolling coecient estimates of Carhart model,

(*Carh.IE.alpha* = *Carhart's Int'l equity alpha*, *Carh.IB.alpha* = *Carhart's Int'l bond alpha*, *and Carh.IM.alpha* = *Carhart's Int'l mixed alpha*)



Figure 5: International Funds rolling coecient estimates of FF-5 model,

(FF5.IE.alpha = Fama's Int'l equity alpha, FF5.IB.alpha = Fama's Int'l bond alpha, and FF5.IM.alpha = Fama's Int'l mixed alpha)

4.3 Management Fee

In the last section, the performances of fund managers are considered net of costs. In other words, the cost that is deducted from the return is the management fee. To assess if managers follow the market, fees can be added back to monthly excess returns and the analysis re-done. Gross alpha is pre-fees, while net alpha is post-fees. The Carhart and FF-5 models are re-estimated with gross returns. Though alpha is negative, excluding international funds, local and international managers perform well except for domestic equity when using gross returns in the Carhart and FF-5 models.

Type of fund	Model	Net a	Gross a
Dom. Equity	Carhart	-0.025**	-0.474**
	FF-5	-0.029**	-0.825
Dom. Bond	Carhart	-2.051**	-0.909
	FF-5	-2.353	-1.189
Dom. Mixed	Carhart	-6.297***	-1.033**
	FF-5	-6.946***	-1.552**
Int. Equity	Carhart	-0.258	1.051***
	FF-5	-0.429**	0.890***
Int. Bond	Carhart	-0.080**	0.178^{***}
	FF-5	-0.113***	0.146***
Int. Mixed	Carhart	-0.302	1.041***
	FF-5	-0.458**	0.894^{***}

Net α is After fees, and Gross α is Before fees

*** statistical significance at the level of 1%

** statistical significance at the level of 5%

* statistical significance at the level of 10%

Table 5: South African domiciled mutual fund managers performance before and after fees

When analyzing gross α , all international fund portfolios have significantly positive values. However, as illustrated in Table 5 and Figure 9, domestic funds still exhibit a negative alpha that is statistically and significantly different from zero across all funds in the portfolio. The positive and significant gross α for international funds could stem from an investment strategy focused on security selection. Additionally, the results for gross α are relatively similar between the Carhart and FF-5 Fama and French models (see Figure 9 & 10) [1,37].



(a) Monthly returns on Domestic Equity (DE) funds along with 24 month rolling means and standard deviations

(b) Monthly returns on International Equity (IE) funds along with 24 month rolling means and standard deviations

Figure 6: Monthly excess return on Equity funds along with 24 month rolling means and standard deviations



(a) Monthly returns on Domestic Bond (DB) funds along with 24 month rolling means and standard deviations

(b) Monthly returns on International Bond (IB) funds along with 24 month rolling means and standard deviations





(a) Monthly returns on Domestic Mixed (DM) funds along with 24 month rolling means and standard deviations

(b) Monthly returns on International Mixed (IM) funds along with 24 month rolling means and standard deviations

Figure 8: Monthly excess return on Mixed funds along with 24 month rolling means and standard deviations







Figure 10: Net and Gross Alpha estimates of FF-5 model

4.4 Persistence

The literature on fund performance acknowledges a divergence of opinions regarding the existence and extent of persistence [41]. initially found no abnormal performance in mutual funds, but subsequent studies, like and, report short and long-term persistence [42-44]. Others, such as, suggest diminishing persistence when accounting for momentum [1]. Some studies find limited evidence of persistence over extended periods [45,46]. There is a consensus that winning funds show little persistence, while loser funds exhibit more consistent performance.

The paper investigates performance persistence using methodology [6]. The hypothesis of persistence in performance is that mutual funds with an above-average return in one period will also have an above-average return in the next period. Based on the past

12 months' returns, rank and divide all funds and assign 1/3 of the funds with the highest previous period return as "High," 1/3 as "Middle," and the rest 1/3 with the lowest period return as "Low." Hold these three equally weighted portfolios for 12 months before rebalancing again based on the obtained return. The analysis includes funds that may disappear during the year. Preliminary results are derived from metrics like the return spread and volatility, with validation using the Carhart Model. Results show persistence, with return spreads and volatilities indicating differentiation among fund portfolios. Carhart's model validates these findings, revealing statistically significant results for most portfolios. Despite strong persistence in South African funds, the observed performance difference is not explained by risk factors. Top-performing funds show negative alpha, suggesting short-term persistence is driven by "icy hands" rather than "hot hands" [43].

		Domestic	e Equity		Domestic	Mixed		
Variables	I	II	III	I - III	Ι	II	III	I - III
	(high)	(medium)	(low)	spread	(high)	(medium)	(low)	spread
mean	1.617	0.512	-0.496	2.066	1.135	0.306	-0.540	1.580
std	4.852	4.487	4.414	3.141	4.521	4.181	4.143	2.372
α	-0.892	-1.560	-2.592***	1.634**	-1.229	-2.012**	-2.941***	1.689***
RmRf	0.130**	0.113	0.065	0.067	0.081	0.085	0.076	0.011
SMB	-0.116	-0.067	-0.122	0.011	-0.108	-0.076	-0.084	-0.033
HML	0.191*	0.116	0.095	0.098	0.153	0.103	0.106	0.037
MOM	0.06	-0.017	-0.028	0.084	0.06	0.009	0.001	0.065
BOND	-0.349***	-0.289**	-0.300**	-0.052	-0.333***	-0.328***	-0.342***	1.689***
		Domesti	c Bond			Internationa	al Equity	
mean	1.223	0.171	-0.761	1.824	0.996	-0.039	-1.012	2.000
std	4.709	4.556	4.672	2.741	3.670	2.440	2.776	3.212
α	-2.071**	-2.152**	-3.358***	1.779***	-0.789**	-0.965**	-2.587***	1.803***
RmRf	0.118	0.031	0.065	0.008	0.088	0.051	0.065	0.019
SMB	-0.093	-0.127	-0.190*	0.091	-0.025	-0.054	-0.069	0.042
HML	0.172	0.076	0.061	0.104*	0.192	0.025	0.004	0.196**
МОМ	0.068	0.007	-0.075	0.127	0.092	-0.022	-0.052	0.150**
BOND	-0.479***	-0.337**	-0.377***	0.005	-0.248**	-0.133**	-0.228***	-0.016

		Internation	al Bond	International Mixed				
mean	0.479	-0.375	-1.162	1.407	1.007	-0.104	-1.003	1.938
std	3.417	3.438	3.365	3.758	3.68	2.684	3.044	3.243
α	-1.602***	-2.533***	-2.848***	0.708	-1.167	-1.521***	-2.184***	1.405**
RmRf	0.094	0.038	0.059	0.042	0.126**	0.070*	0.052	0.035
SMB	0.052	0.052	-0.075	0.058	-0.006	0.003	-0.102	0.091
HML	0.149*	0.08	0.06	0.219**	0.131*	0.102	0.026	0.110
МОМ	0.134	0.098	-0.080	0.241**	0.065	0.035	-0.027	0.088
BOND	-0.303**	-0.308***	-0.242**	-0.111	-0.308***	-0.195***	-0.171	-0.066

*** statistical significance at the level of 1%

** statistical significance at the level of 5%

 \ast statistical significance at the level of 10%

Table 6: Persistence in South African domiciled mutual funds

Type of fund	Carhart	α _G	$RmRf_G$	SMB _G	HML_G	MOM _G	$\operatorname{Bond}_{\operatorname{G}}$	RMW_G	CMA _G	R ²
Dom. Equity	Carhart	-0.474**	0.109	-0.054	-0.132	0.02	-0.316**			0.048
	FF-5	-0.825	0.098	-0.103	-0.196**	-0.033	0.286**	-0.372**	0.078	0.079
Dom. Bond	Carhart	-0.909	0.035	-0.062	0.083	0.012	-0.27**			0.058
	FF-5	-1.189	0.027	-0.097	0.14^{*}	-0.027	0.217**	-0.314***	0.046	0.089
Dom. Mixed	Carhart	-1.033**	0.079	-0.165	0.095	0.036	-0.606			0.039
	FF-5	-1.552**	0.051	-0.264	0.209	-0.058	0.48^{**}	-0.693**	0.192	0.062
Type of fund	Carhart	$\alpha_{\rm G}$	$RmRf_G$	SMB_G	HML_G	MOM_G	$\operatorname{Bond}_{\operatorname{G}}$	RMW_G	CMA _G	R^2
Dom. Equity	FF-5	1.051***	-0.043	0.660^{**}	0.153*	0.078	0.005**			0.236
	Carhart	0.890^{***}	-0.003	0.712***	0.105	0.055	0.389***	0.004^{**}	-0.171	0.287
Dom. Bond	FF-5	0.178***	-0.080***	0.141***	0.048^{***}	0.019*	0.001*			0.521
	Carhart	0.146***	-0.071***	0.151***	0.028	0.014	0.068^{***}	0.001*	-0.017	0.544
Dom. Mixed	FF-5	1.041***	-0.099**	0.728***	0.217***	0.112*	0.006**			-0.286
	Carhart	0.894***	-0.063	0.773***	0.16	0.092^{*}	0.346***	0.005^{**}	-0.167	-0.320

The subscript L and G underneath the factors depict the term local and global, respectively. RMRF is the difference between the return on the market benchmark and the risk-free rate. SMB is the difference in return between a small-cap portfolio and a large-cap portfolio. HML is the difference in return between a portfolio of high book-to-market stocks and one of low book-to-market stocks. MOM is the di erence in return between a stock portfolio of past 1-year winners and a portfolio of past 1-year losers. CMA is the difference between the returns on diversified portfolios of the stocks of low and high investment rms, which we call conservative and aggressive, and RMW is the difference between the returns on diversi ed portfolios of stocks with robust and weak profitability.

*** statistical Significance at the level of 1%

** statistical Significance at the level of 5%

* statistical Significance at the level of 10%

Table 7: Standard Carhart and FF-5 factor model

Type of fund	Model	$\alpha_{\rm L}$	$RmRf_L$	$\mathrm{SMB}_{\mathrm{L}}$	HML_L	MOM _L	$\operatorname{Bond}_{\operatorname{L}}$	$\mathrm{RMW}_{\mathrm{L}}$	CMAL	\mathbf{R}^2
Dom. Equity	Carhart	-0.474**	0.109	-0.054	0.132	0.02	-0.316**			0.04
	FF-5	-0.825	0.098	-0.103	0.196**	-0.033	0.286**	-0.372**	0.078	0.07
Dom. Bond	Carhart	-0.909	0.035	-0.062	0.083	0.012	-0.27**			0.05
	FF-5	-1.189	0.027	-0.097	0.14^{*}	-0.027	0.217**	-0.314***	0.046	0.08
Dom. Mixed	Carhart	-1.033**	0.079	-0.165	0.095	0.036	-0.606			0.03
	FF-5	-1.552**	0.051	-0.264	0.209	-0.058	0.48^{**}	-0.693**	0.192	0.06
Type of fund	Carhart	$\alpha_{\rm G}$	RmRf _G	SMB_G	HML _G	MOM _G	$\operatorname{Bond}_{\operatorname{G}}$	RMW _G	CMA _G	R^2
Dom. Equity	FF-5	1.051***	-0.043	0.660^{**}	0.153*	0.078	0.005**			0.23
	Carhart	0.890***	-0.003	0.712***	0.105	0.055	0.389***	0.004^{**}	-0.171	0.28
Dom. Bond	FF-5	0.178***	-0.080***	0.141***	0.048^{***}	0.019*	0.001*			0.52
	Carhart	0.146***	-0.071***	0.151***	0.028	0.014	0.068***	0.001^{*}	-0.017	0.54
Dom. Mixed	FF-5	1.041***	-0.099**	0.728***	0.217***	0.112*	0.006**			0.28
	Carhart	0.894***	-0.063	0.773***	0.16	0.092^{*}	0.346**	0.005^{**}	-0.167	0.32

The subscript L and G underneath the factors depict the term local and global, respectively. RMRF is the difference between the return on the market benchmark and the risk-free rate. SMB is the difference in return between a small-cap portfolio and a large-cap portfolio. HML is the difference in return between a portfolio of high book-to-market stocks and one of low book-to-market stocks. MOM is the difference in return between a stock portfolio of past 1-year winners and a portfolio of past 1-year losers. CMA is the difference between the returns on diversified portfolios of the stocks of low and high investment rms, which we call conservative and aggressive, and RMW is the difference between the returns on diversified portfolios of stocks with robust and weak profitability.

*** statistical Significance at the level of 1%

** statistical Significance at the level of 5%

* statistical Significance at the level of 10%

Table 8: Standard Carhart and FF-5 factor model with fund returns that added back management fee

5. Summary and Conclusions

This paper provides an overview of the South African domiciled mutual fund industry and examines the performance of mutual fund managers using multifactor asset pricing models. It seeks to test whether the consensus in research about the inability of mutual funds in developed financial markets to consistently outperform the market also holds true in less developed markets like South Africa, aligning with the Efficient Market Hypothesis (EMH). Analyzing data from open-end domiciled mutual funds in South Africa, the study uncovers several key findings: Using data sourced from open-end domiciled mutual funds in South Africa, the study reveals a series of notable findings: Firstly, it discovers that adding back management fees results in a significantly positive alpha for international funds. However, this positive outcome is overshadowed by the broader trend. Secondly, local and international funds exhibit significant underperformance relative to their respective benchmarks, highlighting a substantial challenge fund manager face. Thirdly, when the study incorporates the additional factors from Fama and French, it observes improvements in the performance model. However, even with these enhancements, the result consistently points to a negative fund alpha, indicating an ongoing pattern of underperformance. Fourthly, these findings echo the outcomes of prior studies conducted in developed markets, underscoring that South African domiciled mutual fund managers tend to underperform their benchmarks. Finally, the paper's analysis reveals the presence of persistence in performance across all portfolios. However, intriguingly, this persistence is characterized as "icy-hands" rather than the commonly expected "hot-hands" phenomenon.

In summary, this study offers valuable insights into the South African mutual fund landscape. It suggests that while there is evidence of performance persistence, fund managers in this market face persistent challenges in consistently out-performing their benchmarks, a trend that aligns with observations in developed financial markets [47-51].

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