

The Performance of Nigerian Mutual Funds in the Period 2011 - 2014

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Abstract

This paper aims to contribute to the financial economics literature on the performance of mutual funds in frontier markets. I utilise various measures; the risk adjusted measure for portfolio performance, the “Jensen Alpha” measure, the Treynor ratio and Sharpe ratio, to assess the performance of 31 equity and mixed mutual funds formed on instruments listed on the Nigerian stock exchange and run by fund managers in the period December 2011 to November 2014.

In addition to a review of the performance of mutual funds, I also the review the performance of a portfolio between the periods, December 2011 to November 2014 formed using the Minimum Conditional VAR (“Minimum CVAR”) portfolio approach.

The evidence from this study indicates that the 31 mutual funds reviewed were on average not able to predict stock prices well enough to outperform a buy-the-market and-hold policy, but also that there is very little evidence that any individual fund was able to do significantly better than that which we expected from mere random chance. It is therefore difficult to see the justification for the fees charged. The limitation of this study is also discussed. The Minimum CVAR approach outperforms the mutual funds and NSE All Share Index in the review period December 2012 – November 2014.

Keywords: Mutual funds, Nigeria, Jensen’s alpha, Treynor ratio, Sharpe ratio, Risk adjusted returns

1. Introduction

The Securities and Exchange Commission in Nigeria (“SEC”), estimated that the total assets under management (“AUM”) of fund managers in Nigeria as at June 2014 was N450 billion or \$2.5 billion.¹ This AUM, accounts for about 2.4% of the total market capitalisation of instruments traded on the Nigerian Stock Exchange (“NSE”). Mutual funds in Nigeria therefore form a small percentage of the Nigerian financial system relative to the AUM of Nigerian pension fund administrators at a value of \$25bn which is 10 times that of the mutual fund managers according to Pencom Nigeria in Q3 2014². Anecdotal evidence suggests that there is little knowledge of mutual funds in Nigeria by retail investors and in addition, there are insufficient data points to help these investors adequately review and assess the performance and value of the available mutual funds. The main objective of this study is to shed some more light on this industry and apply a simple and well tested method to assess its performance within a limited timeframe.

The NSE was instituted in 1960 and has been the primary organised exchange for Nigerian equities since then. The market is yet to develop more sophisticated instruments and very few studies exist on the performance of trading strategies and financial instruments within the Nigerian financial space. According to the SEC, as at June 2014, there were 38 fund managers in the country and only six fund managers accounted for 75% of the funds under management. A problem that plagues the industry is an inadequate review of the performance of market participants in the fund management space. The main objective of this paper is to bridge the gap and give reviewers a benchmark using the best researched techniques within the financial literature.

The seminal works of Sharpe (1966), Jensen (1967) and Treynor (1965) laid the foundation for different methodology that can be applied to review the predictive ability of fund managers and mutual funds. These asset pricing performance models although developed in the 1960’s continue to remain important and relevant in the assessment of performance of portfolios across asset classes. However, the base models do have their flaws and numerous critics. These flaws are well documented and researched, the most prominent being the equity risk premium puzzle Mehra and Prescott (1985) which emanated from the Capital asset pricing model (“CAPM”).

¹ The information was collected from the 2nd Quarter 2014, Fund Management Dashboard published by the SEC. This dollar equivalent was calculated using a USDNGN exchange rate of N182 to \$1.

² Culled from Oduwole (2015, Working Paper) – Can Nigerian RSA’s beat inflation (extracts published in the Businessday 17th March 2015)

The work of Kahneman and Tversky (1974) and subsequent behavioural work, shed light on the reasons for observed violations of these asset pricing models. Work continues on finding suitable replacements for the models that currently rely on the maximisation of expected utility.

A mutual fund³ is a professionally-managed form of collective investments that pools money from many investors and invests these funds in stocks, bonds, short-term money market instruments, and/or other securities. In a mutual fund, the fund manager, who is also known as the portfolio manager, trades the fund's underlying securities, realizing capital gains or losses, and collects the dividend or interest income. The investment proceeds are then passed along to the individual investors. The value of a share of the mutual fund, known as the net asset value per share ("NAV"), is calculated daily based on the total value of the fund less transaction and running expenses divided by the number of shares currently issued and outstanding.

The mutual funds reviewed in this study fall into the active fund management category. The premise of active fund management is that the investment in management talent and analytical resources translates into higher returns as skilled managers, together with powerful analytics and superior information about securities, can identify profitable opportunities in the market. This primarily occurs when, unknown to the average investor, similar securities are differentially priced, and so informed investment managers can profit from advantageous positions in the market by buying the underpriced security and selling it at a different price later.⁴ Despite this belief around active managers, many studies such as that by Malkiel (2003) find, however, that up to 71% of mutual funds underperforms the S&P 500, net of fees. This led to the view that with the highly efficient nature of the US equity market, with its sophisticated information technologies, that investment in active management, entailing high fees and analytical costs (thus higher fees offsetting gross returns), does not appropriately compensate investors to the point where the net returns are consistently superior to that of the market benchmark. Within Nigeria, the equity benchmark is the NSE All Share Index. Mutual fund managers earn fees for managing assets on behalf of their unitholders and generating returns above a certain benchmark. In Nigeria, these fees vary depending on the fund manager. Passive fund managers only charge a minimal fee for managing and rebalancing the portfolio on behalf of their clients.

The paper will start by discussing the models set forth by Sharpe, Treynor and Jensen with all the relevant assumptions. The paper will then describe the data utilized to test the models discussed. In addition, the Minimum Conditional Value at Risk portfolio approach is also reviewed to ascertain if the optimal portfolio derived outperforms both the NSE All Share Index and mutual funds in Nigeria. The last section of this paper will discuss with results of the analysis and provide a narrative of further work that needs to be done to improve on the results observed from this work.

2. The Model

For the purpose of this analysis, we will discuss the Sharpe ratio, Treynor ratio and Jensen's model. We begin with the Sharpe ratio

2.1 The Sharpe Ratio

According to Lo (2002), the Sharpe ratio is the ratio of the excess expected return of an investment to its return volatility or standard deviation. The ratio was originally motivated by mean variance analysis and the Sharpe-Lintner, Capital Asset Pricing Model ("CAPM")

The model is laid down;

Let R_t denote the one-period simple return of a portfolio or fund between dates, $t - 1$ and t and denote by μ and σ^2 its mean and variance:

$$\mu = E(R_t) \quad (1a)$$

and

$$\sigma^2 = \text{Var}(R_t) \quad (1b)$$

³ This definition was taken from Nimalathas and Gandhi (2012)

⁴ This definition was taken from Kremnitzer (2012) on the active / passive debate

According to Sharpe (1966) and Lo (2002), the Sharpe ratio (SR) is defined as the ratio of the excess expected return to the standard deviation of return

$$SR = \frac{\mu - R_f}{\sigma} \quad (2)$$

where the excess expected return is usually computed relative to the risk-free rate, R_f . Because μ and σ are the population moments of the distribution of R_i , they are unobservable and must be estimated using historical data. This historical data is described in the data section.

2.2 The Treynor Ratio

The Treynor ratio as described by Hubner (2003) uses as the Security Market Line, that relates the expected total return of every traded security or portfolio to the one of the market portfolio m :

$$E_i = R_f + \beta_i(E_m - R_f) \quad (3a)$$

Where $E_i = E(R)$ denotes the unconditional continuous expected return return, R_f denotes the continuous return on the risk-free security and

$$\beta_i = \frac{\text{cov}(R_i, R_m)}{\sigma^2(R_m)} \quad (3b)$$

is the beta of security i . This equilibrium relationship corresponds to the market model

$$r_{it} = \alpha_i + \beta_i r_{mt} + \varepsilon_{it} \quad (4)$$

Where $r_{it} = R_i - R_f$ denotes the excess return on security i . If the CAPM holds and if markets are efficient, α_i should not be statistically different from 0.

When considered in the context of portfolio management, the econometric specification of equation (4) translates into an ex-post measure of excess return:

$$\bar{r}_i = \alpha_i + \beta_i \bar{r}_m \quad (5)$$

Where \bar{r}_i is the average return of the security over the sample period (0,T) and econometric methodology from (4) to (5) ensures that $\bar{\varepsilon}_i = 0$

Equation (5) constitutes the source of two major performance measures of financial portfolios; Jensen's alpha (1968) and the Treynor ratio (1965). Hubner (2003) defines the Treynor ratio as two things; either as the Total Treynor ratio (TT), as usually treated in the literature, or the Excess Treynor ratio (ET) that directly related to abnormal performance.

$$TT_i = \frac{r_i}{\beta_i} \quad (6)$$

$$ET_i = \frac{\alpha_i}{\beta_i} = TT_i - \bar{r}_m \quad (7)$$

These two measures are roughly equivalent. Nevertheless, the link between the Excess Treynor ratio and Jensen's alpha is easier to interpret: the Excess Treynor ratio is just the equal to the alpha per unit of systematic risk of the portfolio. In particular, this formulation corresponds to the original measure developed by Treynor (1965). This paper assumes the Excess Treynor ratio.

2.3 Jensen's Alpha

Jensen's Alpha is an estimation of equation (3), hence a minor transformation of this equation leads to the equation below which is estimated

$$\bar{R}_{it} - \bar{R}_{ft} = \alpha_i + \beta_i(\bar{R}_{mt} - \bar{R}_{ft}) + \bar{u}_{it} \quad (8)$$

Where is \bar{R}_{it} the return to asset i at time t, \bar{R}_{ft} is the return to the risk-free asset at time t.

According to Jensen (1967) α_i represents the average incremental rate of return on the portfolio per unit time which is due solely to the managers ability to forecast future security prices. It is interesting to note that a random selection buy-and-hold policy can be expected to yield a zero intercept. In addition if the manager is not doing as well as a random selection buy and hold policy, α_i will be negative. At first glance it might seem difficult to do worse than a random selection policy, but such results may very well be due to the generation of too many expenses in unsuccessful forecasting attempts.

The intercept in the Ordinary Least Squares equation (8) is also very useful because it prevents us from regressing through the origin and improves the fit of the model. However, given that we observe a positive intercept in any sample of returns on a portfolio we have the difficulty of judging whether or not this observation was due to mere random chance or to the superior forecasting ability of the portfolio manager. A simple student t test of statistical significance is employed.

In slightly different terms, to ascertain if a fund or fund manager is skilled or adds value to her unitholders, the intercept α_i must be statistically significant. The student t test devised by William Gosset⁵ is sufficient to help us ascertain if the positive intercept generated is statistically significant at 5% and 10% significance levels. The positive alpha is hence the measure of a fund managers skill since we benchmark them against the market index and the risk free rate. An unskilled fund / fund manager will generate alpha that is not statistically different from zero. A worse scenario is when α_i is negative. The implication is that the fund / fund manager is performing worse than a random selection of buy and hold instruments in the portfolio. In the review of NAV's, fund expenses, transaction costs and absence of manager skill could lead to such a scenario. All three approaches described above are equally useful and several papers have reported modifications of the models with varying degrees of success.

A positive sharpe ratio is also a measure of fund manager skill because the higher the sharpe ratio, the easier it is for the fund / manager to get leverage and invest the cash in the strategy employed. If one held the NSE All Share index in a rising market, one would expect a positive Sharpe ratio.

⁵ From <http://www-history.mcs.st-andrews.ac.uk/Biographies/Gosset.html>

3. The Data and Results

The sample data consists of weekly net asset values on the portfolios of 31 open and close end mutual funds for which net asset information was available on the Nigerian SEC website⁶. Nigerian All Share Index data was collected from the Nigerian Stock Exchange data department. The funds are listed in Table 1. Weekly data was gathered for the period 2011-2014 for all 31 funds. The data was transformed to ensure we obtained the weekly returns and the data transform was assumed stationary and that the error term in equation (3) was independent and identically distributed ("IID").

Table 1: 2011 – 2014 Mutual Fund Returns

Fund Code	Fund Name	Fund Manager	Return
1	Legacy Fund	CSL Stockbrokers Limited	56%
2	ACAP Canary Growth Fund	Alternative Cap. Partners Ltd	53%
3	Stanbic IBTC Balanced Fund	Stanbic IBTC Asset Mgt. Limited	49%
4	Paramount Equity Fund	Sterling Capital Market Limited	49%
5	Afrinvest Equity Fund	Afrinvest West Africa Limited	48%
6	ARM Aggressive Growth Fund	Asset & Resources Mgt. Co. Ltd	47%
7	Coral Growth Fund	FSDH Asset Management Ltd	40%
8	ARM Discovery Fund	Asset & Resources Mgt. Co. Ltd	38%
9	Nigeria International Growth Fund	Fidelity Bank PLC	38%
10	Indo Nigeria Unit Trust Fund	Sterling Capital Market Limited	37%
11	FBN Heritage Fund	FBN Capital Limited	32%
12	Stanbic IBTC Nigerian Equity Fund	Stanbic IBTC Asset Mgt. Limited	31%
13	Union Trustees Mixed Fund	Union Trustees Capital Ltd	30%
14	Zenith Equity Fund	Zenith Bank Plc	29%
15	Zenith Income Fund	Zenith Bank Plc	29%
16	Stanbic IBTC Guaranteed Fund	Stanbic IBTC Asset Mgt. Limited	28%
17	Nigeria Global Investment Fund	Chapel Hill Denham Mgt. Limited	28%
18	Coral Income Fund	FSDH Asset Management Ltd	26%
19	Stanbic IBTC Ethical Fund	Stanbic IBTC Asset Mgt. Limited	26%
20	Lotus Halal Inv. Fund	Lotus Capital Limited	21%
21	Zenith Ethical Fund	Zenith Bank Plc	19%
22	BGL Sapphire Fund	BGL Asset Management Limited	18%
23	Nigeria International Debt Fund	Afrinvest West Africa Limited	17%
24	BGL Nubian Fund	BGL Asset Management Limited	15%
25	ARM Ethical Fund	Asset & Resources Mgt. Co. Ltd	11%
26	UBA Balanced Fund	UBA Asset Management Limited	8%
27	Women Investment Fund	Chapel Hill Denham Mgt. Limited	5%
28	Nigeria Energy Sector Fund	Sterling Capital Market Limited	0%
29	SIM Capital Alliance Fund	SIM Capital Alliance Limited	0%
30	UBA Equity Fund	UBA Asset Management Limited	-4%
31	Frontier Fund	Sterling Capital Market Limited	-4%
	Bench Mark	Nigerian All Share Index	77%

⁶ <http://www.sec.gov.ng/collective-investment-schemes.html>

Table 1 above shows the list of all the mutual fund NAV's utilised for this paper. The table ranks the fund managers based on NAV only returns from December 2011 to November 2014. The benchmark for the fund managers selected is the Nigerian All Share Index ("NSE Index"). In the review period, none of the fund managers outperformed the NSE Index which returned 77% before inclusion of dividends.

The risk free rate chosen for the purpose of this analysis is the one month Nigerian Inter-bank Treasury Bills True Yields ("NITTY") as published by the FMDQ OTC. This was chosen because it is a simple available short term proxy for the Treasury Bills rate in Nigeria. The NITTY was adjusted by dividing for the number of trading weeks in the year to get the weekly yields earned by investors.

Three tests were applied to assess the performance of fund managers in Nigeria. The Sharpe ratio and Treynor ratios are useful for ranking fund managers from 1 to 31. The results of the ranking are shown in Table 2. A significant Jensen alpha however shows whether fund managers have a statistically significant ability to select stocks better than the broad index or benchmark. The results of the three measures are discussed below.

3.1 Sharpe ratio results

In the analysis conducted, only 10 mutual funds from the sample size of 31 funds generated a positive Sharpe ratio. These positive generated Sharpe ratios averaged 0.05. The positive Sharpe ratios obtained were however all below 0.1, therefore, leading one to disregard these as meaningful Sharpe ratios. Conventional wisdom amongst fund managers on what constitutes a good Sharpe ratio is a number greater than 2. A simple buy and hold strategy without transaction costs over the period earned a Sharpe ratio of 1.7. The performance is even worse than one would expect from a draw of randomly created portfolios. The usefulness of the Sharpe ratio is that it shows the ability of the manager to obtain leverage and utilize the funds to invest in the trading strategy. The Treynor ratio which is a slight variant of the Jensen Alpha and is all negative for all the mutual funds investigated. The most pertinent measure in the analysis conducted is the Jensen Alpha.

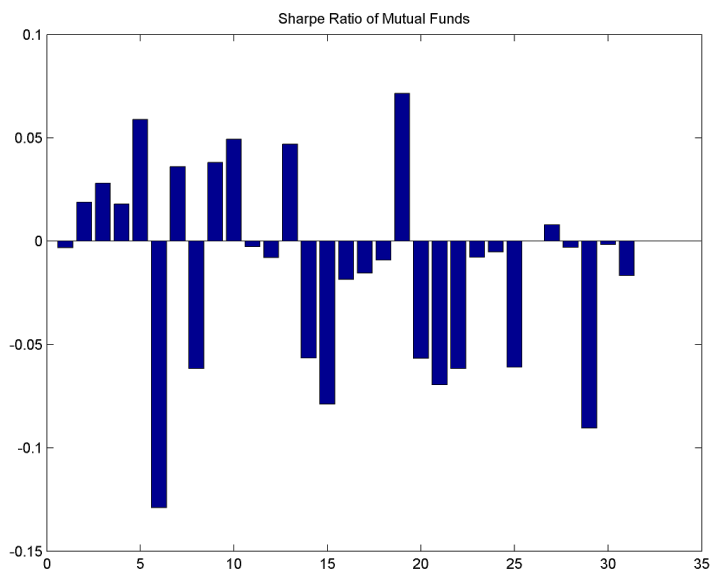


Figure 1. The Sharpe Ratio of Nigerian Mutual Funds

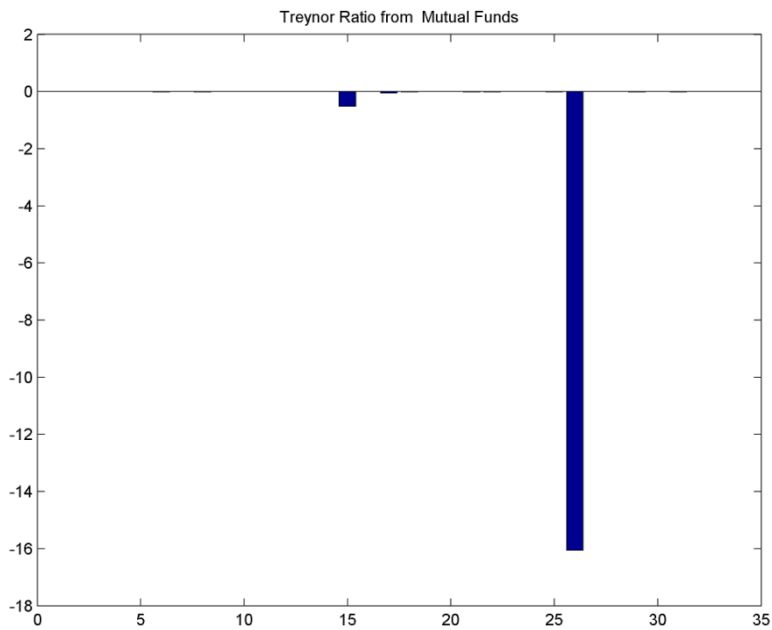


Figure 2. The Treynor Ratio of Nigerian Mutual Funds

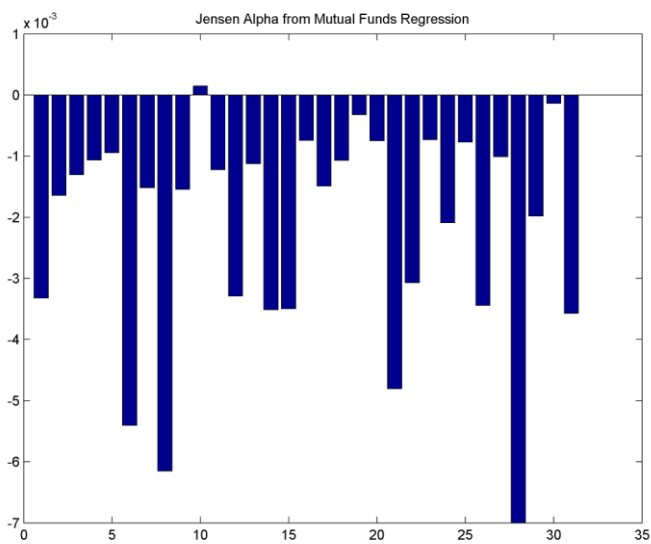


Figure 3. The Jensen Alpha, Bar Chart

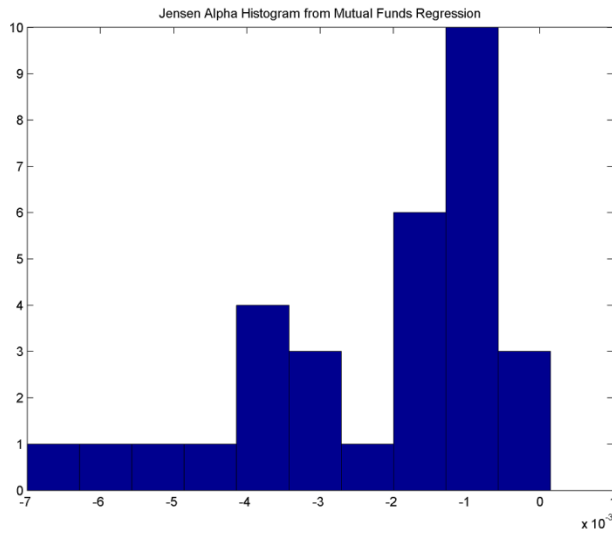


Figure 4. The Jensen Alpha, Histogram

Table 2: 2011 – 2014 Mutual Fund Ranking from Highest to Lowest using 3 Measures

Sharpe Ratio	Treynor Ratio	Jensen Alpha
Stanbic IBTC Balanced Fund	Nigeria International Debt Fund	ACAP Canary Growth Fund
Legacy Fund	Stanbic IBTC Ethical Fund	Stanbic IBTC Ethical Fund
ACAP Canary Growth Fund	ACAP Canary Growth Fund	Stanbic IBTC Balanced Fund
Afrinvest Equity Fund	Stanbic IBTC Balanced Fund	Union Trustees Mixed Fund
ARM Aggressive Growth Fund	Legacy Fund	Nigeria International Debt Fund
Paramount Equity Fund	Afrinvest Equity Fund	Zenith Income Fund
Coral Growth Fund	Paramount Equity Fund	Stanbic IBTC Guaranteed Fund
ARM Discovery Fund	ARM Aggressive Growth Fund	Legacy Fund
Nigeria International Growth Fund	Coral Growth Fund	Indo Nigeria Unit Trust Fund
Indo Nigeria Unit Trust Fund	Indo Nigeria Unit Trust Fund	Nigeria International Growth Fund
Stanbic IBTC Ethical Fund	Nigeria International Growth Fund	Coral Income Fund
FBN Heritage Fund	ARM Discovery Fund	Afrinvest Equity Fund
Zenith Ethical Fund	Stanbic IBTC Nigerian Equity Fund	FBN Heritage Fund
Stanbic IBTC Nigerian Equity Fund	FBN Heritage Fund	Coral Growth Fund
Nigeria Global Investment Fund	Zenith Equity Fund	BGL Sapphire Fund

Sharpe Ratio	Treynor Ratio	Jensen Alpha
Union Trustees Mixed Fund	Zenith Ethical Fund	Paramount Equity Fund
Zenith Equity Fund	Nigeria Global Investment Fund	ARM Aggressive Growth Fund
Coral Income Fund	Union Trustees Mixed Fund	ARM Discovery Fund
BGL Sapphire Fund	Zenith Income Fund	Lotus Halal Inv. Fund
ARM Ethical Fund	BGL Nubian Fund	Nigeria Global Investment Fund
Nigeria International Debt Fund	Stanbic IBTC Guaranteed Fund	UBA Balanced Fund
BGL Nubian Fund	Lotus Halal Inv. Fund	Zenith Equity Fund
Zenith Income Fund	Women Investment Fund	Stanbic IBTC Nigerian Equity Fund
Stanbic IBTC Guaranteed Fund	ARM Ethical Fund	Nigeria Energy Sector Fund
UBA Balanced Fund	Coral Income Fund	SIM Capital Alliance Fund
UBA Equity Fund	UBA Equity Fund	BGL Nubian Fund
Women Investment Fund	Frontier Fund	ARM Ethical Fund
SIM Capital Alliance Fund	UBA Balanced Fund	Women Investment Fund
Lotus Halal Inv. Fund	BGL Sapphire Fund	Frontier Fund
Frontier Fund	SIM Capital Alliance Fund	UBA Equity Fund
Nigeria Energy Sector Fund	Nigeria Energy Sector Fund	Zenith Ethical Fund

3.2 Jensen alpha results

Jensen's Alpha is a measure of the performance of the fund manager to generate excess or abnormal profits if the fund manager is able to generate abnormal profits, the alpha or intercept term in the Ordinary Least Squares (OLS) regression will be statistically significant. In OLS regression analysis, testing for statistical significance could take the form of a simple student t test with a certain number of degrees of freedom. The test would be on the null hypothesis that there is no significant difference between the sample and population. For the purpose of this analysis we conduct our test using a two sided t test at a 95% confidence level.

Only one fund generated a positive alpha in the regression analysis conducted. The ACAP Canary Growth Fund generated a positive alpha in the sample period observed. All other companies generated a negative alpha. The positive alpha was not statistically significant at a 95% or 90% confidence level. Similarly, on the negative alphas obtained from the regression analysis, only five of these were statistically significant. The implication of both described results is that the fund managers did not show any ability in generating meaningful returns above their benchmark of the Nigerian All Share Index. More interesting is that randomly selected portfolios will outperform the returns obtained from the fund managers within the observation period. As a result it's difficult to understand the justification for fees charged whilst their funds do not generate exceptional returns. In line with many studies in different countries on the performance of mutual funds, this study shows that fund managers in Nigeria as a group do not have a statistically significant ability to select stocks over the average investor. A future study should review the performance of Nigerian pension fund administrators ("PFAs") using similar techniques. It is more pertinent for PFA's because a 1% change in the performance of a portfolio over 30 years would amount for as much as 24% of the final value of the retiree's portfolio.

4. Minimum Conditional Variance Portfolio

In 1952, Harry Markowitz as a graduate student had an insight and recognized that, in allocating wealth among various risky assets, a risk-averse investor should focus on the expectation and the risk of her combined portfolios return, a return that is affected by the individual assets diversification possibilities. As a result of

diversification, the attractiveness of a particular asset when held in a portfolio can differ from its appeal when it is the sole asset held by an investor. Markowitz proxied the risk of a portfolios return by the variance of its return profile. Markowitz made the following assumptions;

1. Investors preferences can be expressed with a mean-variance utility function.

That is, they are only concerned with the expected return and the variance of portfolios over a particular period.

2. One period investment horizon

3. Financial markets are frictionless, i.e.

Conditional value-at-risk (CVaR), introduced by Rockafellar and Uryasev (2000, 2002) has recently become a popular tool for managing risk. CVaR approximately (or exactly, under certain conditions) equals the average of some percentage of the worst-case loss scenarios. CVaR risk measure is similar to the value-at-risk (VaR risk measure), which is a percentile of a loss distribution. VaR is heavily used in various engineering applications, including nancial ones. Rockafellar and Uryasev (2000, 2002) showed that CVaR is superior to VaR in optimization applications. The reader is advised to read these papers. CVaR optimization is consistent with VaR optimization and yields the same results for normal or elliptical distributions (see denition of elliptical distribution in Embrechts et al). For this paper, we will not delve into the theory of mean variance analysis but will present both model utilised to generate the Minimum CVAR portfolio and the results obtained. The reader is advised to familiarise themselves with the theory by reading Markowitz (1952).

Optimisation Problem

$$\min CVAR_{\alpha}^{\Delta} \tag{9}$$

$$\text{s.t. } \sum_{i=1}^n r_i x_i \geq \bar{r} \tag{10}$$

$$\sum_{i=1}^n x_i = 1 \tag{11}$$

$$x_i \geq 0 \tag{12}$$

Where, equation (10) is the portfolio mean return, (11) budget constraint and (12) no shorts constraint. Solving the above problem at a 95% confidence level gives one the optimal portfolio within the CVAR framework. Since the returns on the Nigerian stock exchange exhibit non normal properties, the results from the CVAR approach are different from the mean variance approach. The optimal portfolio was obtained from the 196 stocks that constituted the NSE index using data from January 2009 - October 2011 as the in sample data size. The in-sample portfolio was then used to generate the out-sample results from December 2011 - November 2014.

4.1 Minimum CVAR Results

The minimum CVAR portfolio outperformed the NSE All share index between the periods of December 2012 - November 2014. The direct implication is that the theoretical market portfolio outperforms the index and fund managers over the identified review period. It is important to point out that over a longer period ie December 2011 – November 2014, the NSE All share index does out-perform the hypothetical Minimum CVAR portfolio.

5. Conclusion

This paper set out to review the performance of equity based mutual funds in Nigeria between 2011 and 2014. It found that the fund managers didn't out-perform the benchmark, the Nigerian All Share Index and generally generated non statistically significant alphas. In addition, the Minimum CVAR model at 5% level of significance outperformed all in the review period December 2012 – November 2014.

A future or follow-up study will expand the sample size beyond 3 years to at least 10 years. Dividend income or fund distributions should be included in the computation of both index returns and fund returns respectively. The corollary is that active fund managers based on the sample data collected cannot out-perform the Nigerian All Share index, the hypothetical market portfolio or generate positive statistically significant alphas. Passive fund managers with very low fees and commissions are a better alternative.

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