AN ANALYSIS OF MUTUAL FUND PERFORMANCE, BY APPLYING Z-SCORE.

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Abstract

Selecting a mutual fund is not an easy task as there are nearly 38 Asset Management companies (AMC) offering many funds. The first step for investors is decided has how to select a fund. With the 38 active players the mutual fund industry has mopped up nearly ~8 billion through equity mutual fund schemes alone. This is due to the attributes of the indifferent performance player in the equity market.

As an investor we wants a return on our investment, most investors tend to evaluate fund performance on a short-term basis. There is a need to educate investor about risk-adjusted return and also the total portfolio return.

The key to investors return will be the funds ability to outperform the benchmark index on a consistent basis without taking lot of risks. Here's I prepared a blueprint for a structured approach to fund selection that is Z-Score. It is used on the based on the statistics on the group with smaller sample size, which means that almost surely stocks with better trailing 12 months performance experience higher net % change in number of shares, higher net raw change in number of shares, and higher net individual weight change compare to the worst performing stocks.

Key words: Z-Score, Mutual fund, NAV, Performing Stocks, AMC

I. INTRODUCTION

The mutual fund industry in India has taken rapid strides during the past few decades. The key challenge facing the industry is that of educating the investor. Mutual funds are still not regarded as life cycle financial planning products among the middle class in India. The mutual fund industry needs to introduce innovative products which can satisfy investor's requirements. We have seen standard products being introduced by most of the players. These products have met investor's requirement in a bull market but failed to cultivate a long-term saving habit. Mutual funds have become a kind of trading instrument rather than investment vehicles. Off late we have seen the introduction of innovation products in the form of floating Rate Funds, International Investment plans, Exchange Traded Funds and Gold Fund.

Selecting a mutual fund is not an easy task with so many funds. We think that the correct first step towards deciding is to decide on a way of deciding. Rarely do investors- -normal investors, who do something else for a living-have a systematic checklist of things that they should evaluate about a fund, which they are considering buying. Here's our blueprint for a structured approach to fund selection. There are four basic areas that you must evaluate in a fund to decide whether it's a good investment.

The Indian mutual fund industry has stagnated at around Rs 1, 00,000/- crore assets, in the last two years. This is due to the attributes of the indifferent performance player in the equity market. The other important area for the mutual fund industry will be to deliver performance. The investor wants a return on their investment. Mutual funds have sold performance in a bull market but miserably failed during their bear market. Concept of Risk Adjusted Return and Total Portfolio Return are still alien to investors. Most investors tend to evaluate fund performance on a short-term basis. There is a need to educate investor about risk-adjusted return and also the total portfolio return.

The empirical studies in the Indian market have shown that the funds return tends to have a huge variance with the average investor's return. This is mainly because most investors enter the fund after it has shown top quartile performance. Investors also tend to exit when the funds are showing bottom quartile performance. The key to investors return will be the funds ability to outperform the benchmark index on a consistent basis without taking lot of risks. In this study Z- test is used on the based on the statistics on the group with smaller sample size, which means that almost surely stocks with better trailing 12 months performance experience higher net % change in number of shares, higher net raw change in number of shares, and higher net individual weight change compare to the worst performing stocks..

These products produced investors with a choice of investment. They are niche products, which an satisfy specific risk-return profile of an investor and create a long-term investment vehicle for him the mutual funds industry has to bring many such innovative concepts to cater to investor requirements. The option could be on the High

Yield Bonds Funds, Principal Protected Funds, Long Short Funds, Arbitrage Funds, Dynamic Funds etc.,

The success of a portfolio manger in general is measure in terms of both timing ability and selectivity otherwise called as the micro and macro forecasting abilities respectively. Since returns from most financial securities are not uniformly spread throughout the period, a lot of emphasis is being given on timing of investment. In other words the fund mangers are not only required to identify growth stocks but also deploy the limited resource at appropriate time and switch on stock to other to reap maximum return. This paper analyses performance of mutual funds in India on their ability to select right stocks and invest in them at right time.

Objective of the Study:

This paper analysis shows how the Z-Score concept enhances the review function which is the underlying objective in the application of Mutual fund Industry.

a) To help the investors to check the technical stability of the Particular scheme

Evolution of Z-Score:

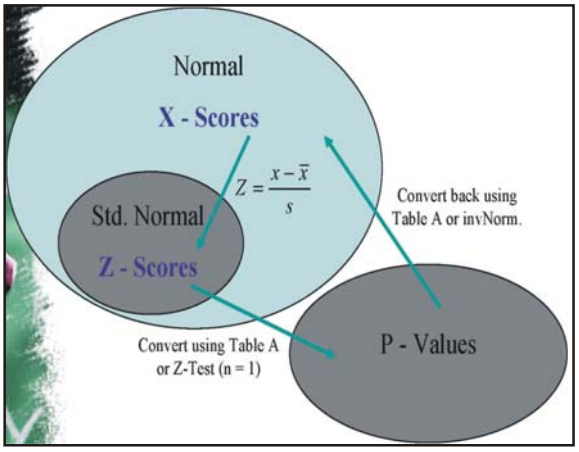
Specific return-rate threshold below which survival is increasingly threatened. Accordingly, Z corresponds to the probability that the behavior will result in a return rate below the threshold. Given these definitions not again with reference to equation that if the threshold, n is below the mean, Z is negative, that is it is a small, and that if n is above the mean, Z is positive that is it is large. This leads to the generalization that to minimize the possibility of falling below the threshold, foraging behavior should minimize Z, threshold – sensitive optimal foragers should be Z minimizes.

The goal of minimizing Z holds some rather counterintuitive implications for the manner in which variability in rate of return, here represented by standard deviation, S affects profitability of resources shortfall. Specifically, when mean return is greater than the threshold (i.e., when u > n) z is negative.

Financial ratio is useful not only to assess the past or present condition of an enterprise, but also to reliability predict its further solvency or bankruptcy. This type of information is of critical importance to present & potential creditor and investors. There are several different methods of analysis for obtaining this predictive information. The best-known and most time-tested is the z-score, developed for publicity traded manufacturing firms by Professor Edward Altman of New York University

The z-score model

The Z-score model is a quantitative model developed in 1968 by Edward Altman to predict bankruptcy financial distress of a business using a blend of the traditional financial ratio and a statistical method know as multiple discriminate analysis (MDA).The z-score model takes its name from the statistic, Z which as many will recognize, is the standardized normal deviate of a normally distributed population with mean, μ, and standard deviation, S fir any such population, Z describes a ratio between the amount an individual measurement, say, n, departs from the mean of the population relative to the standard deviation of the population. Thus Z varies directly with n relative to μ; it is negative when n is smaller than μ and holding s constant from these decreases (becomes more negative) as n decreases. Conversely, it is positive when n is larger than μ, and from there increases as n does. In formal terms.



$$Z = (n-u) / s$$

Every value of Z is associated with a probability corresponding to the amount of a normal curve which means μ and standard deviation s that lies on either side of it (i.e., Z). There probabilities are tabulated in the appendixes of most elementary statistics texts. In the z-sore model, μ & s correspond to the mean & standard deviation of the return rate for a given behavior & n corresponds to a specific

How is it used & applied?

The MDA may be used for one company on a group of companies. The recessionary environment of the early 1990's witnessed an increasing trend in bankruptcies. The Z-score model could be used to determine if an employer was on the verge of bankruptcy or it some other entity would go bankrupt. A major customer? An important supplier? A borrower?

If it can be predicted with reasonable accuracy that a company in which one is a participant is in increasing financial distress protection measure & corrective action can be taken. Some steps might be to curtail capital expansion, cut back on dividends, or engage in refinancing.

Who uses it & when?

- **Financial manager & analyst**: Financial manger & analyst apply the Z score in numerous ways including the following.
- **Financial management analysts:** The score can indicate whether capital expansion & dividends should be entailed to keeps needed funds within the business.
- **Merger analysis**: the Z-score can help identify potential problem with a merger candidates.
- **Loan & credit analysis:** Banker and lender can use the z-score to determine if they should extend a loan. Other creditors such as vendors can use it to determine whether to extend credit.
- **Investment analysis**: The z-score can help an investor in selecting stock of potentially troubled compotes.

II. THE POWER OF Z

A common statistical way of standardizing data on one scale so a comparison can take place is using a z-score. The z-score is like a common yard stick for all types of data. Each z-score corresponds to a point in a normal distribution and as such is sometimes called a normal deviate since a z-score will describe how much a point deviates from a mean or specification point. In Six Sigma parlance, z-score and process sigma are used interchangeably and are sometimes called z-equivalents.

Strictly speaking, the process sigma and z-equivalents are loosely tied to the statistical z-score. The statistical z-score has very strict definitions derived from the rules of the normal distribution. For most applications in Six Sigma, ignoring some of those constraints is innocuous.

In usability testing the benefit of the standardization from process sigma allow us to meaningfully compare disparate measures like task completion and time on task. The z-score /process sigma is calculated by subtracting your sample mean from a target data point and dividing by the target standard deviation. This value is a measure of the distance in standard deviations of a sample from the mean and is expressed using the Greek letter σ.

If your sample is 3 standard deviations from the spec limit, you would describe your process as 3 sigma. or 3σThe further away a sample is from the spec limit the higher the z-score and process sigma. A higher process sigma means a less defective process. The term Six Sigma originates from the z-score. 6σ means that six standard deviations lie between the mean of a sample and the nearest specification limit.

Each process sigma has two equivalent values which provide a meaningful way to compare data and understand how defective a process is:

1. **DPMO**: Each expresses the probability of a defect in terms of a defect per million opportunities or DPMO. That is, if a condition were to occur one million times, how many times out of that one million would a defect occur? A process sigma of .5 is equal to 308,000 defects per million opportunities. And a process sigma of 2.5 means that 6,210 out of 1 million times there will be a defect. For a sample that is 6σ, the DPMO is .0.001. Some organizations prefer to think in terms of defects per opportunities instead of the more abstract "standard deviations above the spec limit."
2. **Probability of a Defect:** The process sigma can also be described in terms of a probability of a defect. A z-score of .5 means there is a 30% probability of encountering a defect. A z-score of .25 means there is a 40% probability of a defect. For a sample that is 6σ, the probability of a defect is .0000001

Why use a Process Sigma?

The process sigma is helpful in three ways:

1. It allows you to compare disparate types of data (seconds, which are a continuous measurement with task completion which is binary with errors which are discrete count data)
2. It provides you with a probability of a defect
3. You can meaningfully compare two different products or processes:

1. The process sigma for one release of a software product can be compared to subsequent versions
2. You can compare two different products' process sigmas
3. You can compare one module of the same product with a different module on the same product

4. You can use the properties of the normal distribution to aide in assessing and improving your data set.

The benefit of using a z-score in usability metrics was explained in " what's a Z-score and why use it in Usability Testing ? this article discusses different ways of calculating a z-score.

The short answer is: It depends on your data and what you're looking for. If you've encountered the z-score in a statistics book you usually get some formula like:

$$z = \frac{(x - \mu)}{\sigma}$$

The above formula is for obtaining a z-score for an entire population. Usability testing obviously samples a very small subset of the population and thus the following formula is used:

$$z = \frac{(x - \bar{x})}{s}$$

Where x-bar and *s* are used as estimators for the population's true mean and standard deviation. Both formulas essentially calculate the same thing:

$$z = \frac{(\text{data point} - \text{mean})}{\text{standard deviation}}$$

III. METHODOLOGY

The study was carried out in Indian mutual fund industries. When we talk about the mutual fund we can see there are lot of schemes is available but in this study I had taken only mutual fund in equity. In this scheme the fund manger will decided to invest in the fund in particular stock according to their performance.

$$z = \frac{(x - \mu)}{\sigma_x}$$

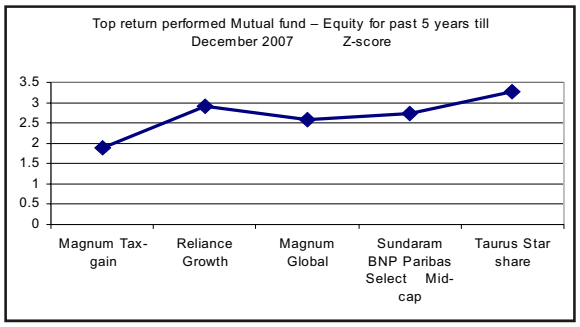
The primary data was collected from the companies of the Asset management companies. Here a sample of top return performed Mutual fund and poor return performed mutual fund was selected from the reputed website [value research online]. For easy collection of data I had taken 5 companies in top return performed and 4 companies in poor return performed companies. Here I had taken the NAV mostly form the evolution of the company. I had also taken even the sales prices of the fund from the same date. So the sum of mean values of NAV is taken for all the years were measured to identify the efficiency of the fund. The Statistical formulae to calculate the Z-Score is given below. In this paper I had taken x has present NAV value of mutual fund, and μ is the mean of selling price of all the years, and σ_x is the standard deviation of NAV values has the NAV is deciding factor of price in mutual fund.

Result and Analysis:

In this paper I had taken both top and poor performed mutual fund schemes for analyzing its performance through z-score. When the z-score is in negative the investor will think before investing and if the z-score is positive then the investor can invest the money boldly, thinking that the not only the investment but also the return will be more.

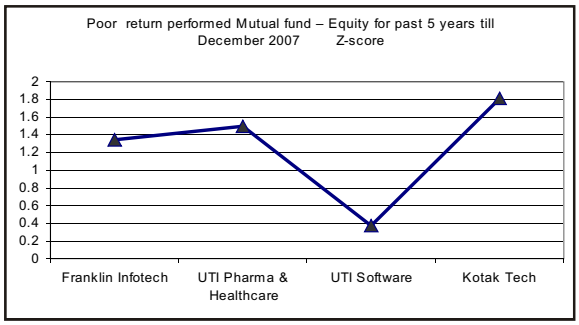
Top return performed Mutual fund – Equity for past 5 years till December 2007

Name of the schemes	Return %	Mean	Std Dev	Z-score
Magnum Tax-gain	73.38	54.30445	7.3	1.88
Reliance Growth	71.28	170.4017	100.59	2.902
Magnum Global	69.07	38.60291	10.81	2.589
Sundaram BNP Paribas Select Mid-cap	67.67	55.2678	34.04	2.743
Taurus Star share	65.79	25.3	16.166	3.259



Poor return performed Mutual fund – Equity for past 5 years till December 2007

Name of the schemes	Return %	Mean	Std. Devi	Z-score
Franklin Infotech	21.7	27.232	14.299	1.35
UTI Pharma & Healthcare	23.39	21.773	1.726	1.50
UTI Software	23.72	22.810	4.42	0.377
Kotak Tech	24.78	5.708	2.748	1.818



From the above table we can able to see the though the return of the mutual fund is varying, there is a steady in their technical field which we can been see it through Z-score tool.

IV. CONCLUSION

Today the investors are confused to select the best scheme and do not know where to invest their money. This study is done because, it not easy to earn money in today's competition, if at all we earn we should know to invest money in a better scheme. This tool i.e., Z-score will say whether the company is technically strong or not.

This failure classification model (Z-score) otherwise called has ZETA model is used for assessing bankruptcy risk of corporations demonstrates improved accuracy over existing failure. Perhaps more importantly, this model is base on the data which should be relevant to current conditions and to a larger number of industrial firms. The investors call it has Z" model. We are concerned with refining existing distress classification techniques by the use of the most relevant data combined with developments in the application of discriminate analysis to finance. We have assessed the effect of several elements involved with the application of discriminate analysis to financial problems. The potential applications of the ZETA bankruptcy identification model are in the same spirit as previously developed models. These include credit worthiness analysis of firms for financial and non-financial institutions, identification of undesirable investment risk for portfolio managers and individual investors and to aid in more effective internal and external audits of firms with respect to going-concern considerations, among others.

REFERENCE

[1] Hunter-gatherers: Archaeological and Evolutionary Theory - By Robert L. Bettinger page 119.

[2] The Portable MBA in Finance and Accounting By John Leslie Livingstone, Theodore Grossman page 32.

[3] Schaum's Quick Guide to Business Formulas 201 Decision-making Tools for business By Joel G Siegel, Jae K Shim, Stephen page 328.

[4] www.valueresearchonline.com/

[5] www.amfiindia.com/

[6] www.indiastockmarket.com

[7] Annexture 1 & 2 in excel format

[8] http://www.sysurvey.com/tips/statistics/zscore.htm

[9] http://www.measuringusability.com/z.htm

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