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Built by investors for investors

Skill vs Luck

Know whether your fund manager is skillful or plain lucky

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Section 1 Introduction

There are currently around 44 Asset Management Companies (AMCs) in India offering more than 800 schemes across multiple asset classes and themes. Clearly, scheme selection, or rather selecting the right scheme is no easy task. In addition to aligning the investment choice with your risk profile, return requirement, and investment time horizon you also need to ensure that your portfolio can meet the dual goals of both growing as well as preserving your wealth. Generally, passively managed equity funds and debt instruments can help you achieve the latter while actively managed funds are envisaged to help you with the former. However, there are currently around 500 actively managed mutual funds in India – as an investor, your goal would be to choose a fund manager that has consistently generated returns in excess of the market. In that context, the SPIVA India Scorecard can be particularly informative. This Standard & Poor's Index vs Active India Scorecard is a bi-annual report which compares Indian equity mutual funds with their comparable indices over the short and long term.

Exhibit: SPIVA India Year-End 2018 : Percent of underperforming active funds in India

Report 1 : Percentage of Funds Outperformed by the Index

Funds category	Comparison Index	1-Year (%)	3-Year (%)	5-Year (%)	10-Year (%)
Indian Equity Large-Cap	S&P BSE 100	91.94	90.59	57.55	64.23
Indian ELSS	S&P BSE 200	95.45	88.1	40.54	51.52
Indian Equity Mid-/Small-Cap	S&P BSE 400 MdSmall Cap Index	25.58	56.52	39.68	55.26
Indian Government Bond	S&P BSE India Government Bond Index	81.58	71.43	88	96.43
Indian Composite Bond	S&P BSE India Bond Index	94.44	90.97	96.64	83.33

Source: S&P Dow Jones Indices LLC, Morningstar, and Association of Mutual Funds in India. Data as of Dec. 31, 2018.
Past performance is no guarantee of future results. Table is provided for illustrative purposes.

The table above is taken from the latest SPIVA score card, updated till 31st December 2018. It is evident that barring a few outlying cases like the Mid & Small cap funds, all other fund categories have underperformed their respective benchmarks in the short as well as the long-term. Out of the few winners who manage to outperform the index consistently, one key question remains:

Can the outperformance be attributed to the skill of the fund managers or is it just plain luck?

Answering this question becomes imperative because you would ideally want to invest in fund managers that have the skills to consistently outperform the benchmark index. Now, an even bigger question is:

How do you separate skills from the fund manager's luck ?

This question was answered by the legendary duo – Eugene Fama & Kenneth French.

Fama & French published a paper in 2009 titled "Luck versus Skill in the Cross Section of Mutual Fund Returns," . The paper examines the performance of actively managed US mutual funds that invest primarily in US equities during the 1984-2006 period. In this study, they note that while the outperformance of active fund managers exists in some cases, the high costs of actively managed funds end up in lowering the returns to investors.

Section 2 Analysis to distinguish between skill and luck in return computations

I. The first step in our analysis is to clearly define skill and luck.

What is skill?

It is the ability of the fund manager to generate returns that are higher than the returns expected from the fund. For example, assume that as per your analysis, a fund is expected to generate a return of 12%. However, the actual returns generated by the fund manager are 16%. In this case, the excess returns – also known as alpha - would be 4%, i.e., (16%-12%). This excess return of 4% can be attributed to the fund manager's skill or luck.

What is luck?

If returns comprise both skill and luck, then when we remove the alpha from the fund returns, we are simply left with the luck portion. To calculate the luck portion, we subtract the alpha from the actual historical returns. In the above example, if we subtract the 4% alpha, what we are left with is the pure luck portfolio, i.e., Above fund's historical returns - 4% (alpha) = pure luck portfolio.

II. The next step is to calculate the expected returns of the portfolio as this will help us calculate both the skill as well as the luck portion of the returns.

The expected returns of the portfolio can be calculated using the Capital Asset Pricing Model (CAPM). The model is commonly used by investment practitioners to determine the expected rate of return on an asset or investment. The mathematical formula is:

$$\text{Expected Return} = \text{Risk free rate} + \beta(\text{market return} - \text{risk free rate})$$

Here,

- Expected return = the rate of return expected on the portfolio
- Risk free rate = this is the theoretical rate of return on an investment with zero risk
- Beta = it is slope or systematic risk and it helps to measure the expected move in an investment relative to the movements in the overall market. A portfolio with beta more than one will be more sensitive to market returns than that with beta less than one.
- Market return – risk free rate = this is the market premium or the additional returns that you expect for taking market risk.

III. Once the expected returns are calculated based on the CAPM, the next step is to calculate alpha i.e. the excess return of the fund.

Alpha = Actual fund returns – Expected fund returns as per CAPM

Exhibit:

Funds with extreme α	Actual Return (A)	Expected Return using CAPM(B)	Alpha (A-B)
••••••• ••••• Multicap Fund(G)	18.65%	12.52%	6.12%
Moats & Special Situations Portfolio	16.75%	10.72%	6.04%
••••• ••••• ••••• Equity Fund-Reg(G)	16.78%	12.29%	4.48%
••••• •••••••• Multicap Fund(G)	16.36%	12.23%	4.14%
•••• Multi Cap Fund-Reg(G)	15.98%	11.95%	4.03%
•••••••• Multi Cap Fund(G)	15.72%	12.58%	3.14%
•• Multicap Fund(G)	12.65%	13.35%	-0.70%
•••••• ••••••••• (Multi Cap) Fund-Reg(G)	10.76%	12.63%	-1.87%
•••••• Multi Cap Fund(G)	9.76%	12.69%	-2.92%
••• •• Multi Cap Fund(G)	9.05%	12.61%	-3.56%

Study period: 2011 to 2019

IV. While we can determine the alpha by using the CAPM, we need to ensure the statistical significance of alpha.

To do this, we use the T-alpha (t(α)). This is a statistical measure that can tell us the significance of estimating alpha.

Higher t(α) implies higher confidence in the test results.

- t(α) more than 2 implies 95% confidence
- t(α) more than 1.64 implies 90% confidence

The steps above will help us calculate the alpha and determine the significance of the alpha calculations. This will, in turn, help us determine the skill portion of the returns.

V. The next step is to calculate the luck portion of the returns and ensure that the luck series that is created is robust.

This is a two-phase process: Create the luck series | Test for the robustness of the luck series

Phase 1 Create the luck series

This can be done by creating a new series of zero-α returns by subtracting respective α from all returns. For example, if you have annual returns of a fund say R1, R2, R3 and so on, then first you calculate alpha. Then we subtract that alpha from each of these returns, to get a new series R1- alpha, R2- alpha and so on. Since the alpha is made zero, this is a pure luck series.

- Original fund return series = R1, R2, R3 …. With some α
- Luck return series = (R1-α), (R2-α), (R3-α) …. With zero α, i.e., no skill, pure luck

Phase 2 Test for the robustness of the luck series

However, this series can be a product of a random chance, and may not be a true representative of the universe. Thus, we need to test for the robustness of the luck series. To do this, we use a technique called the bootstrap simulation method.

The bootstrap method involves iteratively resampling a dataset with replacement to create many simulated samples. It can be particularly useful when you want to extract information from a limited set of data. Below, are the steps to bootstrapping:

1. Assume your original series has 10 observations, a,b, c…..j
2. Create a random sample of the same size with replacement – this means that while one observation can be selected more than once there might also be some observations that would not be reflected in the generated sample

	1	2	3	4	5	6	7	8	9	10
Original	a	b	c	d	e	f	g	h	i	j
Sample 1	a	a	c	d	f	f	g	i	j	j
Sample 2	b	b	b	d	e	g	h	h	i	j

3. The first sample may look something like this, a, a, c, d and so on. Some values are repeated while some are missing from the original series. But the sample size is 10.
4. Next you can draw another sample, which takes values from the same pool, but can be drastically different from the first sample because of new repeating and missing values.
5. This process needs to be repeated to create 10,000 such samples. These will be further used to compute the accuracy of the luck measure.

VI. The next step is to assemble the data for the study.

For each fund, the accuracy of skill is denoted by the statistic t alpha of that fund.

- Accuracy of skill for each fund: actual t(α)

For the accuracy of luck, we will use simulated t alpha which is the average of the 10,000 t alphas from the bootstrap samples. The sampling process will be repeated separately for each fund, to get its simulated t alpha.

- For computing accuracy of luck, i.e., simulated t(α)
- For each fund, Simulated t(α) = average of the 10,000 t(α)'s of bootstrap samples

Section 3 Interpreting the results

If actual t-alpha calculated from the original fund returns is more than the simulated t alpha for the pure luck portfolios, it can be concluded that the manager of that fund possesses skill. However, if the actual t alpha is less than the luck t-alpha, it can be said that the manager does not possess skill, and any alpha that has been generated is primarily due to luck.

Attributing excess returns to skill or luck

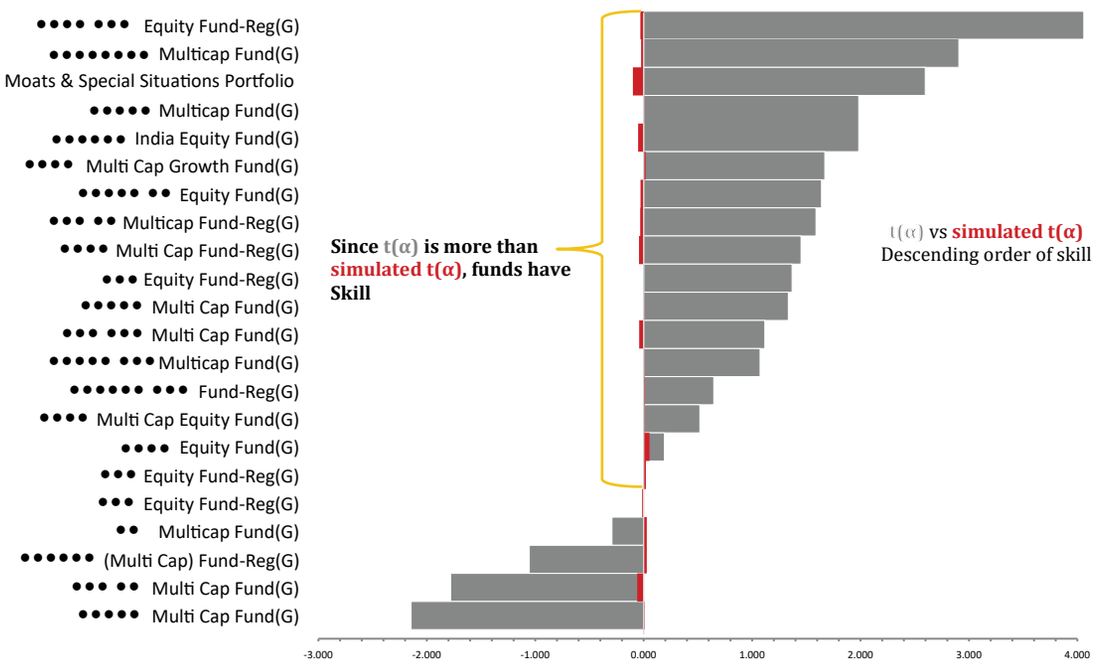
- If actual t(α) > simulated t(α) then manager possesses skill
- If actual t(α) < simulated t(α) then manager does not possess skill

At this juncture it will be important to remember that higher t(α) indicates higher confidence in the results and not that the fund manager has higher skills.

In the vertical bar chart below, each fund is reviewed with its skill and luck t-alpha plotted in front of it. The grey line shows the actual t-alpha. Remember that while calculating the luck series, alpha was removed from the returns, effectively making it zero. As a result, the t-alpha of the luck distribution will be close to zero.

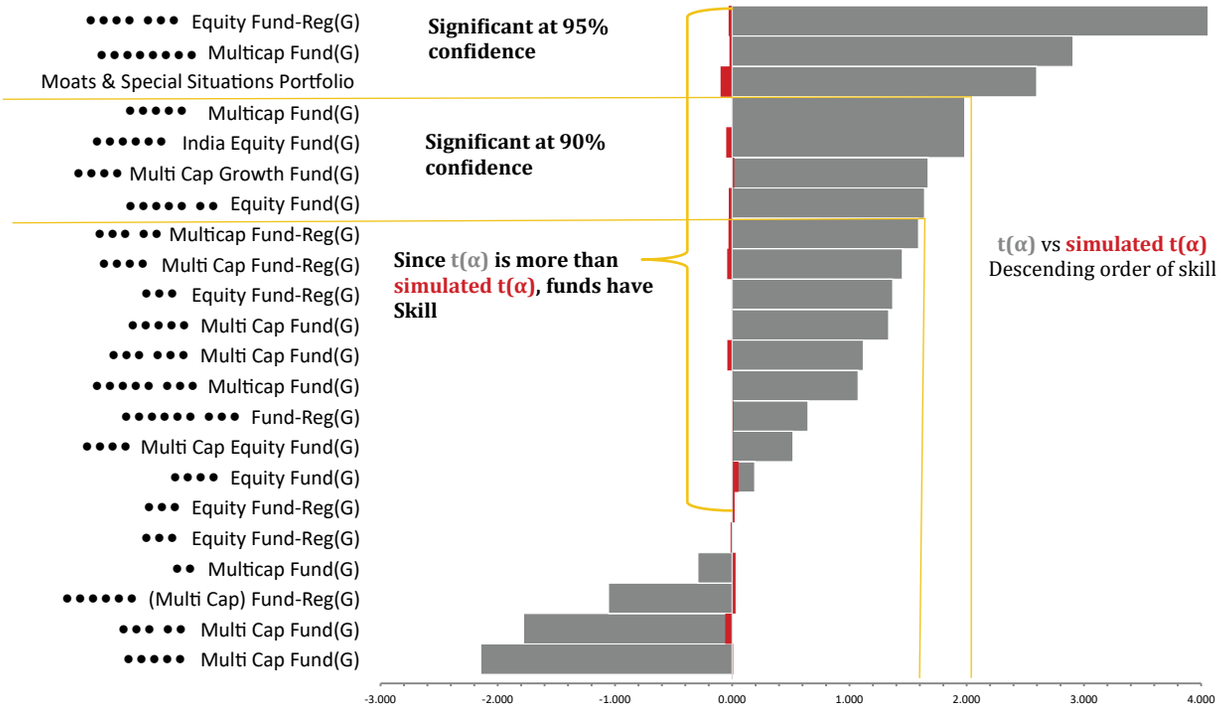
The top portion of the chart is where the accuracy of measuring skill exceeds that of luck and the bottom part is vice versa. So the funds in upper part can be said to possess skill in generating the excess returns.

Exhibit:



Next, let's see the level of confidence in the analysis.

Exhibit:



The t value for 95% confidence is 2. So the top 3 funds with actual t alpha values more than 2 can be said to be possessing skill with 95% confidence. Further, at 90% confidence levels, where the t-value is 1.64, 4 more funds get added to the list of skillful funds.

The funds showcased in the exhibit below possess skill with 95% and 90% confidence. It is evident from this data that higher t-alpha does not necessarily mean higher actual or excess return. It simply means higher conviction in the calculations.

Funds with significant t(α)	Actual Return (A)	Expected Return using SML(B)	Alpha (A-B)	t(α)	
••••• ••••• ••••• Equity Fund-Reg(G)	16.78%	12.29%	4.48%	4.060	Significant at 95% confidence level
••••• •••••••• Multicap Fund(G)	16.36%	12.23%	4.14%	2.907	
Moats & Special Situations Portfolio	16.75%	10.72%	6.04%	2.597	
••••••• ••••• Multicap Fund(G)	18.65%	12.52%	6.12%	1.984	Significant at 90% confidence level
•••••••• ••••• Equity Fund(G)	14.78	11.98%	2.80%	1.983	
••••••••• Multi Cap Growth Fund (G)	15.83%	13.02%	2.81%	1.671	
•••••• ••••• •• Equity Fund (G)	15.65%	12.70%	2.95%	1.640	

Section 4 Conclusion

In conclusion, it can be said that the returns generated from an investment comprise both the skill as well as the luck of the fund manager. However, any prudent investor would prefer to invest in funds where the excess returns primarily stem from the skills of the fund manager and not just merely luck. This can be identified by comparing the measure of t-alpha accuracy for skill and luck distribution. By separating the skilful managers from the lucky managers, you will be better positioned to make optimal portfolio decisions.

Feel free to reach out to us **here** to receive the latest report.

Nobel Laureate Eugene Fama and his colleague and researcher, Kenneth French, have made indelible contributions to the field of finance over the past three decades. What sets this dynamic duo apart is their remarkable ability to harness the power of statistics in their research, coupled with their unwavering commitment to refining and enhancing their groundbreaking work overtime.

In the paper referred to herein, Fama and French have ingeniously applied the Capital Asset Pricing Model to determine whether outperformance by a fund manager is attributed to skill or luck. The tools employed for this purpose are both intriguing and technical. In this white paper, we embark on a journey to elucidate and expand upon the intricacies of the process used to discern skill from luck in this domain

About the authors

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