Building a Mutual Fund Investment Plan

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Introduction…

Mutual Funds are investment schemes where money is collected from multiple investors to invest in a diverse portfolio consisting of stocks, bonds and other securities, usually of high Share Prices and in large volumes to earn higher returns. Mutual Fund portfolios are designed by professionals and experts in this field, considering many variables such that investor returns are maximised in the long term.

In this project, I will use data from NSE to build a Mutual Fund Plan focusing on maximising returns while mitigating the potential risks involved. This can be achieved by choosing companies with consistent growth over time but less volatile. The steps of processes I will follow are:

1. Collect data on historical stock prices, here, the monthly closing price of NIFTY50 companies.
2. Calculate KPIs like ROI and Volatility to understand stock performance
3. find stocks with a high ROI and low volatility
4. select the final stocks to include in the MF portfolio, ensuring a balance b/w risk and returns
5. Calculate the returns for monthly SIP in the above MF plan

About the Dataset…

The dataset consists of daily closing stock prices of 50 major Indian companies from sectors like banking (HDFC Bank, ICICI Bank), technology (TCS, Infosys), consumer goods (Hindustan Unilever, ITC), automotive (Tata Motors, Bajaj Auto), and others, for the period from August 20, 2024 to September 20, 2024. The Case Study and dataset can be referred *HERE*, and the dataset includes the following features:

- Date: The date on which the stock price is recorded.
- Closing Price: The adjusted closing price for each stock on that particular date.
- Companies: A total of 50 top Indian companies are represented by NIFTY50

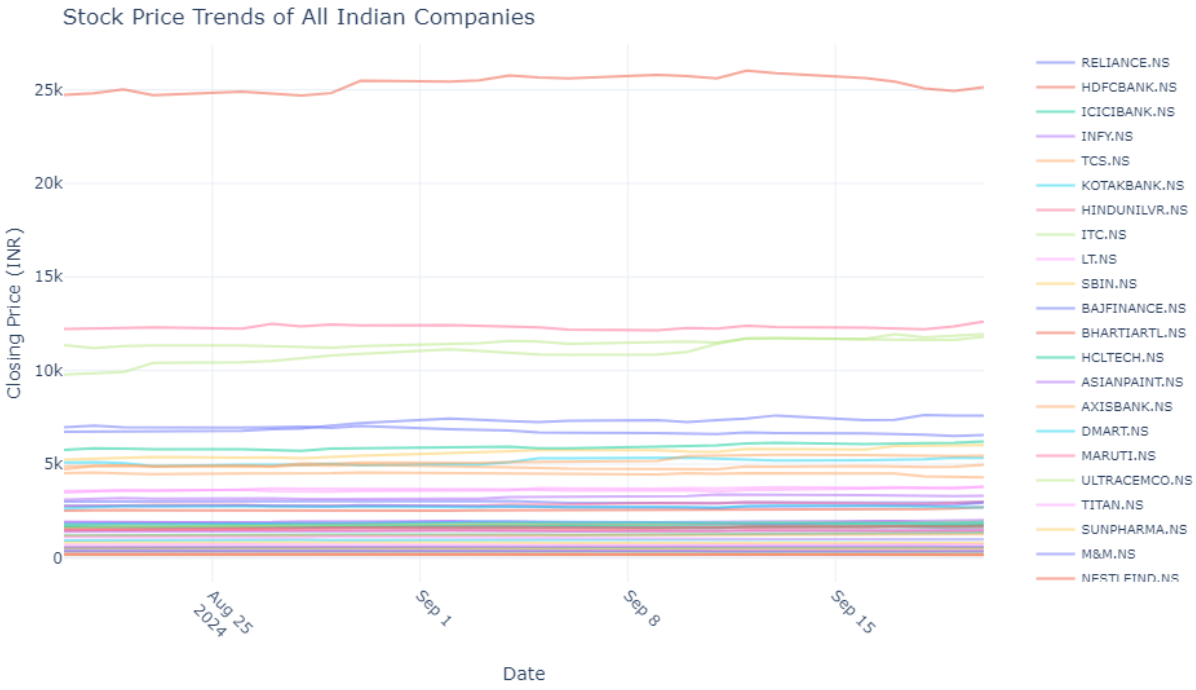
	Date	RELIANCE.NS	HDFCBANK.NS	ICICIBANK.NS	INFY.NS	TCS.NS	KOTAKBANK.NS	HINDUNILVR.NS	ITC.NS	LT.NS	...
0	2024-08-20 00:00:00+05:30	2991.899902	1637.699951	1179.449951	1872.199951	4523.299805	1805.650024	2751.050049	498.799988	3572.699951	...
1	2024-08-21 00:00:00+05:30	2997.350098	1625.800049	1174.849976	1872.699951	4551.500000	1812.949951	2791.199951	505.399994	3596.050049	...
2	2024-08-22 00:00:00+05:30	2996.250000	1631.300049	1191.099976	1880.250000	4502.000000	1821.500000	2792.800049	504.549988	3606.500000	...
3	2024-08-23 00:00:00+05:30	2999.949951	1625.050049	1203.500000	1862.099976	4463.899902	1818.000000	2815.600098	505.799988	3598.550049	...
4	2024-08-26 00:00:00+05:30	3025.199951	1639.949951	1213.300049	1876.150024	4502.450195	1812.500000	2821.149902	505.700012	3641.899902	...

5 rows × 51 columns

The figure above gives a peek into the dataset. Some pre-processing tasks were done to ensure the data is clean and accurate, for example, the column 'Date' was of object datatype; and it was converted into an appropriate datetime datatype.

The Python code and accompanying detailed notes are available in the Jupyter Notebook located in my GitHub portfolio.

The trends shown by a few of the stocks in the data is plotted below:



A few findings from the analysis and the final selected companies are illustrated below:

Companies with High Risk		Companies with High Risk	
Companies	Volatility (SD)	Companies	Growth Rate
BAJAJ-AUTO.NS	659.810841	BAJAJ-AUTO.NS	0.883421
SHREECEM.NS	429.919834	BAJAJFINSV.NS	0.79173
BAJFINANCE.NS	306.658594	BHARTIARTL.NS	0.735219
DIVISLAB.NS	247.674895	DIVISLAB.NS	0.634851
HEROMOTOCO.NS	247.092728	HEROMOTOCO.NS	0.602192
DRREDDY.NS	175.124908	ICICIBANK.NS	0.557742
ULTRACEMCO.NS	172.673053	BAJFINANCE.NS	0.536819
DMART.NS	155.593701	TITAN.NS	0.3938
BRITANNIA.NS	144.164343	HINDUNILVR.NS	0.351634
MARUTI.NS	109.587342	BRITANNIA.NS	0.327747
Companies with High ROI		**Selected Companies**	
Companies	ROI	Companies	ROI
BAJAJ-AUTO.NS	22.107017	ICICIBANK.NS	13.48086
BAJAJFINSV.NS	19.642973	INDUSINDBK.NS	7.159914
BHARTIARTL.NS	18.120965	JSWSTEEL.NS	7.021748
DIVISLAB.NS	15.404976	AXISBANK.NS	6.592466
HEROMOTOCO.NS	14.660402	HDFCBANK.NS	6.319839
ICICIBANK.NS	13.48086	SUNPHARMA.NS	5.627425
BAJFINANCE.NS	12.797149	KOTAKBANK.NS	5.474481
TITAN.NS	9.275089	CIPLA.NS	4.850117
HINDUNILVR.NS	8.235039	NTPC.NS	4.356926
BRITANNIA.NS	7.713587	**Average**	**6.764864**

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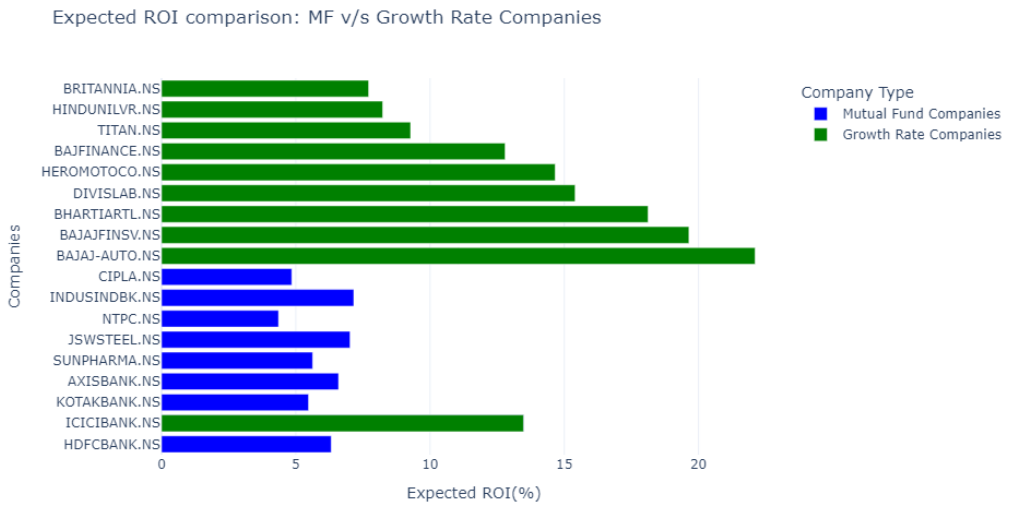
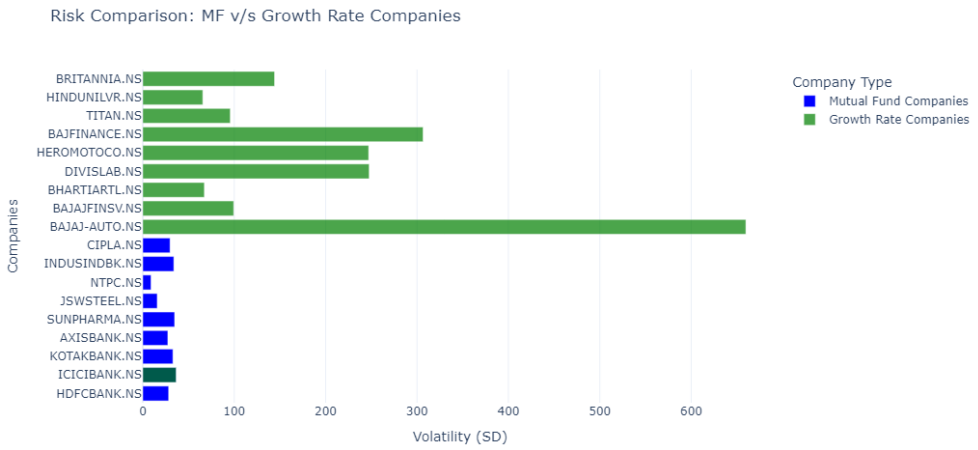
In order to allocate weights to the stocks in the MF plan, its not good to rely on ROI and volatility alone separately. Let us also consider the fact that some companies, though, do not give attractive returns but are stable and consistent. So, to balance the investment in the selected companies, let us use the *inverse volatility ratio* to allocate the investments. Thus, companies with lower volatility get a higher weight. The weightage of investments for each selected companies is found to be:

- NTPC.NS 28.076767
- JSWSTEEL.NS 15.998503
- AXISBANK.NS 9.223133
- HDFCBANK.NS 8.933035
- CIPLA.NS 8.478347
- KOTAKBANK.NS 7.664235
- INDUSINDBK.NS 7.443153
- SUNPHARMA.NS 7.255261
- ICICIBANK.NS 6.927566

Finally, we have built the MF plan. Now, let's compare the volatility and ROI among the companies included in our MF plan and the others. The following graphs show the comparison of Return on Investment and Volatility versus the Mutual Fund we built and other companies respectively.





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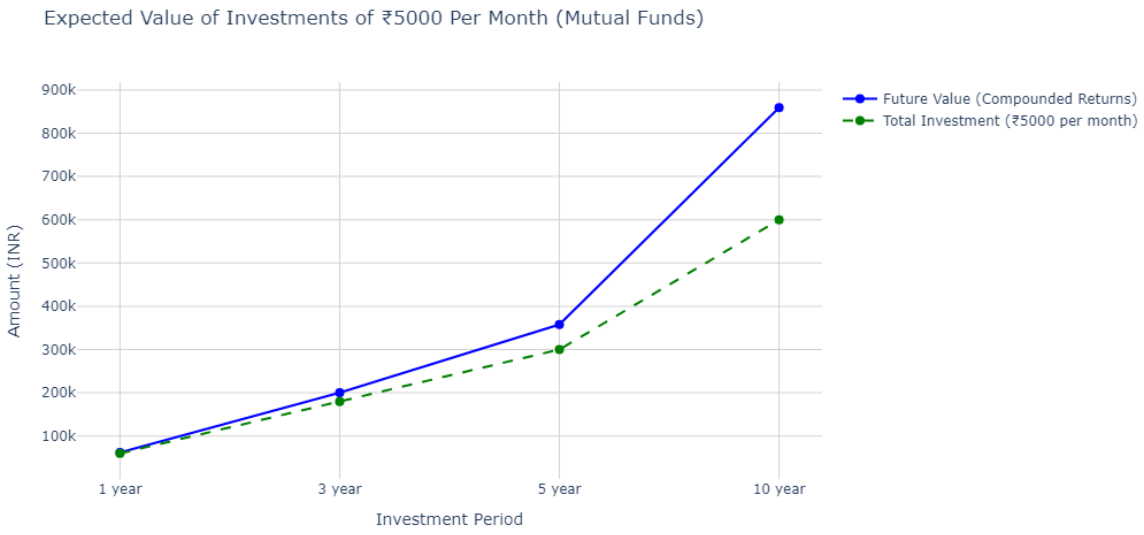
The above graphs comparing our MF plan with other companies show that companies included in the MF plan (indicated in blue) are less volatile; that is, they are less risky but provide lesser returns. Whereas other top companies offer higher returns but are highly volatile, making them too risky to invest in. This is expected as lower risk is associated with lower rewards and a higher risk with higher rewards.

However, from a long-term perspective, less volatile and consistent companies with a stable return are preferred.

Simulating Expected Returns…

Now, in order to demonstrate the performance of our MF plan, let's look into the returns this MF plan would generate with a monthly SIP of 5000 rupees. The compounded returns can be illustrated for years 1, 3, 5, and 10 to show the portfolio growth with this MF strategy. The average return on investment of the built Mutual Fund Plan was found out to be 6.76 percentage.



Both lines show growth over time. However, the returns from the custom plan (blue line) grow more rapidly than the Total Investment (green dashed line), especially after the 5-year mark. At ten years, the ROI Value is around 860k, when the total investment is 600k INR.

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Conclusions…

The project provides a comprehensive analysis of stock price trends, volatility, and growth rates of various Indian companies. Utilising stock data from the Nifty50 index effectively demonstrates how different companies perform in terms of both risk and reward. The data preparation stage ensures the dataset is clean and suitable for analysis, with missing values addressed and date formatting corrected. This sets the foundation for an in-depth exploration of stock price movements, helping to visualise trends and understand the overall market behaviour.

A significant focus of the project is the examination of volatility, where companies with the highest levels of risk, as measured by standard deviation, are highlighted. Although potentially profitable in the short term, these companies come with higher levels of uncertainty. On the other hand, the growth rate analysis emphasises firms with the most robust price appreciation over time. This contrast between high-risk, high-growth stocks and more stable, lower-risk investments is a central theme, providing insights for investors who must weigh the potential for higher returns against the possibility of losses.

The project's most practical element is the investment simulation, where monthly investments of ₹5000 in mutual funds are projected over different time periods. The compound interest formula used here shows the power of consistent investments, with results indicating that even relatively small, regular contributions can grow significantly over time. The comparison between total investments and future returns illustrates how mutual funds, with their lower risk profile, offer a stable and lucrative option for long-term financial growth, particularly for investors seeking steady returns without the volatility associated with individual stocks.

The primary objective of this project was to build a robust mutual fund portfolio tailored for long-term investment. This goal was successfully achieved through a detailed analysis of stock price data and the application of compound interest modelling. By simulating regular monthly investments and comparing returns over different time horizons, we were able to construct a well-diversified mutual fund plan that maximises growth while minimising risk. By focusing on mutual funds, which offer lower volatility and diversification, the plan provides a robust strategy for achieving financial growth with minimal risk, making it ideal for individuals seeking long-term wealth accumulation. I would also like to acknowledge the valuable resources provided by Aman Kharwal, whose work greatly supported the data analysis and insights presented in this project.

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