

A nighttime photograph of a city skyline, likely New York City, with the Freedom Tower prominently featured. The buildings are illuminated with lights, and the lights reflect on the water in the foreground. A large yellow text box is overlaid on the left side of the image.

# Managing Cash and Investment

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# Executive Summary

A sound Investment strategy always creates a soft balance between returns and risk associated with the investment. In this case study, we will try to devise an optimal investment strategy, and calculate the risk. A detailed analysis report will also be provided, laying down the key-points of our strategy.

- ▶ Our goal was to maximise the returns, while minimising the risk, as much as possible. During the fund allocation, our priority was to ensure that at least principal amount is safe. If an investment has been made in a fragile product, we have made sure that returns from a less risky and stable product are enough to compensate, in case if other investment goes down.
- ▶ Old rule of the thumb and traditional methods have been equally respected. A chunk of our total principal amount is invested in G-secs and Fixed Deposits (stable investments). Moreover Diversification has been done to ensure a good portfolio.
- ▶ 10-Year G-sec is generally considered as a benchmark. We can't afford to go for 'blind risk', but there is no harm in opting for 'calculated risk'. A whole branch of finance is dedicated to this subject, hence we have used mathematical terms and modern tools and technology for evaluation of our portfolio.
- ▶ A detailed analysis of each investment instrument is provided in our report. For short term investments, (tenor<3 months), it becomes important to focus on the liquidity. Hence, generally it is observed that short term investments have smaller returns.
- ▶ Finance in the 21st century has started benefitting a lot from technology and analytics tools. Before devising our investment strategy, we optimized the available investments in Python. And for visualization purposes, Power BI was also used.



# 1

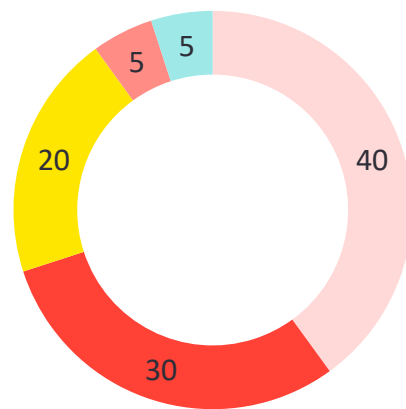
## Orion Technologies & Problem Statement

- **Orion Technologies** is an Indian multinational conglomerate. The company provides information technology and business process services.
- We have been appointed as their Treasurer and have to formulate an investment strategy for the Treasury. As a first task, we have to perform portfolio allocation through a sound investment strategy to deploy the surplus cash of **INR 2,000 crore**.

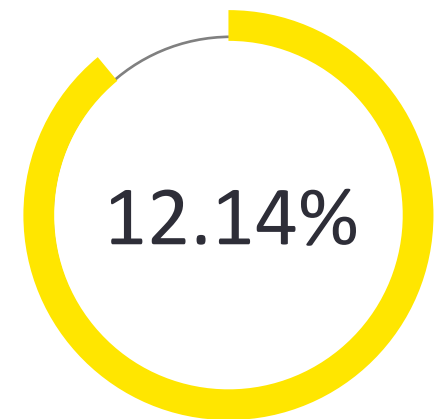
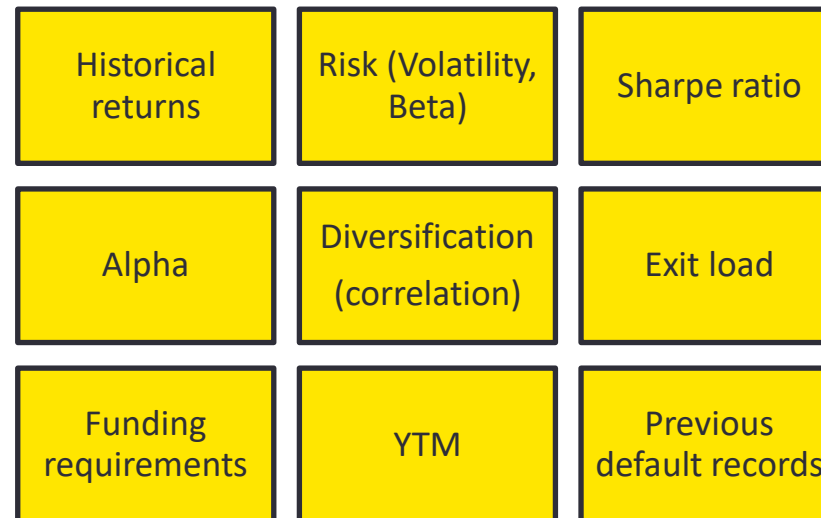
# Investment Strategy

- ▶ The golden rule applied while investing was to save capital. **Saving the company's money** is more important than generating returns or speculating in the stock market. Risky assets are done away with fast, and most of the investment is done in safer assets according to the returns, previous default records and other parameters mentioned below.
- ▶ Apart from **historical returns, risk(volatility), Sharpe ratio, alpha, diversification, exit load, funding requirements, YTM, liquidity and other parameters**, we have also checked **previous default records**(if any) of each investment product before investing into it.

## Major Parameters



Historical Returns Risk (Volatility) Exit Load  
Diversification Liquidity



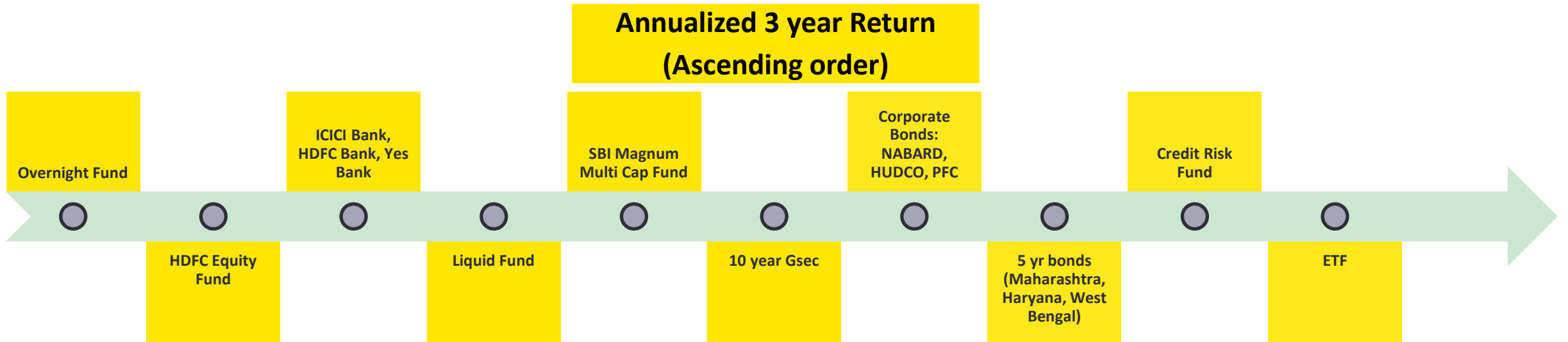
Average Portfolio Return  
(tenor > 3 months)

# Investment Strategy: Reasons for investing in different investment products

Investment Instrument		Investment Tenor	Reasons for investment
FDs	Bank Deposits	1 month - 3 month	<ul style="list-style-type: none"> <li>Diversification</li> <li>Will lead to a good yield if invested for the highest possible duration. We could not allocate this for longer periods because the exit load is high for large cap and credit risk funds and yields are low for them if invested for shorter durations.</li> <li>Within FDs, capital is allocated as per return, risk and historical records.</li> </ul>
Corporate Debt	Bonds / NCDs : 5 year Maturity	1 month - 3 month	<ul style="list-style-type: none"> <li>Safe, have a good return(higher than benchmark:10yr GSec), and this is the longest duration for which we can invest in them (due to the same reason as above).</li> <li>Further, we allotted capital to Bonds as per the returns and previous track record.</li> </ul>
	CP	1 month - 3 month	<ul style="list-style-type: none"> <li>Used for diversification. Amount invested is according to return</li> </ul>
Sovereign Debt	T Bill		
	Gsec / SDL / Municipal Bonds	Within 3 days, 3 days - 7 days, 1 month - 3 month	<ul style="list-style-type: none"> <li>Excess capital is invested here</li> <li>Provide stability and safety, and good return</li> </ul>
Mutual Fund - Debt	Overnight	Within 3 days, 3 days - 7 days	<ul style="list-style-type: none"> <li>For short durations, overnight funds are the only feasible choice. All other instruments tend to be risky and will invoke an exit load and may not give much return</li> <li>HDFC overnight has a lower return as compared to the other 2 overnight funds, although it has a high YTM, so we allocate less to it</li> </ul>
	Liquid	7 days - 30 days, 1 month - 3 month	<ul style="list-style-type: none"> <li>Suitable for short tenures. Also, we need to keep a huge amount liquid.</li> <li>Also the exit load is nil after 7 days. We anyways have to put 20% in Liquid fund.</li> <li>Further, the allocation of money is done according to Sharpe ratio(risk and return both) and previous records</li> </ul>
	Credit Risk Fund	6 month - 12 month, 1 year - 3 year	<ul style="list-style-type: none"> <li>Since its a mandatory instrument for the portfolio, its being added but its not a preferred choice keeping in view the recent defaults. Debt funds give low return in a short duration. Hence, Credit risk funds are kept for a longer duration. Moreover, exit load is high(1%) for redemption within 365 days, so we've allocated capital to credit risk funds mostly for the longest tenor: 1yr-3yr where it has low exit load (0.5%).</li> </ul>

# Investment Strategy: contd.

Investment Instrument		Investment Tenor	Reasons for investment
Mutual Fund - Equity	ETF	3 month - 6 month	<ul style="list-style-type: none"> <li>5% of the total portfolio is being put in Gold for having a diversified Asset.</li> <li>It also has a very high historical return as compared to other ETFs(or even other investment instruments). ETFs have high historical return, are safer and will give a somewhat guaranteed return over a longer time duration.</li> </ul>
	Large Cap MF	1 month - 3 month, 3 month - 6 month, 6 month - 12 month, 1 year - 3 year	<ul style="list-style-type: none"> <li>To cover the mandatory allocation we chose this as it is relatively safe over other instruments with reasonable chance of stable return.</li> <li>There is 0.1% exit load of SBI Magnum if redeemed between 0 and 30 days. So no exit load in the chosen tenor.</li> <li>Also, SBI Magnum has high return and better proven track record as compared to other large cap MFs.</li> </ul>
Direct Equity		1 month - 3 month, 3 month - 6 month	<ul style="list-style-type: none"> <li>Only the best NIFTY stocks are chosen which have consistent, high returns</li> </ul>
Principal protected schemes		3 month - 6 month	<ul style="list-style-type: none"> <li>This is a safe haven, risk is less and return is high</li> <li>Amount of investment in these stocks is according to returns. Moreover, principal can be added/removed anytime from principal protected schemes.</li> <li>Safe, stable, low risk and good return, even in a short duration like 3-6 months</li> </ul>
REITs			



Reference: [Historical returns sheet – Annexure-1](#)

# Benchmarking

- ▶ Assuming the previous 1 week historical returns given in excel sheet “Case study Historical returns of different asset class” as the expected returns for next 6 months, our investment portfolio **will generate alpha** over the 10-year GSec rate.
- ▶ This is a good method of benchmarking because a GSec practically does not default, and is near **risk free**, and stable.
- ▶ Although this is the best benchmark present and we would choose this, but since the GSec gives return over a **10 yr period**, our portfolio may or may not generate an alpha in **6 months**. It may not generate a return that is more than the GSec return within 6 months.
- ▶ In general, the return of the 10 year Gsec is very low as compared to a combined return of our portfolio- majorly because of the **2 factors**:
  - ▶ All of our assets give a higher return than that of the Gsec in the given time frame
  - ▶ The risk is optimised in such a way that no 2 commodities can together have a high risk/chances of default at any time
- ▶ A perfect measure of benchmarking may not be possible because of the fluctuation involved. In an ideal situation, we might have considered **INFLATION** as a benchmark because we are essentially creating a successful portfolio only if we beat inflation. But because of the variations/volatility and unsurety in inflation, the cost of hedging against inflation is high and we do not consider it as a benchmark.

## ▶ OTHER FAMOUS BENCHMARKS



# Technology stack

For optimal investment strategy, our approach should be validated by latest tools and technology. These tools not only maximize the returns, but also reduce the risk and chances of exposure. Below are few features of some powerful tools, we used in our project.

## Excel



- ▶ Performed **mathematical operations** on our investment model.
- ▶ Added required **constraints**.
- ▶ Calculated **standard deviation** and **Sharpe ratio** of a particular model.
- ▶ **Diversified** our model.
- ▶ Monitored the different investment products simultaneously.

## Python



- ▶ Python is one of the best tools for application of **optimization theory**.
- ▶ Variables, such as, return rates and investment products were provided to the program.
- ▶ Random initial weights were provided, and program gave the most optimized weight distribution as output.
- ▶ We used the Modern Portfolio theory with the help of library - **PyPortfolioOpt()**.
- ▶ The key components of our model (used in optimization) were: **Weight matrix, Covariance matrix, Volatility or Standard deviation** (risk), **Sharpe ratio, Efficient frontier theory** and **Annual return**.

## Power BI



- ▶ Visualized and compared various **parameters** like returns, alpha, volatility, exit load, etc. against each other and amount invested, with historical returns.
- ▶ **Quality** of each stock is determined through various analysis like alpha vs Portfolio returns, excess return vs time period
- ▶ In-depth **analysis** of the entire portfolio and its comparison with the benchmark

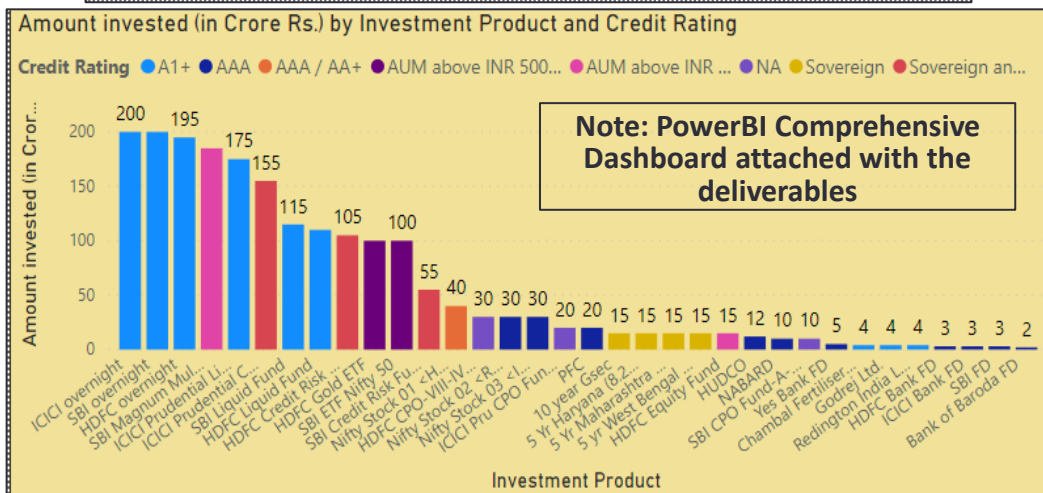
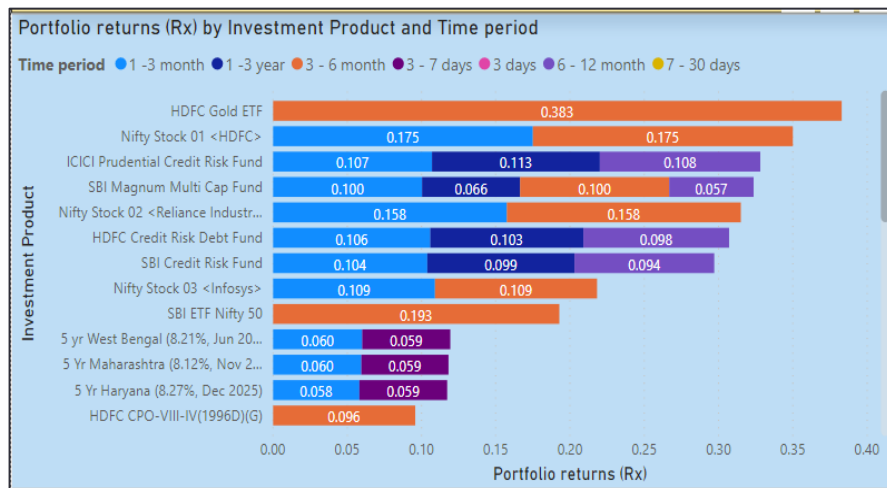
References: [Python Code](#), [Analysis Sheet](#), [Power BI Dashboard](#)



# Visualization tools & portfolio analysis



## Power BI



## Python



### Defining the assets

The first step was to define an array of all the Investment products. The data of these Investments (date-wise) was imported from Yahoo finance.

### Data frame and calculations

After creating a data frame using pandas, covariance matrix was calculated and hence, standard deviation (risk), annual returns (based on the initial weights) were derived.

Expected annual return : 3.0%  
Annual volatility/standard deviation/risk : 11.0%  
Annual variance : 1.0%

### Optimization

Finally, PyPortfolioOpt() library was installed. mean and standard deviation were calculated and provided as inputs to PyPortfolioOpt(). The final output was optimized weight distribution.

```
OrderedDict([('HUDCO.BO', 0.0), ('PFC.NS', 0.0), ('0P00005V0I.BO', 0.0),
Expected annual return: 4.9%
Annual volatility: 0.2%
Sharpe Ratio: 17.81
(0.04949923889367728, 0.0016566949440345777, 17.806077696982207)
```

# Conclusion

## Portfolio Performance Metrics

1.015

**Sharpe Ratio**  
(for tenor > 6 months)

8.11%

**Average  
Return Rate**

0.05

**Volatility**  
(Standard Deviation)

2.26%

**Alpha**  
(for tenor > 6 months)

### Here comes a note to CFO, giving a few recommendations based on our portfolio

- ▶ The foremost motive was to save the company's money. Hence there must not be any speculation.
- ▶ Bonds, Corporate Debts and GSecs have consistency in return and are stable but returns are not very high in short durations.
- ▶ The most liquid instrument is the Overnight Fund, followed by the Liquid Fund, hence short term investment is done in these products.
- ▶ Diversification is important for controlling risk.
- ▶ An intelligent investment includes balancing risk and returns (as indicated by the Sharpe Ratio).
- ▶ Policy parameters, investment strategy and choices of investment have been mentioned in detail in Slide 4-6.
- ▶ The facts and figures clearly indicate the strength of our investment strategy, and are enough to justify its optimality which has been achieved through in depth research, Python optimization, PowerBI Analyses etc.

# Attachments

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The following are the attachments with our solution

- ▶ [Answer to Question A](#) (kindly refer to the attached excel sheet)
- ▶ Answer A – Power BI Dashboard: [Dashboard files](#), [Pdf of dashboard](#)
- ▶ [Answer to Question B](#)
- ▶ [Python code for optimization](#)
- ▶ [Video Link](#)

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\*kindly follow the hyperlink for complete solution