Finance and Risk Analytics Part B

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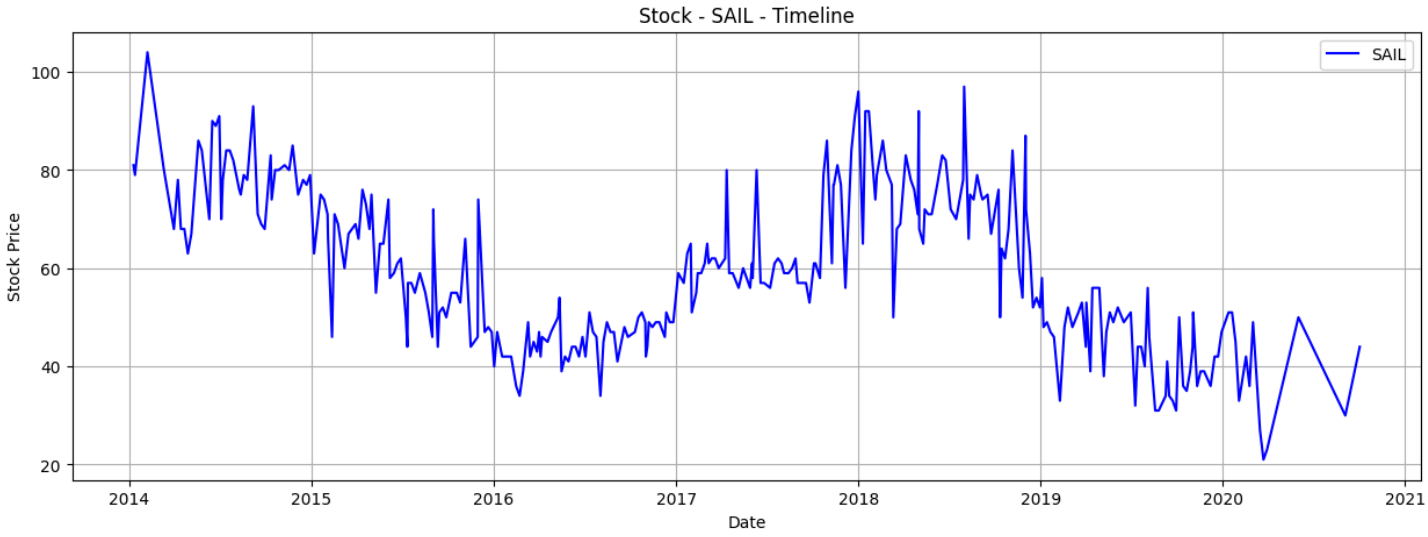
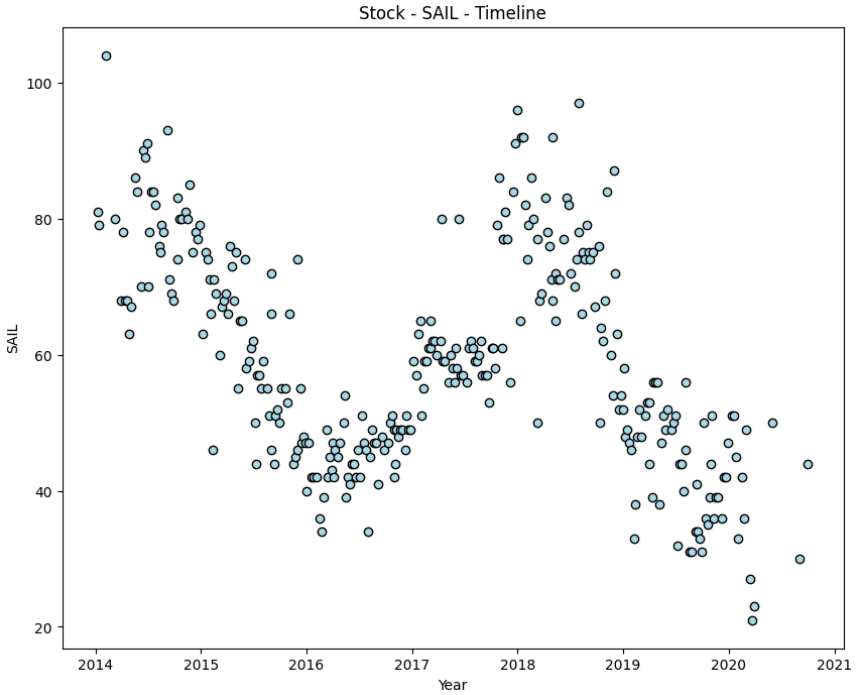
Problem statement

The dataset contains 6 years of information(weekly stock information) on the stock prices of 10 different Indian Stocks. Calculate the mean and standard deviation on the stock returns and share insights. You are expected to do the Market Risk Analysis using Python.

Stock Price over Time(SAIL AND JET AIRWAYS)

We will look at how the stock price changed over time for the company SAIL.



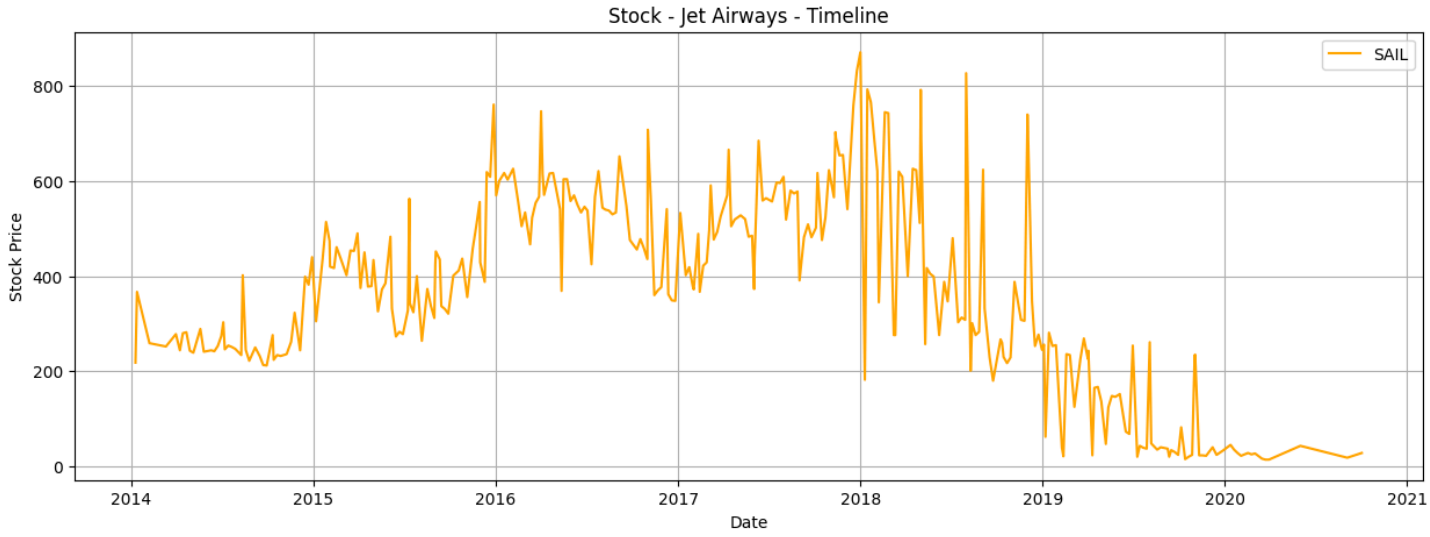


The overall trend is downwards and there seems to be a lot of variation in the micro-time periods.

2014 was the year where the stock peaked at more than 100 units, it came close again in mid of 2018(did not cross 100 though), it has been going downhill since then.

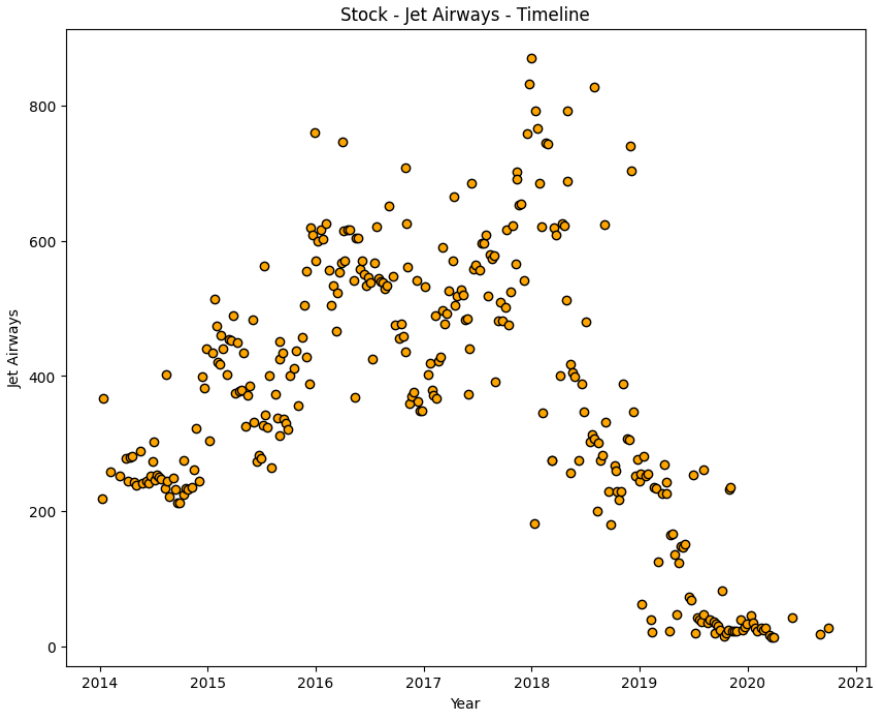
The scatterplot is the same price vs time of the company SAIL, showing a different perspective, we can see that on some of the days the stock price has been stagnant.

Now for Jet Airways



The trend is different to what we saw with SAIL, there has been a gradual growth from 2014 till the start of 2018. After 2018 it has been going down.

Between 2018 to 2019, we can see a huge variation in the prices. It varies by almost 600 price units which is huge.



The months between 2018 to 2019 had so much variance that the trend line is practically not present(or we could not set it up optimally).

Stock Returns

	Infosys	Indian_Hotel	Mahindra_&_Mahindra	Axis_Bank	SAIL	Shree_Cement	Sun_Pharma	Jindal_Steel	Idea_Vodafone	Jet_Airways
0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	0.168208	0.223144	-0.084244	0.182734	-0.025001	0.085787	-0.041673	-0.424883	-0.074108	0.520867
2	-0.385364	-0.256296	-0.072196	-0.286995	0.274943	-0.194148	-0.316890	0.792608	-0.092019	-0.348534
3	0.390427	0.096331	0.028121	0.225339	-0.262364	0.162720	0.402023	-0.735450	0.186330	-0.027399
4	-0.405465	-0.350861	-0.237545	-0.550339	-0.162519	-0.458801	-0.449525	0.609497	-0.186330	0.098192
5	0.163844	0.135341	0.230588	0.316724	0.137201	0.246713	0.284976	-0.073076	0.124454	-0.130453
6	-0.202459	-0.149940	-0.232789	-0.290456	-0.137201	-0.227771	-0.195415	0.007194	-0.124454	0.137621
7	-0.003945	0.000000	0.072218	0.047025	0.000000	0.007583	-0.004955	-0.018084	0.000000	0.007117
8	0.011788	-0.045120	-0.012371	-0.003540	-0.076373	-0.019515	0.011523	-0.140857	-0.049393	-0.148846
9	-0.031749	-0.015504	0.040656	0.061875	0.061558	0.011400	-0.008217	0.024898	0.012579	-0.016598
10	-0.016261	0.259958	0.050496	0.136859	0.249655	0.124413	-0.066521	0.203275	0.024693	0.189963

The above image is a table that shows the returns of the stocks that we have here. We have used “LOG” to calculate the returns. “LOG” method is particularly useful when we attempt to find the return over varied periods of time. The above table shows a variety of returns, from negative to positive and also some exactly at zero.

The “NaN” value at the top is because the log method takes the preceding value in its calculation. Therefore for the first instance there would not have any preceding stock price, hence the “NaN”.

The 7th instance for the company “Indian_Hotel” shows a return of 0.0000, this means that the price did not change for that particular two day transaction. The stock maintained its position throughout.

Lets see the maximum and minimum returns.

Company	Maximum	Minimum
Infosys	0.406782	-0.494889
Indian_Hotel	0.602493	-0.434664
Mahindra_&_Mahindra	0.649975	-0.568918
Axis_Bank	0.669114	-0.558280
SAIL	0.776529	-0.595983
Shree_Cement	0.484777	-0.543639
Sun_Pharma	0.402023	-0.475224
Jindal_Steel	0.991192	-0.949081
Idea_Vodafone	1.504077	-1.609438
Jet_Airways	2.419309	-2.541602

Jet airways has the highest return at 2.4%, but it also has given the least at 2.5%. This could be because of the huge variance we saw between the year 208 to 2019.

All the stocks have been equal and were oscillating quite a bit, on an overall field we can see that the net returns are positive but minimal in value.

Mean and Standard Deviation

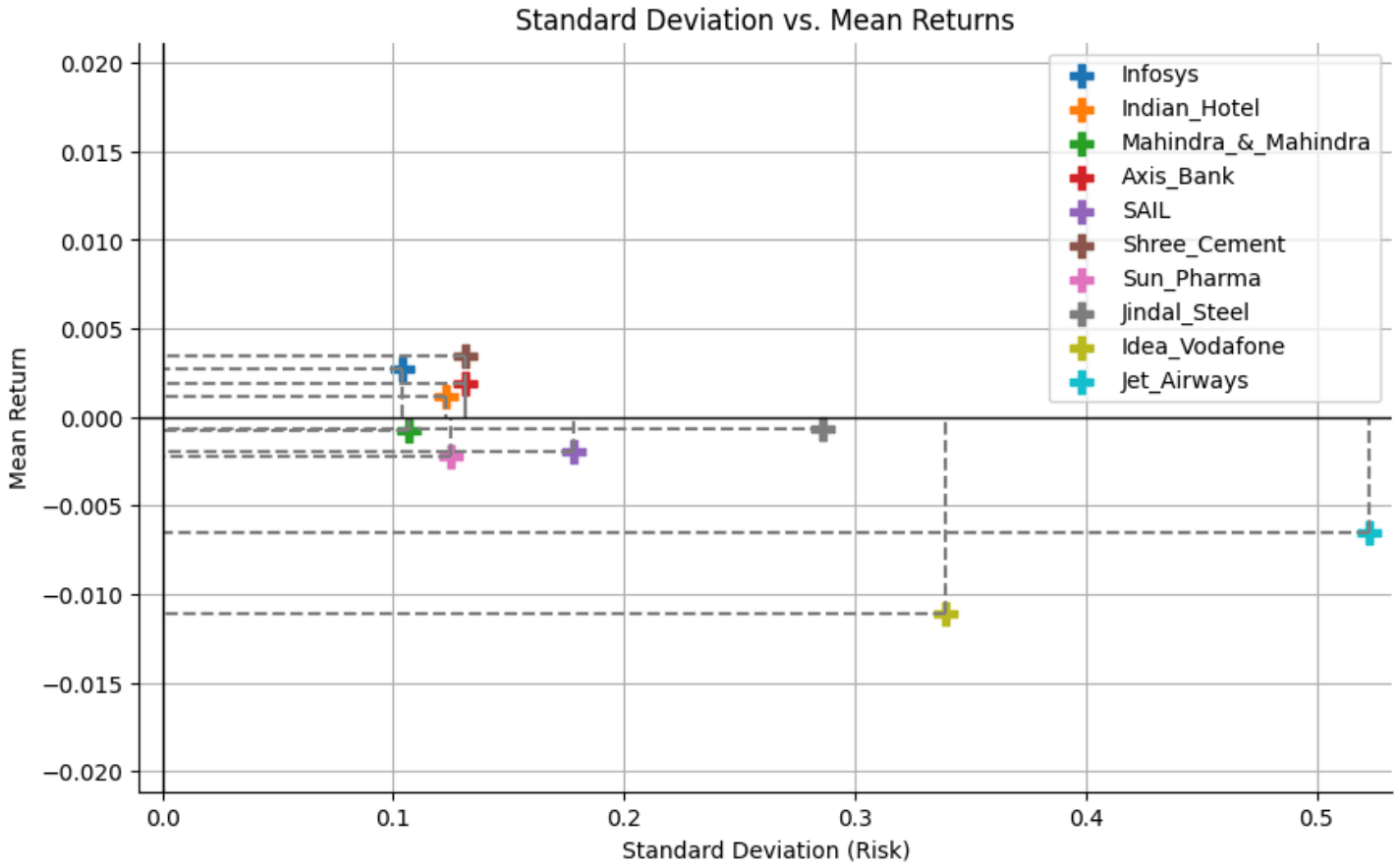
Company	Average(%)	Volatility(%)
Infosys	0.2703	10.4047
Indian_Hotel	0.1178	12.2561
Mahindra_&_Mahindra	-0.0736	10.6492
Axis_Bank	0.1921	13.1545
SAIL	-0.1950	17.7922
Shree_Cement	0.3433	13.0992
Sun_Pharma	-0.2218	12.4966
Jindal_Steel	-0.0649	28.5842
Idea_Vodafone	-1.1139	33.8905
Jet_Airways	-0.6557	52.2823

If the average is greater than 0, then we can conclude that the net return is positive. The same can be inferred conversely. The average has been calculated based on the returns and hence the values are very low.

No single company is sitting on the fence with net zero return, either they are positive or negative. Only 40% have a net positive return. The least performing stock is Idea_Vodafone with a percentage of negative 1.1.

The other surprising thing is for Idea_Vodafone there can be fluctuations at the scale of 33.89%, meaning the loss can grow or reduce to a significant extent. But the most deviations goes to Jet_Aiways, with 52.28%.

A plot of Average against Volatility(Std_Dev)



The plot shows the classic risk-return trade-off. Generally companies with higher volatility (standard deviation) are expected to have higher returns to compensate for the increased risk. That is not the case for these 10 companies.

Companies like Idea_Vodafone and Jet_Airways have high volatility and negative average returns, indicating that they are high-risk investments without corresponding return.

Infosys, Indian_Hotel, and Axis_Bank, for instance, cluster towards the left, indicating lower risk and lower (but positive) returns, partially conservative investments.

Conclusions and Recommendations

- Jet Airways has the highest volatility, indicating a very high-risk profile. Investors in Jet Airways should be prepared and cautious.
- Both Idea Vodafone and Jet Airways have significant negative average returns. These stocks would typically be unattractive unless there are strong, specific reasons to expect a turnaround.
- Infosys and Axis Bank appear to offer a more conservative risk-return profile, with lower volatility and positive returns.
- Investors should assess their risk tolerance. If they are risk-averse, they might prefer stocks like Infosys or Axis Bank.
- Before making investment decisions, it's critical to analyze other factors beyond volatility and mean returns, such as the company's financial health, industry position, growth prospects, and macroeconomic conditions.
- Consider building a diversified portfolio that includes both conservative and potentially higher-return stocks, which could mitigate risk while providing growth opportunities.
- Conduct thorough research to understand the reasons behind their performance before considering them for investment.