

Stocks vs COVID19

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Question 1: Which market showed largest volatility as the virus spread?

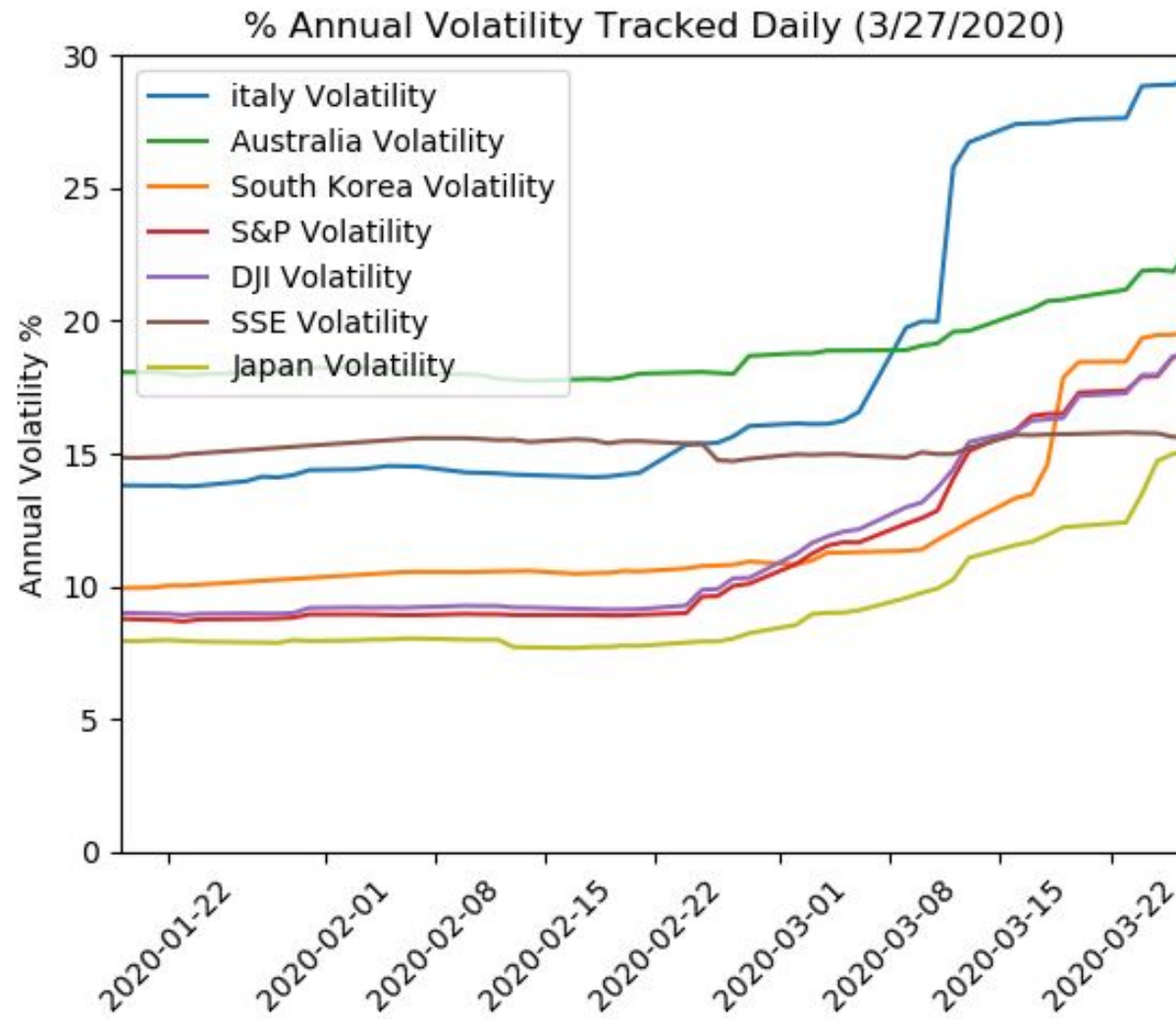
1. Motivation: To track the volatility through confirmed COVID19 cases and recovered cases discover a trend as each country encounters COVID19.
2. Data Sources
 - a. Yahoo Finance API (Rapid API)
 - b. Investing.com (Italy Stock Data)
 - c. John Hopkins (COVID 19 Data)
3. Cleaning and Challenges
 - a. Comparing unix timestamp data to string format dates
 - i. Incorporated Datetime objects
 - b. Calculating moving Volatility.
 - i. Each country had a unique number of trading days

$$\text{Annual Volatility} = \sqrt{\text{Trading Days}} \cdot \sqrt{\text{Variance}}$$

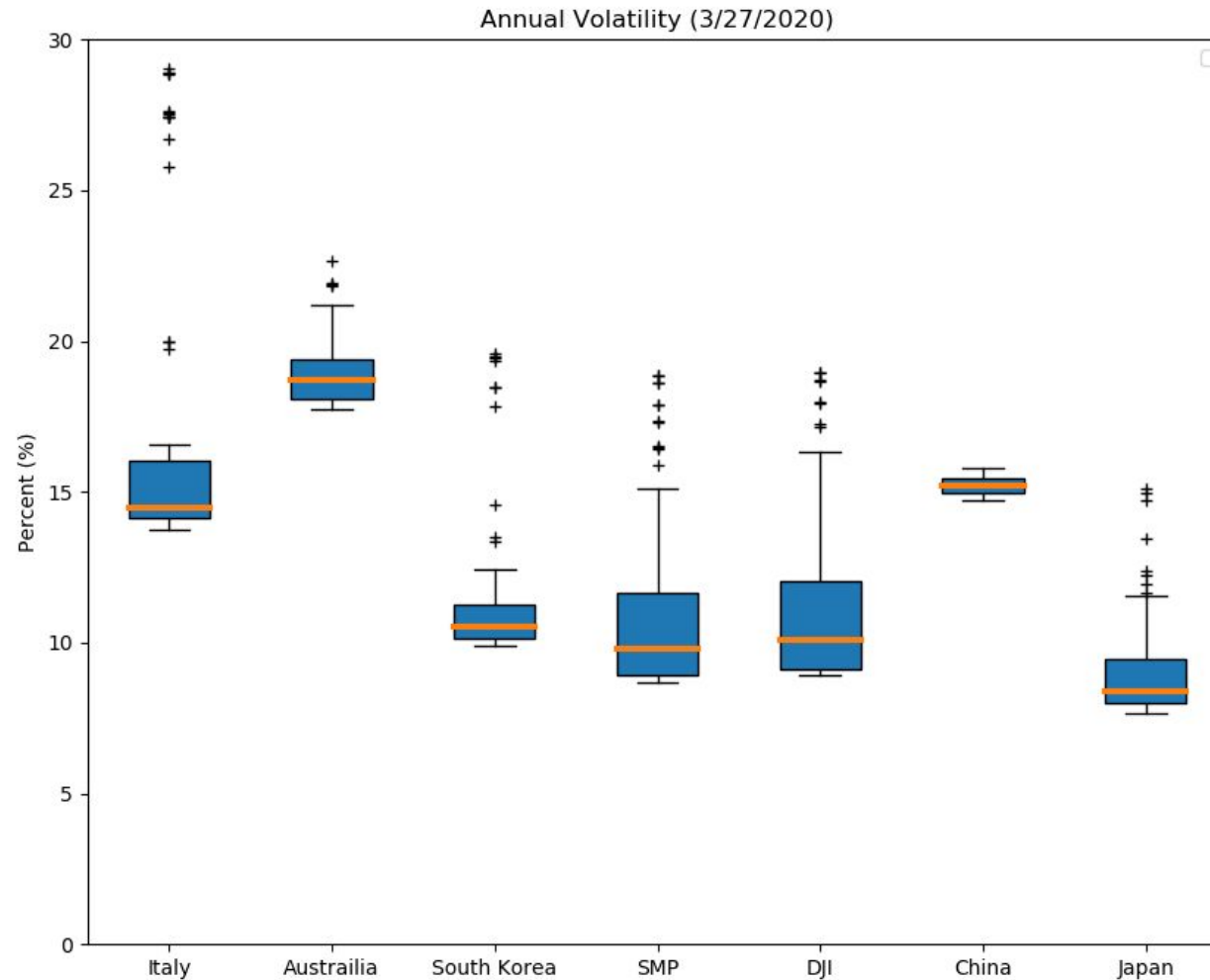
$$\text{Annual Volatility} = \sqrt{\text{Trading Days}} \cdot (\text{Std Dev})$$

```
1
2 volatile_yr_avg = []
3 yearlyGroups = []
4
5 for i in range(0, len(italy_df['Date'])):
6     try:
7         cond1 = italy_df['Date'] <= italy_df['Date'][i]
8         cond2 = (pd.Series(italy_df['Date']) >= (italy_df['Date'][i] - datetime.timedelta(days = 365)))
9         df = italy_df[cond1 & cond2]
10        #print('working')
11        if len(df) > 251: #avoids sets less than a full year
12            volatile_yr_avg.append(df.std()['Change %'] * math.sqrt(252))
13            yearlyGroups.append(italy_df['Date'][i])
14
15    except:
16        print('Error Found')
17 volatile_italy_dict = {"Date": yearlyGroups,
18                        "Annual Volatility": volatile_yr_avg
19                        }
20 volatile_italy_df = pd.DataFrame(volatile_italy_dict)
21 volatile_italy_df.to_csv("cleaned_dataframes/volatile_italy_df.csv")
22 volatile_italy_df.head()
```

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1. Conclusions:

- a. FTSE Italia All Share(FTITLMS) showed the highest volatility of selected markets
- b. S&P500 and Dow Jones Index behaved similarly
- c. China's SSE has a relatively flat volatility (**pvalue=4.67e-11** after Min-Max Scaling)

2. Limitations:

- a. The spread of COVID 19 is still on an exponential growth path and it's too early to see the data for recovered Covid 19 patients.
- b. Limited study to selected markets with high numbers of confirmed COVID19 or high correlation to US markets.