Report 1: Tableau

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Context of consultancy & Problem Statement

The aim of this consultancy project is to provide an understanding of three of the most popular market index funds: the S&P500, Dow Jones, and FT100. Harnessing the power of Tableau and R, this project will include forecasting of future stock prices, as well as an observation of the relationship between the prices and returns of these indices with commonly associated economic

variables such as unemployment rate, CPI and interest rates. We will also explore the effect of seasonality on these returns. Overall, this project will compare and contrast these indices as well as explore their relationship with other factors. It might also help establish for beginner investors which index is best to unilaterally invest in given specific considerations and constraints. This consultancy is not aimed mostly at professional investors although it may certainly be helpful in giving them an overview of the market and their interconnections with economic factors, but at people trying to better understand these indices as they enter the finance field.

The focus of the Consultancy

Our consultancy is dedicated to help investors to better understand the trend of the index market and how will external macro effects have an impact on the indices. The dataset includes three major indices, namely, the Dow Jones Index, The Financial Times Stock Exchange 100 Index, and the Standard & Poor's 500 Index, which track the performance of large companies listed in the US. And we chose Unemployment Rate, CPI, and GDP to represent the macro factors that might have an external impact on the whole market which would finally change the prices of indices.

Data Quality Assurance

After drawing the scatter of different variables, we found some influential points which are far away from the center of the data and having huge residuals, and we deleted these observations from our dataset. Also, because the data is from authoritative databases, the data is of high correctness and cleanliness. And we fill the missing attributes with the average of two closest observations, this is because we think all the variables can be described with time series having trends, meaning that they will not have drastic change in a short period.

Data Visualization

Data Summary

In the summary table above we can see that the macro factors are relatively smaller compared to the prices of the indices. Also, we can see the range of the prices is quite similar.

There are a total of 238 observations in the dataset, and most of the attributes contain no empty values, except for the DJI_Excess, GSPC_Excess, FTSE_Excess, CPI, and Unemployment where there are several empty values.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Date	238	21,123	1,048	19,328	22,919
GSPC_AdjClose	238	2,715	867.2	1,426	4,766
DJI_AdjClose	238	23,184	6,439	13,104	36,338
FTSE_AdjClose	238	6,862	508.6	5,577	7,749
GSPC_Volume	238	7.866e+10	1.485e+10	5.813e+10	1.618e+11
DJI_Volume	238	5.212e+09	2.768e+09	1.483e+09	1.552e+10
FTSE_Volume	238	1.647e+10	3.376e+09	1.007e+10	3.741e+10
GSPC_Excess	236	0.00846	0.0423	-0.134	0.119
DJI_Excess	236	0.00905	0.217	-0.649	1.038
FTSE_Excess	237	0.000779	0.0375	-0.185	0.116
CPI	232	2.254	2.035	-0.200	9.060
Unemployment	236	5.333	1.865	3.500	14.70
ltinterest_perannum	238	0.0212	0.00661	0.00620	0.0398
stinterest_perannum	238	0.00890	0.00917	0.000900	0.0385
GSPC_Open	238	2,698	872.1	1,416	4,778
GSPC_High	238	2,790	911.7	1,448	4,819
GSPC_Low	238	2,606	823.6	1,398	4,560
GSPC_HighLow_price	238	183.8	150.5	45.93	944.9
GSPC_HighLow_percent	238	0.0642	0.0414	0.0199	0.318
GSPC_Close	238	2,715	867.2	1,426	4,766
DJI_High	238	23,835	6,758	13,366	36,953
DJI_Low	238	22,275	6,142	12,884	34,690
DJI_HighLow_proportion	238	1,560	1,220	304.4	8,889
DJI_HighLow_percent	238	0.0647	0.0425	0.0182	0.347
DJI_Close	238	23,184	6,439	13,104	36,338
FTS_Open	238	6,852	516.4	5,577	7,749
FTSE_High	238	7,052	483.5	5,997	7,904
FTSE_Low	238	6,641	551.8	4,899	7,541
FTSE_HighLow_price	238	410.7	220.3	128.1	1,958
FTSE_HighLow_proprtion	238	0.0607	0.0343	0.0189	0.297
FTSE_Close	238	6,862	508.6	5,577	7,749

Exhibit 1: Summary Table

Increasing volatility during COVID 19

During the prevalence of COVID-19, the stock market is behaving unnormal, due to people's panic and some people would like to do speculation. Here are some of the evidence.

Extremely Large trading volume during 2020

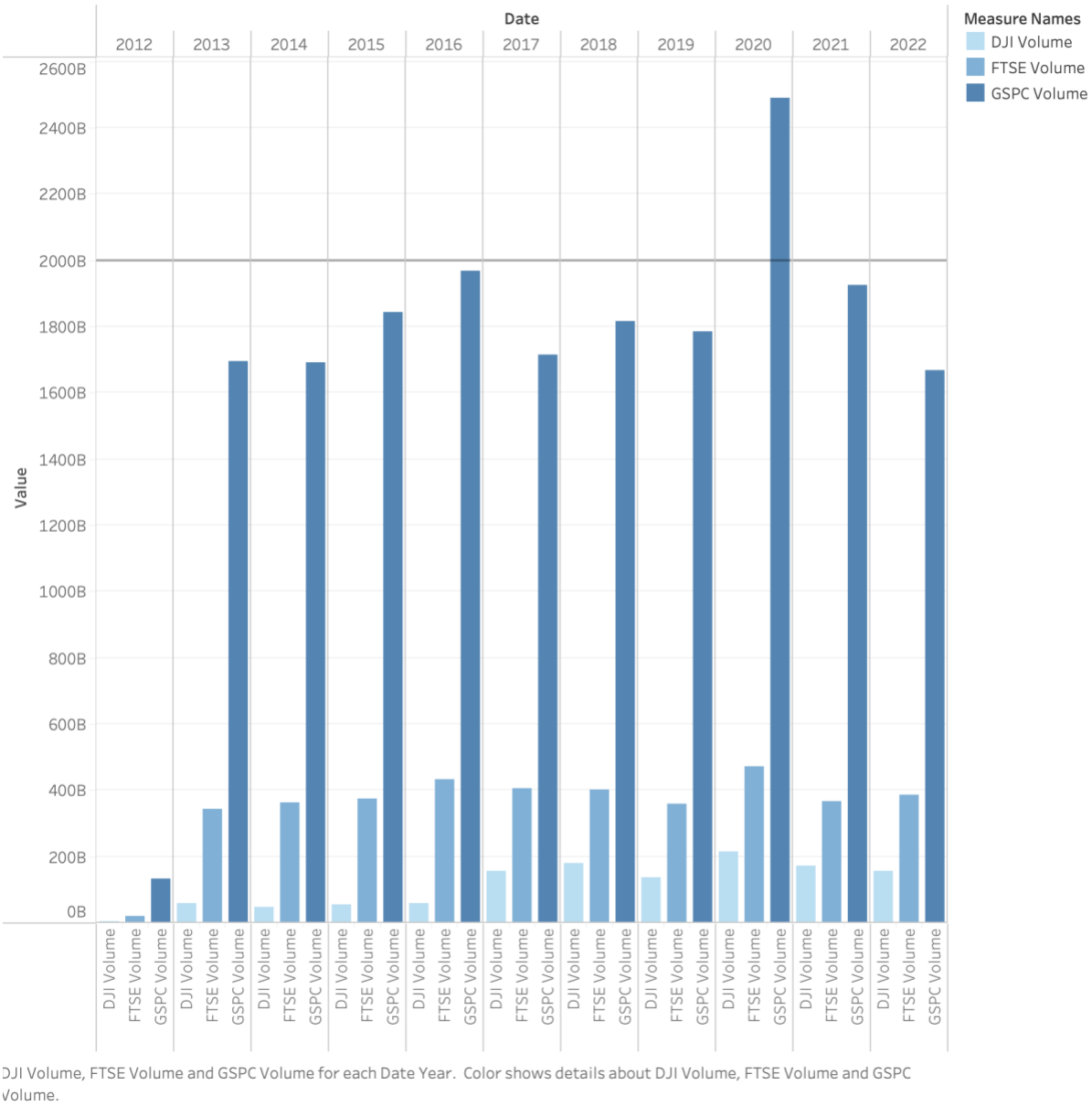


Exhibit 2 Trade Volume by Year

In 2020, the trade volumes of three indices are extremely high. Take GSPC for example, the trade volume exceeds 2500B, and in the other years the number is smaller than 2000B. This could be the result of panic selling due to the outbreak of COVID-19 and the following speculations in the market.

The shock of three indices in March

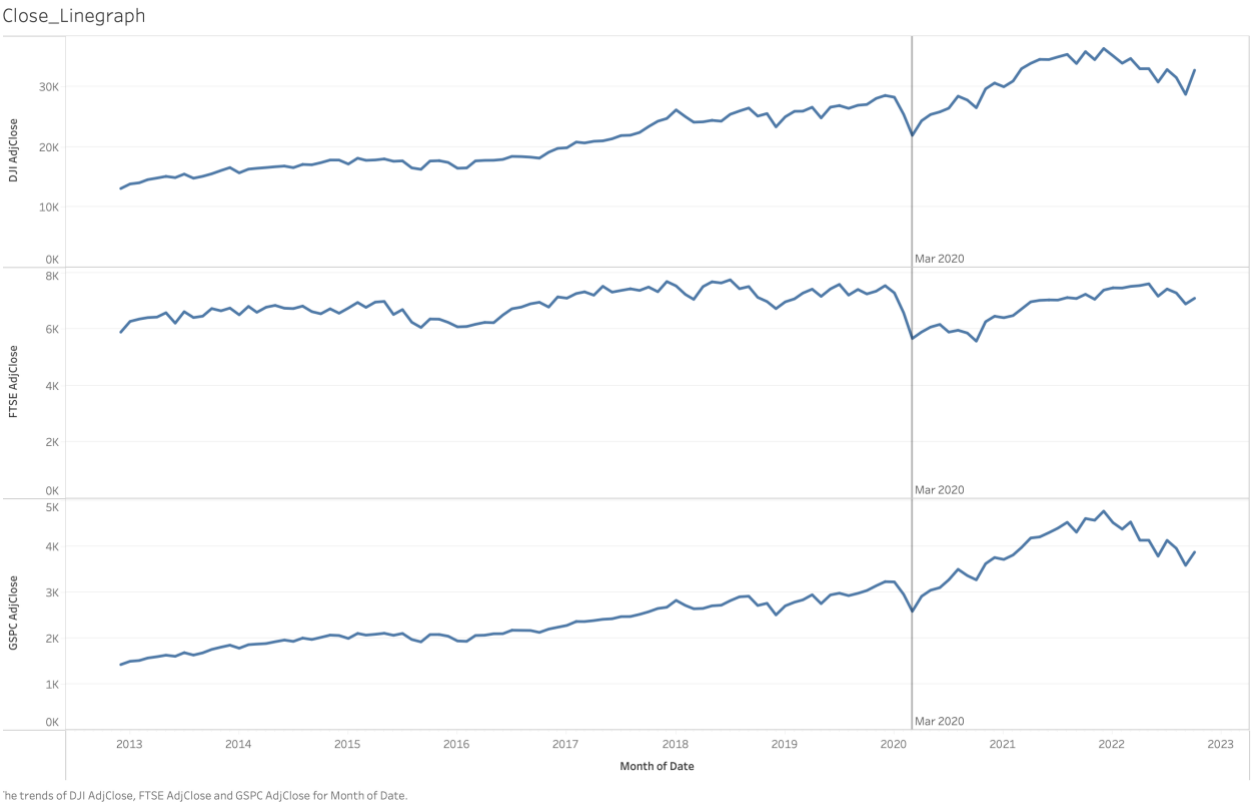


Exhibit 3 Close Prices of indices

In March 2020, when COVID-19 began its global prevalence, three indices dropped down drastically. Especially for FTSE, whose price drop to the lowest point from 2013. However, thanks to the people who made a lot of effort to mitigate the impact, including government, volunteers and people changed their living mode due to the quarantine, the shock of the market was weaker after one month the prices went up again. This is a representation of financial stability in modern society.

COVID Recession

During 2020, the unemployment rate achieved 8.092, which is the peak from 2013. This is the result of the bankruptcy of many firms caused by COVID-19 and the following quarantine. Also, in contrast to the mild in years before, the average CPI is only 1.237. To mitigate these problems, the government take easy fiscal policies in 2021 and 2022, leading to a high inflation rate, which triggers a tight monetary policy of federal reserve, who increases the federal funds rate a lot in 2022.

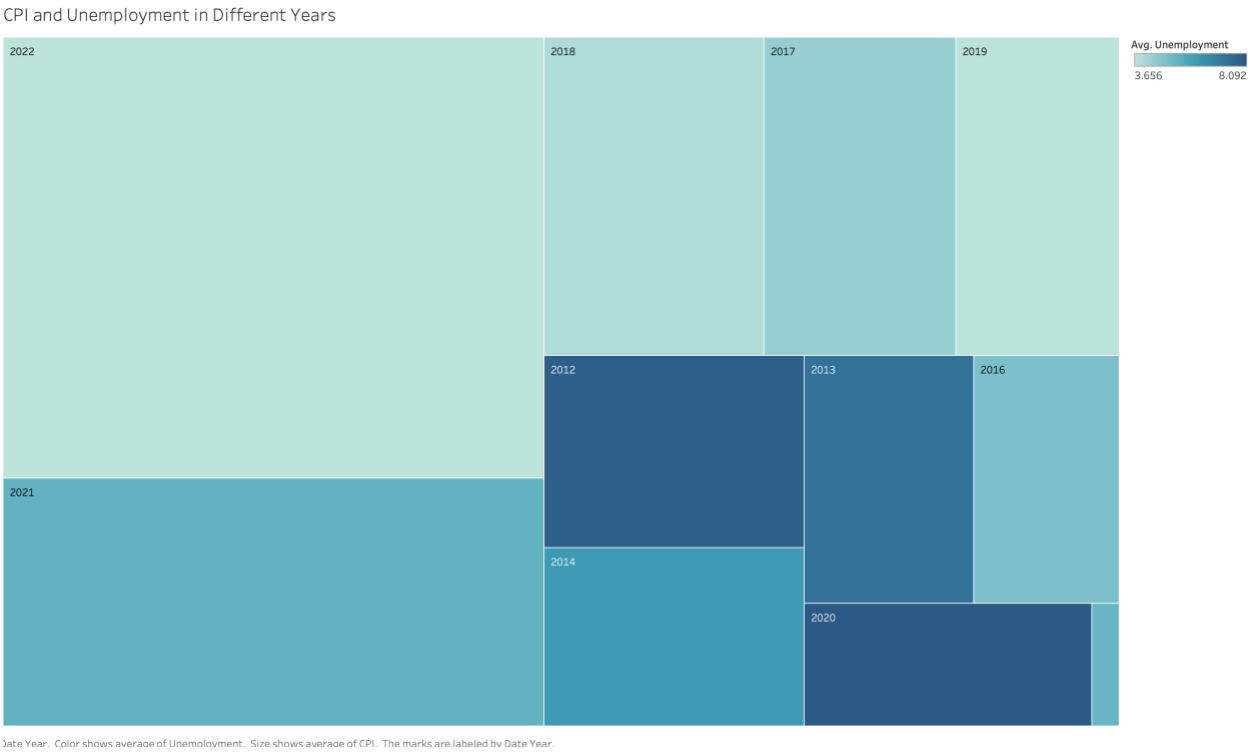


Exhibit 4 CPI and Unemployment Rate in Different Years

Skyscraping interest rates

As mentioned before, the federal reserve tries to control the high inflation rate by setting extremely high interest rates. From the beginning of 2022, the interest rate of federal funds is

raised for the sixth time, which is not common in history.

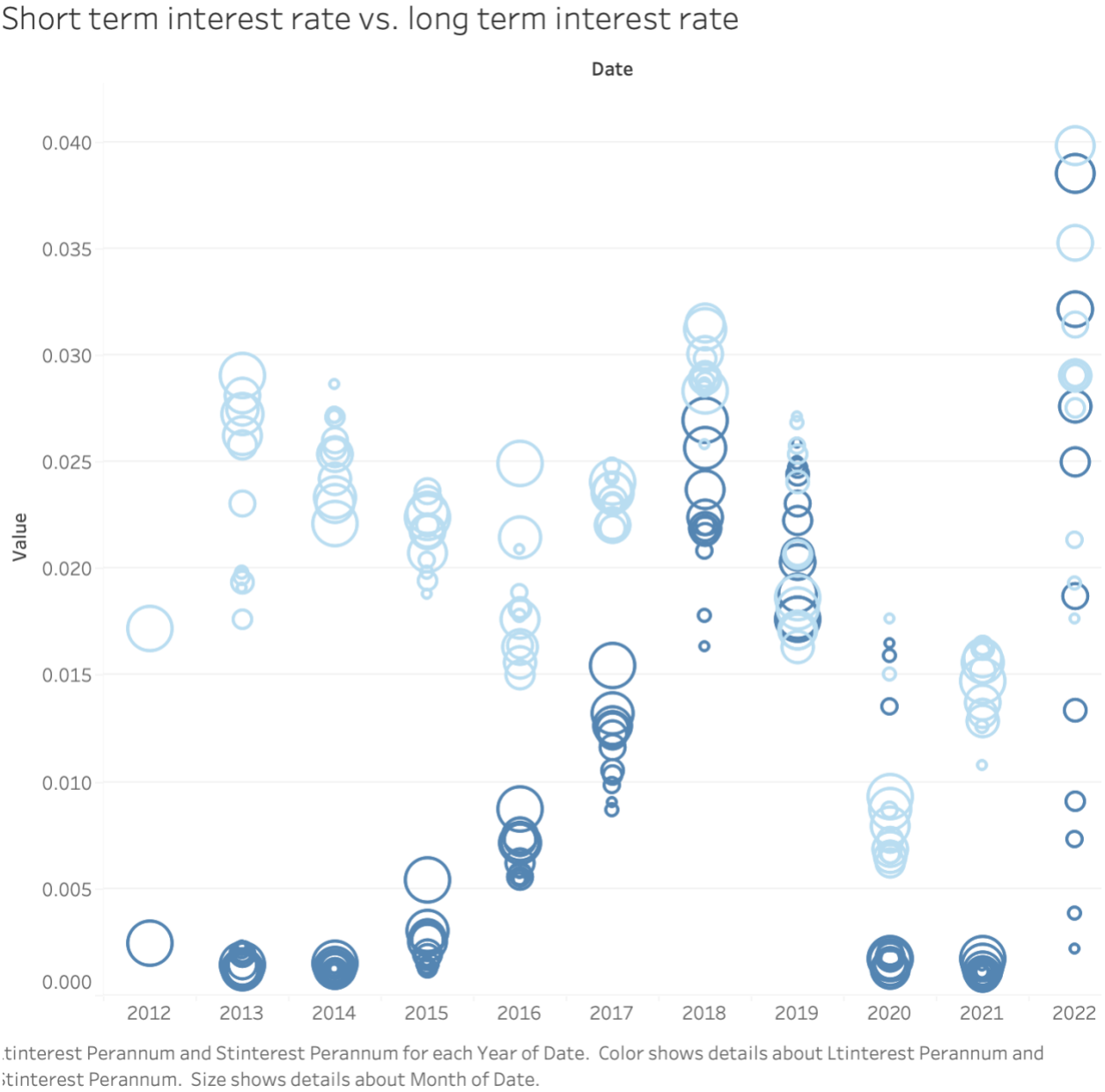
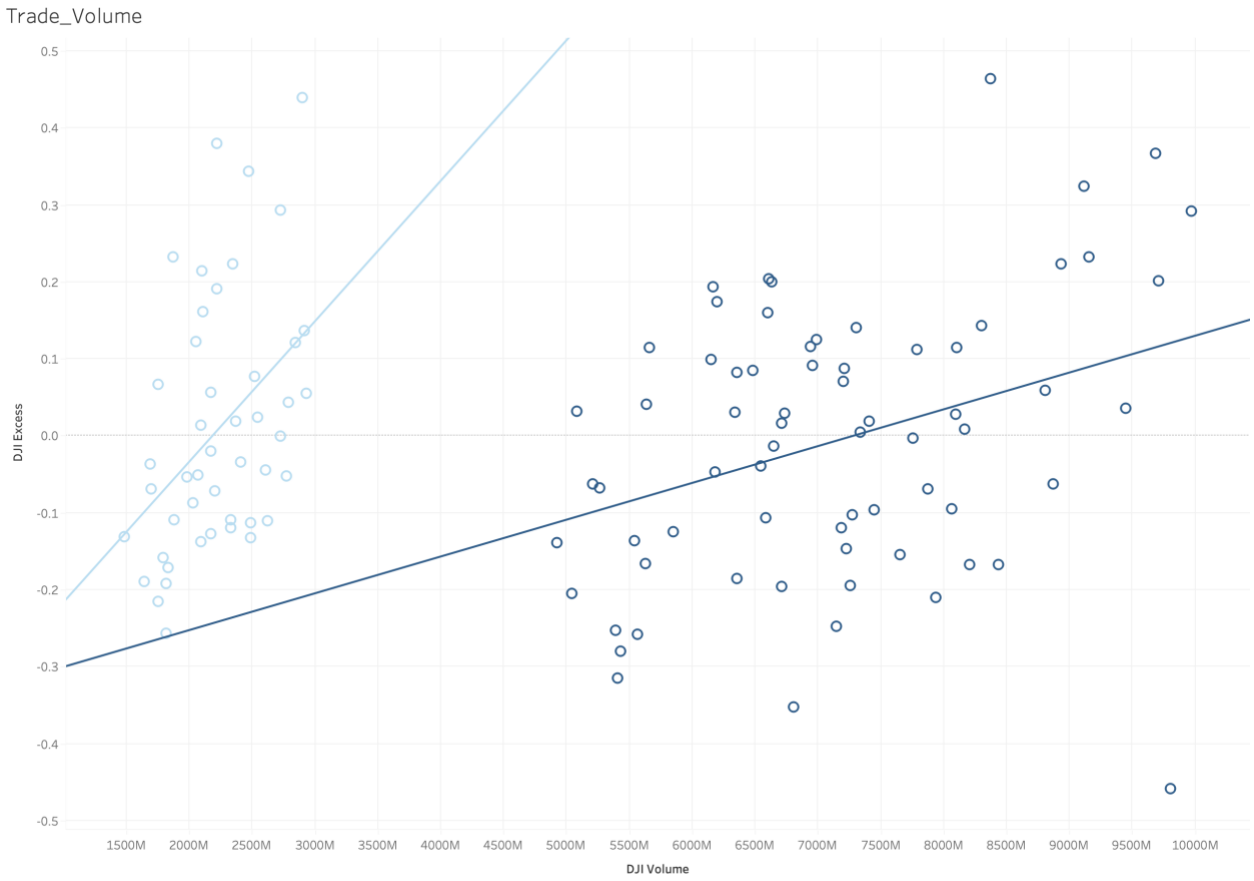


Exhibit 5 Rising in Short term Interest Rates

Different trends in the trades

Usually, the trading volume and the excess yield are affected by the sentiment of the investors, who buy more when feeling optimistic and reversely rising the price in the market (Simon and Wiggins, 2015). Given this kind of understanding, the excess yield and the trade volume are highly correlated. However, after the shock the of COVID-19, the excess yield falls a lot, leading to a lower trend line in the graph.



DJI Volume vs. DJI Excess. Color shows details about DJI Volume (group). Details are shown for Date Day. The data is filtered on Exclusions (DJI Volume,DJI Volume (group),FTSE Excess), which keeps 118 members. The view is filtered on Exclusions (DJI Excess,DJI Volume,DJI Volume (group)), which keeps 117 members.

Exhibit 6 Excess yield vs trade volume