What will have the biggest impact on the markets in 2021? According to traders:

U.S. Residential Real Estate Analysis in the midst Global Pandemic

Analysis by:
Susan F, Valeriia D,
Wes S & Yasir M

Scope

The goal of the project is to help the investors decide if COVID - 19 caused a “Buyer’s Market” or a “Seller’s Market” in major cities, especially New York City.

Scope of the Project is to Answer the following Questions:

- Real Estate impact post COVID - 19
- Correlation of Major ETFs with Actual Home Sales
- Expectations v/s. Reality

Thought Process

U.S. Real Estate market is one of the best indicators of the Economic cycle. Our observations focus on the relationship between buyers and sellers in the Real Estate market.

- Almost a decade ago U.S. economy was on the verge of a collapse due to the housing market.
- COVID - 19 caused a direct threat to the US housing market and paved way for some opportunities to arise “inorganically”, thanks to the US Govt directly controlling the Fannie Mae and Freddie Mac and the mortgage payment deferment option available to anyone owning real-estate.
- Real Estate is one of the best indicators of the Economic cycle. Hence, we wanted to observe a relationship between buyers and sellers in the Real Estate market using the data available.

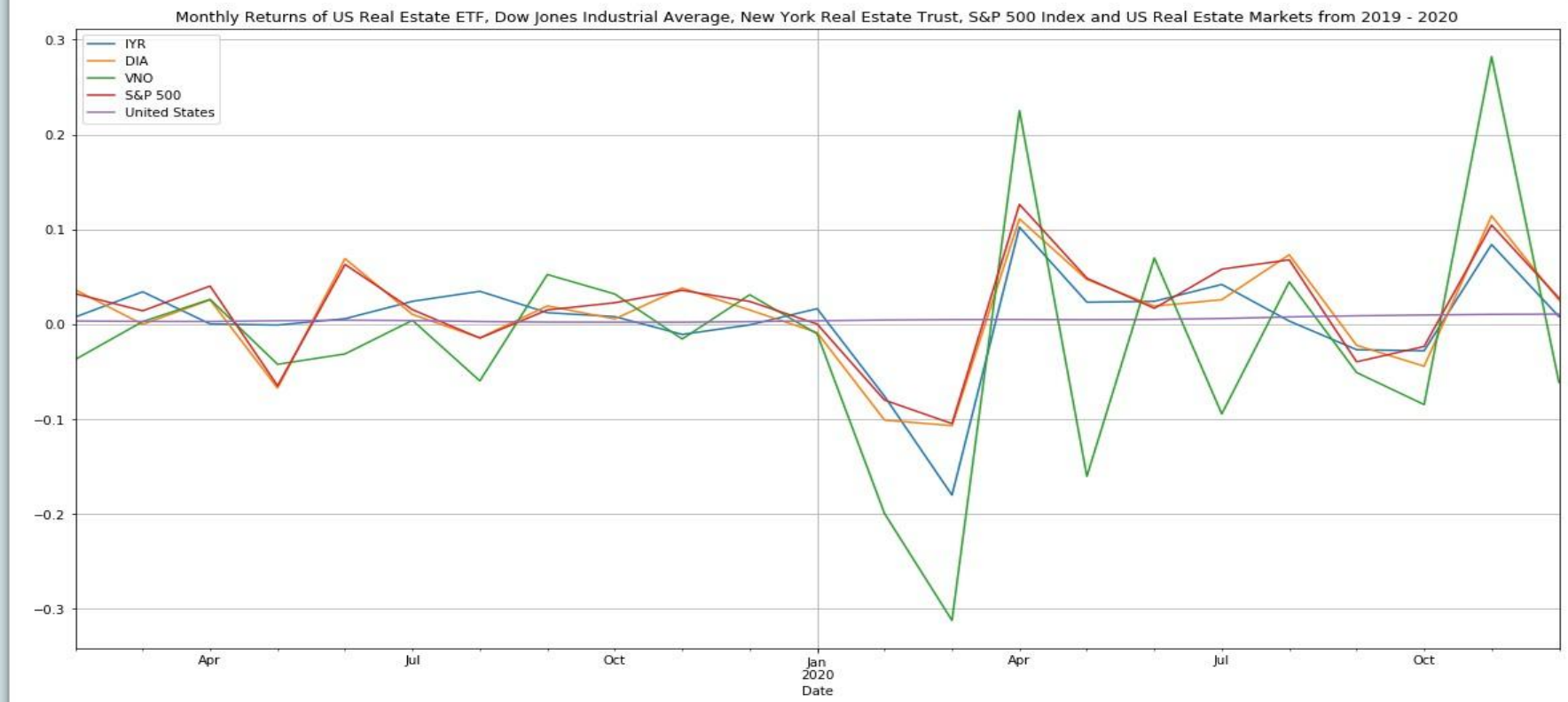
Data Extracts

- The data for US Price Index was extract for Zillow Home Value Index (ZHVI): A smoothed, seasonally adjusted measure of the typical home value and market changes across US.
- The StreetEasy Price indices are used to track changes in resale prices of single-family homes, for Manhattan, Brooklyn, and Queens.
- Four major ETFs extracts from Yahoo:
    - iShares US Real Estate ETF - (IVR)
    - Dow Jones Ind Avg ETF Trust - (DIA)
    - Vornado Realty Trust - (VNO)
    - S&P 500 ETF Trust - (SPY)

Data Cleansing

- Zillow Home Value Index (ZHVI) was extracted from Zillow and rationalized using CSV link to a consumable data frame in Python notebook for seeing the trends in U.S. as a whole
- The StreetEasy Price index data extract was used to narrow down on Manhattan, Brooklyn, and Queens.
- Four major ETFs were extracted Yahoo Finance (APIs have a 6 Months Constraint on the data) to compare and contrast ZHVI for the entire U.S.
    - iShares US Real Estate ETF
    - SPDR Dow Jones Industrial Average ETF Trust
    - Vornado Realty Trust
    - SPDR S&P 500 ETF Trust
- Ran the betas of Real Estate stocks, the US housing price index versus the SPDR S&P 500 ETF Trust
- Ran Monte Carlo Simulation to predict how much investors would make in the 5 years following 2021

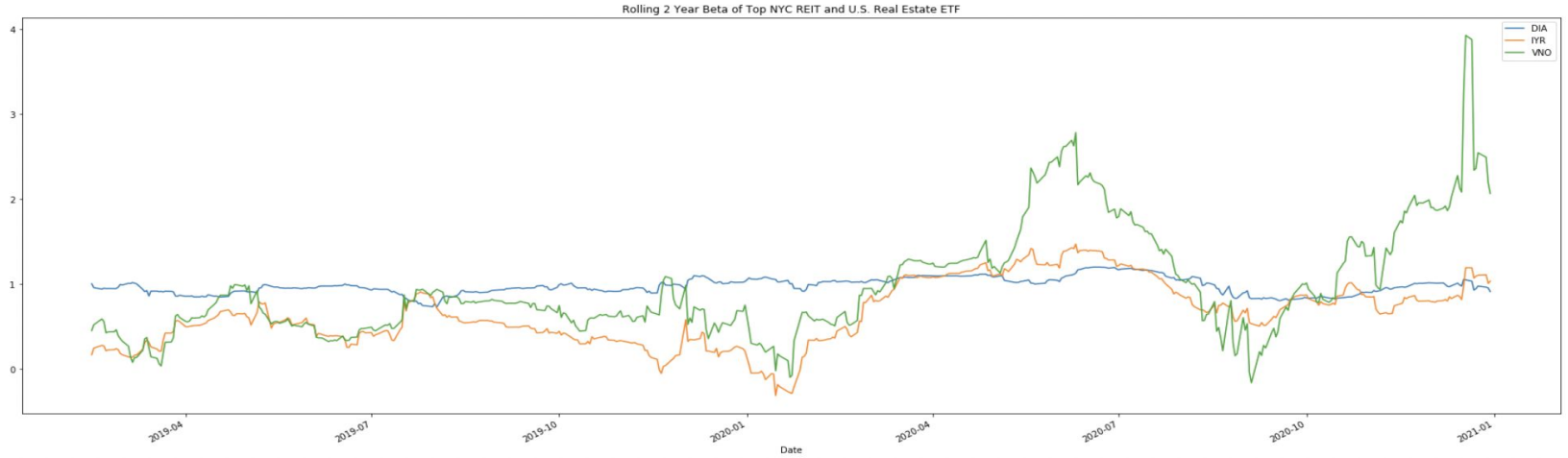
Combined Monthly Returns of ETFs and US Housing Data



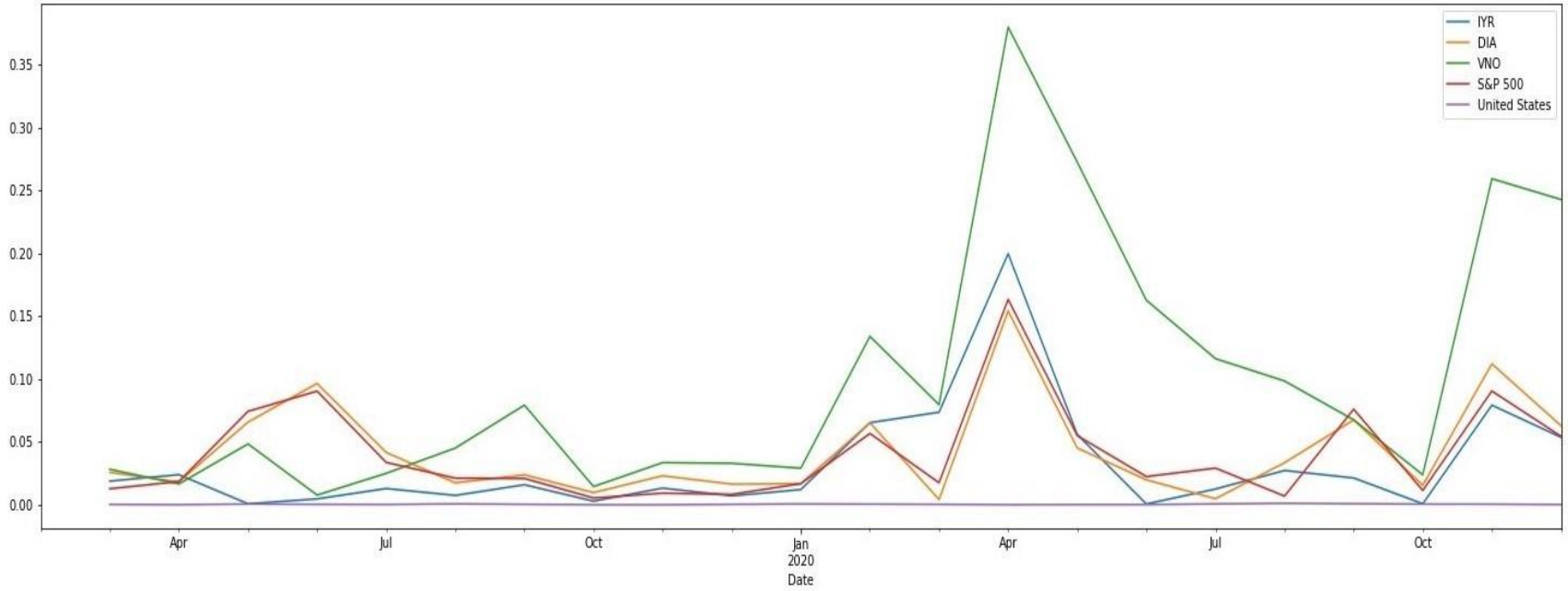
Betas | Correlation| Monte Carlo - Simulation

Betas and Correlation

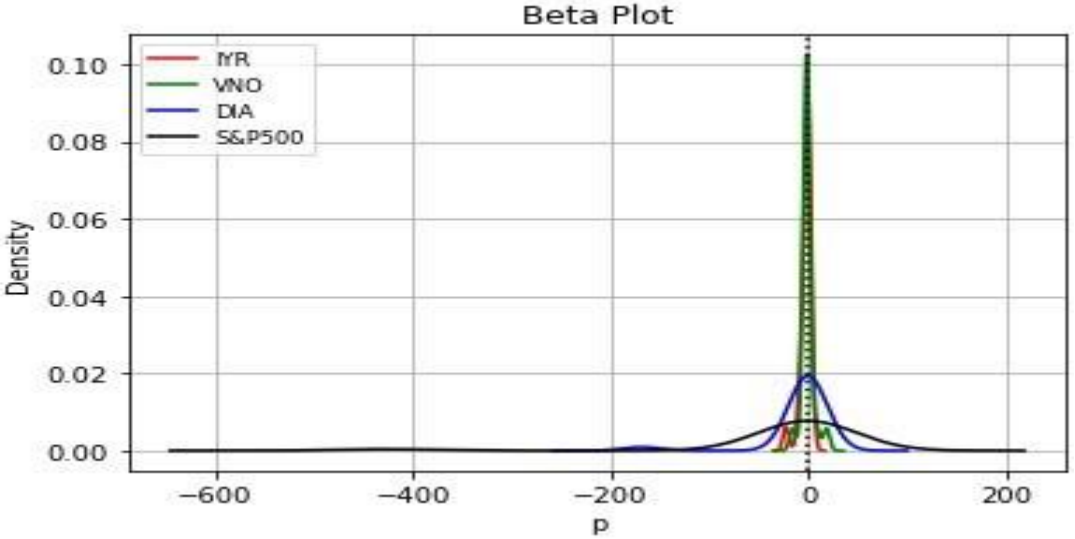
- By the end of this section, you will notice:
  - The volatility of Real Estate stocks increases after COVID strikes.
  - The Inventory of houses for sale on Zillow increased in major cities, and the Average Sales Price decreased
  - The data should also indicate that Real Estate in suburban areas demonstrated an inverse relationship compared to major city RE.



Beta Plot of ETFs

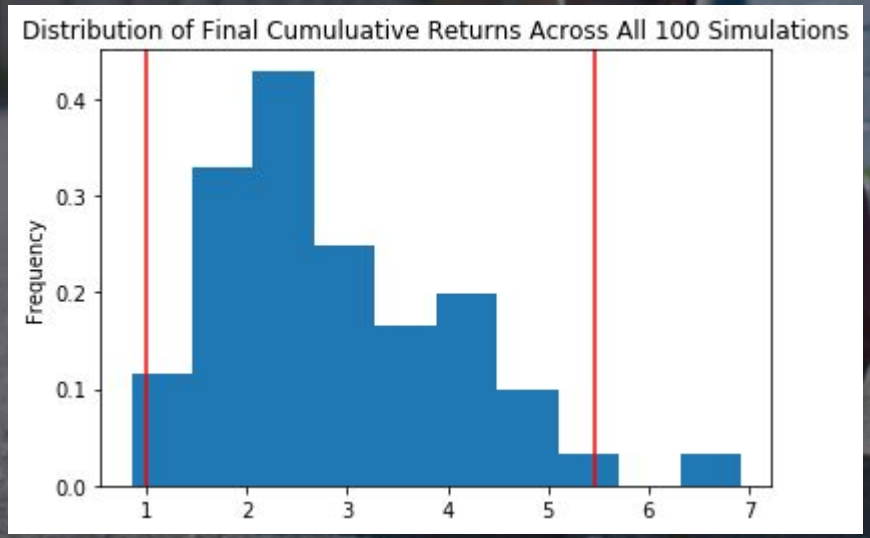


Rolling Standard Deviation



- The iShares US Real Estate ETF and Vornado Realty Trust has a higher beta dispersion compared to the Dow Jones ETF Trust and the S&P 500

The problem with the NYC Real Estate market was the mass exodus of people that didn't need to stay in the city, or didn't want to live in the city due to the dangerous environment caused by the extremely contagious COVID-19 virus

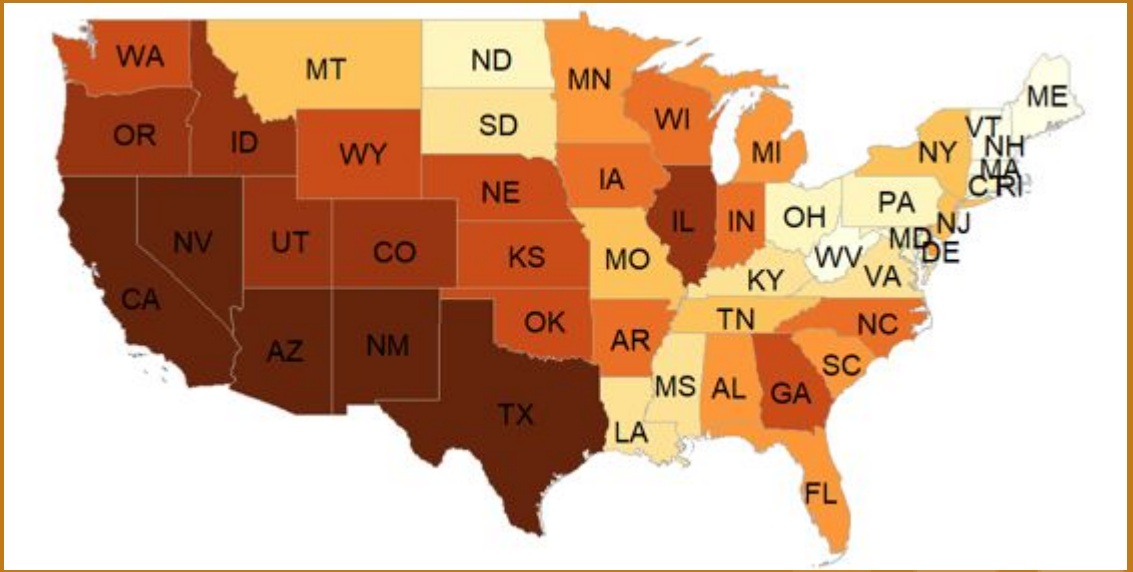


Monte Carlo Simulation

Even weighted portfolio, 5 year projection

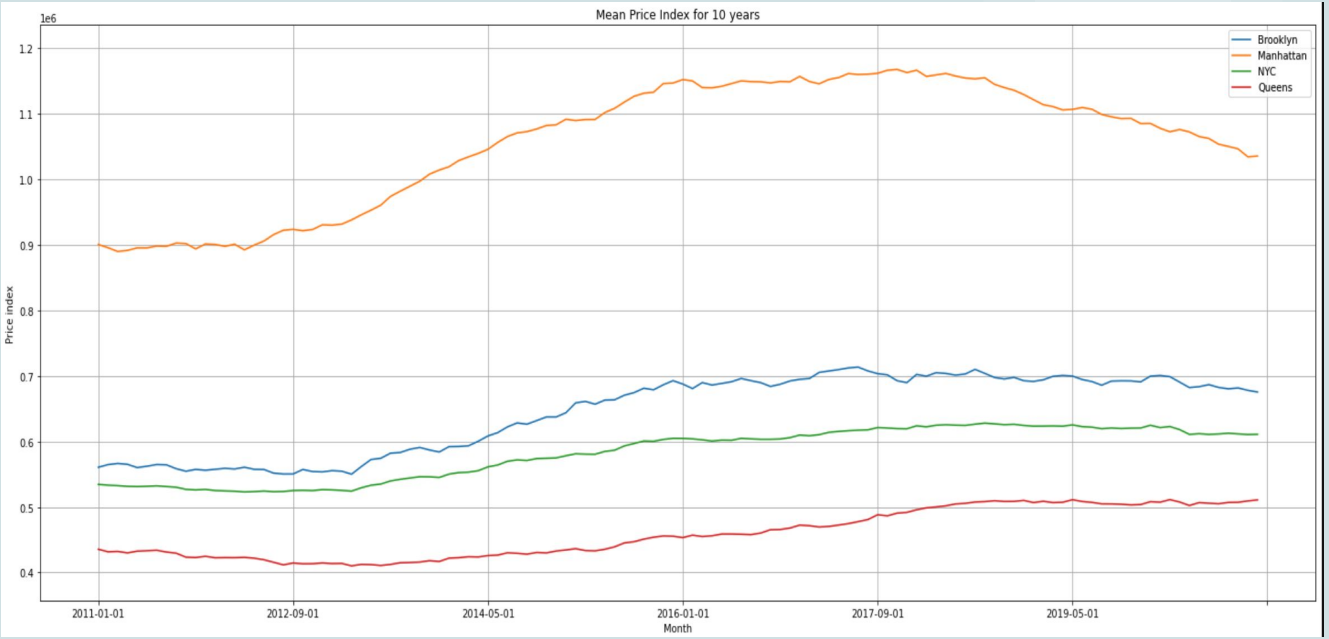
95% confidence interval that $100,000 would return between $99,654 and $545,786

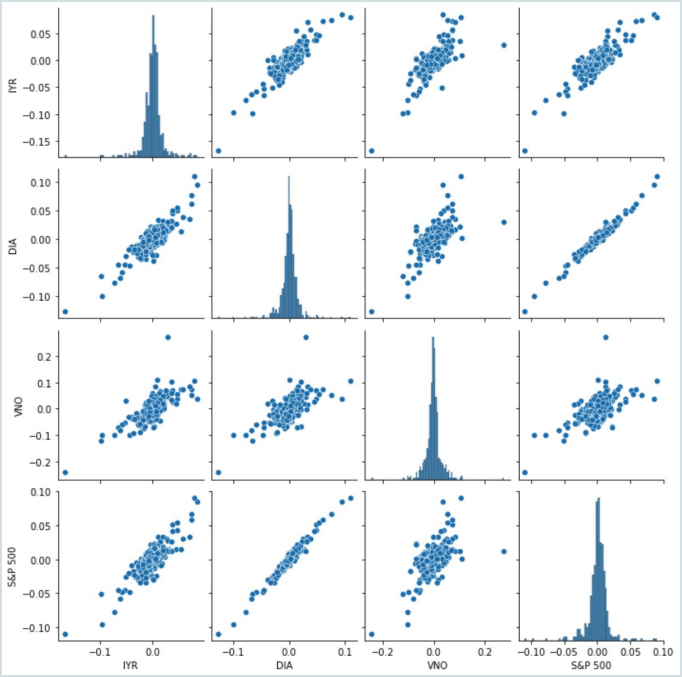
Maps and Plots

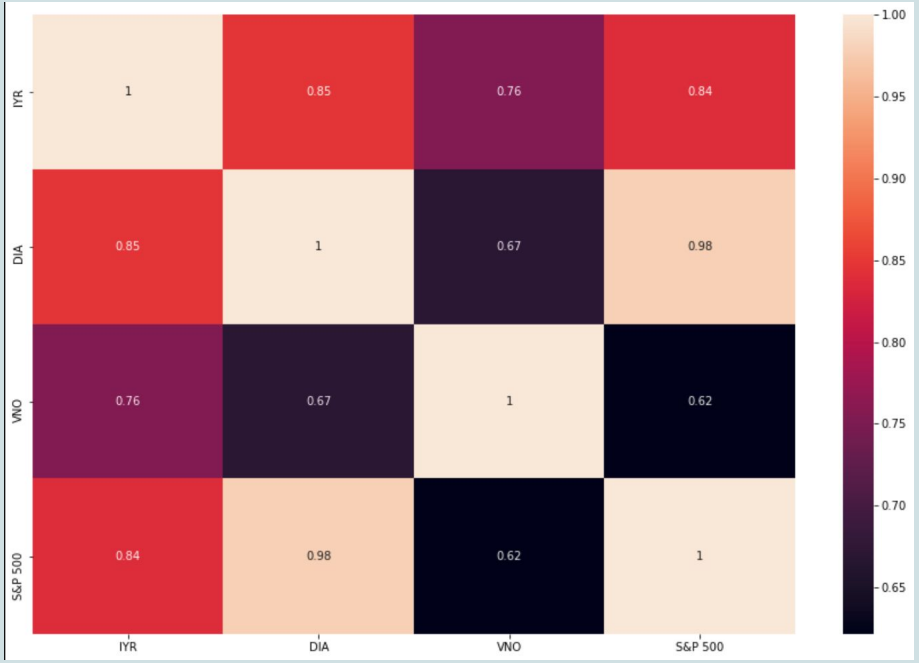


In our analysis we differentiated between New York City (NYC) and three of its boroughs. Visibly Manhattan stands out both as for price levels and growth dynamics

Development of RE prices in NYC and 3 of its boroughs 2010 - 2020



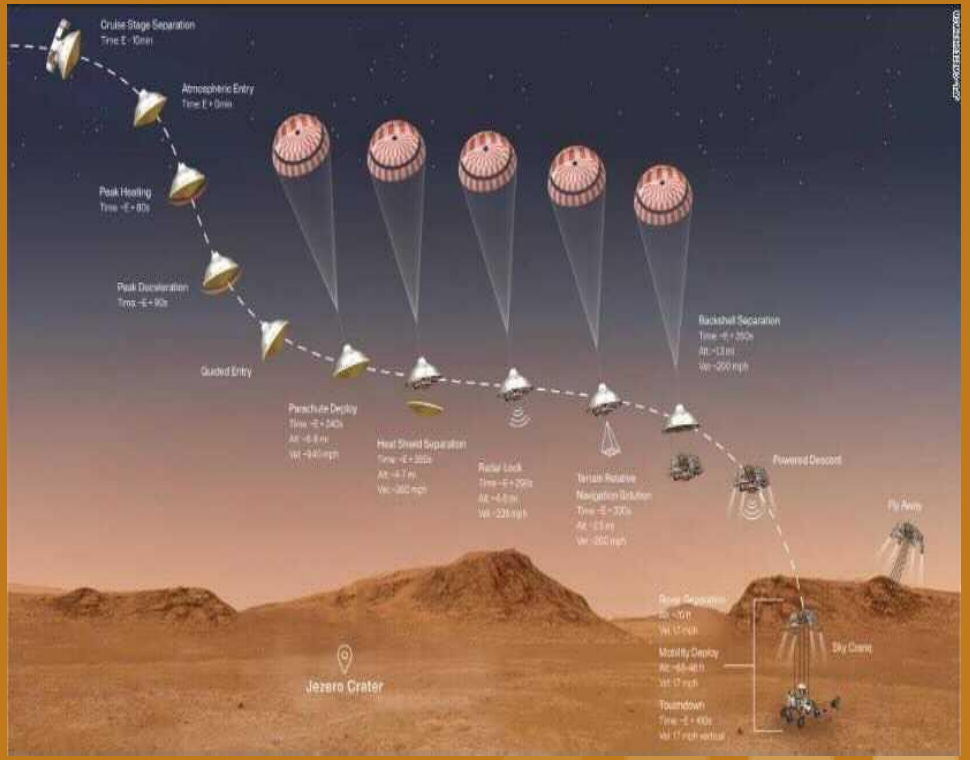




VNO, with a core <u>focus on New York City</u>, shows the lowest correlation to the overall market (0.62), whilst the wider spread **IYR** correlates more closely with the overall market (0.84/S&P & 0.85/DIA).

- 4 boroughs of NYC with rates of Covid-19 cases as of February 7, 2021

Progression to Landing



Progression

December 2019

First cases and stories of COVID spread

October 2020

The election sends the country into frenzy, markets climbing back

2019

2020

March 2020

Government shuts down economy, stock market takes a dive

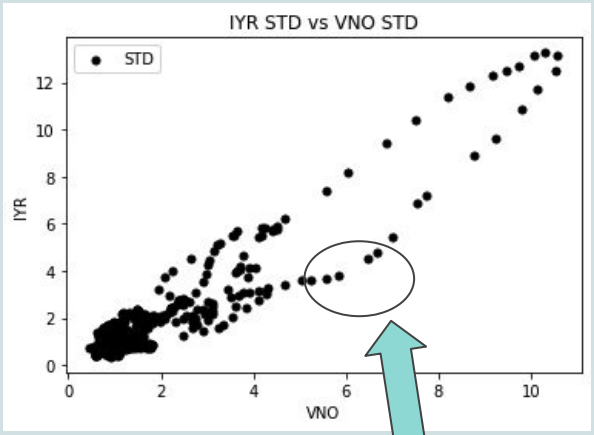
December 2020

US Stock market reaches 2019 highs and RE index has largely recovered

Conclusion

The plots we generated indicate that the NYC housing market became more volatile and less valuable once Covid hit:

- **Manhattan Housing Market suffered compared to the US Market**
- **The decrease in major cities was more than offset by suburban market increases**
- **We were able to gather *enough* information on NYC Metro area**



Vornado NYC REIT riskier than the US RE ETF

Phase - II

Next Steps...

- Multiple Variable regression & Prediction Model
- In-depth analyses of all US Metro housing markets
- Build out Interactive Dashboard with better visuals
- http://localhost:12345

What issues did we ran into?

Collecting Cleaning

We had trouble finding up-to-date datasets for Real Estate that were in desirable formats

Lack of planning

Could have come up with a thesis on the day one

Absent sudo-coding

Technical skills

Had we spent less time data-cleaning or trying to visualize, the rest of the team could have been researching/building

Questions?