MSc FE Capstone

SP500 Recent (2012-2022) Statistical Performance Analysis

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Flow

- Introduction
- Objectives
- Data Analysis
- Algorithm Selection
- Experimental Analysis
- Implementation
- My Contribution(s)
- Conclusion

Introduction

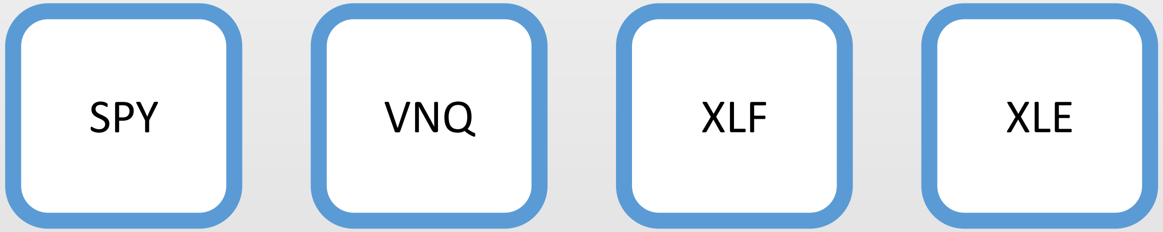
- Financial Instruments
- Stock Markets
- Equities
- Futures
- Options
- Securities
- Bonds
- Analysis

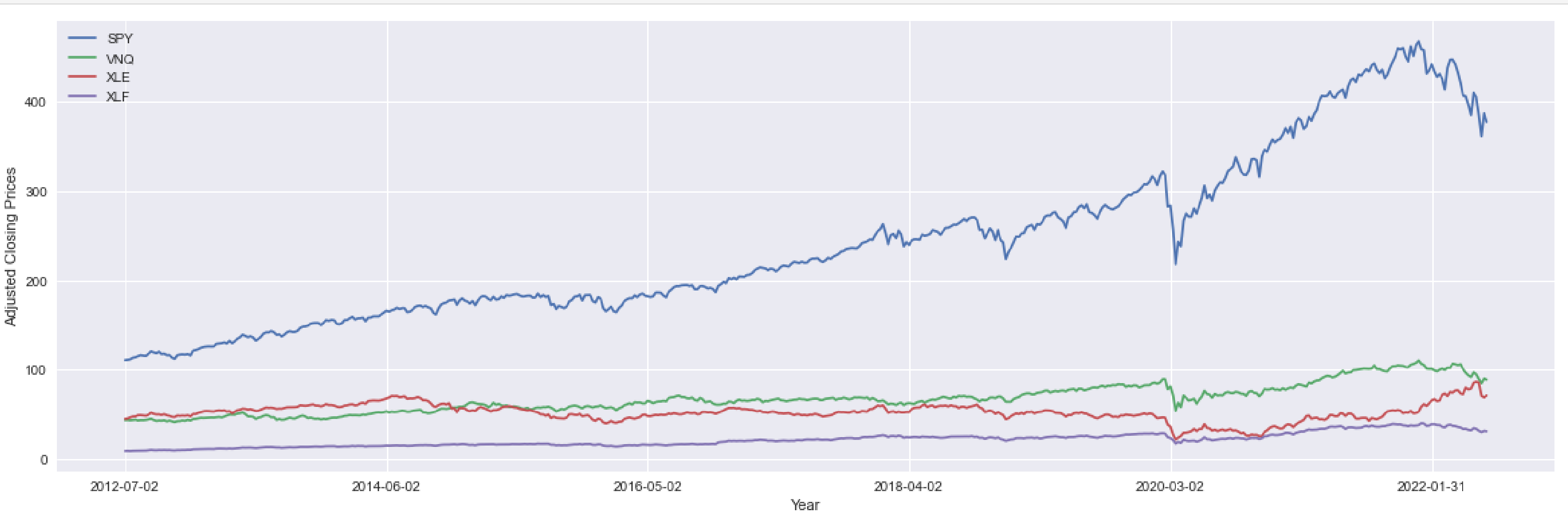
Objectives

- Statistical Analysis on Equities
- SP500 as Benchmark
- Diversified Sector ETFs
- Turbulences
- Relationship establishment

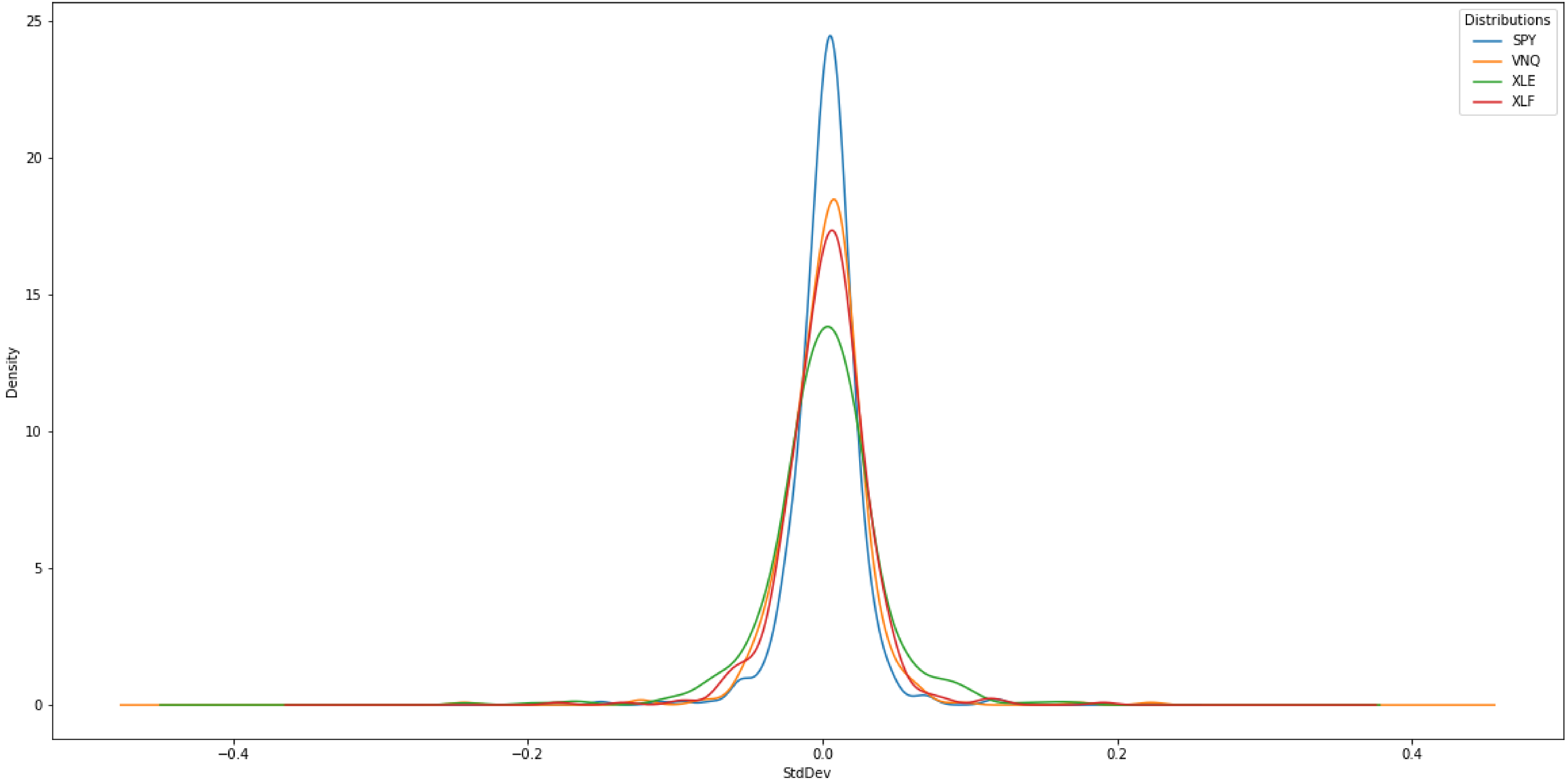
Data Analysis

- Transformations
- Returns Calculation
- Correlation
- Stationarity
- Normality
- Statistics summary
- Visualizations

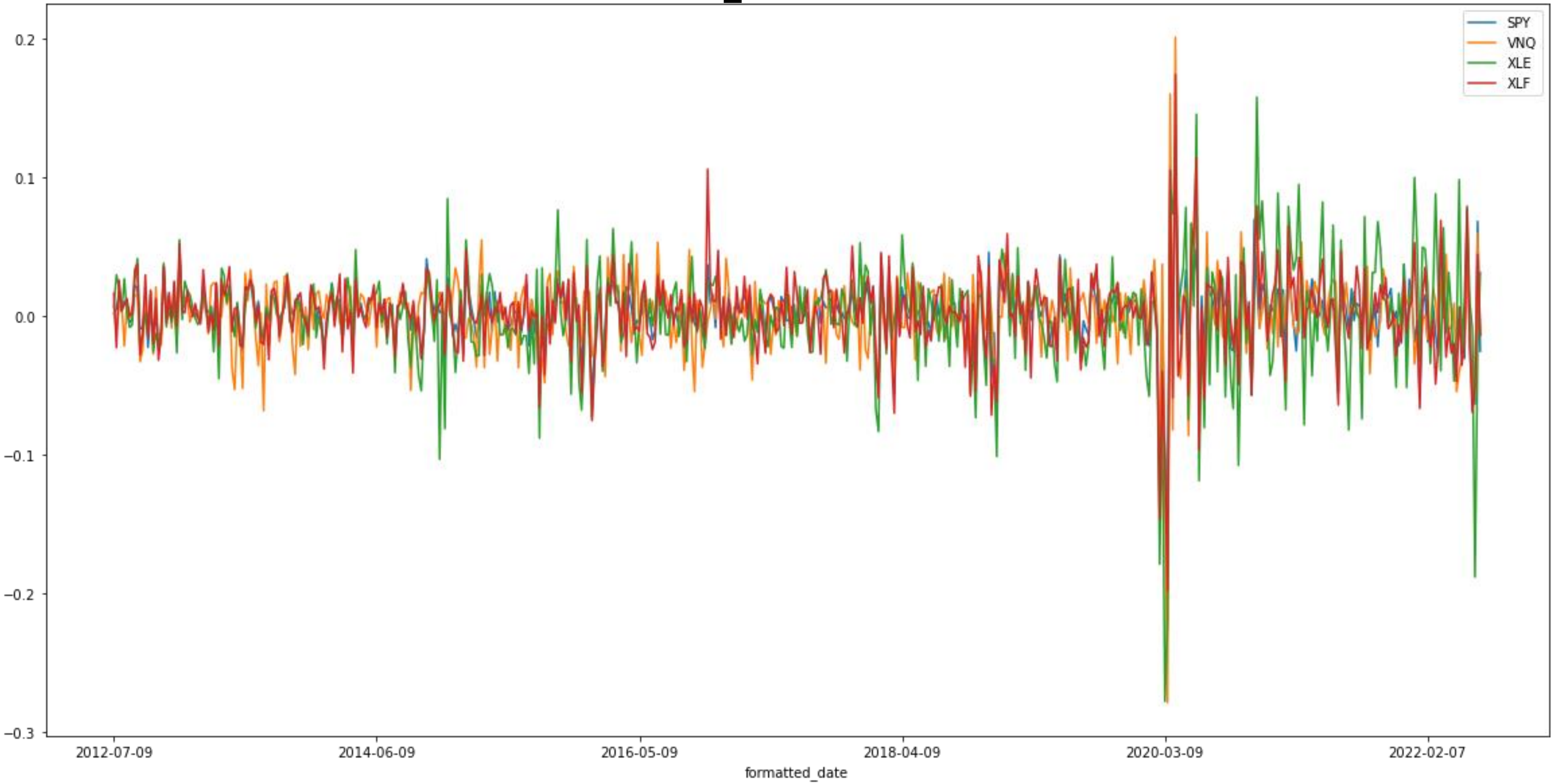




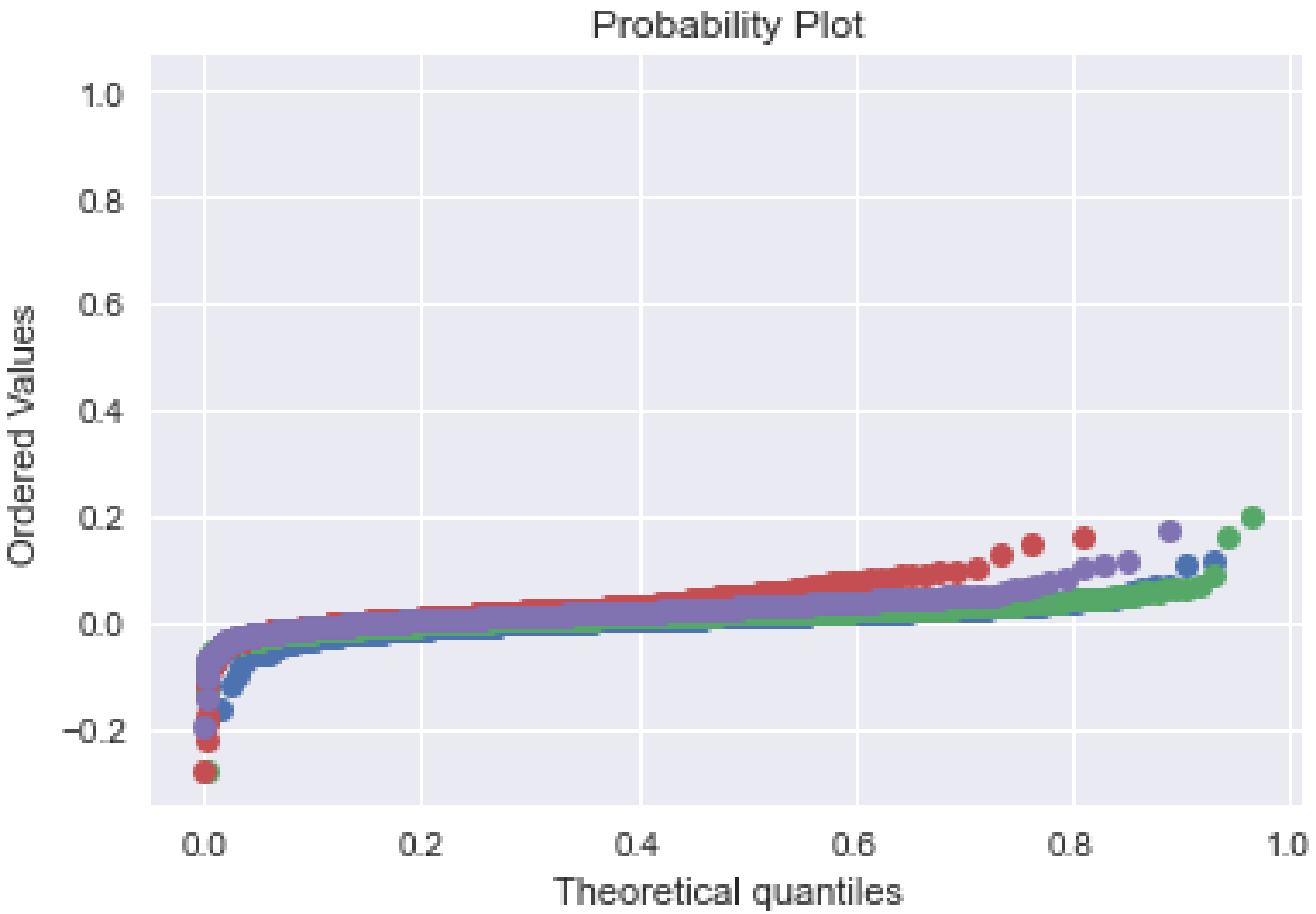
ETFs Distribution



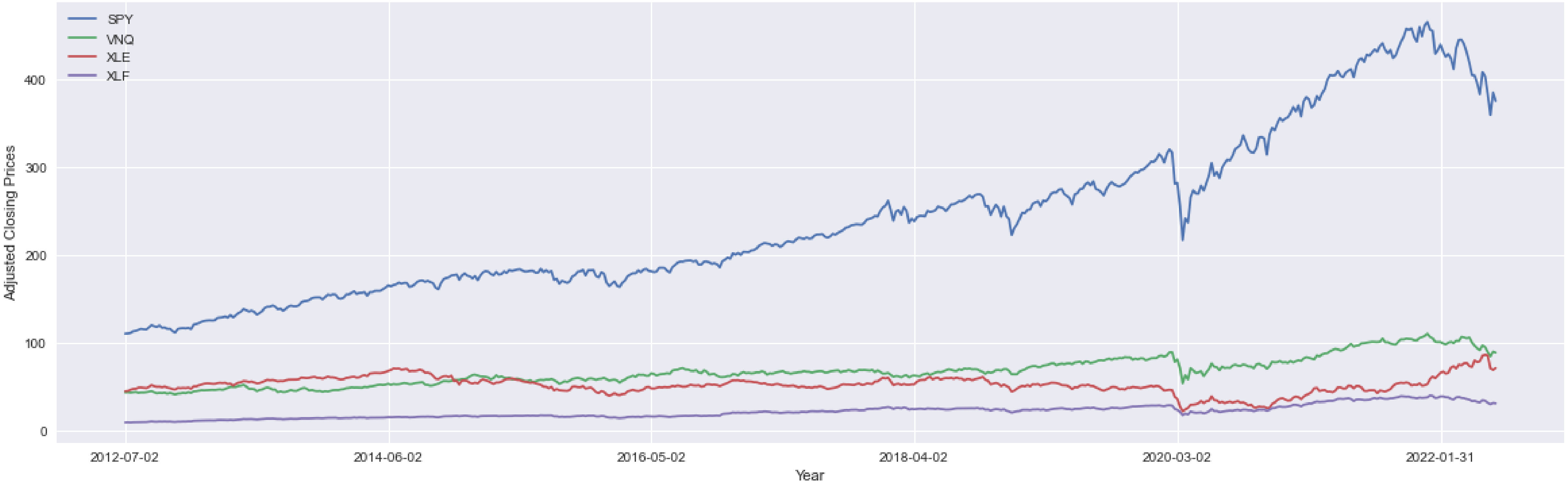
ETFs Returns Comparison



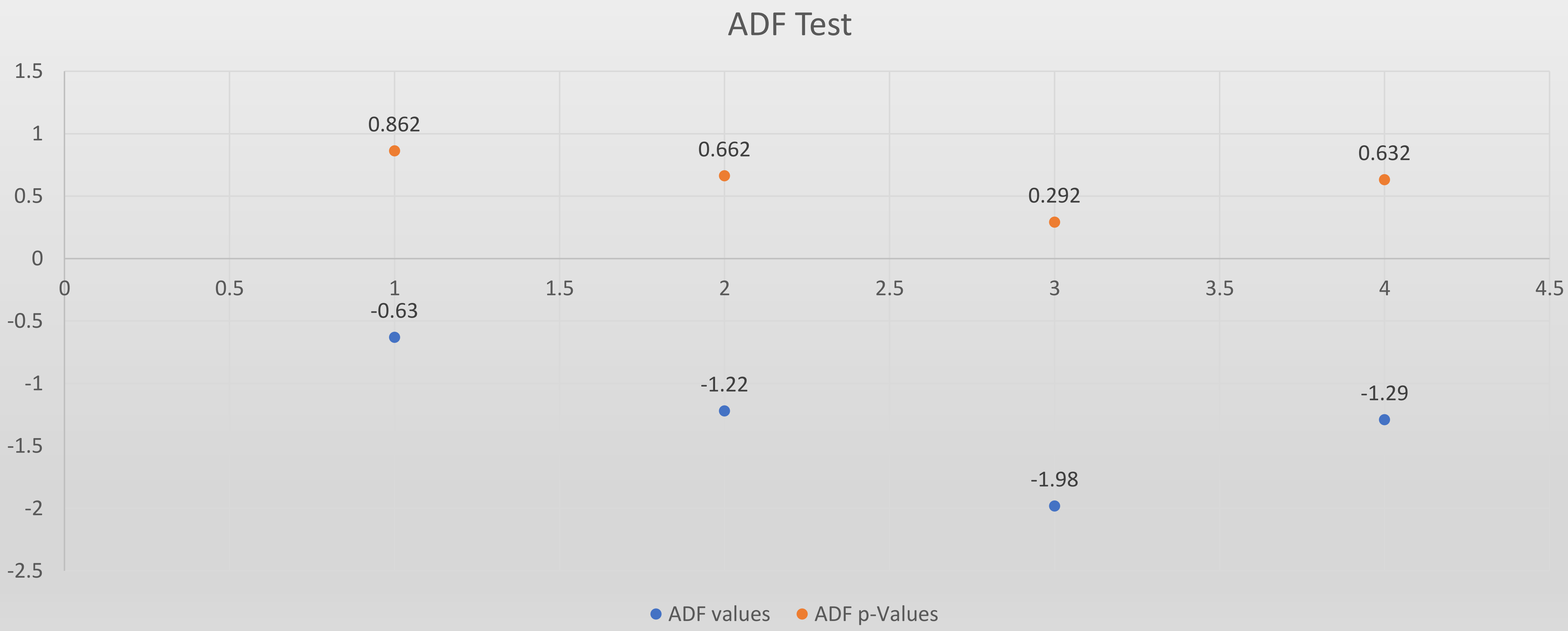
ETFs Q-Q Plots



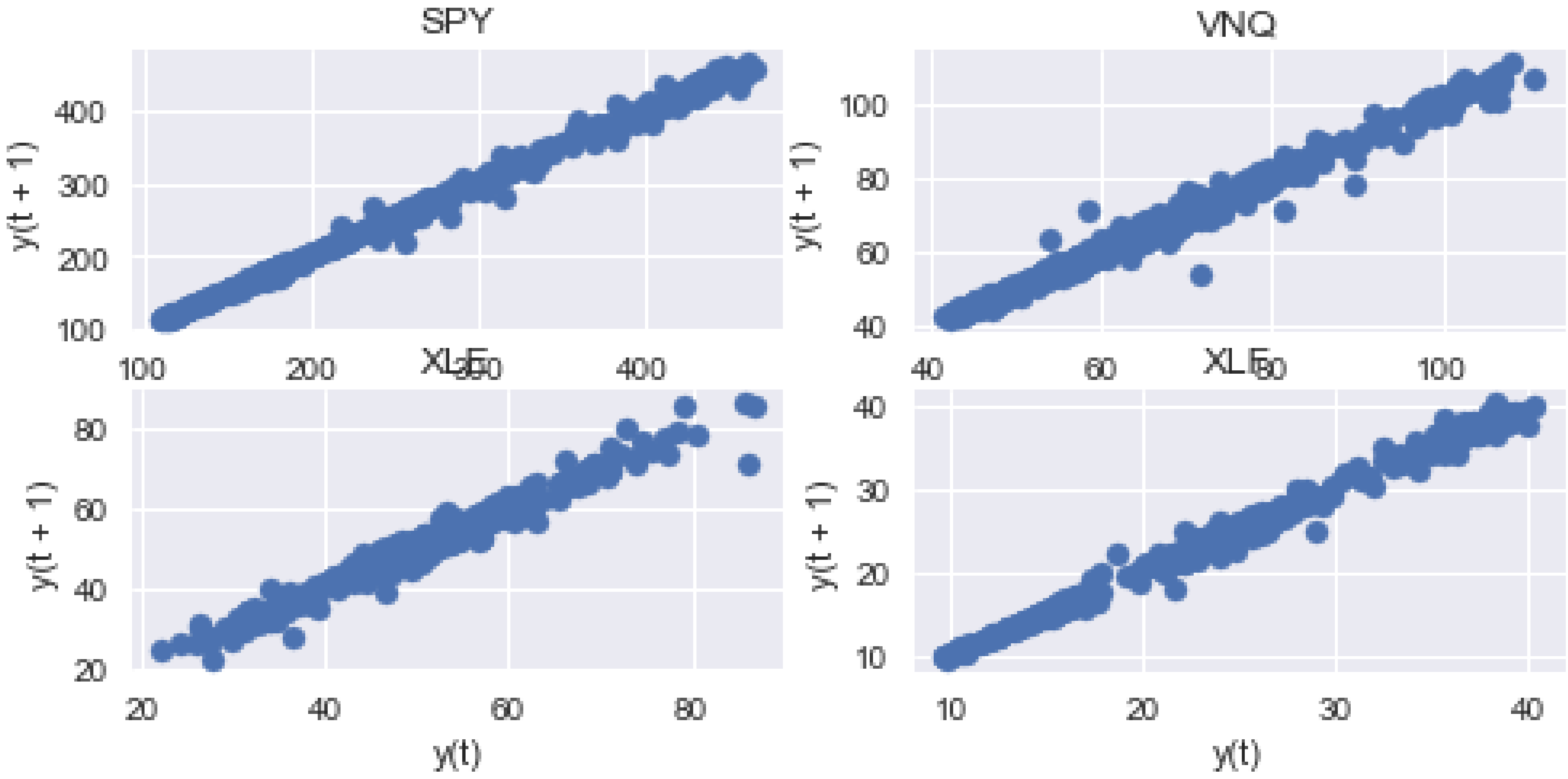
Prices Comparison



Stationarity Test

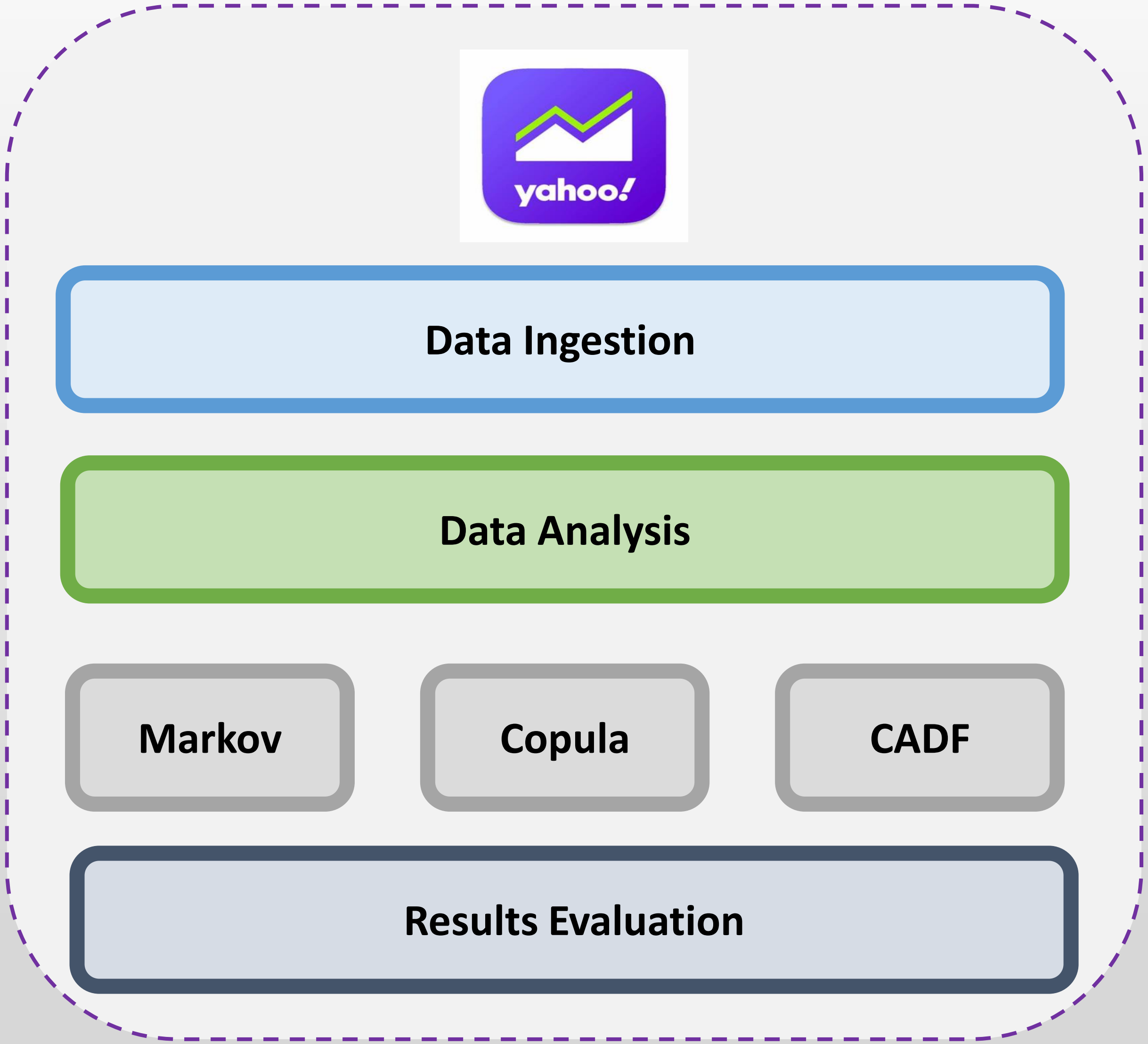


Auto Correlation

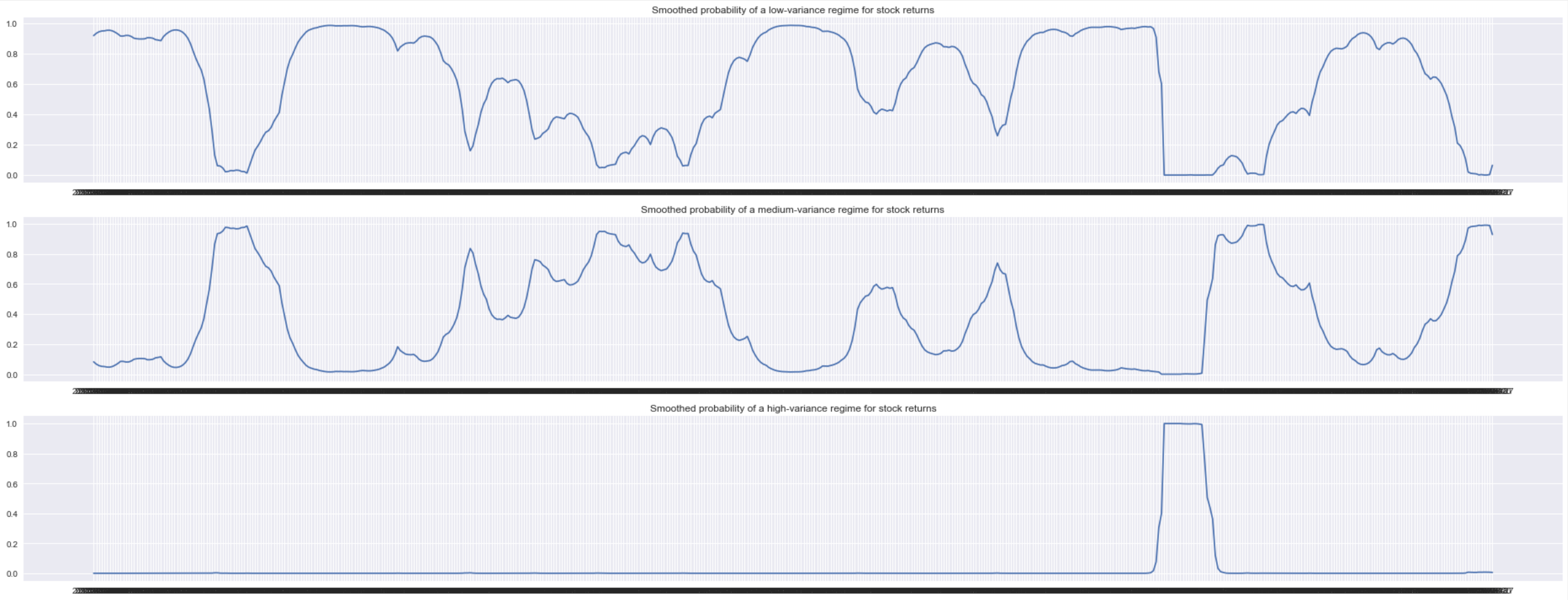


Algorithms Selection

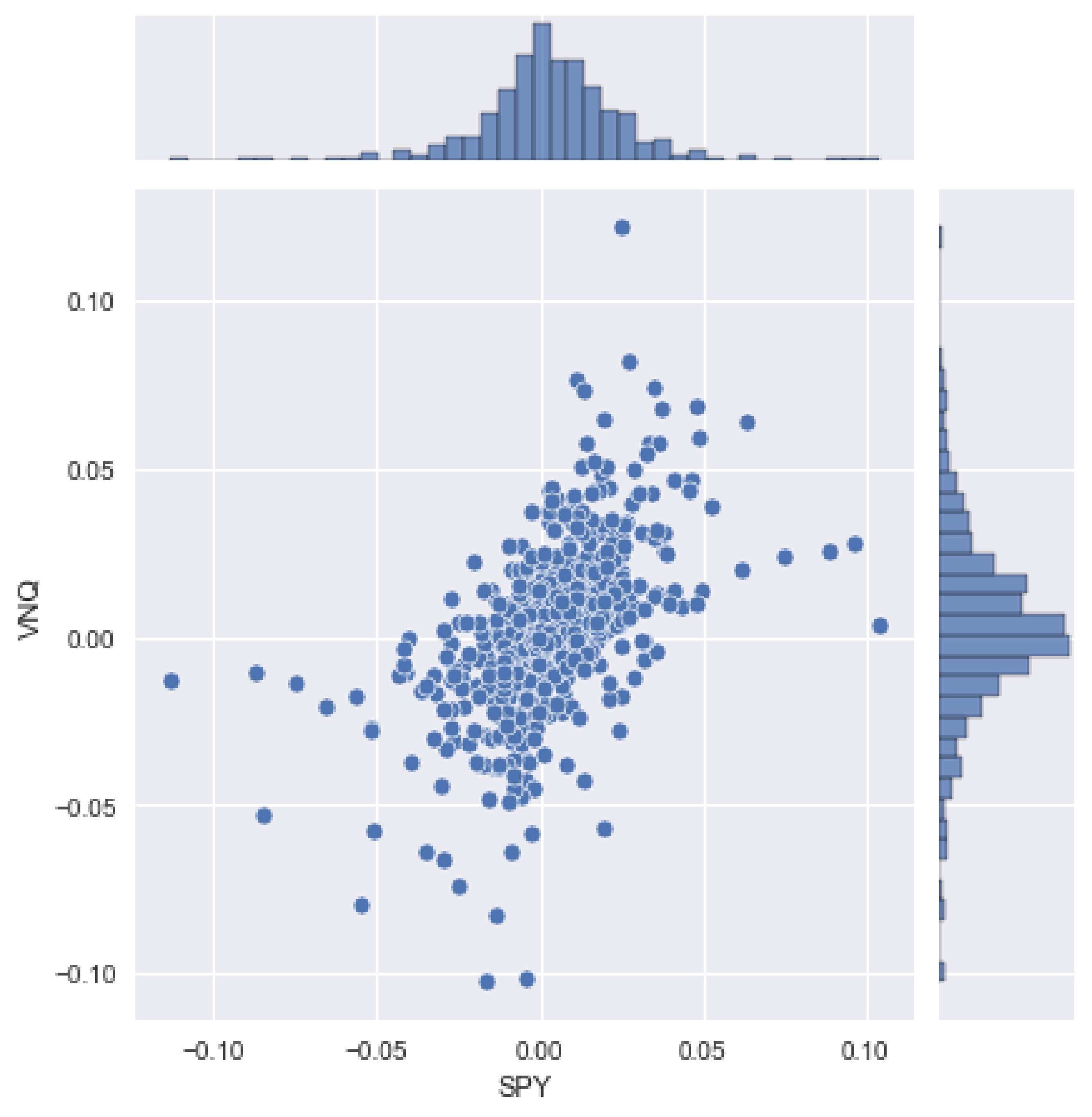
- Markov Switching Autoregressive model
- Copula
- CADF



Markov Switching Autoregressive Model



Copula



CADF

```
CADF(spy_before_covid19,vnq_before_covid19)
```

```
(-20.787088922899446, 0.0, 0, 364, {'1%': -3.4484434475193777, '5%': -2.869513170510808, '10%': -2.571017574266393}, -1943.415035456514)
```

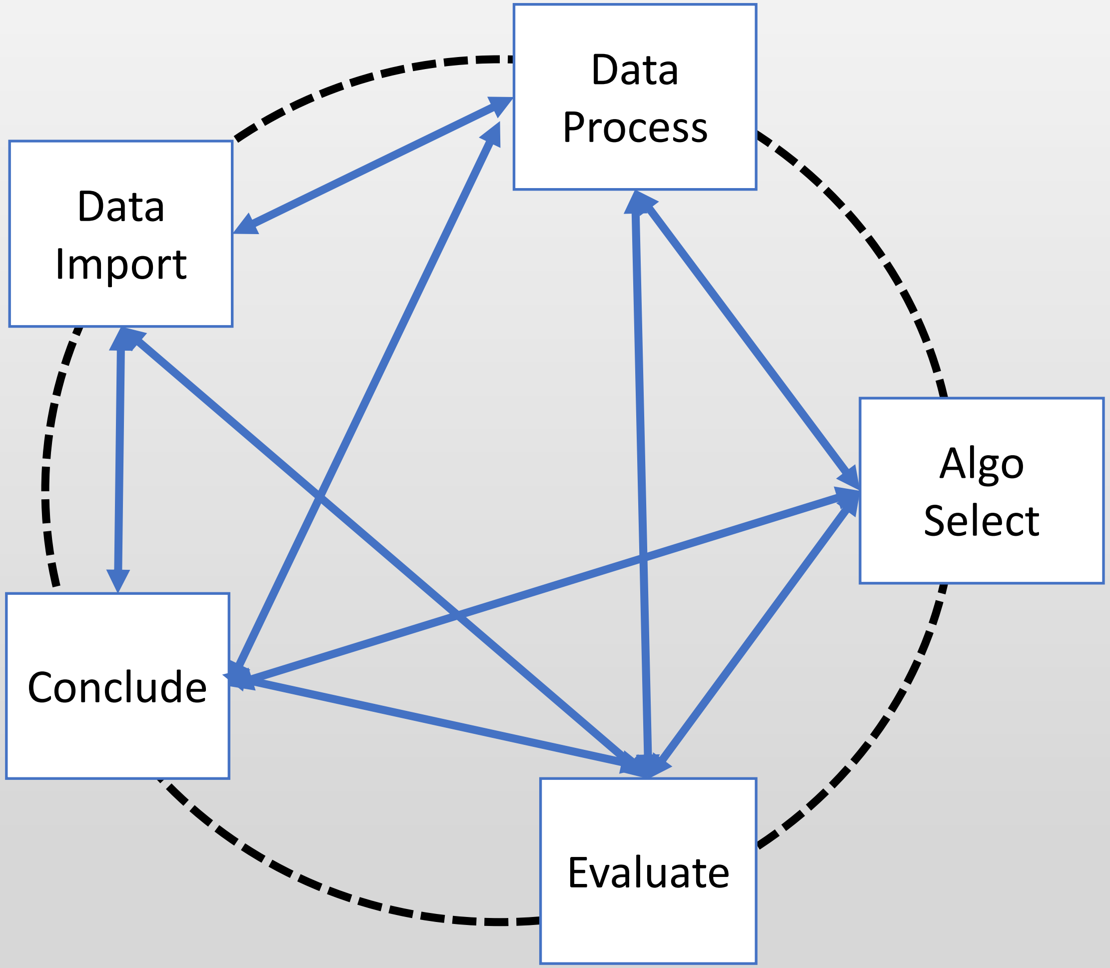
```
# Modeling after a specified range of time
#Get data before that specific date
spy_after_covid19=spy_return["2022-03-31":]
vnq_after_covid19=vnq_return["2022-03-31":]
```

```
CADF(spy_after_covid19,vnq_after_covid19)
```

```
(-6.60011134219835, 6.769213275738157e-09, 4, 8, {'1%': -4.6651863281249994, '5%': -3.3671868750000002, '10%': -2.802960625}, -91.59058684125765)
```

Implementation

- Anaconda Jupyter Notebook
- Python 3.0 Packages
- Statistics & Modelling Packages
- Github Repository
- Iterative Approach



My contribution(s)

- GitHub repo maintenance
- Jupyter Notebook experiments
- Data Imports & Analysis
- Markov, CADF, Copula, Correlations, Normality & Stationarity tests
- Regime shift identification
- Covid pandemic time period effects
- Analysis & Report making

Conclusion

- Reflection of various sectors ETFs with SP500
- Regime Shift Identification
- Covid Pandemic Impact
- All the literature survey & experiments are saved at location: https://github.com/krishxx/wqumscfin

Thank You !!