



Travel Planner Based on Currency Conversion Risk

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Executive Summary

Our team was interested in Forex data and the possibility of predicting future currency risk.

We decided to create an app that could be used by real-world clients

Let's see what we came up with...



Motivation and Summary

Challenge: International travelers have many options when it comes to selecting their ideal travel destination. One of the factors in that decision is the value of their home currency when compared to the travel country. Given that most international travel plans are booked between 3-12 months before traveling, the traveler could be taking on a large amount of currency risk.

Question: Could we create a tool that provides currency risk information to an international traveler before they select a destination?

Answer: Yes - using historical currency data, we created a travel planning tool that allows the user to select a set of countries they are interested in traveling to, along with a travel timeframe (3,6,12 months) and projected travel budget. The tool will analyze historical Forex data and predict the country that will have the least risky currency within the given travel timeframe.



Questions

Q1

Can we Identify the variability of budget in base currency (USD) of multiple locations selected?

Q2

Can we rank the travel location by risk of currency fluctuation?

Q3

Can we provide zone of values based on Monte-Carlo simulation is it wide closely similar etc based on locations selected

Q4

Is there correlation between weather variability and foreign currency variability

Data Exploration

To provide the user a currency forecast, we needed to find and analyze historical Forex data. In addition, we wanted to provide the user with some useful country information facts. We also wanted to see if we could determine any useful information if we were to be able to correlate the currency fluctuation with the weather. It turns out that the first two would be much simpler than finding historical weather data.

APIs used:

- Forex - alphavantage-api
- Countryinfo - capital city, geo location, currency, wiki
- Mapbox API
- Yahoo Financials

Considered:

- Country layer
- AWS data exchange
- Restcountries
- Polygon.io
- Currency Scoop





Data Clean up Process

- Selected clean sources of data from the API, normalized to a singular base currency (USD).
- Imported, concatenated, split, column manipulation
- Cleaned: Drop NAs, counted and removed Nulls





Data Analysis and Techniques

- **Montecarlo:** model used to predict the probability of different outcomes when the intervention of random variables is present. Monte Carlo simulations help to explain the impact of risk and uncertainty in prediction and forecasting models.
- **Sharpe Ratio:** measures the performance of an investment such as a security or portfolio compared to a [risk-free asset](#), after adjusting for its [risk](#).
- **Sortino Ratio:** variation of the [Sharpe ratio](#) that differentiates harmful volatility from total overall volatility by using the asset's standard deviation of negative portfolio returns—[downside deviation](#)—instead of the total standard deviation of portfolio returns



Data Analysis and Techniques, continued

- Charts: line, candlestick, box, scatter, geo map, heat map
- Logarithmic returns
- Calmer ratio



Application Run-Through





Conclusion / implications of findings

Can we Identify the variability of budget in base currency (USD) of multiple locations selected?

Can we rank the travel location by risk of currency fluctuation?

Can we provide zone of values based on Monte-Carlo simulation is it wide closely similar etc based on locations selected?

Is there correlation between weather variability and foreign currency variability



YES!

YES!

YES!

NO :(



Issues / Challenges



- ARIMA: Considered
- Weather Data: Lack of free data
- Montecarlo: plots in dashboard
- Corrupted environments / Library conflicts
- API rate limiting



Questions





Thank you.





Appendix - Charts and Graphs



Appendix - Data, Charts and Graphs



Country name: singapore
Country Capital: Singapore
Country Border: []
Country Currency: ['SGD']
Country Timezone: ['UTC+08:00']
Country Wiki:
<http://en.wikipedia.org/wiki/singapore>

USD To SGD \$1,000.00
Conversion Amount: 1,379.98



Country name: turkey
Country Capital: Ankara
Country Border: ['ARM', 'AZE', 'BGR', 'GEO', 'GRC', 'IRN', 'IRQ', 'SYR']
Country Currency: ['TRY']
Country Timezone: ['UTC+02:00']
Country Wiki:
<http://en.wikipedia.org/wiki/turkey>

USD To TRY \$1,000.00
Conversion Amount: 14,837.28



Country name: united kingdom
Country Capital: London
Country Border: ['IRL']
Country Currency: ['GBP']
Country Timezone: ['UTC-08:00', 'UTC-05:00', 'UTC-04:00', 'UTC-03:00', 'UTC-02:00', 'UTC', 'UTC+01:00', 'UTC+02:00', 'UTC+06:00']
Country Wiki:
http://en.wikipedia.org/wiki/united_kingdom

USD To GBP \$1,000.00
Conversion Amount: 796.09



SGDUSD - Line Plot





TRYUSD - Line Plot



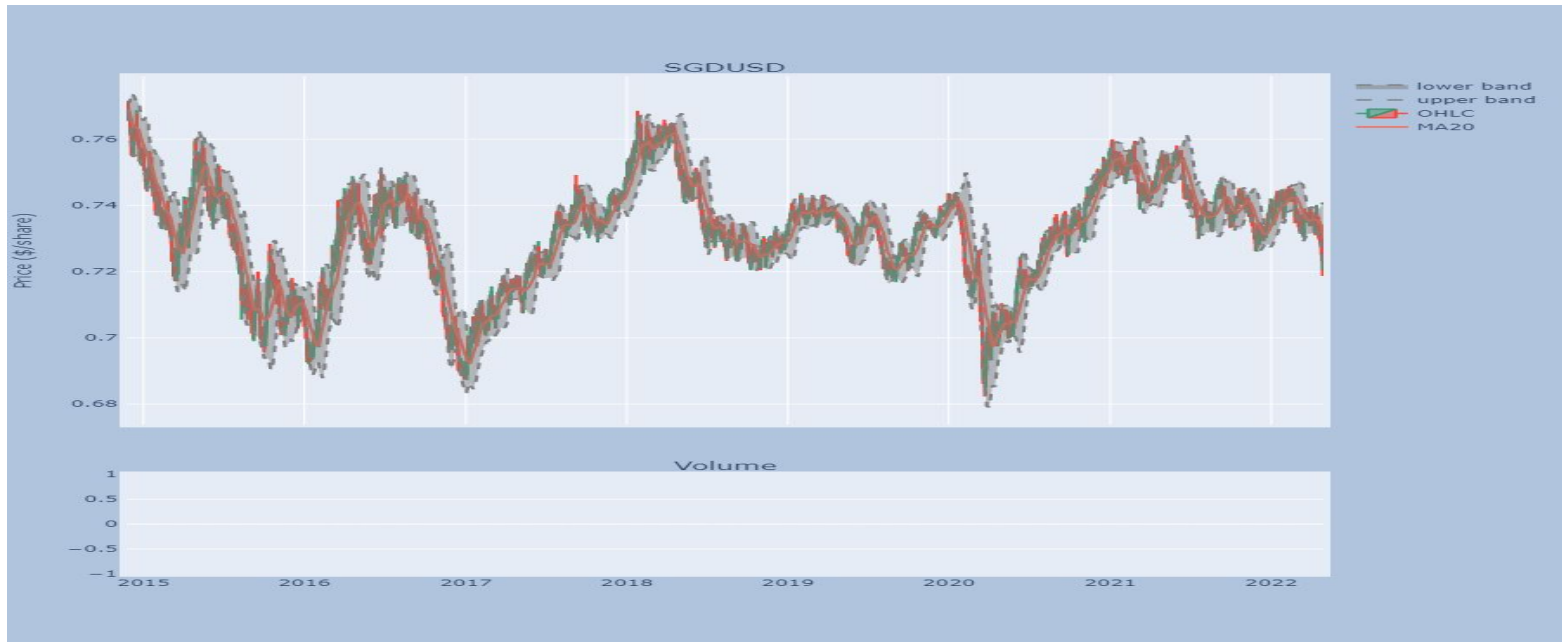


GBPUSD - Line Plot





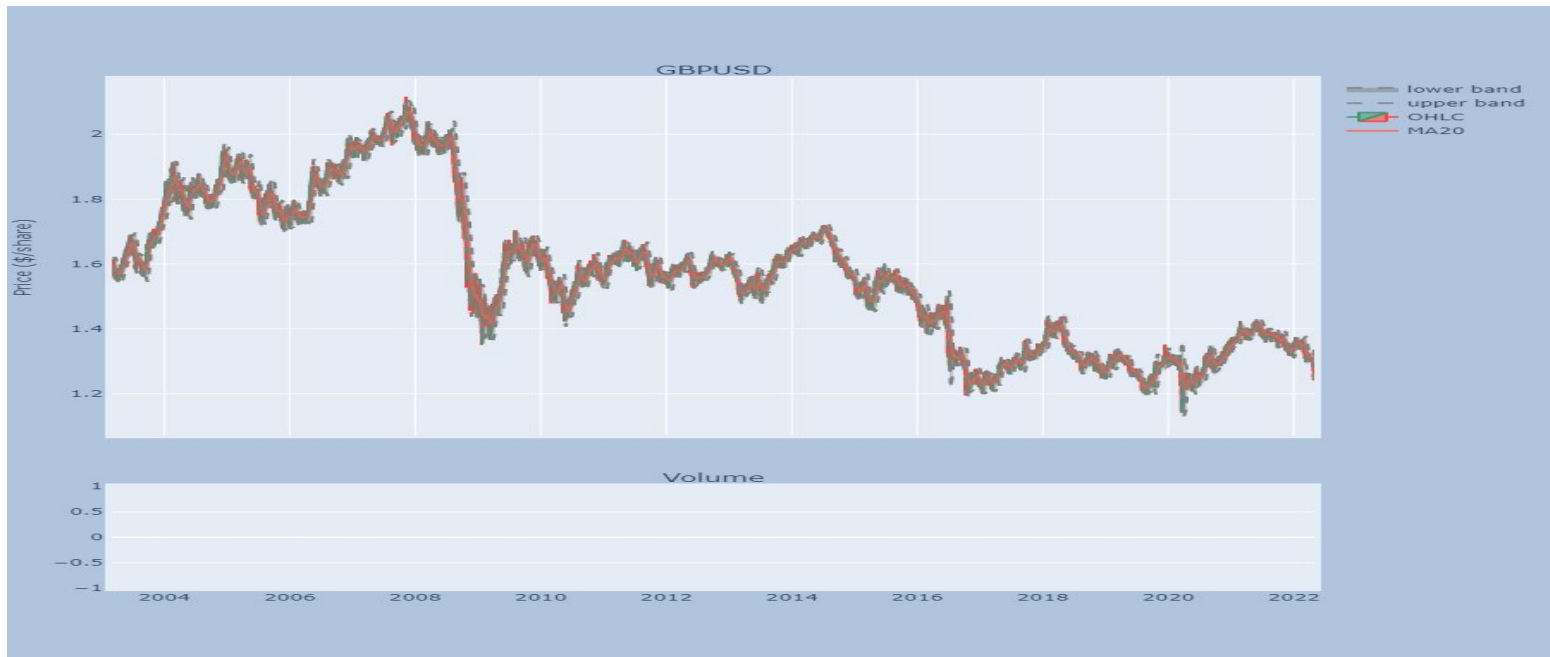
SGDUSD - Candlestick



TRYUSD - Candlestick



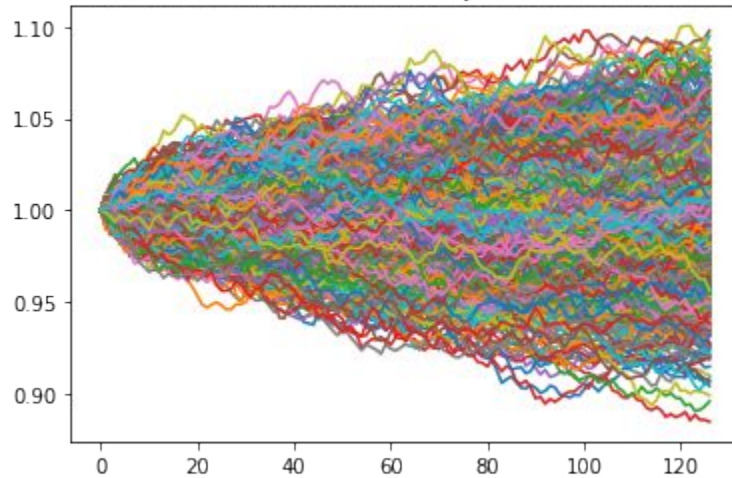
GBPUSD - Candlestick





SGDUSD Monte Carlo - 6 months

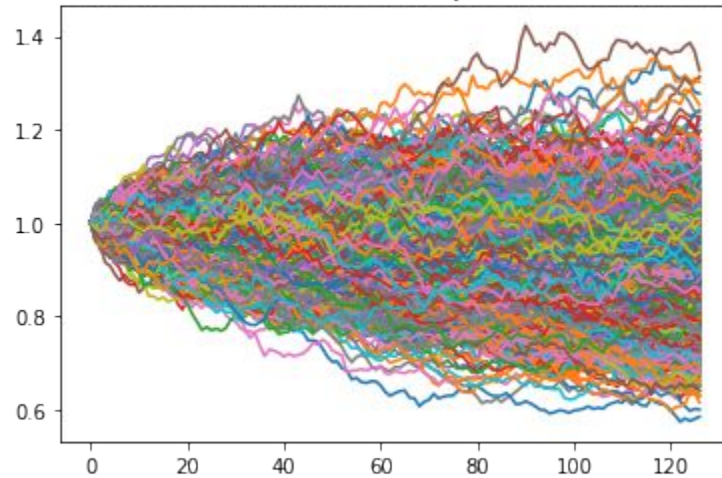
1000 Simulations of Cumulative Portfolio Return Trajectories Over the Next 126 Trading Days.





TRYUSD Monte Carlo - 6 months

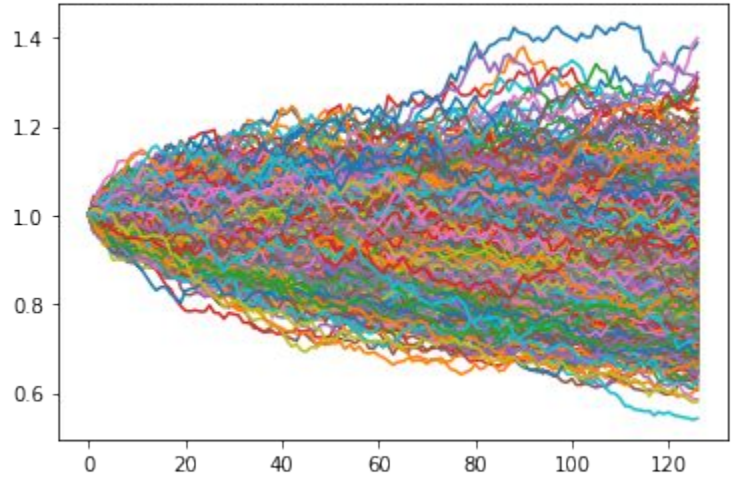
1000 Simulations of Cumulative Portfolio Return Trajectories Over the Next 126 Trading Days.





TRYUSD Monte Carlo - 6 months

1000 Simulations of Cumulative Portfolio Return Trajectories Over the Next 126 Trading Days.





Monte Carlo - 95% Confidence Comparisons

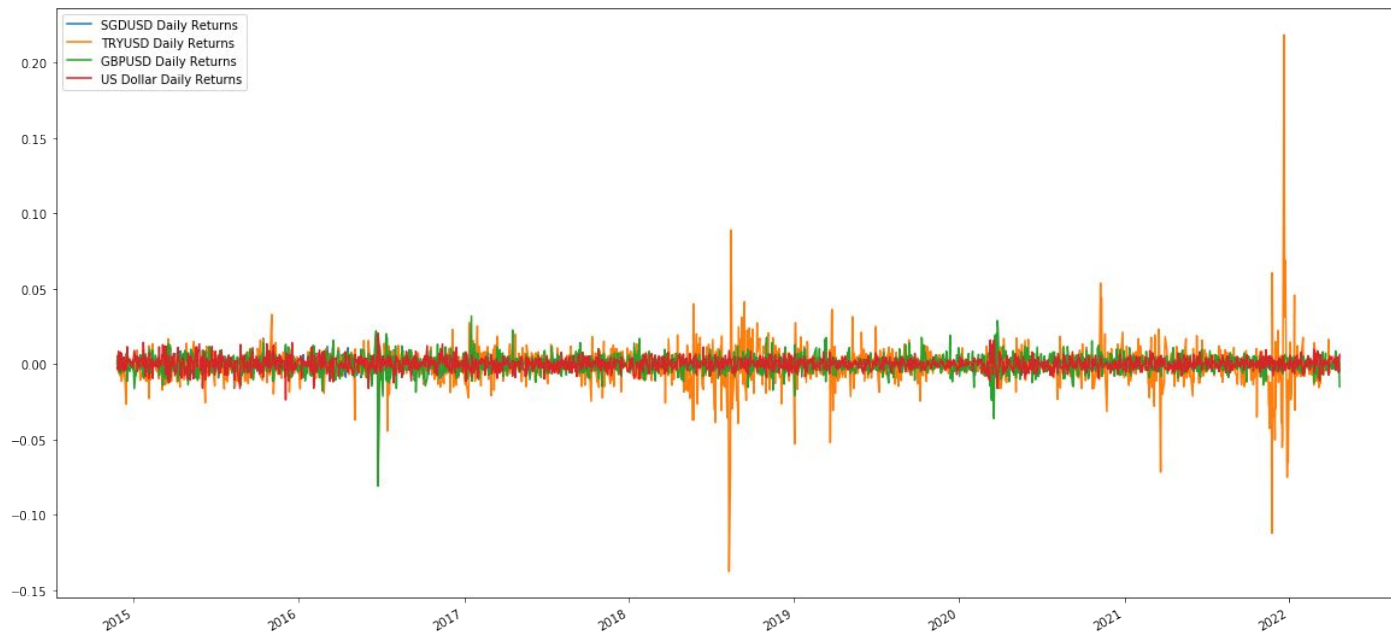
Comparing all 3 desired countries currencies, there is a 95% chance that your travel budget of \$1000 will end within the range of:


- \$927.23 and \$1067.88 for SGDUSD,
- \$677.71 and \$1151.11 for TRYUSD,
- \$672.75 and \$1153.54 for GBPUSD,

by the time of your projected vacation.

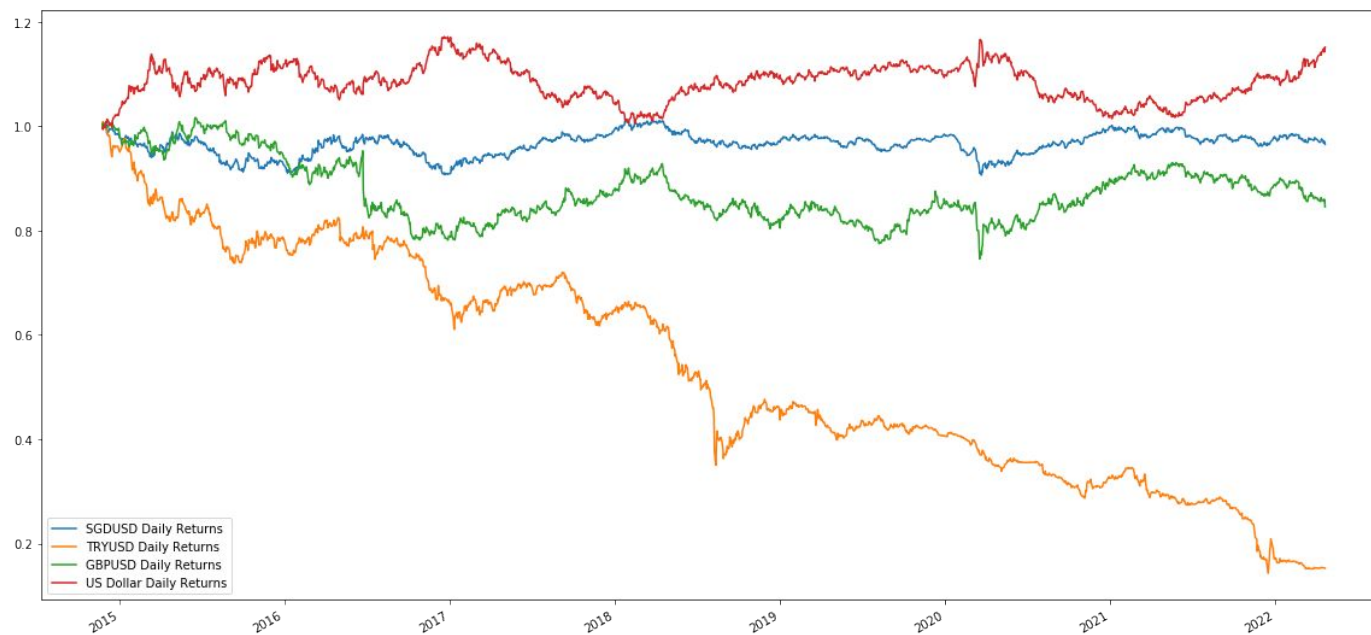


Group - Daily Returns



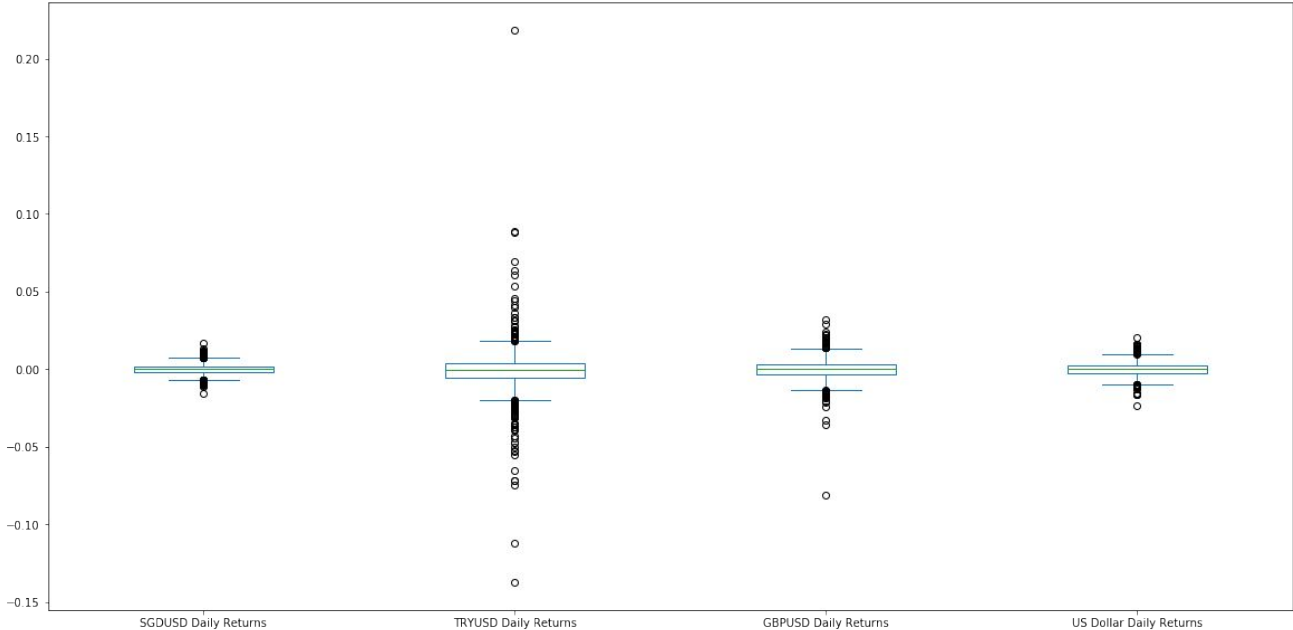


Group - Cumulative Returns



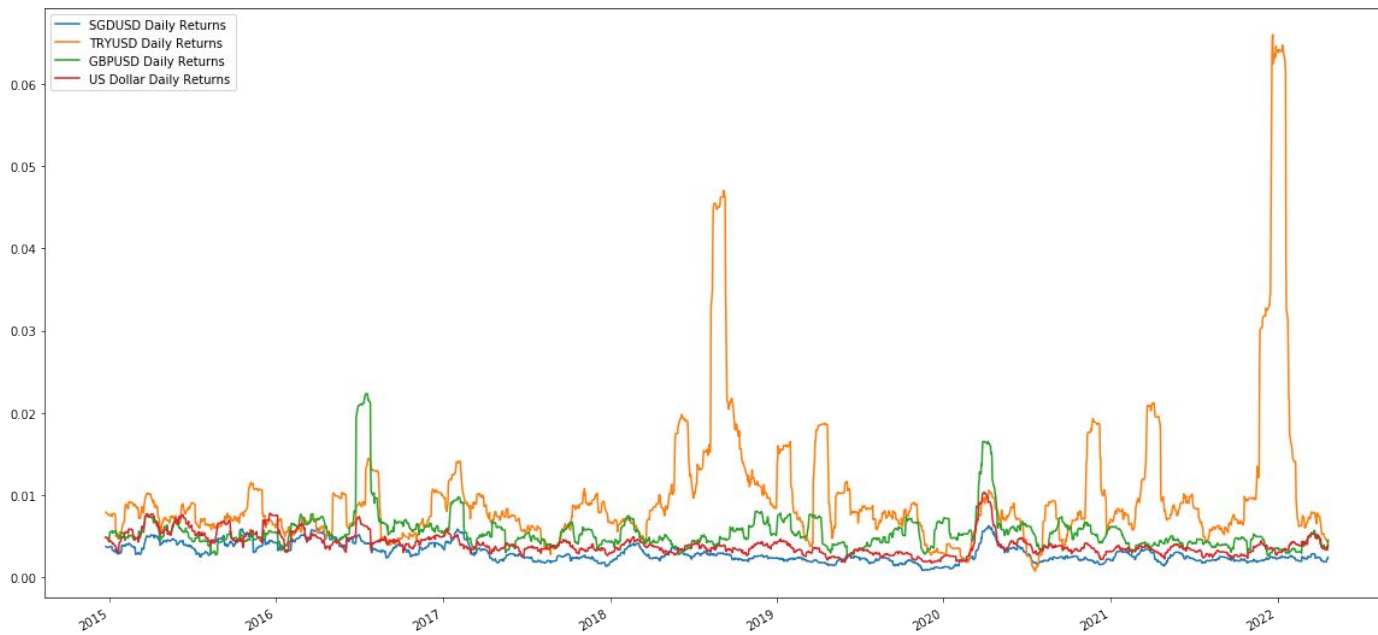


Group - Box plot: Returns





Group - 21 Day Rolling STD



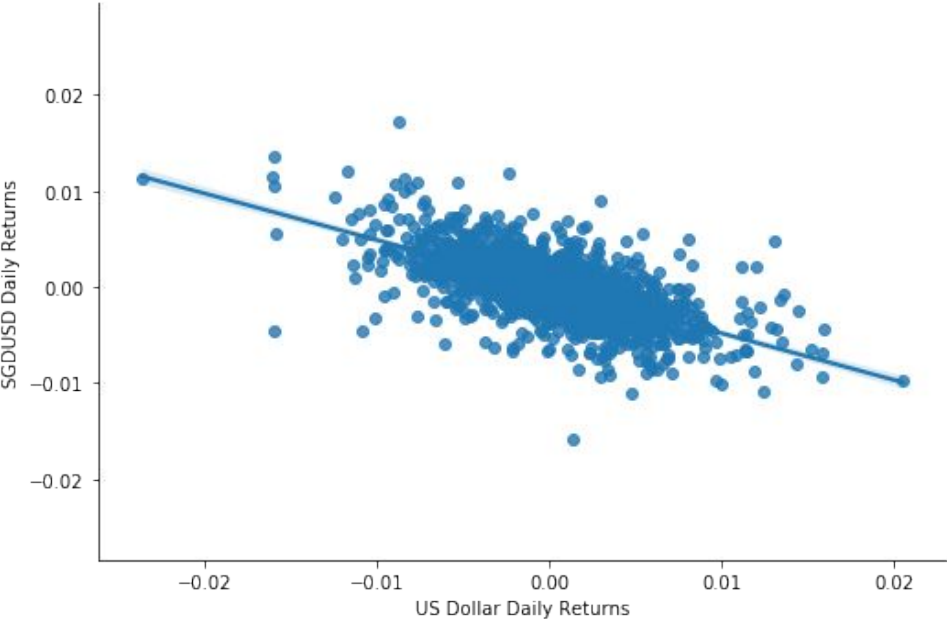


Group - Heat Map



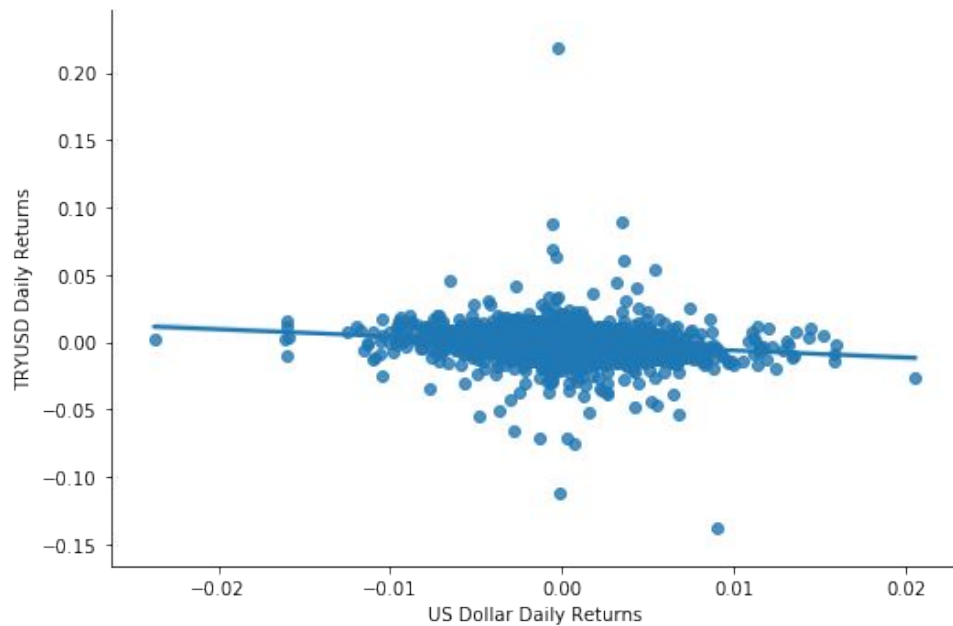



SGDUSD - Beta Trend



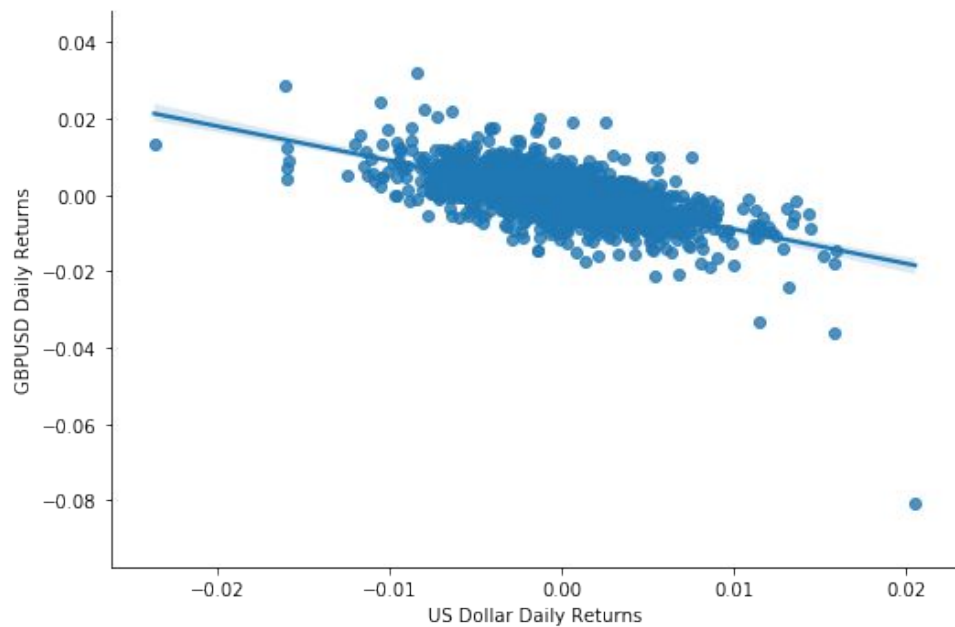


TRYUSD - Beta Trend



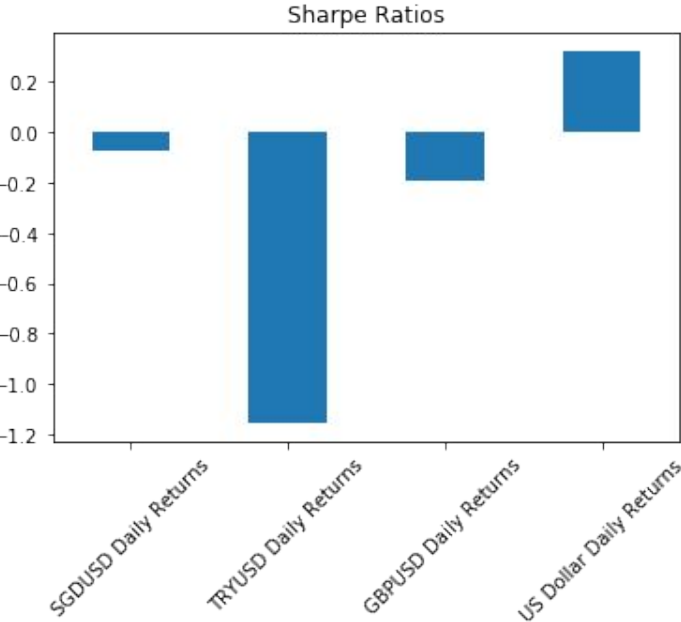



GBPUSD - Beta Trend



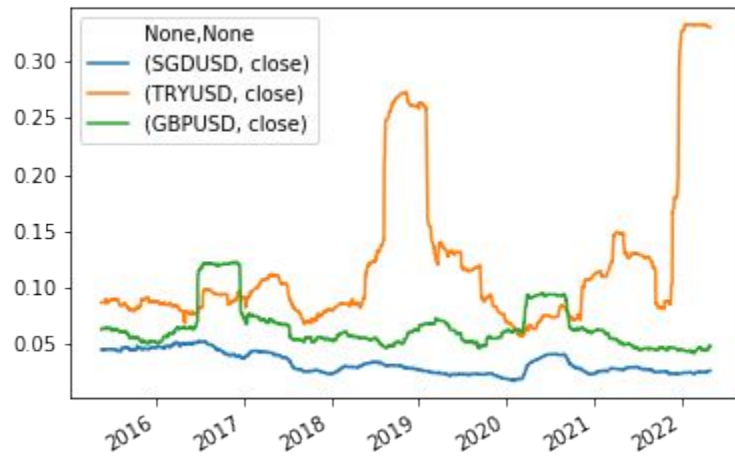


Group - Sharpe Ratios

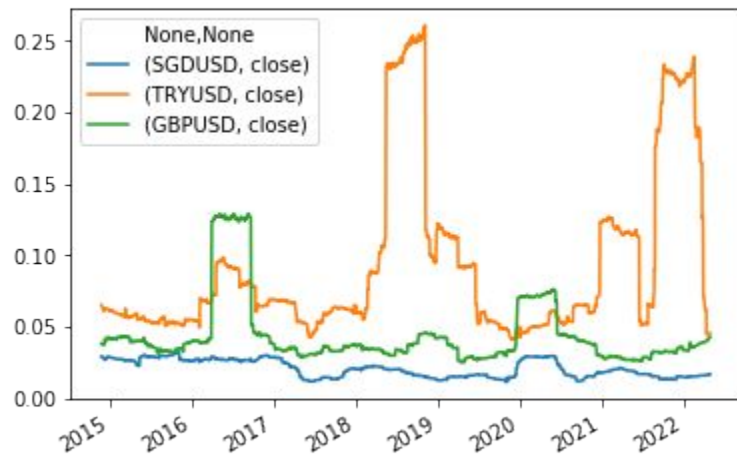




Group - Log Returns: Volatility

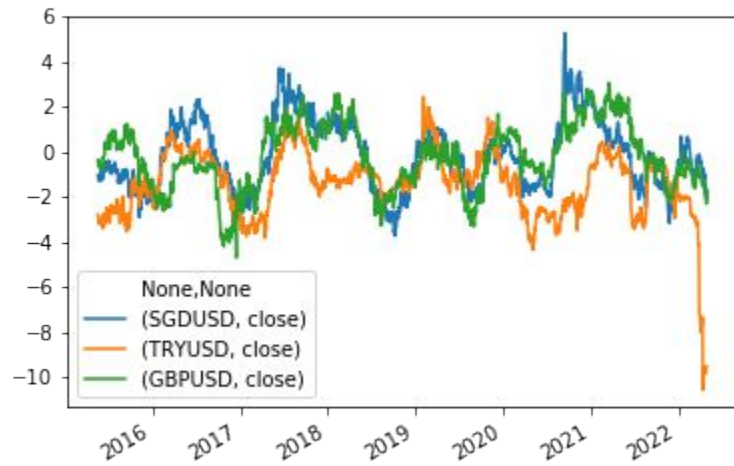


Group - Sortino: Volume



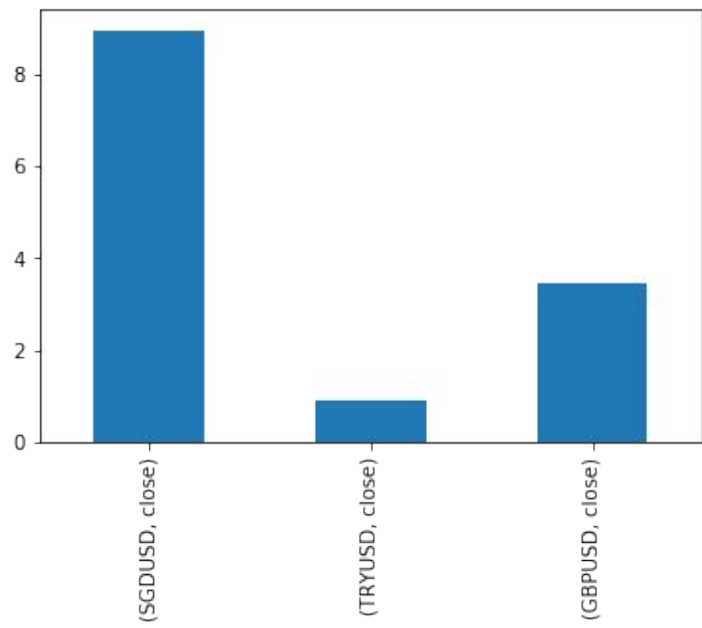


Group - Sortino: Ratios





Group - Calmar Ratio





Country Map



Country

- Afghanistan
- Albania
- Algeria
- Angola
- Antigua and Barbuda
- Argentina
- Armenia
- Australia
- Austria
- Azerbaijan
- Bahrain
- Bangladesh
- Barbados
- Belarus
- Belgium