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 currency risk.

We decided to create a program that could be used by real-world clients

Let’s see what we came up with…

Our Challenge

Challenge: Travelers have many options when it comes to selecting their ideal travel destination. One of the factors in that decision is **Value** and **Risk**. The value of their home currency when compared to the travel country and the risk of currency fluctuation before the trip will commence. Given that most travelers book their trip 3-12 months before traveling, the traveler may not experience the value they would like and at a higher risk.

Question: Could we create a tool that provides a currency value and risk forecast 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 input a set of countries, along with a travel timeframe (3,6,12 months), and their projected travel budget in-country. This tool will analyze historical Forex data and predict the country that will have the least risky currency.

Key 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

Q4 Is there correlation between weather and foreign currency

Data Exploration

To provide 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.

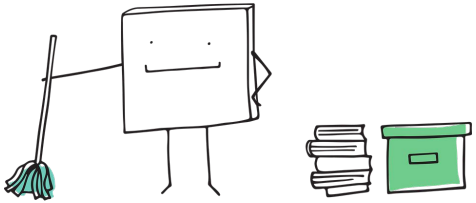
APIs used:

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

APIs Considered:

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

Data Clean up Process



- Selected: clean sources of data from our APIs, normalized to a singular base currency (USD).
- Imported: concatenated, splits, and 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

Application Run-Through

Conclusion / implications of findings

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

YES!

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

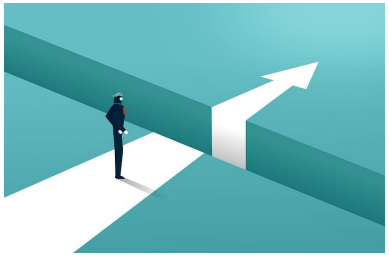
YES!

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

YES!

Is there correlation between weather variability and foreign currency variability

Issues / Barriers



- 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

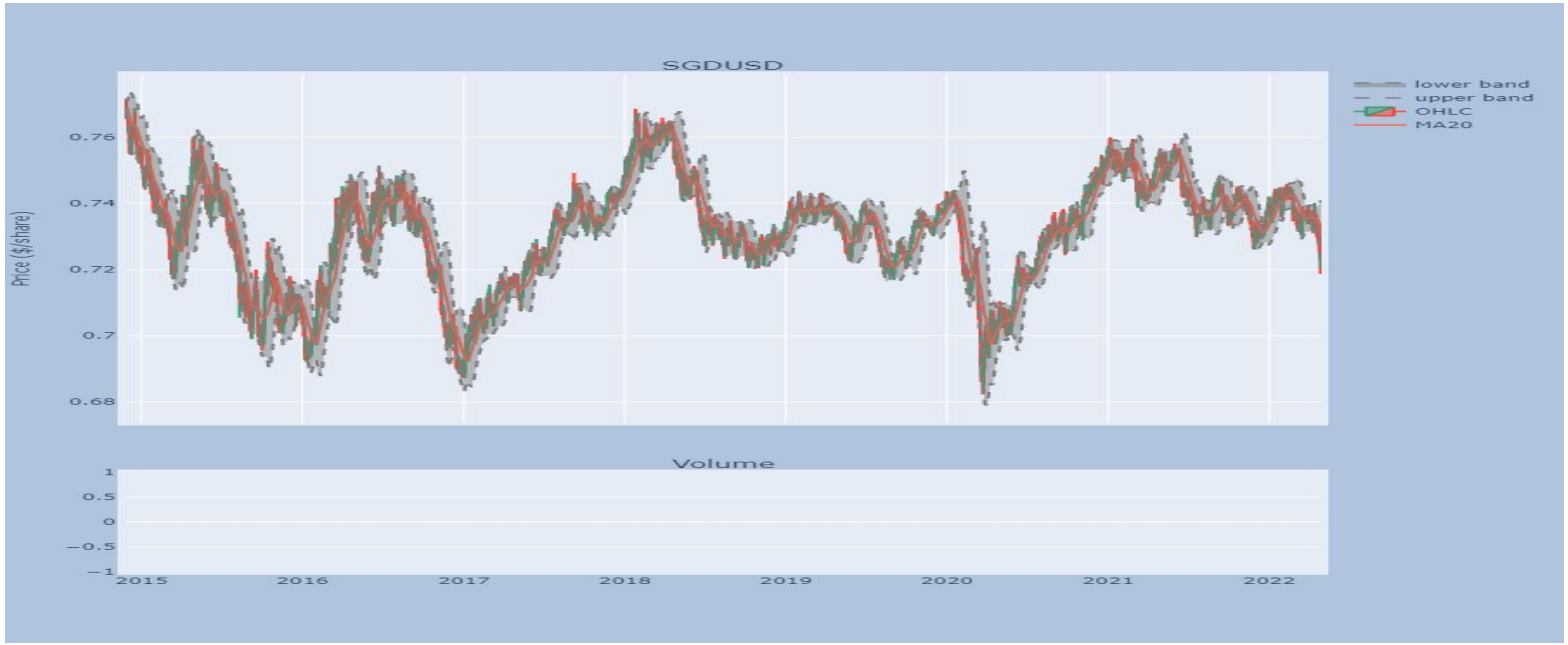
USD To GBP $1,000.00
Conversion Amount: 796.09

SGDUSD - Line Plot

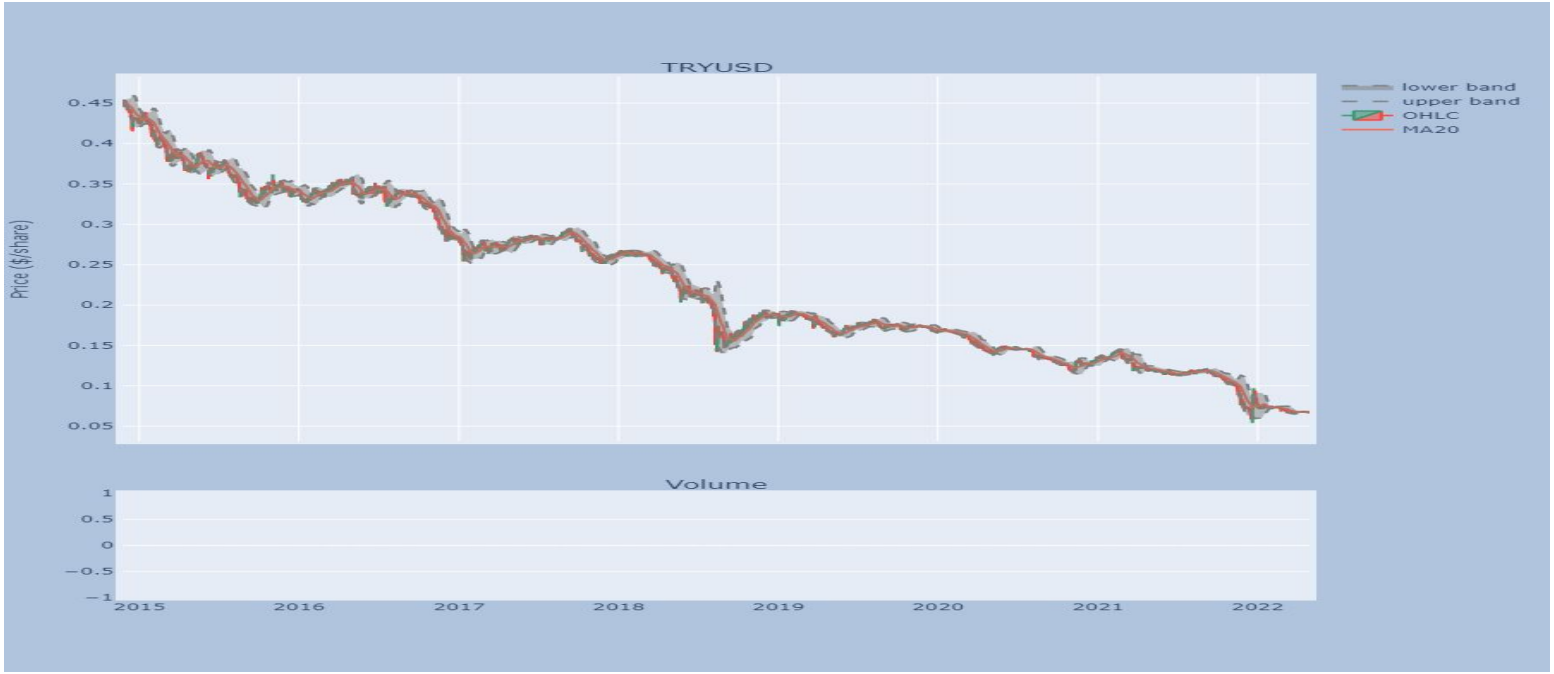
TRYUSD - Line Plot

GBPUSD - Line Plot

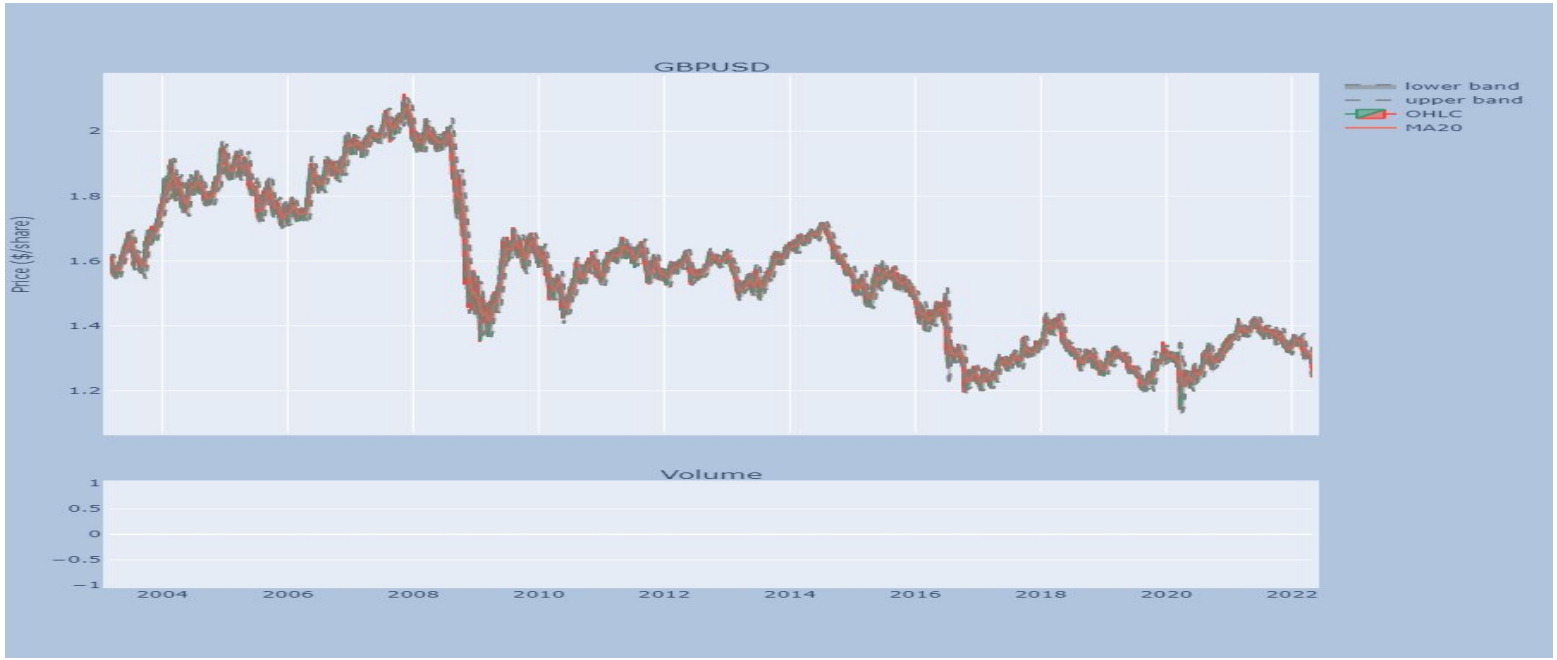
SGDUSD - Candlestick



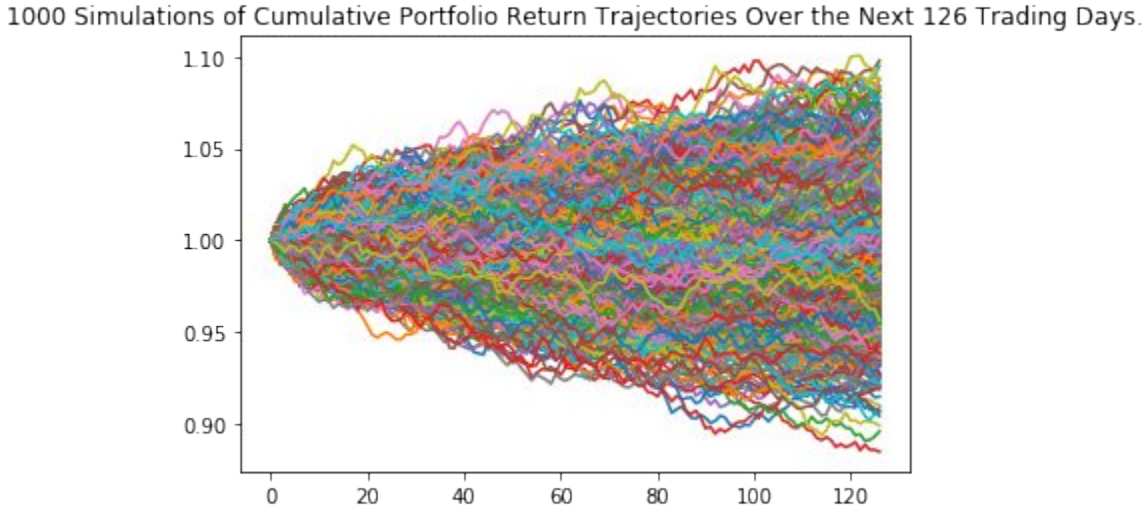
TRYUSD - Candlestick



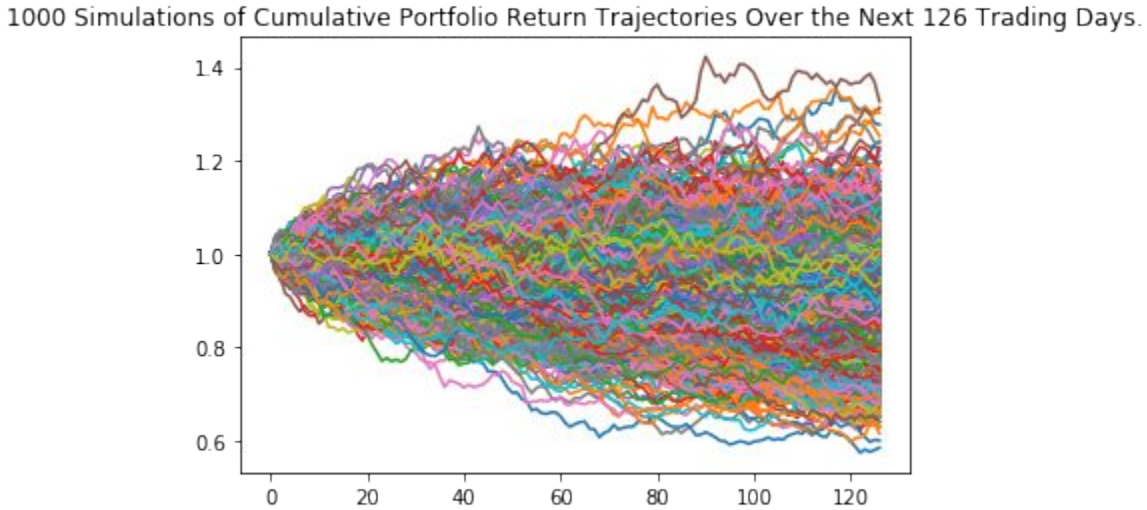
GBPUSD - Candlestick



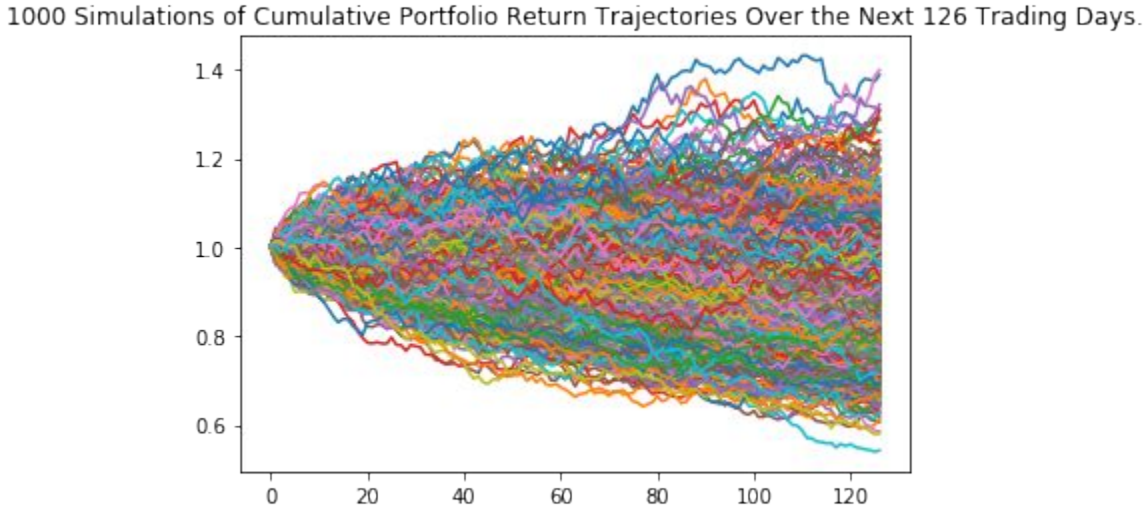
SGDUSD Monte Carlo - 6 months



TRYUSD Monte Carlo - 6 months



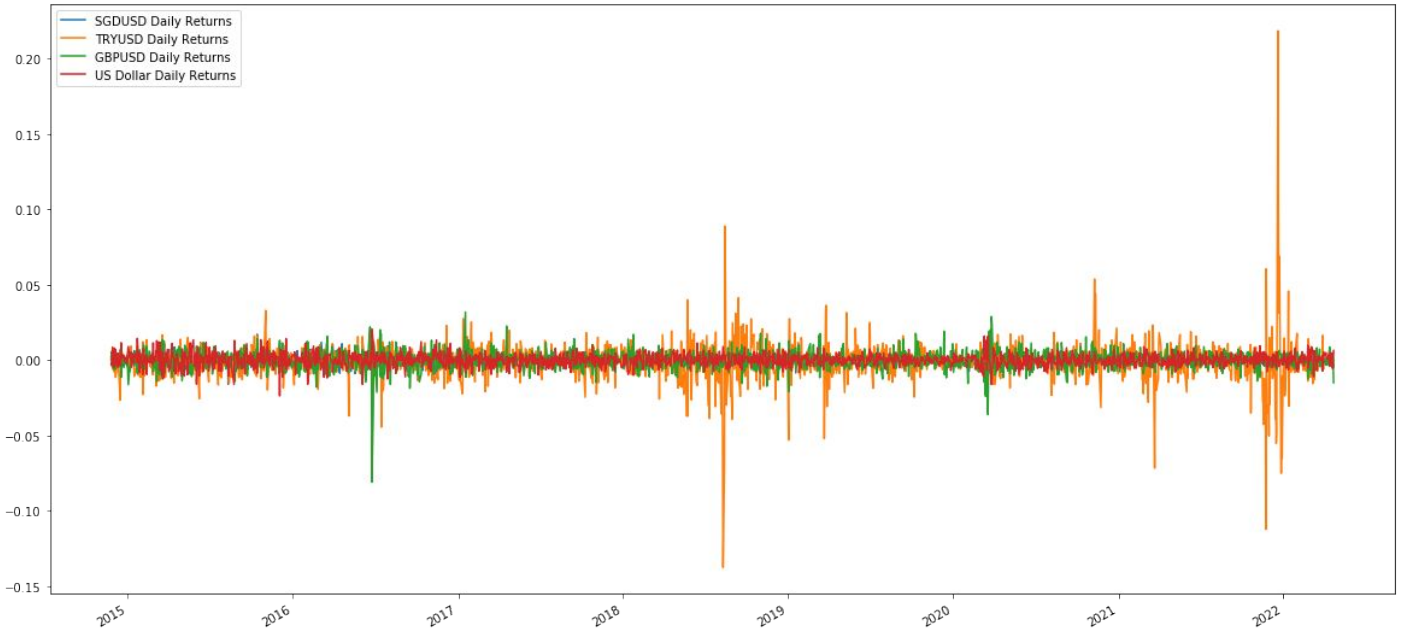
TRYUSD Monte Carlo - 6 months



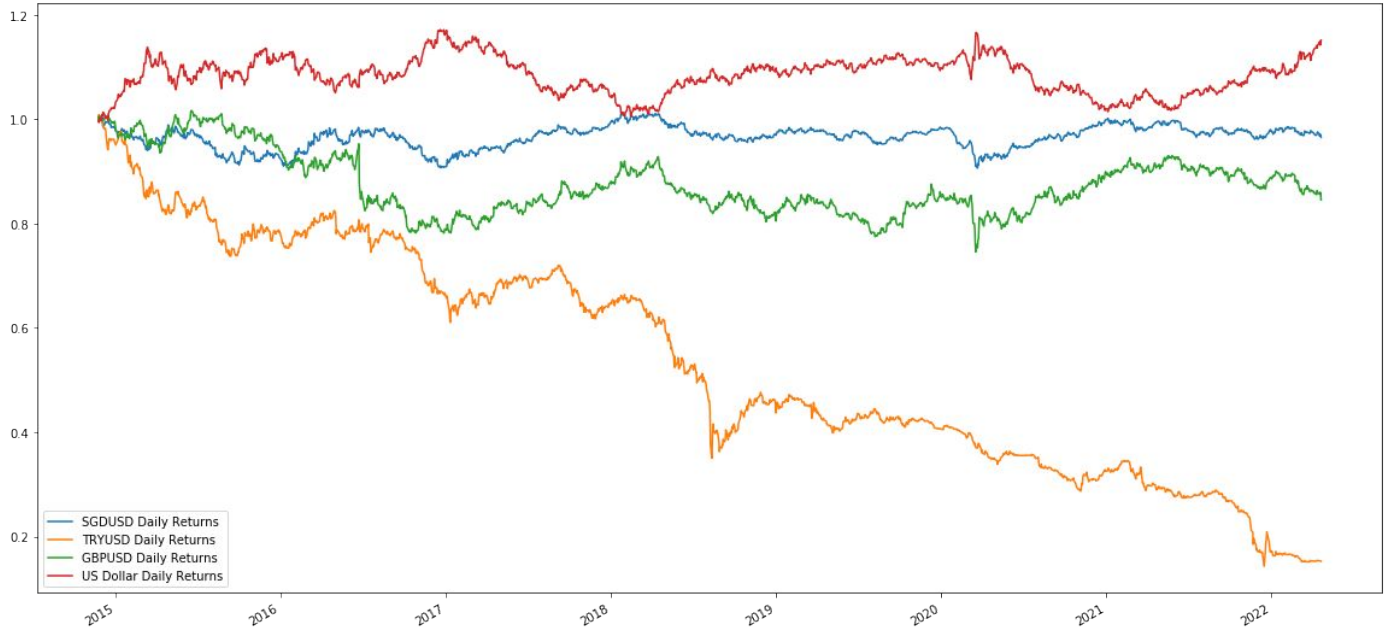
Monte Carlo - 95% Confidence Comparisons

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.

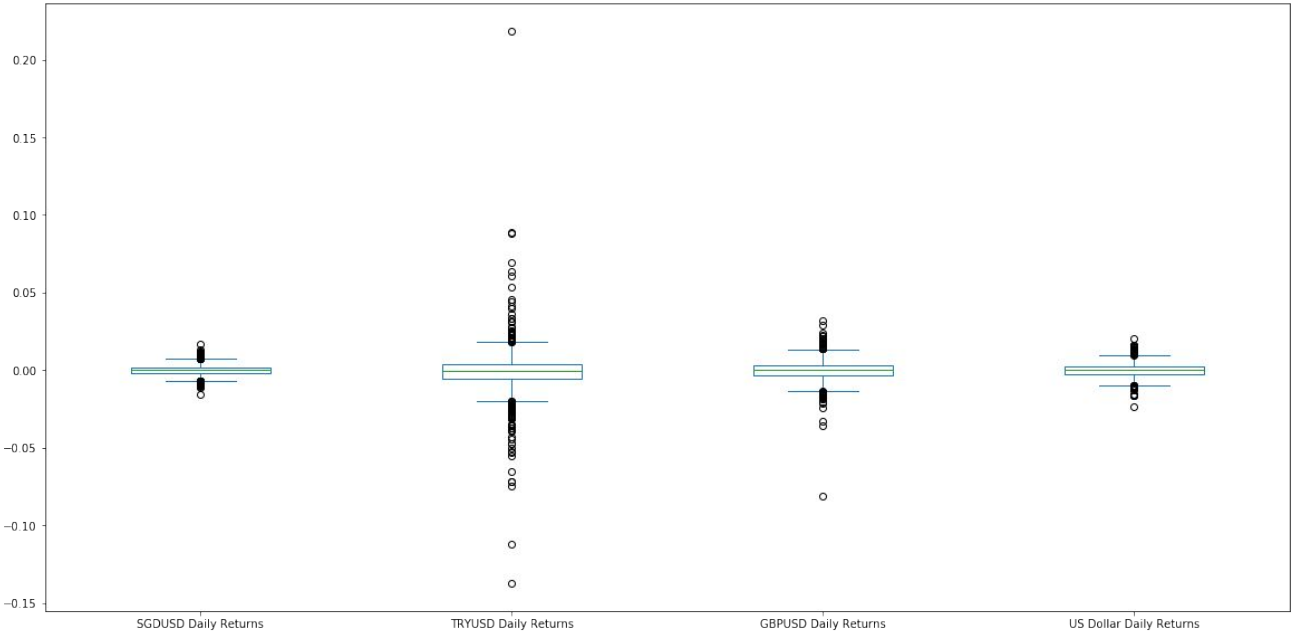
Group - Daily Returns



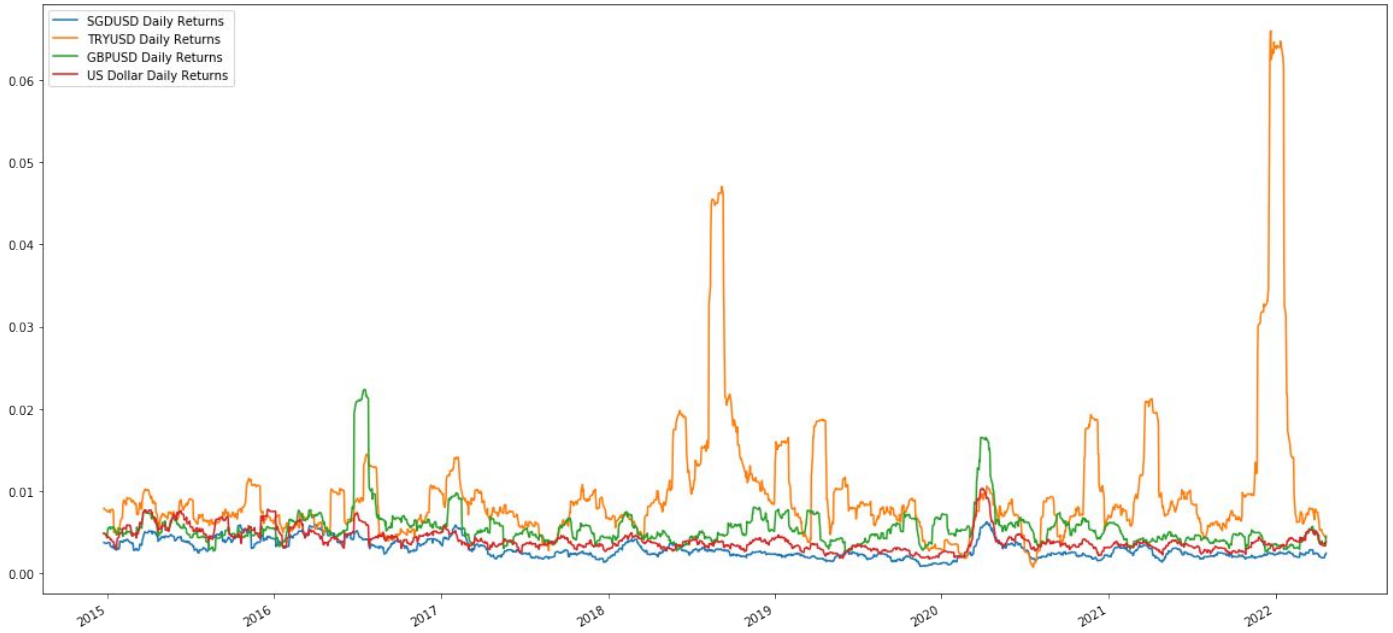
Group - Cumulative Returns



Group - Box plot: Returns

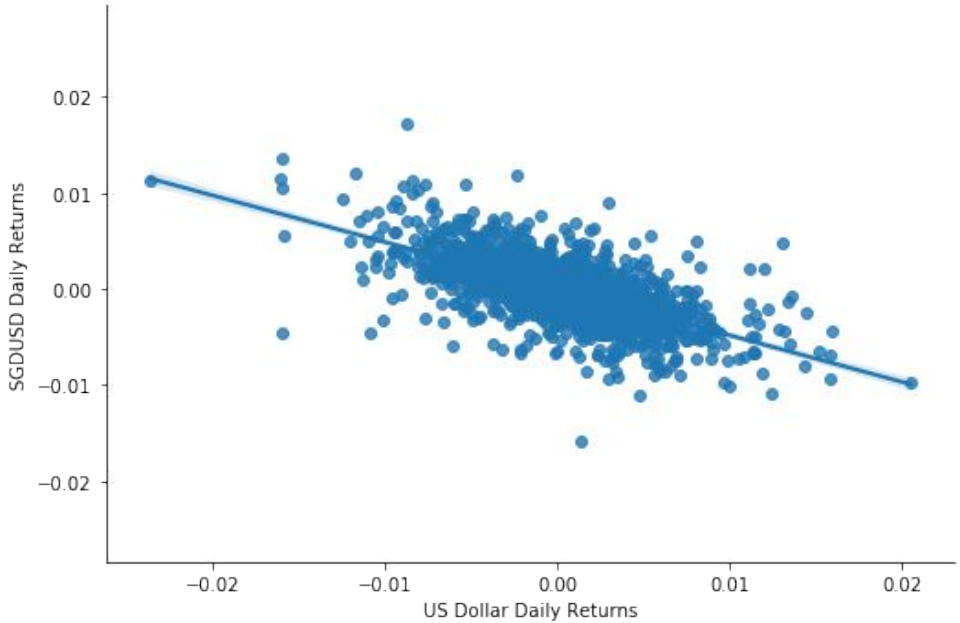


Group - 21 Day Rolling STD

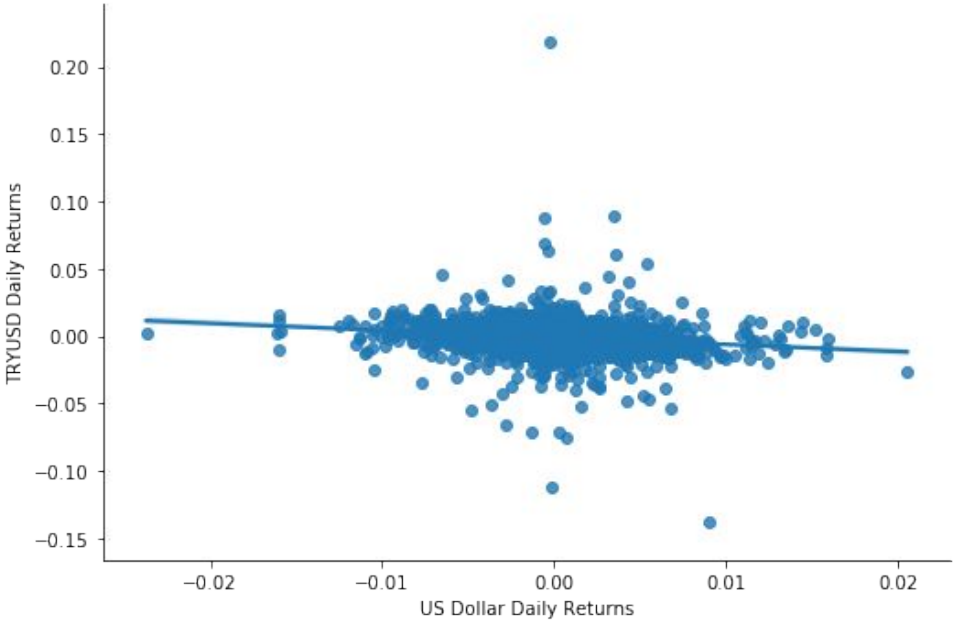


Group - Heat Map

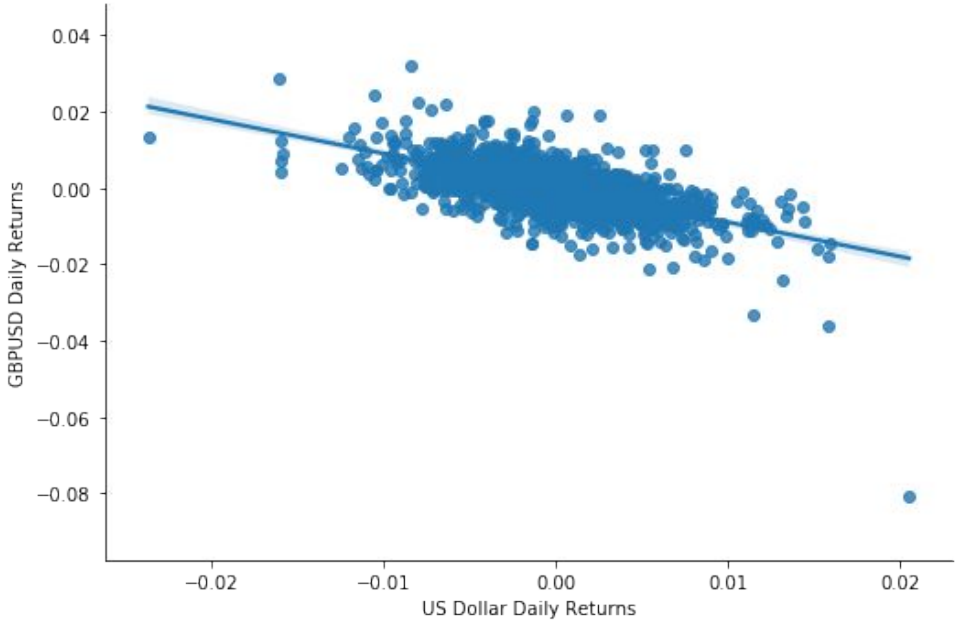
SGDUSD - Beta Trend



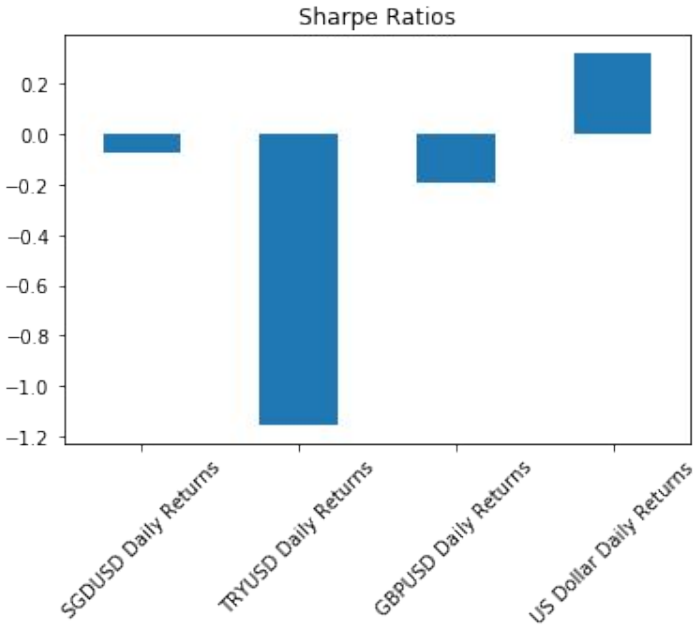
TRYUSD - Beta Trend



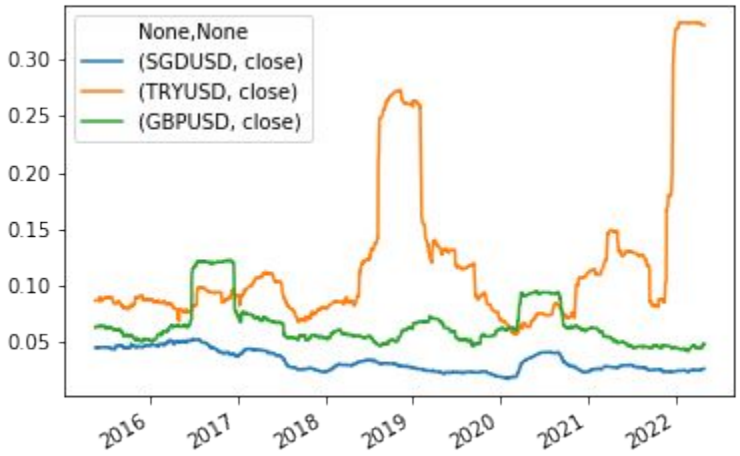
GBPUSD - Beta Trend



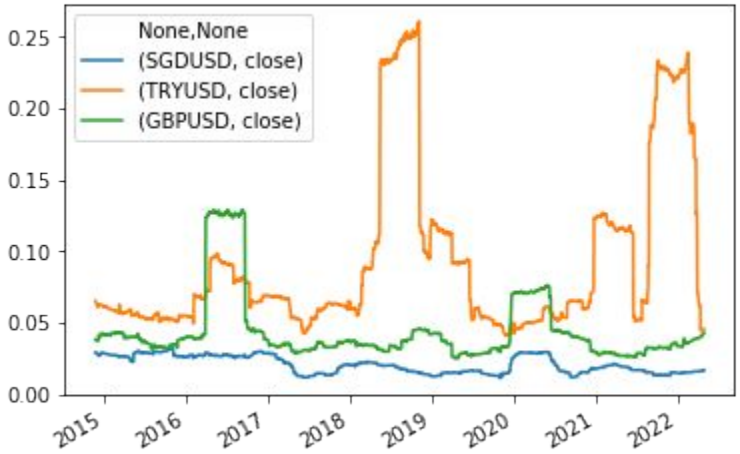
Group - Sharpe Ratios



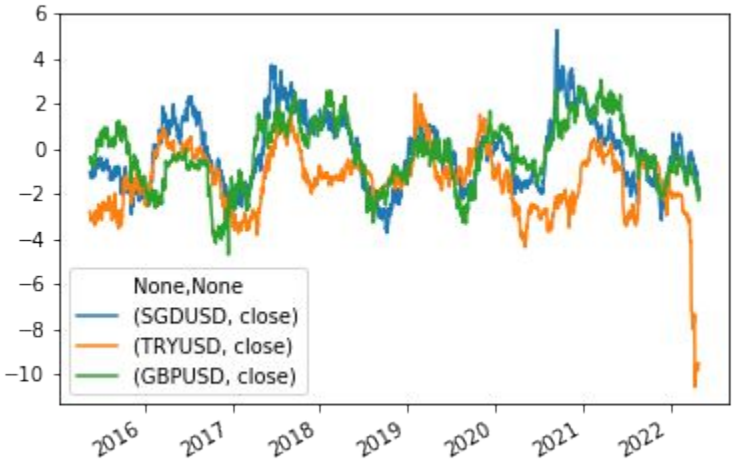
Group - Log Returns: Volatility



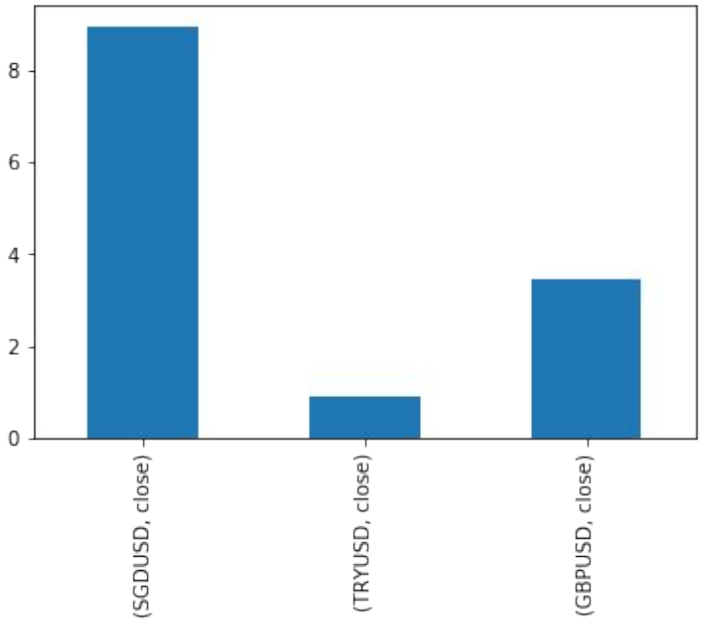
Group - Sortino: Volume



Group - Sortino: Ratios



Group - Calmar Ratio



Country Map


North Atlantic Ocean
South
Indian
United States
Cuba
Colombia
Peru
Brazil
Bolivia
Paraguay
Spain
France
Italy
Ukraine
Belarus
Morocco
Tunisia
Libya
Egypt
Turkey
Iraq
Iran
Saudi Arabia
Yemen
Senegal
Mali
Niger
Sudan
Cameroon
Kenya
Tanzania
Angola
Namibia
Madagascar
Kazakhstan
Uzbekistan
Mongolia
China
Japan
Pakistan
Nepal
India
Sri Lanka
Thailand
Philippines
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Angola
Antigua and Barbuda
Argentina
Armenia
Australia
Austria
Azerbaijan
Bahrain
Bangladesh
Barbados
Belarus
Belgium