Risk Analysis S&P 500

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# Quantitative Risk Assessment of S&P 500 Stocks

## Description

This project performs a quantitative risk assessment of the top 10 performing companies in the S&P 500 index from 2008 to 2023. The analysis includes the calculation of Value at Risk (VaR), Conditional Value at Risk (CVaR), and standard deviation for each company.

## Dataset

* **Source**: S&P 500 stock data from 2008 to 2023.
* **File**: SandP\_stocks\_data\_2008\_2023.csv
* **Columns**: Date, TSLA, NFLX, AVGO, NVDA, ODFL, DXCM, TDG, DPZ, FICO, REGN

## Installation Instructions

To run the analysis, you need to install the following R packages:

```r install.packages(‘dplyr’, repos=‘<http://cran.us.r-project.org>’) install.packages(‘lubridate’, repos=‘<http://cran.us.r-project.org>’) install.packages(‘ggplot2’, repos=‘<http://cran.us.r-project.org>’) install.packages(‘forecast’, repos=‘<http://cran.us.r-project.org>’) install.packages(‘tidyr’, repos=‘<http://cran.us.r-project.org>’) install.packages(‘PerformanceAnalytics’, repos=‘<http://cran.us.r-project.org>’)

# Load necessary libraries

library(dplyr) library(lubridate) library(ggplot2) library(forecast) library(tidyr) library(PerformanceAnalytics)

# Load the dataset

file\_path <- ‘C:/Users/artur/Downloads/New folder/SandP\_stocks\_data\_2008\_2023.csv’ df <- read.csv(file\_path)

# Convert the date column to Date type

colnames(df)[1] <- ‘Date’ dfDate, format=‘%Y-%m-%d’)

# Filter the dataset to include only the top 10 companies

# Top 10 companies identified previously

top\_10\_companies <- c(‘TSLA’, ‘NFLX’, ‘AVGO’, ‘NVDA’, ‘ODFL’, ‘DXCM’, ‘TDG’, ‘DPZ’, ‘FICO’, ‘REGN’) df\_top\_10 <- df %>% select(Date, all\_of(top\_10\_companies))

# Calculate daily returns for the top 10 companies

daily\_returns <- df\_top\_10 %>% mutate(across(-Date, ~ (log(. / lag(.))))) %>% na.omit()

# Calculate risk metrics: VaR, CVaR, and standard deviation

risk\_metrics <- daily\_returns %>% select(-Date) %>% summarise\_all(list( VaR = ~ VaR(., p = 0.95, method = ‘historical’), CVaR = ~ CVaR(., p = 0.95, method = ‘historical’), StdDev = ~ sd(.) ))

# Print risk metrics grouped by each company

for (company in top\_10\_companies) { cat(paste0(“Risk metrics for”, company, “:”)) cat(paste0(” VaR: “, risk\_metrics[[paste0(company, ”\_VaR”)]],”“)) cat(paste0(” CVaR: “, risk\_metrics[[paste0(company, ”\_CVaR”)]],”“)) cat(paste0(” StdDev: “, risk\_metrics[[paste0(company, ”\_StdDev”)]],”“)) cat(”“) }