Finance Application

Read stock prices for 5 different stocks. Close prices for 3 years, most recent 2024. Criteria Beta > 1, PE > 10, growth > 10%, different industries.

{r}

# Read stock prices

start<- as.Date("2021-01-01")

end<-as.Date("2024-01-01")

DIS <- getSymbols("DIS", from=start, to=end, auto.assign=FALSE)

NVDA <- getSymbols("NVDA", from=start, to=end, auto.assign=FALSE)

CVNA<-getSymbols("CVNA", from=start, to=end, auto.assign=FALSE)

SPOT<-getSymbols("SPOT", from=start, to=end, auto.assign=FALSE)

DASH<-getSymbols("DASH", from=start, to=end, auto.assign=FALSE)

## Closed price

DIS.close <- DIS[ ,4]

NVDA.close <- NVDA[ ,4]

CVNA.close <- CVNA[ ,4]

SPOT.close <- SPOT[ ,4]

DASH.close <- DASH[ ,4]

## Returns

DIS.return <- dailyReturn(DIS.close)

NVDA.return <- dailyReturn(NVDA.close)

CVNA.return <- dailyReturn(CVNA.close)

SPOT.return <- dailyReturn(SPOT.close)

DASH.return <- dailyReturn(DASH.close)

Disney: beta(1.44), P/E(29.69), Growth Estimate(11.28), Industry: EntertainmentNvidia: beta(1.96), P/E(38.89), Growth Estimate(27.98%), Industry: SemiconductorsCarvana: beta(3.62), P/E(138.64), Growth Estimate(43.53%), Industry: Auto & Truck Dealerships Spotify: beta(1.75), P/E(90.03), Growth Estimate(27.20%), Industry: Internet Content & InformationDoorDash: beta(1.69), P/E(627.07), Growth Estimate(31.84%), Industry: Communication Services

(a)Plot close prices on three different plots. Notice the general "trend" and "variation" on different spans.

{r, warning=FALSE}

#Plot close stock prices on different plots.

plot(DIS.close, main = "Disney Closing Prices", type = "l", col = "blue", xlab = "Date", ylab = "Price")

plot(NVDA.close, main = "NVIDIA Closing Prices", type = "l", col = "red", xlab = "Date", ylab = "Price")

plot(CVNA.close, main = "Carvana Closing Prices", type = "l", col = "green", xlab = "Date", ylab = "Price")

plot(SPOT.close, main = "Spotify Closing Prices", type = "l", col = "magenta", xlab = "Date", ylab = "Price")

plot(DASH.close, main = "DoorDash Closing Prices", type = "l", col = "purple", xlab = "Date", ylab = "Price")

Remark: The closing prices for Disney, Carvana, Spotify and Doordash show a decline in 2022. Carvana doesn't have much variation through 2023. Spotify shows an increase with slight variation in 2023. Disney and Doordash both show variation in 2023. The closing price for NVIDIA rises until the end of 2021 then falls until it starts to rise again toward the end of 2022.

(b)Calculate annualized average return and annualized risk. Present the correlations matrix.

{r, warning=FALSE}

library(PerformanceAnalytics)

#Calculate the annualized return and annualized risk of each stock.

## A function to compute the Annualized Expected return/Risk

mu.sigma <- function(return){

mu.ann <- mean(return) \* 252

sigma.ann <- sd(return) \* sqrt(252)

return(c(mu.ann, sigma.ann))

}

## Annualized Expected Return and Annualized Risk

dis <- mu.sigma(DIS.return)

nvda <- mu.sigma(NVDA.return)

cvna <- mu.sigma(CVNA.return)

spot <- mu.sigma(SPOT.return)

dash <- mu.sigma(DASH.return)

cat('Disney:', dis, '\n')

cat('NVIDIA:', nvda, '\n')

cat('Carvana:', cvna, '\n')

cat('Spoify:', spot, '\n')

cat('DoorDash:', dash, '\n')

## Correlation Matrix

returns <- cbind(DIS.return,NVDA.return,CVNA.return,SPOT.return,DASH.return)

colnames(returns) <- c('Disney', 'NVIDIA', 'Carvana', 'Spotify','DoorDash')

head(returns)

chart.Correlation(returns)

Remark: Disney has a -18.1% return with a 29.9% risk.NVIDIA has a 58.3% return with a 53% risk.Carvana has a 31.3% return with a 129.6% risk.Spoify has a -3.4% return with a 51.7% risk.DoorDash has a 10.9% return with a 67.1% risk. From the correlation coefficients we can see these companies generally move in the same direction. The Spotify-Doordash scatter plot shows a tight upward trend, indicating a strong positive correlation between the two.

(c)Plot cumulative returns on one common plot.

{r, warning=FALSE}

## Compute cumulative returns

cumulative\_returns <- cumprod(1 + returns)

## Using chart.CumReturns from PerformanceAnalytics

chart.CumReturns(returns, wealth.index = TRUE, legend.loc = 'topleft',

main = 'Cumulative Returns', colorset = c('blue', 'red','green','magenta','purple'))

Remark: NVIDIA shows a significant upward trend, indicating strong growth.Disney, Carvana, Spotify, and DoorDash have more moderate growth.

(d)Estimate alpha, beta, Rsquare.

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## SP500(Benchmark)

SP500<- getSymbols("^GSPC", from=start, to=end, auto.assign = FALSE)

SP500.close <- SP500[ , 5]

SP500.return<- dailyReturn(SP500.close)

##Riskfree rates

rf <- read.csv("F-F\_Research\_Data\_Factors\_daily.CSV", head=T, skip=3) # a data frame

head(rf)

rf$dates <- as.Date(rf$X, format="%Y%m%d") # create dates as X in the fama.french

## sort ff according to dates

rf.new <- rf[rf$dates >= "2021-01-01" & rf$dates<= "2024-01-01", ]

head(rf.new)

#dim(rf.new)

#tail(rf.new)

rf.new <- rf.new[ -754, ]

#dim(rf.new)

# Estimate alpha, beta, Rsquare of 3 stocks.

beta <- function(stock.return, market.return, riskfree.rate) {

stock.excess <- stock.return - riskfree.rate

market.excess <- market.return - riskfree.rate

model <- lm(stock.excess ~ market.excess)

coefs <- coef(model)

Rsquare <- summary(model)$r.squared

results <- data.frame(alpha = coefs[1], beta = coefs[2], Rsquare = Rsquare)

return(results)

}

# Call beta function for each stock

res\_DIS <- beta(DIS.return, SP500.return, rf.new$RF)

res\_NVDA <- beta(NVDA.return, SP500.return, rf.new$RF)

res\_CVNA <- beta(CVNA.return, SP500.return, rf.new$RF)

res\_SPOT <- beta(SPOT.return, SP500.return, rf.new$RF)

res\_DASH <- beta(DASH.return, SP500.return, rf.new$RF)

# Combine the individual results into one table

results\_table <- rbind(Disney = res\_DIS, NVIDIA = res\_NVDA, Carvana = res\_CVNA, SPOT = res\_SPOT, DASH = res\_DASH)

# Display the resulting table

print(results\_table)

Remark: The alphas tell us the stocks underperformed relative to market expectations. Betas are less than the baseline of 1, suggesting less sensitivity to market movements.