VR3_Assignment #2

February 12, 2016

In this report, we provide a current status of a 6 year investment in 5 different stocks, including Apple, GE, Walmart, Exxon, and Band of America. We examine annual return on investment, both absolute and relative to the market. We also examine associated risk, as measured by Historical Volatility: the standard deviation of the stock values for a given time.

Data was obtained from the yahoo finance website, and contains daily values for open, close, high, and lows.

First we load the data

```
#install.packages("data.table",repos="http://cran.rstudio.com/")
#install.packages("bizdays",repos="http://cran.rstudio.com/")
#install.packages("tables", repos="http://cran.rstudio.com/")
library(data.table,quietly=T)
library(bizdays,quietly=T)
```

```
##
## Attaching package: 'bizdays'
```

```
## The following object is masked from 'package:stats':
##
##     offset
```

```
#library(tables)
library(knitr,quietly=T)

setwd("~/Desktop/Data Sciences/Data Visualization/HW/Assignment#2/")
getwd()
```

```
## [1] "/home/tanner/Desktop/Data Sciences/Data Visualization/HW/Assignment#2"
```

```
APPLE <- read.csv("APPLE.csv")
BOA <- read.csv("BOA.csv")
EXXON <- read.csv("EXXON.csv")
GE <- read.csv("GE.csv")
MARKET <- read.csv("NYSE_composite.csv")
WALMART <- read.csv("WALMART.csv")

APPLE$company <- "Apple"
BOA$company <- "Bank of America"
EXXON$company <- "Exxon"
GE$company <- "General Electric"
MARKET$company <- "NYSE Composite"
WALMART$company <- "Walmart"
```

```
all.data <- data.table(rbind(APPLE, BOA, WALMART, GE, EXXON, MARKET))
all.data <- all.data[, c('Open', 'High', 'Low', 'Close') := NULL]
names(all.data)[2] <- 'adj_close'
```

```
## Warning in `names<-.data.table`(`*tmp*`, value = c("Date", "adj_close", :
## This is R<3.1.0 where names(x)<-value deep copies the entire table (several
## times). Please upgrade to R>=3.1.0 and see ?setnames which allows you to
## change names by name with built-in checks and warnings.
```

```
all.data <- all.data[, Date := as.Date(Date) ]
all.data <- all.data[ Date >= as.Date('2010-01-29'), ]
```

next we organize the data with a factor by year, and since we are talking about years since 1/29/10, each "adjusted year" begins and ends on the next business day

```
years <- 2010:2016
dates <- ISOdate(years, 1, 29)
cal <- Calendar(weekdays=c('sunday', 'saturday'))
dates <- adjust.next(dates, cal)

# setting year values (is from 1-29 instead of 1-1)
map <- as.data.table(dates)
map[, year := year(dates)]
all.data$year <- map$year[findInterval(x = all.data$Date, vec = map$dates)]

# add current day to important dates so we get 2016 so far
dates <- c(dates, all.data$Date[1])
```

Now we get the aggregate results for the annual return as 'change', relative annual return as 'rel_change', andhistorical volatility as 'volatility'.

```
# getting changes by adj_year
year.data <- all.data[ Date %in% dates, ]
year.data[, change := 100 * adj_close / shift(adj_close, type = 'lead') - 100 ]

# adjusting year value since date marks when change happens
year.data[Date != last(dates), year := as.integer(year) - 1]
```

```
## Warning in `[.data.table`(year.data, Date != last(dates), `:=`(year,
## as.integer(year) - : Coerced 'double' RHS to 'integer' to match the
## column's type; may have truncated precision. Either change the target
## column to 'double' first (by creating a new 'double' vector length 48
## (nrows of entire table) and assign that; i.e. 'replace' column), or coerce
## RHS to 'integer' (e.g. 1L, NA_[real|integer]_, as.*, etc) to make your
## intent clear and for speed. Or, set the column type correctly up front when
## you create the table and stick to it, please.
```

```
# removing oldest year as it has meaningless change
year.data <- year.data[Date != dates[1] , ]

# getting relative to market changes
market.year.data <- year.data[company == 'market',]
year.data[, rel_change := ((change / 100 + 1) / (market.year.data$change / 100 + 1)) * 100 - 100, by = c

# historical volatility: sd of daily prices
all.data[, volatility := sd(adj_close), by = list(company, year)]
```

```
total_volatilities <- all.data[, sd(adj_close), by = list(company)]
volat <- all.data
volat[, c('Date', 'adj_close') := NULL ]
volat <- unique(volat)

# merging tables
setkey(year.data, company, year)
setkey(volat, company, year)
final.data <- year.data[volat, ]
final.data[, c('Date', 'adj_close') := NULL ]
```

Now that the data has been munged and organized into a proper tabulated format, we must produce an excellent table to represent it. Below are some attempts, including using kable, and the latex function to produce a table in latex.

```
setwd("~/Desktop/Data Sciences/Data Visualization/HW/Assignment#2/")
final_table <- read.csv("final_table.csv")

kable(final_table,
      caption="Annual Return is computed by the change in value from the beginning of year to end. Rela
      col.names = c("Company", " ", "2010","2011","2012",   "2013", "2014","2015","2016","Total"),
      padding=2,
      escape = TRUE,
      format.args = list(na.encode=FALSE,
                         n.rgroup=c(3,3,3,3,3,3,1),
                         n.cgroup = c(2,7))
)
```

Table 1: Annual Return is computed by the change in value from the beginning of year to end. Relative Return is computed by dividing the Annual Return by the market return. Historical Volatility is computed by taking the standard deviation for the given period of time.

Company		2010	2011	2012	2013	2014	2015	2016	Total
Apple	Annual Return	76.67	33.51	2.06	12.01	69.71	-16.74	-2.92	281.01
	Relative Return	4.20	-8.95	0.15	1.05	9.53	1.69	0.70	7.03
	Historical Volatility	5.28	3.89	7.54	6.83	13.54	8.66	1.12	28.35
B of A	Annual Return	-9.28	-48.26	63.31	45.60	-6.82	-7.24	-15.49	-3.53
	Relative Return	-0.51	12.89	4.50	3.97	-0.93	0.73	3.70	-0.09
	Historical Volatility	1.98	3.11	1.31	1.44	0.88	0.99	0.91	3.52
Exxon	Annual Return	28.61	8.47	10.06	6.48	-5.31	-8.06	5.03	42.33
	Relative Return	1.57	-2.26	0.72	0.56	-0.73	0.81	-1.20	1.06
	Historical Volatility	4.74	3.95	3.21	3.86	3.85	4.61	2.18	11.87
GE	Annual Return	28.78	-2.88	23.51	16.04	-1.42	25.02	-2.89	120.92
	Relative Return	1.58	0.77	1.67	1.39	-0.19	-2.53	0.69	3.03
	Historical Volatility	1.17	1.55	1.20	1.66	0.71	2.14	0.48	4.95
Walmart	Absolute Return	7.36	12.32	16.82	8.63	21.35	-22.25	-0.27	44.38
	Relative Return	0.40	-3.29	1.20	0.75	2.92	2.25	0.06	1.11
	Historical Volatility	1.69	2.72	5.57	2.81	4.51	8.35	0.63	12.07
Total	Annual Return	132.14	3.16	115.76	88.76	77.51	-29.27	-16.54	1124.53
	Relative Return	7.24	-0.84	8.24	7.72	10.60	2.95	3.95	12.14

Company		2010	2011	2012	2013	2014	2015	2016	Total
	Historical Volatility	7.65	7.09	10.07	8.62	14.82	13.10	2.73	33.57
Market	Annual Return	18.24	-3.74	14.06	11.50	7.31	-9.90	-4.18	39.95

```
#latex(final_table,center='centering',numeric.dollar=FALSE,colheads=c("Company", " ", "2010","2011","20
```