Return Calculations in R

Econ 424
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Eric Zivot
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Example Data

```
# Set output options and location of data
> options(digits = 4)
> options(width = 75)
> loadPath = "C:\\Users\\ezivot.SOCIOLOGY\\Documents\\FinBook\\excel\\"

# read data into R
> sbux.df = read.csv(file=paste(loadPath, "sbuxPrices.csv", sep=""),
+                header=TRUE, stringsAsFactors=FALSE)
> msft.df = read.csv(file=paste(loadPath, "msftPrices.csv", sep=""),
+                header=TRUE, stringsAsFactors=FALSE)

> class(sbux.df)
[1] "data.frame"

> str(sbux.df)
'data.frame':   181 obs. of  2 variables:
 $ Date     : chr  "3/31/1993" "4/1/1993" "5/3/1993" "6/1/1993" ...
 $ Adj.Close: num  1.19 1.21 1.5 1.53 1.48 1.52 1.71 1.67 1.39 1.39
…
```

Example Data

```
> head(sbux.df)
        Date Adj.Close
1 3/31/1993      1.19
2  4/1/1993      1.21
3  5/3/1993      1.50
4  6/1/1993      1.53
5  7/1/1993      1.48
6  8/2/1993      1.52


> colnames(sbux.df)
[1] "Date"      "Adj.Close"

> class(sbux.df$Date)
[1] "character"

> class(sbux.df$Adj.Close)
[1] "numeric"
```
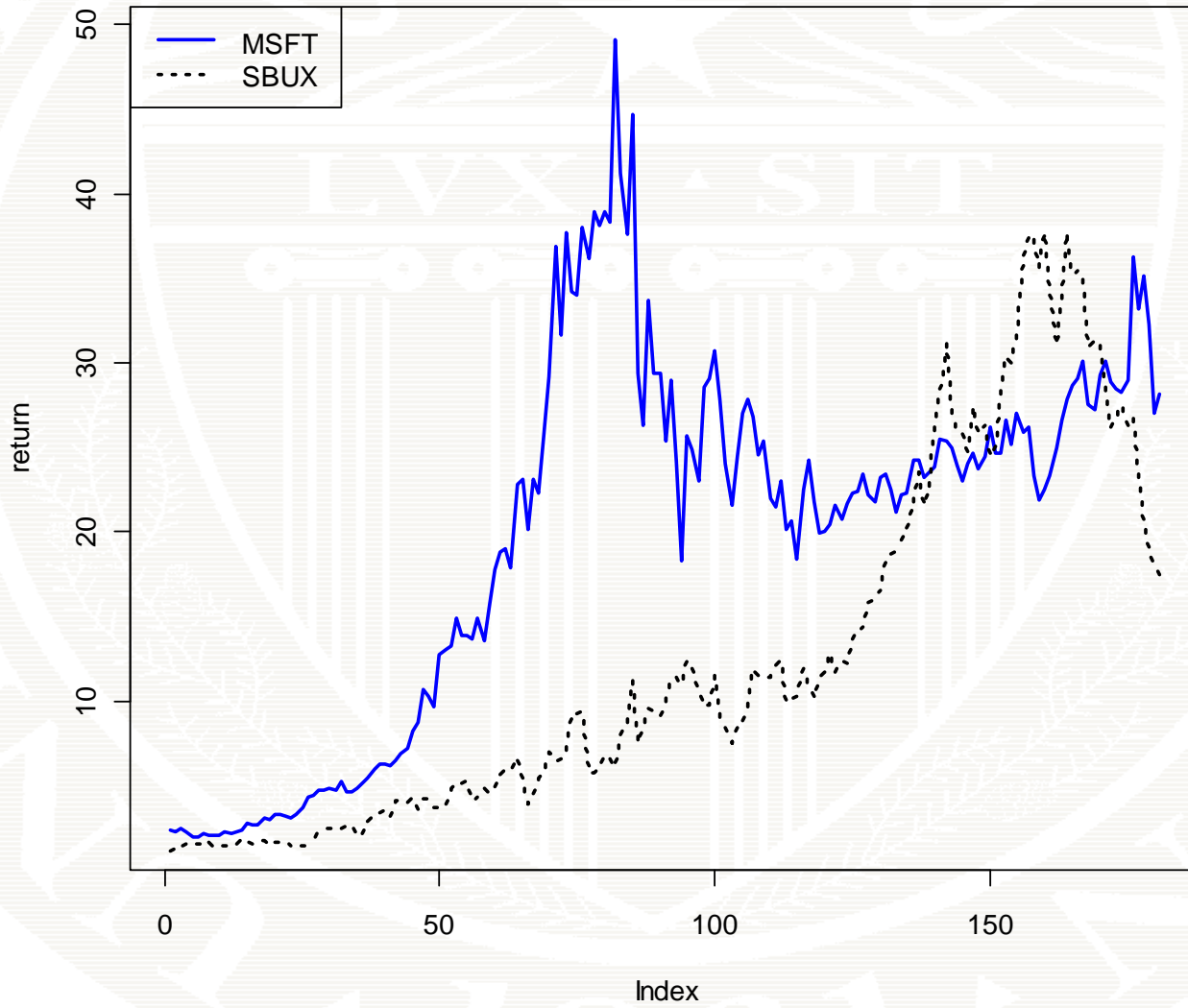
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Plot Prices

```r
# Create line plot of msft prices
> plot(msft.df$Adj.Close, type = "l", lty = "solid", lwd = 2,
+       col = "blue", ylab = "return")

# Add sbux data to existing plot
> lines(sbux.df$Adj.Close, lty = "dotted", lwd = 2, col = "black")



# Add legend to plot
> legend(x = "topleft", legend=c("MSFT", "SBUX"), lwd = 2,
+        lty = c("solid", "dotted"), col = c("blue", "black"))
```

Compute Returns

```r
# Compute simple monthly returns
> n = nrow(sbux.df)

> sbux.ret = sbux.df$Adj.Close[2:n]/sbux.df$Adj.Close[1:n-1] - 1

> msft.ret = msft.df$Adj.Close[2:n]/msft.df$Adj.Close[1:n-1] - 1

> head(cbind(sbux.ret, msft.ret))
     sbux.ret msft.ret
[1,]  0.01681 -0.07407
[2,]  0.23967  0.08444
[3,]  0.02000 -0.04918
[4,] -0.03268 -0.15948
[5,]  0.02703  0.01538
[6,]  0.12500  0.09596


# Compute continuously compounded returns
> sbux.ccret = log(1 + sbux.ret)
> msft.ccret = log(1 + msft.ret)
```

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PerformanceAnalytics Package

```
> library(PerformanceAnalytics)
Loading required package: zoo
Loading required package: xts

Package PerformanceAnalytics (1.0.0) loaded.
Econometric tools for performance and risk analysis.
(c) 2004-2009 Peter Carl, Brian G. Peterson. License: GPL
http://braverock.com/R/


Attaching package: 'PerformanceAnalytics'


# show detailed information about functions in package
> help(library="PerformanceAnalytics")
```

"zoo" objects

```r
# create monthly date objects
> dates.sbux = as.yearmon(sbux.df$Date, format="%m/%d/%Y")
> dates.msft = as.yearmon(msft.df$Date, format="%m/%d/%Y")
> head(dates.sbux)
[1] "Mar 1993" "Apr 1993" "May 1993" "Jun 1993" "Jul 1993" "Aug 1993"
> tail(dates.sbux)
[1] "Oct 2007" "Nov 2007" "Dec 2007" "Jan 2008" "Feb 2008" "Mar 2008"

# create zoo objects from data.frame objects
> sbux.z = zoo(x=sbux.df$Adj.Close, order.by=dates.sbux)
> msft.z = zoo(x=msft.df$Adj.Close, order.by=dates.msft)
> class(sbux.z)
[1] "zoo"
> head(sbux.z)
Mar 1993 Apr 1993 May 1993 Jun 1993 Jul 1993 Aug 1993
    1.19     1.21     1.50     1.53     1.48     1.52
```

Subsetting "zoo" objects

```
# subsetting using date ranges
> sbux.z[as.yearmon(c("Mar 1993", "Mar 1994"))]
Mar 1993 Mar 1994
    1.19     1.52



# subsetting using the window() function
> window(sbux.z, start=as.yearmon("Mar 1993"),
+         end=as.yearmon("Mar 1994"))
Mar 1993 Apr 1993 May 1993 Jun 1993 Jul 1993 Aug 1993 Sep 1993 Oct 1993
    1.19     1.21     1.50     1.53     1.48     1.52     1.71     1.67
Nov 1993 Dec 1993 Jan 1994 Feb 1994 Mar 1994
    1.39     1.39     1.50     1.45     1.52
```

Merging "zoo" objects

```
# create merged time series
> sbuxMsft.z = merge(sbux.z, msft.z)
> head(sbuxMsft.z)
         sbux.z msft.z
Mar 1993   1.19   2.43
Apr 1993   1.21   2.25
May 1993   1.50   2.44
Jun 1993   1.53   2.32
Jul 1993   1.48   1.95
Aug 1993   1.52   1.98
```
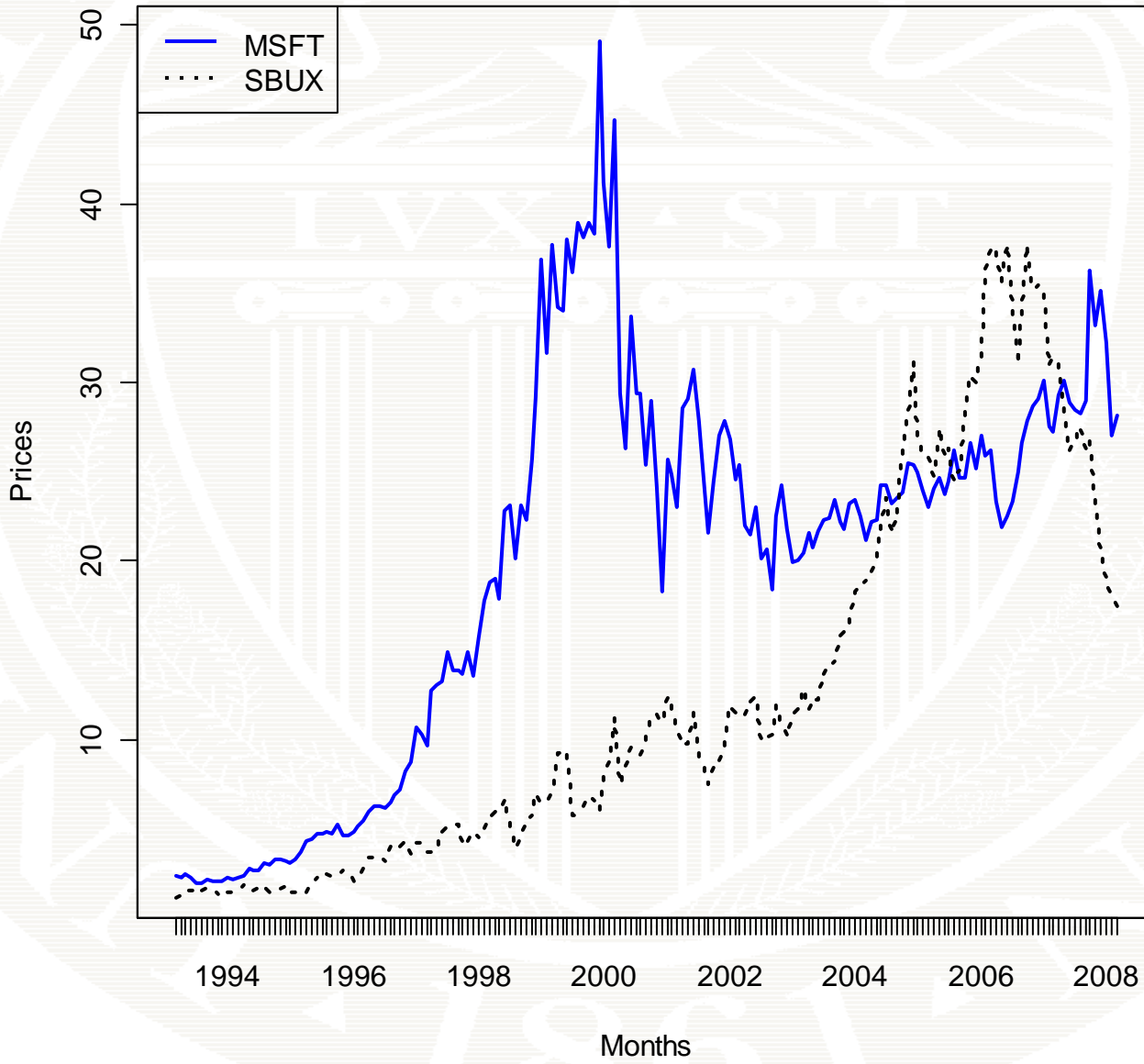
Plotting "zoo" objects

```r
# note: plot invokes the plot method for "zoo" objects
# plot the monthly prices for msft
> plot(msft.z, lwd=2, col="blue", ylab="Prices", xlab="Months")

# add prices for sbux
> lines(sbux.z, col="black", lwd=2, lty="dotted")

# add legend to plot
> legend(x="topleft", legend=c("MSFT", "SBUX"),
+        col=c("blue", "black"), lwd=2, lty=c("solid", "dotted"))
```

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```
# two series in two separate panels
> plot(sbuxMsft.z, lwd=c(2,2), plot.type="multiple",
+       col=c("black", "blue"), lty=c("solid", "dotted"),
+       ylab=c("SBUX", "MSFT"), main="")
```