April 20, 2015 Erin Philip

Reviewing R Script of HW7 (Posted on Course Website)

Trend: time index

Seasonalities: add seasonal dummies

Problem 1:

- Make month a categorical predictor
- Plot demand against temperature (looks like it is rising)
- Add time index to account for trend
- Incorporate weekend effects into model

Problem 2:

- Create general linear model fitting model versus all predictors
- Use tables to find error rates according to ratios in assignment
    - False Positive Rate = Number of False Positives / Number of E-mails Not Spam

Reviewing HW 8

Problem 1

T: Positive test

S: Has disease

Use Bayes Rule

P(S|T) = P(S)P(T|S) / P(T)

P(S) = 1/1000

P(T|S) = 0.95

P(T|~S) = (1-P)(~T|~S) = 1 – 0.99 = 0.01

P(T) = P(T, S) + P(T, ~S)

= P(S)P(T|S) + P(~S)P(T|~S)

= … (algebra expansion)

= 0.01094

P(S|T) = P(S)P(T|S) / P(T) = 0.001(0.95)/(0.01094) = 8.7%

<u>Costs</u>

$10 * 10 mil = $100 mil

$50 * 10 mil * P(T,~S) = $50 mil

<u>Benefits</u>

10K * 10m * P(T,S) = $95 mil

Problem 2

Part A

a) $E(.5x + .5y) = 0.5E(x) + 0.5E(y) = 15$
b) $Var(0.5x + 0.5y)$
$= 0.5^2 var(x) + 0.5^2 var(y) + 2(.5)(.5)cov(x,y)$
$= 41.75$

Part B

$E(x) = 1.03$, $E(y) = 1.04$

$Var(x) = 6.27 * 10^{-3}$; $var(y) = 1.27 * 10^{(-2)}$, $cov(x,y) = -3.17 * 10^{(-3)}$

w: initial wealth

p: fraction in x

$W=wX$ if $p=1$

$W = wY$ if $p=0$

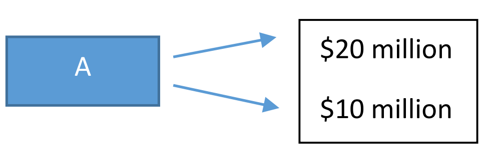
$Var(W) = w^2p^2var(x) + w^2(1-p)^2var(y) + w^2p(1-p)cov(x,y)$

So what should be our strategy when choosing a portfolio? Should we:

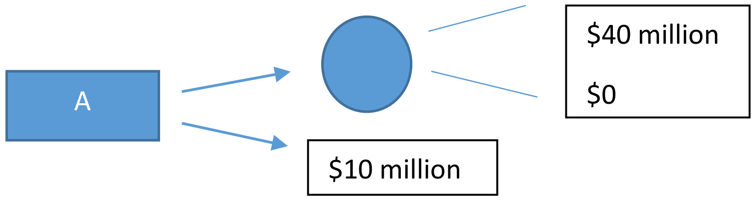
- Maximize expected value? Risky, means you are willing to take swings (more volatile)
- Minimize variance? (aptly dubbed the “Wallflower Strategy” by Dr. Scott) No swings, lower returns

Ideally, we want a mix of both.

Which of these scenarios would you choose?



Above, both are surefire options, so you would definitely choose $20 million.



Now, there is a 50/50 chance of getting either $40 million or $0. Most people would choose the guaranteed $10 million.

Thus, expected value should not necessarily guide our decisions.

Ex: Flipping Game

You get $2^k once you win a coin toss, or you could get $10 million guaranteed.

Intuition says you'd pick the $10 million, but the flipping game's expected value is actually infinity.

- E(x) = Summation(x in all possible outcomes lambda) xp(X=x)