University of Washington
Department of Economics

Summer 2000
Eric Zivot

Economics 483

Midterm Exam

This is a closed book and closed note exam. However, you are allowed one page of handwritten notes. Answer all questions and write all answers in a blue book or on separate paper. Total points = 100.

I. Return Calculations (20 pts.)

1. Consider the following monthly data for Microsoft stock over the period December 1995 through December 1996:

End of Month Price Data for Microsoft Stock	
December, 1995	43.12
January, 1996	43.87
February, 1996	47.06
March, 1996	47.75
April, 1996	51.37
May, 1996	57.56
June, 1996	59.19
July, 1996	61.16
August, 1996	60.31
September, 1996	61.25
October, 1996	66.06
November, 1996	68.69
December, 1996	78.87

a. Using the data in the table, what is the simple monthly return between December, 1995 and January 1996?

b. Using the data in the table, what is the continuously compounded monthly return between December, 1995 and January 1996?

c. Assuming that the simple monthly return you computed in part (a) is the same for 12 months, what is the annual return with monthly compounding?

d. Assuming that the continuously compounded monthly return you computed in part (b) is the same for 12 months, what is the continuously compounded annual return?

e. Using the data in the table, compute the actual simple annual return between December 1995 and December 1996. Compare with your result in part (c).

f. Using the data in the table, compute the actual annual continuously compounded return between December 1995 and December 1996. Compare with your result in part (d).

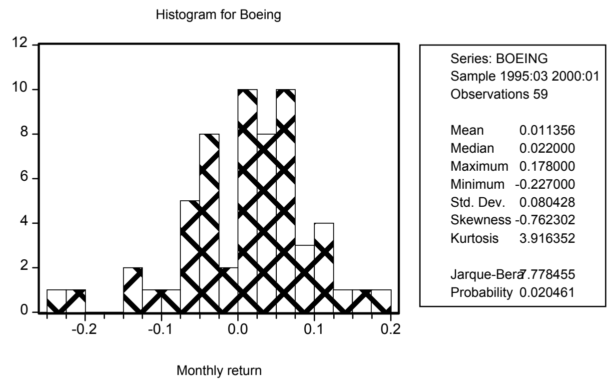
II. Random Variables (20 pts.)

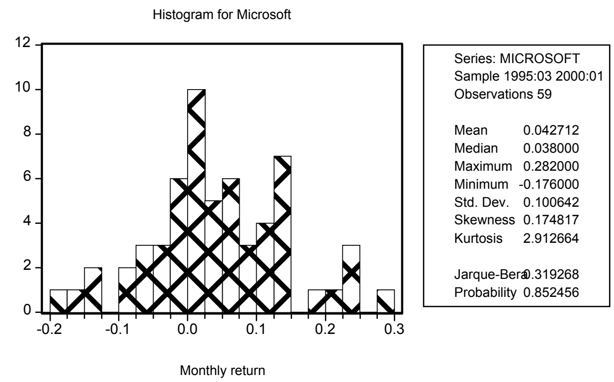
1. Consider a portfolio of 3 risky stocks denoted by A, B and C (say Apple, Boeing and Coca Cola). Let R_A, R_B and R_C denote the monthly returns on these stocks and it is assumed that these returns are jointly normally distributed with means μ_i (i = A,B,C), variances σ_i^2 (i = A,B,C) and covariances σ_{ij} (i = A,B,C and $i \neq j$). Consider forming a portfolio of these stocks where x_i = share of wealth invested in asset i such that $x_A + x_B + x_C = 1$.

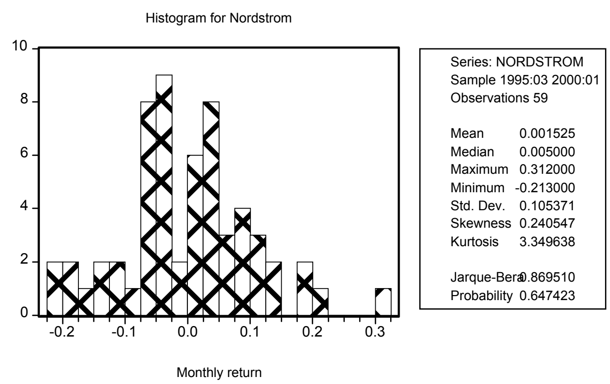
a. What is the expected return, $E[R_p] = \mu_p$, on the portfolio?
b. What is the variance, $var(R_p) = \sigma_p^2$, of the portfolio return?
c. Express the expected return and variance formulas using matrix algebra.
d. What is the probability distribution for the portfolio return?

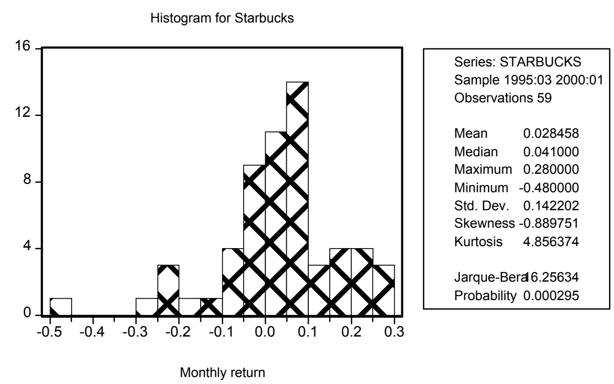
III. Descriptive Statistics and the Constant Expected Return Model

The figure below shows the histogram and descriptive statistics for the monthly continuously compounded returns on Boeing, Nordstrom, Microsoft and Starbucks over the period March, 1995 through January 2000.



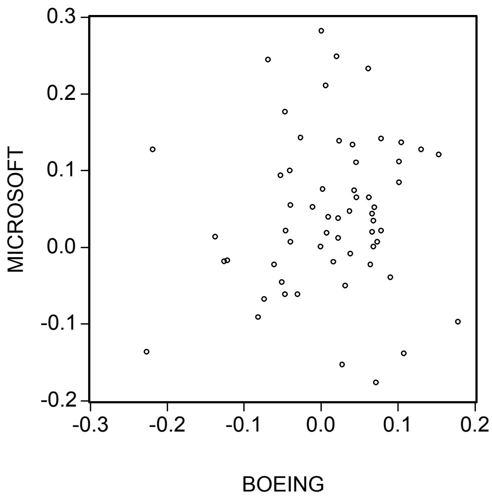






1. Univariate descriptive statistics. (20 pts.)

a. Briefly comment on the shapes of the histograms for each stock utilizing the descriptive statistics.
b. Which returns appear to be normally distributed?
c. For each stock, compute estimated standard errors for the mean and standard deviation. Are these standard errors large or small? Briefly explain.
d. For each stock, compute approximate 95% confidence intervals for the population mean and standard deviation. How well are the means and standard deviations estimated?


MICROSOFT
0.3
0.2
0.1
0.0
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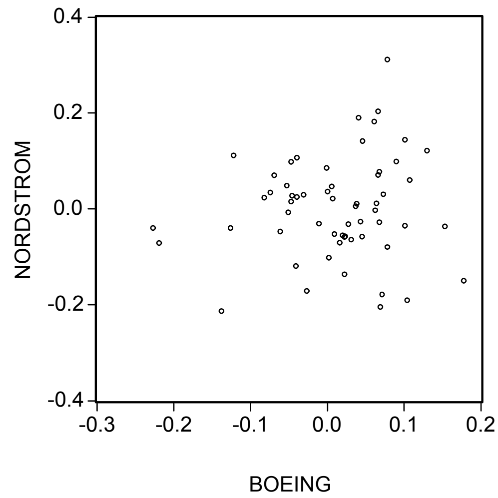
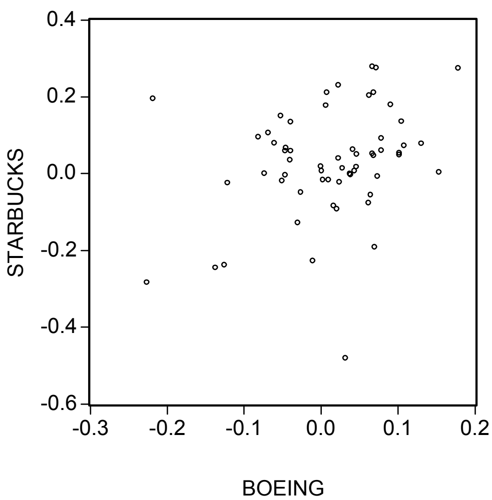
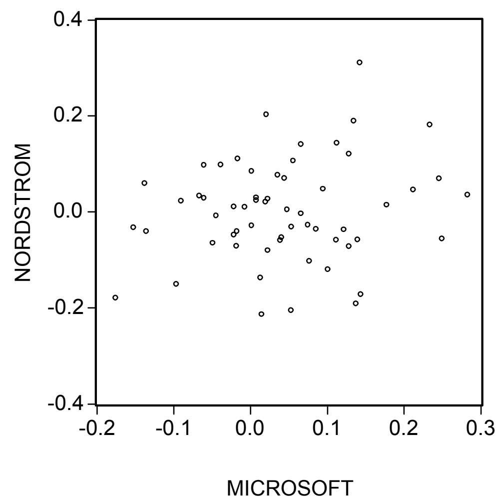
-0.2
-0.3
-0.2
-0.1
0.0
0.1
0.2
BOEING


NORDSTROM
0.4
0.2
0.0
-0.2
-0.4
-0.3
-0.2
-0.1
0.0
0.1
0.2
BOEING


STARBUCKS
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.3
-0.2
-0.1
0.0
0.1
0.2
BOEING


NORDSTROM
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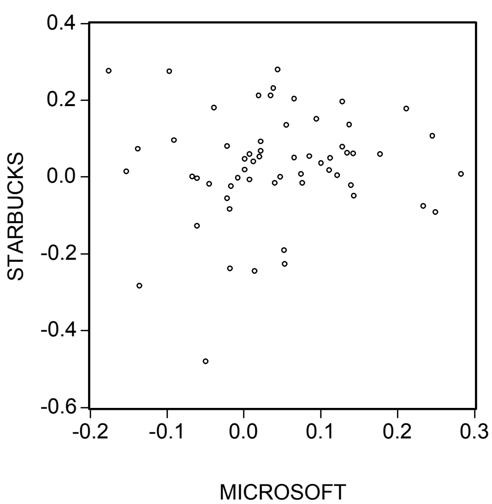
MICROSOFT


STARBUCKS
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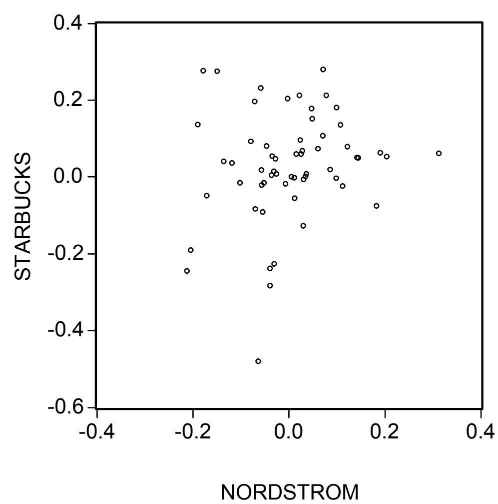
0.0
-0.2
-0.4
-0.6
-0.2
-0.1
0.0
0.1
0.2
0.3
MICROSOFT


STARBUCKS
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.4
-0.2
0.0
0.2
0.4
NORDSTROM

2. Bivariate descriptive statistics. (20 pts.)

a. Using the scatterplots on the previous page, comment on the direction and strength of the linear relationships between the pairs of the four stocks.
b. The estimated correlations are given in the table below.

	Boeing	Microsoft	Nordstrom	Starbucks
Boeing	1.000	0.086	0.102	0.304
Microsoft	0.086	1.000	0.176	0.079
Nordstrom	0.102	0.176	1.000	0.176
Starbucks	0.304	0.079	0.176	1.000

Based on the values of the correlations, does it appear that diversification (forming a diversified portfolio) will reduce risk? Why or why not?
c. Compute estimated standard errors for the correlations. Based on these standard errors, are the correlations estimated very precisely? Why or why not?

I. Portfolio Theory (20 points)

1. Consider the problem of allocating wealth between a collection of N risky assets and a risk-free asset (T-bill) under the assumption that investors only care about maximizing portfolio expected return and minimizing portfolio variance. Use the graph below to answer the following questions.

a. Mark on the graph the set of efficient portfolios for the risky assets only (transfer the graph to your blue book). Briefly describe how you would compute this set using Excel.

b. Mark on the graph the set of efficient portfolios that include risky assets and a single risk-free asset (transfer the graph to your blue book). Briefly describe how you would compute this set using Excel.