

Statistical Analysis of Efficient Portfolios

Econ 424/Amath 540

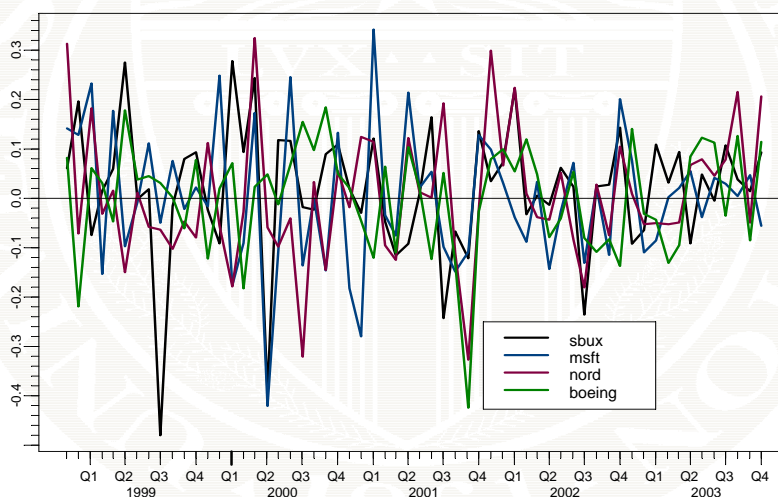
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Example Data: Monthly cc Returns on Boeing, Microsoft, Nordstrom and Starbucks



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Full Sample CER Model Estimates

```
> muhat.vals
      sbux      msft      nord      boeing
0.01782 -0.00006364 0.003202 0.001688

> sigmahat.vals
      sbux      msft      nord      boeing
0.1353 0.1375 0.1325 0.1097

> cor.mat
      sbux      msft      nord      boeing
sbux 1.000000 0.295506 0.1525 0.008218
msft 0.295506 1.000000 0.3833 0.007876
nord 0.152500 0.383348 1.0000 0.258940
boeing 0.008218 0.007876 0.2589 1.000000
```

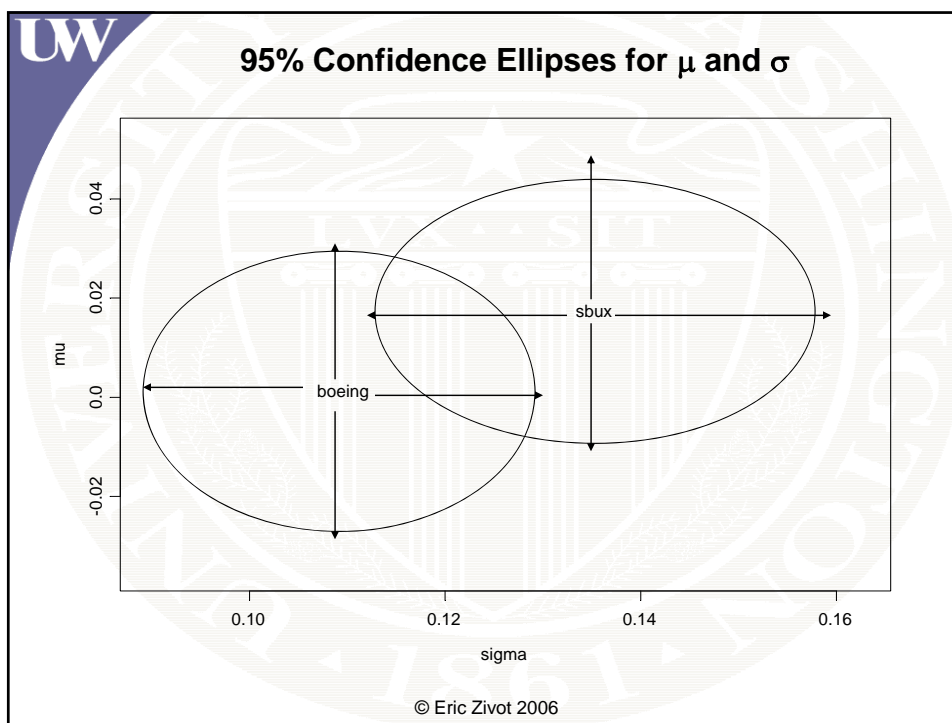
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CER Model Estimates with Standard Errors

```
> rbind(muhat.vals,se.muhat)
      sbux      msft      nord      boeing
muhat.vals 0.01782 -0.00006364 0.003202 0.001688
se.muhat 0.01747 0.01775446 0.017110 0.014168

> rbind(sigmahat.vals,se.sigmahat)
      sbux      msft      nord      boeing
sigmahat.vals 0.13534 0.13753 0.1325 0.10975
se.sigmahat 0.01236 0.01255 0.0121 0.01002
```

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Global Minimum Variance Portfolio

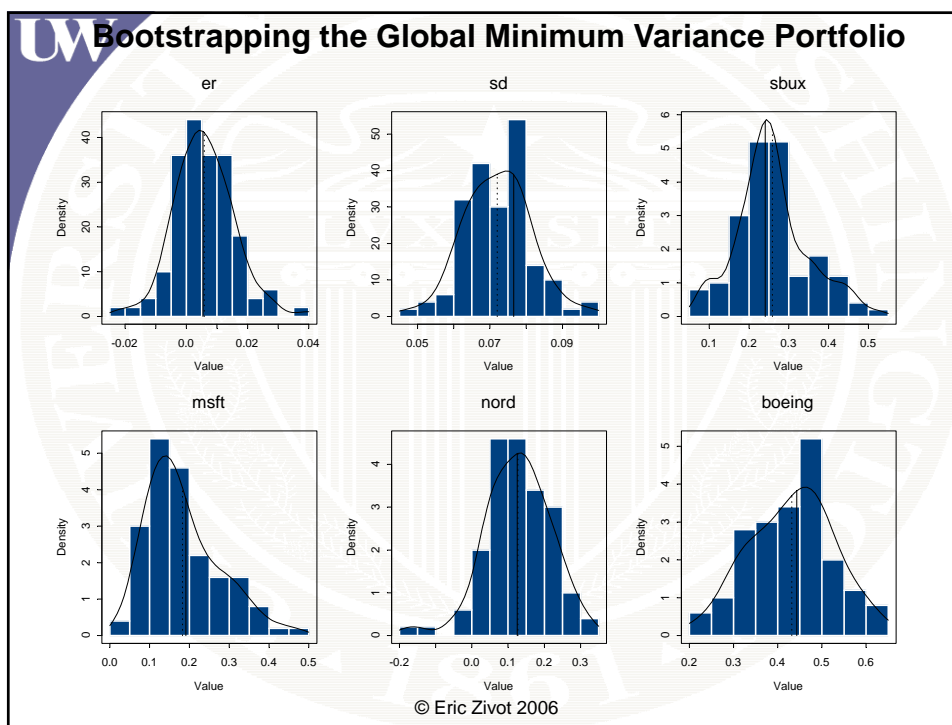
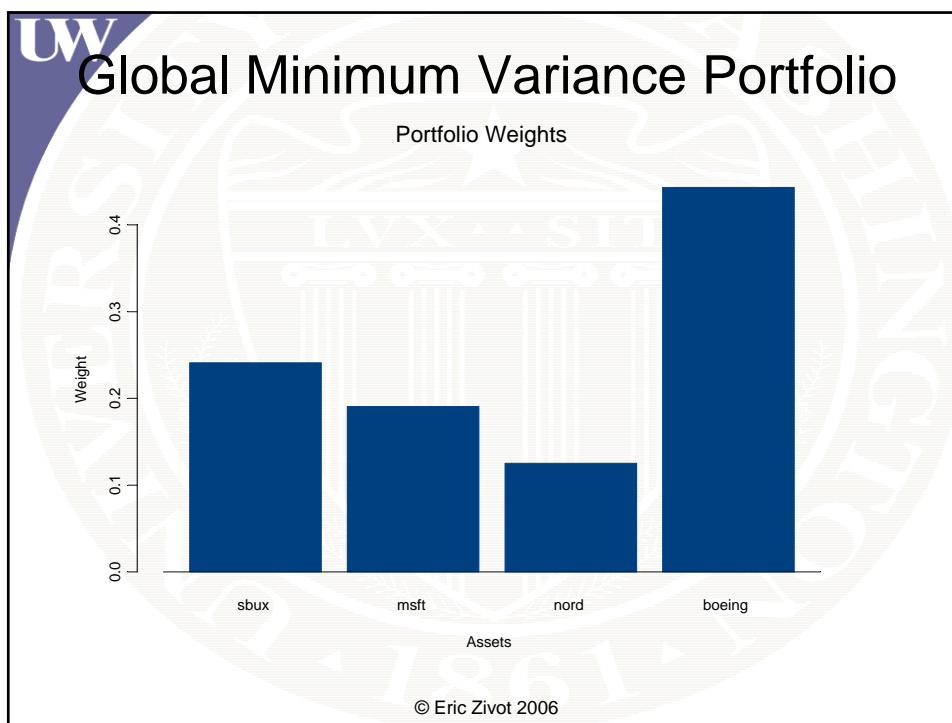
```
# global minimum variance portfolio
> gmin.4 = globalMin.portfolio(er=muhat.vals,
+                               cov.mat=cov.mat)
> summary(gmin.4)
```

Call:
 globalMin.portfolio(er = muhat.vals,
 cov.mat = cov.mat)

Portfolio expected return: 0.00543
 Portfolio standard deviation: 0.07655
 Portfolio weights:

sbux	msft	nord	boeing
0.241	0.1907	0.1252	0.443

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Bootstrapping the Global Minimum Variance Portfolio

Number of Replications: 100

Summary Statistics:

	Observed	Bias	Mean	SE
er	0.00543	0.0003845	0.005815	0.009668
sd	0.07655	-0.0045245	0.072027	0.009249
sbux	0.24100	0.0177585	0.258759	0.090101
msft	0.19070	-0.0081261	0.182577	0.090327
nord	0.12525	0.0015642	0.126812	0.089178
boeing	0.44305	-0.0111965	0.431852	0.094154

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Efficient Portfolio: Target $\mu = 0.015$

```
> eport.015 =
+ efficient.portfolio(er=muhat.vals,
+                     cov.mat=cov.mat,
+                     target.return=0.015)
```

```
> summary(eport.015)
```

Call:

```
efficient.portfolio(er = muhat.vals,
cov.mat = cov.mat, target.return = 0.015)
```

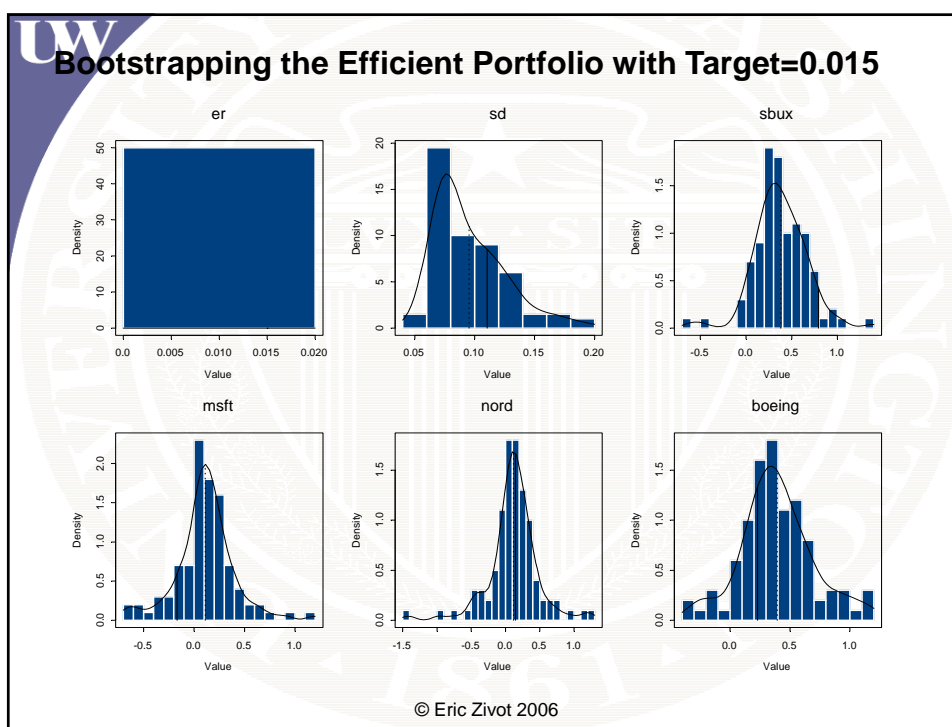
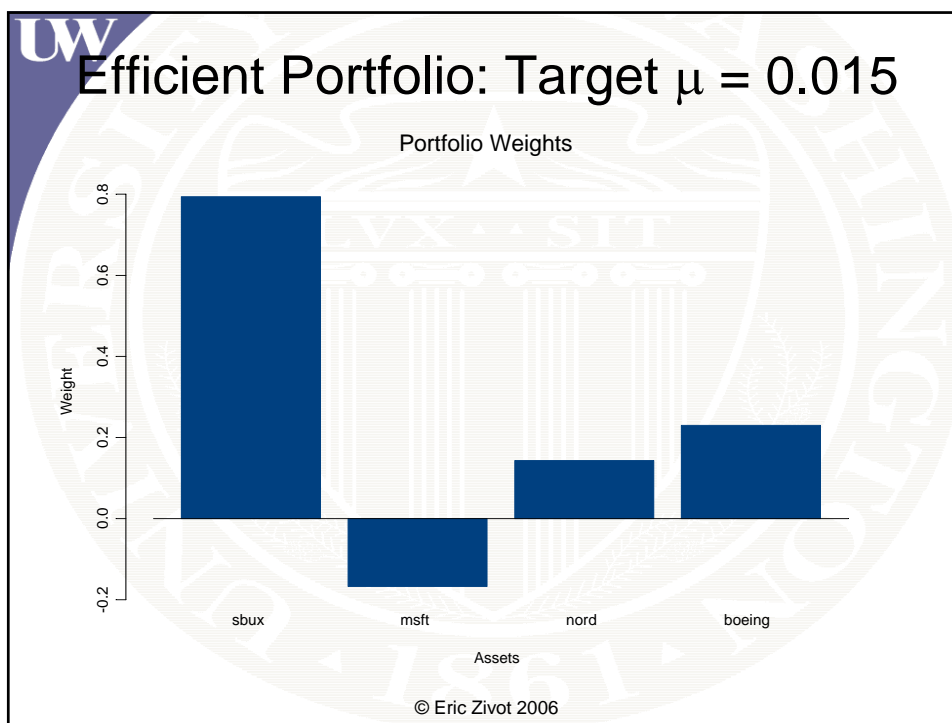
Portfolio expected return: 0.015

Portfolio standard deviation: 0.1104

Portfolio weights:

```
sbux    msft    nord boeing
0.7937 -0.1673 0.1435 0.2301
```

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Bootstrapping the Efficient Portfolio with Target=0.015

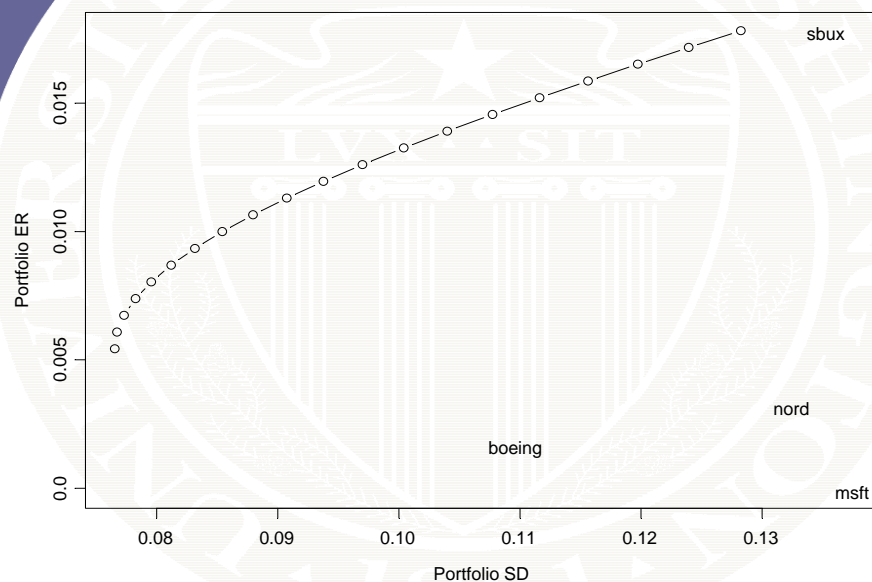
Number of Replications: 100

Summary Statistics:

	Observed	Bias	Mean	SE
er	0.0150	-1.735e-017	0.01500	0.0000
sd	0.1104	-1.500e-002	0.09537	0.0293
sbux	0.7937	-4.139e-001	0.37986	0.2831
msft	-0.1673	2.781e-001	0.11084	0.2938
nord	0.1435	-2.817e-002	0.11529	0.3653
boeing	0.2301	1.639e-001	0.39401	0.3013

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Efficient Frontier



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