Rolling Estimation of Efficient Portfolios

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Example Data on Four Stocks

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Example Data on Four Stocks

sbusx

msft

nord

boeing
Estimated Inputs: Full Sample

# estimated means
> mu.hat
sbux   msft   nord   boeing
0.026753 0.009256 0.012024 0.007423

# estimated sds
> sd.hat
sbux   msft   nord   boeing
0.1305 0.1391 0.1375 0.1051

# estimated correlations
> cor.hat
sbux   msft   nord   boeing
sbux   1.000000 0.253079 0.1533  0.016126
msft  0.25308  1.000000 0.3775 -0.006234
nord  0.15327  0.377483 1.0000  0.233900
boeing 0.01613 -0.006234 0.2339  1.000000

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24-Month Rolling Means and Std Devs

- **SBUX**
  - Returns over the years 1998 to 2003 with rolling means and standard deviations.

- **MSFT**
  - Returns over the years 1998 to 2003 with rolling means and standard deviations.

- **NORD**
  - Returns over the years 1998 to 2003 with rolling means and standard deviations.

- **SBUX**
  - Returns over the years 1998 to 2003 with rolling means and standard deviations.

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24-Month Rolling Correlations
Rolling Global Minimum Variance Portfolio

rollGmin = function(x) {
  mu.hat = colMeans(x)
cov.hat = var(x)
gmin = globalMin.portfolio(er=mu.hat,
                            cov.mat=cov.hat)
ans = c(gmin$er,gmin$sd,gmin$weights)
names(ans)[1:2] = c("er","sd")
return(ans)
}

# rolling 24-month global minimum variance portfolios
> roll.gmin = rollapply(ret.z, width=24,
+                       by.column=FALSE, align="right",
+                       FUN=rollGmin)
> colnames(roll.gmin)
[1] "er"  "sd"   "sbux"  "msft"  "nord"  "boeing"
Rolling Efficient Portfolio with $\mu_p = 0.015$

rollofficient = function(x,target=0.015) {
  mu.hat = colMeans(x)
  cov.hat = var(x)
  eport = efficient.portfolio(er=mu.hat,
                              cov.mat=cov.hat,
                              target.return=target)
  ans = c(eport$er,eport$sd,eport$weights)
  names(ans)[1:2] = c("er","sd")
  return(ans)
}

# rolling efficient portfolios with target = 0.015
> roll.eport = rollapply(ret.z, width=24,
                      by.column=F,align="right",
                      FUN=rollofficient)
> colnames(roll.eport)
[1] "er" "sd" "sbux" "msft" "nord" "boeing"
24-Month Rolling SD on Efficient Portfolio

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Summary of Results

• Changing means, standard deviations and correlations imply changing weights, means and standard deviations of efficient portfolios.

• Efficient portfolios must be rebalanced as inputs change over time.

• How often to rebalance is not straightforward to determine.