

# Global Minimum Variance Portfolio: a Horse Race of Volatilities

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- Portfolios that rely on sample estimates typically perform poorly ex-post due to estimation risk
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  - shrinking the covariance Ledoit and Wolf (2004) or implied volatility based estimates DeMiguel et al (2013)

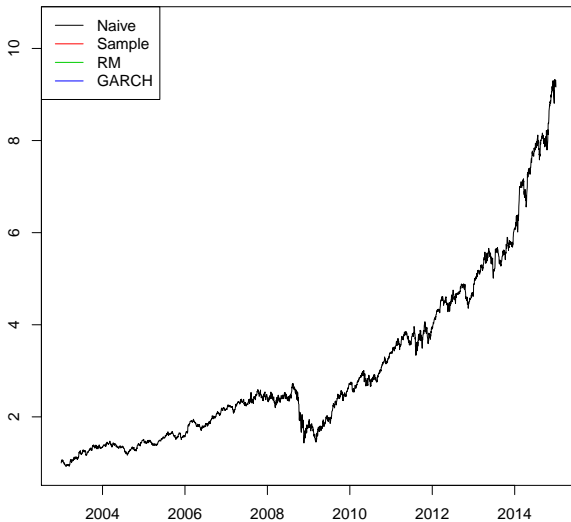
- Our focus is on the global minimum variance (GMV) portfolio:

$$\begin{aligned} \min \mathbf{x}'_t \mathbf{H}_t \mathbf{x}_t \\ \text{s.t. } \mathbf{x}'_t \mathbf{1} = 1 \end{aligned}$$

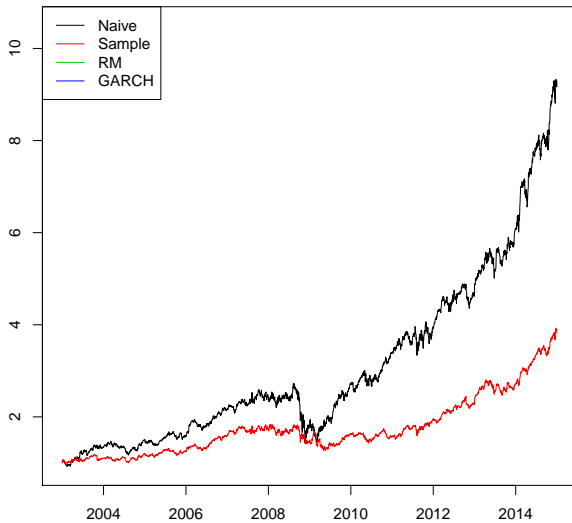
- such that

$$\mathbf{x}_t = \frac{\mathbf{H}_t^{-1} \mathbf{1}}{\mathbf{1}' \mathbf{H}_t^{-1} \mathbf{1}} \quad (1)$$

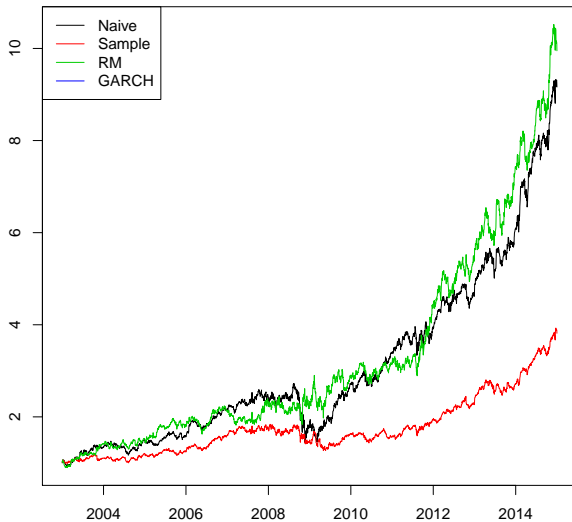
# The Horse Race



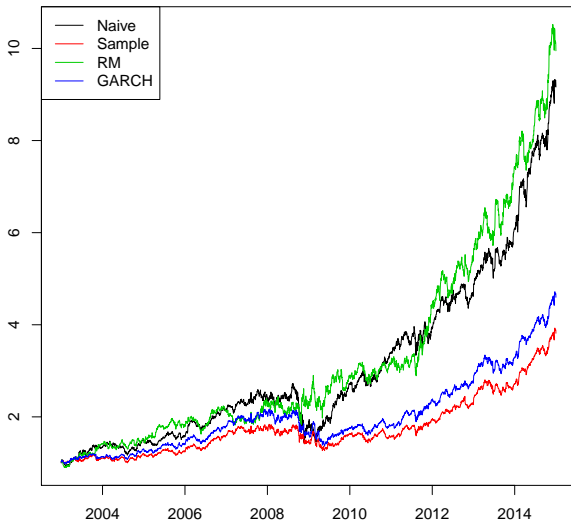
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# Univariate Analysis

	Naive	Sample	RiskMetrics	GARCH
5 Assets				
$\hat{\sigma}_p$	0.23	0.19	0.22	0.19
$\hat{S}R_p$	0.90	0.87	1.01	0.94
$\hat{T}O_p$	0.00	0.01	0.98	0.10
$TC$		—	0.10%	0.40%
10 Assets				
$\hat{\sigma}_p$	0.23	0.19	0.23	0.19
$\hat{S}R_p$	0.87	0.90	1.11	0.97
$\hat{T}O_p$	0.00	0.01	1.13	0.09
$TC$		4.35%	0.21%	1.15%

# Multivariate Analysis

	Naive	Sample	RiskMetrics	GARCH
5 Assets				
$\hat{\sigma}_p$	0.23	0.18	0.24	0.18
$\hat{SR}_p$	0.90	0.72	0.91	0.81
$\hat{TO}_p$	0.00	0.01	1.30	0.16
$TC$		—	0.00%	—
10 Assets				
$\hat{\sigma}_p$	0.23	0.17	0.25	0.17
$\hat{SR}_p$	0.87	0.74	1.01	0.87
$\hat{TO}_p$	0.00	0.02	1.63	0.21
$TC$		—	0.08%	—

