

Bootstrapping Seasonal Spreads

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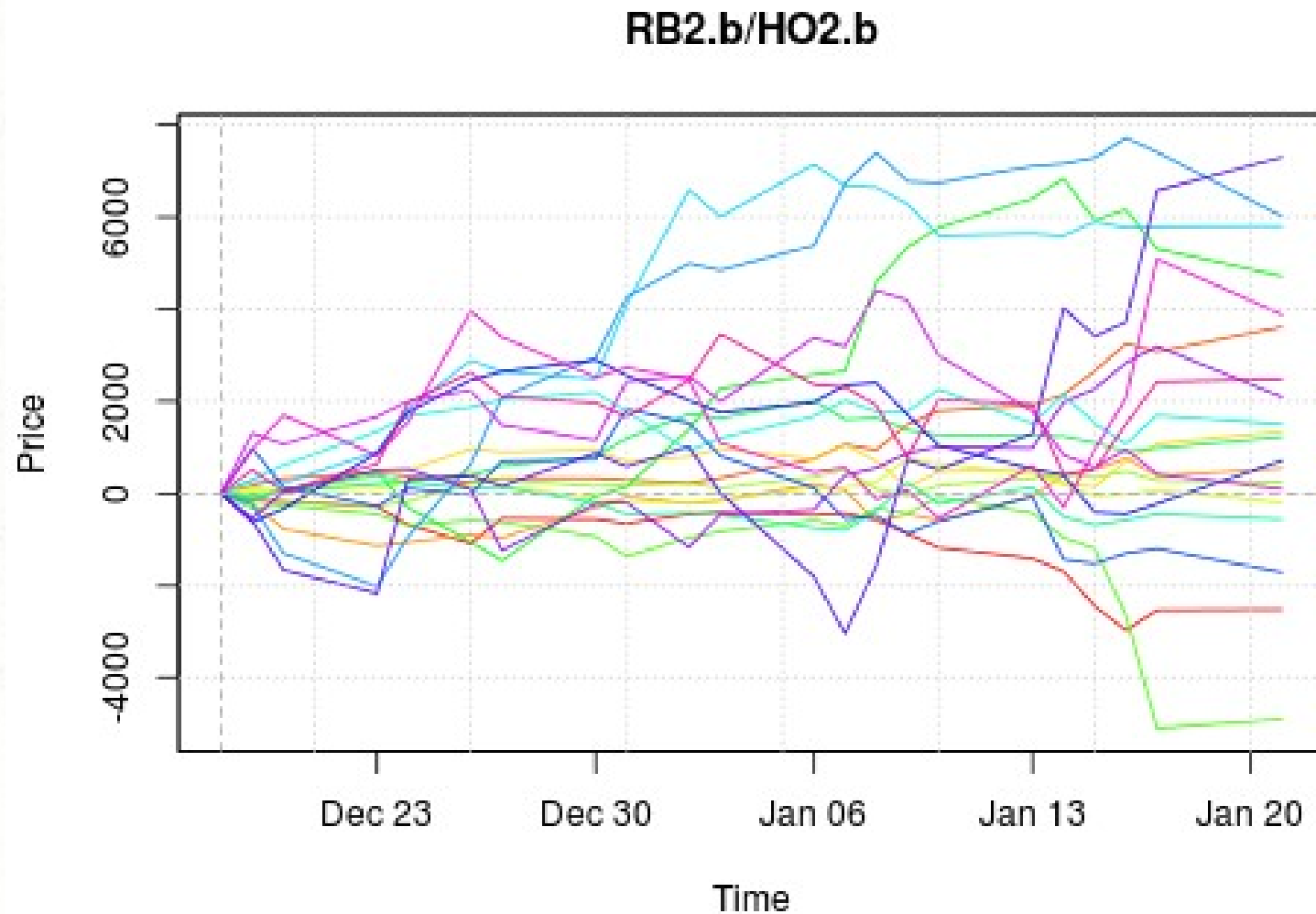
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R/Finance 2014

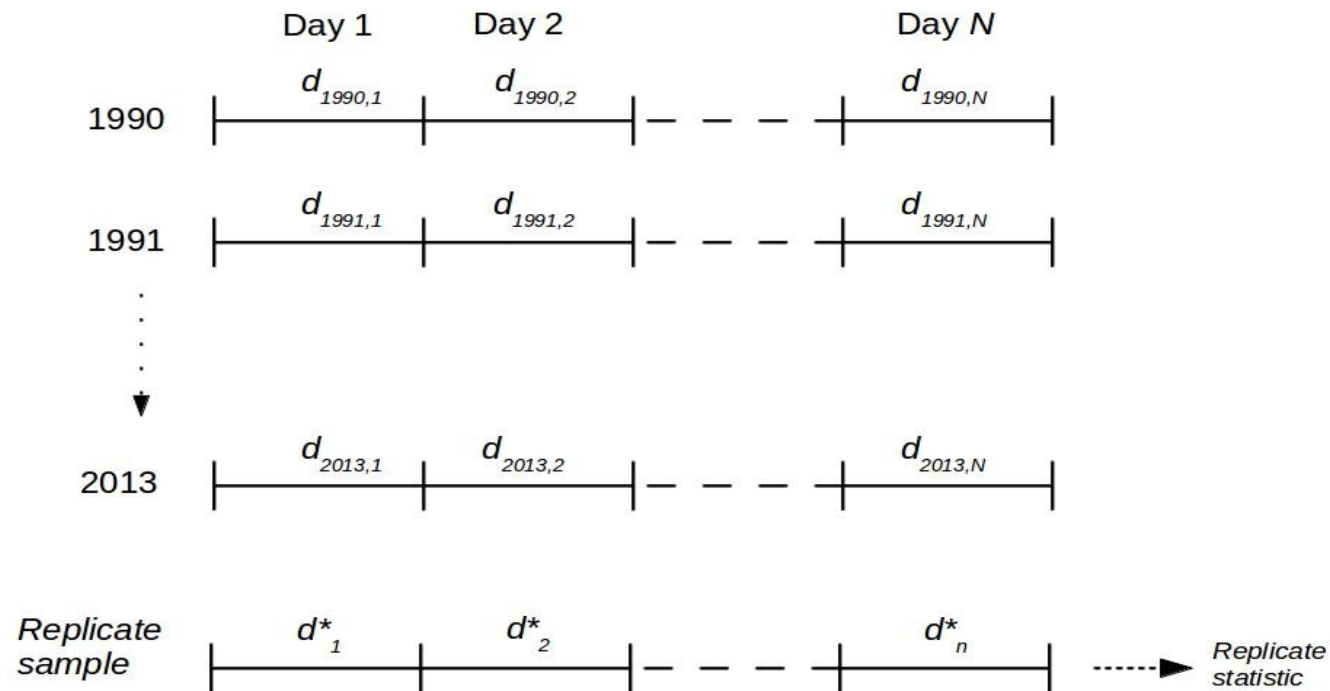
Seasonal spread trading is a wager that history repeats itself.

- Spread shows an annual pattern
- “Repeats itself” on average; not perfectly.
- Risk management requires
 - Stop-loss point
 - Probability of winning
 - Ratio of *average win* to *average loss* (i.e., win ratio)
- Need to know distribution of losses for risk management and money management

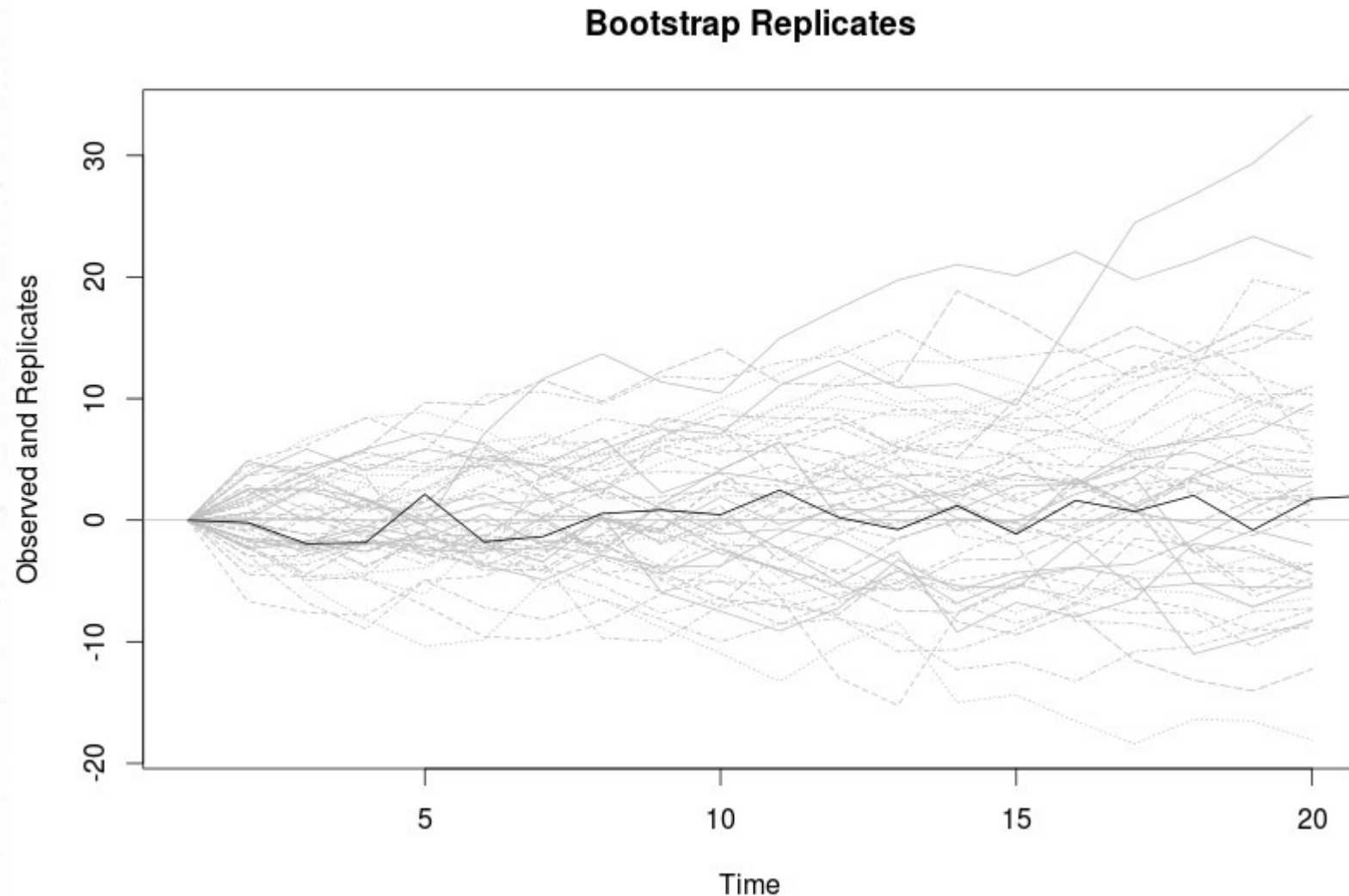
With 20 years history, can't reliably estimate distribution, esp'ly losses.



We resample daily returns across years to create synthetic replicates.



Bootstrapping gives us hundreds or thousands of synthetic replicates.



From the replicates, we can better estimates of risk parameters.

Bootstrap Replicates at Horizon

From 2013-12-18 to 2014-01-17

All replicates

Pr(win)

	Estimate	Lower	Upper
ProbWin	0.684	0.659	0.708
Mean	1505.181	1349.963	1660.398
Median	1482.6	1316.7	1642.2
StdDev	2979.836		
AnnSharpe	1.706		
UpperMAE	2792.16		
MaxMAE	8240.4		

Profitable replicates

E[win]

Stop loss

	Estimate	Lower	Upper
ProbWin	1	0.995	1
Mean	3055.232	2922.082	3188.481
Median	2709		3059.7
StdDev	2113.46		
AnnSharpe	4.883		
UpperMAE	1399.44		
MaxMAE	3771.6		

From the risk estimates, we use the Kelly formula to size the trade.

Kelly analysis

	Estimate	Lower	Upper
Prob of winning	0.694		
Wager	1399.44		
Expected win	2779.03		
Kelly fraction	0.539		
Half Kelly	0.27		
Capital	22750		
Kelly capital	12272.411		
Kelly units	8.77		
Half Kelly capital	6136.205		
Half Kelly units	4.385		

Half-Kelly fraction

Trade size

Bootstrapping the seasonal data gave estimates sufficiently accurate to size trades, set stop-loss points, and set profit expectations.

Some limitations:

- Needed at least 15 to 20 observations for meaningful results.
- Tail estimates from very far out require very large number of bootstrap replicates. Stick with 95% range.

Thank you!