# Video 3: Time-variation in portfolio performance

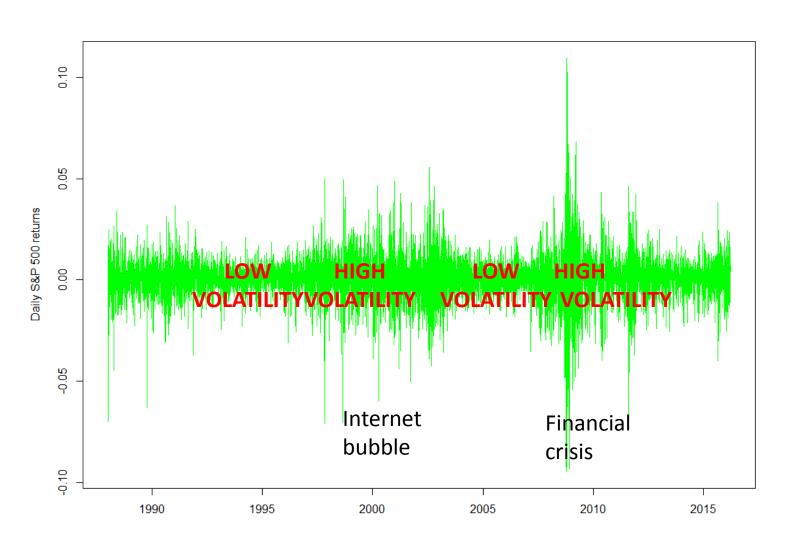
#### Bulls and bears

Business cycle, news and swings in the market psychology



Source: http://www.123rf.com/photo\_34397743\_stock-vector-vector-illustration-of-bull-and-bear-heads-with-buy-and-sell-text.html

## Clusters of high and low volatility



## Rolling estimation samples

#### Complete time series

Rolling samples of K observations: discard the most distant and include the most recent observation

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 $R_{t-K+1}$ 

 $R_{t-K+2}$ 

 $R_{t-\underline{K+3}}$ 

 $R_{t-K+4}$ 

:

 $R_{t-1}$ 

 $R_{\mathsf{t}}$ 

 $R_{t+1}$ 

 $R_{t+2}$ 

R<sub>t+3</sub>

:

 $R_{t-K+1}$ 

 $R_{t-K+2}$ 

 $R_{t-K+3}$ 

R<sub>t-1</sub>

 $R_{t}$ 

 $R_{t-K+2}$ 

 $R_{t-K+3}$ 

 $R_{t-1}$ 

R<sub>t</sub>

R<sub>t+1</sub>

 $R_{t\text{-}K\text{+}3}$ 

 $R_{t-K+4}$ 

 $R_{t-1}$ 

 $R_{t}$ 

R<sub>t+1</sub>

 $R_{t+2}$ 

 $R_{t-K+4}$ 

 $R_{t-1}$ 

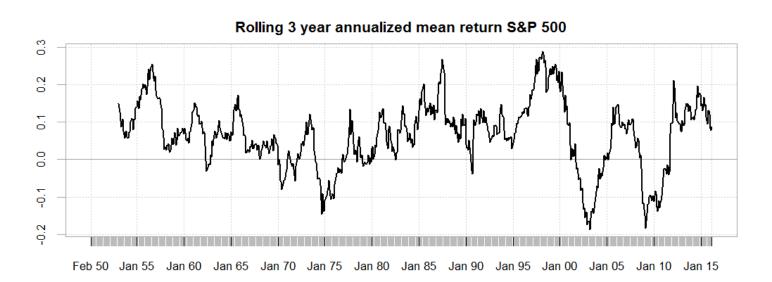
 $R_{t}$ 

 $R_{t+1}$ 

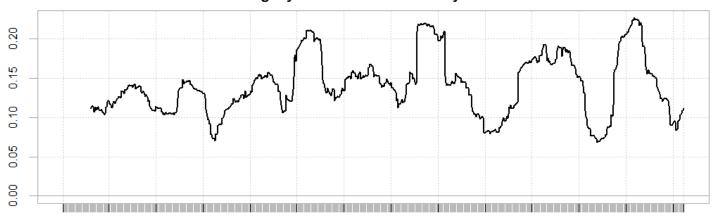
 $R_{t+2}$ 

 $R_{t+3}$ 

#### Rolling performance calculation



#### Rolling 3 year annualized volatility S&P 500



Feb 50 Jan 55 Jan 60 Jan 65 Jan 70 Jan 75 Jan 80 Jan 85 Jan 90 Jan 95 Jan 00 Jan 05 Jan 10 Jan 15

#### How to choose window length?

 Balance noise reduction (longer samples) with objective of timely estimates (shorter

samples)



http://www.dailydot.com/comics/exploding-dog/proof-pudding/