Multifractal detrended fluctuation analysis
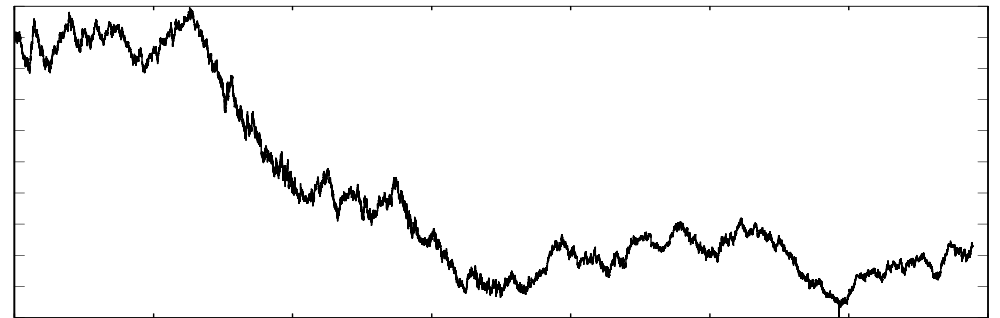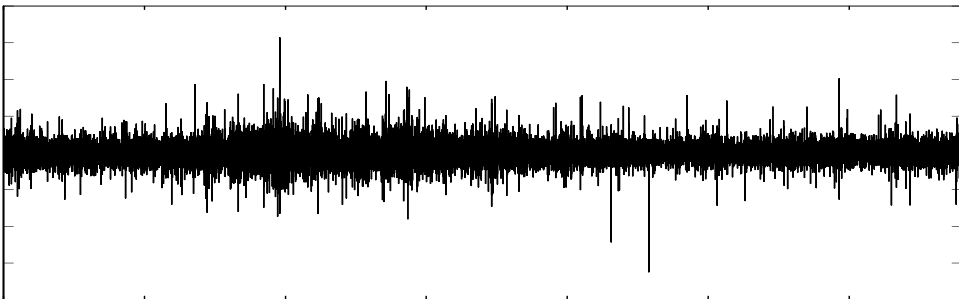
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Mutifractal Detrended Fluctuation Analysis (MFDFA)

① Calculating „profile" $Y(i)$ $\qquad Y(j) = \sum_{i=1}^{j} x_i$

Tip: cumsum

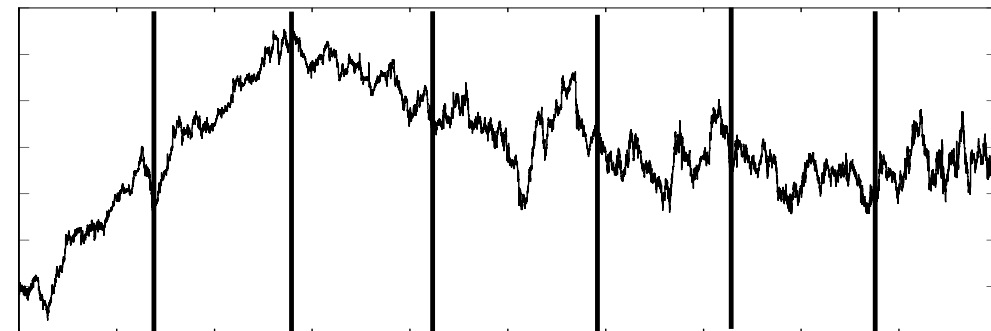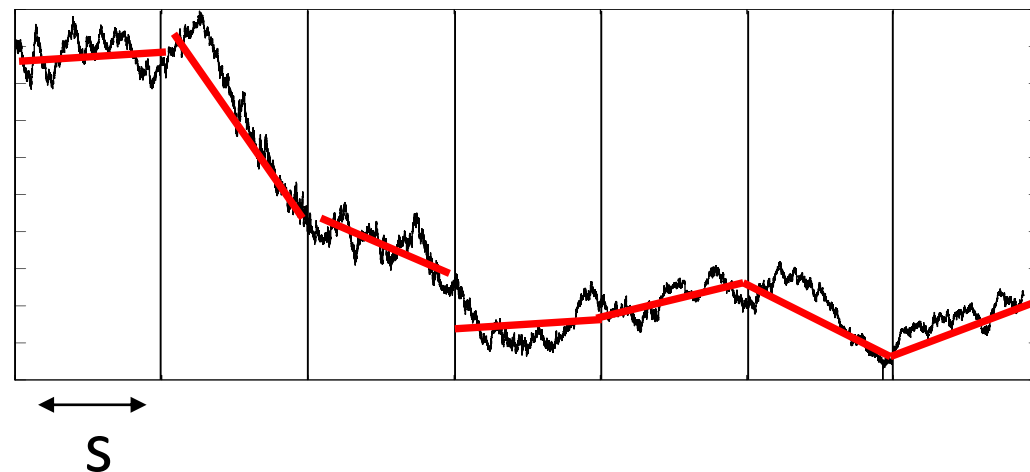# Mutifractal Detrended Fluctuation Analysis (MFDFA)

2 Detrending data and calculating local variance

$$F^2(s,v) \equiv \frac{1}{s}\sum_{i=1}^{s}\{Y[(v-1)s+i] - y_v(i)\}^2$$

Skala   Numer
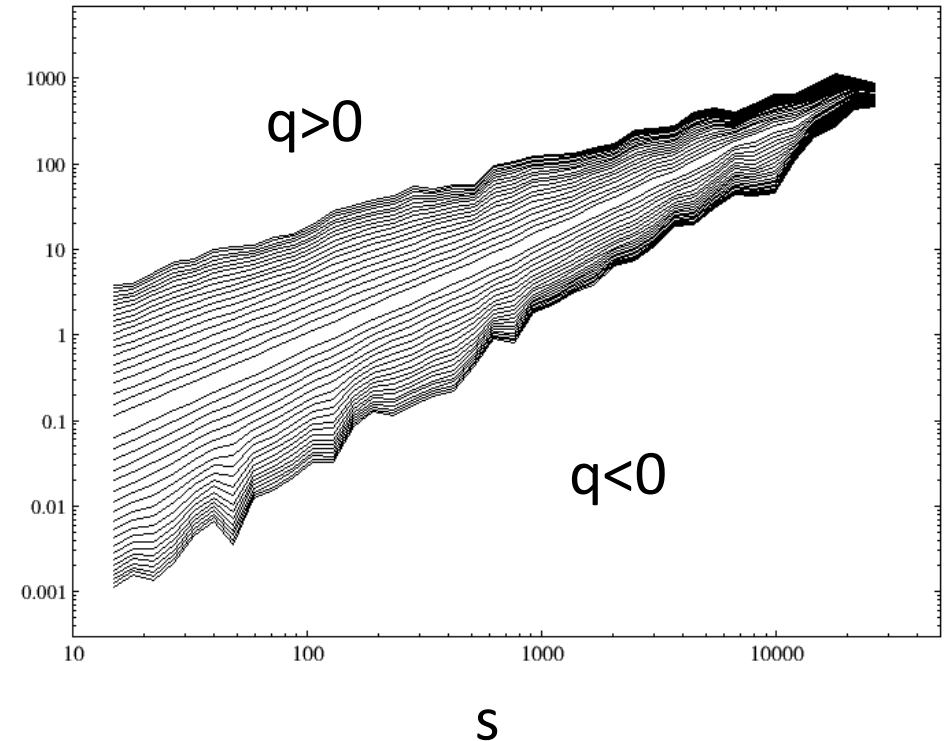   przedziału

Liczba przedziałów $N_s \equiv int(N/s)$

3 Calculating Fluctuation Function

$$F_q(s) \equiv \left\{ \frac{1}{2N_s} \sum_{v=1}^{2N_s} \left[F^2(s,v) \right]^{q/2} \right\}^{1/q}$$

$$\boxed{F_q \sim s^{h(q)}}$$

$F_q(s)$

q>0

q<0

s

Mutifractal Detrended Fluctuation Analysis (MFDFA)

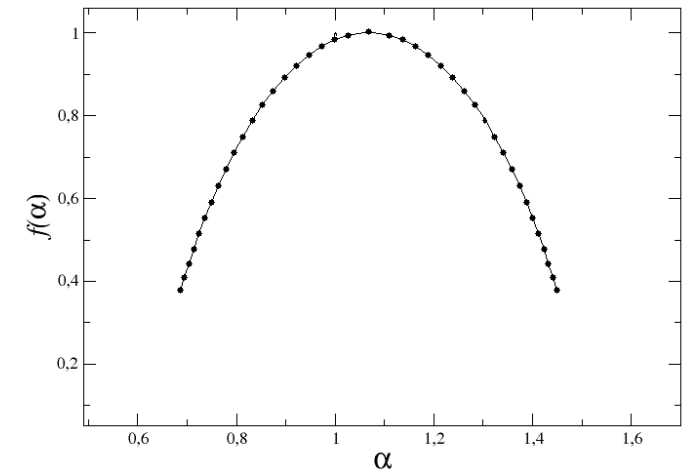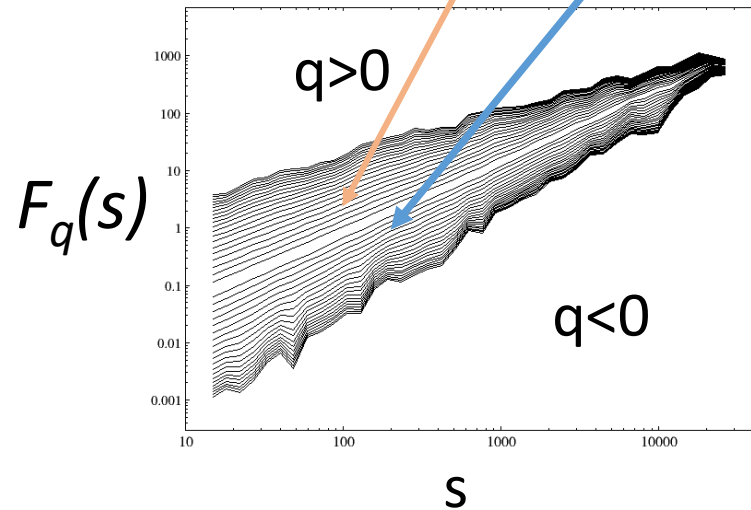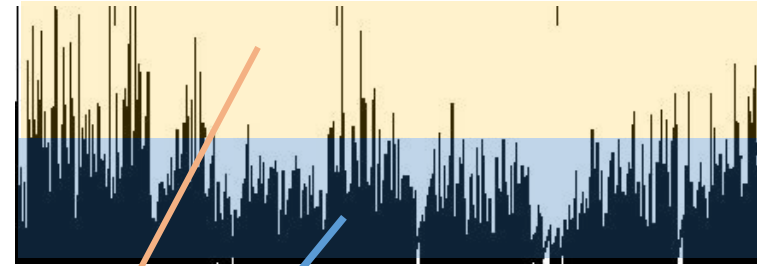**4** Multifractal spectrum

$$F_q \sim s^{h(q)}$$

$$\tau(q) = qh(q) - 1$$

$$\alpha = \tau'(q), \qquad f(\alpha) = q\alpha - \tau(q)$$

$F_q(s)$

q>0

q<0

s

$f(\alpha)$

α

Mutifractal Detrended Fluctuation Analysis (MFDFA)

5   Obliczenia dla różnych *s* i *q*

6   Schemat blokowy algorytmu