Cross-sectional GARCH-based Mean Reversion

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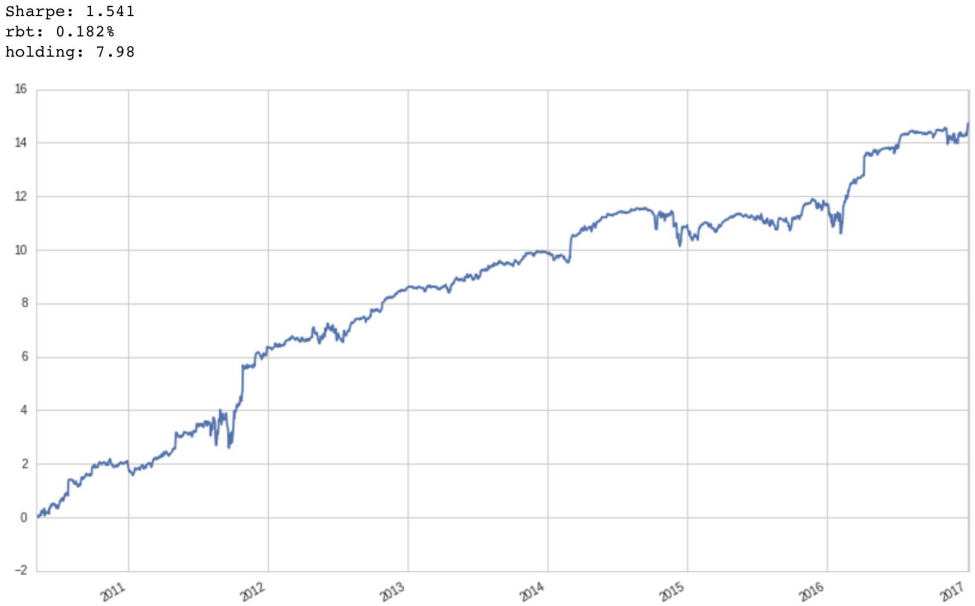
Context

- Goal: developing a stat-arb strategy
- Universe: most traded US equity; trading on a daily basis
- Method:
  - producing a trading signal;
  - trading according to the signal, while market/factor neutral;
  - evaluating with Sharpe ratio and holding period.

Mean reversion

- Mean Reversion Hypothesis: *Prices will go back to their average*.
- Other formulation: *Divergence from the model followed by return to the model.*

Example: $\alpha_t = 1 - P_t / MA_t$



GARCH

- Generalized AutoRegressive Conditional Heteroskedasticity
- Constant Correlation Matrix R
  - $r_{t+1,\,i} = \mu_i + \varepsilon_{t+1,\,i}$
  - $\varepsilon_t = H_t e_t$
  - $H_t = \mathrm{diag}(\sigma_{t,\,i}) \bullet R \bullet \mathrm{diag}(\sigma_{t,\,i})$ with $e_t \sim N(0, Id)$, i.i.d
  - $\sigma^2_{t+1,\,i} = w_i + \alpha_i \varepsilon_{t,\,i}^{\,2} + \beta_i \sigma^2_{t,\,i}$

Signal generation

- At each date :
  - Fit a GARCH model as of $n_{predict}$ days in the past
  - For each stock :
    - Lock the performance of the others since the fit
    - Compute predicted mean and variance based on the others
    - Compare realization with those mean and variance
- Mean reversion on this criterion

Results

- Difficulties fitting the model
- Data is not reliable enough
  - Jumps
  - Corporate actions
  - Volumes
- No significant results yet
  - Pipeline is functional
  - Signal computation works
  - No tangible backtest nor evaluation of signal

What's next?

- Thorough study of the signal.
- Risk factors.
- If we have time, quantopian and execution.