TA Review 3

Schedule

1. Homework 3
   - VaR and CVaR
2. Performance Evaluation, Hedging, Tracking
   - Collinearity
   - Performance Evaluation
   - Hedging vs. Tracking: Alpha?
3. Tips for the Midterm
   - Flexible functions
   - Unittests

Homewor 3

Factor decomposition of return variation

A Linear Factor Decomposition (LFD) of $\tilde{r}^i$ onto the factor $\mathbf{x}_t$ is given by the regression,

$$\tilde{r}_t^i = \alpha + \boldsymbol{\beta}^{i,\mathbf{x}}\mathbf{x}_t + \epsilon_t$$

- The variation in returns is decomposed into the variation explained by the benchmark, x_t and by the residual, ϵ_t.
- These factors, $\mathbf{x}$, in the LFD should give a high R-squared in the regression if they really explain the variation of returns well.

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The problem of collinearity

When should we be most worried about collinearity?

- Evaluating performance
- Tracking
- Hedging

Evaluating Performance

$$r_t = \alpha + \beta r_{t,\mathrm{SPY}} + \beta r_{t,\mathrm{IEF}} + \varepsilon_t$$

What is alpha in this regression?

- Timing
- Selection
- Luck? Problem of small sample sizes

Is this alpha any good? Look at IR and R^2

Hedging vs. Tracking

$$r_t = \alpha + \beta r_{t,\mathrm{SPY}} + \beta r_{t,\mathrm{IEF}} + \varepsilon_t$$

Hedge: **invest** in r_t

Tracking: **no access** to r_t

Hedge: remove **unwanted** risk from "factors"

Tracking: **get** risk from r_t investing in "factors

	Hedge	Track
Where do invest?	Buy left side, sell right	Buy right side
Volatility of the error	Basis risk	Tracking error
If I include alpha, what should I hope for in the out-of-sample?	Big alpha, small error	Small alpha, small error

Hedging vs. Tracking

$$r_t = \alpha + \beta r_{t,\mathrm{SPY}} + \beta r_{t,\mathrm{IEF}} + \varepsilon_t$$

Should I include alpha?

Include an intercept?

In regression for optimal hedge ratio, should we include a constant, (alpha?) Depends on our purpose...

- Do we want to explain the total return (including the mean) or simply the excess-mean return?
- In short samples, mean returns may be estimated inaccurately, (whether in r^i or $\tilde{r}^i$,) so we may want to include α (eliminate means) to focus on explaining variation.

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Regression Simulation