Fundamental Analysis of Securities Trading
(V) Strategy Formulation

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Short Biodata

Kuan-Lun Wang is a doctoral student majoring in generalized pairs trading. The main goal of his research is to develop an algorithmic trading mechanism based on statistical arbitrage. His areas of expertise include automatic search procedures for model selection, multivariate co-integration approach, and structural change test.
Kuan-Lun Wang’s research interests comprise time series models, simulation modeling, and portfolio choice. The central themes of his application are the study of multivariate pairs trading in real time, search for assets with a long-run equilibrium, and building of riskless portfolios. Much of his current work involves conducting structural change analysis and co-integration test of the finite order vector autoregressive process and estimating the probability of mean reversion. Such methods are important in a variety of applications, including economic indicators and hedging. One such application is index funds being tied to indexes with very low costs and risks.
• Holding-Period return (HPR)
  \[ HPR = \frac{\text{Price}_{\text{ending}} - \text{Price}_{\text{beginning}} + \text{Dividend}_{\text{cash}}}{\text{Price}_{\text{beginning}}} \]

• Total rate of return (TR)
  If \( HPR / T << TR / T \), then we need more strategy.

• Arithmetic Average
  Ignores compounding
  \[ \text{Average}_{\text{Arithmetic}} = \frac{\sum_{t=1}^{T} \text{Rate}_{\text{Return},t}}{T} \]

• Geometric Average
  \[ \text{Average}_{\text{Geometric}} = \sqrt[T]{\prod_{t=1}^{T} (1 + \text{Rate}_{\text{Return},t})} - 1 \]
**Strategy**

The Linear Regression Model

Measuring Investment Returns over Multiple Periods
(Quarterly) (2/2)

- Dollar-Weighted Average Return
- Internal Rate of Return (IRR)
  \[ 1 = \sum_{t=1}^{T} \frac{\text{Return}_t}{(1 + \text{IRR})^t} \]
  \[ 0 \leq \text{IRR} < \text{Average Geometric} \] since IRR considers return with scale.

**Strategy**

The Linear Regression Model

Measuring Investment Returns over Multiple Periods
(Annual)

- Annual percentage rates (APR)
  - Regular cash flows
    \[ \text{APR} = \text{Rate}_{\text{Per-period}} \times \text{Periods}_{\text{year}} \]
  - Effective annual rate (EAR)
    \[ 1 + \text{EAR} = (1 + \text{Rate}_{\text{period}})^T = (1 + \frac{\text{APR}}{T})^T \]
    \[ 1 + \text{EAR} = \exp\{\text{APR}\} \text{ when } T \to \infty \]
    \[ \log (1 + \text{EAR}) = \text{APR} \text{ when } T \to \infty \]
Consider return is a variable. Then we can analyzes the distribution of return.

- Value at risk
- Moment
  - Expectation, Variance, Skewness, Kurtosis
- Redefine Expectation, Variance, Skewness, Kurtosis
  - Utility function

**Strategy Formulation**

1. Give some strategies.
2. Consider the relation of strategy.
   - Maybe we can use PTS or other.
3. Write a assumption roll, and check it.
4. Use back-test to control our assets.
   - If strategies are incompatible, then the back-test is important.