Study on Statistical Arbitrage in Futures Market

Midterm Presentation

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Sponsor:
Greenwoods Asset Management Ltd.

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CONTENT

1. Terminology

Arbitrage
The possibility of a risk-free profit at zero cost.

Statistical Arbitrage

1. An investment process based on mathematical models
2. Aiming at making profits
3. Building up long and short positions for assets
4. Taking advantage of asset prices‘ deviation from theoretical values

2. Background Information

Prerequisite:

The securities market in which short selling exists.

Financial Market in China:

1. Before:
   - 1.1 Absent of short selling mechanism
   - 1.2 Absent of stock index futures
2. Now:
   - 2.1 Launched stock index futures on April 16 2010
   - 2.2 Inprovement in startup of securities margin trading

3. Sponsor‘s Background

Greenwoods Asset Management Ltd.

An investment management company specializing in managing investments into mainland China companies. Greenwoods currently manage funds investing in Greater China equities for global investors and A-share trusts for qualified Chinese domestic investors.

4. Deliverables

From team to sponsor:

1. We are going to present an algorithm along with a model in the end of this project.
2. The spread of featured contracts of stock index futures can be predicted.
3. Statistical arbitrage opportunities can be detected by our models.
4. Criteria for entering transactions with arbitrage opportunities can be determined.
5. R packages with a complete set of documents will be created.
6. Technical report and presentation summarizing the work.

4. Deliverables

From sponsor to team:

1. A list of portfolio of interest is needed
2. Sponsor's historic transaction data is needed for modeling, testing, and prediction
3. Computing resources
4. We also expect weekly conference calls for inquiries and consulting

Problem Statement

Data Analysis
To discover arbitrage opportunities, its crucial to extract information from data of historic transactions and featured stock index prices.
We are trying to work out the hidden connection between past data and future trends and make predictions based on this.

Financial Analysis
Based on intensive financial analysis, we seek for benchmarks of arbitrage opportunities for our sponsor.

1. Data Collection

1. Our targeting data should be historic closing prices of contracts of Chinese stock index futures.
2. We choose **CSI300** to be used in our study. CSI 300 is a weighted stock market index designed to replicate the performance of 300 stocks traded in China stock exchanges.

2. Mathematical Models:

Test for Stationarity:

1. Process data before testing
2. Use unit root test to check the property of stationarity

Remark:
a. A stationary process is a stochastic process whose joint probability distribution does not change when shifted in time or space.
b. Providing stationarity of our data, we can apply time series models to analyze data.
b. In statistics, a unit root test tests whether a time series variable is non-stationary using an autoregressive model.

Seven Basic Principles

1. Set the context
2. Choose effective examples and analogies
3. Choose vocabulary to suit your readers
4. Decide whether to present #s in text, tables, or figures
5. Report and interpret #s in the text
6. Specify the direction *and* size of an association between variables
7. For many #s, summarize overall pattern

Creating Effective Tables

Example: Cost of Packaging

Example: The Nuclear Mission Arms Race

Example: Maintaining Inventory