

University of Illinois  
Department of Finance  
Statistical Arbitrage (Fin590ARB) Spring 2005

Austin Gerig  
Office: 4131 ESB  
Email: gerig@uiuc.edu

Credit: 2 Hours

Class Times: Fri 8:30-10:20 170 Wohlers

Enrollment (Interview Required): MBA, MSF, PhD's from across campus

Statistical Arbitrage (working definition) - The exploitation of any statistically significant trend or pattern in market price fluctuations; or . . . the implementation of any trading strategy with a positive expected return but with possible negative returns.

## **Content**

The first half of the course provides a broad introduction to statistical arbitrage in the futures markets. During this time, the class will have a seminar format - there will be weekly reading assignments, and you are expected to participate in weekly discussions on those readings. Independent study/reading is highly encouraged.

During the second half of the course, you will use real market data (in a simulated environment) to analyze, test, develop and fully implement a trading strategy. You will work in teams of 4 people, 2 will be assigned programming duties and the other 2 will be in charge of strategy development.

At various times throughout the semester, the class will travel to Chicago to meet with individuals who work in the field.

## **Grading**

Grades will be assessed as follows:

1/3 Class Participation/Assignments

1/3 Intra/Inter Group Assessment

1/3 Instructor Assessment of Final Report/Presentation

## Schedule

January 28th	Introduction to Futures Markets and Statistical Arbitrage <i>Discussion:</i> Statistical Arbitrage and the Efficient Market Hypothesis. Interact with simulated futures market.
February 4th	Presentation by Professor Neil Pearson “Introduction to Trading Strategies”
February 11th	Travel to Resource Trading Group (RTG) in Chicago, visit CBOT
February 18th	Travel to Trading Technologies (TT) in Chicago
February 25th	Time Series/Statistics (Programmers travel to TT) <i>Discussion:</i> Inhomogeneous time series. Evolution of market returns in time (Central Limit Theorem). Autocorrelation of returns in markets (and linear combinations of markets).
March 4th	Technical Analysis <i>Discussion:</i> MA, EMA, RSI, Pivots, Flags, etc. Statistical analysis of TA signals.
March 11th	Genetic Algorithms/Neural Nets/Markov Chains <i>Discussion:</i> Finding nonlinear trends in data. Optimizing trading strategies. Searching ‘strategy space’.
March 18th	Confidence Measures/Risk Assessment <i>Discussion:</i> Stable P/L distribution. Sharpe ratio. Data mining/Overfitting.
April 15th	Travel to Citadel Investment Group in Chicago.
April 1st - April 29th	Work on projects.

## References

### Introductory

Vidyamurthy. *Pairs Trading, Quantitative Methods and Analysis*. John Wiley & Sons, 2004.

Mantegna&Stanley. *An Introduction to Econophysics*. Cambridge University Press, 2000.

### Trading Strategy Development

Satchell. *Advanced Trading Rules*. Butterworth-Heinemann, 1998.

Dacorogna et al. *An Introduction to High-Frequency Finance*. Academic Press, 2001.

Gwilym&Sutcliffe. *High-Frequency Financial Market Data*. Risk Books, 1999.

Kestner. *Quantitative Trading Strategies*. McGraw-Hill, 2003.

### Random Walk/EMH

Cootner. *The Random Character of Stock Market Prices*. The M.I.T. Press, 1964.

Osborne. *The Stock Market and Finance from a Physicist's Viewpoint*. Crossgar Press, 1977.

### Statistical Mechanics of Markets

Voit. *The Statistical Mechanics of Financial Markets*. Springer, 2001.

Paul&Baschnagel. *Stochastic Processes From Physics to Finance*. Springer, 1999.

Bouchaud&Potters. *Theory of Financial Risk and Derivative Pricing : From Statistical Physics to Risk Management*. Cambridge University Press, 2003.

### Popular Books

Lowenstein. *When Genius Failed*. Random House, 2001.

Malkiel. *A Random Walk Down Wall Street*. W. W. Norton & Company, 2004 (Updated Edition).

Bass. *The Predictors*. Owl Books, 2000 (Reprint Edition)