



NANYANG
TECHNOLOGICAL
UNIVERSITY

Nanyang Business School

Trading Strategies

Saurabh Singal | Ankam Partners | 26 Feb 2011

What We Will Cover

- Systematic Trading
 - Pattern Recognition (Osler, Lo et al)
 - Indicators
- Quantitative Trading
 - Value Investing (Altman, Piotroski, Buffett, EQ)
 - Growth Investing (Mohanram)
- Capital Structure Arb including Convert Arb
- Risk Arb
- Equity Market Neutral
- Stat Arb & Pairs
- Dispersion Trading
- News Sentiment Analysis
- High Frequency Trading



Qualitative vs. Quantitative Trading

Qualitative trading

- the investor typically focuses on
 - a small number of individual stocks
 - conducts research on each to determine its business strengths and weaknesses,
 - market opportunities,
 - competitive positions,
 - quality of its management....

Quantitative Analysis

- The investor
 - seeks to discover overall tendencies or trends in the investment markets, particularly those that are predictive of future excess returns.
 - examines large number of companies over long periods of times.



Systematic Trading

- Rule based trading.
- Usually assisted by computer programs that
 - allow fast processing of large data
 - keep track of events
 - act without emotion or bias
 - compute probabilities accurately



Systematic Trading

- Moving Averages
- Bollinger Bands
- Average True Range and Keltner Channels
- RSI
- MACD
- Stochastic
- William's Percent R



Pitfalls of Chart Reading

Good Points

Bad Points

- Human Brain is very good at pattern recognition
- Easy



Automated Pattern Recognition

Osler, Carol L. & P. H. Kevin Chang

Head and Shoulders: Not Just a Flaky Pattern

No 4, Staff Reports from Federal Reserve Bank of New York

Abstract:

This paper evaluates rigorously the predictive power of the head-and-shoulders pattern as applied to daily exchange rates. Though such visual, nonlinear chart patterns are applied frequently by technical analysts, our paper is one of the first to evaluate the predictive power of such patterns. We apply a trading rule based on the head-and-shoulders pattern to daily exchange rates of major currencies versus the dollar during the floating rate period (from March 1973 to June 1994).



Head and Shoulders not a Flaky Pattern

- We identify head-and-shoulders patterns using an objective, computer-implemented algorithm based on criteria in published technical analysis manuals. The resulting profits, replicable in real-time, are then compared with the distribution of profits for 10,000 simulated series generated with the bootstrap technique under the null hypothesis of a random walk.
- Result: The trading rule has predictive power for 2 out of 6 FX crosses. If all 6 were to be traded, there would economically and statistically significant profits. The results are robust to changes in the parameters of the identification algorithm as well as sample period.



Andrew Lo: Technical Analysis

Lo, Andrew W., Harry Mamaysky and Jiang Wang

Foundations of Technical Analysis: Computational Algorithms, Statistical Inference and Empirical Implementation

Journal of Finance 55 (2000), 1705–1765.

Abstract:

Technical analysis, also known as “charting”, has been a part of financial practice for many decades, but this discipline has not received the same level of academic scrutiny and acceptance as more traditional approaches such as fundamental analysis. One of the main obstacles is the highly subjective nature of technical analysis—the presence of geometric shapes in historical price charts is often in the eyes of the beholder.



Andrew Lo: Technical Analysis (2)

ABSTRACT (Contd.) In this paper, we propose a systematic and automatic approach to technical pattern recognition using nonparametric kernel regression, and apply this method to a large number of U.S. stocks from 1962 to 1996 to evaluate the effectiveness of technical analysis. By comparing the unconditional empirical distribution of daily stock returns to the conditional distribution—conditioned on specific technical indicators such as head-and-shoulders or double-bottoms—we find that over the 31-year sample period, several technical indicators do provide incremental information and may have some practical value.



Quantitative Value Investing: Piotroski F-score

Piotroski, Joseph

Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers

Journal of Accounting Research, Vol 38, Supplement

- Value stocks are often troubled companies.
- Value traps - Many will not recover.
- Is it possible to improve the performance of a value stock portfolio ?
- Eliminate stocks that were the weakest financially.



Quantitative Value Investing: Piotroski F-score (2)

- His findings were that these strong stocks as a group outperformed a portfolio of all value stocks by 7.5% annually over a 20-year test period.
- He devised a 9-point system for evaluating a stock's financial strength using financial statements.
- One point was awarded for each test that a stock passed.
- Any stocks that scores eight or nine points is “strong”.



Quantitative Value Investing: Piotroski F-score (3)

1. **Net Income:** Bottom line. Score 1 if last year net income is positive.
2. **Operating Cash Flow:** A better earnings gauge. Score 1 if last year cash flow is positive.
3. **Return On Assets:** Measures Profitability. Score 1 if last year ROA exceeds prior-year ROA.
4. **Quality of Earnings:** Warns of Accounting Tricks. Score 1 if last year operating cash flow exceeds net income.
5. **Long-Term Debt vs. Assets:** checks if debt is increasing or decreasing. Score 1 if the ratio of long-term debt to assets is down from the year-ago value. (If LTD is zero but assets are increasing, score 1).
6. **Current Ratio:** Measures increasing working capital. Score 1 if CR has increased from the prior year.



Quantitative Value Investing: Piotroski F-score (4)

- 7. Shares Outstanding:** A Measure of potential dilution. Score 1 if the number of shares outstanding is no greater than the year-ago figure.
- 8. Gross Margin:** A measure of improving competitive position. Score 1 if full-year GM exceeds the prior-year GM.
- 9. Asset Turnover:** Measures productivity. Score 1 if the percentage increase in sales exceeds the percentage increase in total assets.



Quantitative Growth Investing : Mohanram's G-score

Mohanram, Partha

**Separating Winners from Losers among Low Book-to-Market Stocks using
Financial Statement Analysis**

Review of Accounting Studies Volume 10, Numbers 2-3

Abstract

This paper combines traditional fundamentals, such as earnings and cash flows, with measures tailored for growth firms, such as earnings stability, growth stability and intensity of R&D, capital expenditure and advertising, to create an index – GSCORE. A long–short strategy based on GSCORE earns significant excess returns, though most of the returns come from the short side... High GSCORE firms have greater market reaction and analyst forecast surprises with respect to future earnings announcements. ...returns are positive in most years ... analysis appropriate for high BM stocks and growth oriented fundamental analysis appropriate for low BM stocks.



Quantitative Growth Investing : Mohanram's G-score

Uses 8 binary signals (profitability & growth-specific financial measures).

1. **ROA** – net income before extraordinary items scaled by beginning of the year total assets
2. **Cash Flow ROA** – cash flow from operations scaled by beginning of the year total assets
3. **Accruals** – cash flow from operations minus net income
4. **ROA variance** over the past five years
5. **Sales variance** over the past five years
6. **R&D Intensity** – R&D expenditure scaled by beginning of the year total assets
7. **Capital Expenditure Intensity** – capital expenditure scaled by beginning of the year total assets
8. **Advertising Intensity** – advertising expenditure scaled by beginning of the year total assets



Earnings Surprise & SUE

Doyle, Jeffrey, Russell Lundholm & Mark Soliman

The Extreme Future Stock Returns following Extreme Earnings Surprises

Ross School of Business Paper No. 922

Abstract:

We investigate the stock returns subsequent to large quarterly earnings surprises, where the benchmark for an earnings surprise is the consensus analyst forecast...returns subsequent to earning announcements that are much larger, persist for much longer, and are more heavily concentrated in the long portion of the hedge portfolio than shown in previous studies. .. and are positive for every quarter between 1988 and 2000.



Earnings Surprise & SUE (2)

Abstract (contd.)

Finally, we explore the financial results and information environment of firms with extreme earnings surprises and find that they tend to be “neglected” stocks with relatively high book to market ratios, low analyst coverage, and high analyst forecast dispersion. In the three subsequent years, firms with extreme positive earnings surprises tend to have persistent earnings surprises in the same direction, strong growth in cash flows and earnings, and large increases in analyst coverage, relative to firms with extreme negative earnings surprises.

- **SUE = Standardized Unexpected Earnings**
= (Actual Earnings – Consensus Forecast) / Std Dev of Forecast



Safety First: Altman Z-score

Altman, Edward I.

Financial ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy

The Journal of Finance 23, 589-609, 1968

- Very old formula (1960's) by NYU Professor Edward I. Altman
- Predicts the probability of a company going bankrupt in 2 years.
- Used Discriminant Analysis to come up with the results.
- $Z = 0.012T_1 + 0.014T_2 + 0.033T_3 + 0.006T_4 + 0.999T_5$.



Safety First: Altman Z-score (2)

- $\text{Factor}_1 = \text{Working Capital} / \text{Total Assets}$.
- $\text{Factor}_2 = \text{Retained Earnings} / \text{Total Assets}$.
- $\text{Factor}_3 = \text{Earnings Before Interest and Taxes} / \text{Total Assets}$.
- $\text{Factor}_4 = \text{Market Value of Equity} / \text{Book Value of Total Liabilities}$.
- $\text{Factor}_5 = \text{Sales} / \text{Total Assets}$.



Quantifying Earnings Quality.

- The two most important parts in an Earnings Quality model:
 - Accruals and
 - Operating Efficiency
- Earnings = Cash Flow + Accruals
- $ROA = (\text{Profit margin}) * (\text{Asset turnover})$
- **Thomson Reuters EQ Model** is a good model

Earnings Quality: Accruals

Sloan, R. G.

Do Stock Prices Fully Reflect Information in Accruals and Cash Flows about Future Earnings?

The Accounting Review 71, 289-315 , 1996

Accrual is the difference between Reported Earnings and Cash earnings.

- Any earning item not supported by cash flow appears as an Accrual item.
- Accruals are subjective – only if free from error ,they can be more meaningful than cash flow.
- Accruals example – aggressively booking sales against accounts receivables.



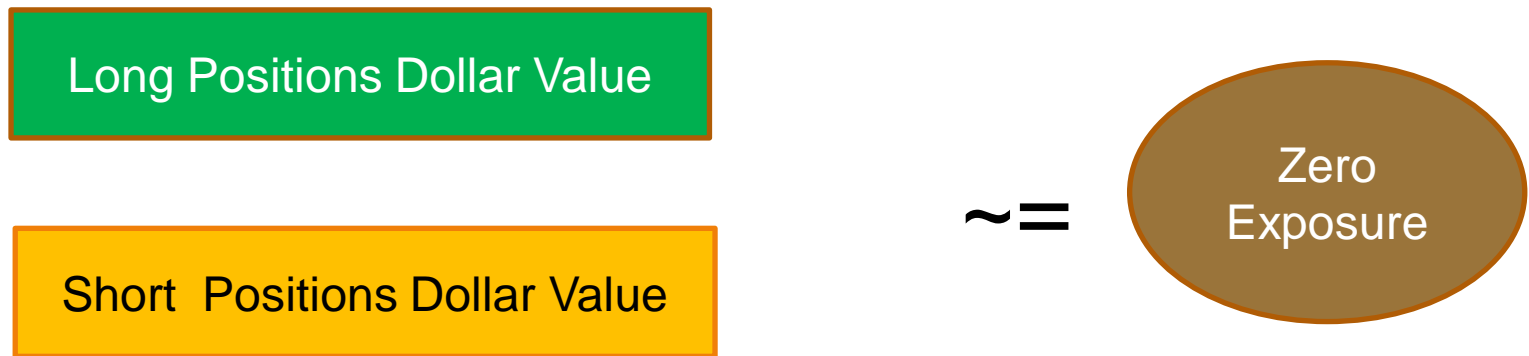
Quantifying Earnings Quality: Operating Efficiency & Du Pont Analysis

- $ROA = (\text{Profit margin}) * (\text{Asset turnover})$
 $= (\text{Net profit}/\text{Sales}) * (\text{Sales}/\text{Assets})$
 $= \text{Net Profit}/\text{Assets}$
- Operating efficiency is measured by profit margin
- Asset use efficiency is measured by asset turnover



Market Neutral Strategy

- Strategy to Generate consistent returns in both up and down markets by selecting positions with total net exposure of Zero.



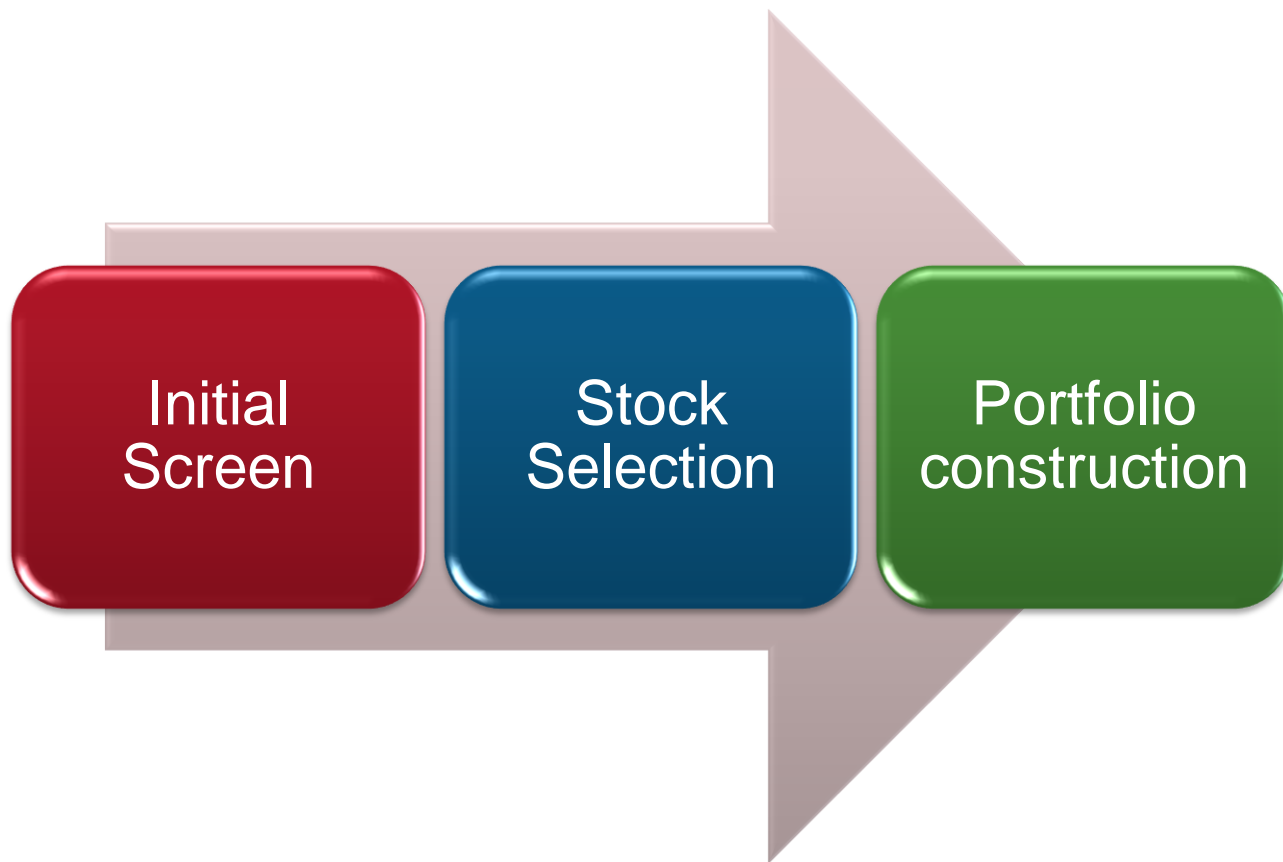
- Take Long and Short Positions in roughly equal amounts to neutralize the effect of changes due to the stock market movement.

Market Neutral return Expectations

- Stocks expected to outperform market are held long
- Stocks expected to underperform market are held short.
- Returns are derived from Long Short spread.
- Traders are able to achieve stable returns, regardless of overall direction of the stock market.

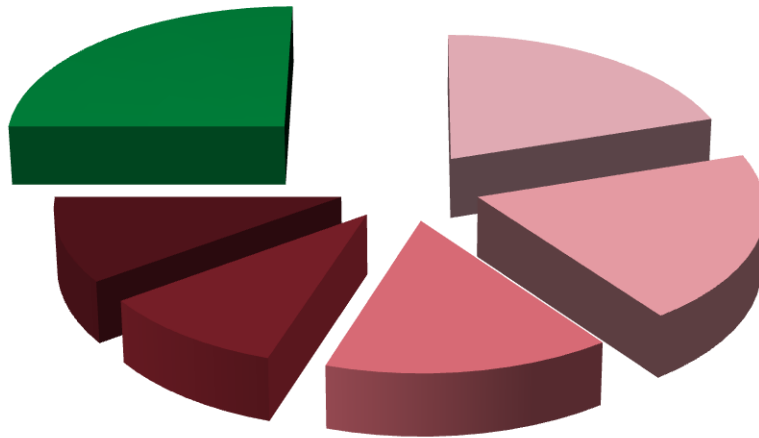


Market Neutral Investment Process



Initial Screen

- Out of possible 8000 stocks traded in US , group down to more manageable numbers(400 to 2000)



- Non Liquid stocks
- Ability to Short
- Market Impact
- Stocks involved in M& A
- Excluded Sectors and Industries
- Final Stock Selection

Stock Selection (1)

- Fundamental Factors –Quantitative
 - Value Factors: Assess a company's current capital value, historical earning stream and future earnings prospects.
 - Growth Factors: reflected in future earnings and changes in investor expectations which can be quantified in analyst's earnings estimate . Thus revisions of these estimates either up or down can be powerful indicator of a company's growth trend.

Price/Earnings	Dividend Yield.	Total Assets over Sales	Earning Growth
Price/Book Value	Return on Equity	Changing in Operating Margins.	Earning Estimate Revisions
Price/Cash Flow	Price/Sales	Earnings Relative to Industry over Price	Earning Surprises

Stock Selection (2)

- Fundamental Factors –Qualitative
 - Usually includes data gathered though industry . The complete lack of qualitative elements is the distinguishing factor between statistical arbitrage and more general category of equity market neutral.
- Putting it all together – Creating Relative Ranking
 - The general form of most multifactor stock selection model is a linear equation of n terms that takes the form:

$$r = \beta_1 f_1 + \beta_2 f_2 \dots \dots \dots + \beta_n f_n$$

- Where r – measure of expected return for a stock
- β (Beta) is sensitivity of the expected return to changes in the value of its Corresponding factor, f

Portfolio Construction and Optimization

- Aim is to balance reward and risk
- Create optimal bundle of equal amounts of high ranked and low ranked stocks while maintaining, as close as possible, a zero net exposure to the chosen systematic risk factors.
- The reduction of risk associated with neutralizing systematic risk factors must be weighed against foregone returns.
- Depending on assessment you might
 - Violate a buy or sell rule in order to maintain proper portfolio balance
 - Allow risk factor exposures to stray from neutrality

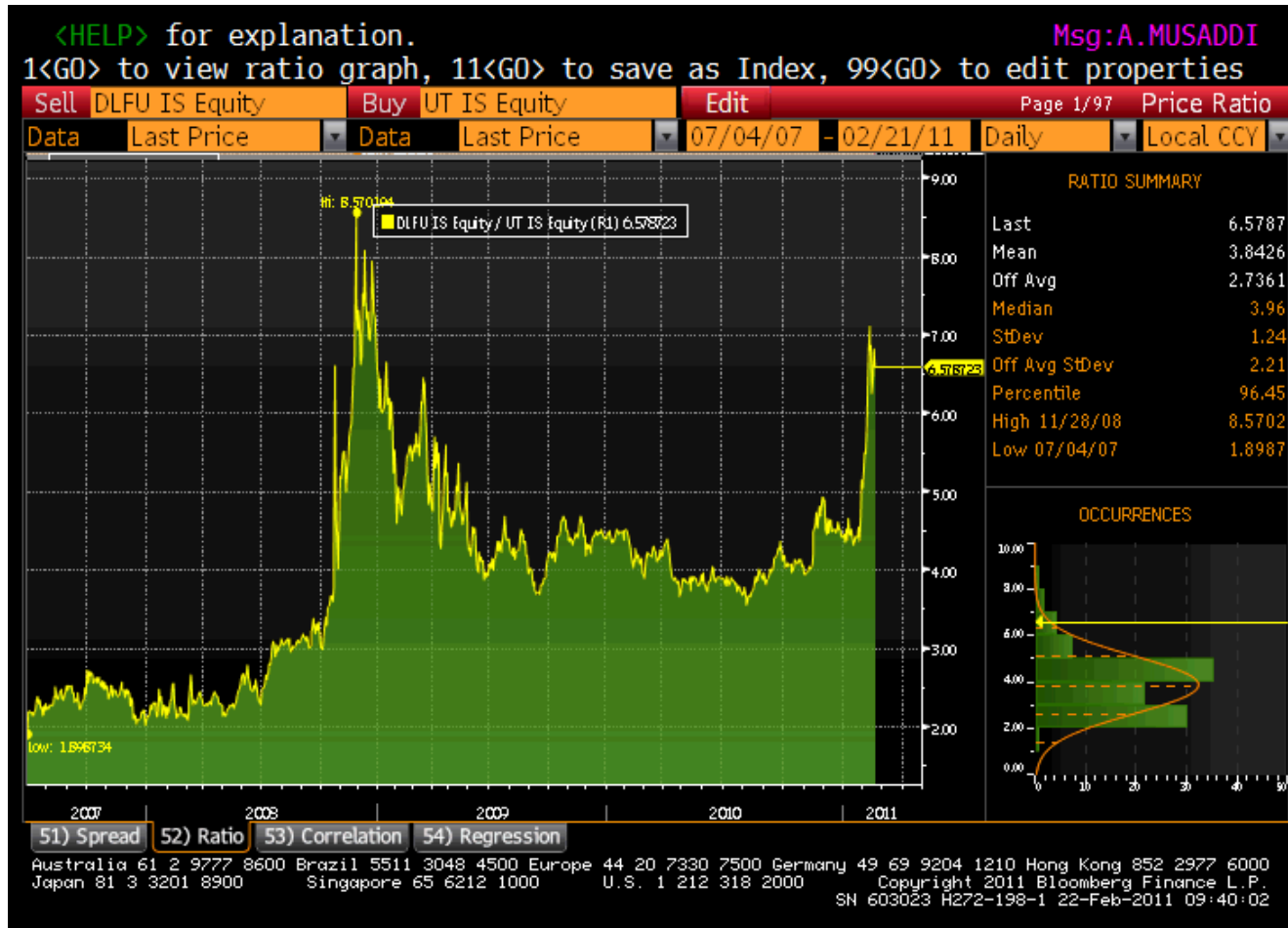


The Pre-cursor to Stat-Arb: Pairs Trading

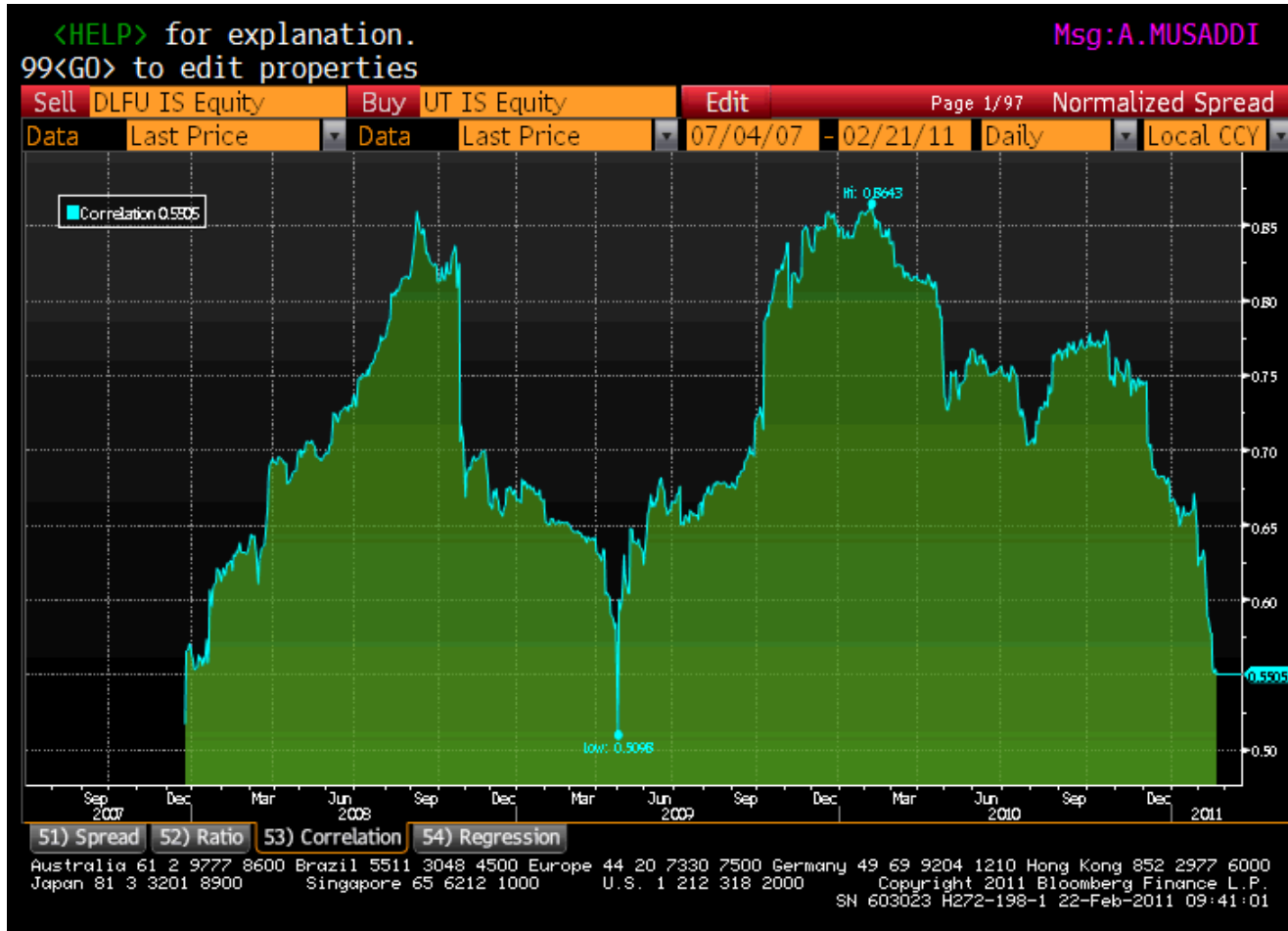
- **Nunzio Tartaglia** at Morgan Stanley examined pairs of stocks from the same sector that had shown high correlation with each other.
- Any departure from co-movement likely to be temporary
- If the correlated stocks moved in the opposite directions, or one of the two underperformed the other sharply,
 - short the outperformer
 - buy the underperformer
- The quantity of each stock is chosen so that the position is either
 - dollar neutral
 - Or “beta neutral”
 - **SGX White Paper** *Trading Strategies Series: Pairs Trading* is the **best** paper on this .



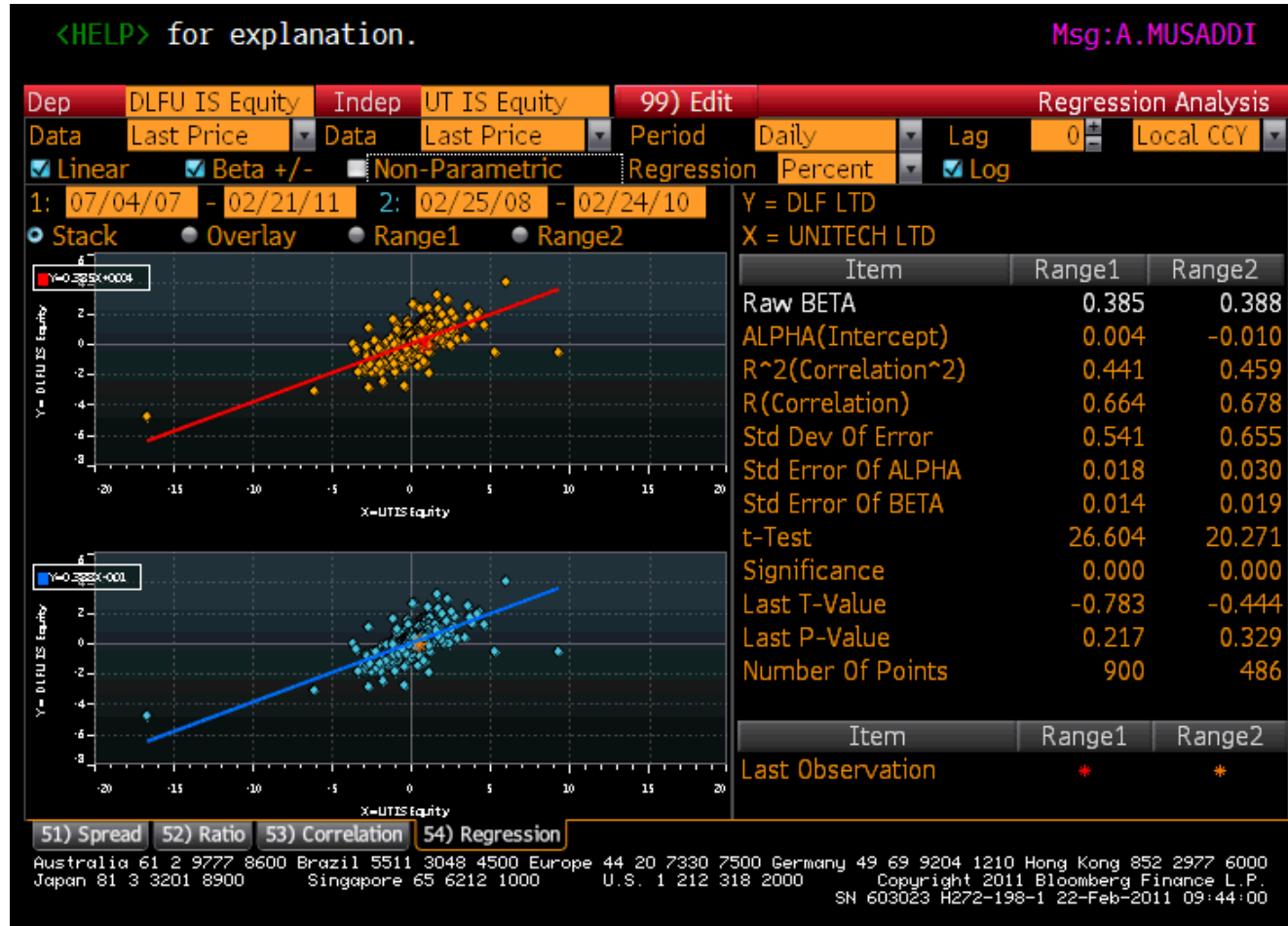
Example of Pair Trade



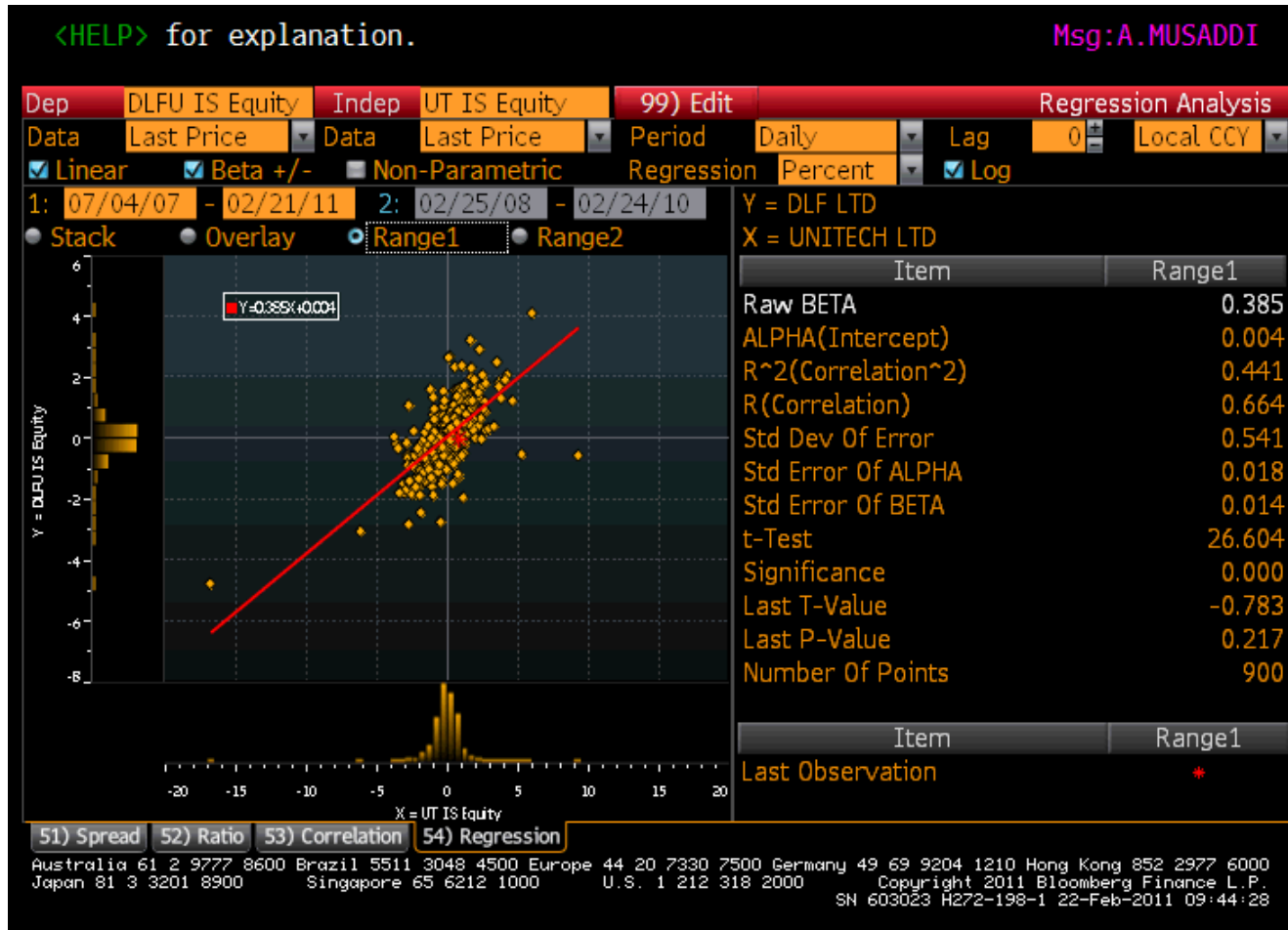
Example of Pair Trade (2)



Example of Pair Trade (3)



Example of Pair Trade (4)



Stat Arb

- According to Prof. Andrew Lo,

Stat Arb refers to

- highly technical short-term mean-reversion strategies involving
- large numbers of securities (hundreds to thousands, depending on the amount of risk capital),
- very short holding periods (measured in days to seconds),
- with substantial computational,
- trading, and
- IT infrastructure



Risk Arb or Merger Arb

- Merger Arb involves buying (or selling short) the stock of a company being acquired and selling (buying) the stock of the acquirer.
- The target company's stock is usually at a discount to the price it would be acquired for – the acquisitions are normally at a premium to the stock price of the target company prior to the merger.
- The **Risk** is that the deal does not go through, e.g., because of regulatory approvals not being granted. In this case, the price of target can decline a lot.



Risk Arb or Merger Arb (2)

- The expert will make money if they can correctly anticipate the chance the deal goes through and lock in the spread.
- Small chance of large loss and large chance of many modest wins.
- In Oct 2000, GE bid for Honeywell - everyone thought good synergy .
- US DoJ approved the merger.
- EU Competition commissioner, Mario Monti cried foul.
- Spread tripled.
- Large loss.



Capital Structure Arbitrage

- Whereas Merger Arb involves taking a long and short position in the stocks of two different companies, Cap Structure Arb involves taking positions in different instruments or contracts of the same company.
- A trader could take long and short positions in equity and debt of the same company.
- Or trade offsetting positions in the junior and senior debt of the same company.
- Credit Default Swaps can often be used.
- Example: If a stock falls precipitously, the credit spreads widen and the CDS also goes up. Depending on his analysis, a trader could buy stock and buy CDS protection.
- Or sell the stock short and also sell CDS protection.



Convertible Bond Arbitrage

- Convertible bond has the characteristics of both a stock and a bond.
- When the stock price falls a lot, it starts to behave more like a bond.
- When the stock price is very high, it starts to resemble an equity.
- Long Convertible and short the stock is a popular strategy.



Quantifying News Sentiment

- Machine Readable News from **Thompson Reuters**: excellent stuff!
- Advances in Computational Linguistics and Natural Language Processing allow us to quantify the sentiment and meaning of the news in real-time.
- Textual data on a large scale becomes available for use in an automated fashion.
- Most of the traditional quant factors are either based on fundamental data or price-volume-
- So Machine Readable News is an independent or orthogonal source of alpha.
- **HOTTEST STRATEGY RIGHT NOW – more if we meet again!**



High Frequency Trading



High-Frequency Trading

Computer-driven, algorithm-based trading at speeds measured in millionths of a second

- **HFT is defined by how many orders do you want to send in how long a period of time?**
- Using supercomputers, firms make trades in a matter of microseconds, or one-millionth of a second. Some trading firms try to catch fleeting moves in everything from stocks to currencies to commodities. They hunt for "signals," such as the movement of interest rates, that indicate which way parts of the market may move in short periods. Some try to find ways to take advantage of subtle quirks in the infrastructure of trading.

- *Picture Courtesy Wall Street Journal*



Examples: High Frequency Trading

- 1. Order routing arbitrage across different liquidity pools of the same instrument (one example can be cash equities in Europe across different exchanges and dark pools)
- 2. Front running the VWAP algos that many banks offer as execution services today (simply being faster at processing the VWAP price and entering the next level of order knowing that there will be a steady flow of orders following you....)
- 3. Triangulation in the FX market (trading a direct FX cross versus a combination of FX crosses that nets into the same exposure)

Dispersion Trading

Dispersion trading refers to trades in which one

- selling index volatility and buying volatility of the index components (sell index options and buy options on the index components)
 - buying index volatility and selling volatility on the index components (buy index options and sell options on the index components)
- ✓ All trades are delta-neutral (hedged with stock)
Profits from temporary shifts in correlations between assets,
e.g., due to news on individual stocks.



Dispersion Trade (2)

- The simplest execution is through variance swaps
 - Sell index variance swaps, Vega = V_I
 - Buy stock variance swaps, Vega for stock $k = V_k$
- The underlying are either
 - The index constituents
 - a subset of index constituents *e.g.* the S&P 500 “top 50”

