



Algorithmic Trading
Session 3
Trade Signal Generation I
Finding Trading Ideas and Common Pitfalls

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Outline

- ▣ **Introduction**
- ▣ **Finding Trading Ideas**
- ▣ **Common Pitfalls of Trading Strategies**
- ▣ **Summary and Questions**
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Introduction

Where Do We Stand in the Algo Prop Trading Framework?



- ❑ As we have seen, algorithmic proprietary trading strategies can be broken down into three subsequent steps: Signal Generation, Trade Implementation and Performance Analysis
- ❑ The first step, **Signal Generation**, defines when and how to trade. For example, in a moving average strategy, the crossing of the shorter running moving average over the longer running moving average triggers when to trade. Next to long and short, the signal can also be neutral (do nothing). Using moving averages to generate long/short trading signals is an example choice of how to trade
- ❑ Sessions 3 – 6 deal with the question of deciding when and how to trade
 - **Today’s Session 3**: Finding Suitable Trading Strategies and Avoiding Common Pitfalls
 - **Session 4**: Backtesting
 - **Session 5**: Mean Reversion Strategies
 - **Session 6**: Momentum Strategies

Introduction

Signal Generation

- ❑ Signal Generation describes the process of **deciding when and how to trade**
- ❑ Finding a trading idea is actually **not** the hardest part of building a quantitative trading strategy. There are hundreds, if not thousands, of trading ideas that are in the public sphere at any time, accessible to anyone at little or no cost. Many authors of these trading ideas will tell you their complete methodologies in addition to their backtest results. There are finance and investment books, newspapers and magazines, mainstream media web sites, academic papers available online or in the nearest public library, trader forums, blogs etc.
- ❑ However, you have to choose a strategy that is suitable to your constraints
- ❑ Avoid common trading strategy pitfalls. Several checks can tell you quite quickly whether you should further investigate a strategy or not

Finding Trading Ideas

Where can you find good trading ideas?

- ❑ Finding prospective quantitative trading strategies is not difficult. There are:
 - ❑ Academic research websites
 - ❑ Finance web sites and blogs
 - ❑ Trader Forums
 - ❑ Newspapers and Magazines

Type	URL
Academic	
Business schools' finance professors' web sites	www.hbs.edu/research/research.html
Social Science Research Network	www.ssrn.com
National Bureau of Economic Research	www.nber.org
Business schools' quantitative finance seminars	www.ieor.columbia.edu/seminars/financialengineering
Mark Hulbert's column in the <i>New York Times</i> ' Sunday business section	www.nytimes.com
Buttonwood column in the <i>Economist</i> magazine's finance section	www.economist.com
Financial web sites and blogs	
Yahoo! Finance	finance.yahoo.com
TradingMarkets	www.TradingMarkets.com
Seeking Alpha	www.SeekAlpha.com
TheStreet.com	www.TheStreet.com
The Kirk Report	www.TheKirkReport.com
Alea Blog	www.aleablog.com
Abnormal Returns	www.AbnormalReturns.com
Brett Steenbarger Trading Psychology My own!	www.brettsteenbarger.com epchan.blogspot.com
Trader forums	
Elite Trader	www.Elitetrader.com
Wealth-Lab	www.wealth-lab.com
Newspaper and magazines	
<i>Stocks, Futures and Options</i> magazine	www.sfomag.com

Finding Trading Ideas

Which Strategy Suits You?

- ❑ Finding a viable strategy that suits you often does not have anything to do with the strategy itself, rather with your constraints:
 - ❑ How much **time** do you have for baby-sitting your trading programs? Do you trade part time? If so, you would probably want to consider only strategies that hold overnight and not the intraday strategies. Otherwise, you may have to fully automate your strategies
 - ❑ **How good a programmer are you?** If you know some programming languages such as Visual Basic, MATLAB, R or even Java, C#, or C++, you can explore high-frequency strategies, and you can also trade a large number of securities. Otherwise, settle for strategies that trade only once a day, or trade just a few stocks, futures, or currencies
 - ❑ **How much capital do you have** available for trading? Do you have a lot of capital available for trading as well as expenditure on infrastructure and operation? In general, I would not recommend quantitative trading for an account with less than EUR 50,000
 - ❑ Is your goal to **earn steady monthly income or to strive for a large, long-term capital gain?** Most people who choose to become traders want to earn a steady (hopefully increasing) monthly, or at least quarterly, income. But you may be independently wealthy, and long-term capital gain is all that matters to you

Finding Trading Ideas

How Does Capital Availability Affect Your Choices?

- Ernest Chan lists a number of considerations dependent on your capital available:

Low Capital	High Capital
Proprietary trading firm's membership	Retail brokerage account
Futures, currencies, options	Everything, including stocks
Intraday	Both intra- and interday (overnight)
Directional	Directional or market neutral
Small stock universe for intraday trading	Large stock universe for intraday trading
Daily historical data with survivorship bias	High-frequency historical data, survivorship bias-free
Low-coverage or delayed news source	High-coverage, real-time news source
No historical news database	Survivorship bias-free historical news database
No historical fundamental data on stocks	Survivorship bias-free historical fundamental data on stocks

Common Pitfalls of Trading Strategies

Quick Checks

- ❑ Before doing an in-depth backtest of the strategy, you can quickly filter out unsuitable strategies if they fail one or more of these tests:
 - ❑ Does it outperform a benchmark?
 - ❑ Does it have a high enough Sharpe/Sortino ratio?
 - ❑ Does it have a small enough drawdown and short enough drawdown duration?
 - ❑ Does the backtest suffer from survivorship bias?
 - ❑ Does the backtest suffer from data snooping bias?

Common Pitfalls of Trading Strategies

Benchmark Outperformance and Performance Consistency

- How compares the strategy with a benchmark and how consistent are its returns? Return comparisons are easy for long- only stock strategies, but more difficult for advanced strategies such as long/short equity
- Another issue to consider is the consistency of the returns generated by a strategy. Though a strategy may have the same average return as the benchmark, perhaps it delivered positive returns every month while the benchmark occasionally suffered some very bad months. In this case, we would still deem the strategy superior than the benchmark. Always use measures such as **Information, Sharpe** (Information ratio with benchmark returns equal to the risk free asset) or **Sortino** ratio to measure risk adjusted performance, never return alone

- Information ratio:
$$\frac{\text{Average of Excess Returns}}{\text{Standard Deviation of Excess Returns}}$$

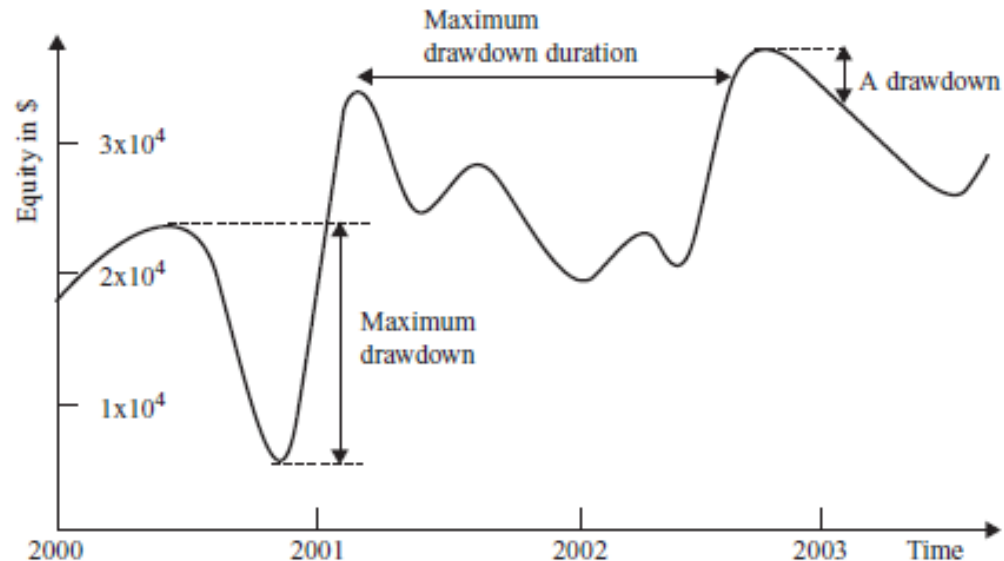
- Sortino ratio:
$$\frac{\text{Average of Excess Returns}}{\text{Downside Deviation of Excess Returns}}$$

$$\text{Average of Excess Returns} = \text{Portfolio Returns} - \text{Benchmark Returns}$$

Common Pitfalls of Trading Strategies

Drawdowns

- How deep and long is the drawdown? A strategy suffers a drawdown whenever it has lost money recently. A drawdown at a given time t is defined as the difference between the current equity value (assuming no redemption or cash infusion) of the portfolio and the global maximum of the equity curve occurring on or before time t . The **maximum drawdown** is the difference between the global maximum of the equity curve with the global minimum of the curve after the occurrence of the global maximum
- Are there any client specific or risk management imposed drawdown constraints?



Common Pitfalls of Trading Strategies

Transaction Costs

- ❑ Every time a strategy buys and sells a security, it incurs a transaction cost. The more frequent it trades, the larger the impact of transaction costs will be on the profitability of the strategy. These transaction costs are not just due to **commission fees** charged by the broker. There exist also **exchange fees** as well as **stamp duty** fees
- ❑ There will also be the **cost of liquidity** - when you buy and sell securities at their market prices, you are paying the **bid-ask spread**. If you buy and sell securities using limit orders, however, you avoid the liquidity costs but incur opportunity costs
- ❑ When you buy or sell a large chunk of securities, you will not be able to complete the transaction without impacting the prices at which this transaction is done. This effect on the market prices due to your own order is called **market impact**, and it can contribute to a large part of the total transaction cost when the security is not very liquid. Algorithmic execution models try to limit these market impact costs
- ❑ There can also be a delay between the time your strategy transmits an order to the broker and the time it is executed at the exchange, due to slow internet connection or slow software. This delay can cause **slippage**, the difference between the price that triggers the order and the actual execution price

Common Pitfalls of Trading Strategies

Survivorship Bias

- ❑ A historical database of asset prices such as stocks that does not include stocks that have disappeared due to bankruptcies, delistings, mergers, or acquisitions suffer from the so-called **survivorship bias**, because only “survivors” of those often unpleasant events remain in the database
- ❑ Same problem applies to **mutual fund or hedge fund databases** that do not include funds that went out of business, usually due to negative performance
- ❑ Survivorship bias is **especially applicable to value strategies**, e.g. investment concepts that buy stocks that seem to be cheap. Some stocks were cheap because the companies were going bankrupt shortly. So if your strategy includes only those cases when the stocks were very cheap but eventually survived (and maybe prospered) and neglects those cases where the stocks finally did get delisted, the backtest performance will be much better than what a trader would actually have suffered at that time

Common Pitfalls of Trading Strategies

Data Snooping Bias – In Sample Over-Optimization

- ❑ If you build a trading strategy that has 100 parameters, it is very likely that you can optimize those parameters in a way that the historical performance looks amazing. It is also very likely that the future performance of this strategy will not at all look like this over-optimized historical performance
- ❑ Data snooping is very difficult to avoid even if you have just one or two parameters (such as entry and exit thresholds). We will further investigate this issue in Session 4, when we discuss backtesting and common backtesting pitfalls
- ❑ In general, the more rules a strategy has, and the more parameters the model has to optimize, the more likely it is to suffer from data-snooping bias
- ❑ The following general rules based on Occam's razor help to avoid data snooping bias in quantitative trading strategies:
 - ❑ Strategy is based on a sound econometric or rational basis, and not on random discovery of patterns
 - ❑ Only a limited amount of parameters need to be fitted to past data
 - ❑ All optimizations must occur in a backward looking moving window, involving no future unseen data. And the effect of this optimization must be continuously demonstrated using this future, unseen data

Summary and Questions

- Finding quantitative trading ideas is not that difficult. There are many finance and investment books, newspapers and magazines, mainstream media web sites, academic papers available online or in the nearest public library, trader forums, blogs etc. which can be used to form intuitive ideas which are then transformed into trading signals
- Finding a viable strategy that suits your constraints is more difficult. Consider your time and capital limitations as well as your programming skills. You also have to decide whether you want to earn a steady monthly income or if you want to strive for a larger, long-term capital gain
- Before backtesting a strategy, you can filter out many unviable strategies based on a quick check. These checks analyse the strategy regarding its outperformance of relevant benchmarks, its risk-adjusted returns, and drawdown characteristics. You should also check whether your strategy suffers from survivorship bias or data snooping

- Questions?

Sources

- ▣ Quantitative Trading: How to Build Your Own Algorithmic Trading Business by Ernest Chan
- ▣ Algorithmic Trading: Winning Strategies and Their Rationale by Ernest Chan
- ▣ The Mathematics of Money Management: Risk Analysis Techniques for Traders by Ralph Vince