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Training, Testing, Assessment and Certification of Your Market Trading System

An Official Guide to Trading System Design - Part III

This is the third and final planned installment of our series on trading system design. As previously discussed, every trading system must be part of an overall plan to be successful. Once a plan has been laid (Sept. '94), and trading systems have been considered (Oct. '94), it is time to set the wheels in motion. This month's installment helps you feed, test and implement your candidate system with data, iterative training performance assessment and evaluation.

SYNTHESIZING MARKET MOVEMENT WITH A CONSTANT TIME SERIES

Each of the trading systems we have discussed (trend following, counter-trend following and neural networks) uses modeling techniques for system development. Modeling requires testing, and testing requires data representing market movement. An uninterrupted pricing series over a long period of time (decades) is recommended. Unfortunately, futures contracts follow a birth and death process that abbreviates the duration of any time series. Even if a given contract could trade for seven or eight years, such as in the isolated Eurodollar market, the structure of the market (its stationarity) changes significantly over time.

A stationary series is one which has a constant mean and variance. Futures market data often suffers from a lack

of stationarity. This could cast a shadow on the hindsight performance derived from analysis of raw data. For this reason, we recommend a transformation be introduced that converts

the data into a form that represents a synthesized constant period forward.

We have formulated such a series in what we have trademarked Perpetual Contract® Data. It focuses on a time-weighted, constant period forward using the prices of the two adjacent contracts that lie before and after a forward point in time. The calculation done for each commodity

produces a smooth, stationary data set suitable for simulated analysis. There are limitations (eg, the price never matches a single contract's value), but for system testing purposes such limitations are often far less serious than the alternatives. Markets that do not mix old and new crops are best for Perpetual Contract construction.

Other series such as back-adjusted continuous contracts can go negative as you move into the past, but they may be viable in many situations. Nearest futures contracts suffer from price discontinuities when contracts switch from nearest to next nearest. Cash data is another alternative, but cash prices could be a poor proxy for futures prices. We suggest testing your system with as much continuous

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Training Testing, Assessment...

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"Knowing the rare experiences of the past is half the effort of preparing for tomorrow."



contract data as possible for the commodities you wish to trade. We urge our readers to understand the limitations of each approach before taking the giant step into the trading arena.

SYSTEM TRAINING

Once you have gathered data for analysis, you are ready to begin the system training stage. If you have followed our recommendations so far, you probably have several system alternatives and approaches in mind plus several candidate markets on which they may be applied. The training stage requires a synthesis study of these combinations where parameter settings for the system alternatives are examined and refined in hindsight. The period of training should be measured in decades, where possible, and program logic should adopt a worst-case analysis where market fills and limit market moves are concerned.

One market analyst advertised that his system would be very profitable if only the buyer would ignore a very bad S&P trade taken during October 1987. In technical analysis, excluding an unfortunate historical event because it appears to be rare is an invitation to suffer the effects of a more serious tragedy in the future. Knowing the rare experiences of the past is half the effort of preparing for tomorrow.

Combinations of parameter content and their settings should be exhaustive. The analyst should attempt to find a solution not sensitive to small changes in assigned parameter settings. This iterative procedure, based on years and years of historical data, may take some time on your computer.

Each iteration of the training exercise will bear some quantifiable result. The usual approach taken by developers is to compute the aggregate profit for the period and take account of the trading frequency which can

lead to average profits, average losses, etc. Aggregate profit is most definitely not a good measure of performance for the system you are considering. It is always much better to work with ratios than absolutes or aggregates when measuring performance.

The ideal ratio is difficult to determine because it is based on a random compilation of profits and losses over time. Profits and losses for a given system occur in a particular sequence, but a given sequence will only represent one sample taken from an infinite set. If trades are independent, a sample drawn from the universe of trades could be repeated in a different order, producing a vastly different funding requirement for the same system.

So what should be the measure of performance that will accurately quantify the merits of one approach over another during the training phase? An answer has to do with the capital required to trade the system with a predetermined level of maximum error or risk. We suggest using a fixed probability of success coupled with the net profit over the training period. The capital requirement can be computed with a Monte Carlo simulation like that performed in CSI's Trading System Performance Evaluator™ (TSPE). A substitute approach could probably be developed by observing drawdown over time.

Don't forget that in synthesizing trading system design we are dealing with a random process. Each simulated trading series could easily be repeated in a scenario far worse than that produced by the sequence of trades observed for a given single training session iteration. We seek to find a workable norm that factors unfortunate strings of losses into our expected results. Only then will we know how to find a viable approach.

Form a ratio of the annualized aggregate training period profit to

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History On Demand - An Update

Imagine, if you will, a trader in his off-hours, working in the dark of night to plan his moves for tomorrow. Illuminated only by the glow of his CRT screen, he selects the stocks and contracts that cry out for his attention. He transmits his orders, downloads price data, presses a few keys. Charts with technical indicators appear. Decisions are made. A good night's sleep awaits.

This scenario has only become possible for CSI subscribers within the last year or so, since we introduced "History on demand" as part of QuickTrieve® version 4.05. In the days before version 4.05, all history orders from CSI were "Assisted," meaning they had to be processed by a CSI Customer service representative. History was available only during CSI's office hours. During the off hours, historical data was simply unavailable.

The history-on-demand service is still evolving, and a much more enhanced scope of information is still to come. Here is an overview of what has been done and what is still to be accomplished.

Already Done:

- Stocks available
- Normal Futures contracts available
- Current day's prices included after 8 p.m.

Still to Come:

- Nearest Future data
- Perpetual Contract data
- Cash data
- LME data

Subscribers who wish to download nearest futures, Perpetual Contract, cash or LME data may do so now on an "assisted" basis. Assisted orders may be placed by voice with one of our service representatives (800-274-4727), or transmitted via the order subsystem. When asked if the data should be retrieved at the time the order is transmitted, be sure to answer (N)o.

The processing time for assisted history orders is typically three to four hours during CSI's office hours. Once a history file has been made available in this way, it will remain on our system for retrieval for about one week.

Of course, all types of historical data are available from CSI on diskettes. Diskette orders provide the benefits of a descending price schedule and the avoidance of long telephone transmissions for large orders.

We thank you for your positive suggestions and for your patience in awaiting full completion of our history-on-demand service. We'll keep you posted on our progress! ♦

Advisory Service

Over the past few months, this page of the Technical Journal has been reserved for updates on our new stock advisory service.

Our experience with the advisory service has prompted us to suspend the monthly update reports from this Journal for the time being. We will continue to post the weekly reports on our host computer on an experimental basis. There will be no fee for updating the weekly electronic reports, but we urge those who download them to do so on a test basis also.

We will resume the monthly printed reports at a later date when merited by future experience. We thank those of you who continue to give us your support and patience in this endeavor. We hope that we can offer recommendations that will live up to all of our expectations in the very near future. ♦

Many Thanks

Ask Customer Service

QuickTrieve version 4.06's new Continuous Contract Menu continues to be the topic of many calls to our Customer Service department. And so, for the second consecutive month, our Customer Service staff will address common questions about this upgrade feature.

Q. I use QuickTrieve to retrieve daily updates from CSI, but I do my analysis with Metastock. How can I analyze the continuous contract files I build with QuickTrieve?

A. The continuous contract menu itself supports only QuickTrieve-format files; That is, QuickTrieve-format data is required for input and QuickTrieve-format data is the only output. However, QuickManager's® Convert Subsystem can easily convert your continuous contract files to the Metastock/CompuTrac format for analysis.

Before you begin, first create or update your continuous files in the QuickTrieve format as desired, then from the QuickManager menu, select:

<K> Enter Convert Subsystem

<A> CompuTrac/Metastock Conversion Utilities

 Convert FROM QUICKTRIEVE format

Select the directory holding your continuous contract files or press <F8>* to select all continuous contract files. Answer the screen prompts to create your CT/MS-format files as desired.

If you use multiple QT-format directories and do not have the <F8> SELECT ALL option, you must select a directory. Then select all continuous contract files to convert. Repeat for each directory that holds continuous contract files. When the conversion is complete, you will be able to chart and analyze continuous contract data with your Metastock or similar software.

*The <F8> SELECT ALL feature was added to version 4.06 in mid October. If your software does not include this feature and you would like to process multiple directories at once, please call CSI or send a subsystem message requesting a free disk with a patch file.

Q. I set the program options in the continuous contract menu to automatically update my continuous contract files after daily data distribution. My QuickTrieve-format files are updating just fine, but my Metastock files are not. How can I update these files too?

A. As mentioned above, the continuous contract menu supports only the QuickTrieve format. Fortunately, the Convert subsystem can transfer the updated data to your CT/MS-format files. To do this, simply use the steps outlined above on a daily basis or whenever you want to analyze continuous files. You can cut down on the keystrokes and conversion time significantly through QuickTrieve Automation's macro facility. Here's how:

1) At the QuickTrieve main menu, press <Alt><L>. This will put QuickTrieve Automation in its "Learn" mode.

2) You will be asked to enter a QA #. Enter any unused number from 1 to 9 or letter from A to Z. Your selection will be the macro's name, so be sure to remember it.

3) Proceed through the steps shown above to convert your continuous files to the CT/MS format. End the macro by pressing <Alt><L> again when the conversion is complete. If you prefer, you may include exiting QuickTrieve in your macro by exiting without pressing <Alt><L>.

To automatically convert your data next time, at the QuickTrieve main menu, press <ALT><P>. This will put QuickTrieve Automation in its "Play" mode. When asked for the QA #, enter the same number or letter you named your macro originally. The conversion routine will play back automatically. ♦

CSI Upgrades

There have been several enhancements to CSI's service over the last few months that may impact our customers.

- Occasionally, when a user logged-on during a very busy time of the day, an incorrect portfolio could be sent. We have corrected this problem by double-checking the user ID before data is delivered.

- Our History on Demand service had a few glitches that have been corrected. For example, on-demand stock data has now been adjusted for splits and daily corrections to the data base are automatically inserted in the on-demand history files. History on demand for commodities with far-out expiration dates (Gold, Eurodollar) is now available without corruption.

If you have been affected by these problems, please take a fresh look at our improved services. ♦

Prepayment Brings Substantial Benefits

We are now offering, for a limited time, heavily discounted prepaid subscriptions. Our re-vamped custom portfolio packages start at just \$19/month for a large portfolio of futures and stocks when prepaid for six months or a year. Five percent and 10% discounts are available for fixed or normally priced custom portfolios paid 6 months or a year in advance.

Please contact CSI Bookkeeping for details. ♦

Holiday Schedule

CSI will be closed for voice contact on Thursday, November 24 for Thanksgiving. U.S. exchanges will be closed, but data from other exchanges will be available as usual. ♦

CSI Software Product Summary

Please check all that apply and complete the information box at right.

Mail or fax to CSI, 200 West Palmetto Park Road, Boca Raton, Florida 33432; Fax: (407) 392-7761

- QuickTrieve®/QuickManager®** for PC - To retrieve, manage & edit data (includes 1994 Alerts Calendar); New daily user \$59. QuickTrieve/QuickManager version 4.06 upgrade (for current QuickTrieve users only): \$39; demo disk \$5
- QuickPlot®/QuickStudy®** for PC - Charting & analysis software (requires QT/QM) \$89
- Trade Data Manager™** - Macintosh downloader & accounting program \$59; upgrade \$49 or *FREE* with \$100 history order
- Trading System Performance Evaluator™ (TSPE)** for PC - Computes your system's capital requirements \$149
- Trader's Money Manager™** for PC - \$399 (includes TSPE); Demo disk: \$15
- TraDesk™** for PC - Traders' complete accounting system - CSI daily user \$149; Unrestricted use \$299; 30-day trial version \$22
- Seasonal Index Value Pack** for PC - Ten years of history for 33 popular commodities \$315
- Daily Updates** for PC - Starting at \$10.80 per month
- CSI Technical Journal** - Aug. '90 to present \$35/Yr. - \$5/Reprint
- CSI Mailing List** - \$200/1,000 names (CSI users omitted)
- CSI Product Catalog** - *FREE*

NAME _____

ADDRESS _____

DAY PHONE (____) _____

USER ID# _____

DISK PREFERENCE

- 5.25"/360K 5.25"/1.2 MB (HIGH DENSITY)
 3.5"/720K 3.5"/1.44 MB (HIGH DENSITY)

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CARD # _____

EXP. DATE _____

SIGNATURE _____

11/94

Please add \$29 per software package for overseas shipping.

All prices subject to change without notice.

Training, Testing, Assessment...

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"...all trading system approaches bear a level of real and present risk"



three times the standard deviation of individual profits and losses. This approach becomes a modified Sharpe Ratio. It will overcome nearly all of the objections of the Sharpe Ratio as a performance measurement tool. The standard deviation would be calculated against the average profit. This approach would factor the annualized aggregate performance as the numerator of our ratio and use the three sigma limit against average profits as an approximation of required capital for the denominator. This is only a suggestion and more study is invited before accepting this as an accurate assessment of required capital.

When calculating standard deviations in the modified Sharpe ratio, be sure to use trade-by-trade profits and losses for each sample. Do not partition the data into N equal time periods of weeks, months or quarters and compute an N sample standard error, as suggested by one popular author. Doing so will produce a false report. A sample is not the month-by-month change in equity. That would falsely imply smooth, well-behaved additions or deductions to your synthesized trading account, which you know are not likely.

SYSTEM TESTING

Once the training stage is complete, the work must be tested. There are two alternatives to the testing effort: 1) Choose an independent period of the market and observe how you would have fared, or 2) Run your profit and loss results together with your parameter consumption count through an evaluation program like TSPE. This will let you see how much capital is required and show the probability that you will stay solvent over the long run.

The independent testing period is a good idea on the surface, but this approach becomes flawed when you have a rejection of your approach. Rejection leads to more training (over

the same period) in a nearly endless training-testing recurrence until such time as the testing period verifies the result. In such a scenario, you have inadvertently made the testing period part of the training period, forcing an inconclusive performance assessment for your work.

My opinion is that you should use the Monte Carlo simulation approach such as is offered by TSPE to verify your system design. You then may make the training and testing period representative of all of the data that you have. This final step may discourage the use of some markets and/or systems, while encouraging the addition of markets and systems that you may have thought unworthy. If your solution stands up to the test, then I believe you have done the proper job to begin paper testing your trading system in real time.

Paper trading can get sophisticated too. Consider Audit Track (407) 393-3876 - Gene Donney, a Boca Raton based neighbor of ours. You can paper trade your approach with them in real time without risking a cent of capital. They supply audited account fills complete with commission and slippage for a monthly fee. We plan to tell more about this great service next month.

IMPLEMENTING YOUR PLAN

Before investing a dime, you must truly understand (not just pay lip service to) the fact that all trading system approaches bear a level of real and present risk. No system can be expected to perform in the same way a hindsight simulation might suggest, but we have presented some safeguards that can reduce the damages. It must be part of your overall plan to strive for the best results, while being prepared for the worst.

Best wishes for prosperous trading. ♦

Bob Pelletier