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## Measuring Relative Market Performance Through Indexing

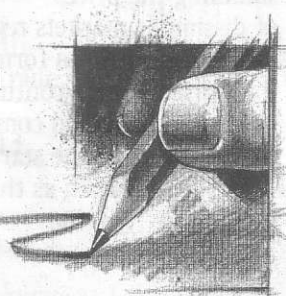
In the July issue of this Technical Journal we introduced the new securities industry indices under development at CSI. These indices are designed to help our users identify the next security or futures industry that will outperform the general market *before* it is announced in the news media. I know that our readers like to make informed decisions on the trading mediums in which they will invest. And so, in keeping with our tradition of offering background data and facts for your consideration, this month's Technical Journal discusses alternative index construction methods that will help to determine which stocks, which industry and which futures markets hold superior profit potential. I think you'll agree the indexing technique we have chosen makes analytical sense and shows great promise for delivering good results.

We were attempting to introduce a method that would do the important screening work necessary to identify worthwhile opportunities. Our first step was to formulate more specific objectives. We wanted our indexing technique to factor markets by their relative rates of change over time. The index change in one period needed to be directly comparable to any other period. We also felt it was essential that we could add, delete, substitute and expand the longevity of each index series without changing the

characteristics of the original index design. Another important criterion was suitability for use with third-party trade-timing products such as neural networks, chaos, etc.

We also believed that it was crucial for the index design to stand up to mathematical testing, such as a proportionality test. Proportionality tests can be performed on an index to verify its worth. One such test, described by Irving Fisher in "The Making of Index Numbers," Boston, Houghton Mifflin, is the Time Reversal Test. Fisher states that the chosen index number design should produce the same proportionate effects whether the data is viewed forward or backward in time.

For example, if the price of gold moves from \$300 to \$400 per ounce in one year then reverses back to \$300 per ounce the next year, the index reading for gold should be the same when it revisits the original \$300 starting point. Here is another way to verify this: If the index increases, a reversal to the same original reading should result according to its reciprocal. A gold index reading that is 133.33% of the original setting would have to experience a decrease of 100% - 75% (1.0 minus the reciprocal of 1.3333) in the resulting index to pass the time reversal test. Since the product of a ratio and its reciprocal is always 1, any differential from 1.0 would measure the



$$I_i = \frac{\sum p_i * 100}{\sum p_o}$$

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## Measuring Relative Market ...

(continued from page 1)

level of error in the method's precision.

The ideas we considered for index formation include: the aggregate method, an arithmetic approach, a method based on medians and a geometric (logarithmic) method. Here we discuss the strengths and weaknesses of each and offer equations to demonstrate the mathematical principles on which they are based.

The aggregate approach requires summing the prices of dissimilar markets regardless of units of measure to form an index of total prices. These continue day-by-day or year-by-year and compare future days or years to the starting period.

A formula such as this would be used:

$$I_i = \frac{\sum p_i \cdot 100}{\sum p_0}$$

The index  $I_i$  computed for the future period  $i$  would be calculated as a ratio of aggregate prices in period  $i$  divided by the aggregate prices in base year 0. Par for this index, of course, would be 100.

A basic fault of this approach is that any higher priced market member of the aggregate could dominate the index without taking into account product value and total market impact. Another shortcoming is the arbitrary selection of the base year which may later turn out to be non-representative of the mix of markets considered. Although the aggregate approach to indexing may be appropriate for some purposes, we feel its shortcomings make it inappropriate for producing a reliable index of any given market group.

The arithmetic approach is more promising than the aggregate method. With this approach, every market within the index is calculated with regard to the base year. The index (ratio) for every item is averaged to

produce the overall group index.

Let's suppose we wish to form an index of the three markets Gold, Live Cattle, and Soybeans. Consider the table below which has artificial data:

	1990	1990 Arithmetic	1991	1991 Arithmetic	1992	1992 Arithmetic
Gold	\$350/oz	100	330	94.29	570	162.86
Live Cattle	\$0.722/lb	100	0.700	96.95	0.820	113.57
Soybeans	\$6.50/bu	100	7.20	110.77	8.50	130.77
Aggregate sum	\$357.22	300	337.90	302.01	579.32	407.20
Arithmetic Ave		100		100.67		135.73
Aggregate Index from below		100	94.59		162.17	
Median Index from above		100		96.95		130.77

Using the aggregate method, the index for 1991 and 1992 using 1990 as a base would produce respective indices of:

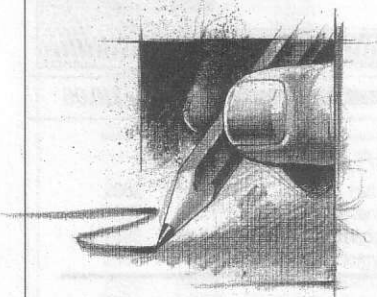
$$94.59 = \frac{337.9 \cdot 100}{357.22} \quad \text{and} \quad 162.17 = \frac{579.32 \cdot 100}{357.22}$$

With the arithmetic approach, each market within the index receives equal weight, producing an averaging of relatives. The aggregate approach parallels the arithmetic index for gold because of its high relative price, and it all but ignores the effects of cattle and soybeans. It should be clear that the arithmetic approach produces a more meaningful result.

The median approach overcomes some of the problems found in the aggregate and arithmetic approaches. The central arithmetic relative is used as the index for the year and no single market can dominate the result. It certainly has some merit in offering a representative reading, but it still falls short of our requirements. The median approach's dependance upon the arbitrarily selected base year makes it less than ideal as the dynamic index we require.

Last, but certainly not least, we present the geometric or logarithmic method. With logarithms, one can

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$$I_i = \frac{\sum p_i \cdot 100}{\sum p_0}$$

## ACCESS: Night Trading at the NYMEX

The New York Mercantile Exchange began trading on its ACCESS computer system on the evening of June 24, 1993. The NYMEX is treating ACCESS as a separate exchange, so CSI has assigned separate commodity codes to report ACCESS trading details.

As always, data for day-session (pit) trading at the NYMEX includes the 9:30 a.m. open, the high and low for the pit session, the 3:15 p.m. settlement, pit volume and pit open interest. ACCESS data includes the 5:00 p.m. open (of the previous evening), the ACCESS high and low, the 8:00 a.m. last trade and the ACCESS volume. No open interest will be reported. Also, note that since ACCESS produces no settlement prices, if a given contract does not trade during an ACCESS session, no price activity will be reported.

### NYMEX pit trading:

#	SYM.	COMMODITY
188	CL	Light Crude Oil
089	HO	Heating Oil #2
224	HU	Unleaded Gasoline
013	PL	Platinum

### ACCESS computerized night trading:

#	SYM.	COMMODITY
376	CL1	ACCESS Light Crude Oil
377	HO1	ACCESS Heating Oil #2
378	HU1	ACCESS Unleaded Gasoline
379	PL1	ACCESS Platinum

These ACCESS commodity numbers and symbols should be added to QuickTrieve's® Commodity Constants file through the Editor Subsystem before data on ACCESS markets is ordered. Please see your QuickTrieve manual or contact Customer Service for details.

Since current QuickTrieve versions do not support three-character commodity symbols in ASCII conversions, CSI subscribers who convert data to ASCII files should substitute dummy symbols for those shown above. Using unique symbols such as C1, H1, H2 and P1 will prevent the inadvertent

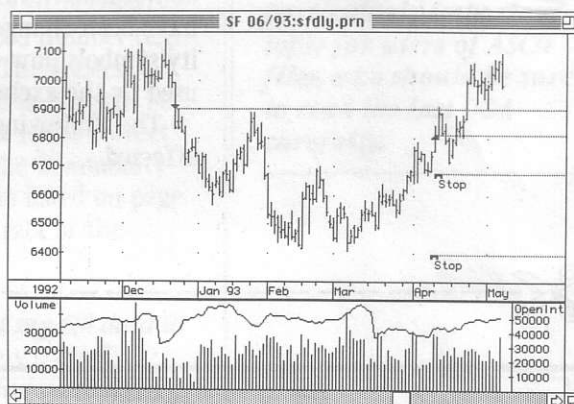
overwriting of NYMEX contracts with ACCESS data or vice versa. QuickTrieve version 4.05, which is due out shortly, will support three-character commodity symbols for all applications and will eliminate the need for dummy symbols. ♦

## Attention Mac Users: Trade Data Manager™ Upgrade Now Available

CSI's Macintosh downloader/accounting software has been enhanced with many very significant changes. Trade Data Manager (TDM) version 1.3 offers:

- 1 Unattended portfolio updates.
- 2 Full CompuTrac/M compatibility as a Data Retrieval Application (DRA).
- 3 Optional display of open positions and current orders on price charts. (see inset.)
- 4 Daily update reports that can be sent to a file or printer.
- 5 Simplified file-naming conventions.
- 6 Miscellaneous keyboard shortcuts.
- 7 Enhanced accounting functions.
- 8 Full support of PowerBook configurations.
- 9 Support of Apple Communications Toolbox.
- 10 Support of "Apple Event-aware" conventions.

This upgrade version is available to existing CSI Macintosh customers for \$45.00 and to new subscribers for \$59.00. For a limited time, Trade Data Manager is free with historical data purchases of \$100.00 or more. ♦



## CSI Commodity Symbols to Match Exchange Symbols

*Bulletin*

**Have you noticed?**  
We've completed work  
on speeding portfolio  
creations. Data lines are  
now transmitted almost  
immediately after logon.

Many a CSI customer has pondered the question of why CSI uses the symbol SV for Comex Silver and SI for CBT Silver, when the respective exchanges use just the opposite. The answer lies somewhere in the comparatively ancient history of the data base, which includes 11 North American commodities for which the CSI symbol does not match the exchange symbol.

In an effort to reduce confusion for our present and future customers, those CSI commodity symbols which do not match the exchange symbols have been changed. All CSI commodity symbols now conform to those used by the exchanges.

The following commodities are affected.

CSI #	COMMODITY	OLD SYMBOL	NEW SYMBOL
003	CSCE Cocoa	CO	CC
006	Comex Copper (defunct)	CP	CU
007	NYCE Cotton	NY	CT
010	CSCE Coffee	CC	KC
016	Comex Silver	SV	SI
020	CSCE Sugar (world)	SU	SB
037	CBT Silver	SI	SV
044	CBT Treasury Bonds	TR	US
059	Winnipeg Flaxseed	F	WF
060	Winnipeg Rye	R	WR
150	CBT 10 Yr. T-Notes	TS	TY

Please refer to "Ask Customer Service" on page 5 for details on how to handle this change. ♦



### CSI Software Product Summary

- ☐ **QuickTrieve®/QuickManager®** - To retrieve, manage & edit data; includes Alert Calendar: Unrestricted use \$99, Daily data user \$39 and 4.04 Upgrade \$29
- ☐ **QuickPlot®/QuickStudy®** - Charting & analysis software (requires QT/QM) \$156 Currently on sale @ \$99
- ☐ **Trade Data Manager™** - Macintosh downloader & accounting program \$59; upgrade \$49 or *FREE* with \$100 history order.
- ☐ **Trading System Performance Evaluator™ (TSPE)** - Computes your system's capital requirements \$199
- ☐ **Trader's Money Manager™** - Introductory price \$499 (includes TSPE)
- ☐ **TraDesk™** - Traders' complete accounting system-(price varies with number of accounts) Starting @ \$399/Unrestricted use \$299/Daily data user or 12-month lease starting @ \$22/Mo.
- ☐ **Seasonal Index Value Pack** - Ten years of history for 33 popular commodities \$444
- ☐ **Daily Updates** - Starting at \$10.80 per month
- ☐ **CSI Technical Journal** - Aug. 1990 to present \$35/Yr. or \$5/Reprint
- ☐ **CSI Mailing List** - \$200/1,000 names (CSI users omitted)
- ☐ **CSI Product Catalog** - *FREE*

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## Ask Customer Service

**Q.** *CSI has changed the commodity symbol for several of the commodities I update with QuickTrieve. Do I need to do anything to accommodate the new symbols?*

**A.** You can continue updating your current files without making any changes, but we wouldn't recommend it. We transmit commodity numbers, not symbols, so all files made with your current QuickTrieve will have the same symbols you have come to know. However, when you get a new QuickTrieve it will produce files with the new symbols. Confusion could result if you haven't adopted the new symbols before hand. This is especially true if you use QuickTrieve to convert and update ASCII files, which rely on symbols for file identification.

**Q.** *How can I change my data files so that my symbols match the new CSI symbols?*

**A.** The symbols used for ASCII file names, data listings, etc. come from two sources: QuickTrieve's Commodity Constants file, which is referenced for making a new data file; and your Data Disk Master File, which holds information on each contract in a given data directory. If you want to keep current with our new conventions, you should change each of these as described next.

### **Editing Commodity Constants:**

Enter QuickManager's Editor Subsystem and select <C> Edit Commodity Constants. Enter the commodity number for the first of the 11 commodities to be changed. For example, enter 3 for CSCE Cocoa. The listing for cocoa will appear. Change the Commodity Symbol from CO to CC. Repeat this process for each of the commodities with new symbols listed on page 4. Press <Escape> to exit. All new data files will include the new symbols. Existing contracts will keep the old symbols until you edit your Data Disk Master Files as described next.

### **Editing Data Disk Master File:**

First, you'll want to get the DOS Filename for each of the contracts with symbols to be changed. Use QuickManager's <F>Display Data Disk Catalog selection (expanded listing) to see the filenames, such as F001.DTA. Write down the number of each file, being sure to keep a separate list for each directory.

Once you know the number of each file to be changed, select <B>Edit Data Disk Master File from QuickManager's Editor Subsystem menu. Select the path for your first set of files (if necessary) and enter the first record number (e.g. F006.DTA is record 6). The master information for your data file will be displayed. Verify that it is the correct file and, if so, change the Commodity Symbol entry to the one listed on page 4. Repeat for each contract of the affected commodities.

**Q.** *I regularly convert my CSI data to ASCII files. Are there any special considerations regarding symbol changes in ASCII files?*

**A.** If you change commodity symbols in QuickTrieve now or if you ever get a new QuickTrieve, you may face the problem of filenames not matching. Since your ASCII files are identified by the SYMBOL, you should backup your ASCII files and then rename your existing ASCII files through DOS before your first update after the symbol change. Simply substitute the new symbol for the old as part of the filename. Otherwise, QuickTrieve may be unable to find the correct files to update and might even put data into the wrong ASCII files.

It is important to avoid problems with temporary duplication of symbols when you rename your ASCII files. If your ASCII files include both cocoa and coffee, rename your coffee files before renaming your cocoa files. If

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*Each month in this column the Customer Service staff addresses a topic of interest to many CSI subscribers in a question-and-answer format. This month, they discuss the timely issue of dealing with changing commodity symbols. This is a particularly important topic for users of ASCII files, who should be sure to read the last Q&A carefully.*

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## Considering the Asia-Pacific Markets?

CSI provides data from 14 exchanges in the developing Pacific Rim, from Osaka, Tokyo, Hong Kong, Singapore and Kuala Lumpur to

Sydney and New Zealand. These exchanges offer new opportunities to investors, along with a myriad of new terminologies, rules and trading practices to understand. We recommend you learn all you can about any market before committing speculative funds.

An excellent source of information on the Pacific Rim markets is "Trading Asia - Pacific Financial Futures

Markets" by Will Slatyer and Edna Carew. This paperback edition includes basic trading principles for all markets with special attention to the Asian exchanges and their respective products.

Contact: Allen and Union Australia Pty Ltd., 9 Atchison St., St. Leonards, NSW 2065, Australia. ♦

### Measuring Relative Market ...

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focus upon a base period to begin the index construction and later expand the series backward and forward in time as greater longevity is introduced. When the logarithmic method is applied, the retrospective addition of new individual market series within a given industry should not appreciably disturb the original work, provided that the number of individual markets comprising the industry is not small. The logarithmic transformation also allows one to add new markets to an index and maintain equal weighting of individual markets. As you can see, the logarithmic method satisfies all of our basic goals and overcomes our objections to an arbitrary base period.

The geometric average of the arithmetic relative prices is defined as the  $n^{\text{th}}$  root of the product of  $n$

arithmetic relatives (for period  $j$  relative to period 0 over the  $i=1$  to  $n$  securities or stocks represented by the broad market or industry which the analyst wishes to index) for a given period  $j$ :

$$M_{g,j} = \sqrt[n]{\prod_{i=1}^n \left[ \frac{P_{i,j}}{P_{i,0}} \right]}$$

where  $P_{i,j}$  represents the  $i^{\text{th}}$  relative security or market for period  $j$ , and  $P_{i,0}$  represents the  $i^{\text{th}}$  relative security or market for base period 0.  $M_{g,j}$  represents the geometric mean for period  $j$ .

This can be conveniently solved using logarithms:

$$\text{Log } M_{g,j} = \frac{\log \left( \frac{P_{1,j}}{P_{1,0}} \right) + \log \left( \frac{P_{2,j}}{P_{2,0}} \right) + \dots + \log \left( \frac{P_{n,j}}{P_{n,0}} \right)}{n}$$

and taking the anti log (i.e.  $10^{\text{Log } M_{g,j}}$ ) of the result to get the geometric average,  $M_{g,j}$  which is representative of period  $j$ .

The U.S. Bureau of Labor Statistics, in support of its Index of Wholesale Prices, also adopts a logarithmic method of indexing prices. They add product weighting into their formula based on quantities produced within the economy. Our use of indexing is meant to support trading efforts, not track the direction of the U.S. economy. Our equal weighting approach is considered most appropriate because the trader may adopt his own market exposure weights based upon other factors, not excluding the Modern Portfolio Theory tenants of risk and reward previously covered in this Journal.

Norman G. Fosback, in his book, "Stock Market Logic" (Institute for Economic Research, 1976. Ft Lauderdale, FL) argues that the arithmetic approach is a more acceptable method for index construction. For the use we

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## Price History for LME Markets Available in \$

On July 1, 1993, London Metal Exchange's lead and copper contracts started trading in U.S. dollars instead of British pounds. They are now quoted in dollars as daily updates from CSI.

For your convenience, we now provide QuickTrieve users with historical data for the LME metals (excluding gold) in U.S. dollars. The daily pound-to-dollar exchange rate was used for the conversion. We recognize that intraday fluctuations in the exchange rate would have had a slight impact on these prices, but we are unable to duplicate the exact hypothetical prices in hindsight. On U.S. holidays when the London markets were open, the previous business day's closing exchange rate was used.

In an effort to retain our high standard for data integrity, we continue to maintain our data base in its original form and will provide the historical data in pounds sterling to magnetic tape customers, unless otherwise requested. QuickTrieve users may continue to request pound sterling history prices, if desired.

Users of London copper and lead data should edit QuickTrieve's Commodity Constants and Data Disk Master File as described in Ask Customer Service. Edit the Pricing Unit field instead of the Symbol as described.

When historical data is ordered to replace existing LME data, the new dollar-based prices will overwrite previous data. If you wish to preserve your original pound sterling data, be sure to archive the files before downloading history.

Normal rates for overseas data apply; however, if you have previously purchased this data in Sterling as daily updates or historical data, ask for our standard re-purchasing discount of 50%.

If you have any questions or need assistance with the change of currency base, please feel free to contact CSI Customer Service. They can be reached

at (407) 392-8663 Monday - Friday 8:30 a.m. to 11:00 p.m. and Saturday 9:00 a.m. to 1 p.m. ♦

### Ask Customer Service ...

*(continued from page 5)*

you update silver from both COMEX and the CBT, you'll need to copy your ASCII files from one exchange onto a floppy or into another directory before renaming them. Otherwise, the reversed symbols are sure to cause a major mixup.

If you have matching QuickTrieve-format files for all the data in your ASCII files, a simpler alternative is to delete the ASCII files and re-convert the CSI-format data to ASCII with QuickTrieve. The new commodity symbols will then be part of the filenames. ♦

### Measuring Relative Market ...

*(continued from page 6)*

intend, however, we believe better performance and better control can be derived from the logarithmic method.

As a result of our work, we will be offering over 200 stock industry and futures industry indices, with the first to be made available in the fall or winter of this year. We'll keep you posted on this effort, which should yield exciting opportunities for profit. Now that you know how and why these industry indices have been formulated, you can make an informed decision on whether you want to use them to help manage your investments. They should be a great addition to the CSI Data Base and a helpful asset to traders. ♦

*Bob Pelletier*

