CSI® TECHNICAL JOURNAL
MARKET DATA ✦ TRADING SOFTWARE ✦ SERVICE
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In This Issue

Basic Strategies for Profiting Through Correlation - Part I

Try it yourself for 2 FREE WEEKS!

The investment industry press typically suggests that one can sustain profitability by simply picking the right stocks or commodities and trading one or another over time. It's a good theory, but this persistent theme relies upon the flawed

assumption that any given market can function independently. Typical tools adopt methods that analyze each market as an independent entity, failing to acknowledge and adapt to the effects of related markets. This is a mistake that can compromise trading performance because all markets are related in some way with other markets and those relationships can impact price performance.

Investors who adopt this faulty paradigm typically trade only one, very specific market at a time, such as one Corn contract or a 100-share lot of Apple Computer stock. While this may seem to be a cautious "toe in the water" approach, the practice of taking on a single "position trade" vastly reduces the odds of sustaining profits from ongoing trading endeavors.

The single-market trading tactic works about half of the time. When commissions are factored in, prevailing odds are likely to be very much against a long-term profitable result.

This is the reason why CSI has adopted a powerful statistical correlation tool as a means for choosing trading opportunities. Markets that are correlated either positively or negatively during a common time frame are far more likely to produce consistent and reliable profits, so markets are best considered in pairs to minimize forecasting mistakes.

CSI calls this approach "pair trading." It can be used for individual pairs or for balancing a portfolio of market pairs that are assembled to benefit from mutual positive or negative correlation effects. This method, which tends to produce profits on opposing sides of correlated market pairs, multiplies the profit potential of any conventional trading experience by profiting from the inherent correlation effects through statistical correlation analysis. This underlying concept is the basis of a two-month newsletter series demonstrating how one can benefit from intermarket Correlation effects. We are hopeful that our readers will adopt this important requirement because achieving consistent market profits, not unsustainable windfalls, should be every trader's primary goal.

Our comprehensive plan shows you how to strategically trade pairs of markets for substantial profits and to build portfolios that avoid excessive risk. It promotes profitable trading results using tools available exclusively through CSI's Market Correlation Studies. You can try CSI's

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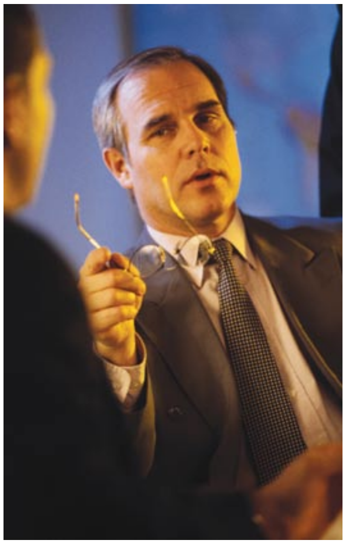

You can experience a
FREE 2-WEEK TRIAL
of the CSI Correlation Studies. Sign up now at www.csidata.com/freetrial.

Holiday Schedule

CSI will be closed for voice communication on Tuesday, December 25th for Christmas and Tuesday, January 1st for the New Year's Holiday. The CSI host computer will be accessible as usual, and data from any world exchanges that are open will be available at normal posting times.

Basic Strategies...
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Correlation tools for free and learn how carefully paired investment opportunities can produce exceptional profits. Use your free trial to see the enormous profit potential of this amazing set of trading tools.

Although not explored by most market analysts, the pair trading conventions pioneered by CSI reveal untapped opportunities from among billions of potential trades. CSI's database and supporting tools greatly help with trade timing, selection and verification, whether you trade stocks, futures or a combination of the two. Precise online instructions will guide you through the process, and this newsletter will help get you started.

The Correlation Analysis

Here's how it all begins: A couple of hours after the end of each trading day, CSI internally posts tabular results from a comprehensive exercise that takes place on a great many high speed processors. Tapping into the CSI database, which consists of daily open, high, low, close, volume and open interest statistics and spans over 50 years, these computers derive the positive and negative statistical correlation levels (correlation coefficients) between over 6 billion pairs of stock, funds and futures on each trading day. The CSI Market Correlation Studies use the peerless CSI database as the source, but they also take the data to a new level of harnessed power through specialized calculations that are not available elsewhere.

Customers use the intuitive CSI Market Correlation Studies search engine found on the CSI website to scan the database of correlation coefficients. The scanning process lets you uncover promising opportunities and potential conflicts from among the market pairs examined each and every day. These could be domestic or international, and may include unusual market pairings that would likely have gone unnoticed without the help of CSI data services and this innovative product.

Give it a Try

Here is how you can use the CSI Market Correlation Studies for TWO WEEKS at no cost and with no financial obligation: First launch your web browser (usually Internet Explorer). Next engage the subscription sign-up page on the CSI website at www.csidata.com/freetrial. Complete and submit the registration form and then check your e-mail to receive the required three-letter User ID and User Number. These will be sent to you automatically within a few seconds of your submission. Next return to the web page and use the link to access the Login page of the Correlation Studies. (On your next log-in you can access these studies by going to the CSI website at www.csidata.com and clicking "CSI Market Correlation Studies" at the top of the screen.)

Once you successfully sign on, you will see several tabbed options across the screen. The third from the right says, "One vs. ALL." This refers to an analysis that discloses statistical levels of correlation between any one market of your choice and all others. Take a moment to decide on one market that you might want to trade, such as Cocoa (symbol CC). Your choice isn't critical. You can try another at any time, but it is good to have a familiar starting point.

Now click the "One vs. All" tab and then enter the symbol for your chosen market into the "Symbol or Name" box. If you only know the name (not the symbol), enter the name in the simplest form possible. When you submit the form, you will be offered a list of markets with similar names from which to choose. Next identify whether your symbol choice represents a stock or a commodity, and then click [View] to launch the search.

There are other parameters on this screen that could be adjusted to refine your search, but the default entries provide a broad, comprehensive analysis with reasonable guidelines. Feel free to adjust your inputs as you become more comfortable with the system. If you would like to know more about the choices, click the [?] (question mark) button beside any of them for a full explanation.

The search engine will examine every possible combination between your market and all others in the CSI database or the subset of the database for the levels you have chosen. These will have already been computed in advance before you made your choices so that the correlation level is known for all pairs of stocks and futures, but the scanning could take a few seconds.

Scanning Results

Your search results will display as a list of markets that show the selected correlation levels with your selected market. There are over 8,000 world futures markets and more than 80,000 world stocks and mutual funds in the CSI database, so your search is likely to turn up a market or two that you don't know. This won't be a problem because the comprehensive correlation engine will plainly show the name and symbol for recommended markets, and those symbols act as links to full details, including the exchange, a price chart, etc. The results are sorted by the strength of the correlation between each pair.

In addition to correlation values, the CSI Market Correlation Studies also produce and evaluate a Z-score for each pair shown. The Z-score, also referred to as a "Signal line," is a powerful secondary calculation that measures the significance and direction of a market pair's statistical separation for the final day on file. Both of these figures of merit are used by traders to measure the expected immediate profit opportunity for each pair. (See Figure 1.)

Figure 1 **Cocoa-CSCE**

Symbol: CC

vs.

All other Commodities and Stocks

15 year correlation beginning 19921112 [?]

Symbol (Type) Click To Sort	Name Click To Sort	Stock Profile	Sector/ Industry Click To Sort	Correlation Click To Sort	Current Z-Score Click To Sort
LCC (Com)	Cocoa-EURONEXT(LCE)			0.974	2.21
TS07-I (Stk)	S&P TSX Chemicals			0.711	-3.22
LNN (Stk)	Lindsay Corp		Industrial Goods / Farm & Construction Machinery	0.673	-2.03
AG (Stk)	AGCO Corp		Industrial Goods / Farm & Construction Machinery	0.672	-3.10
POT (Stk)	Potash Cp		Basic Materials / Nonmetallic Mineral Mining	0.670	-3.29

"One vs. All" results

Examine the list and seek out those markets that you might like to pair trade with your chosen market. Desirable attributes would be the combination of a high correlation value (greater than, say, +/-0.75) and a high Z-score (usually greater than +/-1.9), and other personal preferences, such as the exchange, trading currency, price, etc. For our example, we'll focus on the first pair, CC with Euronext Cocoa (LCC).

The screening results are the launching point for in-depth analysis of any pair of markets. Simply click on the name or symbol to see more information. First you'll see a table showing the correlation rank for this pair over many time periods (Figure 2). Ideally, the level will be consistently high, but, as you'll learn later, this may not always be necessary.

Figure 2 **Cocoa on CSCE**

Symbol: CC , Csinum: 3

vs.

Cocoa on EURONEXT(LCE)

Symbol: LCC , Csinum: 49

Time Frame [?]

# of Years Back	Start Date	Rank Correlation
2 Years	20051112	0.987
5 Years	20021112	0.990
10 Years	19971112	0.985
15 Years	**19921112**	**0.974**
20 Years	19871112	0.983
25 Years	19821112	0.990
30 Years	19771112	0.993
35 Years	19721112	0.993
	End of history for market symbols	

Correlation ranks over time

As you'll notice here, commodities tend to maintain consistent relationships with other commodities over the entire historical period of coverage. When analyzing one commodity vs. another related commodity, ex-

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Supporting Tools From CSI for Traders

CSI offers a broad range of tools that help in generating and certifying trade recommendations. CSI's Unfair Advantage system, which provides daily updates with charting and analysis is strongly recommended as a companion to the web-based Correlation Studies.

The Trading System Performance Evaluator (TSPE), which is part of UA should be consulted to aid in the trading evaluation process. TSPE can certify your trading record and provide the confidence you need to proceed with your ongoing trading. The Market Specifications within UA are very helpful in supplying trading hours, sponsoring exchanges, futures contract sizes, weights and measures, the country of origin, the currency used, point size, first trading date and more. There is also graphing software with a wealth of technical indicators.

No matter which of CSI's ever-expanding analysis offerings you use, your objective should be to achieve profits through buying and selling investment vehicles. In short, buy low; sell high - in whatever order you choose.

pect fairly consistent correlation into the past because a commodity's use and focus generally remain consistent over time. The example of two different cocoa markets in Figure 2 carries the tendency to the extreme.

Stocks, on the other hand, take on a slightly different perspective as a company grows and matures into different markets and other activities. When examining stocks, be aware that the more recent periods of relevance for any company can change as management explores new opportunities for profit. Therefore, the trader should carefully interpret all historical information with a consistent homogeneous focus. Stocks and commodities can be traded together, but the trader should know the markets proposed and avoid inconsistent or false interpretations.

Watch out for Coincidence

An important aspect of trading correlated markets is to be wary of coincidence causing high correlation values. Know your markets and try to discern the relationship before launching any trade based on correlation. Analysts can discover interesting relationships by asking questions or by simply examining the "Profile" link that is available for each stock in the scanning results. That little "face-image" icon for stocks on your Correlation Results screen (see Figure 1) may help in understanding the dynamics underlying the relationship between correlated pairs. Clicking on that face image will often disclose surprising details about the nature and business focus of the company. If no logical relationship can be discerned, coincidence may be at hand and the pair should be avoided.

Scroll down to view a Z-score chart showing normalized values for each of the two markets in the uncovered pair (color coded in red and blue) and observe a green or gray Signal Line, which reflects the combined Z-score shown in the tables.

Figure 3 shows two highly correlated commodities, Cocoa traded on the CSCE and Cocoa traded in London. Their close relationship is obvious from the tight oscillations of their individual Z-scores. Note how the blue market (Euronext Cocoa) and the red market (CSCE Cocoa) take turns being the relatively higher or lower priced market. These red and blue lines show you which market is overpriced (a shorting opportunity) and which is underpriced (a buying opportunity).

When these two markets diverge significantly, a strong positive or negative Signal Line Z-score alerts you to the fact that correlated markets have temporarily fallen out-of-sync with each other. Because they are correlated and tend to move together, they are quite likely to return a handsome profit to the investor who simultaneously buys the underpriced market and sells the overpriced one.

The green Signal Line graphically demonstrates the difference in Z-scores for the two markets shown in red and blue. This example identifies a couple of major opportunities for profit when these two cocoa markets diverged. Each time the green signal line spikes at or above +/- 2.0 and begins to regress, it may represent a striking opportunity for potential financial gain.

More on Interpreting Signal Line Z-Scores

An examination of the Figure 3 Z-score chart reveals that when highly correlated markets (that is, markets that tend to move together) get out of step with each other as indicated by high Signal-Line Z-scores, profit opportunities result. Traders choose a significance level for the pair and mentally draw a horizontal line at that level on the chart. When that level is reached by the Signal Line in the appropriate direction, a pair trade is strongly suggested. The better you understand Z-scores, the better you can use this tool.

The Signal Line Z-score can be thought of as a statistical measure of dispersion between any pair of related markets. Z-scores in traditional analytical frameworks are calibrated in standard deviation units. They fall between - 3.0 and +3.0 standard deviations of dispersion about ninety-nine percent (99%) of the time. Signal Line Z-scores greater than plus +/-2.0 are very significant, and represent strong profit opportunities over 95% of the time. Notice that when the red and blue lines touch, the Signal Line Z-score is zero (0).

Trading Positively Correlated Markets

The green "Signal Line" reflects the Z-score of the spread between the Z-scores of the two markets being analyzed. It is normally used for evaluating positively correlated markets. For highly positively correlated markets, signal line values near zero indicate that the two markets are in-sync with their normal relationship. The greater the green signal line value (either positive or negative), the more out-of-sync the markets are. Signal Line values greater than 1.9 or 2 are considered significant, highlighting fluctuations in price between the two markets that may be tip-offs for good spread (pair) trading opportunities. The CSI Correlation Study shows you which market is overpriced (a shorting opportunity) and which is underpriced (a buying opportunity) along with the Z-score difference. Use this information and your own knowledge of market relationships to find exciting spread opportunities!

Gray Signal Lines in Negatively Correlated Markets

A gray "Signal Line" is typically used in evaluating negatively correlated markets. (Situations where when one market advances the other is likely to fall, and vice versa.) This Signal Line behaves like the average of the Z-scores for each of the markets. If either market is reaching historical highs or lows, the Z-score of the difference will be elevated in absolute value. This is especially true when both markets are making historical moves in opposite directions.

Strongly negatively correlated markets tend to move in opposite directions, so their divergence is a confirmation of significance, which is reflected in a high (positive or negative) Signal value.

Be Aware of Small Differences

A Z-score of +3.0 is 50% greater than a Z-score of +2.0; which may appear to be very significant on the graph; however the significance measure in probability terms would compare roughly 95% with 99%, or about 4% greater. The trader should be cautioned to accept the 50% improvement over the 4% improvement before acting on the difference. Although the significance scale is shown in linear units, the converted probability terms may show minimal levels of significance. For example, the equivalent probability for three sigma would be in the neighborhood of 0.99865 in a normally distributed population. A four sigma

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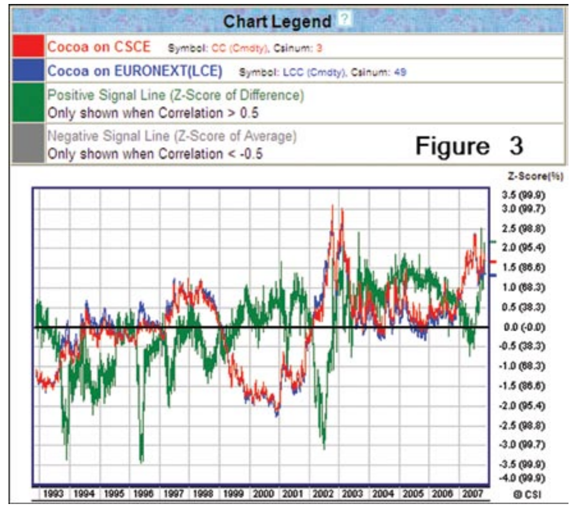

This graph shows color-coded Z-score charts for CSCE Cocoa (red) and Euronext Cocoa (blue). Their close relationship is obvious from the tight oscillations of their individual Z-scores. When these two markets diverge significantly, a strong positive or negative Signal Line Z-score (in green) alerts the trader to a possible spread trade situation. Profits can be garnered when correlated markets return to their normal relationship.

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"Users of this system should execute a daily scanning and screening of the Correlation database to keep abreast of all current opportunities."

Notice: There is a serious risk of loss in stock and futures trading. CSI does not recommend any specific trading pursuit. Each trader must carefully examine his or her own financial situation and risk tolerance before taking on any trade. Never risk more than you can afford to lose. Traders should thoroughly check out what we report and verify your own comfort level with any trading system before entering into a trading situation.

opportunity would indicate a probability of perhaps 0.999683. In terms of probability, there isn't much of a difference, and what difference there is may be attributable to sampling error or the market data stemmed from a non-normally distributed population of events.

Trading Recommendations

I hope you are following along in your own FREE 2-WEEK trial of the CSI Market Correlation Studies. If so, keep scrolling down from the chart to find a wealth of information for trading the selected market pair. Various tables display suggesting position sizes to balance risk, profit potential, current pricing data for individual contracts and stocks, etc. One table labeled "Possible Entry Rules" explains the general system for trading the markets. The "Rules" reveal that the Z-score (Signal Line) may be viewed as a rough gauge of opportunity potential for selling the statistically higher priced market and buying the statistically lower priced market in a positively correlated pair, and for buying or selling both markets in a negatively correlated pair. Choose positions only if the magnitude of the Signal Line Z-score is sufficiently large to accept the risk.

These "Rules" are not requirements, and are certainly not to be taken as customized trading advice. They are intended as rather loose guidelines. In my view, how the user reacts to high Signal Line Z-scores (sigma levels) should be based more upon probabilities than on the actual sigma reports. An extreme reversal in probability may identify opportunities that sigma levels may overlook because of sampling error. My point in advancing this idea is to help customers recognize an opportunity to launch or reverse a trade based upon probabilities and attempt to follow through on the rule to wait for a statistical reversal in market direction before reversing your trade direction. Once taken, the pair trade might be held until the Signal Line Z-score returns to equilibrium (zero) or even longer if the pair tends to oscillate in opposite extremes. Losing trades should be abandoned quickly through stop-loss orders.

Expanding Your View

After exploring one opportunity, you may wish to return to the list of paired markets by clicking the [Back] button. You will, no-doubt, find that some pairs should be immediately rejected because of low liquidity or volume. Nevertheless, each scan will likely uncover striking pair-trading opportunities. These are obvious from their strong positive or negative correlation levels and strong Signal Line Z-scores that indicate statistically significant separations between pairs. Users of this system should execute a daily scanning and screening of the Correlation database to keep abreast of all current opportunities. Some will return immediate profits; others can take a few days or weeks to mature. Eventually, most correlated market pairs reach an extreme level. The timing for trade launch is important for maximizing profits, but it is up to the user to identify the moment to act.

Correlation analysis can also be used to confirm a third party advisory service's directional recommendation for a particular market. Use the One vs. All scanning technique to see how a market is behaving relative to its hypothetical pair-trading partners. If the prevailing recommendation from the Correlation Studies and the third-party software jibe, then consider the recommendation confirmed. If no confirmaiton can be found through correlation analysis, it might be best to reject that given trade.

If you have been following along,

then you'll want to try other pairs and look for opportunities in various markets that are of interest to you. If you haven't been following along, this is a great time to sign up for your FREE 2-WEEK trial at www.csidata.com/freetrial and join the adventure. Once you try it out and become convinced that this is the only sensible and secure way to explore the markets, it is easy to convert to a regular subscription, for which discounted annual service is available online.

Be sure to read the next issue of the CSI Technical Journal for Part II of this article, which discusses selecting multiple correlated pairs and building non-correlated portfolios. These can protect you from situations where coincident losses may drive even the seasoned trader from the markets. Each of the techniques for using the CSI Market Correlation Studies offers unique prospects for earning profits while protecting your accumulating wealth. ✦

Happy Holidays

Bob Pelletier

How Does CSI Do It?

Pairing Futures with Stocks and with Other Futures

In CSI's pair-trading system we expect customers to explore opportunities to engage stocks with other stocks, futures with other futures, or any stock with any future. It is fair to questions how the software analyzes stocks and commodities together. After all, stocks are easy to compare with each other because a stock series always represents prices for specific dates in the past. Comparing stocks with futures or futures with futures is more complex because all futures are, by definition, short lived, eventually expire, and support a calendar of differing delivery months.

Since futures markets, unlike stocks, continually expire at predetermined times, CSI uses a forward averaging method to reduce every futures market into a single series that does not expire. This Perpetual Contract® data focuses upon a constant period forward and incorporates a revolving list of delivery months. This analytical tool, which was trademarked by CSI back in 1974, is essentially an innovative "computed contract" that greatly simplifies intermarket analysis between futures and between futures and stocks. CSI is the only source of Perpetual Contract data, and the CSI Market Correlation Studies are the only in-depth intermarket analysis system using Perpetual Contract Data. ✦

Compatibility Corner

Compatibility Corner is an occasional series that introduces our customers to programs that run on quality CSI data and investment-related services that may be of interest. We at CSI are pleased to be among the preferred data vendors for many third-party investment programs and welcome the opportunity to pass along these notices when space allows. This month we will highlight a new addition to our "Compatible Software Supplier" list, Financial Data Calculator (FDC) by Mathematical Investment Decisions Inc.

Financial Data Calculator (FDC) is a rapid development software environment featuring a natural language interface and powerful built-in functions. Explore, test, and use virtually any trading strategy or analysis processing you may conceive - without professional programming help. Lists of datasets (technical, fundamental, prices, computations) are easily formed and used with our list-based processing. List members can be viewed (complete graphics package included), queried, or manipulated in a fully automated way. Looping and branching are also list based.

The new CSI interface fully integrates the CSI database. In FDC, a CSI portfolio list is a text file of CSI dataset names and desired aliases. Form and select such a list, choose CSI parameters plus start and stop dates, and you have a portfolio (Stocks, commodities, continuous contracts, etc.). The corresponding datasets are then available by name in FDC format and updated each day. Edit portfolios at will - even under program control. Contact Mathematical Investment Decisions Inc. for details. Visit their website at www.financialdatacalculator.com or phone 856.857.9088.

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