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Holiday Schedule

CSI will be closed for voice communication on Thursday, November 23rd for the Thanks giving holiday, Monday, December 25th for Christmas, and Monday, January 1st for New Year's Day. The CSI host computer will be accessible as usual, and data from world exchanges that are open will be available at normal posting times.

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Earning Profits by Trading Correlated Markets

Here's How You Can Find Them

Have you noticed that some commodities behave like elemental opposites? Euros and the Dollar Index, for example, are the fire and water of the Forex markets, reacting in equal and opposite ways to the same driving forces. On the flip side of this economic phenomenon are the inseparable twosomes such as Silver and Platinum that blow through the clearinghouse like leaves caught in the same whirlwind. These two regularly change their leadership positions as they jointly advance and decline. You may have noticed that certain stocks exhibit similar tendencies. Did you know that quantifiable fluctuations in both convergent and divergent markets such as these are likely to be an excellent source for potential speculative profits? Here at CSI, we have been making ongoing enhancements to our Correlation Reports, which now, more than ever, help traders to easily find opportunities that may lead to profits through reduced-risk investments.

Correlation analysis measures the statistical relationship between any two time series, such as the prices for two commodities, two stocks, a stock and an index or even a stock and a commodity. Typically referenced as the statistical correlation coefficient, this measure is very helpful in selecting markets (commodities or stocks) to trade, especially as paired investments.

As we have reported here in recent months, CSI is now unique in offering an enormous collection of Correlation Coefficient data and related Z-score studies on all market pairs. These two elements (correlation, which measures the percentage level of association between market pairs and statistical Z-scores, which measure the significance of the difference in direction for the final day on file between a proposed market pair) combine to create an insightful tool that is available as a premium service to CSI subscribers.

CSI's Correlation Reports allow the user to capitalize on U.S. markets' coexistence with other markets in the world economy, as pairs of markets tend to respond to stimuli in predictable ways. Although the relationship between a given pair of markets can be causal, complementary, parallel or reciprocal, CSI Correlation Reports synthesize local and global interconnectedness into a single numerical value for virtually every pair of markets that exists. For certain trading situations, low correlated pairings may be beneficial to the trader who seeks independence in the elements of a portfolio; however a

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significant few pairings are closely related and these interesting cases offer opportunities for profit when trading one market with or against another.

How Does Correlation Information Help Traders?

Correlation coefficients range from +1.00 to -1.00, reflecting the positive or negative extent (probability) to which members of world market pairs are related over many years or decades into the past. A coefficient of +1.0 tells the trader that a given market pair moves in tandem. When one moves upward, the other market follows suit. A coefficient of -1.0 tells the trader that an up-move in one will result in a down-move in the other. Thus, extreme relationships can be confirmed by studying correlation coefficients. Knowing which markets are positively or negatively correlated with the market you propose to trade is immensely helpful in portfolio selection and for making wise trading choices.

For example, CBT Soybeans and CBT Corn are tradable commodities that are highly correlated because they share growing seasons, grow in similar latitudes and climates, trade in a common currency and require similar fuel and transportation resources. Their relationship, exhibited from CSI's website through the correlation coefficient of 0.75 at the time of this report, reflects a positive shared circumstance that is less than perfect, but highly significant. In general, such a high reading tells us that when the price of one is high, the price of the other can be expected to be high, and vice versa when the coefficient is negative. If the price of Corn were to rise due to news that a drought was causing a low crop yield, the price of soybeans and other grains grown in the same region could be expected to follow. Because of this logical relationship and relatively high correlation coefficient, discrepancies in directional movement between the pair can offer profitable trading opportunities.

Z-scores & Signal Lines

CSI's Z-score and Signal line calculations offer an approach to comparing and trading markets that are positively or negatively correlated, as demonstrated in Figure 1 on page 3. It shows correlation coefficients and Z-scores for Soybeans and Corn. Z-scores represent each market's price derivative relative to its normal price for the historical period analyzed. They are created by subtracting the whole-chart mean and dividing by the whole-chart standard deviation for market prices over the ten-to-forty year period of review. Using the color-coded key presented above the chart for interpretation, you can view what is essentially an index for each of the two markets charted, one in blue and one in red. By using Z-scores instead of actual prices, you can chart both series on a common scale and derive meaningful information from daily price variations.

The green "Signal" line on the Figure 1 chart represents the statistical spread between Soybean Z-scores (blue) and Corn Z-scores (red) in units of standard deviation and percent as shown on the right scale. This is relevant for positively correlated series where high values in one often coincide with high values in the other. The difference between highly positively correlated series tends to be quite small, even for extreme values of the individual markets. The green line is computed from the Z-score of this difference. Common factors such as world economic situations may push both markets to extremes, but the Signal line measures to what relative degree they are reacting differently.

The negative terminal green Signal line shown in Figure 1 indicates that the red-line market (Corn) is above the blue-line market (Soybeans). A positive terminal green Signal value would indicate the opposite.

The chart in Figure 1 suggests

Correlation Reports

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through the terminal day's Signal value quoted at -2.2 sigma, that a sale of Corn vs. a simultaneous purchase of Soybeans may produce a profit when the market pair returns to a more normal state. Missing from view (to save space) is the exact quantity of corn to be traded off against soybeans to maintain a balance of dollars (contracts) for the trade.

Since the Signal line is a Z-score (market price divided by the standard deviation over time) it is more sensitive for highly correlated pairs. For example, a 1% difference between Corn and Soybeans is not very significant, but a 1% difference between the electronic and pit sessions for the Nasdaq 100 Index is very significant because that market pair is heavily correlated. Unfortunately, market pairs involving the electronic session vs. the pit session for a stock or index may not offer a good opportunity for profit because such highly correlated pairs may not have sufficient variance in price to negotiate a profit beyond expenses.

Positively Correlated Pairs

For highly positively correlated markets, Signal line values near zero indicate that the two markets are in sync with their expected relationship. The greater the signal line value (either positive or negative), the more out of sync the markets are with each other. Referring back to Figure 1, (Soybeans and Corn) both the nearness of the red and blue lines to each other and the recurring proximity of the green line to the horizontal center axis indicate that these markets tend to move together.

Here are some trading techniques to consider for launching trades inspired by correlation values, Z-scores and Signal lines for positively correlated markets. These are provided for informational purposes on how to analyze the Correlation Reports. CSI does not recommend any particular trading strategy, but these seem to hold great potential for low-risk, high-reward trades for the long-term trader.

If the markets are positively correlated and the green Signal line is positive, consider launching a spread by selling the blue market and buying the red market when the green line suggests an extreme condition. If the green Signal line is negative, consider launching a spread by buying the blue market and selling the red market when the green Signal line suggests an extreme condition. The gray Signal line was introduced for use with negatively correlated markets, but you might even find some good opportunities using the gray Signal line with positively correlated markets; consider selling both when the gray Signal line is at an extremely high position or buying both when the gray Signal line reaches an extreme low. Learn more about the gray Signal line on page 4.

For a normally distributed random variable, a Z-score greater than 2.0 should only occur about 5% of the time. Signal values greater than 2.0 are generally considered significant, highlighting fluctuations in price between the two markets that may be tip-offs for good spread trading opportunities where profits can be earned from both members of the pair. Lower Signal line values may be relevant if the trader is willing to take on additional risk.

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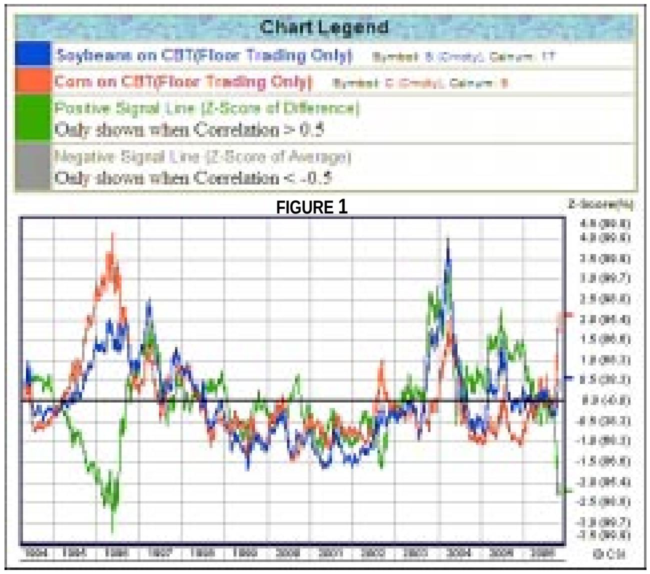

This chart reveals the heavily correlated relationship between Soybeans and Corn through statistical Z-scores (blue and red lines, respectively). The green "Signal" line represents their differential. The chart was produced automatically by the CSI website.

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Libbey Inc. and Newfield Exploration Co. This is an example of negatively correlated stocks that have a logical relationship. Newfield Exploration produces natural gas, which Libbey uses in the production of glassware.

Important Notice:

Investing involves risk! Even when risk-minimizing techniques are employed, the risk of loss in trading commodities and/or stocks can be substantial. Paper-trading is strongly recommended for any trading system to gain risk-free experience for evaluation before investing capital. Past performance does not guarantee future results and trading success is not guaranteed.

Signals in Negatively Correlated Markets

We introduced a feature to the Correlation Reports process which involves an alternate method of Signal line calculation that is intended for use primarily with negatively correlated markets. We colored this Signal line gray, not green, and it is the Z-score of the higher market's Z-scores less the algebraic Z-score of the lower market's Z-score divided by the square root of one plus the correlation coefficient of the market pair. For negatively correlated pairs, if the gray line becomes negative, the trader should consider buying both markets in anticipation of higher prices. Conversely, if the gray line is positive, the trader should consider selling both markets.

If either market is reaching historical highs or lows, the Signal line will be elevated in absolute value. This is especially true when both markets are making historic moves in opposite directions. Since strongly negatively correlated markets tend to move in opposite directions, their divergence is expected and may not have great significance. However, it would be significant if two negatively correlated markets moved together. The average is expected to be small even when the individual numbers are large. The more negatively a pair is correlated, the smaller the average and standard deviation of the pair that results, and the lesser will be the significance of the resulting Signal value.

It may be beneficial to view both the green and the gray lines when launching a market pair study. Doing so may give you a choice in deciding whether to buy or sell only one member of the pair or to buy or sell both markets of the pair. The trader should focus on the position of the Signal line(s) on the final day displayed for making this decision.

See Figure 2 for an example involving the negatively correlated stocks Libbey Inc. (a heavy user of natural gas) and Newfield Exploration (a natural gas producer). The Libbey vs. Newfield Exploration example is typical of a rare negatively correlated pair (-0.83 over 10 years) where the product of one (natural gas from Newfield Exploration) is essential to the business use of the other, Libbey, in heating sand to make glassware. Such relationships are rare in our economy, but it may be worth investigating these situations if you have the time.

More on Signal Lines

It is possible to choose to view both the green and gray Signal lines for a single pair, but you may prefer to view the one "relevant" Signal line. Whether the Signal line is gray or green, unusually high Signal line values (positive or negative) may indicate an abnormal statistical relationship between the two markets and consequently help to identify trading opportunities.

The Correlation Report software will report any pair of markets regardless of relevance, so please prescreen for significant correlation levels and a logical relationship between markets before considering Z-score/Signal-line recommendations. Trade on substantive, explainable behavior, not coincidences. If you miss a trading opportunity because you were overly cautions, wait for another situation. There are thousands of opportunities from which to choose. However, you shouldn't be rushed into acting on any given situation. Exit any trade when the Signal line stops trending, when the zero level is reached, when you are satisfied with your reward or when your stop threshold has been hit.

Be aware that market data is rarely normally distributed, but the percentage readings on the chart surface depend upon the assumption of normalcy. Therefore, the percentages shown are subject to error. The Correlation Report will display any pair of markets and normalize the first and second moment regardless of statistical merit. The cumulative normal probability values associated with the Z-score is displayed, but needs to be tempered with an understanding that they are only absolutely correct in the case of perfectly normally distributed data. Otherwise, unlikely events, such as the markets becoming even more out-of-line, may be more or less likely than for a normal distribution.

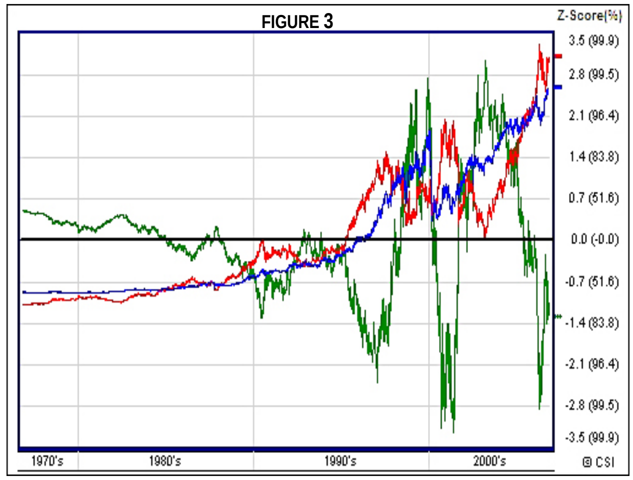
For highly correlated markets, the Signal line should have many of the common factors dampened. The Signal line is thus likely to be closer to a normally distributed event than either of the individual markets. If it were an independent, stationary and normally distributed random variable, then we would know that positive and negative values of the Signal line are equally likely. One can expect that the closer the Signal line is to an independent, stationary, normally distributed random variable, the more regular the zero-line crossings will become.

A quick way to tell how applicable normal statistics may be to a given pair is to make a quick judgment about the Signal range. A Signal value should be between +/- 1.0 about 2/3 of the time, and outside of that range (greater than +1.0 and less than -1.0) 1/3 of the time.

To Spread or Not to Spread?

Spread trades seem less risky than single-market position trades because, if proportioned correctly, you are protected against common factors. By "proportioned correctly" I am referring to a balance of dollars of one product vs. the dollar value of the other product in the pair. However, the Z-score/Signal chart reveals aspects of the market pair's relationship which should help to determine whether it is preferable to take on a spread or a single-position trade for positively correlated markets.

Please refer back to Figure 1 where you will notice that the green Signal line tends to oscillate. Although Soybeans and Corn have a fairly high degree of correlation, their relationship swings. Sometimes the red and blue lines switch positions and sometimes they move in near-perfect tandem. You can use this added insight in interpreting the current relationship between market pairs.



This chart of two unrelated stocks, Procter & Gamble Co. and Boeing Co., demonstrates that price correlation can vary greatly when there is no logical basis for the relationship. These stocks were highly correlated from the 1970's to about 1990, but the level of correlation has dropped markedly since then.

Consider Figure 3, in which the early lock-step relationship deteriorates to a situation with little association when the Signal line moves further and further from the centerline. Even though the 30-year correlation is quite high (91%) for this pair, the 10-year correlation has dissolved to around 50%. If the trend is moving toward greater conformity (with the Signal line approaching the centerline), then this indicator confirms a high likelihood that the two positively correlated markets will move in the same direction and with similar robustness.

Sorting and Filtering

Another new feature on the Correlation Reports offered through CSI's

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Mini Tech Talk

Q. *I have a new thumb drive that allows me to easily transport large amounts of data between my office computer and the laptop I use for travel. Can I move my UA database between the two?*

A. Yes. The easiest way to use UA on two different computers is to copy the c:\UA folder to your thumb drive and then copy it onto the second computer. If you normally create export files for use with third-party software, do not include them in the copy. Execute the program "WhereUa" in the new UA folder to set UA to work in that directory.

Launch the UA program by executing either Uad.exe or EzDownloader.exe. Run the "Rebuild All Files" feature on the Database menu to make sure that your portfolio files are all up-to-date. If you use your laptop for downloads, you can transfer your current data back to your office computer by copying the UA folder from the laptop onto your thumb drive and then copying it back to your desktop computer. ✦

Earning Profits...

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website is the addition of new sorting keys and filters, allowing you to narrow results. You might, for example, run an "All vs. All" search comparing "stocks and commodities" with "stocks and commodities" to find a good pair of trading candidates. While entering your request, you could enlist a filter to leave out all pairs with correlation coefficients of less than, say, 0.5 as shown in Figure 4. This would let you look only at markets that have significant levels of correlation. You could further filter out all pairs whose final Signal line value is less than, say, 1.0 to find pairs of markets that may represent something unusual. The report will show up to 250 of the most highly correlated pairs that meet your specifications, but you can adjust this number according to your Internet connection speed and computer's available memory.

The screening and filtering tools efficiently reduce the number of pairs for you to consider. They are designed to leave out unlikely candidates for trading. Please note that you can sort results on either the correlation coefficient or the Signal value when you are mining for opportunities.

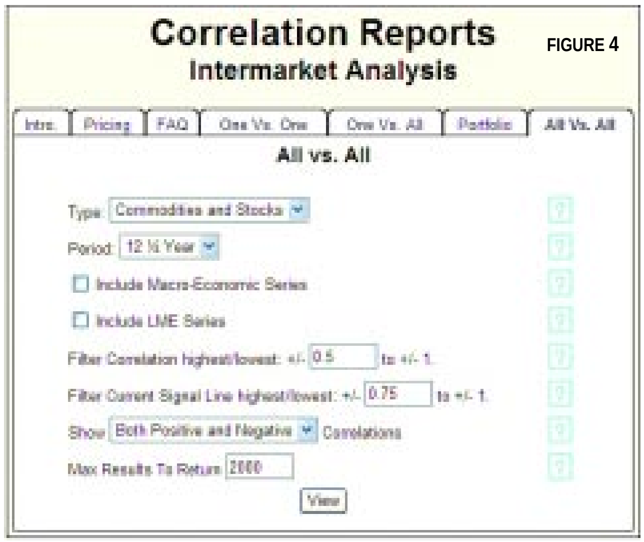

FIGURE 4

Applications

To begin finding correlated pairs for trading, paid subscribers to this web-based service simply go to the csidata.com web page and click "Correlation Reports" at the top of the screen. We recommend starting with the "All vs. All" tab (shown above) because it enables a search of the entire database of commodities, stocks or both, and allows analysis for your choice of time periods.

A long-term (25 to 40 year) study of commodities vs. commodities would reveal many tradable commodity pairs, such as energy products, Wheat, Corn, Soybean meal, etc. Markets with the strongest negative correlation coefficients are typically interest rates, currencies and indexes. Remember that a neutral rating is zero (0), not +/-.5, because correlation coefficients range from a perfect positive +1.00 to a perfect negative -1.00.

If one of the market pairs on the Correlation Reports table (Figure 5) piques your interest, click either of the names to view a graphic display of the pair of markets and their correlated relationship, as shown in Figures 1 - 3.

You can view the same chart by entering the symbols for any two markets into the "One vs. One" selection screen.

The "One vs. All" selection is helpful for the user who might want to choose a particular "dependent" variable (a commodity or stock) in a given search for independent variable opportunities (other commodities or stocks) for spread trading. In this important application the user is presented with correlation coefficients for every possible pair with the chosen dependent variable, and a list of Z-scores for all possible independent variables of either related stocks, related futures markets or both (see Figure 5).

In the course of this exercise, the user will inevitably find stock trading opportunities that are paired off with your chosen dependent variable. If a high Signal value is provided and you are unfamiliar with the presented stock, simply click on the graphic "profile" image on the screen to get a summary of the business. This is important for the trader to match up substantive opportunities that are more than a casual coincidence. Please notice the "Final Z-Score" (Signal) column. The larger the Z-score of a given pair, the greater the opportunity for profit in the very near future. I personally achieved a tidy profit trading off Silver, which was unusually high relative to Platinum, which was relatively low in terms of reported Z-scores. The high resulting Z-score difference tipped me off to this isolated opportunity for a quick profit.

Learning More

Since the Correlation Reports' graphics show the Z-scores of the full contract/stock price converted to U.S. Dollars, not the actual prices, you should complete the picture by scrolling down the web page to view price charts of the underlying products. If your market pair includes a commodity, the Z-score and price charts are derived from three-month-forward CSI Perpetual Contract® data (see sidebar). This convenient method of presentation makes it easy to analyze futures with other futures or with stocks or indices on a continuous basis without bias, allowing you to fairly evaluate stock-vs.-commodity spread trades. The trader should be sure to focus on a delivery month that is three to six months forward of your trade date. This way you will approximate conditions that correspond with the study focus of the correlation experience. Be very careful to choose a contract or stock that has sufficient volume and open interest liquidity to provide a fair price. Check your database statistics through UA before acting.

Upcoming enhancements of Unfair Advantage® (UA) will give a closer look by offering the same Z-score and Signal charts with the ability to zoom in on a smaller time frame. The Correlation Reports can help the alert trader to find situations where members of the correlated pair have moved significantly apart, so that the trader might capitalize on a return to normality.

Quantifying & Certifying the System

We recommend paper trading any system you might be considering by entering prospective trades into UA's Position Manager and then evaluating results through UA's Trading System Performance Evaluator (TSPE), both on the Trading Tools menu. This allows you to gain confidence in the system before risking capital. It is a much different experience to see a $1 million profit after 30 years than to sit through month after month of potential drawdowns. Although past experience is no guarantee of future results, paper trading in real time gives you a feel for the system you are contemplating.

CSI's Correlation Reports make it simple to find tradable gems, so we encourage our readers to make use of this evolving set of studies and tools that we hope you will find helpful. ✦

Happy Trading,

Bob Pelletier

Perpetual Contract data is formed from a pair of adjacent contracts of a given commodity that expire before and after a moving future date. The charts used here show the computed price based on a 90-day-forward interpolation.

If you have any questions on this report or its application, please contact our large customer support staff.

Hours: 8:30 a.m. - 10 p.m. (eastern time) weekdays

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