A research paper by Rich Posson, CMT 386-785-1585 rich@ ag-financial.com

# Cycle Series Analysis: An Orderly Methodology for Discovering and Acting Upon Price Trends

# I. Introduction.

This paper provides an introduction to the technical methodology called Cycle Series Analysis or "CSA." CSA is the study of an interwoven series of cycles that provide unique insights into pricing of commodities and stocks over both short and long term time frames. Other cyclical analysis work seems to show cycles interwoven into such chaotic patterns that the value derived is overwhelmed by the intricacy of the methodology. My goal in creating CSA was to bring a logical and orderly methodology to cyclical analysis in order to provide true value in understanding the market.

# II. Evidence of a Time Cycle

## Phase I: Correlation Study

I postulate that a "time cycle" exists that runs in a 36 year pattern. In this "time cycle," price trends higher out of a bottom, tops, and then reverses to create a new bottom, every 30 to 40 years. The pattern, then, is one of an upside down "U" or "V."

A correlation study of a lengthy period of time enables the technician to develop a proof of a cyclical pattern and to disprove the existence of a statistical anomaly. Correlation is defined as the historical tendency of one set of prices or data to move in tandem with another. In statistical terms, correlation is the strength of the linear relationship between two random variables.

In the instant case, corn prices are used to demonstrate the existence of a 36 year cycle. Monthly cash corn prices from 1720 to the present provide 280 plus years of data. This data provides an input to the study of eight 36 year "time cycles," assuming a 36 year cycle bottom in 2005.

I used a time frame of $1/16^{th}$ to $1/24^{th}$ of the cycle length to obtain my data smoothing standard.[1] This calculation provided a quotient of 3 years, which I then utilized for a 3 year moving average.

Each of the eight "time cycles" was compared to each of the other 36 year period

[1] The three year moving average is used to smooth the data, remove "noise" and identify significant trends.

"time cycles," resulting in 28 cross-correlations of the price data. The following results were obtained:

- A range of -.58 to +.88.
- An average correlation of +.14.

These results might seem but weak evidence of a 36 year cycle. However, the removal of just one unit of data, Cycle #5, provides a far tighter and more positive correlation. With the exclusion of Cycle #5 the following results were obtained:

- A range of -.06 to +.88.
- An average correlation of +.33.
- Negative correlations were reduced from 8 to 1.

Statistically, a data unit that exhibits extreme and atypical characteristics may be removed to highlight the overall patterns or trends within the data. With the inclusion of Cycle #5, the overall results are skewed, occluding the existence of a visually evident cycle.

The incongruity of Cycle #5 is evident on closer inspection. It contains 87.5% of all the negative correlations in the study. It spent the least amount of time in an extreme vertical up trend and the most amount of time trending lower into the next 36 year cycle bottom. It bottomed in the 1860s during the U.S. Civil War and completed its 36 year cyclical bottom during the U.S. depression in 1896.

In spite of these anomalies, Cycle #5 still trended up and down between bottoms that were approximately 36 years apart. Though a difficult cycle to discern statistically, it is evident in a visual graphing of the data as shown later in this report.

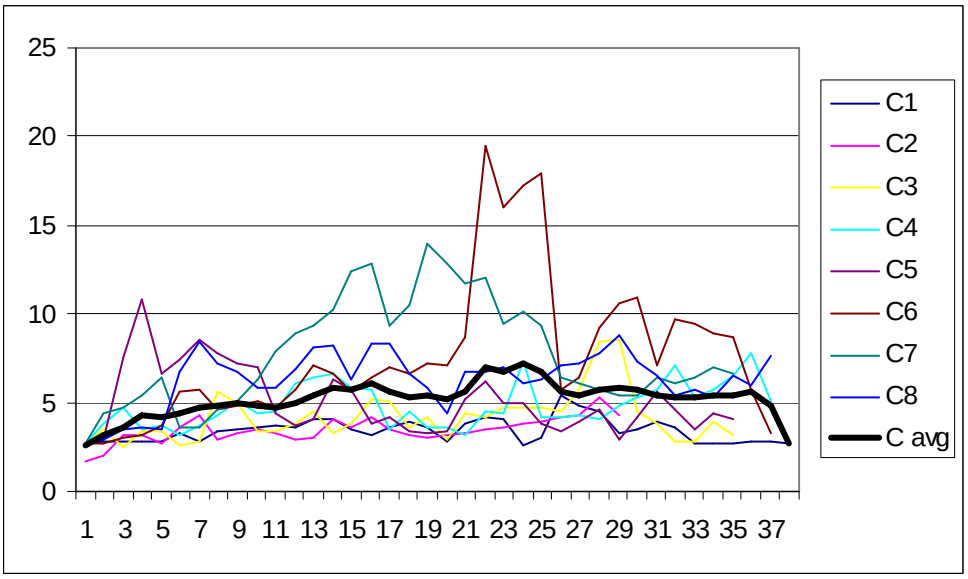
**Table 1: Cross Correlation of eight 36 year cycles**

| Cycle | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0.88 | 0.65 | -0.06 | -0.45 | 0.28 | 0.27 | 0.6 |
| 2 | 0.88 | 1 | 0.14 | 0.37 | -0.58 | 0.5 | 0.43 | 0.16 |
| 3 | 0.65 | 0.14 | 1 | 0.02 | -0.38 | 0.36 | 0.008 | 0.65 |
| 4 | -0.06 | 0.37 | 0.02 | 1 | -0.32 | 0.2 | 0.12 | 0.31 |
| 5 | -0.45 | -0.58 | -0.38 | -0.32 | 1 | -0.41 | -0.48 | -0.31 |
| 6 | 0.28 | 0.5 | 0.36 | 0.2 | -0.41 | 1 | 0.39 | 0.3 |
| 7 | 0.27 | 0.43 | 0.008 | 0.12 | -0.48 | 0.39 | 1 | 0.27 |
| 8 | 0.6 | 0.16 | 0.65 | 0.31 | -0.31 | 0.3 | 0.27 | 1 |

## Phase II: Graphic Study

In order to visualize the data more clearly, I have created a chart using the same data that was utilized in the correlation study. Chart I depicts the 3 year averages of each of the 36 year cycles as well as an average of all of the cycles.

**Chart 1**




**Prices shown with this chart were calculated from a percent change of price with a starting point of year 1 and a corn price of $1.86. This was to compare cyclical performance in terms of today's dollars**.

Because the amplitude of the 36 year cycle can vary broadly, it prevents a high positive correlation. This is shown in Chart I. Still, each of these 36 year units of data create a cyclical trend pattern.

The bold black line shows an average of all of the 36 year cycles. It provides a more concise view of the cyclical trending nature of the data and in fact provides a visual correlation. Note that price trends higher from the left side of the chart (as it should) and into a peak and then trends down (as it should) into the end of the cycle.

**Chart 2**

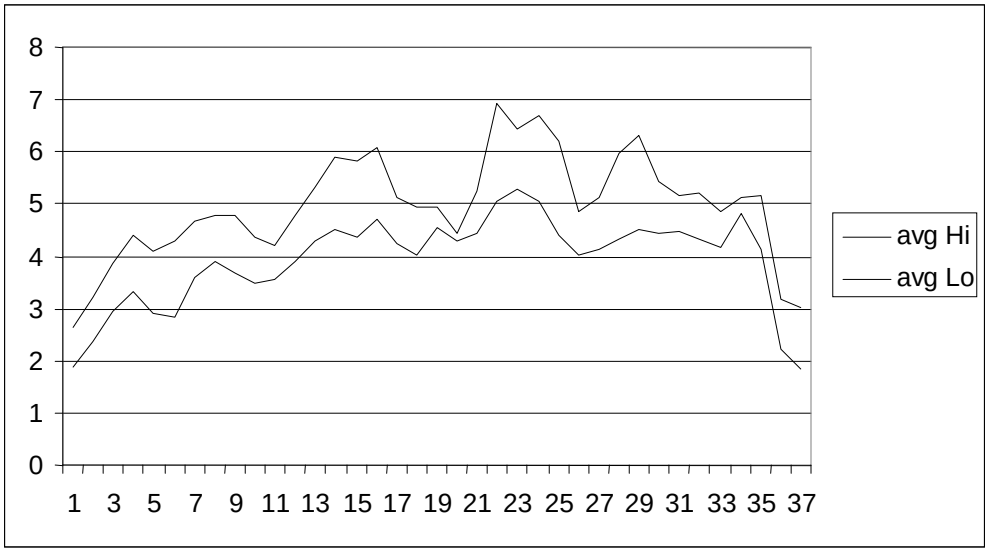



**Chart 2 shows average annual high and low price of corn.**

Looking for more evidence of a cyclical trend, I created a line chart which depicts two sets of data. The first data set is the average of annual high prices for all of the 36 year cycles. The second data set is the average of annual low prices for all of the 36 year cycles.

Chart 2 also exhibits cyclical characteristics and shows that prices trended higher from the bottom of the 36 year cycle at the left side of the chart into a peak, and then trended lower into the bottom of the cycle on the right side of the chart. Chart 2 provides insight into the volatility and consistency of the trending cyclical pattern.

The technical analyst should note that on average the 36 year cycle tends to bottom with a "V" pattern. A "V" pattern suggests a market that achieves extreme oversold condition and then reverses abruptly higher to compensate for a supply and demand relationship that is unsustainable.

The topping out process of this cycle is a "Head and Shoulders" technical pattern. The left shoulder suggests some of the cycles peak with left hand translation while the right shoulder suggests some of the cycles peak with right hand translation. On average, the peak of the 36 year cycle is near the midpoint— creating a near-perfect textbook portrayal of a simple cycle.

The technical analyst should have an understanding of past performance of a cycle

in terms of trend length and percent change in price (amplitude). The following are statistics of the 36 year cycle:

- The bottom to peak phase of the cycle lasted a minimum of 4 years and a maximum of 30 years.
- The bottom to peak phase lasted an average 21.75 years with a geometric mean of 18.99 years.
- Amplitude in the bottom to peak phase shows a minimum price increase of 167% and a maximum price increase of 1080%.
- Average price increase was 507.5% and geometric mean was 413.5%.
- Minimum length of the 36 year cycle was 32 years. Maximum length was 41 years. Average length was 36.125 years with a mean of 36 years.

I conclude from these studies that there is a 36 year time cycle. Evidence of one time cycle infers the possibility of additional time cycles. I will use the evidence of this 36 year time cycle as a starting point to explain Cycle Series Analysis concepts and to create a CSA model.

## III. Cycle Series Analysis (CSA)

Cycle Series Analysis (CSA) is the study of integrated patterns of short and long term time cycles to project price trends and market tops and bottoms. In order to develop a CSA model, the analyst must find evidence of two cycles. The first must be a series of longer time cycles, such as the 36 year cycle developed in the earlier part of this paper. The second must be a series of shorter, but uniform time cycles that are encapsulated by the longer cycle.

The mere existence of shorter time cycles is insufficient to create the CSA model. Rather, the last of the shorter cycles that makes up the longer cycle, must bottom at the same instant that the longer cycle bottoms. The point where these coinciding time cycles bottom is referred to as “convergence.”

The size of the CSA model is only limited by the availability of data. It can be developed to an infinite length, as well as to the smallest of time frames-- minutes, or

smaller.

With the discovery of the 36 year cycle stated in the Evidence of a Cycle section of this paper, I have a starting point to build a CSA model. There are different methods for locating the most important cycle trend contained within the 36 year cycle. My preferred method is a visual one and the one I will utilize in this study.

For this study, I used a bar chart of yearly corn prices from 1720 to 2005 to discover the next shorter cycle of the CSA model. In this case it was the 9 year cycle, which has an average length of 9.4 years.[2] The analyst could apply the same techniques used in the Evidence of a Cycle section to prove the 9 year cycle. For this section of the paper, however, I will concentrate only on time length statistics and the visual shape of the time cycle.

**Chart 3**

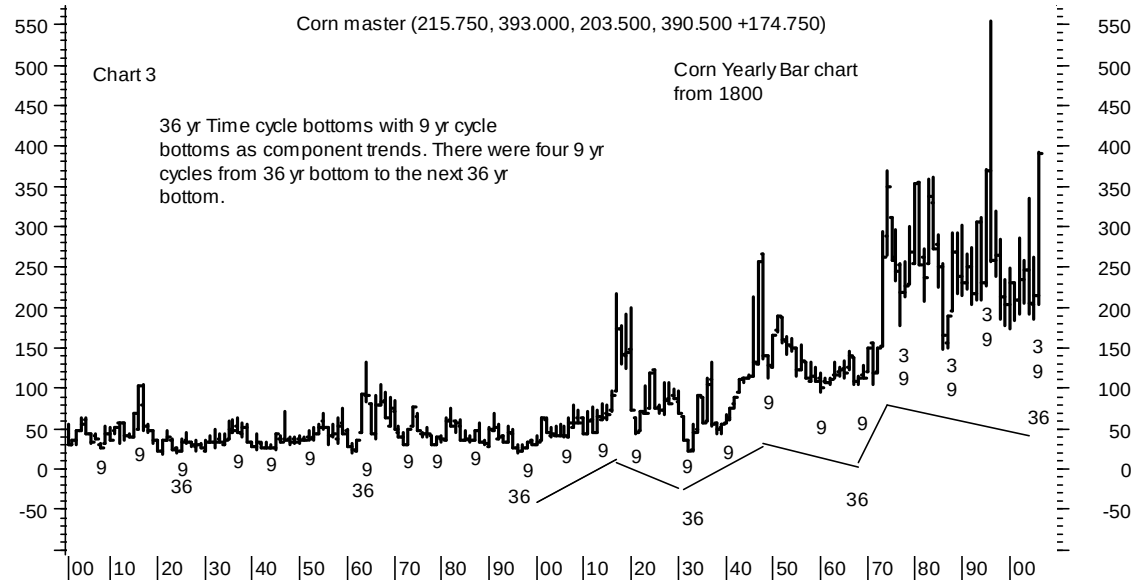



**Chart 3 shows how the 36 year cycles can be broken down into four 9 year cycles.**

We have created a simple CSA model, that is, the larger 36 year cycle which encapsulates the four 9 year cycles. The last of the 9 year cycles, in any given 36 year cycle, will bottom simultaneously with the 36 year cycle—convergence. The 9 year cycle is a tool to time the 36 year cycle.

[2] "9 year cycle" is the name I apply to a cycle with a minimum length of 8 years and a maximum length of 13 years.

Utilizing the same visual methodology, the CSA model can be expanded by breaking the 9 year cycles into their respective component cycles. Chart 4 shows a magnified view of a portion of the same corn data which was used to find the 9 year cycle. This allows a better view for discerning the next lower degree of cycle for the model.

In this instance, the lower degree of cycle is what I label a 3 year cycle. As noted in the higher level cycles, the span of the cycle can be less than or more than 3 years.[3] Chart 4 shows the 3 year cycles found in the corn price data. Rather than a fixed number of 3 year cycles, there is a range: there were 4 to 6 of the 3 year cycles within a given 9 year cyclical trend.[4] Chart 4 shows the 9 year cycle with 3 year cycle bottoms.

**Chart 4**

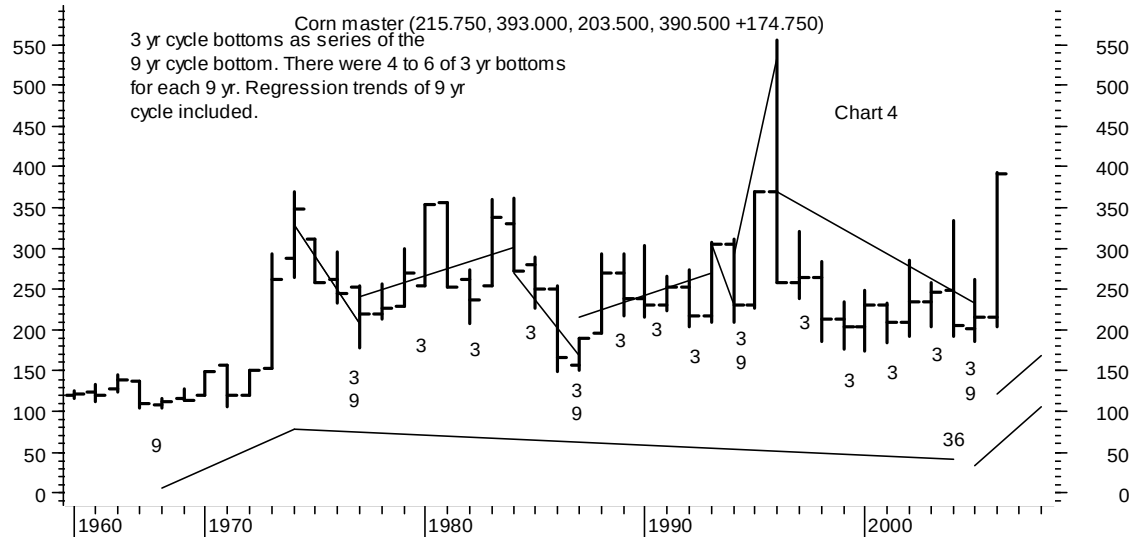



**Chart 4 shows the 9 year cycle with 3 year cycle bottoms.**

The CSA model now shows that the 36 year cycle may be subdivided into a series of four 9 year cycles; these 9 year cycles may in turn be subdivided into four to six 3 year cycles.

This CSA model has multiple uses. It can be used for investment purposes, for input into additional research, or to expose trends within a market. In this model, trends can be viewed from the short-term, intra-decade 3 year cycle viewpoint, to the long-term,

[3] Most of the "3 year cycles" are 3-4 years, with the rare occurrence of a 2 year cycle.

[4] Finding a range of sub-cycles that fit into the next higher degree of cycle, rather than a fixed number of cycles in each higher degree of cycle, is not unique to my work. Joseph Schumpeter, the noted economist and author, discussed similar ideas in his book: *Business Cycles: A theoretical, historical and statistical analysis of the Capitalist process*, 1939.

multi-decade 36 year cycle viewpoint.

My original hypothesis was that a new CSA model would need to be created for each commodity or index that I wanted to study. Upon further research, however, I discovered that this same CSA model, that is, the 36 year, 9 year, 3 year cycle CSA model, is a macro-technical-economic model. It is applicable to at least the following, and perhaps more, commodities: wheat, soybeans, soy meal, soy oil, cattle, hogs, milk, crude oil, natural gas, gold, silver and some commodity indexes.

This same CSA model can even be applied to a stock market index, as shown in Chart 5. The stock market exhibits the same characteristics of the 36, 9 and 3 year cycles. The significance of the 36 year downtrend, or bear market, is shown in the chart. At the 36 year cycle bottoms shown, the S&P index was down 40%, 85% and 42% respectively.

**Chart 5**

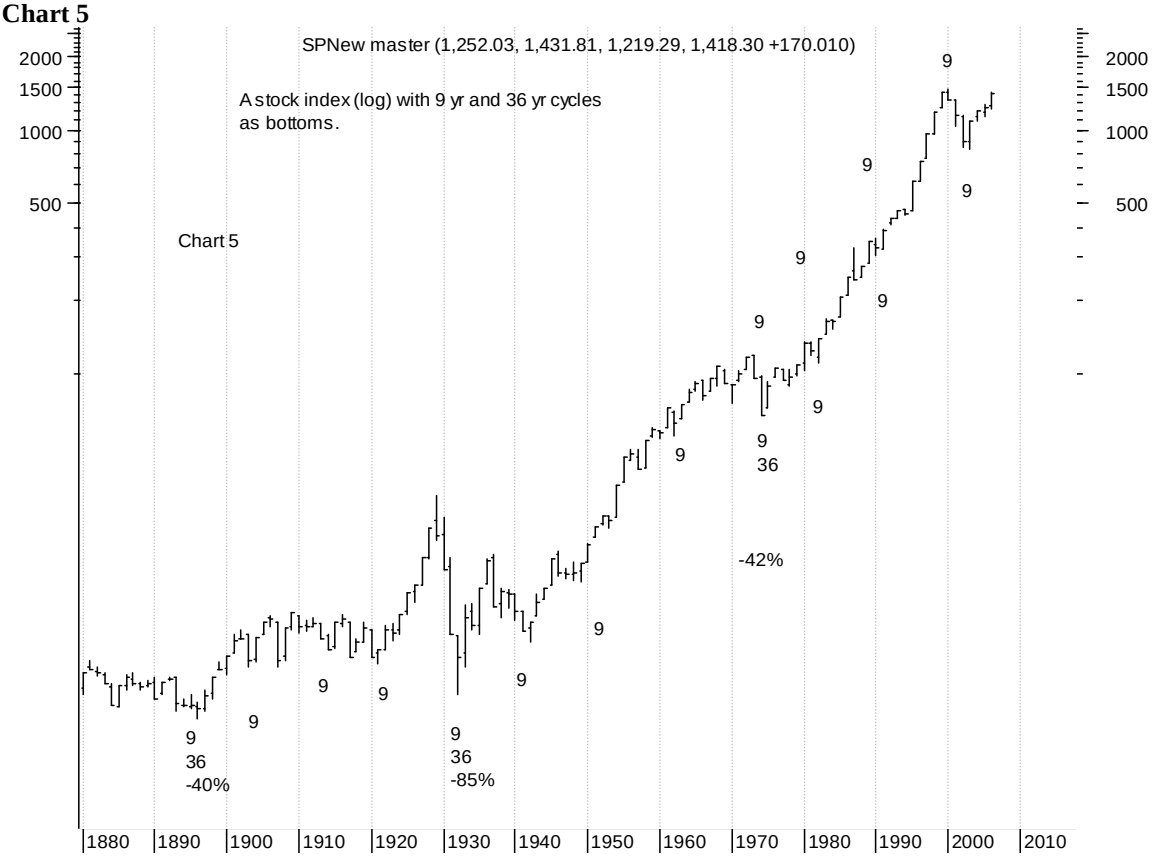



**Chart 5 shows the S&P Composite Index.**

## IV. Conclusion

This paper has shown evidence of cycles capable of being modeled under the CSA methodology. It blends the best of cyclical and technical analysis to create a useful model that is capable of discerning long and short term trends in the market. Its value can be further enhanced by the discovery of smaller and smaller cycles as well as longer term cycles. It provides a basis for further study of the orderly nature of cycles.

Greater confidence in the CSA model is derived by taking the model to at least one degree of cycle higher, and one degree of cycle lower, than that which is needed for actual trading purposes. This extension of the research beyond the upper and lower cycle limits of the CSA trading model verifies the set of cycles contained within that CSA trading model.

Once a thorough understanding of the CSA methodology is achieved, a CSA model of price tops can also be developed. A model identifying both cycle bottoms and cycle tops provides useful forecasts as to how long a trend will last as well as the amount of expected price change. With that information in hand, the analyst or investor has a powerful tool for understanding the market.

My own proprietary work includes the creation of CSA models that last from a few minutes to hundreds of years. From those models I have created systems to satisfy client needs for short-term or long-term trading.