Going To Kansas City

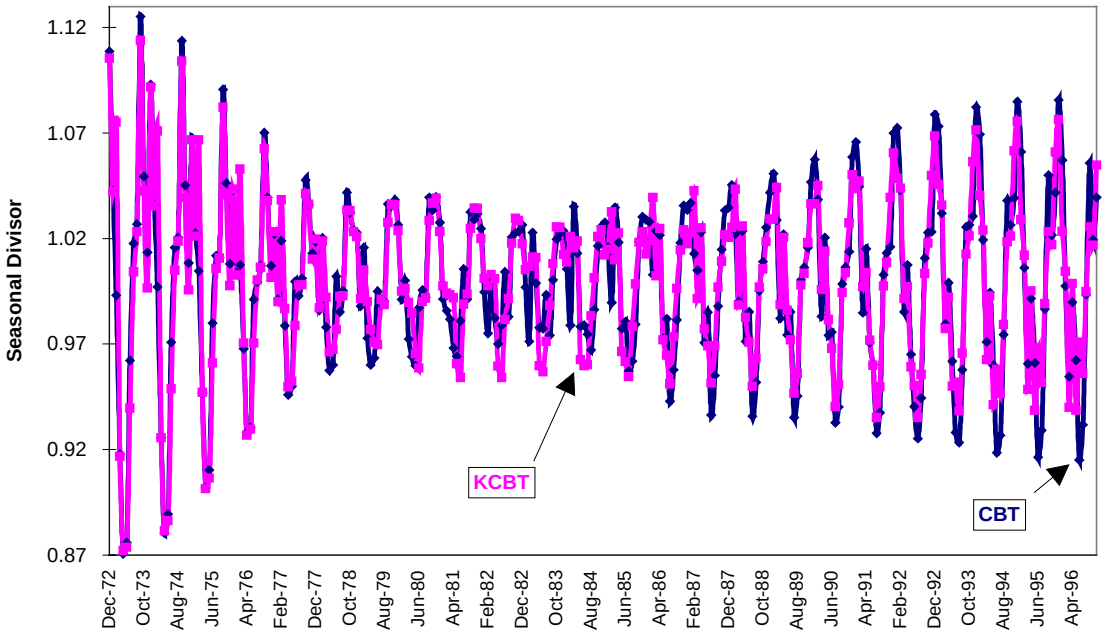
Baby Boomers don't need to watch reruns of what is now referred to as "classic television." They've lived it, breathed it, and most importantly, have all of the musical themes burnt into their deep subconscience. So, while they hypnotize themselves with the opening theme of the *Patty Duke Show*, "... cousins, two of a kind ...," the rest of us will delve into the mysteries of another delightful duo, the Chicago / Kansas City wheat spread.

The basis of the Chicago Board of Trade contract is soft red winter wheat, used for such products as crackers and pasta, while that of the Kansas City Board of Trade contract is hard red winter wheat, used for such products as bread and cakes. Consumption patterns within markets, both domestic and overseas, are fairly stable -- is there a bread-eating season? -- which means that price fluctuations will largely be functions of export demand, weather, and carryover stocks.

As The World Turns

Wheat markets are global. Major producing regions in the northern hemisphere include the U.S., Canada, the European Union, and the former Soviet Union, while major producing regions in the southern hemisphere include Argentina, Australia, and southern Africa. Each one of these regions harvests its crops at different times, and each region has different and frequently-changing government policies, including production incentives and export subsidies. Needless to say, each region has different and randomly-occurring weather and growing conditions. Given any normal price elasticities, we should expect to see widely different seasonal cycles in prices across years and between the two winter wheat markets. However, while seasonal cycles in price vary greatly in amplitude (height) over time, they are virtually identical in phase (peaks and troughs) between the two markets, as shown in "Time Of The Season."

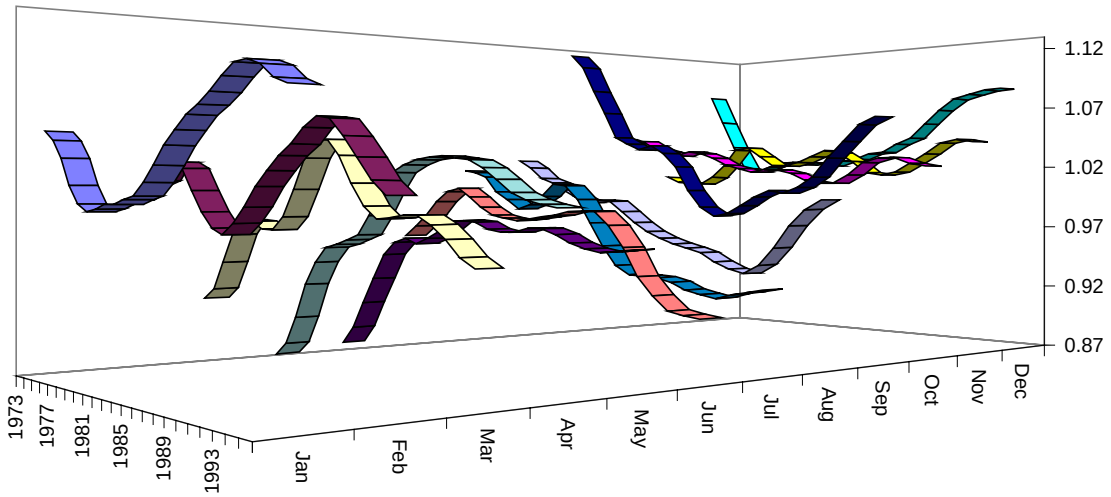
Time Of The Season:
Seasonal Variation In Wheat Prices, 1972 - 1996



While the similarity in phase is somewhat surprising given the vagaries of production and inventory carryover, at least it is constant over time. The variation in amplitude is anything but constant. Several trends are quite visible; both the constriction in amplitude between the early 1970s and early 1980s and its subsequent expansion, and the increasing amplitude ratio of CBT to KCBT amplitude in the 1990s emerge clearly. The seasonal component of both wheat markets has been increasing steadily for a decade, particularly for CBT wheat, but it is still not as large of a determinant of overall prices as it was twenty years ago.

We can rearrange the seasonal data for CBT wheat (the KCBT data is virtually identical) to compare how the seasonal factors for each month have changed over time. Even if the amplitudes are different, we should expect each of the ribbons in "Time Of The Month" to be a flat line; in other words, all the December factors should be the same, all of the May factors should be the same, etc., over all of the years. They clearly are not: past seasonality is not a predictor of future seasonal results!

Time Of The Month:
Variation In CBT Wheat Market Seasonality, 1972 - 1996

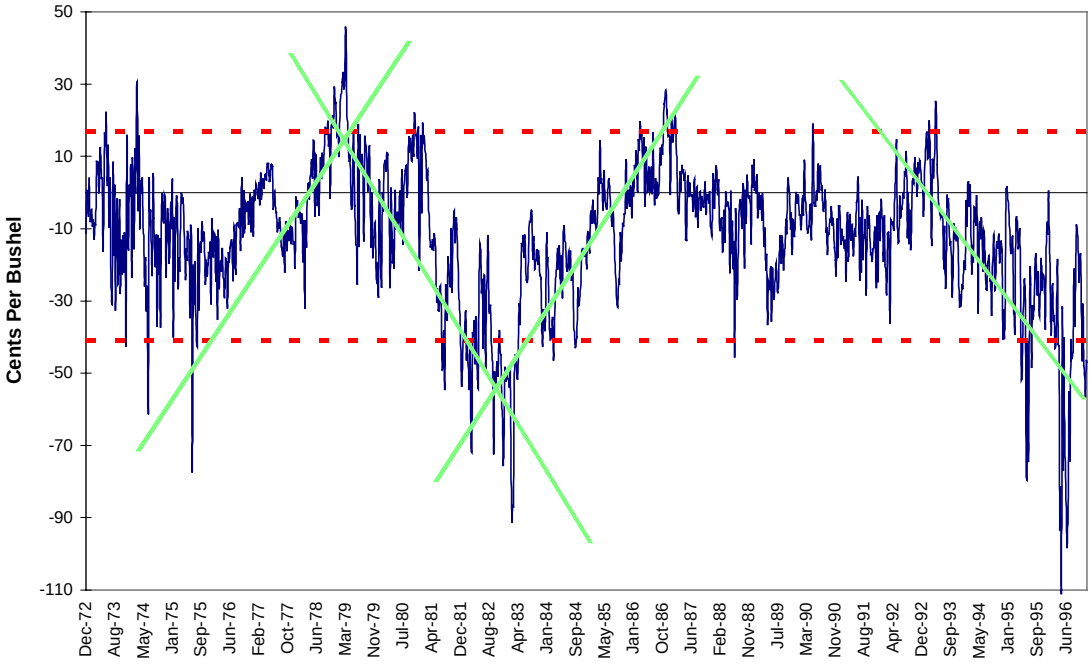


Spread History

Since the seasonal phases of the two wheat markets are largely coincident, and since the seasonal factors affecting prices are unstable both in amplitude and over time, we will have to drop seasonality from our efforts to model the spread.

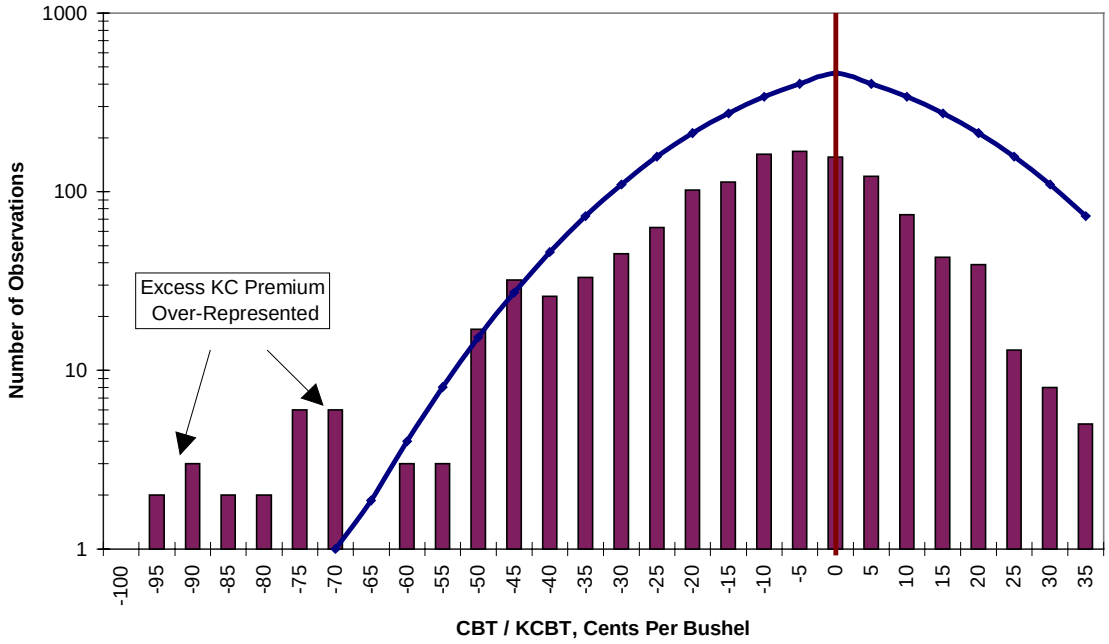
The distribution of the raw CBT / KCBT spread may offer a few clues for model building. In "Spreading The Wealth," we have overlain two bands around the weekly spread, the mean of $(.1205) $\pm$ 1.5 times the standard deviation of $.1925; the area inside the bands accounts for nearly 85% of the observations. The times when KCBT moves toward extreme value are both more frequent and more pronounced than are CBT extremes. We have also drawn in some representative trend lines corresponding to secular movements in the spread. These trends are exceptionally long-lived, nearly four years in duration, and encompass moves in the spread of about $1.25 per bushel. Interestingly enough, we have just completed a four-year cycle favoring Kansas City where spreads moved from Chicago $0.20 over to Kansas City $1.10 over. The broad cycle below suggests that a return move lasting until the year 2001 is in store.

Spreading The Wealth:
Weekly Chicago / Kansas City Wheat Spread, 1972 - 1996



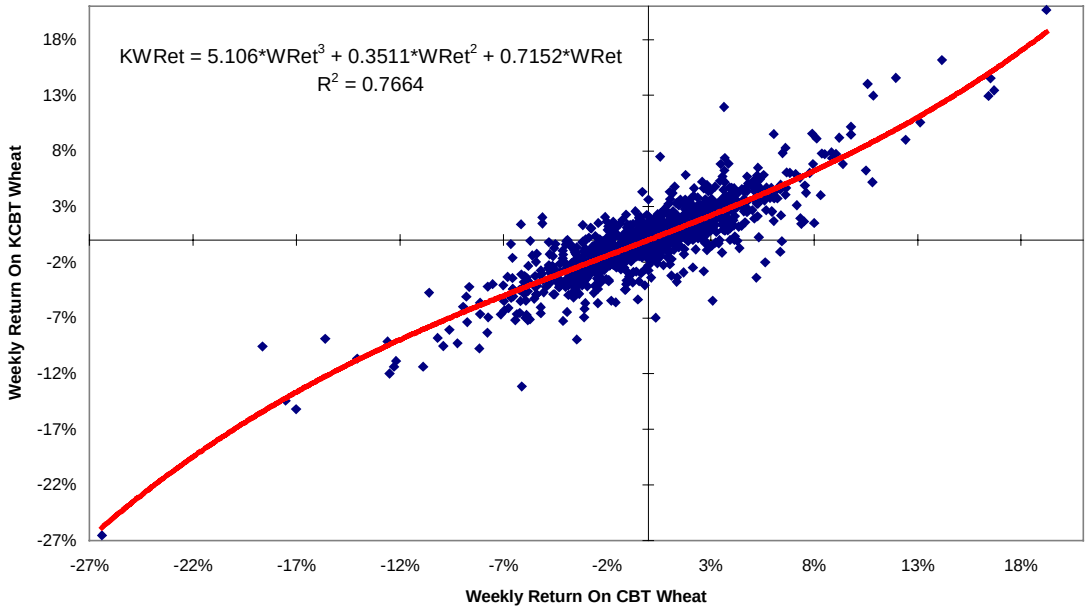
The assymetric nature of the spread can be illustrated in another fashion. The graph “Skewed Outlook” depicts the actual representation of the spread versus an overlying normal distribution. There are a significant number of “excess” observations favoring Kansas City, but none that favor Chicago.

Skewed Outlook:
Weekly Chicago / Kansas City Wheat Spreads, 1972 - 1996



The assymetric nature of the spread suggests that the Kansas City market tends to outpace the Chicago market on large moves higher -- hence the negative values -- but not lower. This is seen in “Flour Power,” which depicts the cubic relationship between weekly returns on the KCBT and CBT wheat markets wherein the regression fit is quite linear at quiet values, but is concavely curved at price extremes.

Flour Power:
Weekly Returns On KCBT Wheat Versus Weekly Returns On CBT Wheat



A Trading Strategy

If the two wheat markets have identical seasonality, secular trends in price, assymetric distribution of the spread between them, and a linear relationship in their returns except at the extremes, then we can trade the spread using a simple and straightforward model. The two items required are the stochastic of the spread and its quadratically-detrended value. The stochastic is simply the [current value of the spread - low of range] / [high of range - low of range], while the quadratic detrending is the normalized residuals of the regression of the spread against time and time-squared over the range. The period of the range is selected by the Adaptive Moving Average algorithm (see "Measuring Market Tension," *Futures*, February 1996).

The results for a daily backtest over ten years are shown below for next-day trading. There were 654 buy signals, which were correct 66.8% of the time for an average gross profit of $83.50, and 677 sell signals, which were correct 72.2% of the time for an average gross profit of $86.20. The distribution of results is shown in the "Performing Daily" graph.

It should be noted in passing that this combined model structure is robust for a large number of intermarket (but not intermonth) spreads.

Performing Daily:
Combined Stochastic / Detrending Model, 1986 - 1996