Springtime For Bran Flakes

A stroll through the open thoroughfares of any great American city on an early spring day, New York City especially, will produce at least one encounter with a citizen expressing his viewpoints, loudly and ungrammatically, to no one in particular. Should the topic du jour be the different types of wheat in commonly traded in American futures markets, please stop and listen with great respect: This could have been the floor broker filling your orders at one point.

Gluten For Punishment

Let's detour a few seconds into some wheat history and trivia. The only grasses with large starchy seeds high in protein are native to Mediterranean climates, areas with hot, dry summers and cool, rainy winters. In addition to the Mediterranean basin itself, these regions include South Africa, southeast Australia, central Chile, and southern California. Outside of the Mediterranean littoral and its extensions eastward, all of these regions are isolated and accessible only from a north-south route, not from an east-west route moving through a broad belt of similar climate and geography.

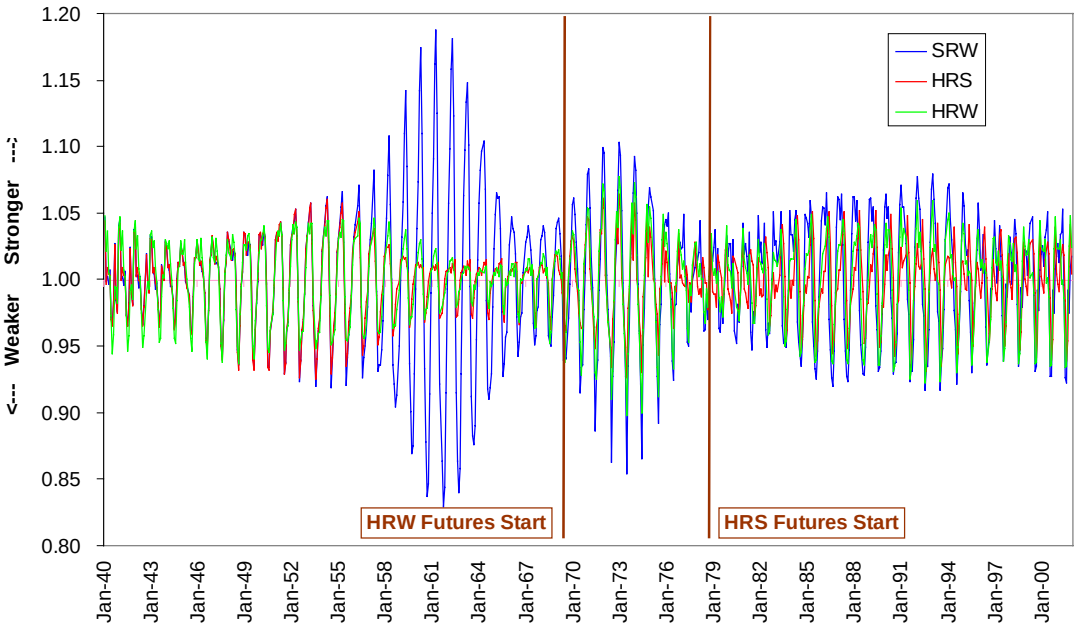
The importance of this geography to the development of agriculture and hence civilization cannot be over-stated: Once grains were cultivated in the Middle East, the seeds and techniques could be spread readily over simple trade routes. While the first grain to be domesticated likely was barley – for brewing beer, of course – wheat likely was the second, and it had a unique attribute, gluten proteins that allowed its ground flour to stick together when baked. Bread has been an important foodstuff ever since, and the grain trade that arose to produce beer and bread was the first recorded commodity market and the second oldest profession.

Red Wheat Roundabout

The three principal wheat grades traded on U.S. exchanges today are soft red winter wheat at the Chicago Board of Trade (SRW, CBOT), hard red winter wheat on the Kansas City Board of Trade (HRW, KCBOT), and hard red spring wheat on the Minneapolis Grain Exchange (HRS, MGE). Spring wheat, which has a protein content of 13.5%, is grown in the northern plains of the U.S. and in Canada, and has a new crop month of September, as opposed to July for the winter wheats. How does this different crop year affect the seasonality of wheat markets, and does it produce any sort of seasonal embedded option we can trade? And, perhaps most important, should we treat the SRW/HRS spread and the HRW/HRS spread equally?

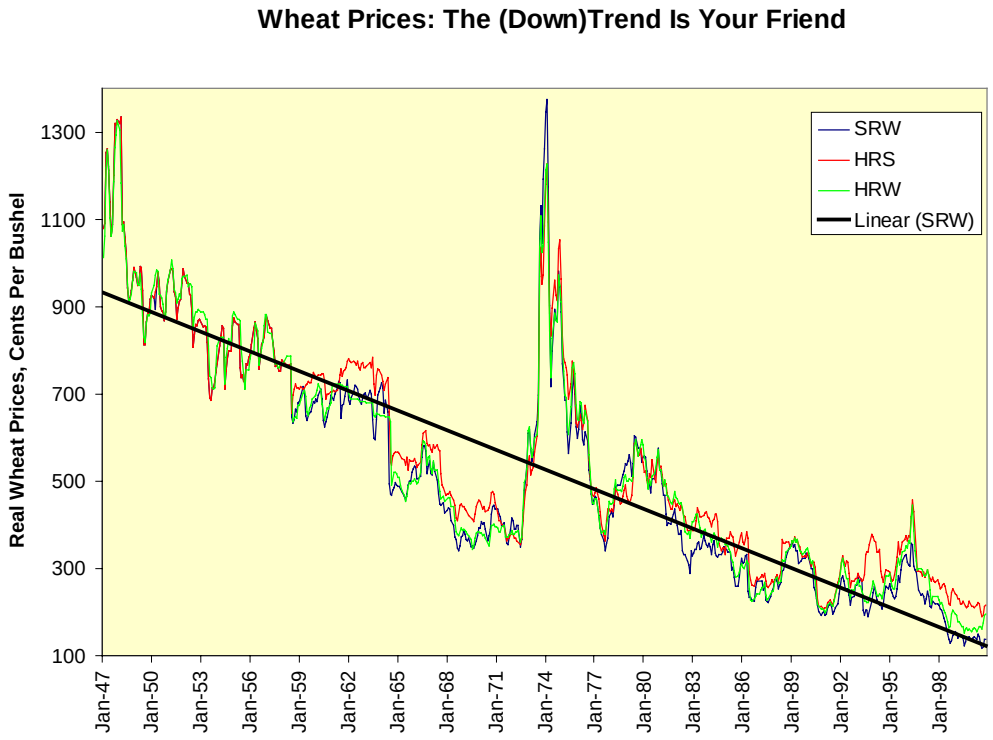
First, we can look at the cash market seasonal factors of the three wheat markets over the past sixty years, with markets overlaid for the start of HRW futures in January 1970 and HRS futures in January 1979. One of the social utilities of futures markets is amelioration of seasonal price swings, and this function certainly seems to have been met by the successive addition of wheat futures contracts. A second reason for the declining amplitude of seasonal swings and an important one as the global controversy over genetically modified grains continues, is the onset of the so-called Green Revolution in the late 1960s. Improved strains and more efficient use of better agricultural chemicals led to vastly higher yields and lower price spikes. Risk management matters, as does agricultural science, and no one associated with the grain trade should feel any need to apologize for either.

Differential Seasonality, Cash Wheat Markets 1940 - 2001



A third reason for the tamer seasonality is simply lower price variance; by the early 1980s inflation was being tamed, the annual Soviet grain debacle was anticipated, and global grain productivity increases stamped out price spikes before they got out of hand. Indeed, the story of wheat prices mirrors that of all other physical commodities, and that is declining real prices, punctuated only briefly by price spikes, over time.

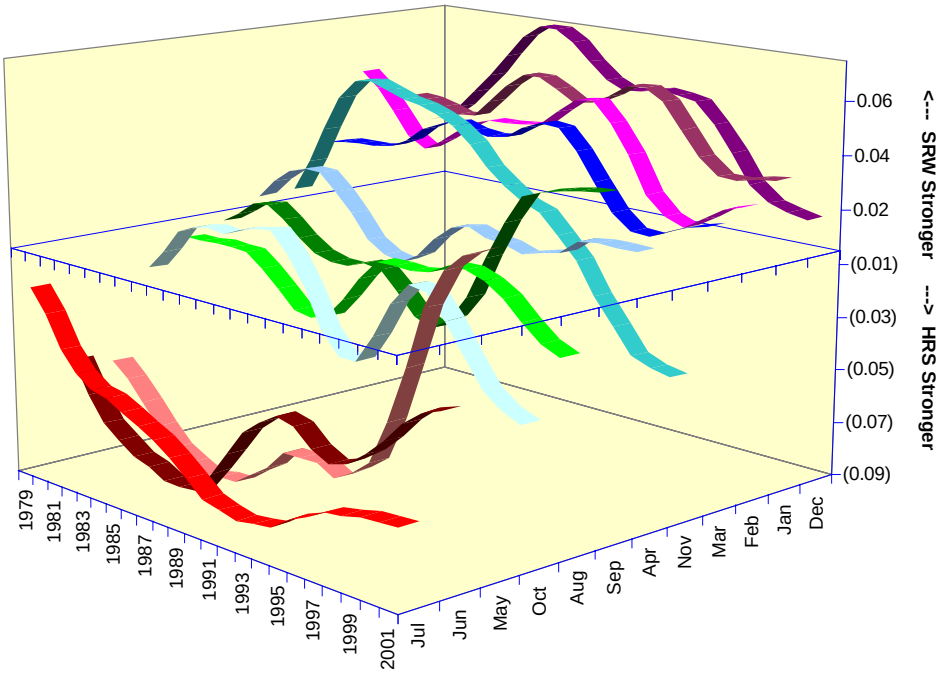
Global wheat farmers have reason to be proud. During the half-century shown in the graph below, the world's population has tripled, and an increasing percentage of all grain production has gone to feeding livestock instead of people. And yet the real price of wheat has fallen by nearly 85%. Not quite the productivity jump of microchips, but impressive nevertheless.



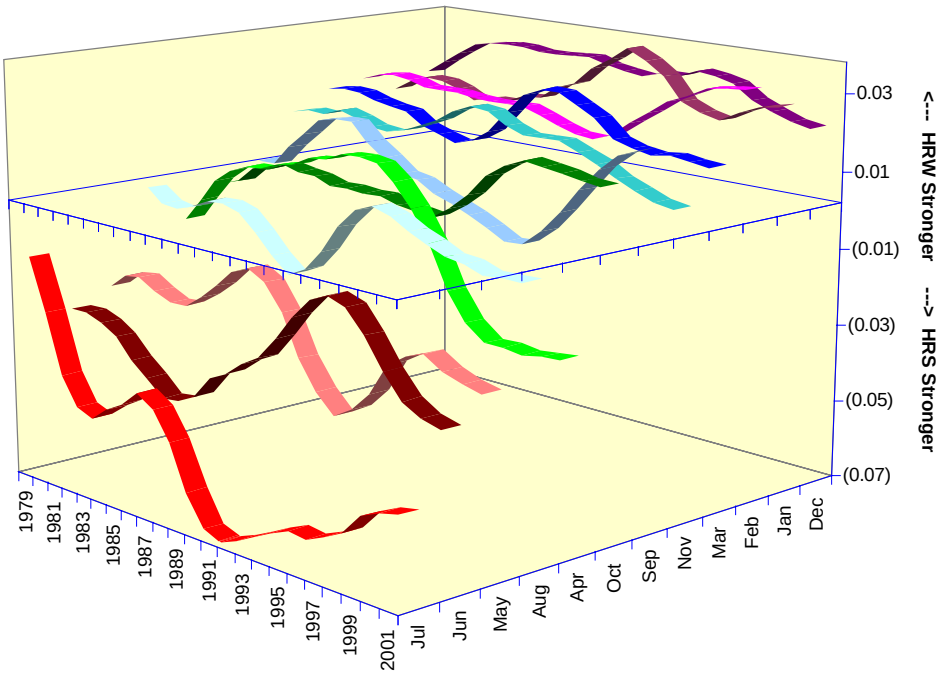
The Minnesota Twins

Let's return to the question of whether the different crop cycle for spring wheat creates a trading opportunity against the two winter wheats traded on U.S. exchanges. The data in our graph of differential seasonality can be sorted by month over the post-1979 period for both the SRW/HRS spread and the HRW/HRS spread. Given the close correlation between the seasonal patterns of HRW and SRW, (see "Going To Kansas City," *Futures*, May 1997) it should not surprise us that the seasonally strong (weak) months for the SRW/HRS spread are the seasonally strong (weak) months for the HRW/HRS spread as well. In both cases, HRS is stronger during the early summer months of May, June, and July, and weaker during the winter months of December, January, and February. While the relative rank of these monthly patterns has been consistent over time, the absolute level of differential seasonality by month has been volatile, as seen in the pair of charts below.

Seasonal Spread Tendencies: SRW/HRS, 1979-2001

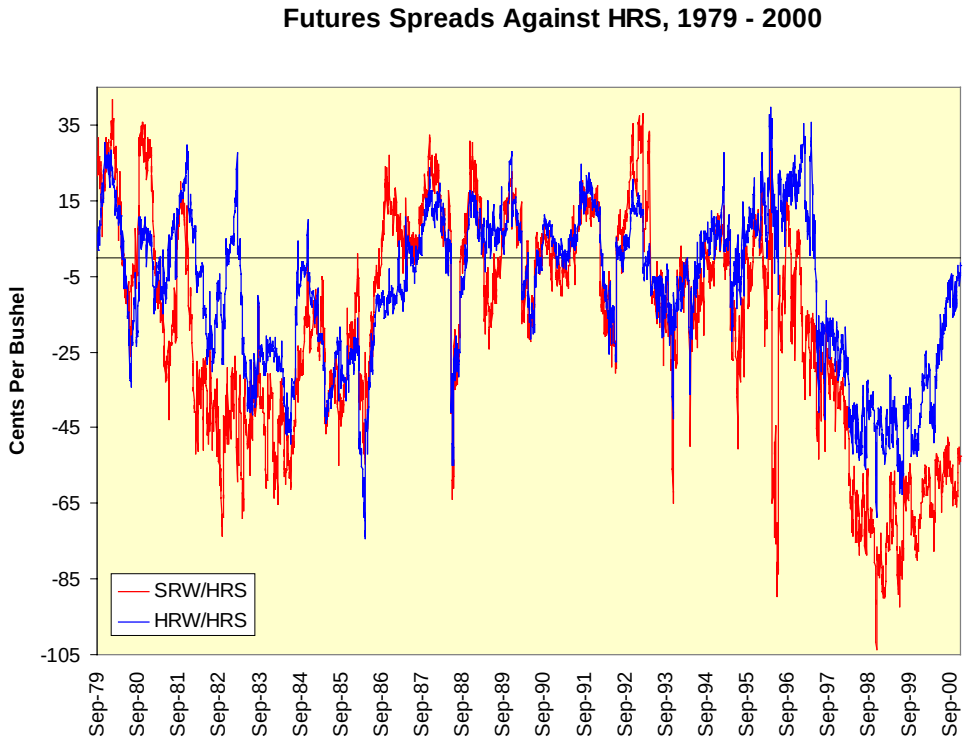


Seasonal Spread Tendencies: HRW/HRS, 1979-2001

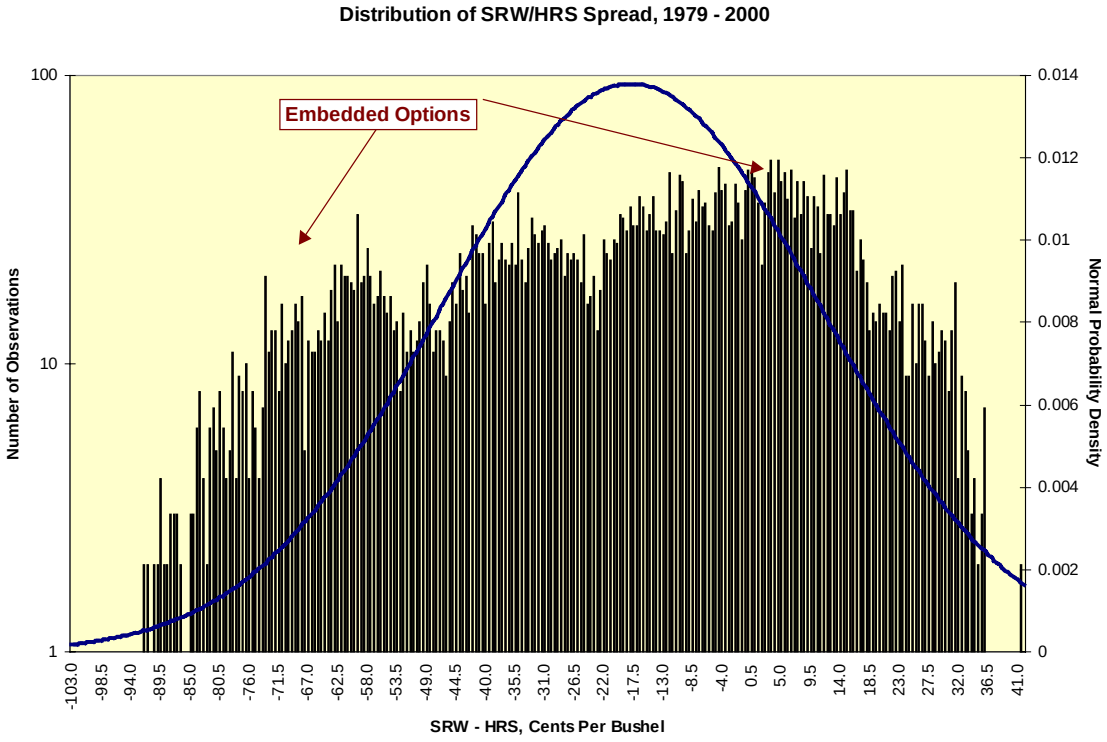


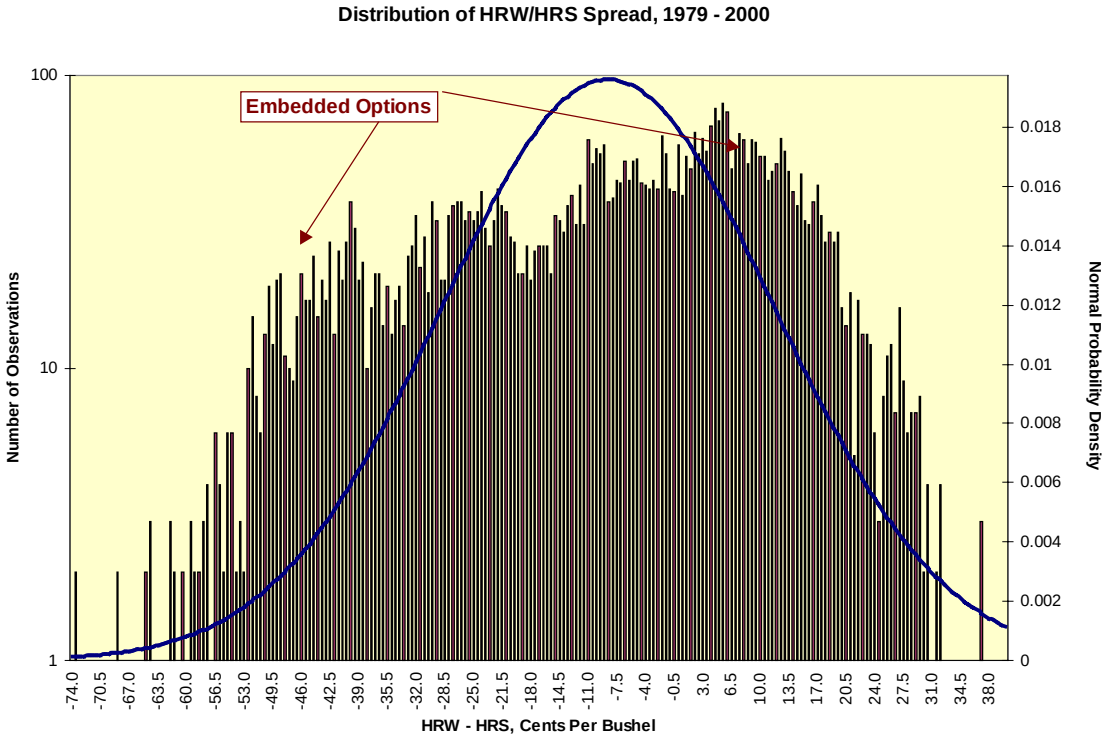
These seasonal tendencies are consistent enough to examine for trading strategies, and they even show up in a daily price chart of the futures spreads over the 1979-2000 period. The asymmetric nature of the spreads between the

winter wheat markets and spring wheat – the negative spread values are much larger and more pronounced than are the positive values – is characteristic of a spread with an embedded option.



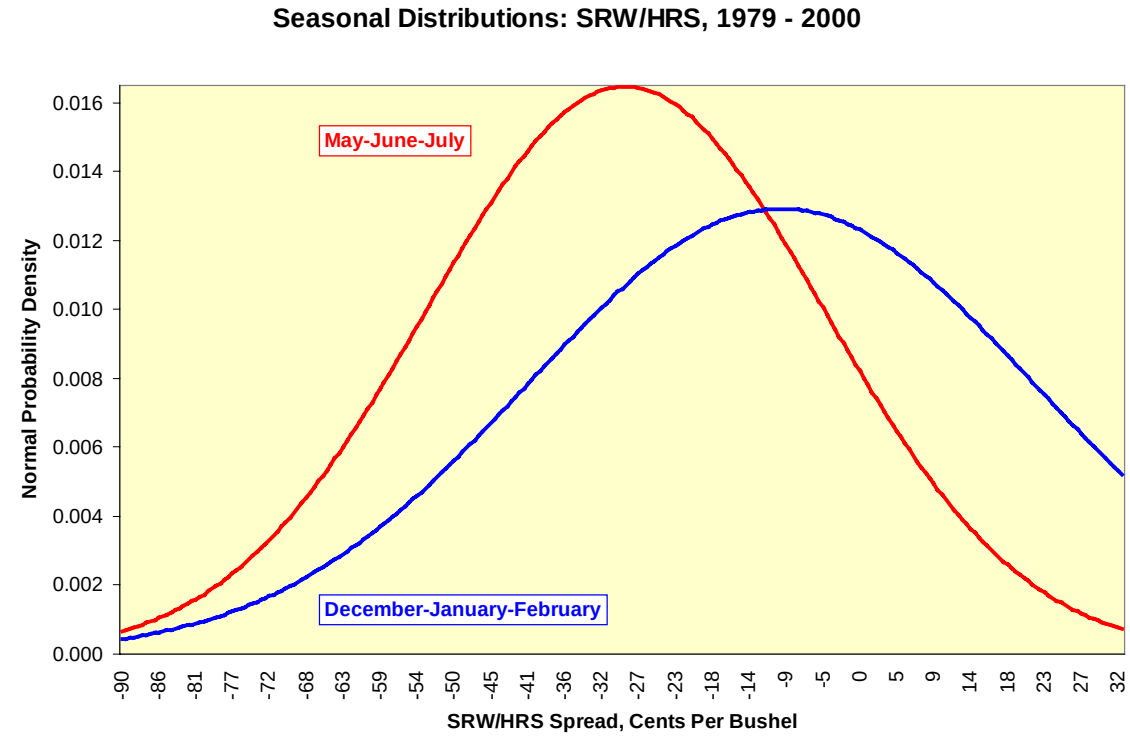
We can rearrange the above data into histograms of the spread values against the expected spread values for a normal distribution.

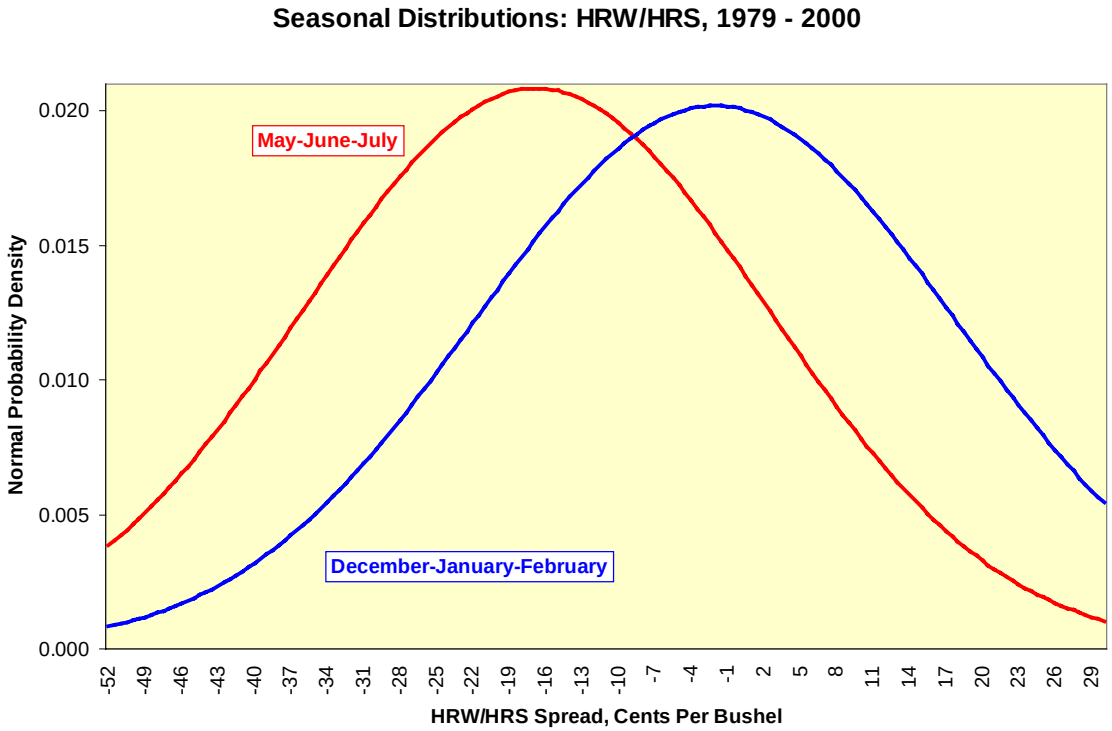




One Lump Or Two?

The presence of embedded options at both the higher and lower spread values makes sense if we consider the seasonal nature of the spreads themselves. After all, if we can see a long-term differential in behavior by month, why shouldn't we use this information? To this end, let's break the summer and winter months out of the statistical population, compare their expected values to one another, and use this information to see whether we should continue to examine both the HRW/HRS spread and the SRW/HRS spread.



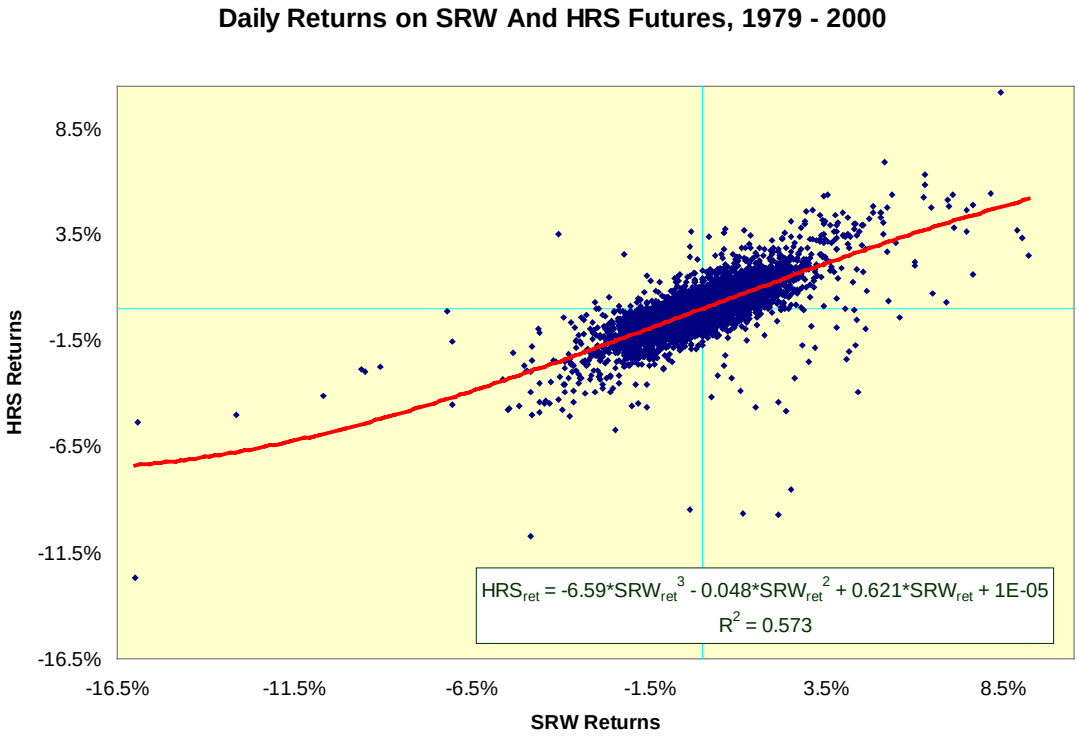


While the summer and winter distributions appear to be different from one another, especially for the SRW/HRS spread, we're hard-nosed quants who won't be satisfied with visual observation alone. We can run a standard F-test to compare the summer and winter spreads for each wheat market pair. For the SRW/HRS spread, the probability of the summer and winter variances not being different is a minuscule 2.07E-16%, but for the HRW/HRS spread, the

probability that the summer and winter variances are not different rises to a significant 25.4%. The suggests we should concentrate our efforts on the SRW/HRS spread, wherein we can take advantage of the larger and more certain swings from season to season. Moreover, we can enjoy the greater liquidity of the CBOT contract as opposed to the KCBOT contract in executing this spread.

The Chicago/Minnesota Spread

Since 1979, the daily correlation of returns for SRW and HRS has shown a great deal of stability in the central zone of observations. On days of extreme price movements, SRW has greater downside volatility and HRS has greater upside volatility. This is consistent with our previous observations of the embedded optionality of the spread as long HRS / short SRW in the summer months and short HRS / long SRW in the winter months.



Like most commodity spreads with only partial substitution, (see "Not All It's Cracked Up To Be," *Futures*, July 2000) the SRW/HRS spread exhibits trending periods, long periods of random and static relationships, and economic bounds defined by the actual substitution of one commodity for another. These spreads can be traded by a simple trend entry / countertrend exit system based on the combination of spread stochastics for the trend component and quadratically detrended values, the residuals of the spread's regression against time and time squared, for the countertrend exit component.

The distribution of spread results for long and short trades in a simulation extending back to 1979, with long being defined as buying SRW and selling HRS, is displayed below. The 322 short trades grossed $3.17, an average of less than $0.01 per trade, while the 313 long trades gross $3.73, an average of slightly more than $0.01 per trade. The success rates for the long and short positions, respectively, were 71.2% and 73.5%. The very narrow average profits and the high success rate suggest that premium execution on these spreads is paramount.

Is such precise execution realistic? Under the present system of floor execution and telephone connections between two different exchanges, no. Can we anticipate better execution in the future? There's no reason to believe we cannot achieve the same tighter spreads and lower trading costs in futures markets that we have in equity markets. If wheat producers can achieve the productivity gains seen above, why haven't wheat traders been able to duplicate them? This is a challenge for the industry, and one that simply must be met.

Combined Trend Entry / Countertrend Exit Model For SRW / HRS Spread