U.S. Commodities Markets

El Nino. A Diminishing Risk To Agricultural Commodities?

Walter Kunisch
Senior Commodities Strategist
612.439.6111
walter.kunisch@hilltopsecurities.com

In our May research note we highlighted our top 5 risks that have the greatest potential to impact commodity prices in 2023. These include the U.S. debt ceiling debate, U.S./Global recession, the emerging El Nino climate pattern, military activity in Ukraine, and the lingering geopolitical tensions with China. With the U.S. debt ceiling temporarily resolved, aka kicked down the road, we focus on our No. 3 risk item – El Nino and weather.

The weather risk variable has evolved as the global climate transitioned from a neutral El Nino Southern Oscillation (ENSO) cycle to a strengthening El Nino cycle. During this transition the global media has profusely reported on how the climate pattern should wreak havoc on world crop production, force food prices higher and inflict broad and renewed inflationary pressures.

From 1970 to current, historical U.S. row crop yield data during El Nino cycles shows the opposite. We see the El Nino climate pattern in MY 2023/24 helping global row crop yields return to the mean with a moderate probability of yields over performing.

Overview

We see the El Nino climate pattern in MY 2023/24 helping yields return to the mean with a probability of yields over performing.

In April 2003 the global climate pattern hastily transformed from an ENSO neutral pattern to El Nino. Currently, NOAA's Climate Prediction Center (CPC) confirms that El Nino conditions are present and are forecasting that the climate pattern will gradually strengthen into the winter. As the El Nino strengthens, heat and precipitation risks will emerge, impacting domestic and global crop yields in that process. Storm activity can be more vigorous in the Gulf of Mexico. Drier weather conditions in northern Brazil, Australia, and Indonesia are also typical characteristics of the pattern while India tends to experience reduced monsoon rainfall.

Since 1970, the ENSO climate events, La Nina and El Nino, possess causality with U.S. row crop (corn, cotton, rice, and wheat) yields. However, the influence of the ENSO patterns on the direction of U.S. yields over the 53-year history period is mixed. Focusing on the El Nino, the climate pattern has a tendency of producing tail classified, extreme, yields. However, the data shows that since 1970 the El Nino impact produces trend to above trend yields. Starting in 2000 we integrate other countries to our analysis. **Our work continues to illustrate that the El Nino climate pattern is connected to trend and above trend row crop yields, both globally and in the U.S.**

July Is a Critical Month for the Northern Hemisphere

July is key for crop development as the growing plants critically require ample moisture. In 2023 the prolonged La Nina pattern has left fields in key U.S. corn and soybean producing states drier than the 10-year mean.

In the U.S., row crops are in key development phases, the Indian monsoon is in full swing, and winter wheat is being harvested. July is key for crop development as the growing plants critically require ample moisture. In 2023 the prolonged La Nina pattern has left fields in key U.S. corn and soybean producing states drier than the 10-year mean. Key cotton producing states like Texas are experiencing furnace like heat. The Indian monsoon is forecast to be 96% of the 10-year average and the arrival was delayed by

Please see disclosure starting on page 5.

tropical cyclone Biparjoy. Concerns about rice production throughout southeast Asia are prevalent. The above weather-related concerns are legitimate and have helped contribute to increased risk premiums inside the respective futures markets. Looking at the historical El Nino events, we believe that these risk premiums may be inflated.

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Weather in the Northern Hemisphere Has Been Generally Positive for Crops

Despite the early season dryness in the U.S. corn belt, timely rains and temperatures have been favorable for U.S. corn and soybean plant development. While the crops are still vulnerable, rains in late June and early July helped arrest the deteriorating weekly condition scores in USDA's Crop Progress report.

In India, as of July 18, the cumulative rainfall from the monsoon is at a "normal level". Data from the India Meteorological Department shows that total rainfall in most regions varies. Some regions are dry, some normal and have experienced above average. Aside of the delayed arrival of the monsoon this dispersion is normal. The key rice producing regions in the southern part of the country are experiencing dryness but the cotton regions in the west have been experiencing normal to slightly below trend moisture. Vegetative health indices (VHIs) in key rice producing areas in China, Vietnam, and Bangladesh illustrate no overarching concerns.

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According To the CPC, Since 2000 There Have Been Four El Nino Climate Patterns and Seven La Nina Patterns

El Nino occurred in 2003, 2007, 2010 and 2016. Of the four El Ninos, the strongest climate pattern was in 2016. Three were classified as mild to moderate. Both domestic and global agricultural production of feed/cereal grains and cotton varied during these El Nino events.

In 2023, the Evolving Climate Pattern in the Northern Hemisphere Can Be Beneficial for U.S. Agriculture Production

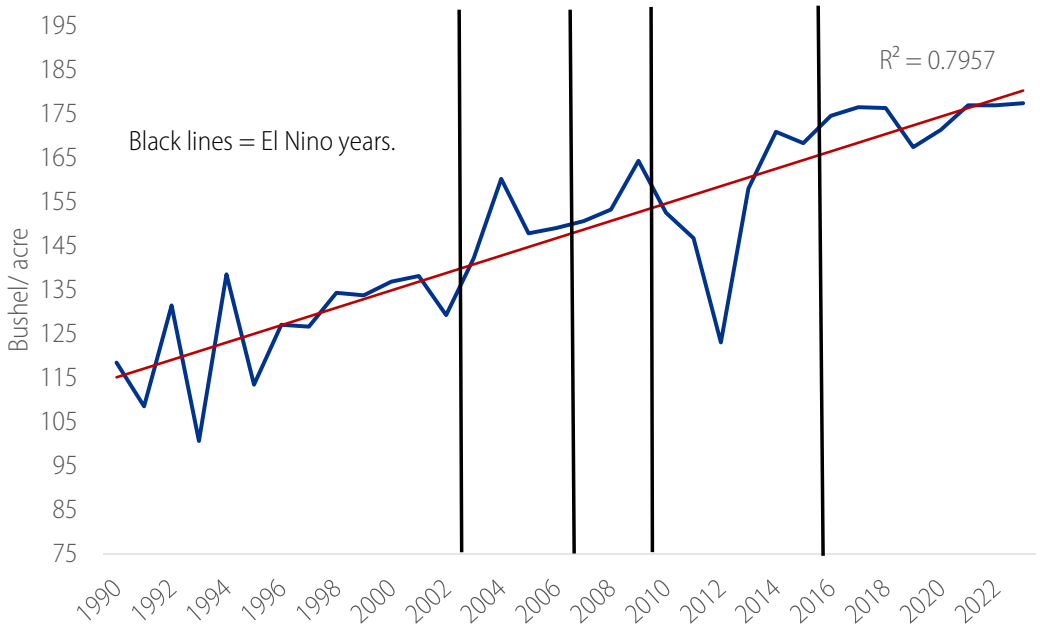
Driven by rising sea surface temperatures (SSTs), trade winds and atmospheric conditions, the weather is constantly evolving. In the early spring, the CPC predicted a transition from La Nina which was accompanied by above average precipitation in the ECB and enhanced dryness in the WCB. NOAA's recent data illustrates the opposite. The 30-day forecast during July is average temperatures in most of the ECB and WCB with above average moisture. While La Nina driven structural dryness remains a lingering concern for U.S. corn and soybean crops, the increased probability of timely moisture can mitigate threats to yield objectives.

Since 2000, history shows that El Nino delivers minimal production risks to U.S. row crops.

Accompanied by Advances in Seed Genetics and Precision Agriculture, U.S. Yields Are Mostly Positive During El Nino

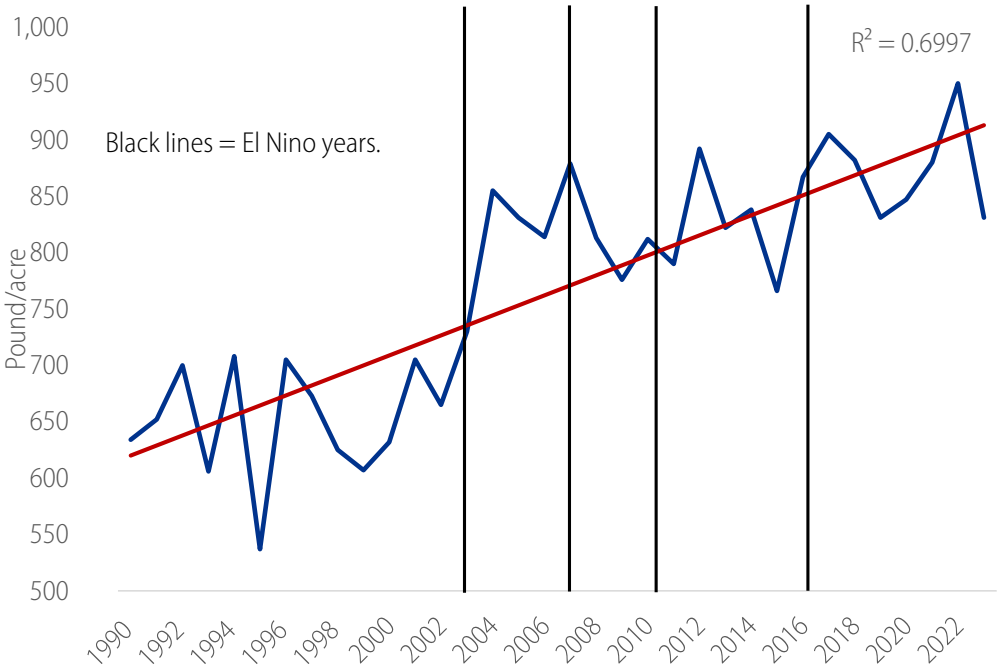
Since 2000, history shows that El Nino delivers minimal production risks to U.S. row crops. Corn yield was below trend 25% of the time. The domestic all wheat and rice yields were split, 75% record yields and 25% below trend. Cotton, 75% record yields and 25% below trend yield. Soy yields, 50% trend, 25% record, 25% below.

U.S. Corn Yield



Source: USDA and HilltopSecurities.

U.S. Cotton Yield



Source: USDA and HilltopSecurities.

Crop Performance During El Nino Events in the U.S.

Except for 2016, each El Nino cycle since 2000 has produced above trend global cotton yields and 50% of these production cycles resulted in record yields.

2003: U.S. corn yield: above trend at 142.2 bpa. All wheat yield: record 44.2 bpa. Rice yield: record 66.7 cwt per acre. Cotton yield: record 730 pounds per acre. Soy yield: below trend 33.9 bpa.

2007: U.S. corn yield: above trend at 150.7 bpa. All wheat yield: below trend at 40.2 bpa. Rice yield: record 72.1 cwt per acre. Cotton yield: record 879 pounds per acre. Soy yield: trend 41.7 bpa.

2010: U.S. corn yield: above trend at 146.8 bpa. All wheat yield: below trend at 43.6 bpa. Rice yield: below trend 70.6 cwt per acre. Cotton yield: trend 790 pounds per acre. Soy yield: trend 42.0 bpa.

2016: U.S. corn yield: record 174.6 bpa. All wheat yield: record 52.7 bpa. Rice yield: below trend 72.3 cwt per acre. Cotton yield: above trend 867 pounds per acre. Soy yield: record 51.9 bpa.

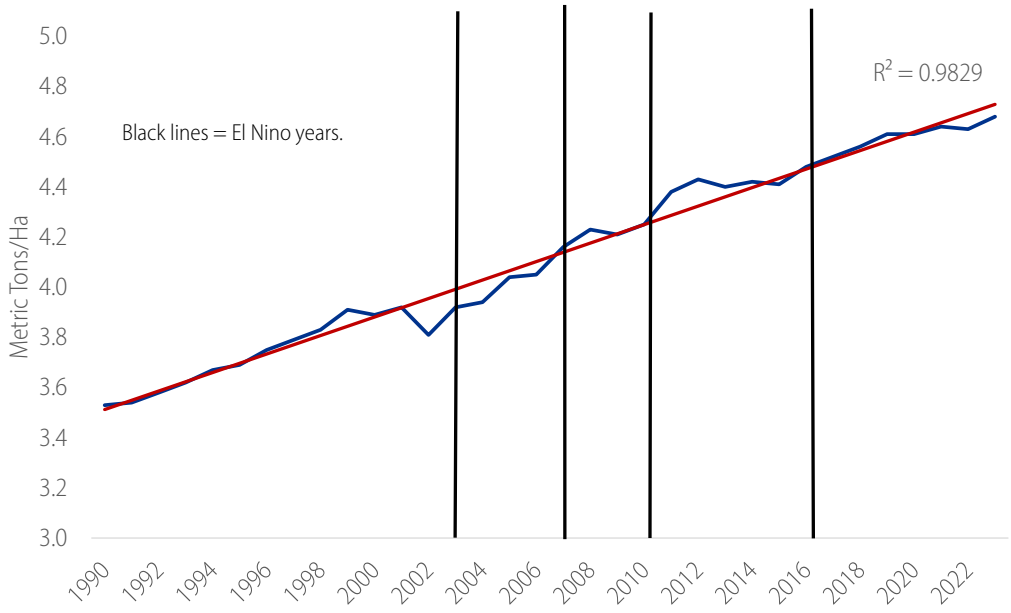
Globally, the El Nino Cycle Has Produced Outsized Rice and Cotton Yields in Key Producing Countries

Cotton: Except for 2016, each El Nino cycle since 2000 has produced above trend global cotton yields and 50% of these production cycles resulted in record yields. 75% of the time Australian, Indian, and Chinese cotton yields have been above trend.

Since 2000, 50% of the global rice yields during El Nino's have been trend, 25% above trend and 25% below trend.

Rice: Since 2000, 50% of the global rice yields during El Nino's have been trend, 25% above trend and 25% below trend. Rice yields in China, Thailand, Vietnam, and India tend to mirror cotton yields. 75% of the yields are either trend or above and 25% of the time yields have been below trend.

Global Rice Yields



Source: USDA and HilltopSecurities.

HTS Commodies' Views

While there is ample time for weather to inflict harm on northern hemisphere global feed/cereal grain and cotton yields, we view the historical data along with the evolving weather patterns as reducing price and supply risks. Using CPC data, we believe that the current El Nino in the northern hemisphere will strengthen into Q4'23. While temperatures and precipitation events in key global agricultural producing countries can impact MY 23/24 yield objectives, we believe that the current El Nino can deliver at least trend yields for global corn, cotton, rice, and wheat.

We believe that the El Nino weather pattern can create left tail and **bullish** price risks for natural gas, coffee, cocoa, sugar, and feeder cattle. We see El Nino as a potentially right tail and a **bearish** price input for wheat, corn, soybeans, and rice as domestic moisture can support yields.

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