



Non-Harvested Corn and Soybean Acres: Historical Context

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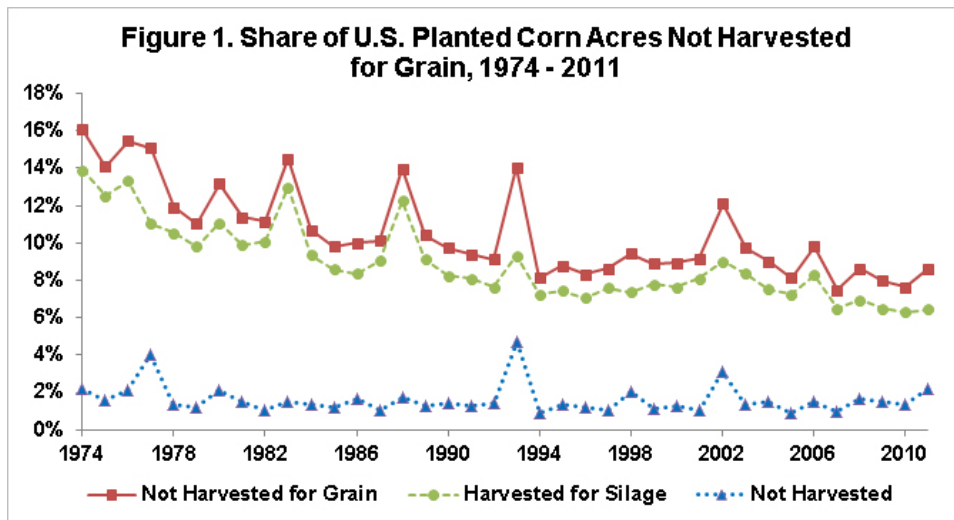
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The share of acres planted to corn and soybeans that will be harvested in 2012 has emerged as a topic of interest as the U.S. drought has intensified. The topic has garnered even more interest in light of the U.S. Department of Agriculture's (USDA) August crop production report that confirmed double digit declines in average U.S. corn and soybean yields. This article examines the data since 1974 to provide perspective on the share of non-harvested acres. A simple historically-based analysis suggests that the share of corn and soybean acres reported as non-harvested in the August report may be somewhat higher than is consistent with the historical evidence since 1974. However, historical examination provides only a guide and history rarely replicates itself. Thus, this article raises an observation for consideration rather than making a conclusion.

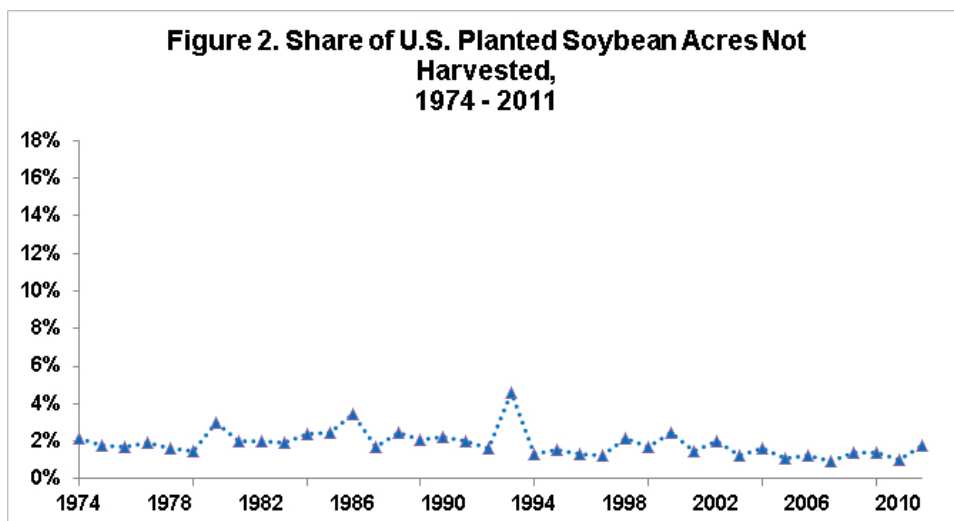
Historical Perspective, 1974-2011

The quantity of corn available as grain for livestock and ethanol production, as well as for export has been a focal point of national discussion over the impacts of the drought. Given this focus, corn acres not harvested for grain is examined in this article. Corn acres not harvested for grain includes both corn acres harvested for silage and corn acres not cut for grain or silage. Figure 1 presents all three measures for the 1974 through 2011 crops. Share of planted corn acres not harvested for grain has declined steadily over this period. The primary reason is a decline in the share of corn acres harvested for silage. Silage's share of planted corn acres was 13.9% in 1974 but only 6.3% in 2011.

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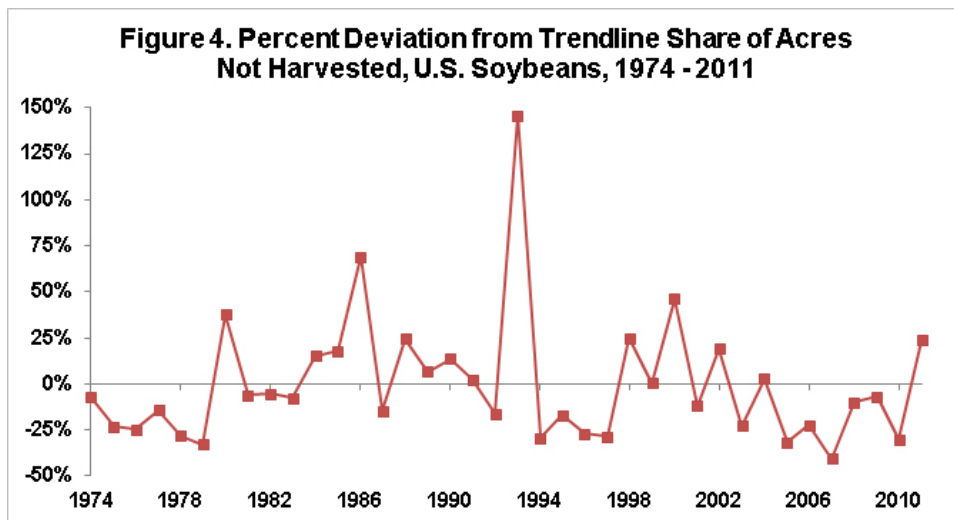
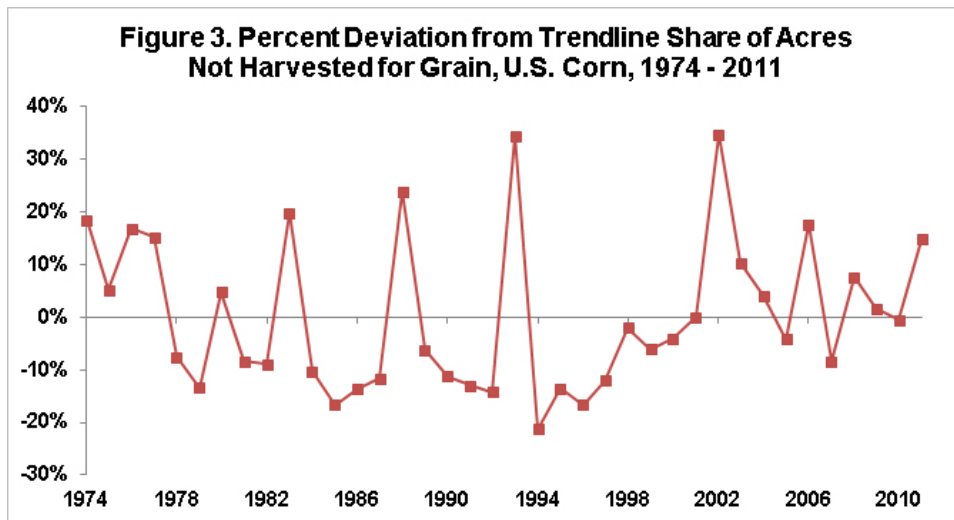
Share of soybean planted acres not harvested also has trended lower since 1974 (see Figure 2). The smallest share of soybean planted acres not harvested was 0.9% in 2007. The highest share was 4.6% in 1993, the year of excessive rains during the growing season in the central and western Corn Belt, notably Iowa.



Deviation of Non-Harvested Acres from Trend

The downward trend in share of non-harvested corn and soybean acres makes it more difficult to understand the deviation that occurs in any given year. Thus, the downward trend is removed from the historical data by estimating a linear time trend for 1974 through 2011. A linear trend was significant at the 98% level of statistical confidence for corn and soybeans.

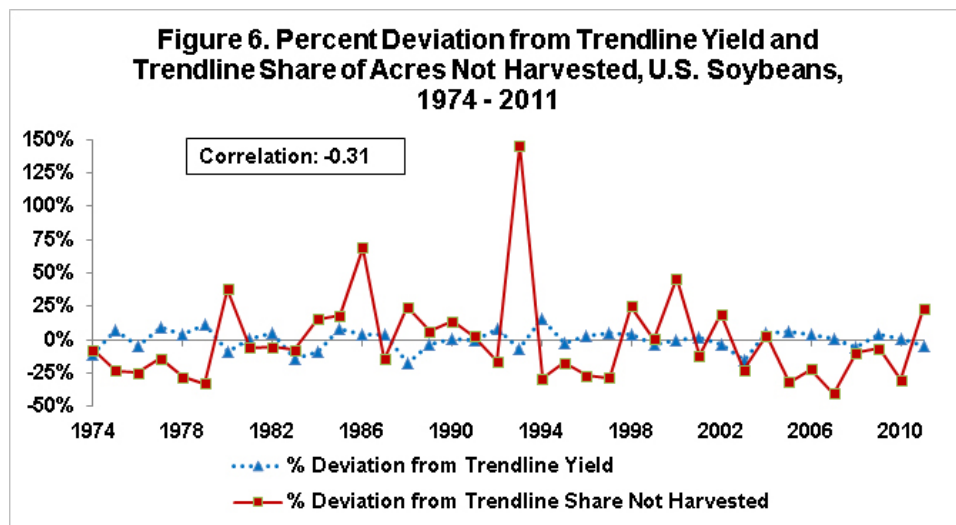
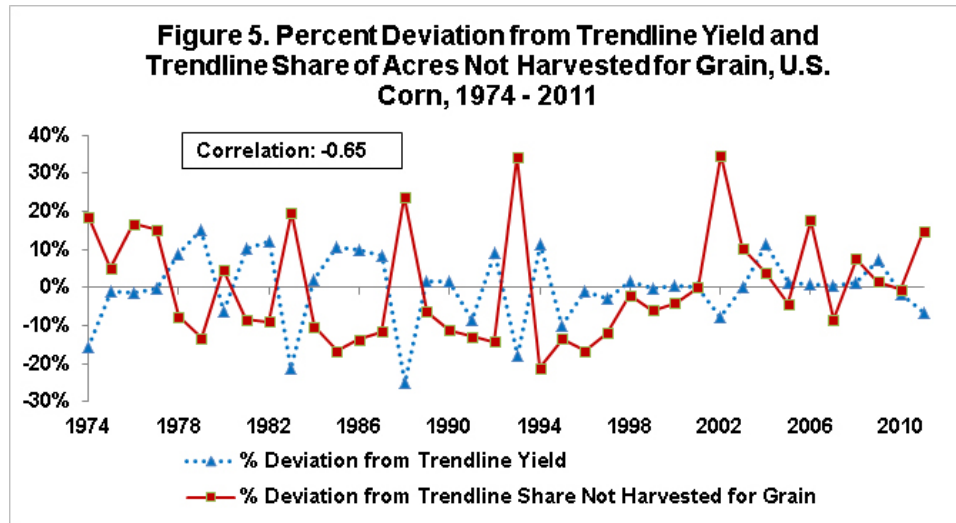
Given the estimated linear time trend, the percent deviation from the time trend was estimated for each year using this calculation: $[(\text{actual share} - \text{trend share}) / (\text{trend share})]$. Results of this calculation are presented in Figure 3 for corn and in Figure 4 for soybeans.



The deviation from trendline value for corn ranged from -21% for 1994 to +34% in 1993 and +35% in 2002. Thus, in 1994, the share of corn planted acres that was not harvested for grain was 21% less than the linear trend value for 1994. In essence, the share of corn acres harvested for grain exceeded trend expectation by 21% in 1994. In contrast, in 2002, the share of corn acres not harvested for grain was 35% higher than the linear trend value. In essence, the share of corn acres harvested for grain in 2002 was 35% less than trend expectation.

Weather factors that cause lower yields should also cause land not to be harvested. Moreover, for corn, lower yields for grain generally mean lower yields for silage. Thus, more acres of corn will be cut for silage in order to reach the desired amount of silage for the farming operation. In short, the percent deviation of harvest yield from its trend value should be of use in predicting the percent deviation in share of non-harvested acres from its trend value.

The relationship between these two measures is presented in Figure 5 for corn and in Figure 6 for soybeans. This relationship is stronger for corn than for soybeans. Specifically, the correlation between the two percent deviations from trendline is -0.65 for corn and -0.31 for soybeans. (The closer a correlation is to -1, the more strongly the variation in the variables are related to one another.) The correlations are significant at the 95% level of statistical confidence for corn and soybeans. The negative sign means that the two deviations move in opposite direction. This makes sense. Specifically, as harvested yield declines below trend value, the share of acres not harvested should increase. Conversely, as harvested yield increases above trend value, the share of acres not harvested should decrease (in other words, more acres are harvested).



Non-Harvested Acres in 2012

In its August crop production report, USDA estimated that 9.4% of planted corn acres would not be harvested for grain (see Table 1). They also estimated that 1.9% of soybean acres would not be harvested.

Table 1. Planted vs. Harvested Acres and Harvest Yield vs. Trend Yield, Crop Production Report from U.S. Department of Agriculture, August 2012

Measure	Corn for Grain	Soybeans
Planted Acres	96,405,000	76,080,000
Harvest Acres	87,361,000	74,635,000
Share of Acres not Harvested	9.4% ^A	1.90%
Trend Share of Acres not Harvested ^B	7.4% ^A	1.40%
Deviation of Non-Harvest Share from Trend	27.40%	33.70%
Yield (bushels) per Harvested Acre	123.4	36.1
Trend Yield ^B	159.6	43.9
Deviation of Yield from Trend	-22.70%	-17.80%

NOTE: (A) Acres not harvested for grain. (B) Trend value estimated using a linear equation and data for the 1974 through 2011 crop years extended to the 2012 crop year.

SOURCE: U.S. Department of Agriculture, National Agricultural Statistics Service, "Quick Stats 2.0," accessed August 17, 2012 at http://www.nass.usda.gov/Quick_Stats/

Using the trendline for 1974-2011, the estimated trend share of corn acres not harvested for grain for 2012 is 7.4%, while the estimated trend share of soybean acres not harvested for 2012 is 1.4%. Thus, the non-harvested acres in the USDA August crop production report were 27% above trend value for corn and 34% above trend value for soybeans. A larger share of non-harvested acres is consistent with a drought.

Reflecting the drought, the August estimated yield of corn per harvested acre was -23% below the 2012 trendline yield based on the 1974-2011 trend (see Table 1). The August estimated yield of soybeans per harvested acre was -18% below the 2012 trendline yield. Using the relationships illustrated in Figures 5 and 6, these deviations in yield from trendline imply a deviation in non-harvested acres from trendline of 23% for corn and 25% for soybeans. Thus, this simple historical trendline analysis suggests that the non-harvested share of corn and especially soybean acres may be slightly less than in the August report.

Moreover, examining the years in which yields declined by at least 10 percent from trend values also suggest non-harvested acres may be slightly less than in USDA's August report. A ten percent decline is commonly used to define a major weather-reducing yield event. For corn, 5 years between 1974 and 2011 had yields that were at least 10% below trend: 1974, 1983, 1988, 1993, and 1995. In these 5 years, the share of corn acres not harvested for grain averaged 17% more than the trend share, which is 10 percentage points less than the 27% share in the August report. This difference translates into 95 million more bushels of corn production, using USDA's August yield estimate. This is a 0.9% increase in the August production estimation.

For soybeans, 4 years over the 1974-2011 period had yields at least 10% below trend: 1974, 1983, 1988, and 2003. In these 4 years, the share of soybean acres not harvested was actually -3% less than trendline value. This value translates into 14 more million bushels of soybeans, using USDA's August yield estimate. This is a 0.5% increase in the August production estimation.

One reason that non-harvested acres could be smaller than otherwise expected is that large declines in yield result in higher prices that increase the incentive to harvest.

Summary

This simple historically-based analysis suggests that the share of corn and soybean acres reported as non-harvested in the USDA August report may be somewhat higher than is consistent with the historical evidence since 1974. Thus, production maybe somewhat higher (less than 1 percent) than in the August report. However, historical examination provides only a guide and history rarely replicates itself. In other words, variation exists that the analysis does not pick up and each year is unique. Thus, the analysis raises an observation for consideration rather than making a conclusion.

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