farmdoc DAILY

Department of Agricultural and Consumer Economics, University of Illinois Urbana-Champaign

2014 Returns for Corn under Drought, Median, and High Yield Scenarios

Gary Schnitkey

Department of Agricultural and Consumer Economics
University of Illinois

October 11, 2013

***farmdoc daily* (3):194**

Recommended citation format: Schnitkey, G. "2014 Returns for Corn under Drought, Median, and High Yield Scenarios." *farmdoc daily* (3):194, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, October 11, 2013.

Permalink: http://farmdocdaily.illinois.edu/2013/10/2014-returns-for-corn-under-dr.html

Corn returns for 2014 are projected under yield scenarios representing drought, median, and high yields for a farm expecting a yield of 195 bushels per acre with a $4.80 projected price. Operator and farmland returns are below $300 per acre for the medium and high yield scenarios. The highest returns occur in the drought scenario.

Outcomes

Expectations on yield and projected price serve as beginning points for evaluating potential return outcomes. An expected corn yield of 195 bushels per acre is used, matching expectations for high productivity farmland. The 2014 projected price, which will be used to set crop insurance guarantees, will be the average of settlement prices of the December 2014 Chicago Mercantile Exchange (CME) corn contract during the month of February. Given current levels of the CME corn contract, $4.80 per bushel is used as the 2014 projected price.

The 195 bushels corn yield and $4.80 corn price center yield and price expectations. Alternative outcomes are estimated based on yield and price changes for the years from 1975 through 2012. For yields, trend yields are calculated for Illinois for each year from 1975 through 2012. Then, actual yields are stated as a percent of trend yields. In 2012, for example, the trend yield is 163 bushels per acre and the actual yield is 105 bushels per acre. This gives actual yield as a percent of trend of .65 (105 actual yield / 162 trend yield). If a year like 2012 occurs in 2014, the resulting yield is 127 bushels per acre (127 = 195 expected yield x .65 actual yield as a percent of trend)

Harvest prices are divided by projected prices to arrive at price changes. In 2012, the projected price is $5.68 per bushel and the harvest price is $7.50, resulting in a change of 1.32 ($7.50 harvest price / $5.68 projected price). For this analysis, a year like 2012 in 2014 results in $6.34 harvest price ($6.34 = $4.80 projected price x 1.32 harvest price as a percent of projected price). Note that the $6.34 harvest price is considerably below the actual 2012 harvest price of $7.50. This occurs because the 2014 projected price will be considerably below the $6.58 projected price for 2012, likely indicating a different level of stocks and demand in 2014.

The outcomes from 1975 through 2012 are grouped into scenarios. Reported below are three of the

scenarios that represent the range of returns that can occur in 2012:

1. The drought scenario is based on yield and price changes from the three years with the lowest yields as a percent of trends between 1975 and 2012: 1983, 1988, and 2012. During these three years, yield as a percent to trend yield averages .63 and harvest price as a percent of projected price is 1.29 (see Table 1). Using these factors, a drought year results in a yield of 123 bushels per acre (195 expected yield x .65 actual yield as a percent of trend yield) and a harvest price of $6.19 per bushel ($4.80 projected price x 1.29 harvest price as a percent of projected price).
2. The median scenario contains yield and price changes for the ten yield changes that are in the middle of the 1975 through 2012 distribution: 1976, 1977, 1978, 1990, 1996, 1998, 1999, 2000, 2001, and 2010. This median scenario represents an average year. Yield as a percent of trend averages 1.01 during these years (see Table 1). The corresponding average of harvest prices as a percent of projected prices is .92. Given the 195 expected yield and $4.80 projected price, the resulting yield is 197 bushels per acre (197 x 1.01) and the harvest price is $4.42 per bushel ($4.80 x .92).
3. The high yield scenario includes years where actual yields exceed trend yields by 10%: 1975, 1979, 1981, 1982, 1985, 1986, 1992, 1994, 2003, 2004, 2007, and 2008. During these years, yields as a percent of trend yield averages 1.13 and the harvest price is .85 of the projected price. Given expectations, the yield is 220 bushels per acre (195 x 1.13) and the harvest price is $4.08 per bushel ($4.80 x .85).

Table 1. Possible Operator and Farmland Returns for Corn with a 195 Bushel Per Acre Expected Yield and a $4.80 Projected Price.

	Yield Scenario		
	Drought	Median	High
Yield as a % of trend yield[1]	0.63	1.01	1.13
Harvest price as a % of projected price[1]	1.29	0.92	0.85
Yield[2]	123	197	220
Harvest price[3]	$6.19	$4.42	$4.08
Cash price[4]	$5.89	$4.12	$3.78
	$ per acre		
Crop revenue	724	812	832
Crop insurance[5]	204	0	0
Gross revenue	928	812	832
Non-land costs	537	537	537
Operator and farmland return	391	275	295

[1] Based on a historical analysis of price and yield changes. See the February 5, 2013 farmdocDaily article entitled "Low Crop Revenues Most Likely Due to Lower Prices" for more detail on yield and price changes.

[2] Based on a trend yield of 195 bushels per acre times "yield as a % of trend" given above.

[3] Based on a projected price of $4.80 per bushel times the "harvest price as a % of projected price" given above.

[4] Harvest price minus a $.30 per bushel basis.

[5] Based on a Revenue Protection policy with an 80% coverage level with a guarantee yield of 195 bushels per acre.

[6] Equals gross revenue minus non-land costs.

Note that there is a negative relationship between yield and price. Lower yields have higher prices. The highest projected price occurs in a drought year and the lowest harvest price in the high yielding year. Illinois is a major source of corn; hence, yield shortfalls in Illinois often lead to higher prices.

Also note that the range of projected prices is from $4.08 per bushel up to $6.19 per bushel. Results of this historical analysis suggest a likely price range for corn in the coming year is below prices in recent years. Also note that prices in the low $4.00 and high $3.00 range result from median and high yields.

Operator and farmland returns

For each scenario, operator and farmland returns are calculated. Operator and farmland return represents a return to both the farmer and land owner. If the operator and farmland return is $300 per acre and cash rent is $250 per acre, the farmer would receive a $50 return under this cash rent lease.

Revenue is based on a cash price that is $.30 below the harvest price, thereby accounting for basis between cash and futures prices. Revenue also includes proceeds from a Revenue Protection (RP) at an 80% coverage level with a 195 bushels per acre guarantee yield. Non-land costs of $537 per acre are subtracted from gross revenue.

The operator and farmland return under the drought scenario is $391 per acre, which includes $204 of crop insurance payments (see Table 1). This is the highest return scenario of the three. Under the medium and high yield scenarios, operator and farmland returns are $275 and $295 per acre, respectively.

Commentary

Historical analysis suggests that 2014 operator and farmland returns under medium and high yielding scenarios will be below $300 per acre. This is a significant reduction in returns from recent years and is driven by lower prices. This analysis suggests cash prices of corn of $4.12 under a medium yielding scenario and $3.78 under a high yielding scenario. These prices will have longer termed impacts beyond 2014, as prices in 2015 likely would be those being projected for 2014, particularly under the high yield scenario.

Somewhat ironically, a drought has the highest return, partially due to crop insurance payments. Because 2014 prices would be higher, 2015 prices likely will be higher after a drought than under medium and high yields.

In recent years, production of corn and other related crops have been below trend levels, resulting in higher prices. Yields in 2013 return to a more normal yield level. As a result, 2014 prices and incomes are projected lower. These lower income levels should be expected to continue into the future as long as production remains at or above expectations.