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Do Price Supports Decrease Variability in Farm Income?; Trend Yield Estimation: Its Impact on Production and Price Forecasts

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DO PRICE SUPPORTS DECREASE VARIABILITY IN FARM INCOME?

by

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There has been much debate about the new farm bill. People and organizations have been expressing their opinions and changing their minds as to what they think is best. Political, business and farm leaders have been making appeals to persuade others to join their positions.

In this article, the following question is examined: Have deficiency payments under the 1990 farm bill increased farm incomes more during low income years than during high income years? Based on the results, readers are encouraged to consider the nature of provisions they would like to see in a new farm law.

Data Examined

In this study, average yield data for Brookings County, along with state average prices and deficiency payments were used. Because results of the analysis may be different for individual producers due to variations in yields, each interested farmer is encouraged to look at his/her own situation to get a valid evaluation for his/her operation. All that is needed are records of past crop yields, price, and deficiency payments.

Corn yields in Brookings County between 1991 and 1995 (while the 1990 farm bill was in effect) ranged from a high of 108 bushels per acre (BPA) in 1994 to a low of 45 BPA in 1993 (Table 1). The state average price ranged from a high of $2.27 per bushel in 1993 to a low of $1.84 in 1992, as reported by the National Agricultural Statistics Service (NASS). Deficiency payments ranged from a high of $.73 per bushel in 1992 to a low of zero in 1995. The yield and price estimates for 1995 are those of the author as NASS data for 1995 is not yet available.

(Continued on page 2)

TREND YIELD ESTIMATION: ITS IMPACT ON PRODUCTION AND PRICE FORECASTS

by

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At this time in the marketing year, demand for grain commodities dominates the discussion of what to do with old crop in storage. As new crop (1996) marketing alternatives begin to be considered, however, price analysts turn their attention to potential production and supply.

To estimate production, analysts use acreage planted estimates and historical ratios of harvested acres to planted acres along with expected yields. Acreage estimates are based on last year's planting, relative prices of crops and changes in government program provisions. Yields are usually estimated using trend yield. It is this trend component of production estimation that will be discussed in this *Commentator*.

Analysts often refer to trend yield as if it is a predetermined number that all analysts use. Nothing could be more exaggerated in this process. Trend yields are calculated by estimating a regression equation (usually linear). The equation estimates the relationship between yield and time. Then, the 1996 estimate of yield is calculated by putting the year 96 or 1996 or X into the equation, where X is the n^{th} year in the time period used for analysis (see equations below).

Soybean trend yield examples for the United States presented in this newsletter show that (a) one trend yield does not exist and (b) how changing the time used in trend yield estimation impacts production and price forecasts.

The equation for soybean trend yield using 1985 through 1995 data is Yield = -14.95 + .55 Year (last two digits). The slope coefficient (+.55) indicates how much yield changes each year. It is often positive, suggesting that yield has been increasing over time. The graph of this equation

(Continued on p.3)

(Price Supports ... Cont'd from p.1)

For 1991, 1994, and 1995, Table 1 conveys a message that there is a positive correlation between the return from the market and government payments. That is to say, the higher the return per acre from the market place, the greater the government deficiency payment. Conversely, the smaller the return per acre from the marketplace, the less the government helps. The years 1992 and 1993 are exceptional years because of disaster consequences, and will be discussed later.

TABLE 1. Brookings County Corn: Yield, Average Price, Costs of Production, Deficiency Payments and Net Returns per Acre.

Year	Yield	Ave. Price	Gross Sales /Acre	Costs /Acre	Net Market Return /Acre	Def. Pmt. /bu.	Def. Pmt. /Acre	Net Total Return /Acre
1991	101	$2.16	$218.16	$200	$18.16	$0.41	$25.37	$43.53
1992	79	1.84	145.36	200	-54.64	0.73	45.17	-9.47
1993	45	2.27	102.15	200	-97.85	0.28	17.33	-80.52
1994	108	2.00	216.00	200	16.00	0.57	35.27	51.27
1995*	66	2.90	191.40	200	-8.60	0.00	0.00	-8.60
Average			174.61		-25.39		24.63	-0.76

*Production and prices estimated without the help of NASS data.

Results in 1991, 1994 and 1995

In 1994, which was the year with the highest yield, gross sales per harvested acre averaged $216.00, although the price was only $2.00 per bushel. That year the deficiency payment was $.57 per bushel, for a total of $35.27 per acre. This generated a total gross revenue of $251.27 per acre. With an assumed averaged production cost per acre of $200.00 (including land, machinery, labor and management charges), net economic profit was just over $51,000 per acre. (With one exception noted below, deficiency payments, costs and revenues were not adjusted for setaside for this report, because doing so only increases the complexity of reporting and makes little difference in the conclusions.)

By contrast, 1995 had the lowest yield of the three years and the lowest deficiency payment (zero). The yield is estimated to be about 66 BPA. With an expected averaged price for corn this marketing year of $2.90 per bushel, gross sales are $191.40 per acre. Subtracting the cost of production, the net income is -$8.60.

The year 1991, with an average yield of 101 bushels per acre, had gross sales of $218.16 per acre. This was the first year under the 1990 farm bill and was characterized by substantial increases in corn use for feed, food, and alcohol production and a 10% setaside requirement, resulting in lower carry-out stocks. With an assumed production cost of $200 per acre, the net market place income was $18.16 per acre, about $2 over 1994. In that year, the deficiency payment was $.41 per bushel, or $25.37 per acre, putting the total economic profit at $43.53 per acre. If the 1991 income is adjusted for the 10% setaside required that year, marketplace income was about $9 per acre, $7 less than for 1994 which had zero setaside.

Based on this analysis one can conclude that deficiency payments have been biggest in years when needed the least and smallest in years when needed the most.

Results in 1992 and 1993

The years 1992 and 1993 are exceptional because of low county yields. In 1992, Brookings County production was down 11 BPA or 21.8%, while the national average was up 22.9 BPA or 21.1%. The increase in the national yield caused the price of corn to decline, which increased deficiency payments, at a time when Brookings County's return from the market was down due to poor yields.

Had Brookings County yields increased 21% instead of decreasing nearly 22%, production would have been about 122 BPA and gross sales about $224.48 per acre. So, the only year deficiency payments were more beneficial in a low income year than in a high income year for Brookings County was when it had a poor crop and the rest of the nation had a good one.

In 1993, the corn yield for the nation was down 23% (from a good year) because of a very poor growing season and Brookings County was worse (down 43% off a poor year). As a result, 1993 had an average price of $2.27 per bushel (only 1995 was higher), for a gross revenue per acre of $102.15. Because of the high market price, deficiency payments were only $.28 per bushel, amounting to $17.33 per acre. This generated total revenue of $119.48 per acre. Subtracting the $200 production cost per acre, the net economic profit is a negative $97.85 per acre. In this year, when income from the market was smallest because of very poor yields in Brookings County, the income from the government was the second smallest.

Historical Perspective

Has the pattern of lower government payments in years of low marketplace income always been present? The answer is "No".

When the United States produced a greater share of the world's grains, income and prices moved together. (This resulted from what economists call an inelastic demand.) In recent years, with the rest of the world producing a greater share of the total and more liberal international trade rules, the demand for US grains has become more elastic. An elastic demand, in turn, causes prices and gross sales to move in opposite directions.

Between 1935 and 1939, when the New Deal farm policy was made, the US produced almost 49% of the world's corn. This grew to over 59% in 1950. By 1960, the US share declined to 52%, by 1970 to 47%, by 1990 to 42%, and by 1995 to only 37%. The same pattern follows for other crops. US wheat production has slipped from 16% of the world's production in 1950 to 11% in 1995. Soybean production has declined from 59% in 1950 to 48% in 1995. It was only 43% in 1993, the year "without a summer," but lots of rain.

The philosophy of supporting price is an offshoot of the parity concept developed in the 1930's. The parity concept was an attempt to keep the ratio of the prices farmers paid to the prices received constant. Nonrecourse loans and supply control were the major tools in achieving the goals. With changing technology and a growing economy, parity was impossible to maintain. The idea of price parity slipped away.

The idea of target prices and deficiency payments to cover the difference between the market price and target price was introduced in the early 1970's after the big Russian grain deal. Then, in the 1980's came the idea of Payment in Kind (PIK) to farmers, who received payment in grain for participation in the government supply control programs. This allowed the government to move its grain stocks into the market and get out of the grain storage business. This reduced the cushioning effect government stocks had on price.

With the target price, if the average market price is less than the target price, the government pays a deficiency payment to make up the difference. Farmers are required to cut acreage if the government estimates that ending stocks will exceed a specified level. Again the idea is to support prices farmers receive, under the assumption that higher prices mean higher incomes.

But, if in fact, the demand for US grains has become elastic as it appears from the above discussion, than attempts to reduce variability of farm income by supporting prices are self defeating. The exception would be when a farmer has a low yield in a low price year.

The New Farm Bill

From the evidence presented above, there is good reason to believe that deficiency payments increase variability in farm income, rather than provide a true safety net for low income years, especially at the national level. However, they have increased total income to the point that cost and income per acre are about the same.

Because an individual farm's production can fall relative to the national yield, I would encourage each interested farmer to look at his/her own situation over the past 5 or more years. Has the 1990 farm bill increased or decreased your farm income variability? Would tying the safety net to production or to the total value of production rather than only price, increase your safety?

You will soon be working on income taxes and have your record books out. Now would be a good time to look at what the current policy has done for you and to let politicians and policy leaders know what you prefer. But this needs to be done quickly, before a decision is made regarding the next farm bill. I would also be interested if you would share your thoughts with me.

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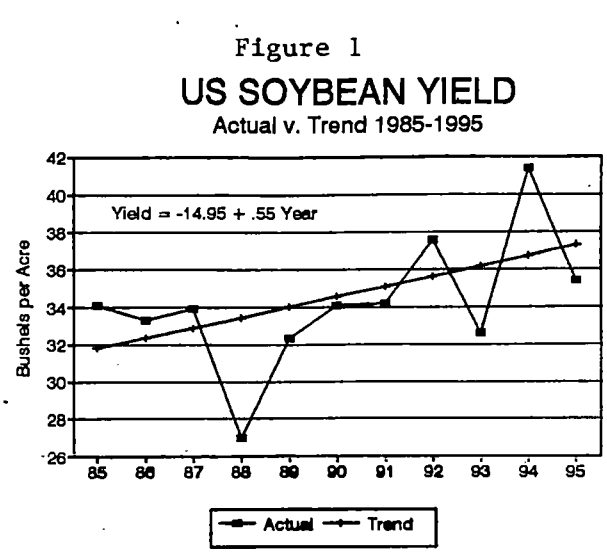
(Trend Yield... cont'd from p.1)

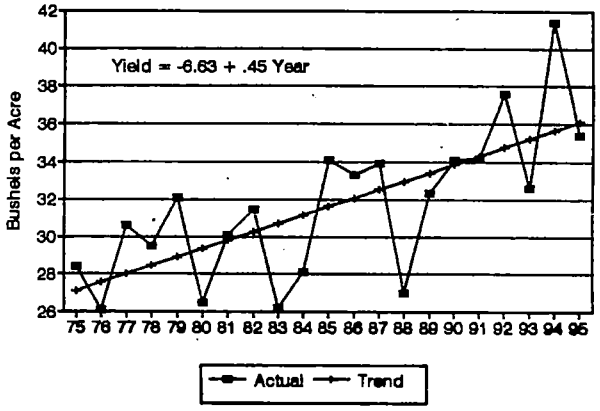
along with the plotted data are shown in Figure 1. Notice the variability of actual yields around the trend line. This indicates that actual yields could be much different from what is estimated many months in advance of harvest.

Figure 1



A second trend yield equation was estimated using a longer time period, 1975-1995 and its graph is presented in Figure 2. The equation is: *Yield= -6.63 + .45 Year.* Notice the slope coefficient is +.45. This is smaller than the first slope coefficient above suggesting that annual yield increases are getting larger on the average.

Figure 2



A third trend yield was calculated using 1985-1994, *Yield= -24.05 + .65 Year.* The slope coefficient is even larger for this equation, which does not take into account the relatively low yield in 1995. This supports the argument that annual yield changes are positive and increasing. However, if 1994's record yield also is left out of the analysis and trend is calculated for the years 1985-1993, the equation is *Yield= 7.03 + .3 Year.* This equation suggests that annual yield increases are becoming less. These results show how one or two extreme years of yields can impact trends. Analysts argue that using longer time periods for trend analysis often helps to level out extreme conditions. This analysis certainly supports

that conclusion.

If you project yield by inserting 1996 (96) into each equation, the trend yield estimates are 37.9, 36.6, 38.3 and 35.8 bushels per acre, respectively for 1996. Assuming planted acreage of 61 million acres and a planted to harvested ratio of .98, production estimates for 1996 range from 2.14 to 2.29 billion bushels. A rule of thumb used in soybean price forecasting is that in a "normal" year the price of soybeans changes 25¢ per bushel for every 50 million bushel change in supply. Using this rule, the price forecasts have a range of 75¢ per bushel with only the trend time period being changed.

The purpose of this article isn't to tell anyone to ignore forecasts using trend because it is one of the best estimates analysts can use this far in advance. Rather, the intent is to caution you to ask questions about the trend period used for forecasting and to inform you that analysts can pick a trend yield to support their position based on other criteria. The good analyst will study trends carefully, choose the "best" estimator, and then make the price forecast rather than vice versa.

Several implications are present in this type of discussion. First, price forecasting is definitely an art and individuals using the forecasts should use them cautiously. Second, one should forecast often as conditions change and provide price ranges rather than one set price. Third, use profit objectives rather than price objectives in your marketing plan. And finally, when your forecasts are correct don't let anyone forget. Choosing the appropriate trend yield can certainly have an impact on forecasted price.

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