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Comparing the 1996 and 2002 Farm Bills

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Abstract

The 2002 farm bill is a big change from the 1996 farm bill. The new bill introduces greater complexity through direct and countercyclical payments. A comparison of the 1996 and 2002 farm bills is needed to estimate how all the changes affect farmers and to guide future farm bill policy. This paper uses simulation analysis to estimate 10 years of net income under the 1996 and 2002 farm bills for three Kentucky counties. Results indicate that both net income and income variance are very similar in all three counties. Changing the projected prices for the simulation affects income under both farm bills almost equally.

Comparing the 1996 and 2002 Farm Bills

Problem Statement

The 2002 farm bill is a big change from the 1996 farm bill. The new bill introduces much more complexity through direct and countercyclical payments. While the direct payment is a fairly straightforward calculation, the countercyclical payment is tied to national market prices. In addition, the countercyclical payment may be based on updated yields from 1998 to 2001 production histories. For both direct and countercyclical payments, the acreage base could also be updated from the 1996 farm bill. Finally, soybeans and other oilseeds are part of the 2002 farm bill.

All these changes make it difficult to compare the 1996 farm bill to the 2002 farm bill. Farmers (and policy makers) do not know for sure if they are better off with the new bill or a continuation of the 1996 bill. The problem is further complicated because farmers had five FSA main options (and three sub-options in one case) to choose from.

Objective

A comparison of the 1996 and 2002 farm bills is needed to estimate how all the changes affect farmers and to guide future farm bill policy. The specific objectives are:

1) to simulate national market prices for the next six year to estimate direct and countercyclical payments for a representative group of farms in Kentucky;
2) to project government payments for the next six years if the last year of the 1996 farm bill was still in effect.

Objective one shows how much in government payments each option of the 2002 farm bill provides to farmers and what kind of variability exists in the payments. Combined with objective

two, farmers and others can determine how much better or worse off they are with the 2002 farm bill.

Background

The 2002 Farm Bill provides three types of payments. The direct payment is guaranteed each year and does not vary. This payment is independent of the crop grown. The countercyclical payment and loan deficiency payments (LDP) are based on the national and county price, respectively. Farmers do not know ahead of time whether they will receive a countercyclical or LDP payment. The countercyclical payment is based on farmer historical acres and yields, and thus the payment does not depend upon current production, only national marketing price for the current year. LDP payments are based on current production as well as the current county price (USDA).

The direct payment is the product of multiplying together the number of base acres, the yield per acre, and a set rate per bushel. The rate per bushel is specified in the farm bill and cannot be changed. The yield per acre for direct payments is also fixed and is a carryover from the 1996 Farm Bill. The only way farmers can change their direct payment is by the choice of an FSA option which affects the acreage base.

The acreage base is determined by choosing between two alternatives. The first alternative is to start with the 1996 Farm Bill acreage base and then use one of the sub-options to add soybean acres. Soybeans are part of the 2002 Farm Bill, but not the 1996 Farm Bill. Farmers cannot have a bigger base than their acreage history, so soybean base acres could be limited for some farmers unless another crop base is reduced. The other major alternative for acreage base is to use the average 1998 to 2001 acreage history for each crop. This alternative does not even consider the 1996 acreage base.

Countercyclical payments are like direct payments because the base acres, yields per acre, and rate per bushel are multiplied together to determine the payment. The same base acres used for direct payments are also used for countercyclical payments. Again, the choice of an FSA option determines the base acres. On the other hand, the rate per bushel is determined from the national market price and can vary from zero to a specified cap. The biggest difference with countercyclical payments, though, is that farmers can update their yield base to reflect more recent yields. However, in order to update countercyclical yields, farmers must also pick the FSA option that updates acres.

FSA Options 1, 2, 3, and 5 all start with the 1996 acreage and yield bases. The main difference among these options is how soybeans are added to the mix. FSA Option 4 is the most different. This option has three sub-options for countercyclical yields. Option 4a just uses the 1996 yield base. Option 4b starts with the 1996 yield base and adds 70% of the yield difference between the 1996 yield base and the 1998 to 2001 yield average. Option 4c uses 93.5% of the 1998 to 2001 yield average. For those farmers choosing Option 4, 4a or 4b will be chosen as long as yields have improved. Option 4c is preferred whenever yields have increased by more than 28%.

The 1996 farm bill is much less complicated than the 2002 farm bill. Originally designed to run seven years, the 1996 farm bill provides payments to farmers through Production Flexibility Contracts (PFC). Figure 1 shows how the payments were scheduled to phase downward over time. The acreage and yield bases are from previous farm bills. The payment rate per bushel is a function of the total money allocated to each crop. Because government payments for PFC payments change each year, the rate per bushel also changes. For 2002, the PFC

payment was scheduled to be $0.26/bu for corn and $0.46 for wheat. There are no oilseed payments and farmers could plant whatever they wanted and payments were not affected.

The 1996 farm bill was modified soon after passage. Starting in 1998, extra ad hoc payments were given to farmers. Figure 2 shows how both the PFC contracts had extra money added and how oilseeds also started receiving money.

Other aspects of the 1996 farm bill are similar to the 2002 farm bill. Both bills provide for a Loan Deficiency Payment (LDP). However, the rates are not identical which means the LDP payment is not directly comparable. Still, the mechanism works the same in both bills and farmers still have to produce a crop in order to receive a LDP payment.

Model

This model compares the Certainty Equivalent (CE) from farming with the 2002 farm bill to farming under an extension of the 1996 farm bill. The 1996 farm bill scenario assumes the same level of ad hoc payments and uses the projected PFC payments for 2002. Because income from actual farming is the same under both comparisons, modeling only the government payments is the only required part. However, the model here includes the farming income as well.

Simulation analysis is used to estimate the net returns per acre under both farm bills. Under the 1996 farm bill, the PFC payment and the ad hoc payment are already known. However, simulation is still needed to calculate the LDP payment. Under the 2002 farm bill, simulation is needed to calculate the LDP and the counter-cyclical payment. Separate multivariate empirical (MVE) distributions are estimated for yields, prices, and selected expenses. For the analysis, yields back to 1972, prices back to 1996, and expenses back to 1992 are used. Because farm bills prior to 1996 influenced prices differently, older prices are not used.

Parameters for the MVE distribution are estimated using Simetar, following procedures detailed in Richardson. The deterministic component and the error term of each random variable are first calculated. The deterministic component of yields and expenses is a trend line while the deterministic component of prices is the mean. The sorted and unsorted fractional residuals are then calculated for each variable. Next, probabilities are assigned to the sorted fractional residuals and the correlation matrix is calculated using the unsorted residuals.

The final step is to simulate the stochastic component of each variable. For the yields, the simulated value is added back to the yield trend. Crop prices and expenses are more complicated. For crop prices, the national market year price is needed to calculate counter-cyclical payments. The state November price is used to calculate Loan Deficiency Payments (LDP) and the state January price is used to determine how much farmers receive when selling their grain. The price simulation calculates a price wedge between the national price and the local or state November and January prices. These price wedges are simulated and are added back to the 2003 FAPRI (Food and Agricultural Policy Research Institute at the University of Missouri) projected national prices to give a November and January local farmer grain price.

In addition to the 2003 FAPRI projections, the 2004 FAPRI projections are used. Prices in 2003 were higher than the 2003 projections so FAPRI's 2004 projection are different.

The simulation of selected expenses is really a simulation of the USDA cost index for fertilizer, nitrogen, seed, fuel, and labor. As with the yields, the simulation value of the expense error term is added back to the trend line for that expense item. Because these are just indexes, the index must be converted to a dollar amount per acre. In this model, 2001 expenses are the baseline and the baseline is adjusted by a ratio of the simulated expense index divided by the

2001 index. The nitrogen index only applies to corn acres, while the fertilizer index is only for soybean acres.

The simulation analysis was applied to three counties in Kentucky: Ballard, Webster, and Christian. With information about yields, prices, and farm bill parameters, it is possible to simulate the net farm returns for 10 years in each of the three counties.

Data and Methods

Kentucky collected 1998 to 2001 yield and acreage histories along with the old PFC yield and acreage bases for over 2,500 farms. With this information, and some estimation of grain prices, it is possible to estimate the government payments to farmers from each of the available FSA options under the 2002 farm bill. Calculating payments under the 1996 farm bill is somewhat easier. By finding the county loan rates under the 1996 bill, LDP payments can be simulated. The direct payment bases from working with the 2002 farm bill are used as the yield and acreage bases for PFC payments. The PFC rates were already established for 2002. These same rates were used for all 10 years of the simulation.

In order to simulate national market prices, the computer add-in Simetar is used to calculate the deviations from the means of historical market prices. FAPRI projections are used as the baseline for the next 10 years of market prices. By simulating the deviations and adding these back to the FAPRI projections, a simulated national market price is calculated. These simulated market prices are used with a representative set of farms to calculate government payments for each FSA option.

Simetar provides an option that gives a certainty equivalent for various risk aversion coefficients. The certainty equivalent calculated for all the 2002 farm bills options is compared to the certainty equivalent with the 1996 farm bill to determine which bill is best for farmers.

Results

Tables 1 and 2 show the net returns in each of the 3 counties for simulated years 1 and 5 under both the 1996 and 2002 farm bill. Table 1 is based on 2003 FAPRI price projections and Table 2 is based on 2004 FAPRI price projections. Under 2003 price projections, both Ballard and Christian counties have higher net returns and lower standard deviations with the 2002 farm bill than with the 1996 farm bill. In Webster county, the 1996 farm bill provides more income but with more variation.

With 2004 FAPRI price projections, the 1996 farm bill fares better. Now, only in Ballard County does the 2002 farm bill provide more net returns. In each county, the 2002 farm bill has less variance.

Figure 3 is a CDF of net returns for the first year of simulation. Both the 1996 and 2002 farm bills are shown under both FAPRI price projections. This combination gives 4 CDFs. As the figure shows, the 1996 and 2002 farm bills are very similar. The biggest difference is from the revised FAPRI price projections. However, the price revision seems to affect both farm bills similarly.

Figure 4 is an illustration of how CE affects the results. For the most part, changing the risk parameters of a farmer do not affect the results much. This figure is one of the few cases where the risk parameter of a negative exponential utility function does affect the farm bill preference. As shown in the figure, in Christian county, in the 5th year of simulation using updated FAPRI price projections, a risk averse farmer would switch farm bill preferences at a risk aversion coefficient of about 0.01.

Figure 5 is a fan graph that attempts to show net returns and a measure of variability for the first 5 years of simulation in Christian county using updated FAPRI prices. As this graph indicates, variability is very similar while the 1996 farm bill provides slightly higher net returns.

Conclusions

These results are very preliminary so things may change as the paper is more fully developed. There are 2 somewhat surprising results. One, the net returns between farm bills in very similar and two, the income variability is also very similar. The variability of income is probably the biggest surprise. Because the PFC payments are fixed, the 1996 farm bill only has variability from LDP payments. By contrast, the 2002 farm bill has variability from both LDP payments and counter-cyclical payments. This added source of variability was expected to increase overall variability

Several things could explain the lack of more variability in the 2002 farm bill. One is that the different county rates in the two farm bills means that the 1996 farm bill has more variability from LDP payments than does the 2002 farm bill. The other possibility is that at the prices simulated, the counter-cyclical payments counter-balance the LDP payments. Although both the CCP payment and LDP payment are driven by low prices there are different price points for the payments to start. Thus, at the simulated prices, the combination of the CCP and LDP payment could possibly reduce overall variance. This still needs to be confirmed with further model testing.

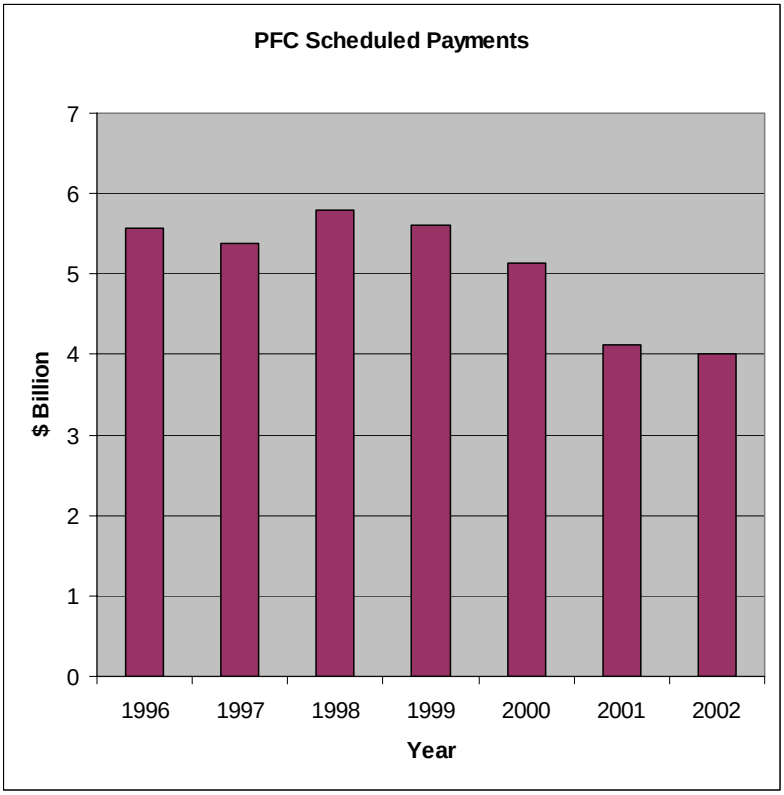

Figure 1. Original FPC allotments per year

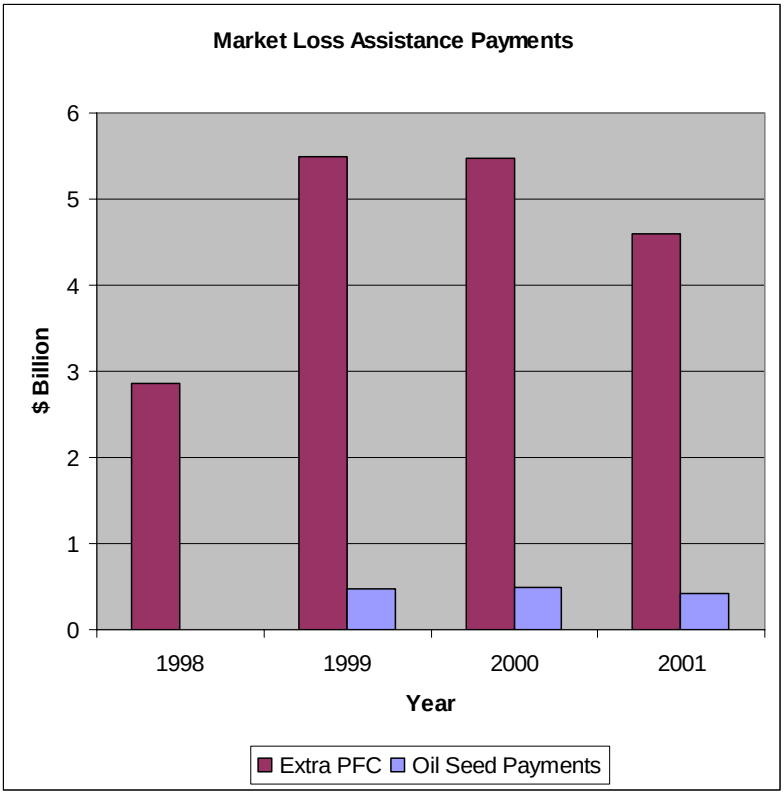

Figure 2. Extra Ad Hoc Payments with the 1996 Farm Bill

Table 1. Net Returns for Years 1 and 5 Using 2003 FAPRI Projections

County	Ballard		Christian		Webster	
Farm Bill	1996	2002	1996	2002	1996	2002
Net Returns - 1st yr	57.63	63.10	68.17	69.91	76.17	75.72
Std Dev - 1st yr	61.4	55.6	67.3	62.8	54.1	49.2
Net Returns - 5th yr	68.74	72.27	76.99	77.02	85.23	82.91
Std Dev - 5th yr	66.8	59.0	76.0	70.1	56.2	50.9

Table 2. Net Returns for Years 1 and 5 Using 2004 FAPRI Projections

County	Ballard		Christian		Webster	
Farm Bill	1996	2002	1996	2002	1996	2002
Net Returns - 1st yr	94.24	94.60	105.47	102.01	116.20	111.28
Std Dev - 1st yr	76.7	69.8	82.4	77.1	70.5	63.9
Net Returns - 5th yr	77.76	78.09	86.84	82.61	93.91	87.83
Std Dev - 5th yr	69.5	61.9	78.9	73.2	58.4	53.6

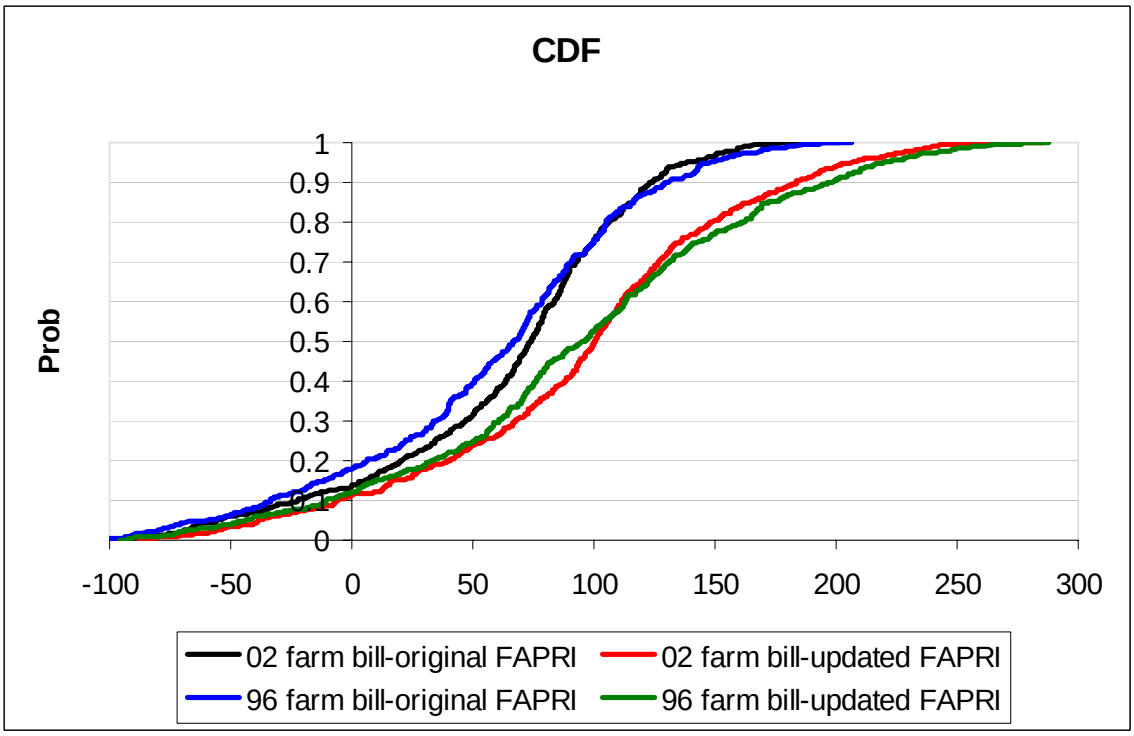

Figure 3. Ballard County – Comparison of Farm Bills and FAPRI Price Projections

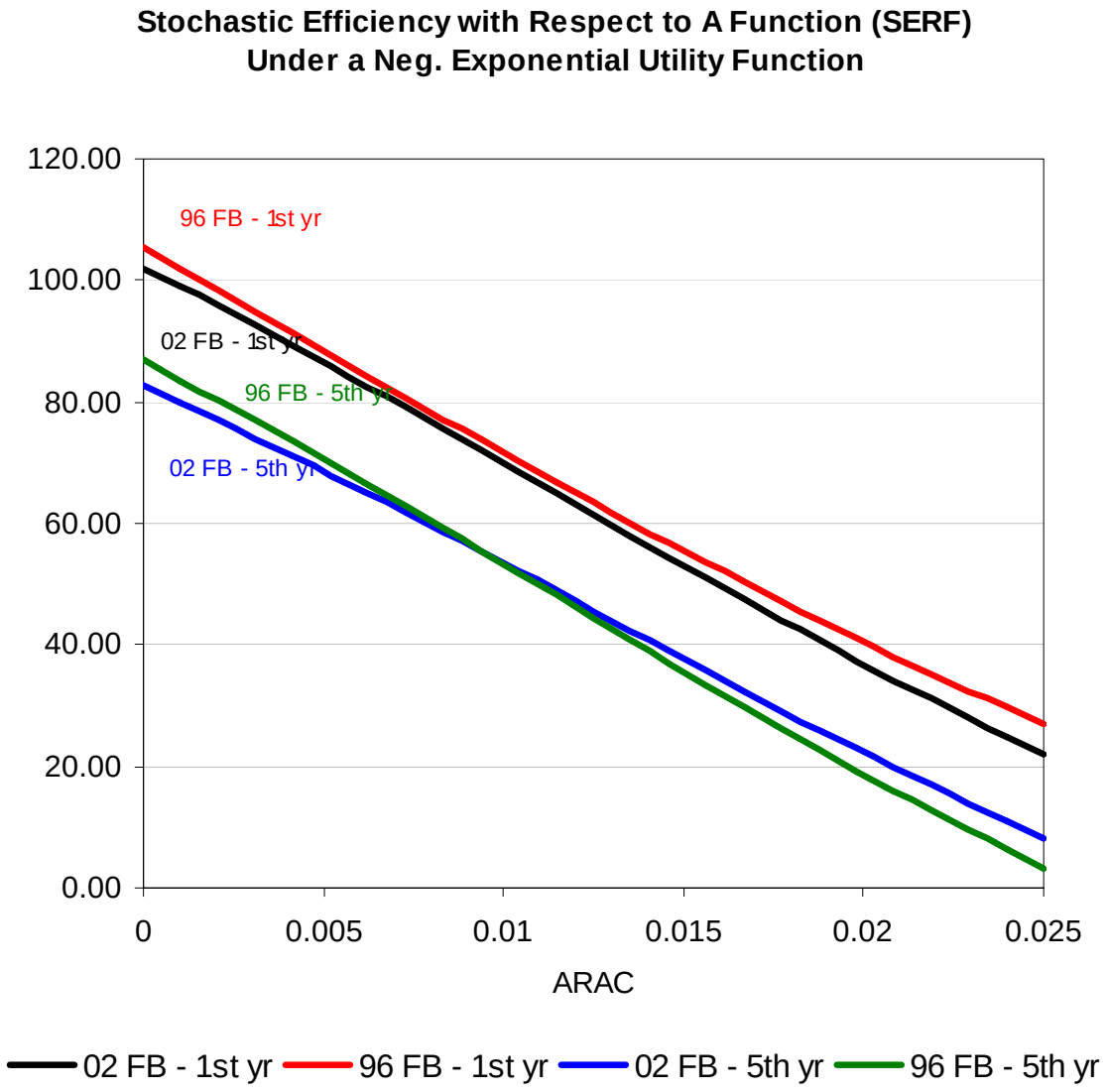

Figure 4. CE from Christian County Using Updated FAPRI Projections

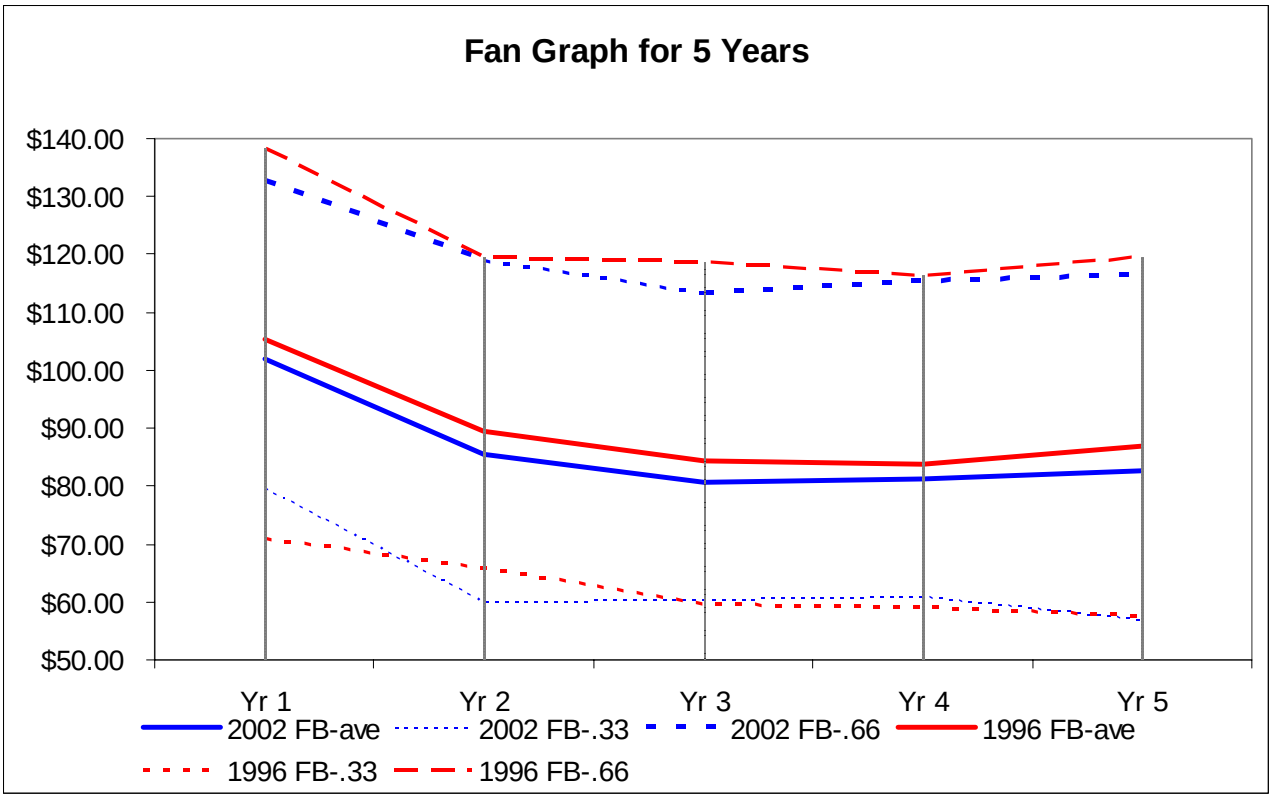

Figure 5. Fan Graph from Christian County Using Updated FAPRI Projections