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**Calculating the Cost to Farmers of Choosing  
the Wrong Farmbill Option**

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**Abstract**

The 2002 Farm bill presents farmers with many different combinations of options for signup. Choosing the wrong option can be expensive for a farmer. This paper uses a dataset of actual farms to calculate the potential revenue lost from choosing a non-optimal option.

## **Calculating the Cost to Farmers of Choosing the Wrong Farmbill Option**

### Introduction

The 2002 Farm bill is certainly one of the more complicated pieces of legislation for farmers to try to analyze. Farmers are required to pick one of the signup options available from their FSA office that will help determine how much in government payments they will receive over the next six years. This choice is independent of what they actually plan to grow over those six years. Unfortunately for farmers, choosing the wrong option can be very expensive. Given the tight profit margins on many farms, this decision may well help determine the survival of a farm.

This paper analyzes the potential revenue from choosing the various options available from the FSA farm bill. Because some of the government payment is tied to grain prices, the analysis will consider how much revenue the various FSA options provide over the entire range of grain prices that affect government payments.

### Background

The farm bill has three types of payments. Direct, countercyclical, and loan deficiency payments (LDP). Only the direct and countercyclical payments are relevant to the signup process. Farmers will receive these payments whether a crop is grown or not. LDP payments require production in order for the possibility of payment to exist.

The direct payment is a combination of the number of base acres, the yield per acre, and a set rate per bushel. Direct payments are always paid each year at a set rate per bushel that is specified in the farm bill legislation. In addition, the yield for direct payments is already determined from the yield base under the 1996 farm bill. Thus, farmers cannot improve their yield for direct payments. However, farmers can update

their yield base by their choice of FSA option. This is really the only way farmers can affect their direct payment.

Farmers have two basic choices for their acreage base. One option is to use their old base under the 1996 farm bill and then use one of the soybean alternatives to add some or all of their soybean acreage history. Because a farmer's recent crop acreage allocation may be different than what his or her 1996 farm bill acreage base is, there are several sub-choices for how to include soybeans (soybeans were not part of the last farm bill). The other major option for acreage base is use to the average of the 1998 to 2001 acreage history for each crop. The choice of acreage base affects both direct and countercyclical payments.

Countercyclical payments vary depending upon the average national market price per year. When prices are high there may be little or no countercyclical payment. By contrast, when prices are low, the payment is higher. Countercyclical payments are capped at a certain amount per bushel. Like the direct payments, countercyclical payments are a combination of rate per bushel, yield per acre, and the number of base acres. Now though, farmers can update both acres and yields by choosing the appropriate option. By updating yields, farmers can get yields per acre for the countercyclical payment calculation that are closer to recent production history. Given that the old program yields are based on early 1980's production, most farmers like the idea of updating yields.

The farm bill has seven basic options (FSA lists five options but one of their options has three sub options). The catch is that the same option has to be used for all crops and for both direct and countercyclical payments. In addition, if farmers want to

update yields, they also have to update acres. This is what really makes the analysis difficult because most farmers would want to update yields but often their new acreage base is not as attractive as they had before under the 1996 farm bill.

### Data and Methods

County agents and area farm management specialists worked directly with individual farmers to help them determine their best FSA option. These agents and specialists used a spreadsheet developed at the University of Kentucky to calculate the expected government payments for each FSA option under different the entire range of grain price levels that would affect the government payment.

The data from these individual farm units were saved and then aggregated together to develop the tables in this paper. Over 2,500 farm units representing 477,148 crop acres (Table 1) were used to develop all the tables. These farms represent 17 percent of the total cropland in Kentucky. The county agents and specialists actually worked with more farms than these but not all farm units were saved for the data analysis.

The analysis examines three levels of yield information and three levels of prices. The three level of yield information are termed “no yields”, “actual yields”, and “complete yields.” The actual yield government payments are determined based on the yields the farmers actually brought in with them when they analyzed their farms. The county FSA offices provided farmers all the other information needed to determine expected government payments (i.e., 1998 to 2001 acreage history and their yield and acreage base under the 1996 farm bill) except what their yields have been from 1998 to 2001. Some farmers may have had all their yields, others only certain years or certain crops, and the rest may have come in with no yields. Whatever the farmer gave to the

agent or specialist for yield information was used to calculate payments under the actual yield scenarios.

The complete yield payments assume no missing yields. If a farmer is missing the yields for a particular crop or year, the program assigns the full county average for any missing values. The complete yield information is used to help farmers determine the value of trying to prove yields. Most farmers will not want to prove yields unless it is to their advantage to do so. By using the full county average, farmers can get a reasonable estimate of the payments they can expect to receive when actual yields for all crops and all years.

The no yield payments strips out any yields the farmers entered and calculate government payments with the county yield plug and the 25 percent penalty. By comparing the payments with complete yields to the payments with no yields, farmers know almost exactly the value of proving yields. Thus, the actual yield payments will always be somewhere between the complete yield numbers and the no yields numbers. When a farmer enters no yield information, the no yield payments are the same as the actual yield payments. When a farmer has complete yield information, the complete yield payments are the same as the actual yield payments.

Government payments are also calculated over a range of national market prices. All crops have a range of prices where they will pay from the maximum countercyclical payment down to no countercyclical payment. If market prices exceed this range, farmers cannot get more than the maximum countercyclical payment or less than a zero countercyclical payment. The “No CC Payment” numbers assume all prices are high enough that farmers receive zero countercyclical payments. The “50% CC Payment”

number assumes all grain prices are exactly halfway within their range of paying a countercyclical payment. The “Max CC Payment” numbers assume all prices are low enough that farmers receive the maximum countercyclical payment for each crop.

### Results

Table 2 attempts to measure Extension’s part in helping farmers pick the best option. Farmers would automatically receive FSA option 2 (the default option) by default. The optimal option shows the range of government payments when farmers pick the best option. The minimum payment is when prices are high enough that no countercyclical payments exist and farmers receive only the direct payment. The maximum payment is when farmers receive the full countercyclical payment in addition to the direct payment. As the table shows, picking the correct option over the default option is worth from \$841,204 to \$3,853,401.

Table 2 is a fairly conservative estimate. Many farmers probably worked with their county agent or area specialist to determine if it was worthwhile to prove yield information. In these cases, it might be more realistic to measure Extension’s part by comparing the optimal option complete yield information to the default option no yield case. With this measure, Extension helped farmers earn an additional \$1,312,092 with the minimum payment up to \$4,706,309. Also, Extension helped many farmers not reflected in these tables.

Table 3 shows what percent of farmers who should update both acres and yields. In many cases, nearly two-thirds of farmers would be better off with FSA option 4. As the tables show (comparing actual yields to complete yields), the better yield information the farmer has, the more likely he or she is to update. Also, the lower the expected



market prices (and thus the greater the countercyclical payment), the greater the percentage of farmers who should update. This last result is expected since updated yields only apply to the countercyclical payments.

Table 4 shows the dollar gain from proving yields. In all cases, the payments from complete yields are compared to either the payments from actual yields or from no yields. As countercyclical payments increase, there are greater gains from proving yields. The right-hand side of the table shows the benefits from proving soybean yields for option 2. Many farmers do not realize that soybean yields can be update even with option 2. Because soybeans were not part of the old farm bill, there is no old yield base to use for direct payments and for the countercyclical payments of option 2. If farmers do not prove soybean yields, they face two penalties. The first is a 25 percent penalty for using the county yield plug and another 22 percent penalty to convert the yield back to the early eighties. By proving soybean yields, farmers avoid the 25 percent penalty.

Table 5 shows all the detail information about each FSA option. The table shows the total government payments, the payment per acre, the standard deviation, the 5 and 95 percentile level, and percent of time the option is optimal. Option 3 or 5 is only calculated when it is better than option 2. In addition, neither 3 nor 5 can be optimal at the same time and when either option 3 or 5 is optimal, it is always better than option 2. The “Max \$ per acre (95%)” represents the dollar per acre payment such that 95 percent of the farms have a payment lower than this. The “Min \$ per acre (5%)” is the payment level where only 5 percent of the farms have lower payments. Between these payment levels, fall 90 percent of the farm’s payments. The best option represents the highest paying option for each farm from options 2, 3, 4a, 4b, 4c, or 5.

Table 6 shows the new acreage base when all farmers either choose option 2 or option 4 (i.e., if farmers all maintain their old base or update their base acres). Table 7 shows the base acres when farmers choose the best option. Notice that there are more corn and wheat acres in Table 7 when compared to Table 6. Because corn and wheat are usually the most valuable crops, it seems reasonable that the optimal options have more relative corn and wheat acres. Table 8 shows the new base yields.

### Conclusions

This study should have a lot of value for future policy analysis. The results generated here can be compared to the actual signup information to see if farmers really understood how to analyze the farm bill. Results should provide guidance about how to design education material and how to design tools to explain all the options in the new farm bill.

**Summary Tables**  
Information for Kentucky

Table 1. Use of Spreadsheet

	Spreadsheet Usage	Total Crop Acres in Kentucky	% of crop acres examined with spreadsheet tool
# of farm units	2684		
# of crop acres	477,148	2,801,250	17.0%

Table 2. Government Payments – Extension’s Part in Helping Farmers

		Default option		Optimal option		\$ earned by Extension	
		Min payment	Max payment	Min payment	Max payment	Min payment	Max payment
<b>Actual yields</b>	Total \$	\$7,540,363	\$15,728,815	\$8,381,567	\$19,277,550	\$841,204	\$3,548,736
	\$ per acre	\$15.80	\$32.96	\$17.57	\$40.40	\$1.76	\$7.44
<b>Complete yields</b>	Total \$	\$7,632,057	\$15,895,530	\$8,475,049	\$19,748,931	\$842,992	\$3,853,401
	\$ per acre	\$16.00	\$33.31	\$17.76	\$41.39	\$1.77	\$8.08

Table 3. % of Farmers Who Should Update

Actual yields		Complete yields	
Min payment	Max payment	Min payment	Max payment
45.3%	66.5%	60.8%	70.5%

Table 4. Dollar Gain from Proving Yields

	Advantage of complete yields over either actual or no yields			
	All options		Option 2 only (proving bean ylds)	
	Actual yields	No yields	Actual yields	No yields
No CC Payment	\$93,482	\$474,499	\$91,694	\$469,100
50% CC Payment	\$274,536	\$1,537,638	\$129,205	\$661,004
Max CC Payment	\$471,381	\$2,682,395	\$166,716	\$852,909

Table 4 note: All options calculation. The total government payment with the best option and complete yield information is compared to either the total government payment with the best option and actual yields or the total government payment with the best option and no yield information.

Option 2 only calculation. The calculation is similar to the all options calculation except only option 2 is considered instead of the best option. This calculation is included to help show farmers that proving soybean yields is worthwhile even if they decide not to update.

Table 5. Detailed Government Payments

		Actual Yield Information					
		Option 2	Option 3 or 5	Opt 4a (old)	Opt 4b (70%)	Opt 4c (93.5%)	Best option
<b>No CC Payment</b>	Total \$	\$7,540,363		\$7,793,517	\$7,793,517	\$7,793,517	\$8,381,567
	\$ per acre (wt mean)	\$15.80		\$16.33	\$16.33	\$16.33	\$17.57
	\$ per acre (mean)	\$17.27		\$15.52	\$15.52	\$15.52	\$19.22
	Std dev	19.41		3.40	3.40	3.40	18.82
	Max \$ per acre (95%)	\$27.11		\$20.58	\$20.58	\$20.58	
	Min \$ per acre (5%)	\$3.91		\$9.48	\$9.48	\$9.48	
	% time optimal	50.78%		3.87%	45.34%	45.34%	45.34%
<b>50% CC Payment</b>	Total \$	\$11,634,589		\$12,009,720	\$12,976,292	\$13,026,731	\$13,793,016
	\$ per acre (wt mean)	\$24.38		\$25.17	\$27.20	\$27.30	\$28.91
	\$ per acre (mean)	\$26.79		\$23.92	\$25.71	\$25.77	\$31.21
	Std dev	30.44		5.55	5.76	5.79	29.28
	Max \$ per acre (95%)	\$42.49		\$32.41	\$34.29	\$34.24	
	Min \$ per acre (5%)	\$5.61		\$13.64	\$14.64	\$14.87	
	% time optimal	34.61%		2.50%	3.80%	20.04%	39.05%
<b>Max CC Payment</b>	Total \$	\$15,728,815		\$16,225,924	\$18,159,068	\$18,259,946	\$19,277,550
	\$ per acre (wt mean)	\$32.96		\$34.01	\$38.06	\$38.27	\$40.40
	\$ per acre (mean)	\$36.30		\$32.32	\$35.91	\$36.02	\$43.37
	Std dev	41.49		7.71	8.30	8.48	39.79
	Max \$ per acre (95%)	\$57.85		\$44.06	\$47.98	\$48.47	
	Min \$ per acre (5%)	\$7.25		\$17.78	\$20.37	\$20.66	
	% time optimal	31.04%		2.50%	3.80%	20.83%	41.84%

		Complete Yield Information					
		Option 2	Option 3 or 5	Opt 4a (old)	Opt 4b (70%)	Opt 4c (93.5%)	Best option
<b>No CC Payment</b>	Total \$	\$7,632,057		\$7,917,616	\$7,917,616	\$7,917,616	\$8,475,049
	\$ per acre (wt mean)	\$16.00		\$16.59	\$16.59	\$16.59	\$17.76
	\$ per acre (mean)	\$17.53		\$15.89	\$15.89	\$15.89	\$19.49
	Std dev	19.35		3.12	3.12	3.12	18.75
	Max \$ per acre (95%)	\$27.32		\$20.62	\$20.62	\$20.62	
	Min \$ per acre (5%)	\$4.42		\$10.48	\$10.48	\$10.48	
	% time optimal	36.36%		2.87%	60.77%	60.77%	60.77%
<b>50% CC Payment</b>	Total \$	\$11,763,794		\$12,184,588	\$13,349,291	\$13,462,945	\$14,067,552
	\$ per acre (wt mean)	\$24.65		\$25.54	\$27.98	\$28.22	\$29.48
	\$ per acre (mean)	\$27.15		\$24.44	\$26.83	\$27.07	\$31.97
	Std dev	30.36		5.15	5.22	5.18	29.11
	Max \$ per acre (95%)	\$42.65		\$32.50	\$35.20	\$35.56	
	Min \$ per acre (5%)	\$6.30		\$14.88	\$16.62	\$17.16	
	% time optimal	31.37%		2.83%	0.07%	11.92%	53.80%
<b>Max CC Payment</b>	Total \$	\$15,895,530		\$16,451,560	\$18,780,966	\$19,008,274	\$19,748,931
	\$ per acre (wt mean)	\$33.31		\$34.48	\$39.36	\$39.84	\$41.39
	\$ per acre (mean)	\$36.76		\$33.00	\$37.76	\$38.24	\$44.67
	Std dev	41.38		7.20	7.48	7.51	39.50
	Max \$ per acre (95%)	\$58.61		\$44.17	\$49.94	\$50.49	
	Min \$ per acre (5%)	\$8.24		\$19.40	\$23.40	\$25.08	
	% time optimal	26.90%		2.61%	0.07%	12.63%	57.79%

		No Yield Information					
		Option 2	Option 3 or 5	Opt 4a (old)	Opt 4b (70%)	Opt 4c (93.5%)	Best option
<b>No CC Payment</b>	Total \$	\$7,162,957		\$7,331,521	\$7,331,521	\$7,331,521	\$8,000,550
	\$ per acre (wt mean)	\$15.01		\$15.37	\$15.37	\$15.37	\$16.77
	\$ per acre (mean)	\$16.63		\$14.64	\$14.64	\$14.64	\$18.56
	Std dev	19.48		3.28	3.28	3.28	18.89
	Max \$ per acre (95%)	\$27.04		\$19.60	\$19.60	\$19.60	
	Min \$ per acre (5%)	\$3.16		\$8.67	\$8.67	\$8.67	
	% time optimal	47.65%		2.46%	49.89%	49.89%	49.89%
<b>50% CC Payment</b>	Total \$	\$11,102,790		\$11,358,726	\$11,462,097	\$11,235,032	\$12,529,915
	\$ per acre (wt mean)	\$23.27		\$23.81	\$24.02	\$23.55	\$26.26
	\$ per acre (mean)	\$25.88		\$22.68	\$23.08	\$22.69	\$29.27
	Std dev	30.54		5.42	4.86	4.56	29.47
	Max \$ per acre (95%)	\$42.44		\$31.03	\$31.08	\$30.34	
	Min \$ per acre (5%)	\$4.48		\$12.22	\$12.92	\$12.93	
	% time optimal	47.65%		2.46%	12.52%	33.08%	4.36%
<b>Max CC Payment</b>	Total \$	\$15,042,622		\$15,385,932	\$15,592,674	\$15,138,543	\$17,066,536
	\$ per acre (wt mean)	\$31.53		\$32.25	\$32.68	\$31.73	\$35.77
	\$ per acre (mean)	\$35.13		\$30.71	\$31.51	\$30.73	\$40.01
	Std dev	41.61		7.56	6.51	5.96	40.07
	Max \$ per acre (95%)	\$57.85		\$42.49	\$42.50	\$40.88	
	Min \$ per acre (5%)	\$5.85		\$15.77	\$17.49	\$19.34	
	% time optimal	46.13%		2.79%	12.52%	34.24%	4.40%

Table 6. Number of Crop Acres – Update vs Non-update

	Corn	Barley	Sorghum	Wheat	Soybeans	Oats	TOTAL
No update (option 2)	190,161.0	7,840.4	5,675.0	86,105.1	155,837.9	779.6	446,398.9
Update (option 4)	187,768.7	4,432.8	1,084.0	89,337.4	194,082.0	442.8	477,147.6
Actual Acres	1,172,500.0	0.0	8,750.0	435,000.0	1,185,000.0	0.0	2,801,250.0

Table 7. Number of Base Crop Acres – Choosing Best Option

		Corn	Barley	Sorghum	Wheat	Soybeans	Oats
<b>Actual Yields</b>	No CC Payment	214,129.0	4,678.0	4,452.0	103,425.6	158,111.7	273.5
	50% CC Payment	211,686.2	4,326.6	3,254.8	101,228.2	164,103.3	411.1
	Max CC Payment	210,592.9	4,238.6	3,199.0	99,992.5	166,431.5	400.3
<b>Complete Yields</b>	No CC Payment	214,177.7	4,665.4	4,403.3	103,399.2	158,150.7	273.5
	50% CC Payment	211,476.5	4,221.7	3,188.4	100,586.5	165,092.5	400.9
	Max CC Payment	210,035.1	4,356.8	2,749.6	98,684.6	168,482.6	400.6
<b>No Yields</b>	No CC Payment	213,841.4	4,881.1	4,504.6	104,009.1	157,564.8	273.5
	50% CC Payment	214,425.8	4,816.4	3,848.0	103,523.2	158,279.2	226.7
	Max CC Payment	214,515.0	4,756.8	3,705.9	103,367.7	158,539.0	229.9

Table 7 note: The number of crop acres is the new acreage base when farmers pick the optimal option based on available historic yields and expected prices

Table 8. Yields

		Corn	Barley	Sorghum	Wheat	Soybeans	Oats
<b>Direct Payment Yields</b>		97.1	51.2	63.9	40.3	24.4	49.5
<b>CC yields - 4b (with 70% yld option)</b>	Actual yields	117.3	70.0	73.7	54.2	29.3	34.5
	Complete yields	122.2	74.0	79.9	56.9	31.3	34.5
	No yields	95.2	53.8	58.2	43.4	21.7	14.3
<b>CC yields - 4c (with 93.5% yld option)</b>	Actual yields	117.5	72.9	78.1	56.3	29.3	27.0
	Complete yields	124.0	78.3	86.5	59.9	31.4	27.0
	No yields	87.9	51.3	57.4	41.9	21.7	

**General Notes**

**Actual yield** – These numbers are based on the actual yield information provided by the farmer. Any missing yields use the 75% of the county yield plug. When the farmer provides all his or her yields, the actual yield and the complete yield boxes will be the same. When the farmer has no yield information, the actual and the no yield boxes will be the same.

**Complete yield** – These numbers assume full yield information can be provided. Actual yields are used if available but if not, the county yield plug is used. However, in these scenarios, the county yield plug is not penalized.

**No yield** – Any farmer provided yields are ignored and the penalized county yield plugs are used.

**Default option** – FSA option #2. This is what the farmer receives without making a choice.

**Optimal or Best option** – The highest paying FSA option from #2, #3, #4a, #4b, #4c, #5. Also note that option #3 and option #5 are only calculated when they pay more than option #2.

**Min payment or No CC Payment** – These numbers represent receiving only the direct payment.

**Max payment or Max CC Payment** – These numbers represent receiving the maximum counter-cyclical payment for each crop.

**50% CC Payment** – These numbers represent receiving half of the counter-cyclical payment. The numbers are generated by setting each crop price to a level that gives half of the maximum counter-cyclical payment available to a given crop.

**\$ earned by Extension** – This is a fairly conservative estimate of the potential value of Extension helping farmers with the farm bill signup. The dollar amount is calculated by subtracting the government payments of the optimal option from the government payments of the default option. Given that many farmers were likely to prove yields after finding out their potential payments, we could estimate Extension’s value by subtracting the payments under the optimal option with complete yield information from the default option with no yield information. Also, these numbers do not count farmers who used the spreadsheet on their own or may have missed recording their results.