Effects of Adding a Target Revenue Program and Soybean Fixed Decoupled Payments to Current Farm Programs

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Summary

This paper provides a one-year forward-looking analysis of a revenue countercyclical farm program. The basis for the revenue countercyclical farm program originates from the National Corn Growers Association's (NCGA) farm bill proposal. We explore several options under this program. The options consist of various crop loan rate levels for corn and soybeans. The amount and distribution of payments to producers under the various NCGA options and the Agricultural Act of 2001 (House Resolution 2646) are examined and compared against expected payments under the current array of farm programs.

EFFECTS OF ADDING A TARGET REVENUE PROGRAM AND SOYBEAN FIXED DECOUPLED PAYMENTS TO CURRENT FARM PROGRAMS

Introduction

TWO YEARS AGO we conducted an analysis of Congressman Charles Stenholm's (D-Texas) Supplemental Income Payments for Producers (SIPP) proposal (http://www.card.iastate.edu/ publications/texts/ 9bp28_ revised.pdf). The idea of SIPP was to increase payments when farm income was low, in contrast to fixed decoupled payments that arrive without regard to farm income levels. The Stenholm idea of a countercyclical payment program has caught on with others in Congress and with commodity organizations as they look ahead to a new farm bill. A new countercyclical payment program was part of the Agricultural Act of 2001 (H.R. 2646) that was passed by the House agriculture committee in August. The Senate agriculture committee soon will be looking at proposals that include countercyclical payment programs. Given this level of interest, it seems likely that the new farm bill will contain a new program that increases payments when income is low.

In our original analysis, we assumed that soybeans would become a new program crop. Justification for this assumption is that soybean producers received billions of dollars in marketing loan gains and loan deficiency payments (LDPs) under the 1996 Federal Agriculture Improvement and Reform (FAIR) Act. Nearly all new farm bill proposals also include soybeans as a new program crop. Inclusion of soybeans in a new farm bill that eliminates all past programs is relatively straightforward, as was demonstrated in our analysis of SIPP. But most of today's proposals envision adding a new countercyclical payment program on top of existing production flexibility contract (PFC) payments (also known as fixed decoupled payments) and non-recourse loans. Soybean producers currently have access to non-recourse loans, but they do not receive PFC payments. If soybeans are to become a regular program crop, then a PFC payment rate and base acreage levels must be established. H.R. 2646 did both, establishing a PFC payment rate of $0.42 per bushel. In conjunction with this additional benefit, the soybean loan rate was decreased from $5.26 per bushel to $4.92 per bushel.

Adding a countercyclical program on top of existing marketing loan programs increases the complexity of the analysis and makes it more difficult to interpret results. If LDPs count as market revenue, then countercyclical payments will decrease when LDPs increase. The purpose of this paper is to extend our earlier analysis in order to more fully understand the trade-offs when both a countercyclical program and non-recourse loans are in operation.

To give more structure to this analysis, we base our countercyclical payment program on the National Corn Growers Association's (NCGA) farm bill proposal. The original NCGA proposal did away with non-recourse loans, so we modify their proposal by adding marketing loan gains into their definition of market revenues. The following section gives the exact details of the program that we analyze.

Our original SIPP analysis estimated what SIPP would have paid out had it been in existence from 1977 to 1999. This new analysis estimates what the payments would be for the first crop year that the program is in existence. That is, we conduct a forward-looking analysis rather than a historical analysis. Because we do not know what prices and yields are going to be, the analysis

necessarily uses stochastic simulation methods in that we estimate the expected level of payments and the probability distribution of payments. In this way, we can estimate by crop the probability that payments will exceed any given level for all eight program crops.

In the following section, we outline the policy options analyzed and the assumptions and methods used in the analysis. Then we present and discuss the results.

Policies, Program Parameters, and Methodology

The Countercyclical Program

We take the NCGA countercyclical proposal (see pp. 689–705 of *The Future of Federal Farm Commodity Programs,* Serial No. 107-2, Washington, D.C.: U.S. Government Printing Office, 2001) as the starting point of this analysis. The NCGA proposal would pay farmers with established base acres of a crop the difference between national target income for the crop and national actual income, which are defined as follows:

National Target Income =
[(Total Crop Market Income from 1996 to 2000
+ Total Marketing Loan Benefits from 1996 to 2000
+ Total Market Loss Assistance Payments from 1996 to 2000)÷ 5]
× (adjustment factor)

National Actual Income =
Annual Crop Production
× 3-month USDA market price

The adjustment factor in National Target Income is the ratio of projected (by the Congressional Budget Office [CBO]) production to average production from 1996 to 2000. The adjustment factor is used to make sure that departures from historic planted acreages and yields are reflected in target income.

Because we want to understand the tradeoffs that would be made between marketing loan benefits and the NCGA proposal, we need to modify the NCGA definition of National Actual Income by adding marketing loan benefits. Thus, farmers would not be paid twice when prices fall below the loan rate for a crop.

Payments to producers would be based on their base yield and base acres, which would reflect producers' average acreage and yields from 1996 to 2000. Any revenue shortfall would be divided by national base production (national base acreage times national average yield) to determine the shortfall per unit. Then producer payments would equal their individual base production times this per unit shortfall.

Table 1 provides the components of target revenue for each of the program crops from 1996 to 2000. The values of production, marketing loan gains, loan deficiency payments, and market loss assistance payments are summed for each year; then the sum across the five-year period is averaged in the final column.

Table 2 provides the components needed to calculate the adjustment factor. We assume that the first year of the program would be 2002. As shown, the CBO projection of soybean production is 12 percent greater than the average production levels from 1996 to 2000, which reflects the large increase in soybean acres in recent years.

Table 3 provides the unadjusted and adjusted National Target Income Levels for 2002. A quick comparison of the Table 3 income levels with the value of production reported in Table 1 shows that National Target Income exceeds the market value of production for most years. For barley, corn, sorghum, and wheat, the market value exceeds target income in one year out of five. For cotton, oats, and soybeans, the market value exceeds target income two years out of five. And the value of rice production never exceeds the value of income. This suggests that the target income is quite high relative to the historic value of production.

TABLE 1. Components used to calculate National Target Revenue (in thousand dollars)

Crop	Year	Value of Production	Marketing Loan Payments	Market Loss Assistance Payments	Total Returns	Average
Barley	1996	1,080,940	0	0	1,080,940	
	1997	861,620	2,072	0	863,692	
	1998	686,517	82,683	59,089	828,288	
	1999	597,038	38,402	114,672	750,112	
	2000	632,098	68,815	113,678	814,591	867,525
Corn	1996	25,149,013	0	0	25,149,013	
	1997	22,351,507	97,886	0	22,449,393	
	1998	18,922,084	1,387,087	1,307,578	21,616,749	
	1999	17,103,991	2,405,838	2,543,804	22,053,633	
	2000	18,621,160	2,557,370	2,542,107	23,720,636	22,997,885
Cotton	1996	6,136,592	0	0	6,136,592	
	1997	5,708,940	28,841	0	5,737,781	
	1998	3,923,827	562,830	316,229	4,802,886	
	1999	3,533,825	1,547,158	613,251	5,694,234	
	2000	4,597,962	414,740	611,375	5,624,077	5,599,114
Oats	1996	313,910	0	0	313,910	
	1997	273,284	71	0	273,355	
	1998	199,748	19,608	4,236	223,592	
	1999	169,576	28,453	8,407	206,436	
	2000	164,555	44,485	8,303	217,343	246,927
Rice	1996	1,690,270	0	0	1,690,270	
	1997	1,756,136	0	0	1,756,136	
	1998	1,654,157	14,120	237,960	1,906,237	
	1999	1,230,257	401,398	464,544	2,096,199	
	2000	1,072,791	582,997	463,263	2,119,051	1,913,579
Sorghum	1996	1,986,316	0	0	1,986,316	
	1997	1,408,909	1,120	0	1,410,029	
	1998	905,468	61,150	141,532	1,108,150	
	1999	937,406	152,631	276,556	1,366,593	
	2000	822,598	82,653	275,649	1,180,900	1,410,397
Soybeans	1996	17,439,971	0	0	17,439,971	
	1997	17,372,628	15,794	0	17,388,422	
	1998	13,493,891	1,223,226	0	14,717,117	
	1999	12,205,352	2,326,995	475,000	15,007,347	
	2000	13,073,497	2,521,115	500,000	16,094,612	16,129,494
Wheat	1996	9,782,238	0	0	9,782,238	
	1997	8,286,741	15,693	0	8,302,434	
	1998	6,780,623	477,485	744,677	8,002,785	
	1999	5,593,989	937,699	1,445,038	7,976,726	
	2000	5,970,197	834,083	1,442,698	8,246,978	8,462,232

TABLE 2. Calculating the adjustment factor

Crop	1996-2000 Average Production (million yield units)	CBO 2002 Preliminary Production Estimate	Adjustment Factor
Barley	341	319	0.94
Corn	9,519	9,784	1.03
Cotton	17	18	1.06
Oats	156	141	0.90
Rice	187	197	1.05
Sorghum	603	588	0.98
Soybeans	2,647	2,952	1.12
Wheat	2,366	2,225	0.94

TABLE 3. National target income levels

	National Target Income				
	Unadjusted	Adjusted		Unadjusted	Adjusted
Crop	(million $)		Crop	(million $)	
Barley	868	813	Rice	1,914	2,013
Corn	22,998	23,637	Sorghum	1,410	1,376
Cotton	5,599	5,916	Soybeans	16,129	17,990
Oats	247	223	Wheat	8,462	7,959

Loan Rates

We keep loan rates for all program crops except corn and soybeans constant. We evaluate different combinations of corn and soybean loan rates to show the trade-offs involved between countercyclical payments and marketing loan gains. We examine six corn and soybean loan rate combinations as shown in Table 4. Each of the scenarios we examine includes the modified NCGA countercyclical program as earlier defined.

In addition to the loan rate scenarios in Table 4, we also observe the budget impacts of the creation of the soybean PFC rate. We examine three soybean PFC rates: $0.15, $0.42, and $0.55 per bushel. Base acreage and yields for soybean PFC payments are equal to the 1996 to 2000 average levels.

Stochastic Methods

Because future prices and yields cannot be known with certainty, forward-looking analyses can be used to assume a certain level of prices and yields, which would result in predetermined results, or future prices and yields can be treated as random variables that follow specified probability distributions. We use the second method where prices are distributed lognormally and national crop yields follow a beta distribution.

The parameters of the lognormal distributions are defined by setting the mean price equal to the 2002 projected Food and Agricultural Policy Research Institute (FAPRI) farm price, and the price volatility is set equal to 25 percent. The parameters of the beta distribution are found by setting the mode equal to the 2002 projected FAPRI yield. The minimum yield is set equal to 80 percent of the observed minimum yield taken from adjusted (for trend) yields from 1956 to 2000, and the maximum yield is set equal to 110 percent of the maximum yield taken from adjusted (for trend) yields from 1956 to 2000. All correlations between national yields of the program crops, prices of the program crops,and yields and prices are set equal to their historical values from 1975 to 2000.

TABLE 4. Loan rates under the alternative scenarios

Crop	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	House Proposal
				($ per yield unit)			
Corn	1.89	1.89	1.89	2.10	2.04	1.97	1.89
Soybean	5.26	5.10	4.92	5.26	5.10	4.92	4.92
Barley	1.71	1.71	1.71	1.71	1.71	1.71	1.65
Cotton	0.5192	0.5192	0.5192	0.5192	0.5192	0.5192	0.5192
Oats	1.14	1.14	1.14	1.14	1.14	1.14	1.21
Rice	6.50	6.50	6.50	6.50	6.50	6.50	6.50
Sorghum	1.69	1.69	1.69	1.69	1.69	1.69	1.89
Wheat	2.58	2.58	2.58	2.58	2.58	2.58	2.58

Yields and prices are simulated by taking 10,000 random draws from the specified distributions. That is, 10,000 corn prices and 10,000 corn yields are drawn. This allows us to estimate the probability distribution of crop revenue for each program crop. In essence, this procedure allows us to repeat the 2002 crop year 10,000 times.

Key Assumptions

Planted acreage and expected price levels are held constant across all alternative scenarios. We recognize that acreage levels will likely respond somewhat to the incentives embodied in the different scenarios. For example, a higher soybean loan rate will likely lead to higher soybean acreage, lower market prices, and higher loan deficiency payments. But our attention is on the difference in total payment levels, so we hold acreage and market prices constant.

Results

Table 5 shows the main results of the analysis. The results are the expected change in payments (the average change over the 10,000 draws) from the new countercyclical program and marketing loan gains relative to the expected marketing loan gains that would be obtained under current farm policy. We provide the various corn and soybean loan rates that define the alternative scenarios in Table 6 (a reduced version of Table 4).

The results show that all crops would gain from this proposal except for cotton and rice. The biggest gains would accrue to soybean producers. This large gain comes about because the soybean target revenue level under the alternatives implicitly gives a much higher level of support than the soybean target price in the House bill. To see this, note that the implicit target price for the revenue countercyclical program can be obtained by dividing the National Target Revenue from Table 1 by the 1996–2000 average production reported in Table 2. This results in a price of $6.80, which is 16 percent higher than the $5.86 target price in the House bill. The other seven program crops have target prices in the House bill that are equal to or greater than the implicit target price for the revenue countercyclical program.

For soybeans, the response of payments to the alternative loan rates is generally quite low. The reason for a lack of response is simple: in most price-yield situations, there is a dollar-for-dollar trade-off between countercyclical payments and marketing loan payments (marketing loan gains and LDPs). Recall that all marketing loan payments are added to market revenue in the determination of countercyclical payments. Only when the countercyclical payment is zero and price is below loan rate will an increase in loan rates result in an increase in payments. This situation occurs only if marketing loan payments are so large that their addition to market revenue exceeds target

TABLE 5. The change in expected payments relative to current farm policy

Crop	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	House Proposal
				(million $)			
Barley	118	118	118	118	118	118	47
Corn	2,896	2,896	2,896	3,038	2,962	2,913	2,621
Cotton	966	966	966	966	966	966	976
Oats	59	59	59	59	59	59	39
Rice	230	230	230	230	230	230	303
Sorghum	324	324	324	324	324	324	166
Soybeans	2,741	2,717	2,712	2,741	2,717	2,712	803
Wheat	1,450	1,450	1,450	1,450	1,450	1,450	1,207
Total	8,784	8,760	8,755	8,926	8,826	8,772	6,162

TABLE 6. Corn and soybean loan rates under the alternative scenarios

Crop	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	House Proposal
				($ per bushel)			
Corn	1.89	1.89	1.89	2.10	2.04	1.97	1.89
Soybeans	5.26	5.10	4.92	5.26	5.10	4.92	4.92

revenue. When a dollar-for-dollar trade-off occurs, the marketing loan program and the countercyclical program duplicate each other in the sense that elimination of the marketing loan program would have little aggregate effect on total payments. Only when an increase in the loan rate significantly increases the probability that countercyclical payments are zero because of large marketing loan payments will total expected payments increase with the loan rate increase.

Raising the corn loan rate from $1.89 significantly increases the probability that countercyclical payments are driven to zero. This results in expected payments for corn increasing by 5 percent when the corn loan rate increases by 11 percent ($1.89 to $2.10) as one moves from policy Alternative 1 to Alternative 4. In contrast, expected payments for soybeans increase by only 1 percent when the soybean loan rate increases by 6.5 percent ($4.92 to $5.26) as one moves from policy Alternative 3 to Alternative 1, suggesting that for soybeans the dollar-for-dollar trade-off adequately describes the current economic situation under this range of soybean loan rates and expected market prices.

It is important to understand that the Table 5 results are the average of simulated payments. To get more insight into the operation of the countercyclical program requires an understanding of the entire distribution of payments. Recall that we generate 10,000 observations of price and yields and resulting payment levels. Figures 1-8 show the probability distributions of payments under the countercyclical program under Alternative 1 for the individual crops. Figure 9 shows the probability distribution of total payments under the countercyclical program in Alternative 1. For the individual crops under Alternative 1, the probability of no payments from the countercyclical program ranges from 2 percent for oats to 30 percent for barley. There is roughly a 20 percent probability of no countercyclical payments for corn, cotton, rice, and wheat. This probability drops to 10 percent for soybeans and to 5 percent for sorghum. However, total countercyclical payments (summing across the crops) are almost always greater than zero; there is a less

than 0.1 percent probability that total countercyclical payments are zero.

The distributions also show the maximum likely payments under the countercyclical payment program. Figure 2 shows that both the corn and the soybean countercyclical programs could each pay out more than $9 billion, although the likelihood is low. This would be on top of any loan deficiency payments. The wheat countercyclical program could pay out more than $4 billion, and cotton, not quite $4 billion. The height of the bars in Figures 1–9 shows the probability of a certain level of payments. Given that a payment will occur, corn payments in the range of $1.2 to $6.0 billion are most likely. Soybean payments are most likely to fall between $500 million and $5 billion.

Figure 9 shows the distribution of payments across all crops under Alternative 1. As shown, the most likely scenario is a payment of around $8.2 billion. But there is some chance that total payments could exceed $20 billion. This raises the question of compliance with World Trade Organization (WTO) limits. This revenue countercyclical program could be classified as non-crop-specific amber box spending given the recent U.S. Department of Agriculture ruling that 1998 market loss assistance payments are non-crop-specific amber box payments. Total U.S. amber box spending is limited to $19.1 billion under WTO. Clearly, WTO compliance is in question once marketing loan payments, expenditures on dairy and crop insurance, and the effects of the sugar and peanut quota program are added to the Figure 9 results. This suggests that the probability of exceeding the WTO limit under this program is substantially greater than under the House bill.

PFC payments to soybeans depend on base acreage, base yields, and the PFC payment rate. Following the base for the countercyclical program, we use 1996 to 2000 average acreage and production to establish the base for soybean fixed decoupled payments. The average acreage was 70.9 million acres. The average production was 2.65 billion bushels. Payments are assumed to be made on 85 percent of the average production, following the existing structure of PFC payments for other crops. If the soybean payment rate is $0.55 per bushel, then total PFC soybean payments are $1.237 billion. With a payment rate of $0.42 per bushel, soybean PFC payments are $0.945 billion. At a payment rate of $0.15 per bushel, soybean PFC payments would be $0.337 billion. To calculate the change in total soybean payments relative to the current farm program, simply add these payments to those reported in Table 5.

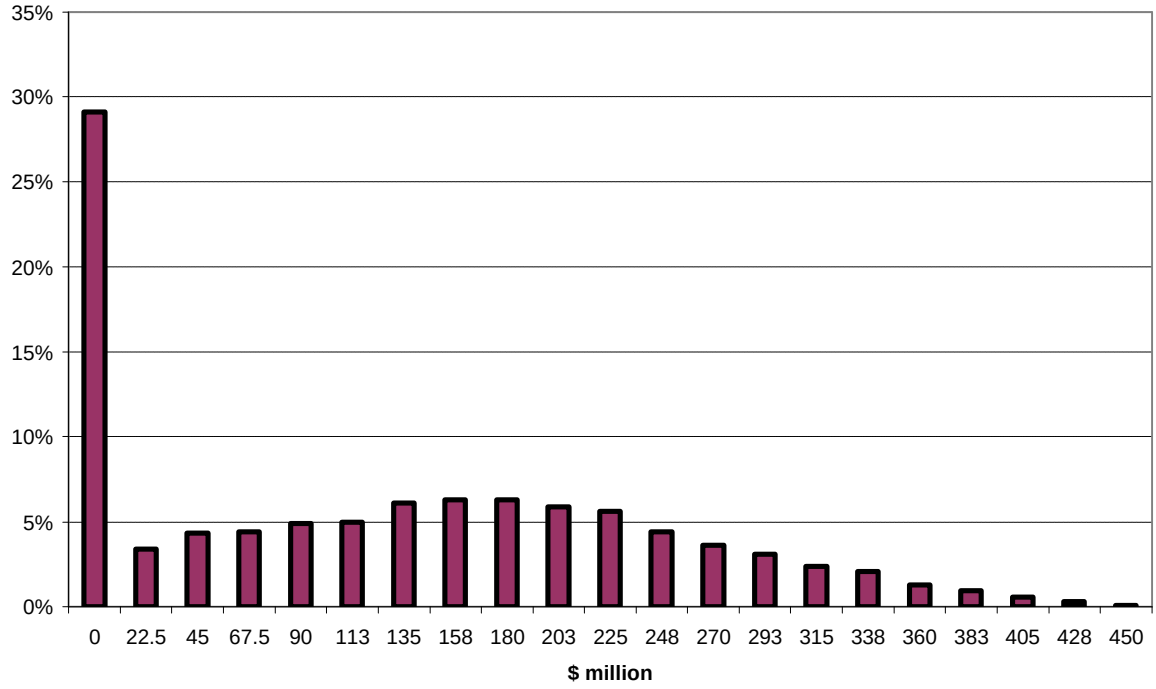

FIGURE 1. Distribution of barley countercyclical payments

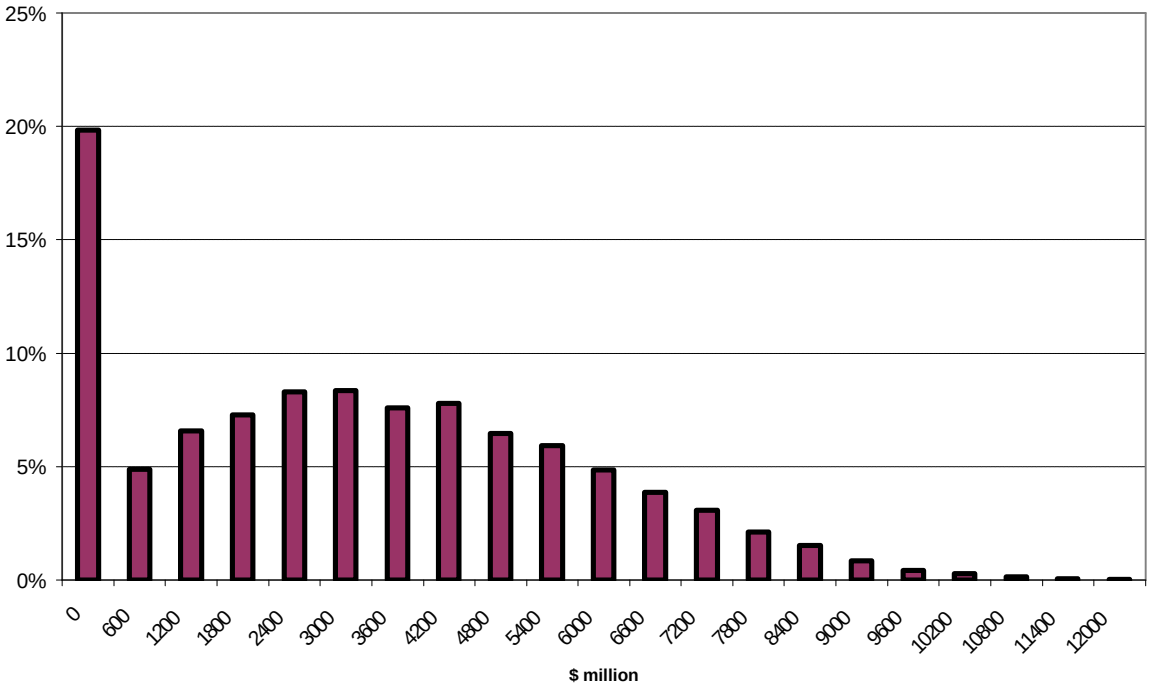

FIGURE 2. Distribution of corn countercyclical payments

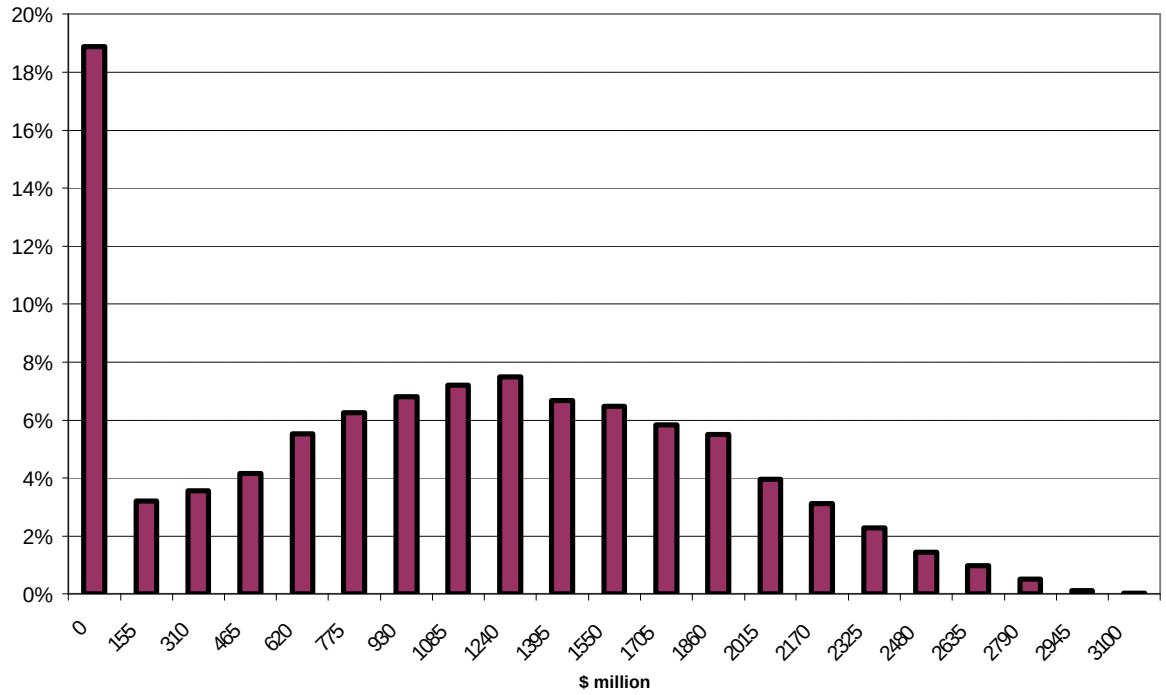

FIGURE 3. Distribution of cotton countercyclical payments

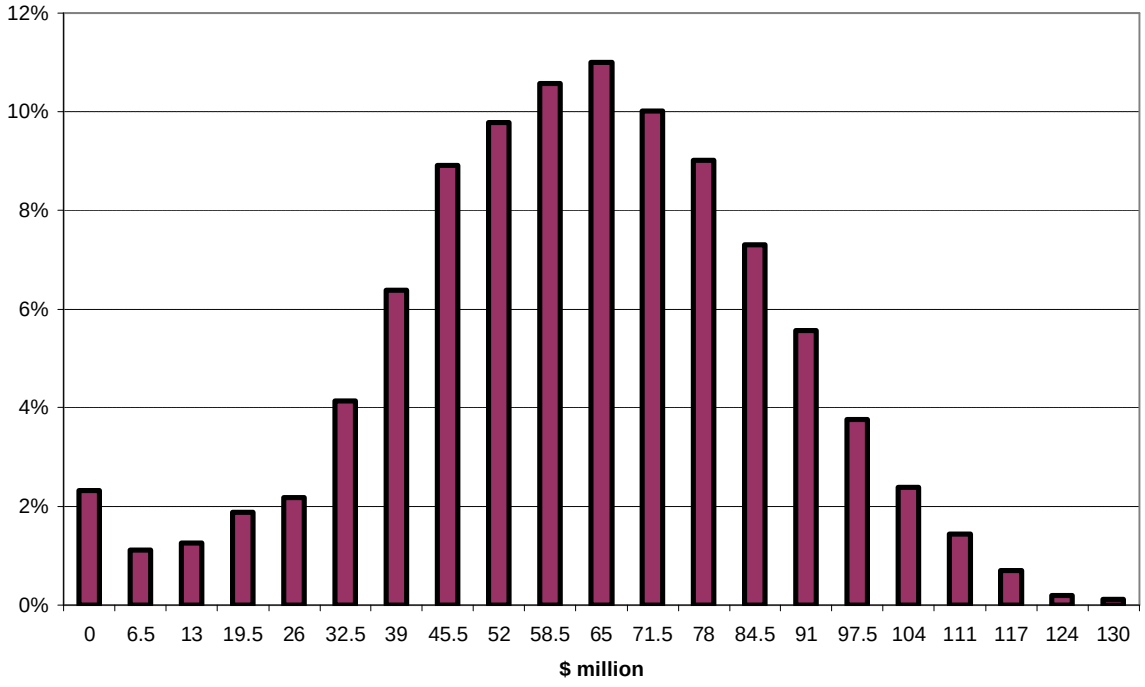

FIGURE 4. Distribution of oat countercyclical payments

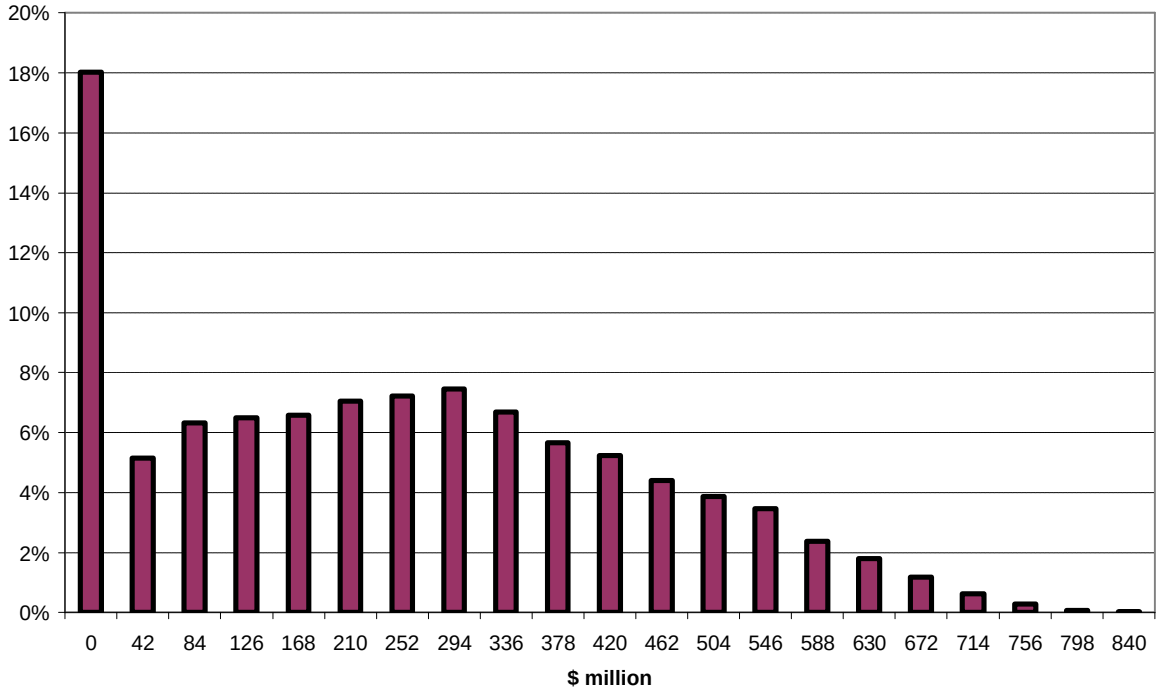

FIGURE 5. Distribution of rice countercyclical payments

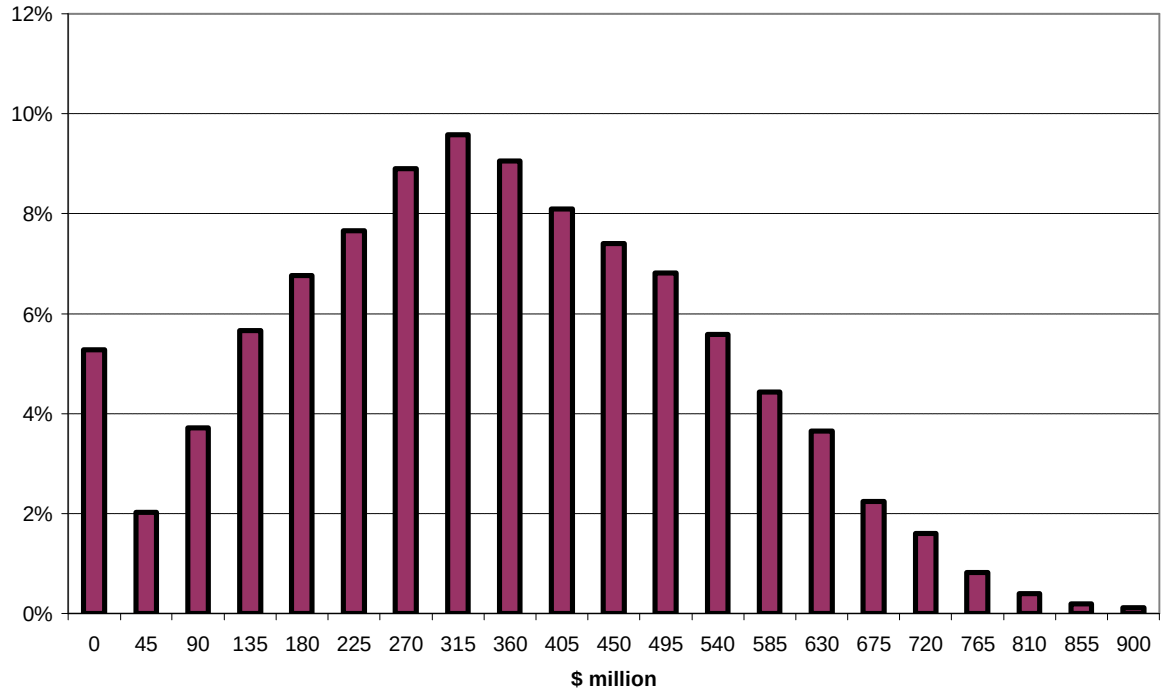

FIGURE 6. Distribution of sorghum countercyclical payments

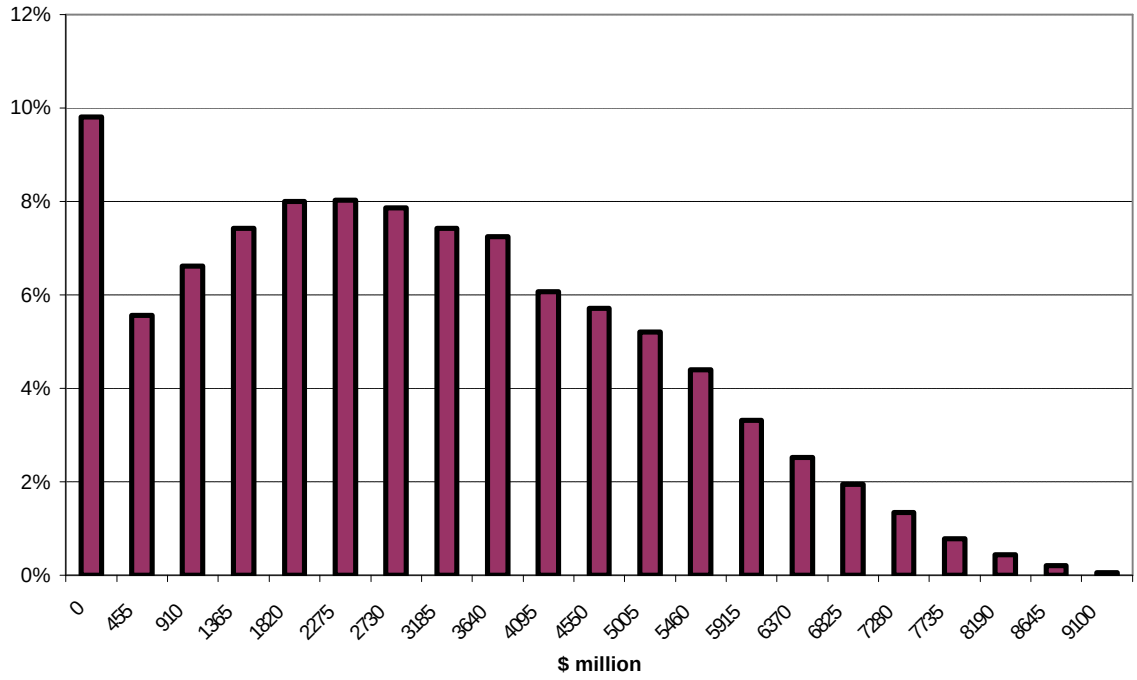

FIGURE 7. Distribution of soybean countercyclical payments

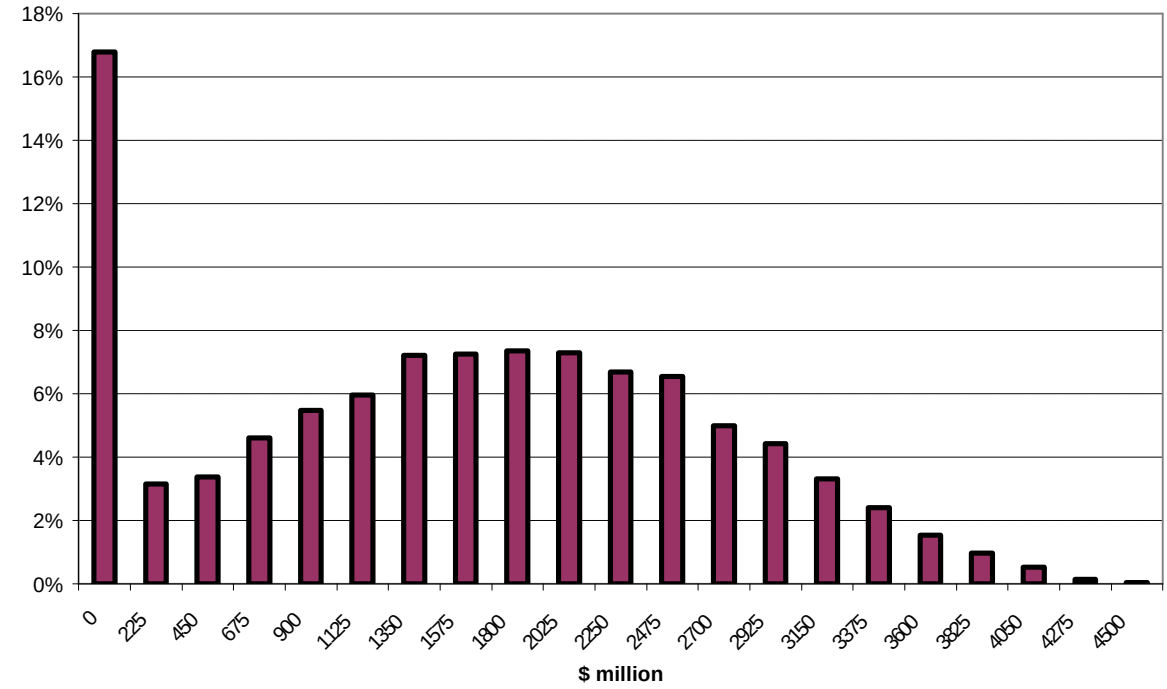

FIGURE 8. Distribution of wheat countercyclical payments

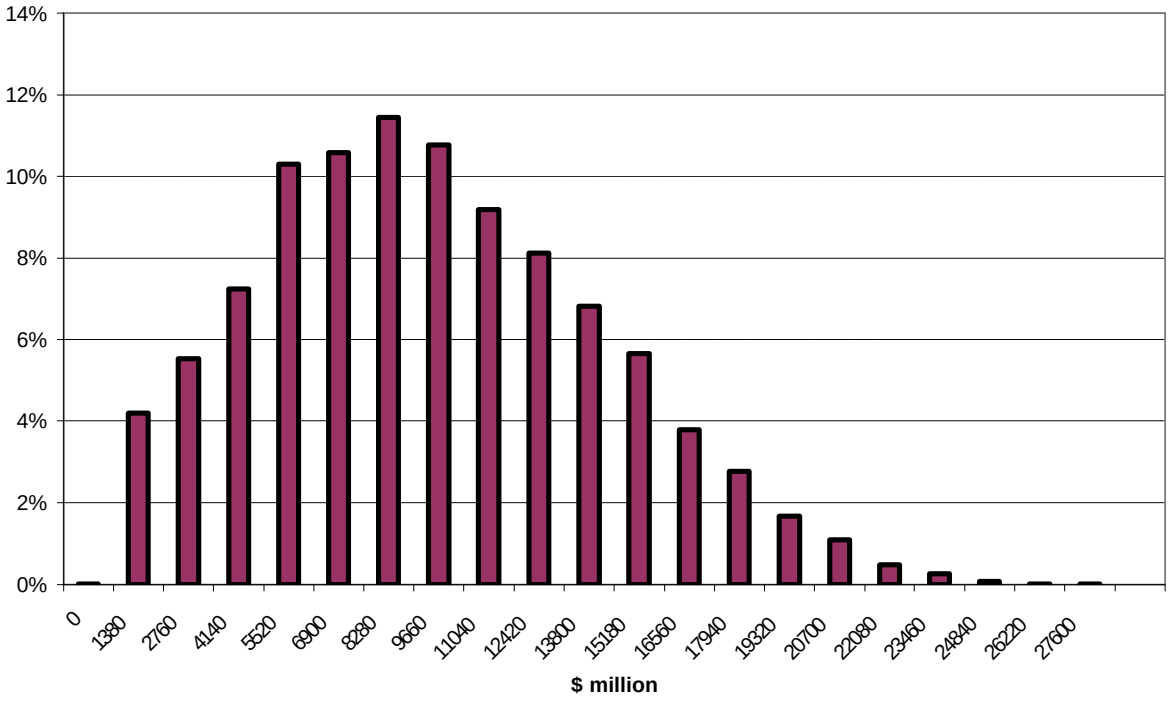

FIGURE 9. Distribution of total countercyclical payments