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An Analysis of the Permanent Emergency Agricultural Assistance

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Almost every year portions of North Dakota are declared disaster areas due to weather related problems. Whether there are floods in the spring, or drought in the summer, agricultural production is reduced due to "abnormal" weather conditions. Each year, sections of the country experience some weather related problems. Those areas reach out to Washington for assistance. Table 1 shows the ad hoc and emergency payments made to North Dakota and U.S. farmers. Most of the payments made in 1997-2001 were price related, but since 2001 low yields provided $629 million to North Dakota producers and about $24 billion to U.S. producers. The total amount of emergency payments received by North Dakota producers is about 6 percent of the total U.S. payments.

Proposal

Senator Byron Dorgan has proposed legislation which would amend the Federal Crop Insurance Act to allow the Secretary of Agriculture to provide disaster relief to agricultural producers that incur crop and livestock losses as a result of damaging weather or related conditions in federally declared disaster areas. The legislation would provide the means to support producers without appealing to Congress. The objective of this study is to estimate the value to North Dakota agricultural producers of this legislation. The legislation covers both crop and livestock losses due to weather. Crop losses, for both quality and quantity, are covered. Also, livestock producers are covered for both losses of livestock and losses associated with rangeland depravation.

Table 1. Ad Hoc and Emergency Government Payments to North Dakota and the United States

	North Dakota	United States	North Dakota's Share
	----------$1,000----------		-Percent-
1996	246	172,538	0.01
1997	18,452	189,173	9.75
1998	124,092	2,884,633	4.30
1999	377,910	7,951,397	4.75
2000	402,366	8,623,672	4.67
2001	427,741	8,538,767	5.01
2002	79,760	1,654,969	4.82
2003	232,786	3,142,352	7.41
2004	13,984	583,139	2.40
2005	302,564	3,168,734	9.55

Source: USDA-ERS

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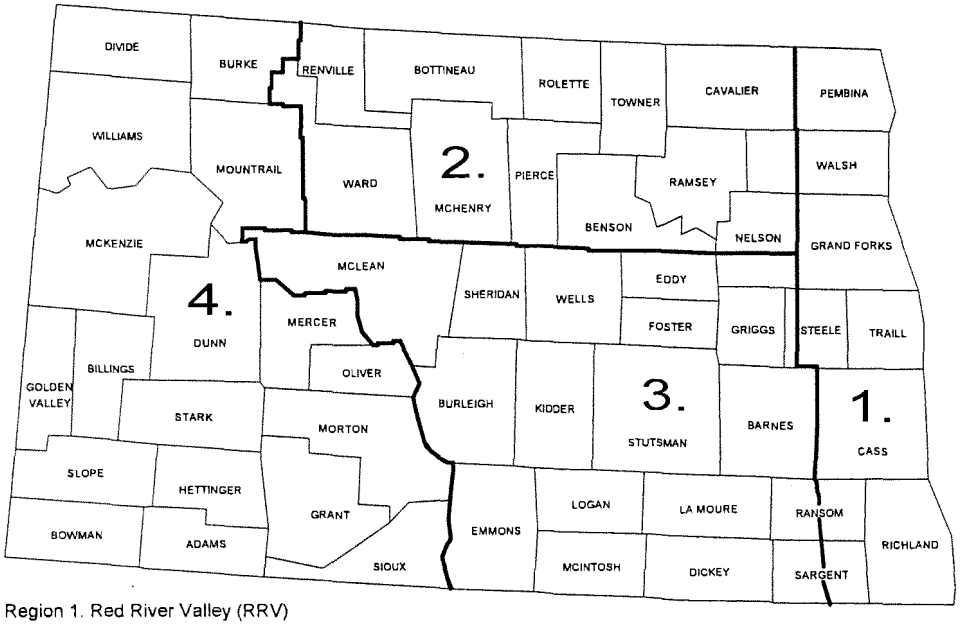
It is proposed that producers who lost more than 35% of their crop are eligible for a payment of 65% of the crop price, and if producers experience quality losses of more than 35% of the crop value, a payment of 65% of the crop's value times 65% of production would be made. Livestock producers would be paid for losses due to floods, wildfires, extreme heat or other weather conditions as determined by the Secretary.

Methodology

This study will estimated the benefits of this legislation to North Dakota producers due to quantity losses, since data are not available for crop quality or livestock losses. The North Dakota Representative Farm Model (MODEL) was used to estimate the probability and size of disaster payments for North Dakota producers. The MODEL uses production data from the North Dakota Farm and Ranch Business Management program and price data from the Food and Agricultural Policy Research Institute (FAPRI).

The MODEL divides the state into four regions and three different farm types to capture varying weather and soil types across the state as well as different management types. The four regions are shown in Figure 1. The computer program, "Risk," by Palisade was used to generate probability distributions of crop losses based on historical yield patterns. Changes in price were not considered for this study. Risk analysis requires two statistics, mean and standard deviation, to generate a distribution of potential yields. Yields were obtained from National Agricultural Statistical Service (NASS) and the North Dakota Farm and Ranch Business Management program. Standard deviations were estimated from individual farm data of the North Dakota Farm and Ranch Business Management program. Table 2 shows the estimated standard deviations and means of individual crops for North Dakota producers by regions. Standard deviations of yields indicate variations of yields from their mean yield. For example, a standard deviation of 10.2 bushels with a mean yield of 50.3 bushels for spring wheat in the Red River Valley indicates that yields of spring wheat can be expected to range between 60.5 and 40.1 under normal conditions.



Region 1. Red River Valley (RRV)
Region 2. North Central (NC)
Region 3. South Central (SC)
Region 4. Western (West)

Figure 1. North Dakota Farm and Ranch Business Management Region

Table 2. Standard Deviations and Means of Crop Yields for North Dakota Farmers.

	Spring Wheat	Durum Wheat	Barley	Corn	Soybeans	Sugarbeets	Sunflowers	Canola
	----------bushels----------					-tons-	--------pounds-------	
Standard Deviations								
RRV	10.20		13.04	23.51	6.43	2.25	286.48	
NC	10.89	10.27	18.17				450.02	472.58
SC	11.37	8.24	17.82	29.29	9.20		381.28	
West	12.02	11.54	17.55					
Means								
RRV	50.3		63.2	130.9	33.9	19.3	1474.9	
NC	36.2	34.7	54.8				1449.6	1504.0
SC	44.0	33.6	67.4	104.6	32.2		1338.2	
West	28.4	26.8	40.8					

These standard deviations were estimated from twenty to thirty individual farm records for each crop and in each region over a nine-year period. The standard deviations for the western region are larger than those in other regions, indicating that yield variations in the western region are larger than those in other regions. An average individual's standard deviation will be about 1.6 times larger than that from the county where the individual belongs because aggregated data tend to reduce variation within the data set. Similarly, the standard deviations of yields for a county are about 1.5 times larger than those for the state yields. It was assumed that the standard deviations of crop yields for an individual farmer is about 1.7 times larger that the standard deviations for a group of individual farmers. Based on these assumptions we developed three scenarios in which the standard deviations of yields for individual farmers are 1.5, 1.7, and 1.9 times the estimated standard deviations for groups of individual producers.

Table 2 also shows the average yields for producers within the four regions and eight crops. These two sets of statistics, mean yields and standard deviations, were used to generate a distribution of possible yields consisting of 1000 observations with known means and standard deviations. From those generated yields, total per acre gross value of production was determined using prices received by farmers in 2005 (Table 3).

Table 3. Prices Used For The Analysis

Spring Wheat	$/bushel	4.35
Durum Wheat	$/bushel	4.50
Barley	$/bushel	2.78
Corn	$/bushel	2.65
Soybean	$/bushel	5.65
Sugarbeets	$/ton	42.00
Sunflower	$/cwt	13.25
Canola	$/cwt	11.33

Total regional returns were calculated using the gross per acre return and the average acres planted for the major crops in each region of the state (Table 4). From that distribution of total regional production, the disaster payments are calculated. It was assumed that, if an individual's production was below 65% of normal production, he was qualified for disaster payments and located in a county that was declared a disaster county.

Table 4. North Dakota Planted Acres for Major Crops, by Regions

	Spring Wheat	Durum Wheat	Barley	Corn	Soybean	Sugarbeet	Sunflowers	Canola
	1,000 acres							
RRV	1,353		108	479	1,331	245	98	
NC	1,706	389	690				339	701
SC	1,934	222	448	616	1,329		513	
West	1,707	1,393	344					

Results

Table 5 shows the potential distribution of disaster payments made to North Dakota producers under the base and alternative scenarios. If the total gross return for any crop within the observation fell below 65% of the mean gross return, an emergency payment was calculated based on 65% of the crop value times the amount lost. It was assumed that Federal Crop Insurance paid for any losses greater than 30%. For the base scenario, using county standard deviations, the producers did not receive any payments about 9% of the time. Emergency payments, between zero and $30 million, were made about 19% of the time. With the base standard deviations for a group of individual producers in each region, payments of less than $30 million were made to North Dakota producers over 27% of the time. Payments between $30 million and $60 million were made about 29% of the time. The average emergency payment under the base scenario would be about $73 million per year.

The actual emergency payments during the past four years averaged about $150 million per year. This indicates that the individual standard deviations for producers are larger than the base estimates. Under scenario 1, standard deviations increased 1.5 times, average disaster payments would be $88 million per year. The average payment increases as standard deviations increase. With the standard deviations increased to 1.9 times the group standard deviations (scenario 3), the average expected emergency payment for North Dakota would be $112 million per year. Under scenario 3, producers in the state would not receive emergency benefits 2% of the time. The payment of $30 million level would be reached about 9% of the time and the $60 million level would be paid about 22% of the time. The large disaster payments would be made infrequently. Payment over $150 million would be paid about 26% of the time or one in five years and payments over $210 million would be paid about 19% of the time or one in every 5 years. Payments similar to the amounts paid in 1999-2001 would be made less than 1% of the time. Figure 2 shows the distribution of emergency payments with base standard deviations and figures 3-5 show the distribution with the standard deviation under the various scenarios. Emergency payments increased rapidly as the standard deviations were increased.

Table 5. Estimated Frequency of Disaster Payments Made To North Dakota Producers, Under Various Standard Deviation Estimates

	----------Frequency of Payments----------			
Payment Level	Base Scenario (Estimated Group Std)	Scenario 1 (Estimated Producer Std Times 1.5)	Scenario 2 (Estimated Producer Std Times 1.7)	Scenario 3 (Estimated Producer Std Times 1.9)
million $	---------- Percent----------			
0	8.8	5.1	3.3	2.2
0 - 30	18.5	14.8	12.5	9.0
30 - 60	29.2	28.1	23.4	21.7
60 - 90	17.2	18.3	19.2	19.5
90 - 120	8.6	9.4	13.1	14.1
120 - 150	3.4	5.5	5.5	7.2
150 - 180	3.3	4.0	3.8	3.4
180 - 210	2.3	3.4	3.4	4.2
210 - 240	3.1	4.8	5.5	5.6
240 - 270	3.0	3.7	5.7	7.0
270 - 300	1.7	2.0	3.2	4.2
300 - 330	0.4	0.6	1.2	1.5
330 - 360	0.0	0.2	0.1	0.3
360 - 390	0.1	0.1	0.1	0.1
Average payment million $	72.8	88.0	101.5	111.8

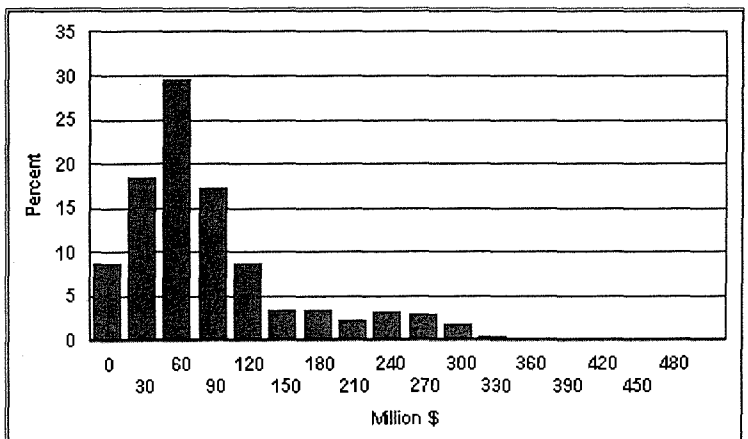


Figure 2. Estimated Distribution for Emergency Payments Under Base Scenario

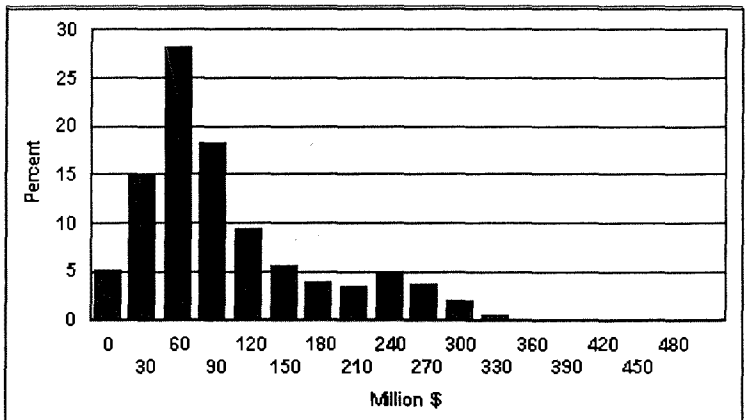


Figure 3. Estimated Distribution for Emergency Payments Under Scenario 1.

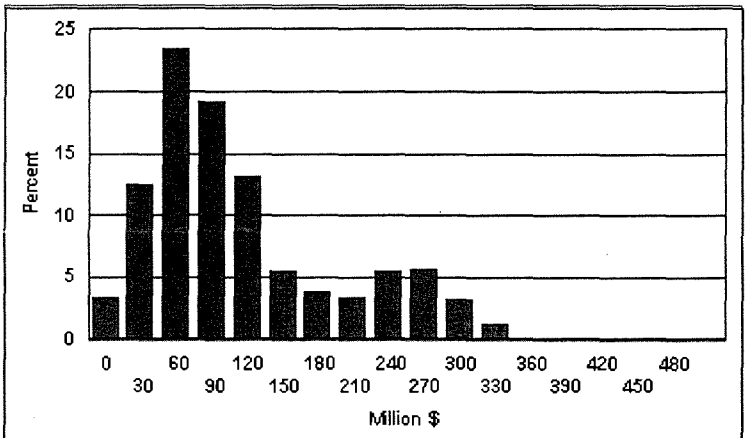


Figure 4. Estimated Distribution for Emergnecy Payments Under Scenario 2.

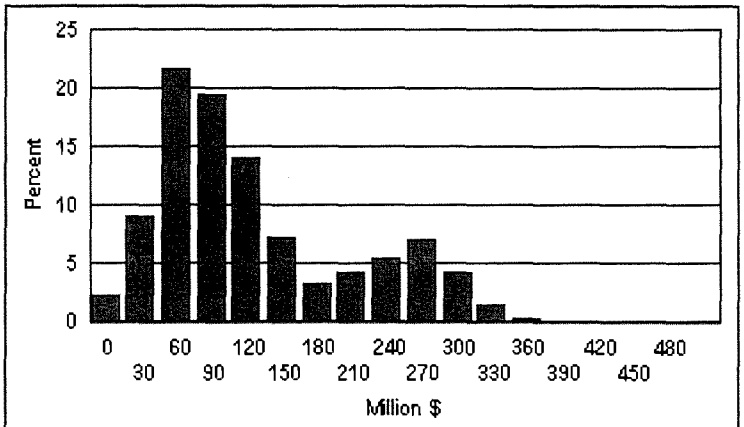


Figure 5. Estimated Distribution for Emergency Payments Under Scenario 3.

Summary

Gross returns vary wildly even with this proposed legislation. Without the emergency disaster payments, gross crop returns for the state could vary between $1.86 billion and $3.64 billion. Under the base scenario, gross crop returns plus disaster payments vary between $2.06 billion and $3.64 billion. Under scenario 3, gross crop returns plus emergency disaster payments varies between $2.01 billion and $3.77 billion.

This study looks only at crop losses due to low yields. Quality and livestock losses were not considered because no data were available. Thus, the estimated payments under the disaster program are the minimum payments under the different scenarios.

The study found that the permanent disaster payments program provides an average payment of $73 million with variations between zero and a maximum of $390 million under the base scenario. However, with more volatile weather conditions than standard weather, payments would increase substantially to an average of $112 million. The range of payments are basically the same but the frequency of large payments is much greater with higher standard deviations.

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