

Farm Level Impacts of a Revenue Based Policy in the 2007 Farm Bill

**Lindsey M. Higgins, James W. Richardson, Joe L. Outlaw,
and J. Marc Raulston**

**Department of Agricultural Economics
Texas A&M University
College Station, TX 77843-2124
Phone: (979) 845-5913**

Email: lhiggins@tamu.edu
jwrichardson@tamu.edu
joutlaw@tamu.edu
jmraulston@afpc.tamu.edu

*Selected Paper prepared for presentation at the American Agricultural
Economics Association Annual Meeting, Portland, Oregon, July 29-August 1, 2007.*

*Copyright 2007 by Lindsey M. Higgins, James W. Richardson, Joe L. Outlaw, and
J. Marc Raulston. All rights reserved. Readers may make verbatim copies of this
document for non-commercial purposes by any means, provided that this copyright notice
appears on all such copies.*

Background:

Using revenue as a basis for farm bill payments has been a topic of discussion over the last two farm bill debates (Coble and Miller 2006). Discussion of the 2007 Farm Bill has once again picked up the idea of incorporating a revenue based support program, including proposals from the National Corn Growers Association (NCGA), American Farmland Trust, American Farm Bureau Federation, and the current Administration (Hart 2007). Revenue based programs are designed to tie together price and yield risk which provides a safety net for farm income, thus assisting farmers when they need it the most. Revenue based programs are thought to reduce a producer's exposure to both price and yield risks, helping to provide a more stabilized farm income (Congressional Budget Office 1983). The idea of a stabilized farm income coincides with the definition of providing a "safety net" for farmers, which is commonly thought of as an objective of U.S. farm policy (United States Department of Agriculture 2006).

Perhaps the strongest proponent of a revenue based program for the upcoming farm bill is NCGA. NCGA has put forth two revenue based proposals, but little is known about how this will impact farmers across the country. NCGA's proposals are combined with current direct payment and crop insurance programs. NCGA's original proposal consisted of a "Revenue Counter Cyclical Program" (RCCP) combined with a "Base Revenue Protection" (BRP) program. BRP provides the producer with a guarantee of "70% of farm-level, crop-specific net revenue" (National Corn Grower's Association 2006). The producer's crop-specific net revenue is calculated as harvested yield times the NASS season average national price less an index of regional estimates of variable costs from ERS (National Corn Grower's Association 2006). On the other hand, RCCP

serves as a modified version of the current farm bill's counter cyclical payment (CCP). The major element of modification comes from RCCP being a function of revenue, rather than based on prices. An RCCP payment is made to producers when calculated revenue falls below a targeted revenue guarantee. The county wide guarantee revenue is determined by multiplying the county trend yield by a fixed target price (National Corn Grower's Association 2006). The calculated revenue is determined as the NASS county yield multiplied by national price. RCCP payments make up the difference between the guaranteed revenue and the calculated, but are limited to be at most 30% of county guaranteed revenue (National Corn Grower's Association 2006).

NCGA made recent revisions to their initial proposal. The new proposal consists of only the RCCP, rather than both the RCCP and BRP. Additionally, revisions were made as to how RCCP is to be calculated. RCCP is paid out on base acres when expected county crop revenue exceeds actual county crop revenue (National Corn Grower's Association 2007). Ninety-five percent of the product of county trend yield and the three year average spring futures price will be considered the expected county crop revenue (National Corn Grower's Association 2007). The fall futures price and the county yield will be used to determine actual county crop revenue (National Corn Grower's Association 2007).

A proposal for a revenue based counter cyclical payment (CCR) program to replace the CCP program that exists in the 2002 Farm Bill was included in the USDA's report of farm bill proposals provided to Congress (Richardson and Outlaw 2007). A CCR payment would be made when the national target revenue per acre is less than national revenue per acre (United States Department of Agriculture 2007). National

target revenue is determined as the Olympic average of national yield multiplied by the target price less the direct payment rate (United States Department of Agriculture 2007).

Whereas, “national actual revenue per acre for a commodity would equal the national average yield for the commodity times the higher of: (1) the season-average market price or (2) the loan rate for the commodity” (United States Department of Agriculture 2007).

This research is not the first to analyze the potential impacts of a revenue based commodity title in the upcoming farm bill. Richardson and Outlaw (2007) used the Food and Agricultural Policy Research Institute’s (FAPRI) 2007 baseline to compare the proposed CCR payment relative to CCP payments over the 2008-2016 period on a crop by crop basis. The results of Richardson and Outlaw’s analysis reveal that a budget savings of \$1.46 billion over the 9 year period would take place due to the implementation of the proposed CCR program.

In a series of staff papers, Aakre, Haugen, and Swenson (2007) look at the impacts of the NCGA proposal on Corn, Soybeans, and Spring Wheat in North Dakota (Aakre, Haugen and Swenson 2007a; Aakre, Haugen and Swenson 2007b; Aakre, Haugen and Swenson 2007c). The authors used selected counties in North Dakota to compare projected payments received by representative farms under the NCGA proposal and under the provisions set forth in the 2002 Farm Bill. Their results indicate that soybean producers should receive more payments under NCGA’s proposal, while corn and spring wheat producers had mixed results based upon yield variability within each of the representative North Dakota counties.

Olson and DalSanto use two different approaches, one from a historical basis and one from a projection standpoint, to compare alternative farm bill proposals (including

that of NCGA's) on Minnesota farms (Olson and DalSanto 2007). Olson and DalSanto use historical prices and yields from 2002 to 2005 to determine government payments and crop revenues under each proposal. Projected revenues and government payments for one year are based upon stochastic yields and prices. These stochastic prices and yields were developed using deterministic price forecasts, historical relationships between variables, and historical variability. The simulated payments for the NCGA proposal are slightly higher than the simulated payments for the current policy. Based off of their analysis for all of the proposed alternative policies, Olson and DalSanto conclude that revenue based programs are a "more appropriate safety net for the future" (Olson and DalSanto 2007).

The aforementioned studies address location specific impacts of farm bill proposals on crop farmers or address the impacts of just one proposal. Olson and DalSanto note that further farm level analysis is necessary to develop the complete picture of what will happen under revenue based programs (Olson and DalSanto 2007). The existing literature may be expanded by addressing a wider geographic region, by addressing a wider range of farm types (e.g. primary crops grown), by making broader attempts at incorporating the risks and uncertainties with the future, and by making comparisons between proposals over a longer time frame.

The objective of this research is to show how a revenue based farm program will impact the economic viability for different types of farms across the United States over the next 5 years. Specifically, this research will make a direct comparison between the current farm bill and the revenue based proposals made by the National Corn Growers Association (NCGA) and the Administration, revealing impacts at the farm level for a

switch to a revenue based program in the upcoming farm bill for feed grain, oilseed, cotton, wheat, and rice producers.

Methodology:

The impacts of a revenue based policy for twelve representative crop farms were evaluated. The twelve representative farms were selected from the 110 representative farms maintained by the Agricultural & Food Policy Center (AFPC). These representative farms were established by collecting information from producer panels to create whole farm budgets. The information collected includes details on the size of the operation, enterprises they participate in, fixed costs, historical yields, and costs of production for each enterprise. This information is used to model the specific characteristics of alternative policy scenarios in a stochastic farm financial simulation model. Figure 1 provides a map of the representative farm locations.



Figure 1: Location of AFPC maintained representative farms

In an attempt to provide a robust assessment of the impact of NCGA’s and the Administration’s revenue based proposals we selected four different types of farms (grain and oilseed, wheat, cotton, and rice) from ten states. The twelve selected farms (three from each “type”) were selected for their ability to serve as a representative agent for producers in each region. Table 1 describes the individual characteristics of each selected farm. Analysis conducted on such a diverse group should provide a rich story about the effect of a revenue based policy on U.S. farms.

Table 1: Characteristics of Selected Farms

Farm ID	State	County	Primary Crop(s)	Total Cropland	2006 Planted Acres	2006 Assets (in \$1000)
MOCG2050	Missouri	Carroll	Corn and Soybeans	2,050	2,050	4,982
ING1000	Indiana	Shelby	Corn and Soybeans	1,000	1,000	2,012
NDG2180	North Dakota	Barnes	Soybeans	2,180	2,180	749
COW3000	Colorado	Washington	Wheat	3,000	2,475	1,489
MTW4500	Montana	Chouteau	Wheat	4,500	2,330	2,551
ORW4000	Oregon	Morrow	Wheat	3,600	2,000	1,314
CAC4000	California	Kings	Cotton	4,000	4,000	13,645
TXSP2239	Texas	Dawson	Cotton	2,239	2,043	928
TNC1900	Tennessee	Fayette	Cotton	1,900	1,900	2,410
CAR550	California	Sutter	Rice	550	500	1,764
TXR1350	Texas	Colorado	Rice	1,350	855	1,083
ARSR3640	Arkansas	Arkansas	Rice	3,640	3,564	3,974

Using the payment computations outlined in the background section of this paper for both the original and revised NCGA proposals and the CCR proposal, government payments and total receipts were calculated for the twelve representative farms for the 2007 to 2012 period. As a basis for comparison, government payments under the 2002 Farm Bill were computed over the same time period.

Historical and current data from these representative farms was used to create stochastic (and in some cases, deterministic) forecasts of future variables. Planted

acreage was assumed to remain constant over the analyzed time frame, including CRP acreage and any land used for base acreage purposes only. A representative farm's decision to participate in multi-peril crop insurance was also assumed to follow their historical pattern of purchase.

The first step of this analysis involved the computation of on-farm receipts. Deterministic farm prices were created by applying a wedge, calculated based off of historical observations, to FAPRI forecasts for national prices. These deterministic price forecasts were made stochastic by assuming future prices would follow a multivariate empirical distribution built off of historical on-farm prices for the representative farm from the 1996 to 2006 time period. Stochastic harvested yield was created by developing a trend yield forecast for future years and applying a multivariate empirical distribution based off of on-farm harvested yield for each individual representative farm. Combining the stochastic yield and price variables along with planted acreage gave us stochastic total receipts for each representative farm in each year.

Stochastic government payments for 2007-2012 under the base scenario (2002 Farm Bill) were determined by calculating direct payments, counter-cyclical payments (CCP), loan deficiency payments (LDP), and multi-peril crop insurance (MPCI). Direct payment rates and yields were assumed to remain constant at the 2002 level through 2012. Total direct payments were calculated on 85% of base acres. Target prices were also assumed to remain constant at 2002 levels. CCP payment rates were determined as the difference between the effective target price and the maximum of either the loan rate or the stochastic on-farm price. Stochastic CCP payments are made using the payment rate on 85% of base acres. LDP rates were determined as the difference of the loan rate and the adjusted world price. Adjusted world price was calculated using a wedge off of stochastic forecasted national prices. Stochastic national prices were taken from the 500 iterations of FAPRI's January 2007 baseline. CRP payment rates and acreage were assumed to be held constant over the analyzed time frame.

Per acre MPCCI premiums for each representative farm were assumed to be held constant at their 2006 level. Actual production history (APH) was determined as the ten year average of stochastic actual yields (actual historical yields were used up until 2006, while stochastic forecasts were used for years following 2006). A 70% coverage level was assumed for each of the twelve representative farms chosen for this analysis. The 2007 guaranteed price is found from the Federal Crop Insurance Corporation (FCIC). Guaranteed prices for subsequent years were forecasted using stochastic FAPRI national prices. Crop insurance payments were assumed to be received when actual yield fell below the APH multiplied by the coverage level. The payment rate was based on the difference between the APH and the stochastic actual yield multiplied by the guarantee price for each planted acre. Net MPCCI payments were calculated as the per crop indemnity payment less the premium.

The original proposal from NCGA was modeled in two stages, one each for the RCCP payment and the BRP payment. The BRP payment is made when per acre net income is less than 70% of the five year Olympic average net income. Stochastic net income per acre was calculated as stochastic FAPRI national prices multiplied by stochastic actual yields less trend forecasted costs of production. The Olympic average net income was found using historical net income information from the representative farm through 2006 and then stochastic forecasted net income for years following 2006. The RCCP payment is based off of county revenue, which is calculated as stochastic on-farm price multiplied by stochastic county yields. Stochastic county yields were assumed to follow a multivariate empirical distribution following historical NASS county yields. Deterministic forecasts of county yields were made using a trend regression. The target revenue level for RCCP is a function of stochastic county yields and the effective target price. RCCP payments are made when stochastic county revenue falls below the stochastic target revenue. RCCP payments are set to be a maximum of the difference between the target revenue level and the county revenue guarantee (70% of the product of

effective target price and stochastic county yield). Both RCCP and BRP per acre payment rates were multiplied by base acres to determine the total payment for each representative farm. RCCP, BRP, direct payments, and MPCCI proceeds were included in the calculated stochastic government payments under the original NCGA proposal.

The revised payment proposal by NCGA requires the use of actual county crop revenue and expected county crop revenue, both of which were made stochastic in this model. Expected county crop revenue was defined by the NCGA to be the product of the fall futures price and county yield. County yields for years 2007-2012 were made stochastic by assuming they followed a multivariate empirical distribution off of historical county yields, having used the trend yield as a deterministic forecast. Fall futures prices were stochastically forecasted by using a stochastic basis relative to stochastic national prices. A historical set of basis' were developed by subtracting 10 years of fall futures prices (assumed to be defined as the average October futures price) from national average price. The future basis values were assumed to follow an empirical distribution. Futures prices for sorghum and barley were wedged off of corn futures prices. National average prices for years 2007-2012 were taken from 500 iterations of FAPRI's January 2007 baseline. NCGA defines expected county crop revenue as 95% of trend yield times the 3 year average spring futures price. Again, spring futures prices (assumed to be defined as the average futures price for that particular crop for the month of April) were stochastically forecasted using a multivariate empirical distribution that was built off of a historical basis. When actual county crop revenue is less than the guaranteed crop revenue, the difference is paid out on planted acres. Total government payments for the revised NCGA proposal include the RCCP payment, direct payment, and payments for CRP acreage, along with MPCCI.

The final proposal that was analyzed is that of the Administration's CCR program. Payments are made when national actual revenue falls below national target revenue. National target revenue is built off of the effective target price (target price less

direct payment rate) and the 2002-2006 Olympic average crop yield. National target revenue therefore remains constant over the analyzed time period. In the context of this model, national actual revenue is the only stochastic element. National actual revenue is calculated as the national yield, which was taken from 500 iterations of FAPRI's 2007 baseline, multiplied by the maximum of either the loan rate or the national season average price. This model utilizes the 500 iterations of FAPRI's 2007 baseline for national season average price. The payment rate is defined as the difference between the national target revenue and actual revenue divided by CCP yields. Payments are made on 85% of base acres. Total government payments for the CCR program incorporate CCR payments, direct payments, LDP, and any payments received for CRP acreage.

The model that was created allows the operator to select a farm for analysis and then select the crops on that particular farm to be analyzed. For the purposes of this paper, all results are reported from a whole farm basis (i.e. total government payments incorporates all of the government payments projected to be received by that individual farm for all of its on-farm activities).

Results:

Stochastic total receipts and stochastic government payments for each of the 12 representative farms were simulated for 500 iterations. An additional key output variable (KOV) was identified as being whether or not payments for that specific program were received in a particular year. This binary variable (0 if payments were not received and 1 if payments were received) was also simulated for 500 iterations over each of the twelve representative farms.

As one may expect the result vary significantly between the types of farms analyzed, but there is also significant variability within farm categories. Table 2 provides

a summary of the simulations, displaying the average annual probability of receiving payments in the 2007-2012 period. It is interesting to note that although CCR payments for cotton and rice farms are occurring at a relatively high frequency, the dollar value of those payments is very low. The 4000 acre California cotton farm (CAC4000) had an average total CCR payment of \$157 in 2007 and \$67 in 2012, while the 3640 acre Arkansas rice farm (ARSR3640) had an average total CCR payment of \$490 in 2007 and \$187 in 2012. Based solely on frequency of payments, we can see that all 4 types of farms should prefer at least one of the analyzed options relative to receiving CCP and LDP payments under the 2002 farm bill structure.

Table 2: Average Annual Probability of Receiving Payments

Farm ID	Primary Crop(s)	Average Annual Probability of Receiving Payments			
		CCP, LDP	RCCP+BCP 1	RCCP+BCP 2	CCR
MOCG2050	Corn and Soybeans	0.77	1.00	0.55	0.03
ING1000	Corn and Soybeans	0.57	1.00	0.56	0.03
NDG2180	Soybeans	0.71	1.00	0.67	0.03
COW3000	Wheat	0.51	0.72	0.91	0.01
MTW4500	Wheat	0.24	0.52	0.89	0.01
ORW4000	Wheat	0.36	1.00	0.42	0.01
CAC4000	Cotton	0.70	0.74	0.82	0.84
TXSP2239	Cotton	0.96	1.00	0.94	0.84
TNC1900	Cotton	0.83	0.85	0.94	0.84
CAR550	Rice	0.47	0.52	0.55	0.30
TXR1350	Rice	0.53	0.61	0.55	0.30
ARSR3640	Rice	0.73	0.81	0.71	0.31

As a snapshot of the model results, Appendix A offers cumulative density functions (CDF) of total government payments for the grain and oilseed farms for years

2008 and 2012. Over all three grain and oilseed farms analyzed, the revised NCGA proposal maintains a positive probability over the largest dollar amounts (2008 government payments for ING1000 is the single exception). The vertical portion of each CDF represents constant minimum payments under each particular scenario, generally direct payments less crop insurance premiums (should they apply). In all cases CCR not only provides the smallest probability of receiving a payment larger than the minimum payment, but also provides one of the smallest payments when the CCR payments do kick in. With respect to these selected grain and oilseed farms, there is not a particular proposal that first order stochastically dominates the others, but based on this analysis it is not unreasonable to expect a strong preference for the NCGA proposals by grain and oilseed producers.

The wheat farms that we analyzed provided interesting results; Appendix B displays CDFs for wheat government payments in years 2008 and 2012. Perhaps the most striking result is the completely vertical line for CCR payments in all cases, indicating that CCR payments never significantly come into affect for all 4 of the wheat farms analyzed (the probabilities represented in Table 2 show CCR payments coming into play about 1% of the time, however these payments are of such a small magnitude that the CDFs for wheat farms fail to significantly reflect these positive payments). MTW4500 show consistently large RCCP and BRP payments such that during all 500 iterations there are positive payments beyond what this farm would have earned with CRP and direct payments. The base farm bill and the revised NCGA proposal have government payments less than those from CCR for approximately 40% of the time on the MTW4500, representing the proportion of the time in which premiums are paid for

MPCI and no indemnities are received. Over all three wheat farms, it is clear that both of the NCGA proposals offer the potential of higher upside payments.

The four scenarios “pull away” from each other in the cotton farms more so than in any of the other types of farms. Appendix C offers CDFs of the cotton farms analyzed in both 2008 and 2012. With the exception of the NCGA proposals changing positions, the results for the cotton farms appear to be relatively consistent. CCR payments come into play about 30% of the time in 2008 and 20% of the time in 2012. The two NCGA proposals have the positive probabilities assigned to the highest level of potential government payments. Government payments in 2012 from the original NCGA proposal on the Texas cotton farm offer the only case of first order stochastic dominance; however, it is clear that either of the two NCGA proposals are likely to be preferred by a majority of producers on farms comparable to these three cotton farms we have analyzed.

Perhaps the most consistent set of farms analyzed were the rice farms (see Appendix D). CA550 and TX1350 had no prior MPCI participation and thus have the same starting point for payments (total direct payments for that particular farm) for all four scenarios analyzed. Reviewing where each of these scenarios “leave” the vertical line reveals the frequency at which the payments occur. In most cases, the original NCGA proposal is the first to come into play, while CCR payments are the last to move beyond the initial starting point.

Conclusions:

These above results appear to be consistent with the findings of Richardson and Outlaw (2007) that CCR would result in a budget savings for the government.

Additionally, the results of Aakre, Haugen, and Swenson (2007), along with those of

Olson and DalSanto (2007), are confirmed indicating that the NCGA proposal will expand the payments received by producers. This research extends the prior work, revealing specific impacts for representative farms across alternative crops and alternative U.S. locations.

While there is no particular proposal that stands out over all farms and all years analyzed, the two proposals by the NCGA offer the most potential for larger upside government payments. In addition, as table 2 revealed, the NCGA proposals offered a frequency that is at least as comparable to payments under the 2002 farm bill. These two concluding points make it clear that producers would generally prefer the NCGA proposals to either the Administration's proposal of the revenue based countercyclical payments or to remaining under the current programs of the 2002 Farm Bill.

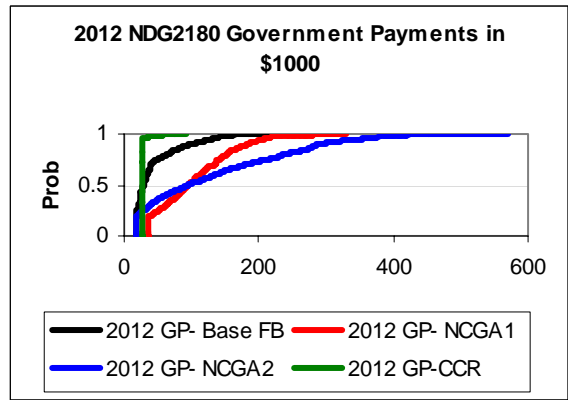
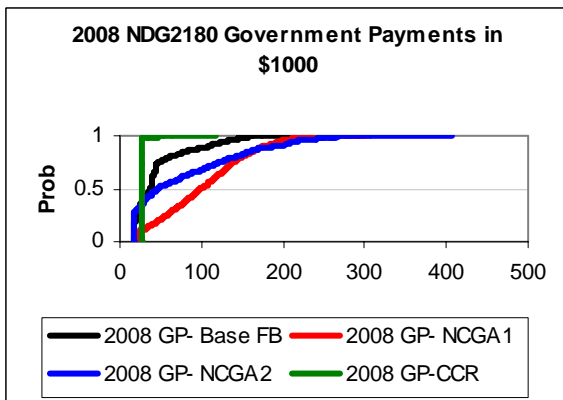
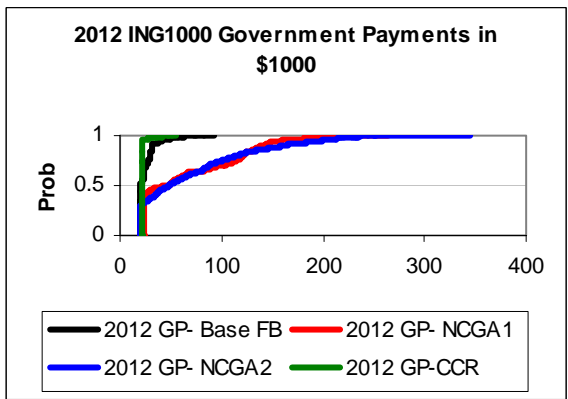
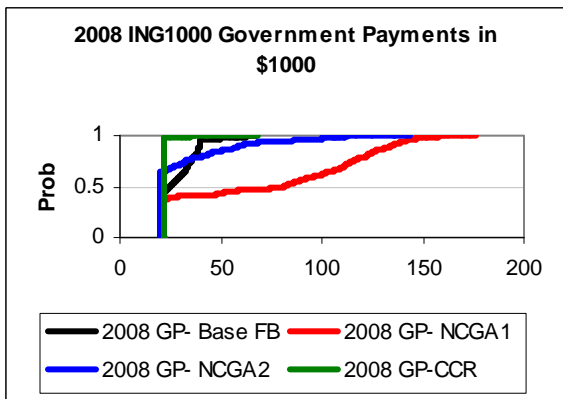
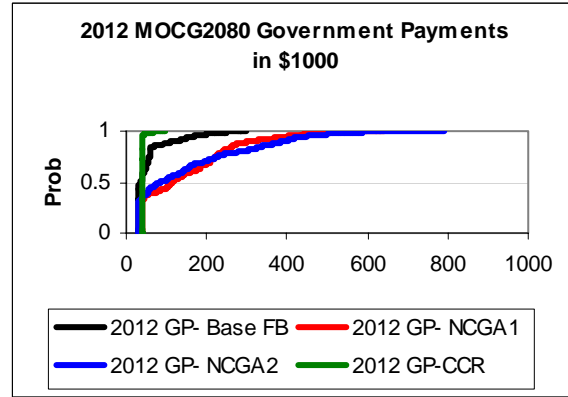
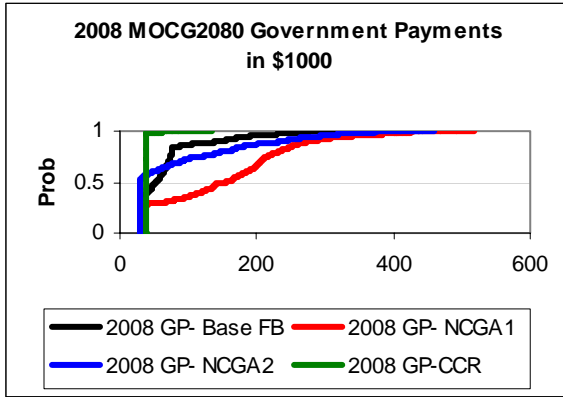
References:

- Aakre, D. G., R. H. Haugen, and A. L. Swenson. "Base Revenue Protection and Revenue Countercyclical Programs for Corn in North Dakota." Staff Paper AAE 07003. Department of Agribusiness and Applied Economics, North Dakota State University, Fargo, ND, March 2007.
- Aakre, D. G., R. H. Haugen, and A. L. Swenson. "Base Revenue Protection and Revenue Countercyclical Programs for Soybeans in North Dakota." Staff Paper AAE 07005. Department of Agribusiness and Applied Economics, North Dakota State University, Fargo, ND, March 2007.
- Aakre, D. G., R. H. Haugen, and A. L. Swenson. "Base Revenue Protection and Revenue Countercyclical Programs for Spring Wheat in North Dakota." Staff Paper AAE 07004. Department of Agribusiness and Applied Economics, North Dakota State University, Fargo, ND, March 2007.
- Coble, K. H., and J. C. Miller. "The Devil's in the Details: Why a Revenue-based Farm Program is No Panacea." Staff Report 2006-01. Department of Agricultural Economics- Mississippi State University, Mississippi State, MS, March 2006.
- Congressional Budget Office. "Farm Revenue Insurance: An Alternative Risk-Management Option for Crop Farmers." Congress of the United States, Washington D.C., August 1983.
- Hart, C. "Revenue-Based Income Safety Nets." Paper presented at Iowa Farm Bureau Policy Information Conference, Des Moines, Iowa, February 2007.
- National Corn Grower's Association. "National Farm Security Act Proposal." Farm Policy Issue Brief. Washington DC, December 2006.
- National Corn Grower's Association. "NCGA Commodity Title Recommendations." Farm Policy Issue Brief. Washington DC, April 12, 2007.
- Olson, K. D., and M. R. DalSanto. "Alternative Farm Bills: Impacts on Minnesota Farms." Staff Paper P07-5. Department of Applied Economics, University of Minnesota, St. Paul, MN, April 2007.
- Richardson, J. W., and J. L. Outlaw. "Comparison of the Counter Cyclical Payment Program to a Proposed Counter Cyclical Revenue Program." AFPC Briefing Paper 07-3. Agricultural and Food Policy Center, Texas A&M University, College Station, TX, March 2007.

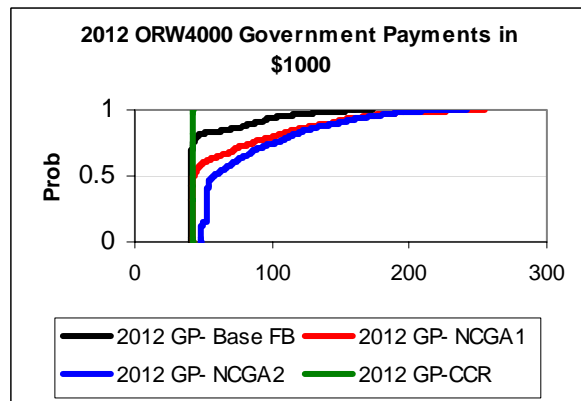
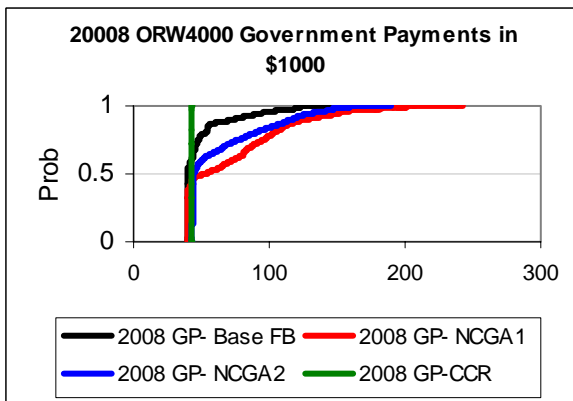
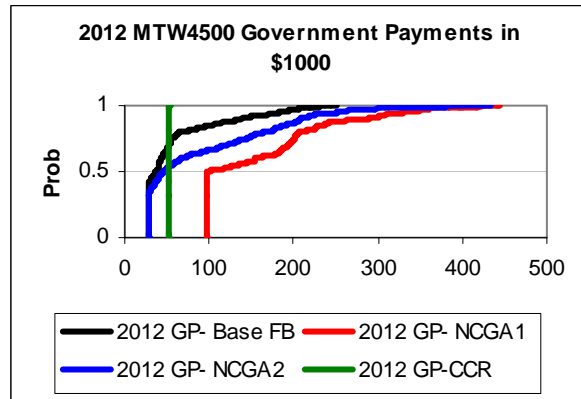
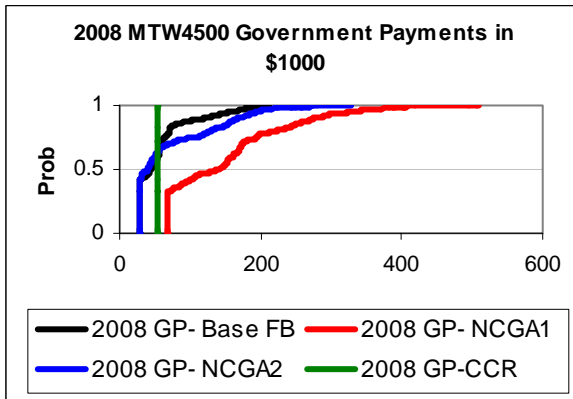
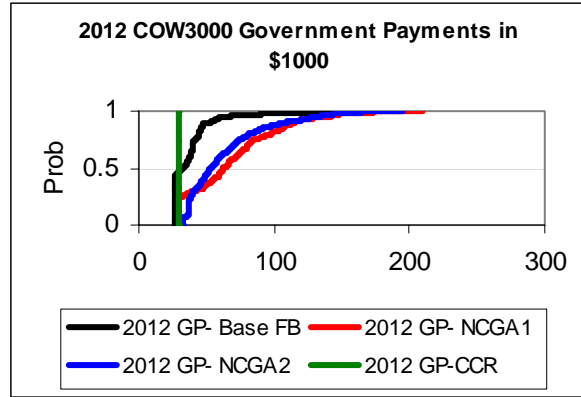
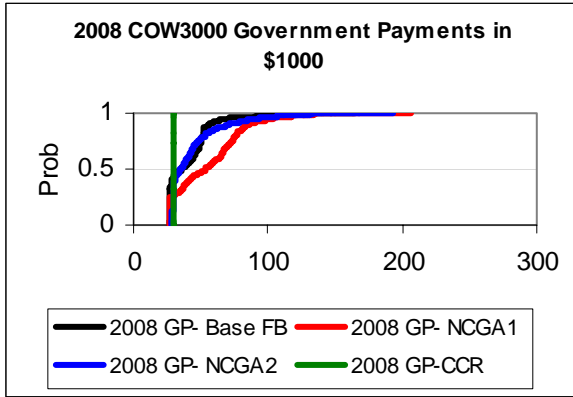
United States Department of Agriculture. "U.S. Department of Agriculture's 2007 Farm Bill Proposals." Report to Congress, Washington D.C., 2007.

United States Department of Agriculture. "Whole-Farm Approaches to a Safety Net." Economic Information Bulletin Number 15. Electronic Report from the Economic Research Service, Washington DC, June 2006.

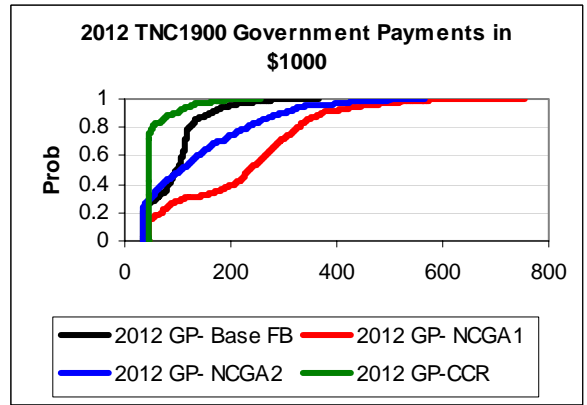
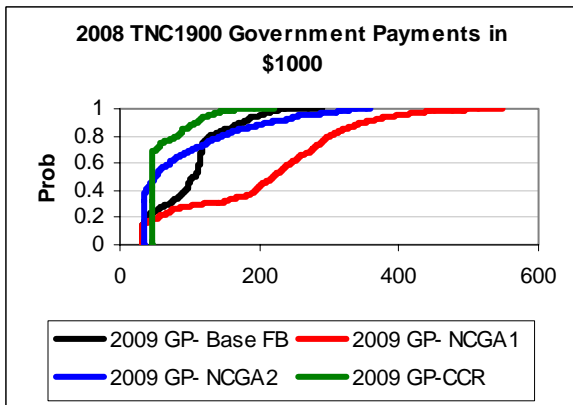
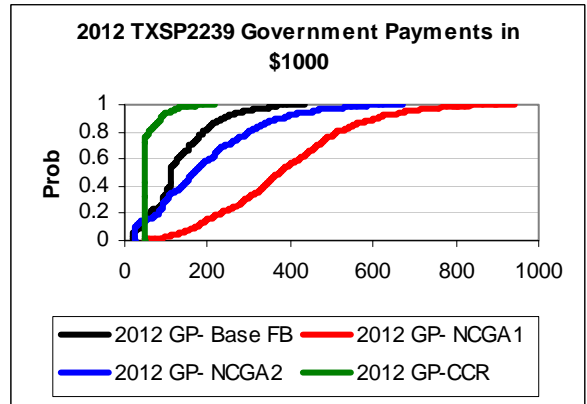
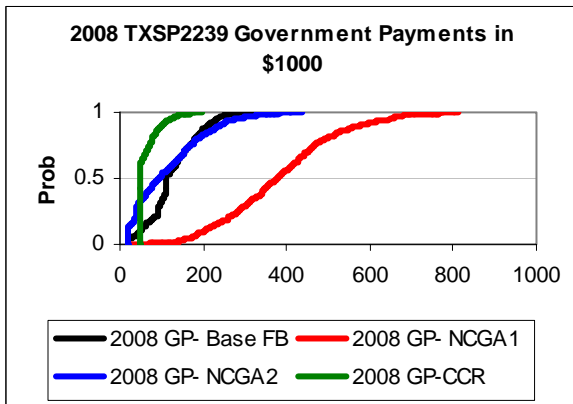
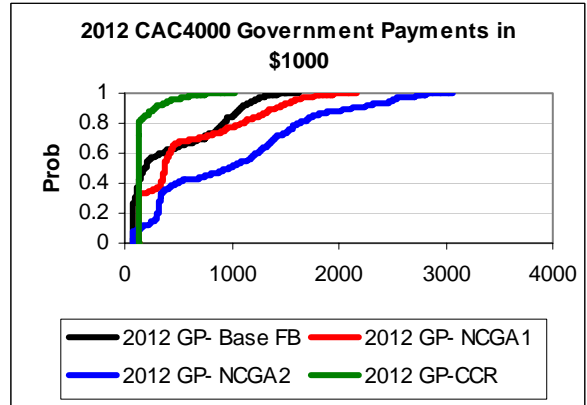
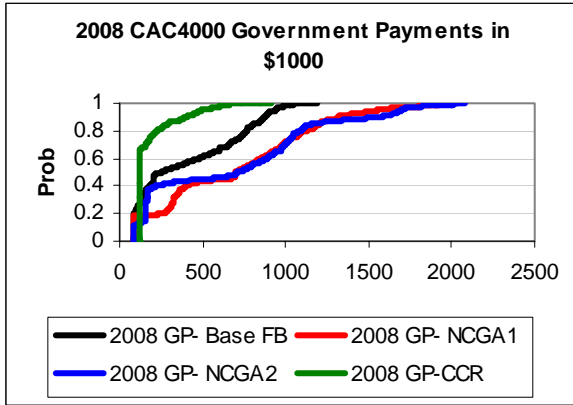
Appendix A- Grain and Oilseed Government Payments



Appendix B- Wheat Government Payments



Appendix C- Cotton Government Payments



Appendix D- Rice Government Payments

