POTENTIAL COST OF BEING LESS TRADE DISTORTING ON U.S. CROP FARMS

J. Marc Raulston, Joe L. Outlaw, James W. Richardson
Agricultural & Food Policy Center, Texas, USA
Email: jmraulston@afpc.tamu.edu

Abstract

The objective of this research is to evaluate impacts of moving to a less trade distorting commodity program. An optimal control stochastic simulation model is teamed with primary representative farm data and a whole farm simulation model to evaluate the impacts of shifting government payments from countercyclical payments (CCPs) to direct payments (DPs) on U.S. crop producers. The actual difference in total government expenditures can be sizable when switching from an uncertain payment dependent on prices that fluctuate to a fixed payment that is paid regardless of prevailing market conditions. Results indicate producers historically experiencing prices high enough to exclude them from receiving substantial CCPs require very little or no increase in DPs to make them as financially viable as before removal of the CCPs. Cotton and rice farms, historically receiving significant levels of CCPs, will require a larger cash outlay in the form of DPs to maintain financial viability.

Keywords: WTO, decoupled payments, trade, simulation model

Objective

The objective of this research is to evaluate impacts of moving to a less trade distorting commodity program. That is, how do different methods of shifting current countercyclical payments (CCPs) to direct payments (DPs) impact agricultural producers at the farm level? This study utilizes a two step methodology to measure and compare the impacts of shifting government payments from CCPs to DPs on crop producers in the United States. An optimal control stochastic simulation model is teamed with primary representative farm data and a whole farm simulation model to measure financial impacts of shifting government program payments at the firm level.

Background

Government program payments will certainly be more heavily scrutinized than ever as the upcoming farm bill debate gets underway. Negotiations during the now "paused" Doha Round negotiations have focused on reducing amber box payments. For the U.S. that would include the loan deficiency payments (LDPs), and the costs of the dairy and sugar support programs among others. Thus far, the U.S. has not reported expenditures for the CCP program, but it very likely could be considered amber box as it is only partially decoupled. Partially fueled by the panel rulings regarding the Brazilian cotton case, pressure is mounting for U.S. policymakers to shift government payments even further away from coupled payments tied to current production and market conditions to decoupled payments that do not depend on current production or prices.

One way of accomplishing this goal is to shift expected future coupled payments to fixed, decoupled payments. Different methods for achieving this exist; however, each method has very different, specific

impacts on various sectors of production agriculture. In this study, a stochastic optimal control model was used to determine increases in DP rates given a budget neutral policy change through two different methods. One method estimated increases in DP rates by a fixed percentage across all crops to maintain current spending levels, but changed how the payments are awarded. A second method maintained total payments for each crop by increasing DP rates sufficiently to offset losses in coupled payments.

Data and Methods

A two step approach was utilized to quantify and compare the impacts of alternative methods of shifting CCPs to completely decoupled, fixed DPs. In the first step, a model for projecting annual farm program payments to nine major crops is used to determine the DP rates necessary to offset government support forfeited through elimination of CCPs. The second step in the methodology calls for simulating representative crop farms with the DP rates identified in the first step for each policy alternative in order to determine the farm level impact of these potential changes.

Stochastic Optimal Control Model

The March 2006 Congressional Budget Office (CBO) Baseline for CCC and FCIC provides a projection of annual CCP, DP, and LDP program payments for feed grains, wheat, rice, upland cotton, soybeans, and peanuts. The CBO Baseline was used to develop a stochastic simulation model that calculates annual payments for these program crops over 2007-2016. The model uses the same stochastic framework as CBO to calculate program payments over the complete range of possible crop prices and weighing these costs by the probability of price falling in the associated range. The model is naive in that it does not allow a production response to changes in target prices, DP rates, and loan rates. Given that CCPs and DPs are decoupled from production, this assumption is not viewed as a limitation to the model. The lack of a production response to reductions in loan rates is not a significant limitation if the loan rate reductions are small in percentage terms and mean prices are greater than the loan rates.

Extensions in the author's model beyond the CBO model used to develop the CBO Baseline include an update of the probability distributions for prices based on the January 2006 FAPRI Stochastic Baseline and the inclusion of minor feed grains, comprised of sorghum, barley, and oats. These minor feed grains were added to the model using the January 2007 FAPRI Baseline projections of prices, acres, yields, DPs, CCPs, and LDPs for these crops. The CBO Baseline reports total payments to the three minor feed grains. The proportion of payments in FAPRI's Baseline paid annually to each crop was used to apportion CBO's projected payments to the minor feed grains. The mix of payments (CCP, DP, and LDP) to the minor feed grains was estimated using the fraction of payments for these programs in the FAPRI Baseline.

An optimal control mechanism (Solver in Microsoft® Excel) was used to estimate unreported price wedges, LDP wedges, and program participation fractions implicit in the CBO Baseline. After calibrating the model to the March 2006 CBO Baseline, the difference in total payments (error) for the nine program crops over the 2007 to 2016 period between the two models was $0.907 billion, or less than one percent, on a $104 billion budget forecast.

Total government expenditures for 2007-2016 CCPs are calculated given current and projected market conditions assuming the January 2007 FAPRI Baseline and assuming continuation of current farm program provisions (2002 farm bill). The model was used to estimate the increase in DP rates necessary to offset an elimination of the CCP program. The optimal control mechanism was used to estimate the DPs assuming there are no CCPs over the 2007-2016 period. The DP rates were calculated two ways:

Equity DP -- the DP rates for all crops were increased the same regardless of which crop had generated the CCPs.
No Equity DP -- the DP rates were only increased for a crop to offset its loss in CCPs. The DP rates for the Base DP scenario and the calculated DP rates for the Equity DP and No Equity DP alternatives are reported in Table 1.

Table 1: Direct payment rates for Base situation and two policy alternatives and average probability of receiving CCP by crop, 2008-2012.

	Base DP	Equity DP	No Equity DP	P (CCP > 0)
	--$/unit--	--$/unit--	--$/unit--	--%--
Cotton	0.0667	0.0815	0.1547	91.4
Wheat	0.52	0.64	0.53	3.2
Sorghum	0.63	0.76	0.63	1.6
Corn	0.28	0.34	0.28	0.8
Barley	0.24	0.29	0.24	2.2
Oats	0.02	0.03	0.03	2.0
Soybeans	0.44	0.54	0.44	7.7
Rice	2.35	2.87	3.10	38.8
Peanuts	36.00	44.00	36.00	59.2

For the first option, the DP rates were increased the same amount (22.2 percent) for all crops to offset the 10 year expected CCPs of $11.35 Billion. Under the second method, each crop's DP rate was solved for on a crop by crop basis using the optimal control mechanism in Excel. The DP rate for wheat increased 2.8 percent and the DP rate for corn remained unchanged because these crops have very low projected CCPs in the CBO baseline (Table 1). On the other hand, the DP rate for cotton increased 131.9 percent and the rice DP rate increased 32.1 percent as these crops have projected CCPs of $7.96 Billion and $1.33 Billion, respectively, over the next 10 years.

For the first option, the DP rates were increased the same amount (22.2 percent) for all crops to offset the 10 year expected CCPs of $11.35 Billion. Under the second method, each crop's DP rate was solved for on a crop by crop basis using the optimal control mechanism in Excel. The DP rate for wheat increased 2.8 percent and the DP rate for corn remained unchanged because these crops have very low projected CCPs in the CBO baseline (Table 1). On the other hand, the DP rate for cotton increased 131.9 percent and the rice DP rate increased 32.1 percent as these crops have projected CCPs of $7.96 Billion and $1.33 Billion, respectively, over the next 10 years.

Representative Farm Analysis

The simulation step utilizes primary representative farm data paired with a whole farm simulation model to examine the effects of alternative farm policies on agricultural producers. The representative farms were created through a focus group interview process. Variables including commodity prices, crop yields, production costs, equipment complement, and government program data are collected in initial meetings with the focus groups and are periodically updated through face to face meetings with the panels of producers. The Agricultural & Food Policy Center (AFPC) representative crop farms are categorized into four commodity groups based on percent of total receipts earned from particular commodities.

Impacts of policy changes were evaluated on representative farms located in major production regions throughout the United States using the farm level income and policy simulation model (FLIPSIM)

developed by Richardson and Nixon (1986). The FLIPSIM model draws random crop yields, livestock production variables, and prices from a multivariate empirical probability distribution allowing projections to incorporate production and price risk using the procedures described by Richardson, Klose, and Gray (2000). This study analyzed two farms from each of four commodity groups including feedgrain (Iowa and Nebraska), cotton (Texas Middle Coast and Georgia), wheat (Northwest Kansas and Montana), and rice (Texas and Arkansas). Government program variables for the eight farms are reported in Table 2.

Results

All representative farms within a commodity classification exhibited consistent preferences. Table 3 reports total government payments for the **Base DP** scenario and the percentage change resulting from implementing the **Equity DP** and **No Equity DP** alternatives. Average annual net cash farm incomes (NCFI) for the representative farms show the impacts of eliminating the CCP program and increasing the DP rates on the farms' financial situations.

The two representative feedgrain farms prefer the **Equity DP** scenario based on increases in NCFI. The second choice for the feedgrain farms is the **Base DP** situation. The least preferred alternative is the inequitable distribution of former CCPs in the **No Equity DP** scenario, as this scenario results in a decrease in NCFI for the Iowa and Nebraska representative farms of 1.6 percent and 1.5 percent, respectively. Although the feedgrain farms have considerably better CCP payment yields due to updating in response to the 2002 farm bill legislation, projected corn and soybean prices are high enough that a CCP is expected to be paid only 0.8 percent of the time for corn and 7.7 percent of the time for soybeans over the 2008-2012 period.

Table 2: Government program base acres and program payment yields for AFPC Representative Farms.

	Base Acres	DP Yield	CCP Yield
Feedgrain			
Iowa			
Corn	675	127	154
Soybeans	675	37	45
Nebraska			
Corn	1470	130	170
Soybeans	300	42.3	56.3
Wheat			
Kansas			
Wheat	1200	37	37
Sorghum	450	37	37
Corn	450	70	70
Montana			
Wheat	2295	41	41
Barley	1260	42	42
Cotton			
Texas			
Sorghum	495	39.4	41.4
Cotton	720	548	632
Corn	495	86	90
Rice	90	56.3	57.6
Georgia			
Cotton	1495	833	880
Corn	230	82.2	88.25
Peanuts	575	1.9	1.9
Rice			
Texas			
Rice	1280	60	60
Sorghum	160	43.7	43.7
Soybeans	50	23	23
Arkansas			
Rice	1620	55.4	59.4
Wheat	235	44	44
Soybeans	1620	29	36

Table 3. Average total government payments and net cash farm income for Base situation and percent change from Base for two policy alternatives, 2008-2012.

	Base DP	Equity DP	No Equity DP
	-- $1000 --	-- % Change from Base --	
Government Payments			
Feedgrain			
Iowa	57.4	5.6%	-4.1%
Nebraska	99.2	6.2%	-3.9%
Wheat			
Kansas	37.8	11.7%	-1.7%
Montana	55.3	14.6%	-0.3%
Cotton			
Texas	95.9	-22.0%	-5.4%
Georgia	293.4	-37.8%	-16.6%
Rice			
Texas	181.2	4.4%	10.8%
Arkansas	180.7	3.5%	7.0%
Net Cash Farm Income			
Feedgrain			
Iowa	207.5	1.2%	-1.6%
Nebraska	429.9	0.8%	-1.5%
Wheat			
Kansas	87.4	4.4%	-1.9%
Montana	203.0	4.0%	-0.1%
Cotton			
Texas	117.2	-33.5%	-18.0%
Georgia	288.8	-56.2%	-31.6%
Rice			
Texas	-341.3	0.2%	4.1%
Arkansas	134.2	1.0%	6.3%

The representative wheat farms exhibited similar preferences to the feedgrain farms; however, the preference of the Base DP scenario over the No Equity DP scenario is very slight, as the NCFI for the No Equity DP alternative is only 1.9 percent lower for the Kansas farm and 0.1 percent lower for the Montana farm. Wheat is only expected to experience a CCP 3.2 percent of the time over the 2008-2012 period. The preference for the Equity DP situation over the Base DP case is a much stronger preference. The representative wheat farms did not update their payment yields during the 2002 farm bill base and yield updating period, so their payment yields are equal between CCP and DP.

Both representative cotton farms prefer the Base DP situation. Cotton producers view CCPs favorably as they are expected to be paid on average 91.4 percent of the time over the 2008-2012 period. Increasing

the DP to compensate for lost CCPs inequitably in the No Equity DP scenario is the second preference for the representative cotton farms, although it results in sharp declines in NCFI for the Texas and Georgia farms of 18.0 percent and 31.6 percent, respectively. The Base DP scenario is preferred over the No Equity DP scenario because the associated increases in DP rates are not enough to compensate for the high CCPs already expected to be paid out over the period on a higher CCP yield. The equitable shift of former CCPs (Equity DP) is the least favorable scenario for cotton producers.

On average, rice is expected to experience prices low enough to trigger a CCP payment 38.8 percent of the time over the 2008-2012 period. It is interesting to note rice producers comprising the Texas representative farm did not update CCP payment yields during the 2002 farm bill base and yield update period as they would have lost valuable rice base acres in the process. Planted acres of rice in Texas have decreased sharply in recent history, and updating payment yields would have required assigning base acres on the basis of plantings over the 1998-2001 period. Both representative rice farms prefer the inequitable distribution of DPs in the No Equity DP scenario. The second preference for rice producers is the equitable shift of DPs in the Equity DP scenario, thus preferring the Base DP situation last. Implementation of the Equity DP scenario results in modest increases in NCFI over the Base DP situation of 0.2 percent and 1.0 percent for the Texas and Arkansas farms, respectively. Rice producers prefer both methods of shifting their CCPs, a risky form of government support, to DPs, a payment that is guaranteed regardless of prevailing market conditions because of little or no differences in payment yields.

In summary, producers historically experiencing prices high enough to exclude them from receiving CCPs of any consequence require very little or no increase in DPs to make them as financially viable as before removal of the CCPs. Cotton and rice farms, historically receiving substantial CCPs, will require a larger cash outlay in the form of DPs to maintain financial viability.

Discussion

The actual difference in total government expenditures can be sizable when switching from an uncertain payment that is dependent on prices that fluctuate to a fixed payment that is paid regardless of prevailing market conditions. All producers will not necessarily be affected equally. In addition, the process of updating farm program yields and base acres associated with the 2002 farm bill affects how a farm is impacted by the policy change. Many rice farms held off on updating program yields in many areas as they would have lost valuable rice program acres to improve DP yields, and, as a result, would suffer from converting CCPs to DPs. Cotton producers prefer CCP because it is essentially guaranteed money under the current FAPRI price projections. Rice producers prefer to shift risky CCP payments into higher guaranteed fixed payments. Feedgrain, oilseed, and wheat farmers were expected to receive very little or no CCPs anyway, so the transfer of expected CCPs to DPs is favorable for them.

References

Food and Agricultural Policy Research Institute. February 2007. FAPRI US Baseline Briefing Book. University of Missouri, Columbia, MO. FAPRI – UMC Report #02-07.

Hull, D., J. Langley, and G. Hitz. 2006. "CBO March 2006 Baseline for CCC and FCIC Outlays." U.S. Government Congressional Budget Office.

Richardson, J. W. and C. J. Nixon. July 1986. "Description of FLIPSIM V: A General Firm Level Policy Simulation Model." Texas Agricultural Experiment Station, Bulletin B-1528.

Richardson, J.W., S.L. Klose, and A.W. Gray. 2000. "An Applied Procedure for Estimating and Simulating Multivariate Empirical (MVE) Probability Distributions in Farm-Level Risk Assessment and Policy Analysis." Journal of Agricultural and Applied Economics, 32:2: pgs. 299-315.