



The 1995 Farm Bill

A Special Series of Alternative Policy Analyses

Agricultural Policy Analysis Center • The University of Tennessee
Great Plains Agricultural Policy Center • Oklahoma State University

August 1995

No. 1

Introduction to an Analytical Series

By Daryll E. Ray, Daniel G. De La Torre Ugarte, and Michael R. Dicks¹

Although much is yet to be decided, it is certain that the next farm bill will spend less money on agricultural price and income supports than current legislation. A range of interest groups representing taxpayer activists, agribusinesses, environmentalists, and even farmers who participate in farm programs have their own reasons to want to modify – if not completely eliminate – farm programs. Taxpayer groups are concerned about program cost, agribusinesses want to sell more farm inputs and process and market more farm products. Environmentalists want to tie environmentally benign practices to the receipt of direct farm payments, and farmers want to shed themselves of rigid rules.

It would be easy to become blasé if we were to consider only the national impacts of a policy change. A \$4 billion dollar drop in net farm income at the national level might have the *appearance* of agriculture's reasonable share of the impact of declining federal outlays. Adjustment and economic dislocation problems loom much larger if such a reduction is born by corn farmers in State A or by wheat farmers in State B. Farmers producing non-program crops in various areas also may be adversely affected as acreage shifts from crops which once received payments to their crops.

Also, it should be remembered that while the trend toward an increased "market orientation of agriculture" (begun with the Food

Highlights

- It is certain that Congress will reduce spending on agricultural commodity price and income support during the next farm bill. This series is intended to provide timely examinations of farm bill alternatives.
- This series was established with the idea of looking beyond merely national-level analysis of farm bill alternatives and including state- and regional-level results.
- These analyses were conducted using POLYSYS, a modeling system which anchors its analysis to a baseline, or expected situation, provided by CBO.

Security Act of 1985) made crop prices more freely determined in the marketplace, the incomes of grain, cotton, and rice farmers were not freed from their dependence on farm programs. In fact, their incomes are more directly dependent on the government than before the 1985 act. The 1985 legislation, in fact, resulted in grain farmers receiving less income from the marketplace and a larger share as direct government payments in the form of deficiency payments.

Farm-level data show that since 1985, government payments frequently comprise 25 percent to 50 percent of the net income of typical, full-time grain farmers. It is not uncommon for that share to reach 100 percent for some commodities. It may be easy to be lulled into thinking otherwise, but changes in the

¹ Authors are Blasingame Chair of Excellence in Agricultural Policy and Research Assistant Professor of Agricultural Economics, both of The University of Tennessee; and Associate Professor of Agricultural Economics, Oklahoma State University.

structure of farm programs have made farmers especially vulnerable to budget cuts at the very time when drastic cuts are likely to occur.

This discussion says nothing about the *desirability* or *undesirability* of current farm programs or the need to modify them. It only suggests that it would be easy to underestimate the adjustments which could be required as expenditures for farm programs decline significantly.

The key question is, *How can commodity programs be altered to achieve the budget cuts mandated for agriculture?* A range of approaches have been suggested, including:

- Modifying parameters in existing farm programs such as reducing target prices or increasing flex acreage.
- Shifting to a new program type such as lump sum payments or marketing loans.
- A complete phase-out of all farm programs.

Each approach could be shaped to achieve or exceed specified budget reductions. However, their impacts may vary widely across commodities, geographical regions, farm sizes, and on the general level and variability of national net farm income.

This publication series will examine the major farm program contenders, analyzing their impacts on grain, soybeans, and cotton sectors as well as the entire agriculture sector. This first issue reviews the basic assumptions and analytical framework used in these analyses. Also, the major elements of the farm program alternatives will be summarized.

Analytical Assumptions

To make comparisons across policy alternatives, it is important that the underlying economic conditions be held constant; in this manner, any changes in variables can be attributed solely to differences between the policy alternatives. The analyses performed for this series of papers employs the

Congressional Budget Office's (CBO) baseline estimates for 1996-2000 to represent economic conditions and serve as a yardstick for comparing alternatives.

This baseline was selected because Congress uses CBO estimates when considering the budget effects of alternative legislation. The CBO baseline contains estimates and assumptions about interest and inflation rates as well as changes in income, employment, exports, crop yields, and other economic indicators. Of particular importance are the assumptions about farm programs. CBO generally builds its baseline assuming the continuation of existing farm programs; this is done for analytical convenience and to reduce ambiguity. Assuming continuation of current programs makes no value judgements about current policy – nor does it imply anything about the probability that a given program will in reality be continued.

Assuming the extension of current programs, the baseline's direct federal outlays for price and income support for the feed grains (corn, oats, grain sorghum, and barley), wheat, rice, and cotton total \$33.7 billion during the period, 1996-2000. Federal expenditures for these major commodities account for 97 percent of the total direct outlays on all farm commodities and 82 percent of total Commodity Credit Corporation outlays for all farm commodities. Dairy and export programs are the only other major cost items (table 1). Tobacco, peanut, and sugar programs affect consumer prices – but program changes or even elimination would result in little budget savings. The crops included in this analytical series are the feed grains, soybeans, wheat, and cotton.

Other key assumptions have been made which could significantly affect analytical results. Those assumptions, some of which have been mentioned, concern: a) farmers' price expectations in making planting decisions; b) the speed of land-use shifts between crop activities; c) the existence and level of ARPs; d) the existence and configuration of the Conservation Reserve Program (CRP); and

Table 1. Baseline Estimates of Expenditures Assuming Continuation of Current Programs, 1996-2000 Fiscal Years

Program	1996	1997	1998	1999	2000
	<i>Million dollars</i>				
Feed Grains	3276	2950	3230	3405	3364
Wheat	1774	1825	1922	1843	1694
Rice	819	799	756	658	571
Upland Cotton	687	1051	1028	1015	1042
Soybeans	0	0	0	0	0
Peanuts	91	89	63	65	64
Tobacco	-155	-268	-364	-339	-130
Honey	10	0	0	1	2
Sugar	-32	-33	-33	-34	-34
Dairy	371	361	329	286	266
Other Commodities	101	107	119	119	120
SUBTOTAL	6941	6881	7050	7018	6960
Disaster Payments (Crops & Livestock)	80	80	80	80	80
Export	1126	995	885	781	679
Operation Expenses	260	298	148	135	125
Net Interest	86	143	105	42	4
SUBTOTAL	1552	1515	1218	1038	887
TOTAL OUTLAYS	8494	8396	8268	8056	7847

Source: Congressional Budget Office

e) uninterrupted, constant growth in crop yields.

Price expectations. Planting decisions are based on expected market returns and, if applicable, farm program payments. Farmer estimates of future market returns and deficiency payments affect planted crop acreage and program participation. Most farm policy analyses use the prior year's season average price as the expected price for planting decisions. Some analyses employ "rational price expectations," an estimate of the season average price based on futures prices, trend prices or econometric forecasts.

This analytical series uses a three-year, weighted-average price. The prior year ($t-1$) receives half the weight, the $t-2$ year receives 30 percent of the weight, and the $t-3$ year 20 percent. This approach reduces variability in planting and program participation decisions versus using only the previous year's price.

Further, the weighted-average approach is more tractable analytically than using futures prices – especially for outlying years.

Land-use shifts. A critical assumption in the analyses is how much year-to-year shifting is likely to occur between crops as well as in and out of production. Generally, during the past 60 years, a crop's acreage has not changed by more than 10 percent between any two years. But greater land shifts may occur if the highly restrictive land policies of the past are replaced with alternatives which include few restrictions on land use. This series bases land-use and crop mix changes on both historical shifts and expected returns to achieve consistency across scenarios and allow the possibility of greater land-use shifts.

If market returns exceed total cash costs (all out-of-pocket production costs), then the acreage devoted to any crop may rise or fall 10 percent. For example, if expected returns for

corn exceed those for soybeans in the geographic unit, then 10 percent of the soybean acreage may shift to corn. If market returns are lower than cash costs but higher than variable costs, then a 20 percent shift is allowed. If market returns are lower than cash and variable costs, then 100 percent of the acreage may shift to another crop or out of production.

Net returns are computed for substate regions (agricultural statistical districts, or ASDs) from average gross revenue and average cash and variable costs. This strategy allows for regional variation in yields and local prices and cultural practices. However, using only averages precludes producers with substantially higher-than-average costs who may cease operations if prices drop. Farmers leaving agriculture release land, machinery, and other resources to other farmers who can profitably use those resources to expand operations. Hence, continued growth in farm size is assumed implicitly. Even if lower net returns do not reduce significantly the total land under cultivation, farm size and output per operator may be expanding behind the scenes.

ARP levels. Deciding how to address short- and long-term, land-retirement programs (ARPs and CRP, respectively) was important in performing the analyses. Specific ARP “triggers” were written into the 1990 farm bill, but triggers were set at only a few stock levels, and the Secretary of Agriculture was given considerable discretion in their use. The ARP for corn, for example, was to be set from zero to 12.5 percent if the prior year’s stock-to-use ratio was 25 percent or lower; a 10 percent-to-20 percent ARP was required if the prior year’s ratio was greater than 25 percent. A more continuous relationship was needed for these analyses to allow comparison across scenarios. This series assumes that the Secretary would make incrementally increasing ARP requirements as stocks increased (total stocks/use is used for cotton) as indicated in table 2 (all feed grains are represented by the corn ARP).

CRP. The CBO baseline includes an extension of 15 million acres from the contracts

Table 2 Acreage Reduction Program Rules Used in the Analyses

ARP Level	Stocks		
	Corn	Wheat	Cotton
<i>Percent:</i>	<i>— Million Bushels —</i>		<i>Stocks/Use</i>
5.00	1,200 – 1,600	650 – 850	< 0.25
7.50	1,600 – 2,000	—	0.25 – 0.27
10.00	2,000 – 2,500	850 – 1,000	0.27 – 0.29
12.50	2,500 – 3,000	—	0.29 – 0.31
15.00	3,000 – 3,500	1,000 – 1,250	0.31 – 0.45
17.50	3,500 – 4,000	—	—
20.00	4,000 +	1,250 +	0.45 – 0.50
25.01	—	—	0.50 +

entered into during 1986-89. We have estimated the location and crop acreage most likely to be targeted based on the Environmental Benefits Index used by USDA during post-1990 sign-ups – with the exception that wildlife benefits have been added to the index. It should be noted that slightly more than 3 million acres were enrolled after 1990, and contracts for some acreage enrolled in the 1989-90 crop year actually began in the 1990-91 crop year. As a result, more than 20 million acres will remain in the CRP through 2000 but will decline to 15 million acres by 2005.

Volatility. The baseline and the alternative scenarios assume annual yield growth will follow historical trends. CBO assumes corn yields will grow by 1.5 bushels each year. However, corn yields have increased by little more than 1 bushel per year on average during the past decade. More importantly, corn yields have varied from 75 percent to 115 percent of the trend over the decade. This degree of variation is approximately the same for all program crops except wheat.

The variation in wheat yield ranges from 85 percent to 115 percent of the trend. Although the extremes are not as wide, year-to-year variation is greater for wheat than for other program crops. One issue this series intends to examine is this issue of volatility. Not accounting for such variations can mask the price and income instability which could

occur if certain programs (e.g., land-retirement programs) were eliminated.

Analytical Framework

The analytical system used in this series is called POLYSYS and is specifically designed to analyze farm program alternatives using a national-level baseline (such as that provided by CBO) as a reference point. As mentioned earlier, by anchoring the analysis to a baseline, only changes in farm program specifications are considered. Other influences – such as interest rates, population or income – are held at baseline levels. This approach results in a manageable system which is relatively easy to operate, modify, and update and can provide timely and comprehensive policy analyses.

Modifications and most of the applications of POLYSYS are carried out at the The University of Tennessee's Agricultural Policy Analysis Center (APAC). Development of the system has been a joint effort between APAC, the U.S. Department of Agriculture's (USDA) Economic Research Service (ERS), and the Great Plains Agricultural Policy Center at Oklahoma State University (OSU). A spreadsheet version of the crop supply module originally was developed by Michael R. Dicks at OSU. The crop demand, livestock supply and demand, and aggregate income portions of POLYSYS trace their origins to the microcomputer version of POLYSIM developed by Daryll E. Ray, APAC's director. Daniel G. De La Torre Ugarte of APAC rewrote the supply module and integrated the components to form the current system.

Regional crop supply. As mentioned earlier, crops currently in POLYSYS are the feed grains, wheat, soybeans, and cotton. Rice is the process of being incorporated. The geographic unit of analysis for crop supply in POLYSYS is the ASD (formerly known as Crop Reporting Districts). Linear programming (LP) models estimate acreage and production for 267 U.S. regions (ASDs in each of the contiguous states, except for the Northeastern States, which are treated as a

single region). Operating the model requires information on cash and variable costs, local price differentials, and yields for each of the model crops. The per-acre cost information is based on ERS's Farm Cost and Return Survey. Price differentials are computed at the county level from the USDA Consolidated Farm Services Agency's loan-rate data. Yield estimates are available from the USDA National Agricultural Statistics Service.

These data, gathered for a benchmark year, are indexed to corresponding national baseline data to develop annual data series for the full analysis period for each ASD. Regional acreages are normalized to national baseline levels prior to beginning a simulation so regional acreage and production changes are direct or indirect policy effects away from the baseline. During the simulation process, the LP model is fed expected national prices and, hence, expected ASD crop returns from the demand portion of the model.

POLYSYS supply-side output includes acreage, production, cash and variable costs, local prices, deficiency payments, value of production, and net returns for each of the 267 regions. Figure 1 shows the sum of the baseline net returns of the seven crops for the 267 POLYSYS regions. In addition to aggregated national numbers, output also is available by state and USDA production region. Other aggregations also are possible. Baseline deficiency payment totals for the seven crops are shown in figure 2 by state.

National portion. Season average crop prices and utilization levels are estimated at the national level. For grains, the national module estimates the following variables by crop for each year simulated: feed demand; food demand for wheat; exports; ending total, commercial, and government inventories; and calendar year cash receipts. The model's livestock product categories are cattle and calves, hogs, sheep, broilers, eggs, turkeys, and dairy. National estimates are derived from the system for production, domestic consumption, exports, imports, price, and cash receipts.

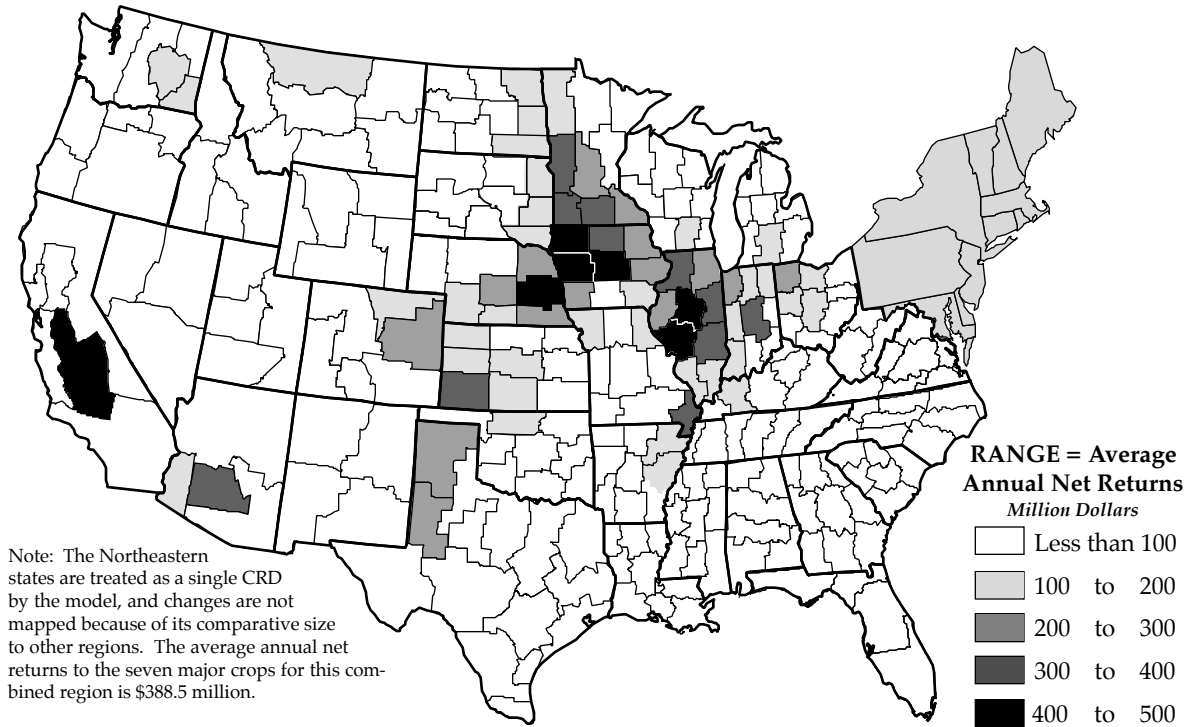


Figure 1. Average Annual Baseline Net Returns to the Seven Major Crops by Agricultural Statistical District, 1996-2000, Million Dollars

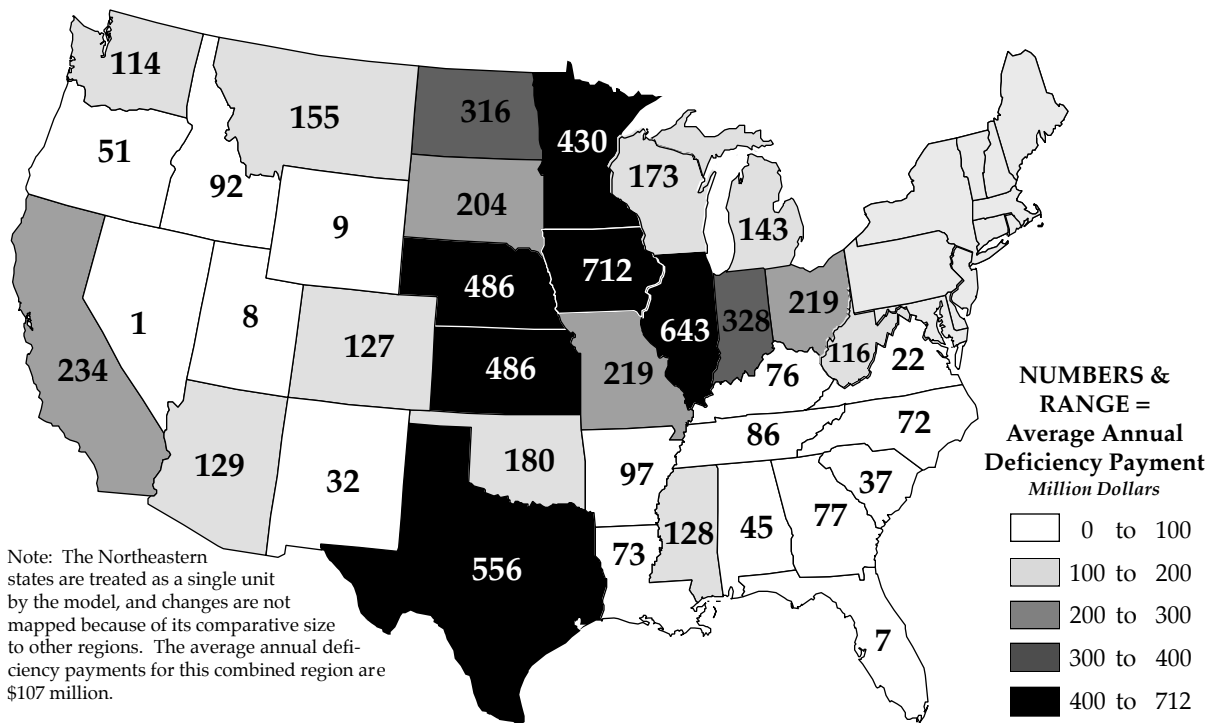


Figure 2. Baseline Average Annual Deficiency Payments by State, 1996-2000, Million Dollars

The approach of POLYSYS's national portion is to use percent changes from baseline values and demand (and supply) price-response parameters (elasticities) to estimate the effects of changes in farm programs and economic conditions. Use of a baseline and elasticities gives POLYSYS a scope and detail similar to other policy models but with substantially fewer computer time requirements.

Information from the crop and livestock modules are combined to estimate total net farm income and its major components: total market receipts, government payments, and production costs.

Program Alternatives

It is anticipated that this series will deal with specific issues already on the table, including:

- ***The Lugar Proposal.*** The main features of the farm policy changes proposed by Sen. Richard Lugar (R-Ind.), Chairman of the Senate Agriculture, Nutrition, and Forestry Committee are a 3 percent annual decline in target prices (15 percent total over the five-year life of the bill from the 1995 level) and the elimination of the Export Enhancement Program (EEP).

Some contend that virtually all of the exports under EEP are net increases which would not have occurred without the program; others feel it has substituted regular exports with lower-priced, subsidized exports. Our analyses will consider both possibilities.
 - ***Increased Flex.*** This alternative involves increasing the current program's 15 percent flex (the percent of base acreage ineligible for payments) by 5 percent annually to a total of 40 percent by 2000.
 - ***Program Phase-Out.*** In this scenario, all commodity programs are eliminated by 2000. The separate and combined effects of eliminating the various programs are evaluated. For example, it is anticipated that the separate impacts of eliminating land-retirement programs will be evaluated.
 - ***Marketing Loans.*** This alternative replaces nonrecourse loans and target prices/deficiency payments with a marketing loan program in which the loan rate is based on the market prices of previous years. This new loan program would be similar to current marketing loan programs for cotton and soybeans – except the loan rate for grains would be a percentage, say 110 percent, of a five-year average of market prices.
 - ***Lump-Sum Payments.*** This proposal also is known as the Freedom to Farm Act. Under this concept, farmers who participated in commodity programs during three of the past five years may enter a seven-year contract with the federal government, after which federal income support would end. The contract would allow these farmers to receive annual payments based on an average portion of their historical payments.
 - ***Administration's Proposal.*** Although details were sketchy at the time of publication, the components include the increase of planting flexibility to 30 percent, replacement of the three-entity rule with a one-entity rule, and other means to target benefits to moderate-size farm operators.
 - ***Budget Cap.*** In this scenario, target prices are changed proportionally each year to meet that year's projected budget cap.
- Before debate over the farm bill ends, other proposals undoubtedly will surface. In addition to evaluating as-yet unseen proposals, this series will address the sensitivity of simulation results to such things as weather-induced variability in crop yields, as well as assumptions about the speed of land-use shifts and farmer price expectations in making planting decisions.

For Additional Information...

Lipton, K.L., and S.L. Pollack. *A Glossary of Food and Agricultural Policy Terms*, 1989. 1989. USDA/ERS Agricultural Information Bulletin No. 573.

Hallberg, M.C., R.G.F. Spitze, and D.E. Ray, ed.s. 1994. *Food, Agriculture, and Rural Policy into the Twenty-First*

Century: Issues and Trade-Offs. Westview Press.

Ray, D.E., S.P. Slinsky, R.M. Pendergrass, and R.L. White. 1994. *An Analytical Database of U.S. Agriculture, 1950 to 1992: The APAC Database*. APAC Staff Paper No. 4-94.

Agricultural Policy Analysis Center

APAC was established by The University of Tennessee in 1991 to examine the impacts of changing policies and economic conditions at the national, regional, state, and farm level. The center is built around the Blasingame Chair of Excellence in Agricultural Policy, held by Daryll E. Ray.

Agricultural Policy Analysis Center
The University of Tennessee
310 Morgan Hall
Knoxville, TN 37901-1071
(615) 974-7407
Email: dray@apac.ag.utk.edu

Great Plains Agricultural Policy Center

The Great Plains Agricultural Policy Center was established in 1991 at Oklahoma State University in Stillwater, Okla. The center's mission is to analyze the implications of changes in federal and state policies on agriculture. Of particular interest are impacts on the economies, farms, and resources of the Great Plains.

Great Plains Agricultural Policy Center
Oklahoma State University
314 Ag Hall
Stillwater, OK 74078-0505
(405) 744-6163
Email: mdicks@okway.okstate.edu



Richard L. White designs this series and provides editorial and graphic support

The University of Tennessee Institute of Agriculture does not discriminate on the basis of race, sex, color, religion, national origin, age, handicap, or veteran status in provision of educational opportunities or employment opportunities and benefits.

The UT Institute of Agriculture does not discriminate on the basis of sex or handicap in the education programs and activities which it operates, pursuant to the requirements of Title IX of the Education Amendments of 1972, Public Law 92-318, and Section 504 of the Rehabilitation Act of 1973, Public Law 93-112, respectively. This policy extends both to employment by and admission to The University.

Inquiries concerning Title IX and Section 504 should be directed to the Office of Affirmative Action; 403-C Andy Holt Tower; The University of Tennessee, Knoxville; (615) 974-2498. Charges of violation of the above policy should also be directed to the Office of Affirmative Action.

The University of Tennessee E11-1216-00-001-96