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FAPRI Projections of CCC Expenditures: Accounting for Everything from ARP to PIK

by

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Patrick C. Westhoff and William H. Meyers*

Introduction

In the current budget-conscious environment, policymakers are not satisfied with estimates of the impacts of alternative agricultural policies on commodity prices, production, exports and net farm income. They also want to know the government cost of each policy on a fiscal-year basis. While it is relatively easy to compute the deficiency and diversion payments associated with a particular crop in a particular marketing year, calculating total government costs on a fiscal-year basis is another matter entirely. Cost calculations must pay special attention to factors as varied as the timing of payments, the operation of commodity loan programs and the effects of generic certificates.

This paper provides an overview of the model used by the Food and Agricultural Policy Research Institute (FAPRI) to estimate the cost to the government of U.S. agricultural programs. The paper also presents FAPRI's March 1988 baseline projection for government costs, and explains, in terms of the model, why costs are expected to fall.

The FAPRI Government Cost Model

The government cost model is one component of the set of models maintained by FAPRI to do agricultural policy analysis. As shown in Figure 1, the government cost model is essentially recursive off the domestic crop and livestock models. In turn, the estimates of direct government payments and subsidies which are derived by the government cost model enter as an input in the FAPRI net farm income model. The only simultaneity with other models occurs in the case of government stocks of program commodities, which are jointly determined by the domestic crop and government cost models.

The government cost model consists primarily of a set of accounting relationships. Given policy assumptions and the price and quantity outputs of the domestic crop models, deficiency and diversion payments and some other components of government costs can be computed directly. Costs of commodity loan programs, on the other hand, depend on a number of behavioral relationships that are not modeled elsewhere. Generic certificates, the Conservation Reserve Program (CRP) and the Export Enhancement Program (EEP) also require special treatment.

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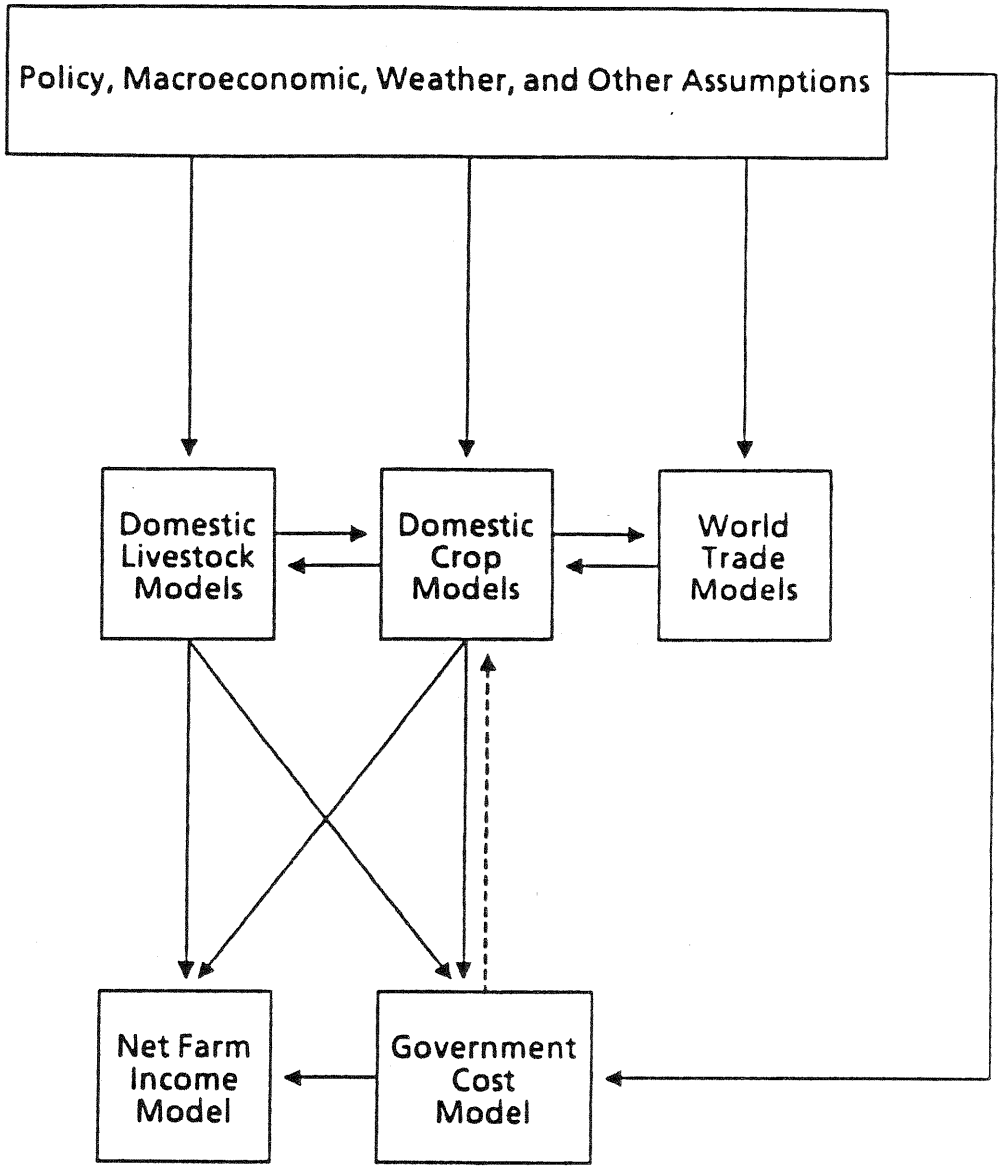


Figure 1. FAPRI Policy Modeling System

Programs accounting for more than 90 percent of the net cost of government agricultural programs are explicitly included in the FAPRI government cost model. Eight major program crops are covered: Corn, wheat, soybeans, cotton, rice, sorghum, barley and oats. In addition, the model estimates costs of the Conservation Reserve Program (CRP) and the dairy program, as well as net interest costs of government farm programs. Other net costs, for programs ranging from peanuts and sugar to wool and mohair totaled only $1.7 billion in fiscal 1986. Given assumed levels of only these other net costs, the model can provide estimates of net Commodity Credit Corporation (CCC) outlays which correspond to those published each year by the Agricultural Stabilization and Conservation Service (ASCS 1988).

To be consistent with the reporting practices of the CCC, costs are reported on a cash basis. Thus, when the CCC makes a payment with generic certificates, it is not recorded as a government cost. Likewise, when a farmer repays a nine-month loan with generic certificates, it is not recorded as a receipt. In practice, the FAPRI model computes costs as if all transactions were made with cash, but then makes adjustments to reflect the effect of generic certificates. A detailed description of the model is presented in the Appendix.

FAPRI Government Cost Projections

U.S. Government costs of agricultural programs peaked at $25.8 billion in fiscal 1986, and declined only slightly in fiscal 1987, to $22.4 billion. As shown in Figure 2, FAPRI projections completed in February 1988 (and published in March) indicate that costs are likely to fall sharply in fiscal 1988, and that more modest declines are likely to occur in later years. USDA also projects a sharp decline in CCC program costs in fiscal 1988 (Lyng 1988), but FAPRI's estimate is approximately $2.3 billion below the USDA estimate of $17.7 billion. Information unavailable at the time the FAPRI projection was prepared indicates that the final cost for fiscal 1988 is likely to approach the USDA projection.

Due to space limitations, no attempt is made here to explain in detail all the specific cost projections and the assumptions from which they are derived. FAPRI's outlook publication (FAPRI 1988) explains the policy assumptions, provides commodity supply and use projections, and includes a table and discussion of government costs by commodity. The complete set of government cost tables provides even more detail (Westhoff 1988).

The focus here is on the reasons why costs were as high as they were in fiscal 1986 and 1987, and why they are projected to decline under a continuation of current policies. The sharp increase in CCC costs during fiscal 1986 and the subsequent decline can be explained by examining what happened to two different types of government costs: direct payments and CCC stock outlays. Figure 3 shows that direct government payments and subsidies (a component of net farm income) peaked in calendar year 1987, more than a year later than the (FY 85/86) peak in CCC costs. Stock outlays account for most of the difference between the $24 billion average in CCC costs for fiscal 1986 and 1987 and the $14 billion average in direct payments and subsidies for calendar years 1986 and 1987.

Figure 2.
CCC Program Costs

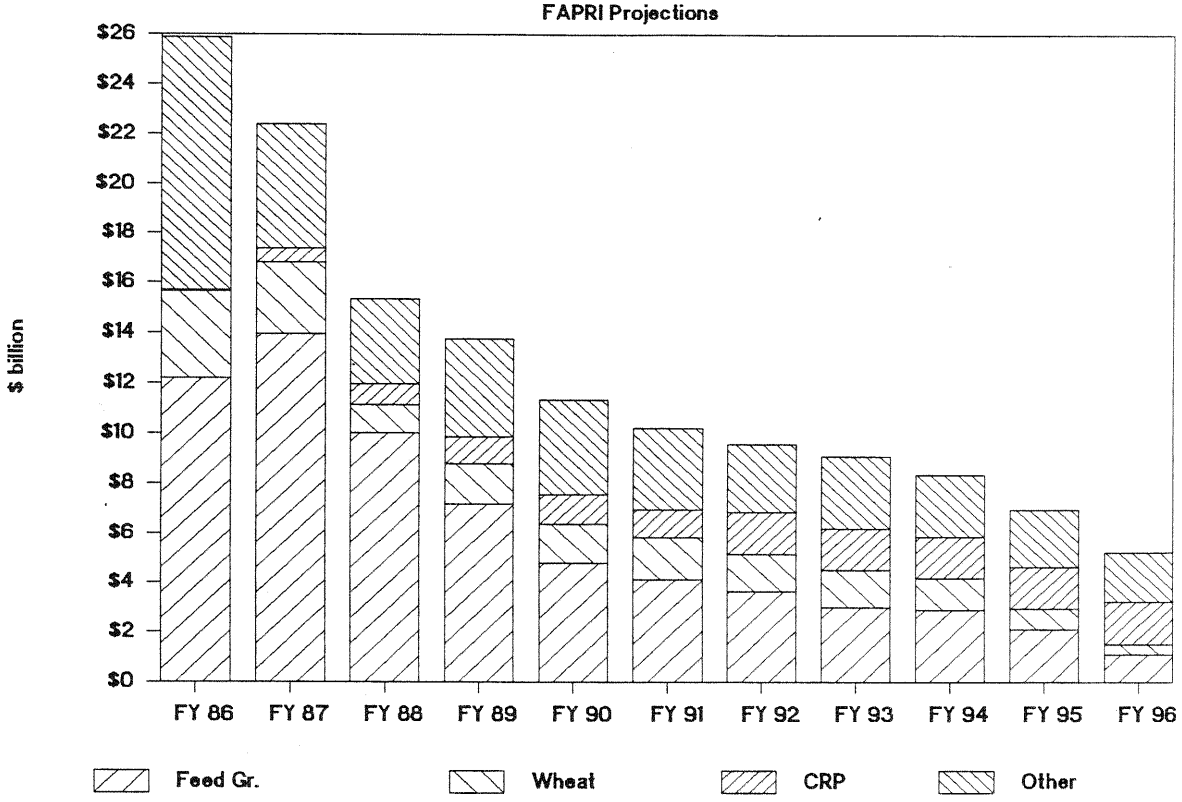
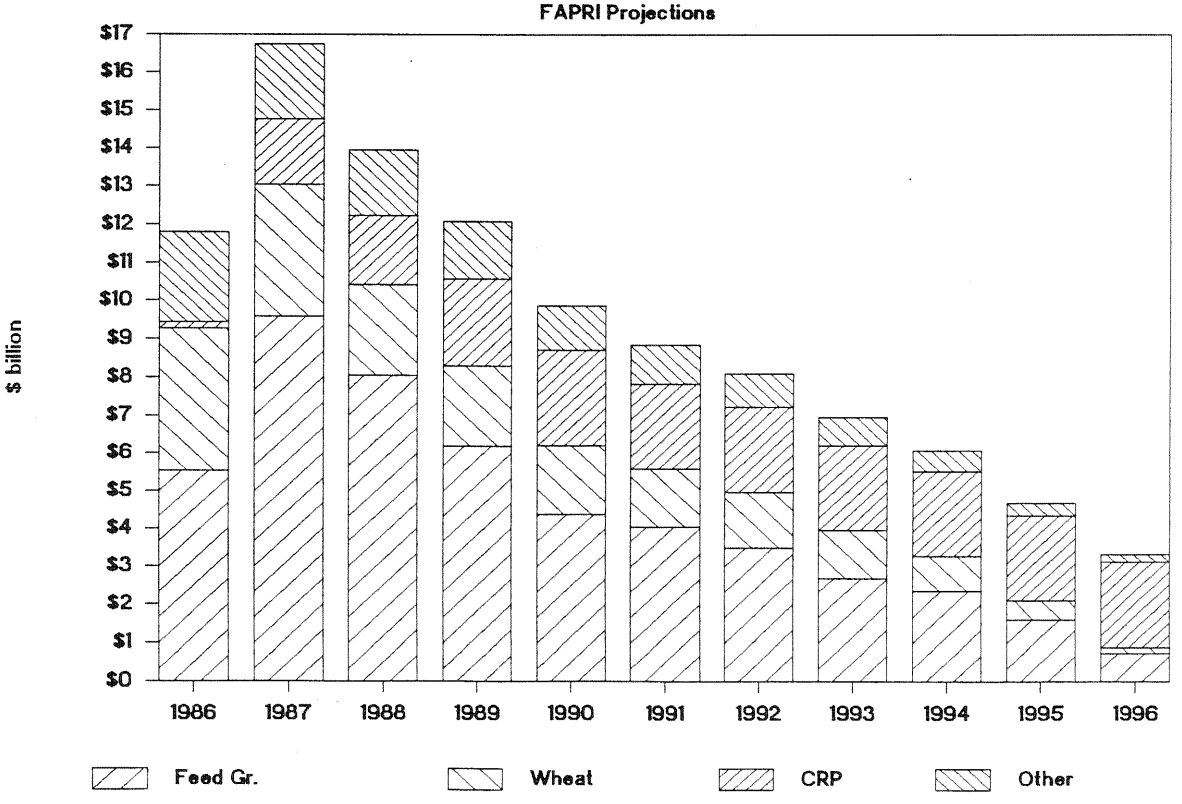


Figure 3.
Government Payments & Subsidies



Direct Payments

For major commodities, direct payments and subsidies are the sum of deficiency, diversion and producer storage payments. Also included are CRP rental payments and payments made under the Dairy Herd Termination Program. Generally excluded are costs associated with commodity loan programs, the handling and storage of CCC stocks, dairy product purchases, and program administration.

As a direct result of the FSA85, direct payments and subsidies increased from less than $8 billion in 1985 to about $17 billion in 1987. Figure 4 shows one reason why. By lowering loan rates while holding target prices constant, the FSA85 increased potential and actual deficiency payments dramatically. Since market prices fell below the loan rate, the corn deficiency payment rate was at its maximum allowed level for every crop year between 1985/86 and 1987/88. However, that maximum rate increased from $0.48 per bushel of eligible production in 1985/86 (the $3.03 target price minus the $2.55 loan rate) to $1.21 in 1987/88 ($3.03 minus $1.82). The picture is similar for wheat and most other major program commodities.

After 1987/88, FAPRI projects that the deficiency payment rate for corn (and most other program commodities) will fall steadily, until there is essentially no deficiency payment associated with the 1996/97 crop. Between 1987/88 and 1990/91, the FSA85 (as amended) calls for approximately a 10 percent reduction in target prices. After 1990/91, FAPRI assumes that target prices will be reduced by 2 percent per year under new legislation. Meanwhile, FAPRI projects that average annual corn prices will exceed the loan rate in 1988/89 for the first time since 1984/85, and that further modest increases will occur over the next decade. By 1996/97, FAPRI projects a target price of $2.44 per bushel and a market price of $2.40. Again, similar projections are made for other commodities.

The actual deficiency payment rate could differ substantially from the projections, due to the difference between projected and realized market prices, even if the target price assumptions prove accurate. Since the loan rate is assumed to be 75 percent of a moving average of market prices, potential deficiency payments are considerably larger than those projected. If, for example, a bumper crop resulted in prices falling to the loan rate in 1990/91, the deficiency payment rate would be $1.19 per bushel instead of the projected $0.75. If, on the other hand, a short crop or unanticipated foreign demand resulted in a $2.75-per-bushel corn price, there would be no deficiency payment in 1990/91.

Changing program requirements and participation rates also have an impact on direct payments and subsidies. Figure 5 shows that the number of bushels eligible for corn deficiency payments is projected to fall from 6.2 billion bushels in 1986/87 to 4.5 billion bushels in 1989/90. In 1986/87, 85 percent of all corn base acreage was enrolled in the program, and participants were only required to idle 17.5 percent of their land in the ARP and 2.5 percent in the PLD program. In 1989/90, the projected participation rate is 67 percent, and the ARP and PLD percentages are 20 and 10, respectively. Relaxed ARP and PLD requirements actually result in a slight increase in eligible production

Figure 4.
Corn: Deficiency Payment Rate
FAPRI Projections

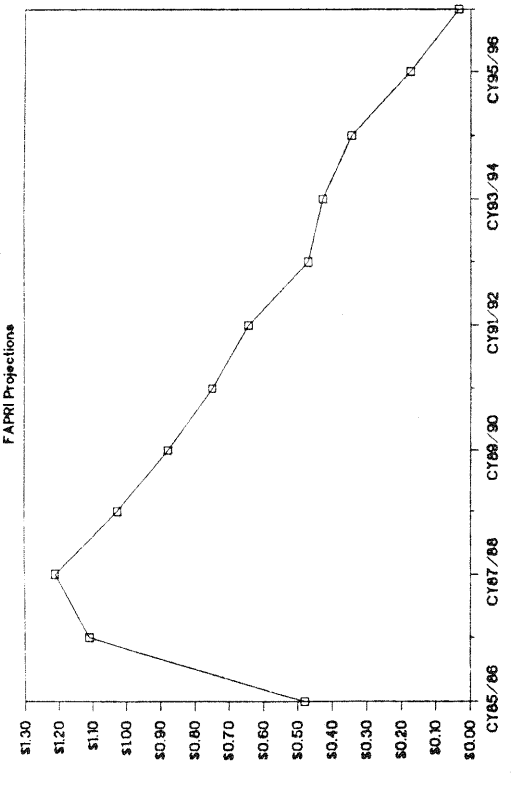


Figure 5.
Corn: Eligible Production
FAPRI Projections

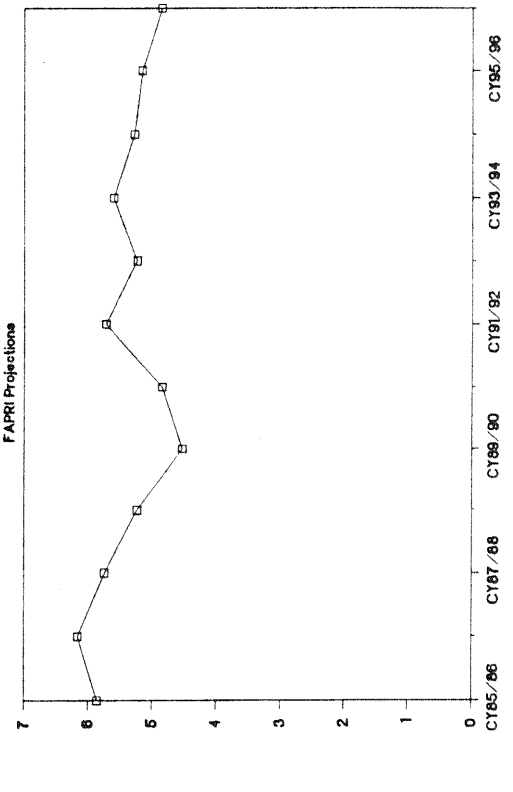


Figure 6.
Corn: Loan Rate and Market Price
FAPRI Projections

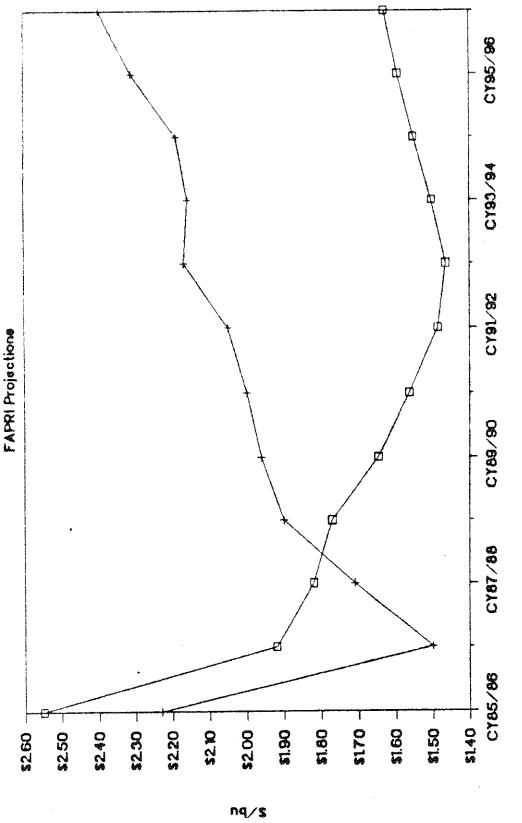
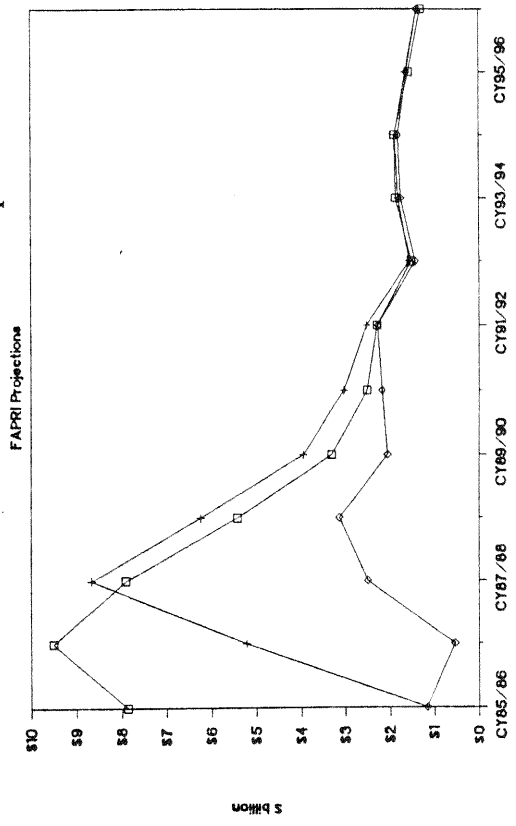


Figure 7.
Corn: Loans Made and Repaid
FAPRI Projections



in 1990/91, 1991/92, and again in 1993/94. After 1993/94, eligible production trends downward due to falling participation rates. Diversion payments, of course, are eliminated when PLD programs are eliminated after 1989/90.

CCC Net Loan Outlays

CCC net loan outlays were very large in fiscal years 1986 and 1987, but they are projected to become insignificant over the next couple of years. Again using corn as an example, Figures 6 and 7 indicate why. During the 1985/86 and 1986/87 crop years, market prices fell substantially below the loan rate. As a result, a very high proportion of eligible corn went under loan, and very few loans were repaid, at least not with cash. The availability of generic certificates resulted in about $5 billion in total repayments in 1986/87, but that still fell more than $4 billion short of the value of loans made.

Reduced production and stronger demand are resulting in higher market prices and reduced stock levels during the 1987/88 marketing year. Including loans repaid with certificates, FAPRI projects that loan repayments may actually exceed the value of loans made during 1987/88. Market prices are projected to exceed the loan rate in 1988/89 by a modest margin, and the gap between market prices and loan rates is projected to increase over time. As a result, the incentive for farmers to put grain under loan will fall dramatically, and forfeits should be few. Until stocks are brought down to more normal levels, loan repayments are likely to continue to exceed the value of loans made.

Program Costs

Three different ways of looking at the cost of the corn program are presented in Figure 8. Using the account framework of the CCC, the government cost of the corn program exceeded $12 billion in fiscal 1987. The cash value of direct payments and subsidies was less than $6 billion. Part of the difference was due to stock outlays, as discussed above. Another part, however, was due to the net inflow of generic certificates. When certificates were issued in lieu of wheat deficiency or CRP rental payments, and then used to redeem corn loans, the value of the certificates was not counted as a cost to the wheat or CRP programs, or a revenue to the corn program. Adjusting for the net inflow of certificates, the "true" cost of the corn program in fiscal 1987 was about $2 billion less than that reported by the CCC.

Since corn prices remain relatively weak compared to prices of other commodities, certificates are expected to continue to flow into corn for the next few years. Thus, the "true" cost of the corn program will continue to be less than that reported by the CCC, although the gap will narrow over time. The cash value of direct payments and subsidies will actually peak in fiscal 1988. In later years, the net stock outlays are projected to be small, so the difference between CCC costs and direct payments is also projected to be small.

As shown in Figure 9, the picture for wheat is the mirror image of that for corn. Reported CCC costs are below direct payments and "true" program costs, due to the net outflow of certificates from the wheat program.

Figure 8.

Corn: Total Program Costs and Payments

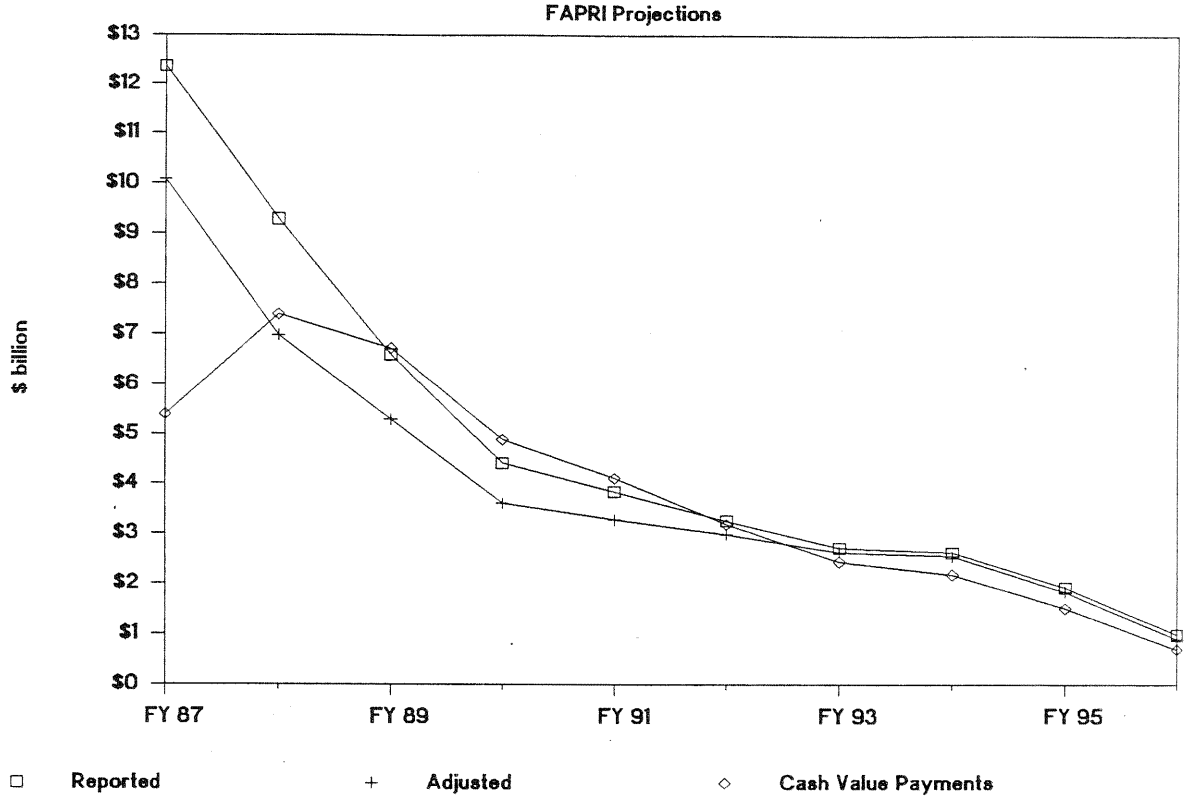
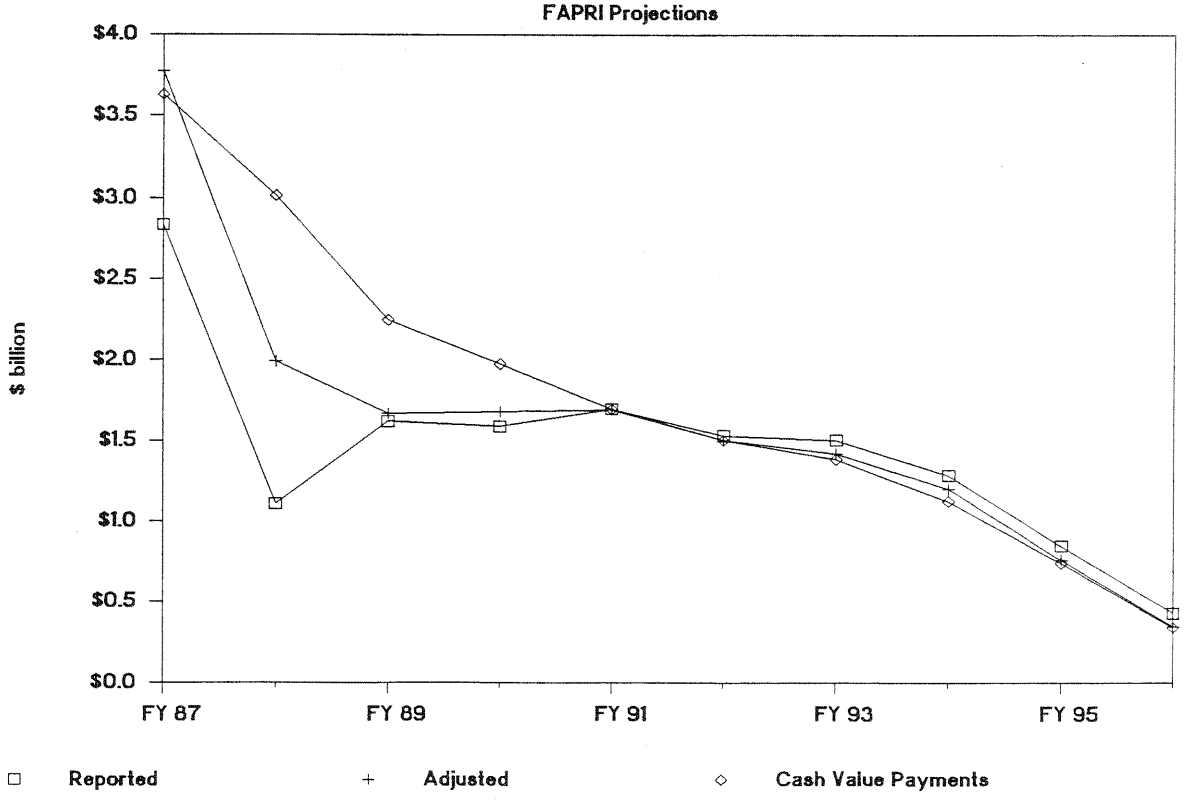


Figure 9.

Wheat: Total Program Costs and Payments



Other reasons for the projected decline in CCC costs are detailed in FAPRI (1988). They include reduced dairy purchases, an end to marketing loan subsidies for cotton and rice, reduced storage costs due to lower stock levels, and lower net interest costs. On the other hand, CRP rental payments will increase as the size of the reserve increases. By 1996, in fact, CRP rental payments are projected to account for more than half of all direct government payments and subsidies.

Conclusions and Qualifications

This paper has provided an overview of the FAPRI government cost model, and a brief explanation of why FAPRI projects government costs will fall under a continuation of current policies. The model is able to use the output of other FAPRI models to develop projections of government costs that are consistent with the accounting framework used by the CCC. This is an important tool for doing policy analysis, since it allows FAPRI to provide meaningful estimates of the effect on government costs of alternative policies. In the era of Gramm-Rudman budget constraints, policymakers are more interested in the effect of a policy on the budget than its effects on some measure of net social welfare.

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APPENDIX

Table 1 summarizes key identities used in computing government costs for corn, as an example of the procedure used for major program crops. To simplify matters for purposes of this table, is is assumed that no generic certificates are utilized in making program payments.

Deficiency Payments

To calculate the deficiency payment corresponding to a particular crop, the amount of eligible production and the deficiency payment rate must be determined. This is done in Equations 1-3 in Table 1. Eligible acreage is, approximately, the amount of land that program participants are allowed to plant. For any given farmer, this is equal to his or her base acreage (as adjusted for CRP enrollment) minus any land idled under the Acreage Reduction Program (ARP) or the Paid Land Diversion (PLD) program. To calculate national eligible acreage, rates of participation in the ARP and PLD programs must be taken into account. A "slippage" factor is included to account for any land which receives deficiency payments that seemingly should not. Our estimates indicate this is a small, but positive amount. Eligible production is simply the eligible acreage multiplied by the program yield.

The total deficiency payment rate per bushel is the difference between the target price, on the one hand, and the higher of the loan rate and the market price, on the other. This rate must be adjusted for any Gramm-Rudman reductions, such as those in effect for the 1986/87 crop.

The Food Security Act of 1985 provides for three separate corn deficiency payments. Advanced deficiency payments are made when farmers enroll in the program, several months before planting. The second deficiency payment is made several months after the crop is harvested, and the final payment is made after the end of the marketing year. Thus, corn deficiency payments corresponding to a single crop are made in three different fiscal years. For example, the advanced deficiency payment corresponding to the 1987/88 corn crop was made during fiscal 1987, the second payment was made in fiscal 1988, and the final payment will be made at the beginning of fiscal 1989 (barring a change in policy).

Advanced deficiency payment rates are announced before sign-up, and generally are set equal to 40 percent of the expected total deficiency payment (Equation 4). This may not be the same as 40 percent of the actual total deficiency payment, because the actual market price may not equal that projected by USDA at the time of sign-up. Advanced deficiency payments equal the payment rate multiplied by eligible production for most producers. However, since advanced deficiency payments are subject to the $50,000 limit on certain direct government payments, some producers do not receive all the payments to which they would otherwise be entitled. As a result, calculated advanced deficiency payments must be adjusted slightly (Equation 5). Relatively few corn farmers are affected by the payment limitations, but the limit does affect a significant proportion of cotton and rice farmers.

The regular (or second) deficiency payment is perhaps most easily described as that part of the total deficiency payment not included in

Table 1: Key Identities Used to Calculate Corn Government Costs
(Assumes all payments are made in cash)

1. Eligible Acreage = Base Area * Participation Rate * (1 - Acreage Reduction Program Rate - (Paid Land Diversion Rate * Percent of Participants Also Enrolled in the PLD)) + "Slippage"

2. Eligible Production = Eligible Acreage * Program Yield

3. Total Deficiency Payment Rate = max (0, (Target Price - max (Actual Loan Rate, Market Price)) * (1 - Gramm-Rudman Reductions)))

4. Advanced Deficiency Payment Rate = Announced Rate, or Proportion of Payment Made in Advance * Total Deficiency Payment Rate

5. Advanced Deficiency Payments = Advanced Deficiency Payment Rate * Eligible Production * Adjustment for the $50,000 Payment Limit

6. Regular (2nd) Deficiency Payment Rate = Total Deficiency Payment Rate - Advanced Deficiency Payment Rate - max (0, Base Loan Rate - max (Actual Loan Rate, Market Price))

7. Regular (2nd) Deficiency Payments = Regular (2nd) Deficiency Payment Rate * Eligible Production * Adjustment for the $50,000 Payment Limit

8. Final (Findley) Deficiency Payment Rate = max (0, Base Loan Rate - max (Actual Loan Rate, Market Price))

9. Final (Findley) Deficiency Payments = Final (Findley) Deficiency Payment Rate * Eligible Production * Adjustment for the $250,000 Payment Limit

10. Paid Land Diversion Acreage = Base Acreage * Participation Rate * Paid Land Diversion Rate * Percent of Participants Also Enrolled in the PLD

11. Diversion Payments = Paid Land Diversion Acreage * Program Yield * PLD Payment Rate * Adjustment for the $50,000 Payment Limit

12. Farmer-Owned Reserve Storage Payments = 0.5 * (Beginning + Ending FOR Stocks) * FOR Storage Payment Rate

13. Commodity Credit Corporation Storage and Handling Costs = 0.5 * (Beginning + Ending CCC Stocks) * CCC Storage Payment Rate + Loan Forfeitures * Cost of Handling Forfeited Grain + Factor for Miscellaneous Storage and Handling Costs

14. Value of Loans Made = Loans Made * Loan Rate

15. Value of Loans Repaid = For Each Crop Year, Loans Repaid * Loan Rate for that Crop Year

16. Value of Commodity Credit Corporation Sales = Volume of Sales * Market Price * Adjustment for Grain Quality, Timing of Sales

advanced or final payments. The regular deficiency payment rate equals the total rate minus the advanced rate minus any difference between the base loan rate and the higher of the market price and the actual loan rate (Equation 6). The base loan rate is that which would have been in effect had the Secretary of Agriculture not applied the Findley Amendment to reduce the actual loan rate by up to 20 percent (in 1987, for example, the base loan rate for corn was $2.28 per bushel, and the actual loan rate was $1.82). In computing the regular deficiency payment, an adjustment must again be made for the $50,000 payment limitation (Equation 7).

If the season-average market price for corn is below the base loan rate, a final (or Findley) deficiency payment is made. The final payment rate is the difference between the base loan rate and the higher of the market price or the actual loan rate (Equation 8). Final deficiency payments are not subject to the $50,000 payment limitation, but they are subject to an overall limit of $250,000 on government payments of all types. In the case of corn, little adjustment is necessary to reflect this limitation (Equation 9).

Diversion Payments

Diversion payments have also been made in two installments, but generally both occur during the same fiscal year, and therefore, they do not need to be treated separately. Paid Land Diversion acreage can be estimated, given base acreage, the PLD rate and participation rates (Equation 10). The diversion payment rate is determined by the announced payment rate per bushel and the average base yield of PLD acreage. Diversion payments are subject to the $50,000 payment limitation, so calculated payments must be adjusted accordingly (Equation 11).

Producer Storage Payments

Storage payments are made to producers participating in the Farmer-Owned Reserve (FOR) and Special Producer Storage Loan (SPSL) programs. Storage payments are assumed to equal the average of beginning and ending stocks in the FOR and SPSL multiplied by the payment rate (Equation 12). Since the payments depend on how much corn is in storage each month during the year, Equation 12 is only an approximation which may err substantially when FOR stocks vary dramatically during the course of the marketing year.

CCC Storage and Handling

CCC storage and handling costs are assumed to depend primarily on the amount of corn in CCC stockpiles and on the amount of corn forfeited to the CCC in the course of a year. Storage costs are handled in the same manner as producer storage payments, although the CCC storage payment rate is higher (Equation 13). Handling costs are incurred when the CCC must move forfeited grain to CCC elevators. Miscellaneous expenses include the cost of moving and treating grain in CCC elevators.

Commodity Loan Programs

The net cost of commodity loan programs is equal to the difference in the value of loans made and those repaid. The value of loans made is simply the

loan rate multiplied by the number of bushels put under loan (Equation 14). Loans must be repaid at the loan rate which prevailed when the loan was made, so the value of loan repayments depends both on the number of bushels redeemed and the year in which the loans had been made (Equation 15). Interest payments are included in the estimates of net interest costs of farm programs.

In addition to loan repayments, the CCC also receives revenues when it sells grain from CCC stocks. Since sales are only allowed when prices are substantially above current levels or when grain is out of condition, most corn sold by the CCC in recent years has been sold at prices below the market price for Number 2 Yellow. Offsetting this, however, is the fact that the CCC is more likely to sell grain when prices are at seasonal highs than when prices are depressed (Equation 16). Other net costs of the government corn program (including items as diverse as disaster payments and program administration) are not explicitly modeled, but are included as an exogenous line item.

Converting Crop Years to Fiscal Years

To calculate total government costs of the corn program for any given fiscal year, it is important to carefully consider when payments are made and when other costs are incurred. As shown in Table 2, fiscal year costs include payments corresponding to three different corn crops. Since the corn marketing year (September-August) does not exactly correspond to the fiscal year (October-September), loan program costs incurred during one crop year do not precisely correspond to particular fiscal year. This is not a major problem for corn, but it is for wheat, where the marketing year is June-May.

Government Stocks

In the FAPRI crop models, 9-month loan, FOR and CCC carryover stocks are not determined by estimated equations. However, the analyst who operates the model does adjust government stock levels when policy parameters and market signals change. A stock activity table, like that show in Table 3, is used to keep track of government stocks, and to require the analyst to "tell a story" consistent with the specified levels of carryover stocks. The stock activity table is located on the same spreadsheet as the rest of the government cost model, since many of the numbers it includes are necessary to calculate storage and loan program costs, and since it relies on estimates of generic certificate availability generated by the cost model. The stock activity table is the only source of simultaneity with the domestic crop models.

In Table 3, the column labeled "Crop Year" indicates the year in which the grain of interest was harvested. For example, the table indicates that at the beginning of the 1986/87 crop year (September 1, 1986), there were 2569.2 million bushels of corn from the 1985 harvest still under 9-month loan. During the course of the 1986/87 marketing year, an additional 83.9 million bushels from the 1985 crop were placed under loan, 847.7 million bushels were converted to the FOR or SPSL programs, 1286.6 million bushels were forfeited to the CCC, 275.4 million bushels were redeemed, and, therefore, 243.3 million bushels were left under loan on August 31, 1987. FOR and SPSL loan activity is handled in a similar way.

Table 2: Calculating Fiscal Year Corn Program Costs Given Crop Year Data

	Fiscal 1988	Fiscal 1989
Deficiency Payments		
Advanced	CY-1988/89	CY-1989/90
Regular (2nd)	CY-1987/88	CY-1988/89
Final (Findley)	CY-1986/87	CY-1987/88
Diversion Payments	CY-1988/89	CY-1989/90
Producer Storage Payments	CY-1987/88*	CY-1988/89*
CCC Storage and Handling	CY-1987/88*	CY-1988/89*
Commodity Loan Program		
Loans Made	CY-1987/88*	CY-1988/89*
Loans Repaid (Revenue)	CY-1987/88*	CY-1988/89*
CCC Sales (Revenue)	CY-1987/88*	CY-1988/89*
Other Net Costs	CY-1987/88*	CY-1988/89*

*Crop year does not precisely correspond to a particular fiscal year.

Table 3: Corn Stock Activity Table for the 1986/87 Crop Year
(million bushels)

	Crop Yr.	Carryin	Made	Convert	Forfeit	Repaid	Outstand
9-Month Loan	1983-84	19.7	0.9	0.0	7.5	6.4	6.7
	1985	2569.2	83.9	847.7	1286.6	275.5	243.3
	1986		4872.4	0.0	17.4	3002.7	1852.3
	Total	2588.9	4957.2	847.7	1311.5	3284.6	2102.3
Reserve Loan Activity	1980	5.9			1.5	0.2	4.2
	1981	103.7			20.7	6.4	76.6
	1982	146.6			26.9	4.5	115.2
	1983	10.6			0.4	0.1	10.1
	1984	382.4		0.0	0.6	0.2	381.6
	1985	62.3		847.7	0.0	0.0	910.0
	1986	0.0		0.0	0.0	0.0	0.0
	Total	711.5	0.0	847.7	50.1	11.4	1497.7

		Carryin	Forfeit	Exports	CCC PIK	Sales	Carryout
CCC Stock	1986	546.0	1361.6	35.0	131.0	298.6	1443.0

	CRP	Defic.	Divers.	Other	Total	For Loan	For CCC
PIK	301.3	1243.5	460.7	1225.0	3230.5	3099.5	131.0

The row labeled "CCC Stock" can be explained as follows: The total supply of CCC stocks is equal to the carryin from the previous year plus the number of bushels forfeited to the CCC from loan programs. Stocks can be reduced through PL-480 and other export programs, by exchanging CCC grain for generic certificates, or by outright grain sales. Most (but not all) of the numbers needed to complete the "9-Month Loan," "Reserve Loan Activity," and "CCC Stock" portions of Table 3 can be derived from the weekly report of "Price Support Loan Activity" issued by ASCS.

While the numbers in the stock activity tables for each crop and each crop year are not derived from estimated equations, they are adjusted to reflect likely behavior by farmers, traders, and the government. The number of loans made is increased when market prices fall, or when loan rates, eligible production, and certificate availability increase. Loan repayments increase with the number of outstanding loans, market prices, and certificate availability, and fall when loan rates increase. Forfeitures increase when the number of outstanding loans and loan rates increase, or when market prices and certificate availability fall. Conversions from the 9-month loan program to the FOR increase when current market prices fall or when loan rates and storage payment rates increase, but conversions can also be restricted by the government. Likewise, the ability of farmers to extend loans is determined by government policy.

Present intentions are to systematize the behavioral relationships implicit in the stock activity tables. However, estimated equations using time series data are likely to be of limited relevance. The advent of generic certificates has resulted in major changes in stock-holding behavior that would not be reflected by equations estimated over data collected under previous policy regimes. For example, no estimated equation would have been likely to predict that over 60 percent of the 9-month corn loans made in 1986/87 would be repaid in the same year, even though prices were substantially below the loan rate during the entire marketing year.

Generic Certificates

Generic certificates (also know as payment-in-kind, or PIK, certificates) greatly complicate the computation of government costs. When the CCC issues certificates in lieu of making cash payments, many components of government costs are affected. Some of the changes are due simply to the use of an accounting framework that determines the cash cost of different programs. Other changes result from behavioral changes that occur when certificates are available.

Considering first the effect of certificates on the government cost accounting system, certificates necessarily reduce the cost of some line items while increasing the cost of others. Suppose that half of all corn deficiency payments are made in certificates. This would reduce the cash cost of the corn deficiency payment program by 50 percent, if all else remains constant. How the certificates are used will determine the net impact on government costs.

Suppose the certificates are used to repay 9-month corn loans. When loans are repaid with cash, the farmer pays the CCC the loan rate plus accumulated interest. However, when certificates are used to redeem loans,

the repayment rate is the lower of the Posted County Price (PCP) and the loan rate. No interest payment is made, and an additional implicit subsidy results if the PCP is below the loan rate, as it has been for most of the last two years in most of the country. The PCP generally is equal to or less than local market prices, and is subject to considerable manipulation by the government.

The above scenario would be treated in the FAPRI cost model as follows:

1. Corn deficiency payments would be reduced by 50 percent.
2. The dollar value of the certificates would be computed, and that would be translated into bushels at a rate equal to the lower of the market price (as a proxy for the PCP) and the loan rate.
3. If all else is held equal, the number of bushels of corn redeemed with cash would be reduced by the number of bushels redeemed with certificates, reducing the value of repayments by the corresponding amount.

Unfortunately, matters get much more complicated. Certificates can also be used to redeem CCC grain, in which case the government loses only potential sales revenue, and saves on storage costs. Certificates issued to make payments in one program can be used to redeem grain in another program (e.g., certificates received in lieu of wheat deficiency payments can be sold to a corn farmer, who can then use them to redeem a corn loan). Although they are only valid for a certain time period, certificates can be carried over from one fiscal year to the next. Finally, certificates can be redeemed for cash, although there is little incentive to do so as long as they sell at a premium above their face value (Since "PIK-and-roll" activities can result in arbitrage profits and save storage costs, certificates generally sell at a premium, sometimes as much as 10 percent above their face value).

The FAPRI model attempts to account for these varied ways in which certificates are utilized. In Table 3, for example, the bottom line (labeled "PIK") summarizes the sources and destinations of certificates related to corn for the 1986/87 crop year. The number under "CRP" represents the bushel-equivalent of the certificates issued under the Conservation Reserve Program to make bonus and rental payments on corn base acres enrolled in the program. Likewise, the bushel-equivalent of corn deficiency and diversion payments made during the crop year are reported. The number under "Other" represents net inflow of certificates from other programs, including the wheat, CRP, and EEP programs, and carryover from the previous year. The total number of certificates can then be used to redeem loans ("For Loan") or obtain CCC stocks ("For CCC").

Assumptions about behavior in the presence of generic certificates determine the net effect of certificates on government costs. Although the relationships are not systematized, it is assumed in model operation that the use of certificates depends on a number of market and policy factors. The lower the market price relative to the loan rate, the more likely that certificates will be used to redeem loans. Higher market prices imply certificates are more likely to be used to obtain CCC stocks or to be redeemed for cash. Certificates generally flow from commodities (like wheat) where prices exceed the loan rate to commodities (like corn) where prices are below

the loan rate. The proportion of certificates used for different purposes can be manipulated by USDA, depending on how terminal and PCP prices are set. It is likely that fewer certificates will be issued when carryover stocks have been reduced to more normal levels.

As shown in Table 4, the net effect of certificates on government costs is ambiguous. Certificates lower prices by releasing more grain onto the market, which tends to increase participation rates, deficiency payment rates, and the number of commodity loans made. On the other hand, certificates reduce loan defaults and storage costs, and they may increase market prices in the long run. In 1986/87, few certificates were used to obtain CCC stocks, while almost all corn loans were repaid with certificates at PCPs well below the loan rate. Unless loan forfeitures would have increased dramatically in the absence of certificates, it seems likely that the issuance of certificates increased fiscal 1987 program costs above what they would have been had all payments been made in certificates. As prices rise and the proportion of certificates used to obtain CCC stocks increases, it is more likely that certificates may actually reduce CCC costs, at least in the long run.

Miscellaneous Programs

For wheat, corn, soybeans, sorghum, barley and oats, the above description provides a basic overview of the FAPRI government cost model. Rice and cotton are complicated slightly by the marketing loan program, which allows loan repayment at the lower of the loan rate and the world price. Conservation Reserve Program cash costs are easily computed, given assumed enrollment, establishment costs, annual rental payments and the proportion of payments made in certificates. Net dairy program costs depend on net CCC purchases, the support price, assessments, and the cost of the Dairy Herd Termination Program. Net interest costs are estimated based on the number of loans made and defaulted. Other net costs are exogenous.

Future Model Development

There are a number of ways in which the FAPRI model can and will be improved:

1. Many of the parameters included in the current version of the model were arrived at through Delphi processes. Obtaining more information about program specifics may help reduce the level of uncertainty in these parameters.
2. The behavioral assumptions implicit in the stock activity tables need to be systematized. Even if this does not imply estimated equations, there is a need to reduce the reliance on the judgment of the model operator.
3. The manner in which generic certificates are handled should be revised. An approach that derives a supply and use table for generic certificates holds the most promise.
4. Finally, it is important to note that the FAPRI government cost projections are only as good as the program assumptions and the supply, use and price projections from which they are derived. Improving FAPRI crop and livestock models may be more important to improving cost projections than are improvements in the cost model itself.

Table 4: Change in Government Costs Due to an Increase in Certificates

Program	Factors which Increase Costs	Factors which Reduce Costs
9-Month Loan	More loans made, due to lower market prices, more eligible production, lower storage and interest payments, and the possibility of arbitrage profits.	More loans repaid, since loans can be repaid with certificates even when prices are below the loan rate.
FHR Loans	If entry is permitted, lower current prices and higher expected prices might result in more entry.	More loans repaid, due to repayment with certificates, and some early repayments which reduce FHR storage payments.
CCC Stocks	Defaults could increase due to lower market prices if certificate availability is insufficient to repay enough loans, resulting in higher storage payments.	Defaults could fall due to certificate availability, and redemption of CCC stocks with certificates would also reduce CCC storage payments.
Deficiency Payments	Lower market prices increase payment rates and increase program participation.	In the long run, higher market prices could result from lower stocks and reduced acreage.
Diversion Payments	Lower market prices increase program participation.	In the long run, lower stocks reduce the need for diversion programs.
Export Subsidies	Subsidies may be politically necessary for commodities where certificates have little effect on market prices (e.g., wheat).	Lower market prices may avert demands for export subsidies where prices fall due to certificates (e.g., corn).
Conservation Reserve	Bids could increase if farmers believe declining stocks imply higher prices ahead.	Bids could fall if farmers focus on current market prices.
Dairy	Lower current grain prices may increase milk production.	Higher future grain prices could discourage current investment.