Modeling Agricultural Policies and Programs

Major agricultural policies and programs, as currently in effect in the Farm Security and Rural Investment Act (the 2002 Farm Act), are modeled as below.

Payment Bases

Producers' payment bases establish the producer's eligibility for direct payments and counter-cyclical payments but do not limit production of these crops. Payment bases apply to the following commodities: corn, soybeans, grain sorghum, wheat, rice, barley, oats, and cotton. They are based on the producer's crop and yield history for each crop. However, the producer need not produce the crop (or any crop) to be eligible for the decoupled payments.

Decoupled Payments

Production flexibility contract, market loss assistance payments, and post-2002 direct payments apply to the same list of commodities and are modeled as lump sum additions to gross income that are decoupled from current production levels and prices. They are limited by payment bases and affect only net farm income. Direct payments associated with the payment bases of particular commodities are calculated post-optimally according to the provisions and parameters of the farm legislation and proportionally adjusted to equal the aggregate direct payments reported in the ERS farm income accounts.
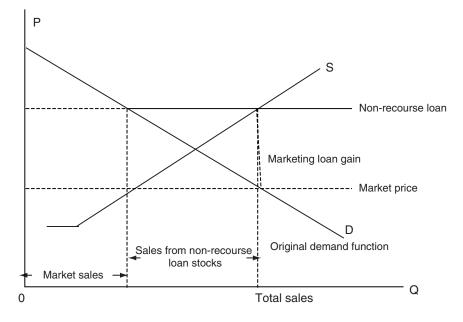
Counter-Cyclical Payments

Counter-cyclical payments can be termed partially decoupled payments, because though they depend on the average market prices of the commodity, they do not depend on the quantity of production by any individual. They are disbursed in the same manner and on the same payment bases as decoupled payments. Counter-cyclical payments are treated the same as direct payments in this model because they do not change the market prices for the commodity that the producer faces. Rational producers would not alter their market-determined optimal production levels unless they believed that their actual production history would someday be used to update their payment bases.[1] Counter-cyclical payments for supported commodities are calculated post-optimally as the payment base acreage *times* the program yield *times* the difference between: (1) the higher of the average market price or the loan rate and (2) the target price minus the direct payment rate. The result is then multiplied by an adjustment factor to scale the aggregate counter-cyclical payment level to that reported in the ERS farm income accounts. This amount is paid as a lump sum, and, as with the decoupled payments, the owner of the payment base need not produce the commodity or any commodity to be eligible to receive them. Note that counter-cyclical payments will be at their maximum whenever loan deficiency payments or marketing loan gains are active.

[1]This ignores any changes in risk or wealth that may affect the producer's decisions.

Loan Deficiency Payments and Marketing Loan Gains

Loan deficiency payments and marketing loan gains are two different support mechanisms that have identical results—they allow the effective price to producers to be above the market price of supported commodities. The programs have remained the same under the 1996 Farm Act and the 2002 Farm Act. Marketing loan gains operate in the following manner. The producer can obtain a loan equal to the value of the crop at the loan rate and later repay it at the value of the crop at a lower posted county price (market price), which may be changed daily or weekly. The marketing loan gain rate, the difference between the average market price and the loan rate, is paid to the producer on **all** production of the supported commodity, whether marketed, stored, or used on the farm. In the EDMP model, marketing loan gains are endogenously calculated by successively introducing perfectly elastic nonrecourse loan demands at the loan rate, then introducing activities that sell from the nonrecourse loans into the market (fig. 3). At levels of production at which the nonrecourse loans are active, the effective price to the producer for the commodity is the loan rate. Market prices, in contrast, seek market-determined levels below the loan rate determined by the sales from the nonrecourse loan activities. Loan deficiency payments and marketing loan gains are thus coupled payments; producers know that the lowest effective price they will receive for the commodity is the loan rate and will take this into consideration in making production and asset value decisions.[2]

Figure 3
Marketing loan gains

[2] Two versions of this EDMP model were constructed on an experimental basis. The first version modeled the loan deficiency payment mechanism by inserting loan deficiency payment activities that activated at the loan rate and its corresponding demand quantity and offset the decline in market prices. This kept the effective prices to the producer constant when market prices fell below the loan rate. Some problems arose with this formulation in that it allowed multiple optimal solutions to the model. The alternative formulation of the marketing loan gain mechanism, adopted and discussed in this version, does not allow multiple optimal solutions.
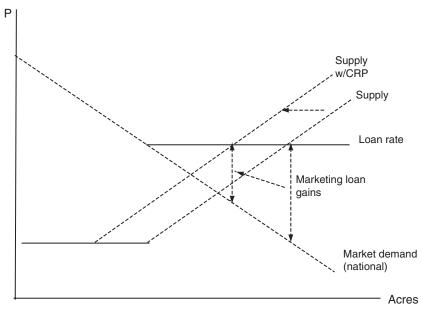
Conservation Reserve, Wetlands Reserve, and Grassland Reserve Programs

Under the Conservation Reserve Program (CRP) and Wetlands Reserve Program (WRP), landowners can voluntarily retire environmentally sensitive cropland or grant easements or restore wetlands in return for long-term rental contracts that pay them cost-share benefits and an annual rental fee for retiring the land and maintaining it in conservation uses. Landowners submit bids for the amount they are willing to accept as annual payments. Bids are accepted based on an environmental benefit index. The CRP and WRP are modeled by activities through which the Government rents cropland up to an authorized limit for a rental rate that can be either constant or endogenously determined by equating marginal returns from the CRP or WRP with the marginal returns from using the land in production. The CRP and WRP thus reduce the amount of cropland available for planting and shift all supply functions to the left.

The CRP and WRP interact with the loan deficiency payment program, as shown in figure 4, to greatly reduce Government budgetary cost exposure. Under normal circumstances, shifting supply functions to the left would result in higher prices and lower quantities of commodities. However, with the loan deficiency payment or marketing loan plan in place, if prices and quantities are in the range where loan deficiency payments or marketing loan gains are made, effective prices to producers remain at the loan rate, but quantities produced are reduced by the shift in the supply function, market prices are increased, and the loan deficiency payment rate or marketing loan gain is reduced.

The Grassland Reserve Program uses similar long-term leases for maintenance of native grasslands and prevents their conversion or development.

Figure 4

Conservation reserve program

The program is modeled by altering the endowment of rangeland and crop-land pasture resources and/or hay production activities to reflect relevant provisions of the program.
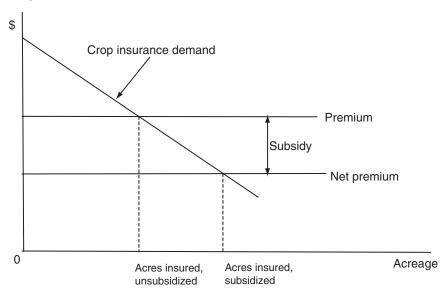
Working Lands Conservation Programs

Working lands conservation programs include the Environmental Quality Incentives Program, the Wildlife Habitat Incentive Program, and the Conservation Security Program. Each of these programs provides technical and cost-sharing incentives which are modeled as alterations to the cost and/or yield components of crop production activities.

Crop Insurance Subsidies

Crop insurance subsidies are paid in an effort to foster greater producer participation in risk management programs. This EDMP model focuses only on the static, deterministic, supply-increasing effects of the subsidies, considered as a normal production input for each commodity for which they are available. The model abstracts from any supply-inducing effects of reductions in risk, wealth effects of insurance, or issues of adverse selection or moral hazard, which are typically central issues addressed in crop insurance studies. In keeping with the theoretical specification of the EDMP model, it addresses only the deterministic allocative effects of the subsidies that result from changes in producers' marginal costs or marginal revenues. As shown in figure 5, crop insurance is modeled as having a factor demand elasticity of -0.6, a quantity equal to the observed insured acreage of that commodity, and a premium equal to the average unsubsidized premium for that commodity. The subsidy is applied as 57 percent of the unsubsidized premium. Increasing the subsidy decreases the net premium and increases the acres insured. Decreasing or eliminating the subsidy does the opposite. In order to focus

Figure 5

Crop insurance subsidies

only on the subsidy, we assume that the crop insurance aggregate loss ratio is 1.0, that is, that indemnities paid out exactly equal net premiums collected.

Crop insurance programs interact with the loan deficiency payment and marketing loan programs in a manner opposite to the interaction of the CRP and WRP with the loan deficiency payment program shown in figure 4. Crop insurance subsidies lower production costs, which shifts the supply function to the right. Under normal circumstances this would result in higher quantities of commodities and lower effective prices to producers. However, with the loan deficiency payment plan in place, if prices and quantities are in the range where payments are made, effective producer prices remain at the loan rate, quantities produced are increased by the rightward shift in the supply function, market prices are reduced, and the loan deficiency payment rate is increased.

Superseded Agricultural Programs

Acreage bases were in effect prior to the 1996 Farm Act for corn, soybeans, grain sorghum, wheat, rice, barley, oats, and cotton. Acreage bases (if they are ever re-instituted) are modeled as limiting constraints on the production of the base commodity.

Acreage reduction programs (ARPs) or set-asides were periodically authorized for several commodities prior to the 1996 Farm Act. These required producers to reduce the acreages they planted to the crops with ARPs by some proportion of their production base in order to be eligible to receive commodity payments. The 1996 Farm Act eliminated the authority for acreage bases and ARPs, but we have retained the capability to analyze them. ARPs are modeled by simply reducing acreage bases by the amount of the ARP requirement.

Nonrecourse loans, wherein the Commodity Credit Corporation would take ownership and store supported commodities whenever the market price fell below the loan rate, were used prior to the introduction of marketing loans and loan deficiency payments beginning with the 1985 Farm Act. Nonrecourse loans supported market prices at the loan rates for supported commodities but also led to the accumulation of CCC-owned stocks that were said to "overhang the market" tending to keep market prices from rising above the loan rates. They were also alleged to encourage imports from foreign countries, thereby supporting prices in those countries. While no longer used, the model retains the capability to analyze nonrecourse loans through its mechanism for analyzing marketing loan gains.