Producer Participation: Doing the Math

Farm income and environmental outcomes depend largely on whether (and how) farmers and ranchers choose to participate in a green payment program. Imagine a producer sitting down to "pencil out" his or her green payment program options. He or she may have a number of tracts of land that could qualify for payments if one or more resource concerns were addressed. Addressing a resource concern would entail the application of an appropriate conservation practice or a set of practices (sometimes referred to as a conservation "treatment"; see table 1). The existence of a water-quality concern, for example, may lead to treatment for soil erosion (to reduce sediment flows), nutrient runoff, or pesticide runoff through conservation tillage (and other soil erosion control practices), nutrient management, or pest management, respectively.

The producer's participation decision boils down to a single question: Am I willing to accept the payment offered in exchange for undertaking the prescribed conservation treatment(s)? Producers may consider a range of factors in deciding whether a given payment is large enough:

- out-of-pocket costs
- changes in production (e.g., change in crop yields)
- difficulty of managing and maintaining required conservation practices
- changes in production risk (e.g., an increase or decrease in the probability of low yields).

All of these factors come together in the producer's willingness to accept (WTA), defined as the minimum payment he or she would be willing to accept in exchange for taking a specified action. Farmers and ranchers will participate any time the prospective payment exceeds their WTA for the conservation treatment in question. If a producer is willing to accept $4 per cropland acre for nutrient management, for example, he would agree to undertake nutrient management if the per-acre payment for nutrient management is $4 or higher. For ease of exposition, we also refer to WTA as "economic cost" because all factors outlined above are real (or economic) costs to the producer, even if they are not out-of-pocket costs. From a Government perspective, we also refer to economic costs as net conservation expenditures because it is the minimum the Government must pay to leverage a specific conservation action on a specific farm. Payments in excess of economic cost (WTA) are income support.

We simulate the process of "penciling out" green payment options for each one of a series of model farms, based on the 2002 Agricultural Resources Management Survey (ARMS):

- For each green payment program scenario defined above, we simulate a set of green payment participation options for each farm.[4] The options are based on the requirements of the scenario, e.g., the types of land and conservation treatments that trigger payment, and a farm-specific estimate of the number of acres that could be treated (see appendix 2 for details).

[4]Producers have multiple options in each of the scenarios except *Extended Compliance*.

- The level of payment the producer would be willing to accept for undertaking any specific option is estimated using contract data from the Environmental Quality Incentives Program and techniques detailed in appendix 3.

- In general, we assume that the producer selects the option that yields the largest net return over economic costs or net income support. In other words, we define net return and net income support as the total payment to the producer less the producer's economic cost for undertaking prescribed conservation treatments (see appendix 4 for a detailed discussion of producer decision rules). We also assume that producers will participate only when net return exceeds $200 (total) to offset transaction costs, e.g., the cost of application and related expenses.

Because the scenarios are analyzed as entitlements, total payments to producers are a function of producer response to the payment rates offered, rather than a program budget. To compare our scenarios across a wide range of program sizes (i.e., total producer payments), we vary these payment rates. For the *Improved Performance* and *Good Performance* scenarios, program payments are varied implicitly by varying the payment rate per environmental point. As the payment rate rises, more producers participate, and those who would have participated at a lower payment rate undertake additional conservation treatments. Because the scenarios are different, however, the payment rate corresponding to a given level of program payments varies across scenarios.

For the *Extended Compliance* and *Modified Compliance* scenarios, program payments are also varied implicitly by varying the farm-specific level of direct payments (as reported for the ARMS farms that are the basis for the analysis) using a scale factor. For example, if the scale factor is 1.2, each farm would receive (at most) 120 percent of the direct payment the farm received in 2002. Given the economic cost of complying with environmental compliance requirements, participation in the environmental compliance scenarios increases as the scale factor increases. For *Modified Compliance*, moreover, producers also undertake additional conservation treatments—treatments they may otherwise have opted out of—as the scale factor rises.