Green Payment Program Design Tradeoffs: Do Income Support and Environmental Gain Go Well Together?

While there are many ways to combine conservation and commodity payments, the real question is whether they are a good match. The answer depends largely on policymakers' conservation and income support objectives. Using the distribution of payments under existing commodity programs as a benchmark, however, we can analyze some key questions that policymakers would almost surely face in designing a green payment program:

- What proportion of green payments ends up as income support?
- How much environmental gain is obtained given the level of net conservation expenditure?
- How does conservation cost-effectiveness affect the *distribution* of income support?

What proportion of green payments ends up as income support? At some level, there is always a tradeoff between income support and the environment. In a green payment context, policymakers implicitly relinquish control over the allocation of funds between income support and environmental gain in order to merge these two program objectives. The portion of producer payments that offsets producer economic costs cannot support farm income. Once the economic cost of required conservation actions are covered, the remainder of the green payment is net farm income support.

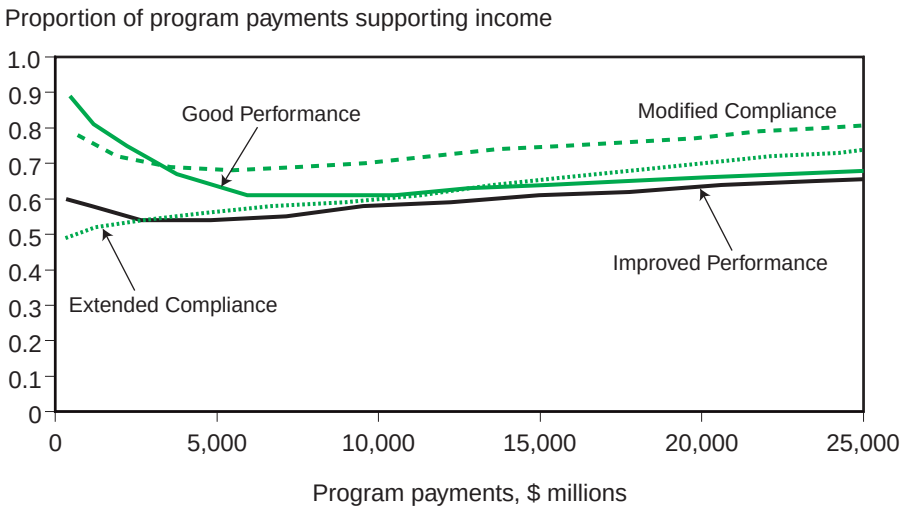
Both *environmental compliance* and *environmental performance* scenarios deliver environmental gain and income support. The portion of total producer payments that covers the economic costs of taking specified conservation actions varies from 10 percent to as high as 50 percent, depending on the program scenario and the overall level of program payments. The balance of the payments—net income support —ranges from 50 to 90 percent of overall program payments (fig. 4). The ultimate effect of this split between conservation and income support expenditures on overall income support and conservation effort also depends on whether a green payments program is in addition to or instead of existing programs.

At an aggregate level, the tradeoff between net income support and net conservation expenditure is modest. When program payments are relatively low (less than $5 billion over 5 years), the *Good Performance* and *Modified Compliance* scenarios yield the highest overall levels of income support. That's because producers can participate without additional environmental effort. Low payments result from low payment rates, prompting many producers to base their participation on existing conservation efforts rather than new conservation action, if possible. So, payments are largely devoted to income support. In contrast, income support is relatively low for the *Improved Performance* and *Extended Compliance* scenarios, where producers must take additional action to receive payments.

When payments are larger—$20 billion or more over 5 years—the compliance scenarios yield the largest income support, although the difference

Figure 4

Net income support as a proportion of program payments



Source: USDA, Economic Research Service.

between the environmental compliance and environmental performance scenarios is not dramatic. The proportion of payments going for income support in the environmental compliance scenarios rises quickly as payments become large, reflecting the fact that limiting eligibility (to recipients of existing commodity program payments) also limits opportunities for conservation treatment. In other words, as the scale factor in the environmental compliance payments rises, there is a shrinking pool of eligible acres that still need conservation treatment.

How much environmental gain is obtained given the level of net conservation expenditure? That is, how cost-effective is each scenario in terms of environmental gain per dollar of conservation spending? A specific green payment program design is cost-effective *relative to* another design if it produces more environmental gain for a given level of net conservation expenditure (*not* total program payments, which also include an income support component). Because the overall level of income support lies in a relatively narrow range across green payment scenarios, particularly when total payments are $5 billion or larger, net conservation expenditures also lie within a relatively narrow range. Given similar levels of net conservation expenditure, differences in environmental gain depend largely on the cost effectiveness of conservation expenditures.

Environmental gain depends critically on program design. Figure 5 shows net income support and environmental gain (in terms of environmental points) for our four hypothetical green payment programs at three different levels of overall program payments. The oval in the lower left-hand side of the plot area shows net income support and environmental gain for each scenario when program payments are $5 billion (total over 5 years). Other ovals correspond to total payments of $10 billion and $15 billion.

As a point of comparison, we also graph a fifth scenario in which all funds are channeled into environmental gain. We refer to this scenario as *Environmentally Efficient*. The points representing various levels of program

payments are located on the vertical (environmental points) axis in figure 5. This scenario is identical to *Improved Performance* except that payments are only large enough to cover producer economic costs (WTA). In other words, the entire payment goes to leverage conservation; income support is zero. In theory, competitive bidding can yield payments just large enough to cover producer conservation cost, although it would be very difficult to design and implement an auction in which all producers submitted bids equal to their economic costs. Nonetheless, this scenario gives an upper bound for the potential of a purely environmental program.

The downward sloping curves in figure 5 represent all combinations of income support and environmental gain that could be achieved by separate programs focusing, respectively, on income support and conservation, given $5 billion, $10 billion, and $15 billion in total payments (the sum of conservation expenditure and net income support). We refer to these curves as cost-effectiveness frontiers. Suppose fixed budgets of $5 billion, $10 billion, and $15 billion are available for allocation between the *Environmentally Efficient* scenario and an income support program similar to the existing direct payment program. By varying the allocation of funds across the two programs and using our model to estimate the maximum possible environmental gain, we define all feasible combinations of income support and environmental gain, given the available budget. Combinations of environmental gain and income support that are on or inside (below and the left of) the cost-effectiveness frontiers can be achieved given $5 billion, $10 billion, and $15 billion in program payments.

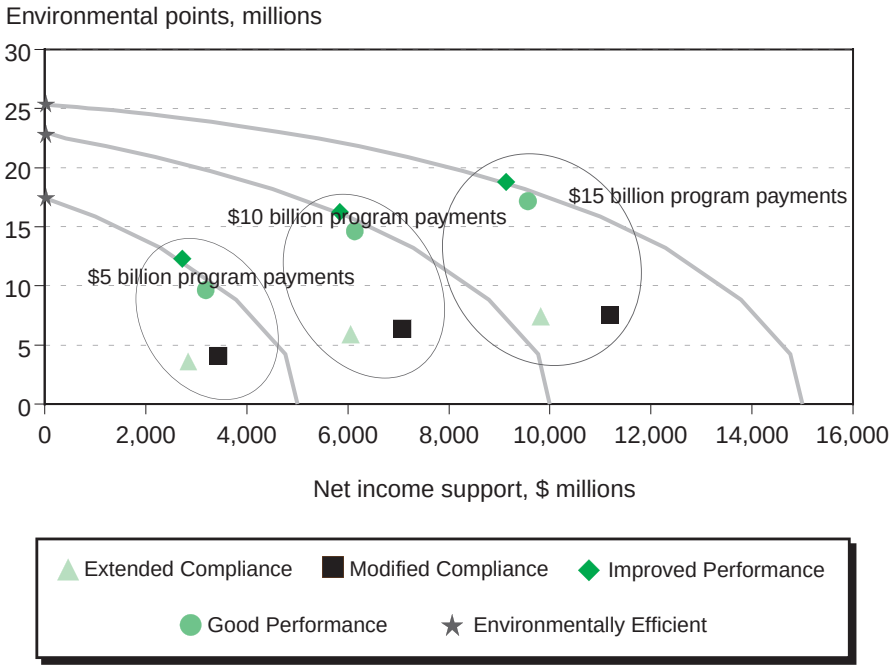
These cost-effectiveness frontiers show the underlying tradeoff between environmental gain and income support when separate, cost-effective programs are used to leverage environmental gain and provide income support. Following the $10-billion frontier beginning at the horizontal axis in figure 5, shifting funds from income support to the *Environmentally Efficien*t scenario would increase environmental gain, rapidly at first (the frontier is almost vertical) indicating that some environmental gain can be achieved at very low cost. As more money is shifted from income support to environmental gain (moving toward the upper left) additional environmental gain declines as indicated by the decrease in the slope of the cost-effectiveness frontier. The increase in the cost of additional environmental gain is driven by the fact that payment incentives encourage producers to undertake the least expensive (most cost-effective) gains first.

Figure 6 is similar to figure 5, but shows treated acreage rather environmental points. Figure 6 shows that treated acreage is not necessarily a good indicator of environmental gain. While some scenarios (other than *Improved Performance*) can treat as many or even more acres than could be treated with the *Environmentally Efficient* scenario, different acres would be treated—acres that would produce less environmental gain as measured by our environmental index. Environmental targeting generally produces this type of result—policymakers choose to pass up acres that could be treated cheaply in favor of treating acres that produce large environmental gain relative to treatment cost.

Returning to figure 5, note that only the *Improved Performanc*e and *Environmentally Efficient* scenarios are on the cost-effectiveness frontiers.

Figure 5

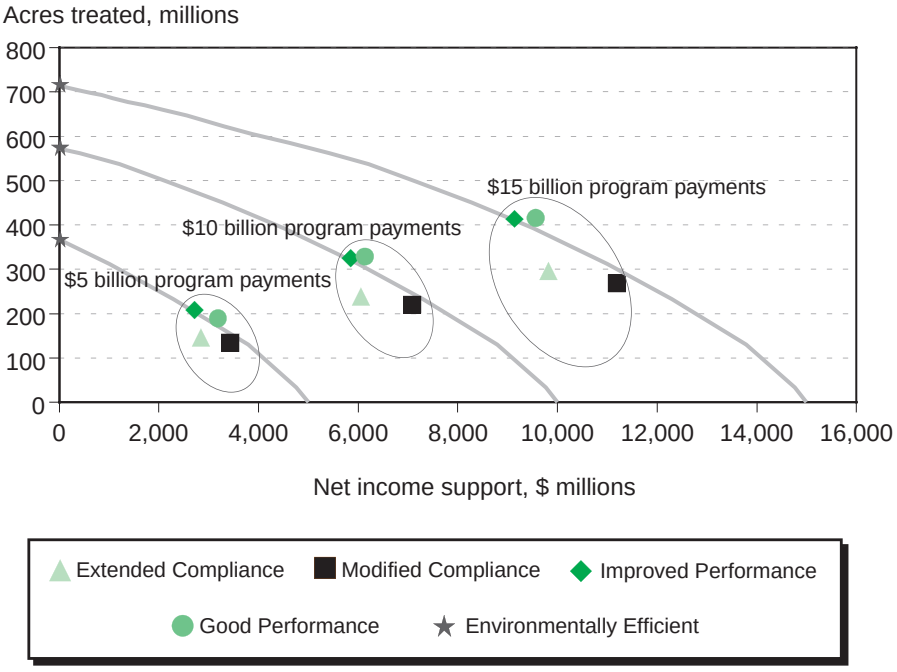
Efficiency matters: Trading environmental gain and income support in green payment program design



Source: USDA, Economic Research Service.

Figure 6

Efficiency matters: Trading treated acreage and income support in green payment program design



Source: USDA, Economic Research Service.

Consider the *Improved Performance* scenario on the $10-billion frontier (the middle of the three curves). Of the $10 billion in producer payments, roughly $4 billion offsets conservation costs, yielding about 16 million environmental points and leaving $6 billion for income support. Because this scenario is already on the cost-effectiveness frontier, it would be impossible to increase environmental gain without reducing overall income support, and vice versa, while staying within the overall $10-billion budget. The same is true for the *Environmentally Efficient* scenario: if some of the $10 billion in payments were allocated to income support, overall environmental gain would decline.

Our other green payment scenarios are not on the cost-effectiveness frontier, indicating that more environmental gain, more income support, or both could be obtained without increasing overall program payments. The *Good Performance* scenario, in which "good actors" are eligible for payments even if they do not improve their environmental performance, is close to the cost-effectiveness frontier, delivering slightly less environmental gain and slightly more income support than the *Improved Performance* scenario. In this scenario, the decision to support producers who have achieved a relatively high level of environmental performance—even if they take no action to improve their performance—is achieved at the cost of a modest loss in environmental gain.

In contrast, the environmental compliance scenarios produce substantially less environmental gain than either environmental performance scenario. The *Extended Compliance* scenario, moreover, delivers very little additional overall income support. The *Modified Compliance* scenario does a bit better—it would yield the same or slightly more environmental gain than *Extended Compliance* while also producing a higher level of overall income support. In these scenarios, the decision to direct support toward the current recipients of farm commodity program payments comes at the cost of a substantial loss in environmental gain.

Differences in cost-effectiveness across our four scenarios are largely a function of three key determinants: 1) the broadness of eligibility requirements; 2) the effectiveness of payment incentives in encouraging the participation of producers who can deliver environmental benefits at low cost; and 3) the flexibility that producers have in responding to those incentives. In the environmental performance scenarios, broad eligibility ensures that producers who can deliver cost-effective environmental gains can participate. Payments reflect the potential for environmental gain, encouraging the participation of producers who can offer environmental gains that are large relative to the cost of obtaining these gains. Finally, because producers are free to decide which tracts of land they will offer for enrollment and which practices they will adopt on those tracts, they are free to offer only the land and practices for which the payment (which is proportional to environmental gain) exceeds economic costs.

By contrast, *Extended Compliance* offers only limited eligibility, payments that are unrelated to environmental gain, and no flexibility on environmental requirements. Producers must meet all environmental requirements or face loss of eligibility for payments. If producer economic cost varies widely across conservation treatments, individual producers may be able to make a cost-effective contribution toward some environmental objectives but not

others. Some farms would elect to undertake these treatments because their overall payment would be larger than their overall economic cost of conservation improvements. Other farms would decide not to participate at all, given the level of payment they could receive and the cost they would incur. As a result, the overall economic cost of environmental gain is high.

Modified Compliance is more environmentally cost-effective than *Extended Compliance* because the opt-out provision offers producers both flexibility and the incentive to exercise that flexibility in a way that increases cost-effectiveness. Unlike *Extended Compliance*, *Modified Compliance* allows producers to opt out of some requirements, if they agree to a reduction in payment commensurate with the loss of environmental gain due to the opt-out. If the payment reduction is commensurate with the level of benefits forgone, producers will opt out only when the benefits of a given conservation treatment fail to outweigh the cost of the treatment. In other words, producers will opt out of treatments only when they are not cost-effective. Net income support to participating producers also increases (relative to the extended compliance scenario) because the reduction in payment is less than the reduction in economic cost. By allowing producers to focus on relatively cost-effective environmental gains, both environmental gain and income support can be increased in relation to *Extended Compliance*.

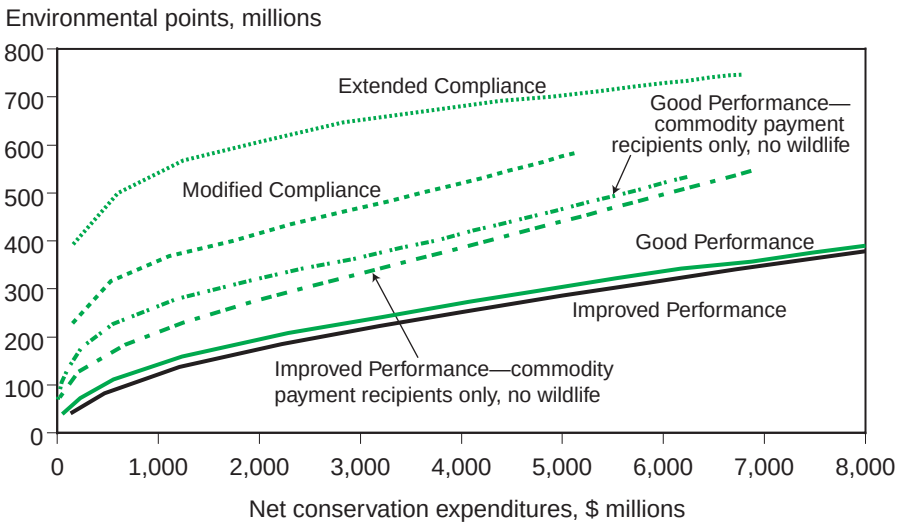
To what extent is higher cost effectiveness in the environmental performance scenarios driven by differences in eligibility versus differences in incentives? That is, are the environmental performance scenarios more cost effective simply because they can include a broader range of producers and land? To separate these effects, the environmental performance scenarios were re-estimated, restricting eligibility to recipients of existing income support and excluding payments for wildlife habitat-related treatments, because this is not required in the compliance scenarios. Figure 7 shows the cost-effectiveness curves for all four green payments scenarios but also shows curves for the *Improved Performance* and *Good Performance* scenarios under the assumption that eligibility is limited to the same producers and resource concerns that are eligible for payments in the environmental compliance scenarios. Although the change in assumptions does increase the average cost of environmental gain in the environmental performance scenarios, costs are still substantially lower than in either environmental compliance scenario. These results show that both broad eligibility and effective incentives are needed to obtain cost-effective environmental gain.

How does conservation cost-effectiveness affect the distribution of income support? Policymakers may face a difficult tradeoff between environmental gain and the *distribution* of income support. The same program design features that lead to cost-effective environmental gain also result in a distribution of net income support, across producers, that is quite different from that of existing commodity programs.

A key factor is broad eligibility. While cost-effectiveness is enhanced by ensuring that all producers who can make a cost-effective contribution are included, net income support is also spread much more broadly across the farm sector. Figure 8 shows the number of participating farms for all four scenarios against total program payments. For program payments of $3 billion or more (total over 5 years), the number of farms participating in

Figure 7

Net conservation expenditure per environmental point



Note: Conservation expenditures don't reach $8 billion in some scenarios because overall payments are limited to $25 billion. The compliance-based scenarios yield larger farm income support than do performance-based scenarios, particularly when overall program payments are larger (see fig. 4).

Source: USDA, Economic Research Service.

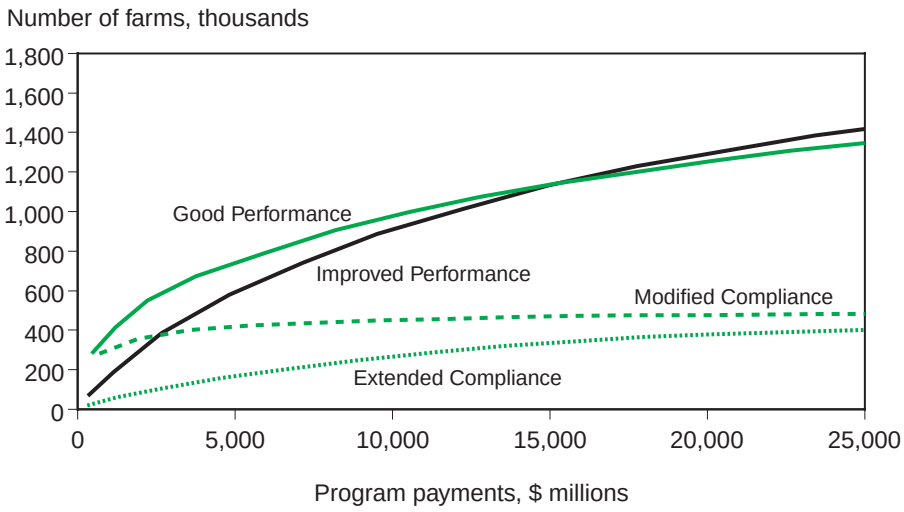
either environmental performance scenario exceeds participation in either environmental compliance scenario. Because participation in environmental performance scenarios is relatively large, payments per farm are small when compared to per-farm payments received through the environmental compliance scenarios.

Environmental performance and environmental compliance scenarios also vary in distribution across the ERS combined farm typology, commodity specialization, and ERS farm resource regions. Figure 9 shows the distribution of net income support across the ERS combined farm typology for the green payment scenario. Commercial farms (with gross annual sales of more than $250,000) capture the largest share of net income support in every scenario, although their share is somewhat larger for the compliance scenarios, particularly *Modified Compliance*. Compared to payments that are distributed like existing direct payments, however, income support is lower because of conservation treatment costs.

While commercial farms receive the largest share of income support, the environmental performance scenarios tend to shift support toward intermediate and rural residence farms. Intermediate farms (gross sales of less than $250,000) capture the next largest share of income support. For the performance-based scenarios, intermediate farms receive almost as much overall income support as commercial farms, although they would receive less on a per-farm basis because there are more intermediate farms than commercial farms. Rural residence farms, which tend to be small and are typically operated by retirees or individuals with full-time off-farm jobs, receive the smallest share of total income support. Nonetheless, these producers receive as much net income support in the performance-based scenarios as they would from payments that mimic the existing direct payments program.

Figure 8

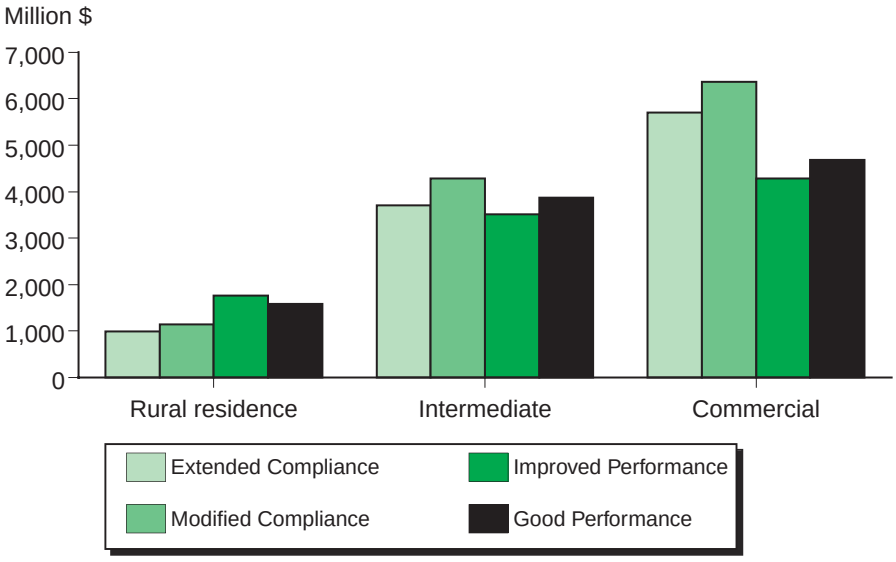
Number of participating farms by green payment scenario



Source: USDA, Economic Research Service.

Figure 9

Net income support by scenario and combined typology

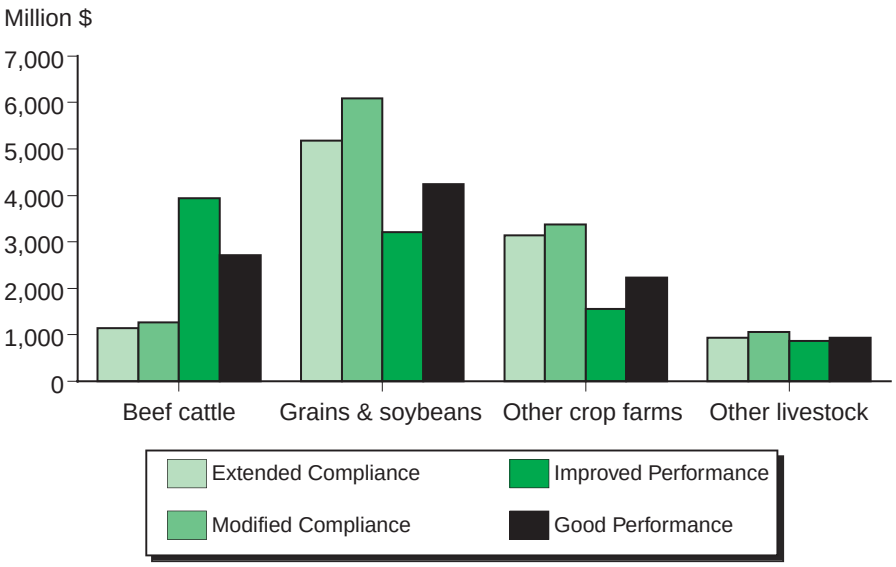


Source: USDA, Economic Research Service.

In terms of commodity specialization, beef producers do quite well in the environmental performance scenarios, despite the cost of conservation treatment (fig. 10). Beef producers hold large acreages of grazing land, which is eligible for payments under *Improved Performance* and *Good Performance* but not for existing direct payments or under *Extended Compliance* and *Modified Compliance*. For crop producers, who tend to receive larger payments under existing income support programs, the situation is reversed: Net income support is larger for scenarios based on existing income support programs.

Figure 10

Net income support by scenario and primary commodity



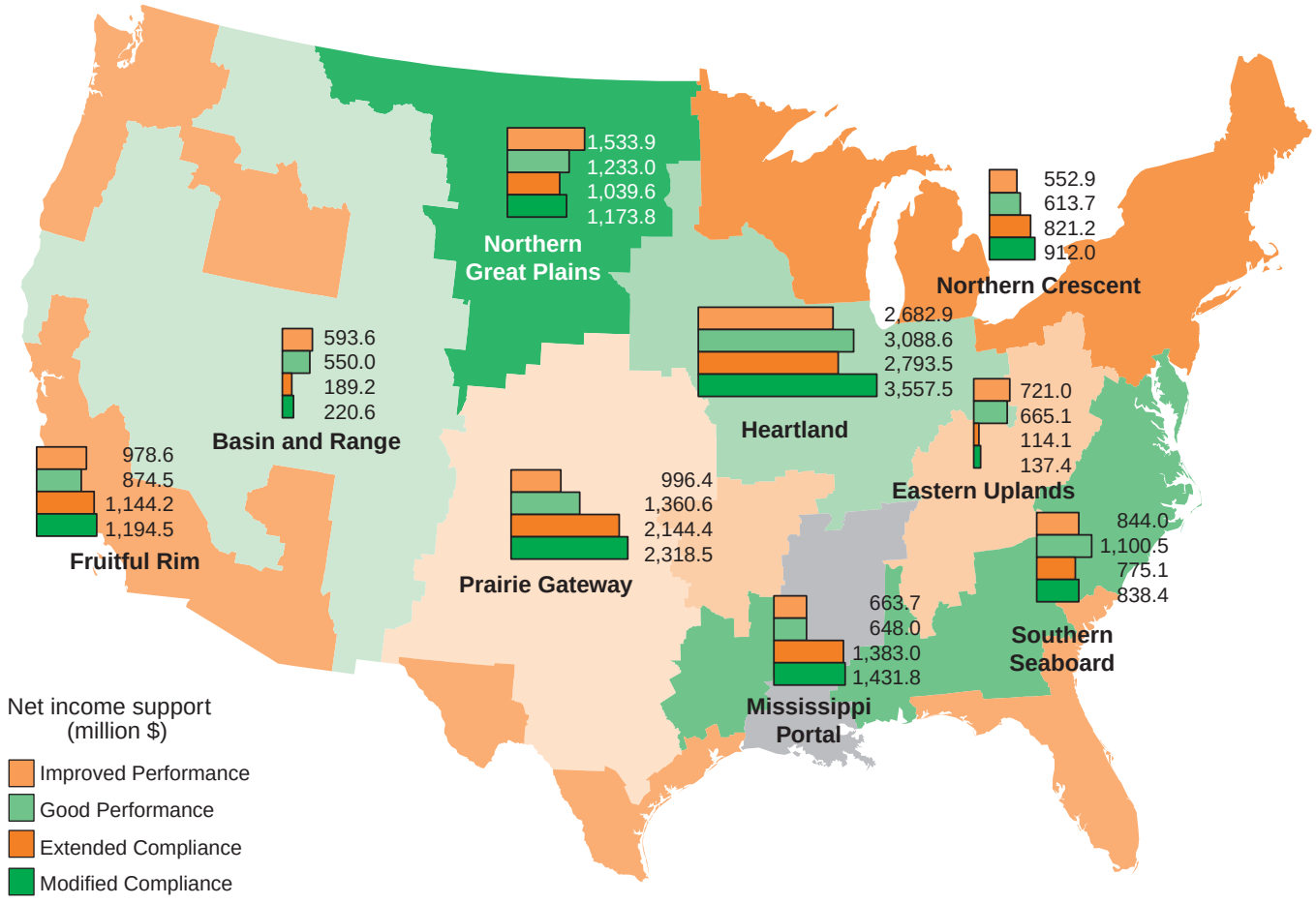
Source: USDA, Economic Research Service.

Regionally, income support tends to be large in the Heartland in all four scenarios, and particularly the two income support scenarios, because a large share of agricultural land, particularly cropland, is located there (fig. 11). Payments in the *Improved Performance* and *Good Performance* scenarios tend to be more uniform across regions than for the compliance scenarios. Under *Improved Performance* and *Good Performance*, for example, regions like the Eastern Uplands and Basin and Range receive a substantial level of income support, even though they currently receive a relatively small share of direct payments. In the compliance scenarios, the Heartland and Prairie Gateway regions are favored because they receive a large share of existing direct payments.

Can the tradeoff between environmental cost-effectiveness and the distribution of income support be avoided? Our analysis indicates that only separate income support and conservation programs offer policymakers full flexibility to tailor income support and conservation payments to maximize environmental gain and achieve a distribution of income support payments that matches that of the existing direct payment program (or any other distribution policymakers choose to implement). Because the environmentally efficient and pure income support scenarios are separate, the desired distribution of income support does constrain cost-effectiveness and vice versa. The mix of overall income support and environmental gain achieved with *Improved Performance* can also be achieved, at least in theory, with *Environmentally Efficient* payments and pure income support without any constraint on the distribution of income support. Even though this exact outcome would be difficult to achieve in reality, the additional constraint imposed by combining income and environmental payments would likely make it impossible.

Figure 11

Net income support by scenario and ERS Resource Region, program payments $16 billion



Source: USDA, Economic Research Service.