Working Paper WP94-2
July 1994

Designing Green Support:

Incentive Compatibility and the Commodity Programs

A Study prepared for the

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Alternative Agriculture

by

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Draft: September, 1994

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My thanks to Sandra Batie, Jim Cubie, Ralph Heimlich, Sarah Lynch, John Schnittker, and Jerry Skees for comments on an earlier version.

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"If agricultural economists wish to play a major role in coordinated commodity and resource policy design and implementation, conventional economic frameworks must be set aside."

Rausser and Foster (1991)

Outline

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I. Introduction: Overview and Scope of Work

The purpose of this brief analysis is to consider the potential points of contact between a program of "green support" and the existing commodity programs in U.S. agriculture. These points of contact may take the form of conflict, complementarity, or neutrality. We shall assume initially that green support is "added" to the programs as they exist in 1994. Five main commodity program areas are considered:

A. Deficiency payments resulting from the loan rate/target price structure

B. Acreage reduction programs (ARPs) operating in conjunction with A.

C. Conservation compliance, sodbuster and swampbuster programs

D. Conservation Reserve Program (CRP) and the Wetland Reserve Program (WRP)

E. GATT obligations and "planting flexibility" as a form of decoupling

The analysis has four main parts. First, the concept of "incentive compatibility" is explored as the basis of the analysis to follow. Second, the five main program areas noted above are considered in terms of their compatibility with a program of green support. Third is a discussion of what changes in the five program areas would make them more compatible with green support. Finally consideration is given to how the green support program itself might be designed.

Throughout, a basic familiarity with the commodity program areas under discussion is assumed. While cursory descriptions of each area are provided, this study is too brief to be filled with the details of the commodity programs themselves. In addition, certain general assumptions are made concerning the nature of the green support programs. It is assumed that these programs will function mainly as positive incentives, or "carrots," rather than negative incentives, or "sticks" (see Runge, 1994). That is, they will reward farmers for behavior which either (a) mitigates existing environmental

damages; or (b) improves environmental management from a current baseline. These rewards can be divided into two general categories:

- Cost-sharing, including grants, soft loans and direct "green" payments, for a variety of mitigation and/or improvement efforts, including tree-planting, terracing, and changes in crop rotations, among many other examples. These have their primary impact at the "intensive" margin.
- Paid environmental set-asides such as the U.S. Conservation Reserve Program (CRP) and Wetlands Reserve Program (WRP), either expanded or altered from the current basis. These have their primary impact at the "extensive" margin.

When examined in this light, it is clear that programs already exist which fall into the general category of green support. However, the continuation of a variety of "sticks," notably penalties for non-compliance with conservation requirements, remains critical to this analysis, since it establishes a threshold beyond which environmental damages will not be tolerated. We now consider the potential role of green support programs at an expanded level, in relation to existing programs.

II. What is Incentive Compatibility?

If green support is added to the existing mix of farm programs, "this layering of existing and green programs could result in an incentive structure which either is mutually reinforcing, is at cross-purposes or is non-overlapping" (Lynch, 1994). A formal approach to this mix, generally attributed in large part to Hurwicz (1972), is known as "incentive compatibility." In this paper, we shall adopt a simplified version of this approach originally described by Schelling (1960), in which incentive compatibility is positive, negative, mixed, or neutral.[1]

In describing these distinctions, Schelling used the example of Sherlock Holmes and his opposite Moriarity, in which Holmes and Moriarity were traveling aboard separate trains, let us say between Oxford and London. Four combinations of incentives are possible. In one, Holmes and Moriarity each benefit most if they get off at the same station. This is a positive sum situation in which their incentives are to coordinate their behavior. The second situation is one in which they each benefit most if they get off at different stations. This is a negative sum situation in which their incentives conflict. Third are situations in which both Holmes and Moriarity seek to get off at the same station, but the station Holmes prefers is different from that which is most preferred by Moriarity (e.g., Reading versus Basingstoke). This is described as a game of "mixed motives," in which their incentives are partially but not entirely aligned. For completeness, it should be noted that a fourth situation may exist in which either Holmes or Moriarity, or both, are entirely indifferent respecting the opposite's action.

Let "Holmes" stand for the commodity programs and "Moriarity" for green support. The first case corresponds to the notion that certain commodity and green support programs would motivate farmers in ways that are mutually reinforcing. The second is one of incentives that are wholly at cross-

[1]The neutral case is not due to Schelling, but has been added for completeness.

purposes. The third situation is also partially one of cross-purposes, but in which gains are still possible from some coordination. The fourth case is one of non-overlapping, or neutral, incentives. In the discussion to follow, we shall adopt these distinctions, together with a conventional nomenclature for positive, negative, mixed and neutral effects, as shown in Figure 1. These effects indicate the direction of incentives for environmental improvement from the commodity programs as they affect programs of green support.

Figure 1.

(Commodity Programs, Green Support Programs)

1.	Pure Positive Incentives	(+, +)
2.	Pure Negative Incentives	(-, -)
3.	Mixed Incentives	(+, -) (-, +)
4.	Neutral Incentives	(+, 0) (-, 0) (0, +) (0, -) (0, 0)

As Figure 1 shows, these four situations generate two "pure" forms of coordination and conflict. The third case, of mixed incentives, can be positive for commodity programs, while negative for green support, or vice versa. The fourth case generates five possibilities: positive/neutral, negative/neutral, neutral/negative, neutral/positive, and neutral/neutral. In all, nine possible relationships exist.

A last preliminary comment concerns the direction of causality or effect. In general, because of their size and influence, we assume that the commodity programs dominate green support. However, it is possible that in time green support will actually drive the decision of farmers to participate in the programs we shall review below.

III. Commodity Programs/Green Support

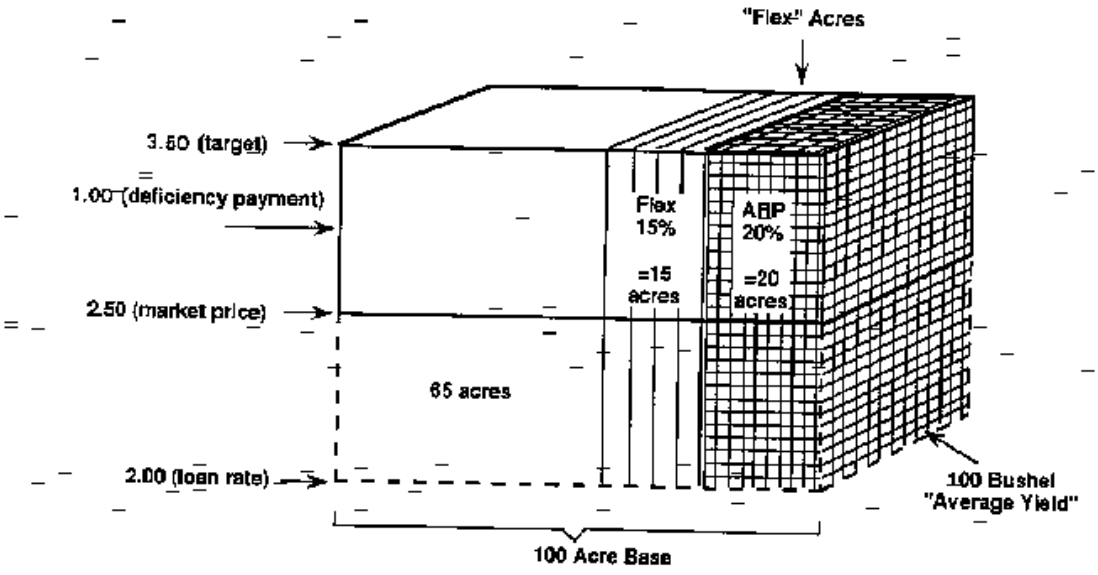
A. Deficiency Payments: Loan Rates and Target Prices

The loan rate and target price, together with market prices, jointly determine the limits of the deficiency payment paid to farmers who elect to participate in the price support programs offered for many field crops, notably corn, wheat, oats, barley, cotton, and rice (for a discussion see Cochrane and Runge, 1992, Chapter 3). This scheme of price support truncates the distribution describing possible price fluctuations for crops, assuring farmers of the market price or loan rate (whichever is higher), plus a deficiency payment equal to the difference between the market price (or loan rate) and the target price, multiplied times an average yield-per-acre figure and the number of "base" acres for a given crop on a given farm. In return for this price protection and risk reduction, farmers are required in certain years (depending on USDA determination in a given year) to set aside, through the acreage reduction program (ARP) and occasionally through paid-diversions, a proportion of this "base." In 1990, an additional "flex-acres" requirement of 15 percent of base was added, on which no deficiency payments are made (see Figure 2).[2]

The primary consequence of this arrangement is to encourage farmers to grow the program crops so supported, and thus to build and retain "base." In the 1980s, as much as 95 percent of program crop acreage was enrolled in the federal commodity programs (National Research Council, 1989). Complying base acreage as a percent of program crops ranged from 43.6 percent in 1982 to 106.4 percent in 1987. These percentages have fallen slightly in the 1990s, in part because the yields on which deficiency payments are calculated

[2]This study does not explicitly cover the incentive effects of a wide variety of federal marketing orders for fruits and vegetables, although the policy prescriptions in the conclusion could apply to many lands devoted to such uses.

Figure 2. How Deficiency Payment are Calculated (with Acreage Reductions).



Source: Adapted from Cochrane and Runge, 1992, p. 70.

have been frozen, and in part because of the "flex-acres" mandated for program participants (see Section E). But risk reduction continues to make these programs attractive, and thus encourages farmers to forego other crops, or to alter rotations, in order to secure this protection.

The environmental impacts of these programs are not the main focus of this analysis; it is the incentives compatibility between them and green supports. However, numerous empirical studies strongly suggest that high deficiency payments distort incentives in ways which run counter to the rewards contemplated under green supports, ecnouraging monocultures, reducing planting flexibility, and increasing intensity to boost yields (Young and Painter, 1990; Dobbs, et al., 1988; Lyman, et al, 1989). For example, Just, et al. (1991), simulated the impacts of deficiency payments for wheat and corn on irrigation and groundwater depletion in the Ogallala Aquifer. The study also estimated impacts of acreage diversions (see B. below). It concluded:

> We show that increases in target prices and price supports produce sizeable increases in the adoption of irrigation and therefore groundwater depletion. Interestingly, high price supports coupled with more stringent diversion requirements increase irrigation and groundwater depletion substantially in as short a time as 5 years. This finding bears out quantitatively previous conjectures that efforts at supply control give farmers a strong incentive to increase yields by intensifying cultivation (p. 231).

Now imagine that green supports -- such as cost-sharing, direct payments, or paid set-asides -- were available at attractive enough levels to encourage farmers to engage in agronomically more sound rotations, or to reduce production intensity by limiting irrigated acreage. How do such green supports interact with the deficiency payment? In effect, the deficiency payment raises the ante required in order for green supports to represent an attractive alternative. While farmers might well desire to engage in such environmentally sound practices with green support, they still would benefit more from retaining base and restricting rotations by seeking the shelter of the commodity programs.

The situation is thus one of mixed motives, in which farmers are attracted to alternatives with green support, but in which traditional

deficiency payments, and the commitment to certain cropping patterns they engender, remain even more attractive. If green supports were "layered" on top of deficiency payments (as they are, in effect, now), deficiency payments raise the amount of green support necessary to induce a change in behavior. The incentive compatibility relationship, as shown in Figure 3 is one of mixed motives (+, -).

Figure 3.

EXISTING PROGRAMS	GREEN SUPPORT Incentive Compatibility
A. Deficiency Payments	(+, -)
B. Acreage Reduction Programs (ARPs)	(+, +) (if targeted to high pollution-to-output land)
	(+, -) (if targeted to low pollution-to-output land)
	(+, 0) (if untargeted)
C. Conservation Compliance, Sodbuster and Swampbuster Programs	
• As currently structured	(+, -) (due to A. above)
• If penalties decoupled from A. and B.	(+, +)
D. Conservation Reserve Program (CRP) and Wetlands Reserve Program	
• As currently structured	(+, -) or (+, 0) (due to supply control target [same as B.])
• If retargeted to high pollution-to-output land	(+, +) (same as B.)
E. GATT Obligations and Planting Flexibility as a form of "Decoupling"	(+, +)

B. Acreage Reduction Programs (ARPs)

The next program area involves the set-asides required on a year-to-year basis in return for participation in the commodity programs. These acreage reductions are designed to reduce the amount of budget exposure for federal commodity program outlays and to reduce surpluses.

Because the amount of acreage reduction is determined by the U.S. Department of Agriculture (USDA) annually prior to planting, it is difficult to guess how much the supply control "brake" should be applied in the face of the "accelerator" of both market and government price signals. Moreover, farmers regularly retire acres of lowest productivity, leading to substantial "slippage" in the amount of production actually reduced through mandated acreage reduction. Over time, income support programs also have increased the amount of investment in added capacity, contributing to growing problems of surpluses. Roberts, et al. (1989) concluded that the "brakes" approximately offset the "accelerator," so that "the production reducing effects of the acreage reduction arrangements approximately offset the short term production stimulating effects of the deficiency payments."

In effect, the ARPs shift production from the extensive to the intensive margin. As Antle and Just (1991) show at a theoretical level, the environmental impact of such production control depends on whether the land taken out of production has a higher or lower pollution-to-output ratio than the land remaining in production. Since it is rational for farmers to divert lower productivity acres, the question is the joint distribution of productivity and vulnerability to erosion or other pollution-creating characteristics (see Heimlich, 1989; Taff and Runge, 1988; Rausser, et al., 1984).

In general, however, ARPs are difficult to target to high pollution-to-output acres compared with longer term set-asides. Osborn (1993) and Heimlich and Osborn (1993) show that in practice, ARPs have failed to establish adequate vegetative cover and are constantly shifted from one location to another, failing to provide any consistent impact on erosion control.

If ARPs (or other diversions, such as the Conservation and Wetlands Reserve Programs considered in D. below) are targeted to land highly vulnerable to erosion or with other high pollution-to-output ratios, then they will be more consistent with green supports also designated to reduce such pollution events (+, +). Unfortunately, ARPs and other diversions have been oriented in substantial part toward production control, implying a preference for higher output lands and thus lower pollution-to-output ratios. The result is to raise the intensity of production on lands remaining in crops and to aggravate pollution events, operating partially at cross-purposes (+, -). Since ARPs are also shifted from one location to another, and vary in extent from year to year, and are thus untargeted to envirnomenbtal goals at present, they are at best random in their pollution-to-output effects. The result would presumably be neutral with respect to green support (+, 0).

C. Conservation Compliance, Sodbuster and Swampbuster Programs

Three main conservation programs were implemented as part of the 1985 farm bill and reauthorized in 1990, which make receipt of federal agricultural subsidies conditional on adherence to certain environmental management practices. These three programs are known as conservation compliance, swampbuster and sodbuster requirements, and represent the main "sticks" or negative incentives used to induce environmentally responsible farm-level behavior.

When originally devised in the 1985 farm bill, these penalties were set in terms of the loss of all future farm program payments, as well as eligibility for federal crop insurance and other USDA benefits. In 1990, this so-called "drop dead" penalty was adjusted so that local ASCS committees could impose penalties graduated from $500.00 to $5,000.00, depending on the severity of the violation. While this adjustment has helped to reduce the apparent lack of proportionality between the penalties and the offenses involved, there are still serious difficulties with these programs.

Conservation compliance requires farmers with fields classified as highly erodible to develop conservation plans for their farms, and by 1995 requires full implementation of these plans. Farmers who fail to implement them potentially face the financial penalties described. Conservation

compliance has faced several problems related to general agricultural subsidies to which it is held hostage, that make it difficult to implement (Gardner, 1993, pp. 16-17). In this respect, its incentive effects emerge directly from the loan rate/target price mechanism described above.

First, high reliance on government deficiency payments (and other government payments) for net farm income has continued to make farmers and their elected representatives in Congress view even the adjusted penalties for noncompliance as excessive. Enforcement has been problematic, and a variety of loopholes have been created through legislative and administrative means so that local committees primarily responsible for enforcement have penalized relatively few.

The 1990 farm bill language establishing the graduated sanctions provided additional discretion for USDA to waive ineligibility for program benefits if the farmer is found to have "acted in good faith and without the intent to violate the provisions of this subtitle," and/or if the violation is "technical and minor in nature." How "intent" is to be shown in such cases is problematical, as are local interpretations of "technical and minor."

Second, in any case, with higher market prices (and lower deficiency payments), the incentive to undercut conservation compliance remains, because when prices are high, conservation is most threatened by the incentive to farm every available acre. And when market prices are high, the penalties for noncompliance appear relatively low. As the Economic Research Service (ERS) of USDA noted in a 1990 report:

> The effectiveness of the conservation provisions depends upon the attractiveness of Federal price and income support programs. If Federal commodity support programs become less attractive due to such factors as higher market prices or increased set-aside requirements, the conservation provisions will become less effective (Young and Osborn, 1990, p. 31).

Third, conservation groups have also charged that Soil Conservation Service (SCS) offices have retreated from conservation compliance under pressure from farmers who claim that its requirements are too strict and its penalties too severe. Federal authorities responsible for administering conservation compliance changed the erosion goal from soil loss tolerance levels (T-values) required in the basic conservation system (BCS) to

alternative conservation systems (ACS) which required a "substantial level of erosion control at reasonable cost." These levels were interpreted very differently from state to state as field office technical guides (FOTG) were developed, and make comparative evaluations of conservation compliance very difficult (Heimlich, 1994). Noting weakened standards in the key farm states of Iowa and Nebraska in April, 1990, the Center for Rural Affairs (1990) raised the concern that "The SCS is sending a signal to other regions and states that weaker erosion standards are acceptable."

The "sodbuster" and "swampbuster" provisions suffered from related problems. "Sodbuster" is designed to limit the plowing of cropland designated as highly erosive, and "swampbuster" to limit the conversion of designated wetlands to croplands. To do either leads, as in conservation noncompliance, to the penalties described. Again, these laws are likely to be undercut precisely when they are most needed if administrators and legislators view the penalties involved as excessive. Like conservation plans, sodbuster and swampbuster conditions are interpreted and enforced by local committees acting on behalf of USDA. At the local level, where the offending farmer is likely to be well-known to committee members, administering the penalties is especially difficult. To date, only a relatively few such penalties have been handed down, and many have been overturned on appeal. Cook and Art (1993) report that as of 1992, 1,953 producers were found in violation of conservation compliance, sodbuster, and swampbuster requirements, leading to denial of $10.8 million. However, $4.6 million was restored on appeal, leaving a net of $6.2 million in penalties. This is roughly equal to less than one-half of one-percent of total commodity program payments in the single year 1992. The real issue is whether USDA can and will actively enforce these laws after 1995, when conservation plans are to be fully implemented.

Estimating the impact of green support layered on top of conservation compliance, sodbuster and swampbuster is thus complicated by the fact that they are all a function of the deficiency payments and other programs,

including CCC loans, FmHA loans, crop insurance, etc., the denial of which potentially constitutes the penalty for noncompliance. Hence, reducing or eliminating the loan rate\target price mechanism or other USDA program benefits would convert the penalty from what is currently a highly unlikely event to one with zero consequences.

However, there is no reason in principle why the penalties for noncompliance should be tied to USDA programs, and there are several reasons already described why they should not. Many farmers do not participate in these programs, and fewer are likely to in the future if program benefits fall before budget cuts. If all penalties for noncompliance were assessed directly by an agency outside of USDA, utilizing the graduated structure currently on the books, like traffic tickets, even clearer signals would be sent to farmers. These penalties would be considerably easier to administer and enforce if responsibility for them were removed from local committees of USDA. Once these noncompliance penalties were decoupled from the commodity and other USDA programs, green support could operate as a complementary "carrot" to the "stick" they would represent, both driving in the same direction (+, +).

D. Conservation Reserve Program (CRP) and Wetland Reserve Programs (WRP)

In the face of major crop surpluses in the early 1980s and as a result of new demands from environmental groups, the CRP became part of the Food Security Act of 1985, and was reauthorized in the 1990 farm bill. The 1990 farm bill also authorized a Wetland Reserve Program (WRP), which pays farmers to restore wetlands by offering easements. The WRP and CRP, as well as the Water Quality Improvement Program (WQIP), together constitute the Environmental Conservation Acreage Reserve Program (ECARP). To date, the WRP has been capped for budgetary reasons at 50,000 acres in 1993, which was raised in fiscal year 1994 to 75,000 acres (Gardner, 1993, p. 18). This compares with 36.5 million acres currently enrolled in the CRP. Together the CRP and WRP constitute the most major effort to date to undertake "green support." They are thus worthy of especially detailed analysis of incentive effects.

The CRP, like its 1956-62 precursor the Soil Bank, pays volunteering farmers to retire land from field crop production and to plant grasses and/or trees. CRP contracts are 10 years. The original Soil Bank paid farmers to retire cropland for 3-10 years (10-15 years for trees). In return farmers received an annual rental payment and 80 percent cost-sharing to plant cover crops or trees. No limits were placed on individual acreage enrollment and "whole farm" retirement was rewarded with a 10 percent rental bonus. Where trees were planted (2.1 million acres) especially in the South of the U.S., nearly 90 percent remained planted to trees in 1976 (Alig, 1980). However, much of the rest of the Soil Bank, especially in the Midwest, was returned to field crops in the 1970s and 1980s.

As CRP contracts begin to expire in 1996, a question arises: will the CRP, like the Soil Bank, simply end up as a temporary measure to remove land from production? Or can the incentive to protect vulnerable lands be retained through a revised program of green support? The answer to these questions requires disentangling the two primary objectives of the CRP: surplus crop

reduction and environmental protection. These two objectives have confounded the incentives of the program from the outset, and have different implications for a layering-over of green support payments.

From the outset, the CRP has attempted to do two things at once: reduce surpluses and protect highly erodible lands. Like conservation compliance, sodbuster and swampbuster provisions, the CRP has been affected by motivations tied less to conservation than to the farm subsidy programs. It was thus in large part justified as an addition to the Acreage Reduction Program in controlling crop surpluses. This has created serious incentive problems.

First, the opportunity cost of the 10-year contract is set by the market price of the commodities which could be grown on CRP acres, and thus is related to deficiency payments, which fall with rising market prices. When market prices were weak and deficiency payments high (as in the 1985-86 period when the CRP began), the program looked relatively "cheap" to USDA relative to direct paid land diversions. However, in order to attract farmers into the program, rental payments had to be competitive with target prices on base acres. As a result, USDA had to pay rental rates well-above market rents in most areas of the country in order to induce enrollment (in some cases 200-300 percent higher) and even offered bonuses for corn base acres.

These bonuses reflected a second major problem: because the CRP was understood as a mechanism for supply control, the lands targeted for retirement gave explicit priority to reducing cropland acres, rather than to the most environmentally vulnerable lands, which might include pasture, forestland or wetlands with no cropping history. Specifically, farm base acreage (defining eligibility for crop subsidies) was reduced when land was enrolled in the CRP according to the ratio between acreage put in the CRP and total acreage for "program crops" on the farm. For example, if a farmer had a 200-acre farm (all of which were "crop acres") and a 100-acre corn base, and put 50 acres into the CRP, the ratio of CRP acreage to total cropland was 50/200, or 1:4, and corn base was reduced by 25 percent, or from 100 to 75 see

Cochrane and Runge, 1993, Chapter 3).

The result of this "base bite" was to further increase the reservation rent which the government was required to pay to induce farmers into the program. The CRP will cost about 19.2 billion dollars between fiscal years 1987 and 2003. A 1989 GAO report found that it could have been much less costly and more effective, and that USDA was focusing mainly on getting acres into the CRP, rather than on fulfilling its environmental objectives (GAO, 1989). Despite some broadening of program design, a 1993 GAO report concluded:

> CRP is an expensive way to reduce the environmental problems linked to agricultural production. The program will require budget outlays of about $19 billion to take 36.5 million acres out of production; however, not much is known about the dollar value of the environmental benefits purchased or about the extent to which removing the land from production will alleviate environmental problems associated with agriculture (GAO, 1993, p. 8).

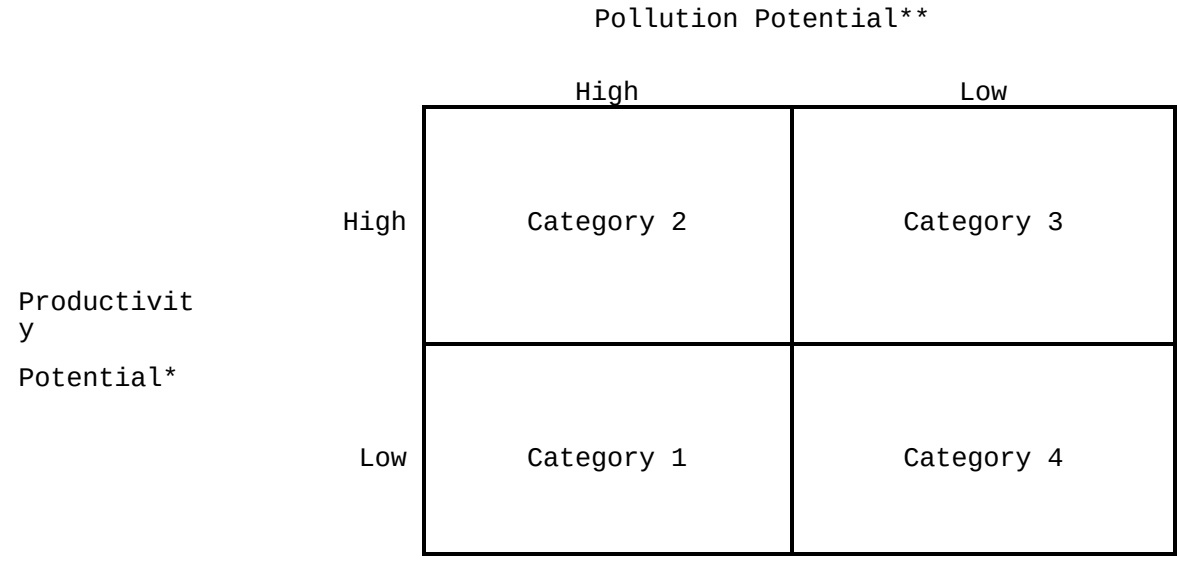
Finally, as surpluses have dwindled and market prices have risen, both farmers and the government find the CRP less attractive as a supply control measure, and the desire to be done with it grows. Its impact on total acres in production is significant. Yet simply eliminating it would do nothing more than repeat the Soil Bank experience, at considerable cost. Current policy discussions in the U.S. are focused on three key issues:

- Which lands now under CRP contract should be returned to active cropping (although still subject to the 1995 conservation plans under "conservation compliance")?
- Which lands now under CRP contract should <u>remain</u> under restrictive contract, and what form should this contract take?
- Which lands <u>not</u> now under CRP contract should come under some form of additional environmental restrictions?

In order to answer these questions, a targeting distinction needs to be made between land that is "marginal" from a supply control perspective (because it is unproductive and has low output) and land that is "marginal"

from an environmental perspective (because it is vulnerable to erosion damage or otherwise manifests high pollution potential). In Figure 4, these two dimensions, identified as "productivity potential" and "pollution potential" are described as continuous variables, but are divided into "high" and "low" categories for purposes of discussion. The approach shown in Figure 4 has been applied in a practical setting by the State of Minnesota, in implementing a state-level set-aside discussed below (see Larson, et al., 1988).

Figure 4



*Measurable either as yields per acre on the basis of historical data or in terms of productivity indices calculated for various soils.

**Pollution potential can be expressed in term of erosion potential, or more broadly to reflect land parcels subject to groundwater contamination, strips along protected streams, wetlands, or areas of special value as wildlife habitat, etc.

It is apparent that land in Category 1 has a high pollution-to-output ratio, while land in Category 3 has a low pollution-to-output ratio, and that land in Category 2 has high pollution and high output, making the ratio uncertain but clearly intermediate to Categories 1 and 3.

Category 1: Low productivity/High vulnerability land

Land in this category has limited potential for supply control, but is highly vulnerable to pollution. It is thus land which, if currently enrolled, should remain in the CRP or under some form of restrictive easement, preferably on a permanent basis. Land not currently in the CRP, but falling in this category, should also be targeted for permanent retirement from cropping through land-use restrictions, including conservation compliance, sodbuster or swampbuster. Because its productivity is low, the opportunity cost of its removal from cropping is also low. Hence payments to farmers to retire it or not to crop it should also be relatively low.

Category 2: High productivity/High vulnerability land

Land in this category has high productivity potential, but is also highly vulnerable to environmental damages from pollution. If it is currently in the CRP, it should remain so, protected by a restrictive easement which will require a higher price paid to participating landowners than Category 1 lands. There may be reason not to seek permanent easements, simply because on a short-term basis, its productivity might be needed. If it is not currently in the CRP, then efforts should be made to designate it through conservation compliance criteria, restricting cropping in most cases. Some additional CRP contracts might be offered where needed.

Category 3: High productivity/Low vulnerability land

Some land in the CRP already falls in this category. In these cases, current CRP contracts should be allowed to expire, and only limited land-use restrictions should be imposed in the future, consistent with conservation compliance requirements. Land in this category not currently in the CRP

should be granted special status as "sustainable cropland," and cropping practices that maintain its high productivity should be encouraged.

Category 4: Low productivity/Low vulnerability land

Lands in this category are of relatively limited value for either agricultural production or environmental conservation. If they are now in the CRP, such contracts should simply be allowed to expire. However, this land may be especially well-suited for non-agricultural industrial or residential uses, and land-use restrictions, zoning ordinances, and land-use planning could all reflect these considerations.

Implementing CRP Targeting Criteria

Categorizing land into such divisions is not especially demanding from an analytical or official point of view. The approach is adaptable to local conditions, so that relative rather than absolute standards could be set for given geographic areas, while maintaining federal oversight. Such divisions could go a long way toward tailoring policies which would

- maximize the environmental benefits of land use restrictions, even where these benefits are difficult to quantify
- reduce budget expenditures for land retirement contracts or easements
- release highly productive and relatively non-vulnerable cropland from the CRP

Apart from the CRP, these categories could also be used to calibrate penalties for non-compliance with conservation requirements. If these penalties were divorced from the commodity and other USDA programs, and paid like traffic tickets, enforced outside of USDA, penalties would be highest on Category 2 lands, followed by Categories 1, 3 and 4.

Suppose now that funds are available for green support to continue some form of modified CRP. This discussion offers some targeting guidelines for green support, which follow along the same lines as the discussion of ARPs in Section B. (see Figure 3).

- Land which is highly productive but not vulnerable to environmental pollution (low pollution-to-output ratios) should be allowed to produce on a sustainable basis largely free of restrictions on cropping practices.
- Land which is highly vulnerable to environmental pollution, whether productive or not, should be subject to strict conservation standards, compliance requirements and should be retired on a permanent basis if low in productivity, and on a time-limited contract if higher in productivity.
- Penalties for violations of conservation requirements should be adjusted to be proportional to damages, and enforced by an agency other than USDA.
- Payments for land retirement on either a permanent or time-limited basis should reflect the productivity of the land, with lower payments for lower productivity lands.[3]

In sum, as currently structured, the CRP operates very much like the supply control mechanism of the ARP, and fails to maximize environmental benefits. By encouraging intensive cultivation of non-CRP acres, and focusing excessively on supply control, it has failed to target high pollution-to-output lands. Such retargeting would shift much of the CRP from the (+, -) or (+, 0) to the (+, +) incentive category.

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[3]Steps in this general direction are already occurring. As a result of 1990 FACTA, USDA changed CRP bid evaluation procedures to screen all bids against productivity-adjusted dryland cash rent. Thus, bids that are higher than the county average dryland cash rent, adjusted up or down based on the ratio of the county average to the soil-specific yield of a reference crop, are rejected. Bids that pass this rent screen are then ranked according to an environmental benefits index (EBI) per dollar of rent asked and the best land chosen. Thus, cheaper land with lower benefits may be competitive with more expensive land that has high environmental benefits. However, environmental benefits cannot be quantified in dollar terms, although the rent screening and EBI ranking are an improvement over procedures used for the first 9 CRP signups (Heimlich, 1994).

E. GATT Obligations and Planting Flexibility as a Form of "Decoupling"

The 1990 farm bill mandated that 15 percent of "base" acres for the program crops be treated as flexible acres, on which farmers were free to plant other crops (subject to certain restrictions) in return for which they would forego deficiency payments. These "flex acres" were a remnant of a larger 1990 proposal to make the entire base flexible, also known as Normal Crop Acreage (NCA). The 15 percent "flex acres" in the 1990 farm bill represented an incremental step toward "decoupling" commodity price supports from specific crop bases. The NCA concept would move even more dramatically toward such decoupling. In the context of the now-completed GATT (General Agreement on Tariffs and Trade) negotiations, decoupled approaches have been given additional impetus, since it is generally acknowledged that decoupled supports are less trade distorting.

Various empirical analyses have supported the idea that greater planting flexibility would reduce the force of the "vise grip" described in connection with the commodity program in Section A. Young and Painter (1990), in their case study of the Palouse Region, found that if an NCA had been in place in 1986-90, rather than the 1985 farm bill provisions, "the NCA would have been markedly more effective in sheltering the base of a farmer using the environmentally sustainable perpetrating alternative legume system (PALS) rotation" (p. 13). In a 1991 world Resources Institute study, based on micro-level analysis of representative farms, Faeth, et al., argued that decoupling farm subsidy payments would provide greater environmental benefits than a variety of alternative policies. The authors concluded:

> Multilateral decoupling provides the greatest net economic value of the policies we tested. The simple fact that income support is not tied to commodity production allows market signals to reach farmers, encouraging them to use their resources in ways that are inherently more efficient. In areas with high resource costs, farmers who take a long view would likely shift to resource-conserving rotations, while in regions with low resource costs, farmers would shift to less chemical-intensive methods (p. 20).

More recently, Feinerman, et al. (1993) at the Center for Agricultural

and Rural Development (CARD) simulated the effect of planting flexibility in the face of tightening environmental regulations, specifically a ban and a tax on the use of corn root worm herbicide. They concluded that such "Base flexibility relaxes a constraint for producer behavior... [and] can be tied to a ban or a partial ban on corn rootworm insecticides as a way of compensating farmers for associated income loss" (p. 14). Referring specifically to the incentive effects of planting flexibility and environmental improvements, they noted that "flexibility in commodity policy is important to the maintenance of farm income for producers that must comply with restrictive environmental policies" (p. 2). Moreover, because of the interdependencies between commodity and environmental policies, greater planting flexibility offers "opportunities for win-win or near win-win outcomes from more coordinated policy actions" (p. 3).

If green support were added to this mix, it thus would be highly complementary to planting flexibility, and could even be used as a primary mechanism to substitute decoupled green support for deficiency payments tied to base (+, +).

IV. Changes in Existing Programs to Increase Compatibility with Green Support

The analysis above leads to three clear implications concerning existing programs. Each of the changes identified below would increase compatibility with green support.

- Deficiency payments should continue to be eliminated in favor of flexible acres. In place of these payments direct decoupled support should substitute for commodity-specific price guarantees; however, these payments can be "greened" by recoupling them to various environmental objectives.
- Acreage Reduction Programs (ARPs), as well as the CRP and WRP, can all be made more compatible with green support by targeting them to high pollution-to-output ratio lands. ARPs would continue to apply to crop acreage bases, but CRP and WRP would be broader in scope.
- Conservation Compliance, Sodbuster and Swampbuster requirements should be decoupled from the commodity programs and applied to all farmland, whether it is in or out of the farm programs, including pasture and lands without cropping histories. Graduated penalties for non-compliance would then be applied based on the severity of the problem and the size of the land parcel involved by an agency outside USDA, using the same criteria applied to target the ARP, CRP and WRP.

Each of these proposed changes arises directly from the lack of incentive compatibility discussed above. However, it is most useful to think of these changes as a package, and to envision how current programs might begin to shift in the direction of green compatibility over time, utilizing the billion dollars or more currently devoted to conservation in more effective ways.

The 1990 farm bill provisions for 15 percent flexibility represented a step in the direction of decoupling, which has been documented to improve the

capacity of farmers to respond to environmental regulation (Feinerman, et al., 1993), and to alter rotation practices in a resource-conserving way (Young and Painter, 1990; Faeth, et al., 1991). However, continuing to increase the proportion of "flex-acres" in relation to total base also reduces the income security represented by deficiency payments. It is therefore unlikely that additions to flex-acres to, say, 30-50 percent from the current level of 15 percent would be feasible without some form of additional revenue or income assurance. However, a fixed payment per acre could be offered in lieu of deficiency payments, essentially along the lines of the 0-92 provisions of the 1990 farm bill. This payment could be constant, but preferably would fluctuate inversely with farmers' terms of trade (prices received versus prices paid) (see Cochrane and Runge, 1992).

As will be described in detail below, these payments could be "greened" by graduating them to reflect advanced soil-conservation methods such as no-till, the use of alternative crop rotations, extensive livestock/cropping, integrated pest management, wetlands rehabilitation, diversified forest plantings, and a wide range of other approved practices reflecting local priorities for sustainable agricultural development. A specific scenario for this type of green support will be illustrated in the next section.

Increases in planting flexibility to levels of 30-50 percent (or even to 100 percent, as under Normal Crop Acreage) do not imply that the U.S. Department of Agriculture would need to abandon the Acreage Reduction Program (ARP) as an instrument of policy. ARPs in the form of some planting restrictions could continue to apply either to the complement of base <u>not</u> in flex-acres (e.g., 20 percent ARP on 50 percent of corn base not treated as flex-acres, equal to 10 percent), or even to Normal Crop Acres (e.g., no more than 90 percent of NCAs to be planted to corn). Whether ARPs would be any more effective under these circumstances than currently in restraining production is an important question, but is outside the scope of this study.

What is most germane to the issue of green support, however, is that acreage set-asides with environmental aims, especially a revised CRP and WRP,

respond primarily to environmental objectives rather than serving as programs of supply control. The simplest way to assure that they do is to continue the trend toward explicitly targeting high pollution-to-output acres, and graduating payments for conservation set-asides such as the CRP and WRP to reflect the opportunity cost in productivity of removing these environmentally vulnerable lands from production and engaging in approved conservation management practices. Such payments would then become an additional green support option for landowners, whether they were participating in the flex-acres/deficiency payment scheme or not.

Finally, conservation compliance, sodbuster and swampbuster would continue to apply to all farmland, independent of participation in the above programs. The result would be to pose a choice to the landowner: be liable for these requirements without compensation in the form of green support, or get on board (for example, by signing up for a CRP or WRP contract) and engage in management practices which receive green support as well. In effect, the requirements of conservation compliance, sodbuster and swampbuster would establish a baseline, or threshold, below which penalties would apply, graduated to reflect the severity of the infraction. Management practices above this threshold, representing "affirmative action," would become eligible for green support.

V. Designing Green Support Programs

The three elements of the policy reform package described in the previous section also provide the basis for designing a green support program. The program would be composed of three parts, two "carrots" and one set of "sticks."

- Increased participation (whether voluntary or mandatory) in flex-acres would be compensated with decoupled payments; these payments could be "greened" by graduating them to reflect a wide array of locally-developed sustainable practices, with local and federal priorities determining the level of green compensation.
- Acreage set-asides (ARPs, CRP, WRP) would be targeted to high pollution-to-output acres, with compensation (in the case of CRP and WRP) graduated to reflect productivity differences. Such payments would constitute the second main form of green support, and could also be varied depending on landowner willingness to engage in locally and federally approved conservation management alternatives.
- Conservation Compliance, Sodbuster and Swampbuster requirements would be expanded to include all federally designated lands, whether or not enrolled in federal farm programs. Penalties for violations would be graduated to reflect the severity of the infraction and the acreage involved, and would be entirely divorced from the commodity programs. These requirements would set minimum acceptable management practices.

As in the reform of existing programs, the design of green support should be thought of as a package. The expansion of flex-acres, independently of green payments, should increase the ability of farmers to respond to environmental objectives. By substituting decoupled support for deficiency

payments, and graduating and "greening" this support to reflect local and federal conservation priorities, trade-distorting subsidies are eliminated at the same time that environmental needs are targeted. Decoupling is thus accompanied by "recoupling" to environmental objectives. Conservation acreage set-asides would be the second main option for landowners. Finally, stringent and more widely applied requirements for conservation compliance, sodbuster and swampbuster would create a stick for noncompliance.

An Example

Consider a 400 acre corn-soybean farm in the Mississippi Valley with 300 acres of corn base and 100 acres enrolled in the Conservation Reserve Program, with a CRP contract terminating in 1997. Under the proposed reforms, mandatory "flex-acres" under the 1990 farm bill equaling 45 (300 X .15) might be expanded to 90 (300 X .30), to a total of 30 percent. In addition "optional flex-acres" could be offered, with decoupled compensation, up to 50 percent of total base. If the farmer had been receiving a deficiency payment of $1.00 per acre and had yields frozen at 100 bushels, then his loss in revenue from the mandatory expanded flex-acres would be

($100.00 X 45 = $4,500.00).

This income foregone due to increased flexibility would be combined with the prospect of loss of CRP revenues beginning in 1997-98. Suppose that a per-acre payment of $75.00 under the CRP, equal to $7,500.00 a year, would be lost. Then the losses of flex-acre expansion from 15 to 30 percent ($4,500.00) combined with the annual CRP loss ($7,500.00), would represent a $11,500.00 reduction in revenues.

Now suppose that decoupled payments are paid on the mandatory 15 percent increase in flex-acres, equal to 50 percent of the foregone income, or $2,250.00. In addition, optional flex-acres are reimbursed at 90 percent of foregone income. If the farmer enrolled a total of 50 percent of base in such flex-acres (an additional 20 percent or 60 acres) at 90 percent of the previous payment, he would receive $5,400.00. Finally, suppose that decoupled

"green payments" were made on all of the mandatory flex-acres (90 acres) plus the voluntary flex-acres (60 acres), equal to 150 acres, in return for an expanded rotation including oats and some fallow in what had previously been a strict corn/soybean rotation. This approved rotation would receive an additional .20 cents per acre per year assuming 100 bushel yields, equal to $3,000.00.

On net, the farmer would reduce his income due to mandatory flex-acres by $2,250.00, and due to voluntary flex-acres by $400.00, but would receive an additional $3,000.00 in green payments, leaving him with a net gain of $340.00. The consequence of the flex-acre addition applied to all corn base would probably be to reduce excess supplies, making an ARP less likely, although it could still be applied to the remaining 50 percent of base.

Now suppose that a new CRP contract is offered at 75 percent of the previous bid price (in this case $75.00) for high pollution-to-output designated acres with this farm's productivity potential, and that acres not so designated could be returned to base. Of the 100 acres in the CRP, 50 percent are determined eligible for a continuing contract or easement, equal to a continuing revenue stream of

$$50 \text{ X } (.75 \text{ X } \$75.00) = \$2,812.50.$$

Since 50 acres are returned to base, the calculations above would need to be redone. If the same percentages applied, then total base would be 300 + 50 = 350, of which 15 percent would be uncompensated flex-acres, a mandatory additional 15 percent would be compensated at 50 percent, and 20 percent voluntary flex-acres would be compensated at 90 percent. In addition, green payments on all of the flex acres would be paid at .20 cents per acre, and a CRP contract on the remaining 50 eligible acres would pay 75 percent of the previous bid price, or $56.25.

In sum, the effect of the green payments would be as below.

- Total new base = 350 acres
- Total eligible for CRP = 50 acres
- Existing mandatory flex-acres = 15 percent = 52.5 acres

- Additional mandatory flex-acres = 15 percent = 52.5 acres
  @ .50 cents per acre X 100 bushels/acre = $2,625.00
- Voluntary flex-acres = 20 percent = 70 acres
  @ .90 cents per acre X 100 bushels/acre = $6,300.00
- Green payments on all flex-acres = 50 percent = 175 acres
  @ .20 cents per acre X 100 bushels/acre = $3,500.00
- CRP payments on 50 acres @ 75 percent of $75.00 = ($56.25 X 50) = $2,812.50

- Continued Deficiency Payment on 175 acres @ $1.00 per acre
  X 100 bushels/acre = $17,500.00
- Total Decoupled Income Assurance on Flex-Acres $8,925.00
- Total Green Payments 3,500.00
- Total CRP Payments on New Contract 2,812.50

- TOTAL PAYMENTS $32,737.50

It should be noted that this compares to an assumed status quo payment of

- Total base = 300 acres
- Total in CRP = 100 acres
- Existing mandatory flex-acres = 15 percent = 45 acres
- Deficiency Payment = (300 acres - 45 flex-acres)
  X $1.00 per acre X 100 bushels/acre = $25,500.00
- CRP Payment = (100 acres X $75.00 per acre) . 7,500.00

. . . . . $33,000.00

In short, the proposed reforms in this hypothetical example are essentially budget neutral. Reductions in support due to additional planting flexibility and CRP retrenchment are offset by green payments. What has changed, in a major way, are the incentives linking farm income support programs and environmental improvements.

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