

The Environmental Effectiveness and Effects of Farm Policies¹

David Blandford

Agriculture uses natural resources (land, water and air) to produce food, fiber and other outputs (e.g., energy) to support humankind. The way that these resources are managed affects environmental quality in both objective (measurable) ways through such aspects as water and air quality or rates of soil erosion and in subjective ways (not immediately measurable), such as landscape character and amenity value. Agriculture's impact on wildlife is often a combination of both effects, for example, through the impact of production practices on wildlife populations and the effect that biodiversity has on the public's perception and enjoyment of the countryside. Agriculture has the potential to generate both positive and negative environmental impacts through changes in production practices (e.g., use of agro-chemicals, changes in grazing density) and through changes in land use (e.g., use of land for crops or grazing, wooded area, wetlands as well as field structure and hedges).

This short paper addresses two questions:

1. What is the relationship between existing agricultural policies in OECD countries and environmental quality?
2. Can existing policies be adapted so that they are more effective in achieving desired environmental outcomes?

Traditional agricultural policies and the environment

In most OECD countries government intervention in agriculture has its roots in the late 1920s and early 1930s, which was a period of depressed agricultural prices and economic distress in rural areas. The dominant focus of agricultural policy was on price and income support. That focus remains important today, although there has been some broadening of objectives and changes in the types of instruments used to pursue these. The OECD Secretariat provides annual estimates of the support provided to producers through various types of government policies. The latest Producer Support Estimate (PSE) indicates that the share of the total provided by market price support averaged 55 percent in 2004-06, compared to 77 percent in 1986-88 (OECD 2007). If other forms of support are included that relate directly to production (i.e., other payments linked to output or to the use of inputs) the figure rises from 55 percent to 85 percent. Government support that does not affect farmers' production decisions directly (although it may well have indirect effects) is a relatively minor part of the total support provided to farmers in OECD countries.

If most of the support provided to farmers is linked to agricultural production, what are the

¹ Paper presented at the conference "Making the CAP work for the environment", Ljubljana, Slovenia, May 28th, 2008. The author is Professor of Agricultural and Environmental Economics and Professor, School of International Affairs, Pennsylvania State University, U.S.A. (dblandford@psu.edu)

potential environmental implications? We can distinguish two major categories of impact: 1. those associated with changes in input use; and 2. those associated with changes in farm structure.

If support is linked to the volume of production, it is likely to lead to an increase in the volume of inputs used by farmers. Since total farm income is equal to the volume of production multiplied by the returns per unit of production, farmers will respond to higher output prices or government payments linked to production by expanding output in order to maximize their incomes. This will result in an intensification of production in comparison to the case where no government support is provided. If support is linked directly to the use of particular inputs (e.g., subsidies on agro-chemicals) or factors of production (e.g., land) there will be greater use of subsidized inputs and factors. It is worth noting that if particular production practices carry substantial environmental risk (e.g., pesticide use or the conversion of wetlands to cropland), subsidizing such practices is likely to be particularly damaging.

Intensification places greater demands on natural resources and can lead to a reduction in environmental quality. Farmers may use higher volumes of agro-chemicals, increase grazing intensity, or shift more land into the production of supported crops than would otherwise be the case. However, this does not mean that the removal of support will eliminate such effects. Even in the absence of support, changes in output and input prices will prompt farmers to vary the level of output and input use and this may have negative consequences for environmental quality. For example, high loadings of nitrogen and phosphorous in the streams and rivers that drain into the Chesapeake Bay in the Eastern United States are creating major ecosystem problems. Dairy farmers, who have intensified production in response to government support, and poultry and hog farmers, who receive little government support but have intensified production in response to market forces, both contribute to the problem. If the negative byproduct of production carries no cost to farmers, or its reduction confers no gain, then they are unlikely to modify their behavior to reduce environmental impact – this is a classic case of market failure that forms the basis of much of what we study in environmental economics.

A second way in which support policies can influence the environment is through their impact on farm structure. Over time the support provided by governments to farmers is capitalized into the price of land. Since land is the scarcest factor of production in agriculture an increase in farm income causes farmers to bid up the price of land through purchase or rental agreements. This may impede structural change in the industry since it becomes more expensive to expand the size of existing farms or for new farmers to enter the industry. A relative increase in the price of land may create additional pressure for intensification of production as farmers try to substitute cheaper inputs (e.g., agro-chemicals) for higher priced land. It may also cause them to make structural

changes on farms, for example, removing hedges or woodland, or draining wetlands so that they can maximize the returns to their land area. However, even without government support it is likely that structural change will occur. Increasing productivity in agriculture since the Second World War has contributed to a long-run decline in the real price of farm output. This has created an incentive for farmers to increase the scale of production in order to avoid a decline in real income.

Technological change, for example, through advances in farm equipment, often tends to favor larger scale operations and it may be profitable to remove hedges or make other changes in land use in the absence of support.

As a result of these conflicting effects, it is extremely difficult to generalize about the environmental impact of farm policies in OECD countries, and even more difficult to determine whether agriculture would generate more environmental goods or produce less environmental bads in the absence of support. It is notable that relatively little empirical analysis has been undertaken on the environmental impact of agricultural support policies (Lichtenberg 2002). One can examine particular types of policy instruments and draw some conclusions. For example, it is generally accepted that prior to the introduction of environmental requirements in 1985, acreage set-aside (mandatory withdrawal of cropland to be eligible for government payments) in the United States resulted in more intensive use of agro-chemicals on land remaining in production. Unfortunately, determining the net effect of support policies on production practices and input use is often not so clear cut.

Environmental requirements as a component of income support

In recognition of the fact that support policies can have negative environmental consequences many OECD countries now attached environmental conditions to the receipt of support. Mandatory cross-compliance has been a feature of U.S. farm support policies since the mid-1980s and part of the EU's single payment scheme since 2005. Is cross-compliance an effective approach for achieving environmental aims in agriculture?

Attaching environmental conditions to support is an example modifying an existing policy instrument (or set of instruments) in order to pursue multiple objectives – in this case to provide income support to farmers while at the same time ensuring that they apply good environmental practices. A priori there are reasons to believe that such an approach will have limited effectiveness.

More than fifty years ago, the famous Dutch economist, Jan Tinbergen wrote about the basic requirements for policy effectiveness, i.e., what is required to achieve a particular policy outcome or target (Tinbergen 1956). There are two parts to his conclusions:

1. the number of policy instruments should be (at least) equal to the number of targets; and
2. instruments should be coordinated and directed toward the set of targets.

Given these conditions one might immediately question whether a single instrument, such as a direct payment to producers, or a combination of price supports and government payments can be expected to satisfy simultaneously both redistributive and environmental objectives in an efficient way.

To achieve the environmental objectives, the following would seem to be basic requirements:

1. There must be sufficient understanding of the technical relationships between land use management and agricultural practices and the benefit we are trying to enhance (or the negative impact that we are trying to reduce). It is necessary to know this if any form of policy incentive is to be used to try to achieve that outcome (target). This seems to be fairly obvious, but it is by no means clear that it is universally applied in agricultural policymaking.
2. The incentive structure must align with the desired outcome. If the costs of compliance are higher than the benefits that farmers receive through compliance we should not be surprised if the desired outcome is not achieved.
3. There must be a way to verify that the environmental outcome is being achieved. Some form of compliance monitoring is required so that we can know if we are achieving the targeted outcome. This is likely to be expensive if the inspection of individual farms is needed.
4. There should be consequences for farmers if they fail to meet their obligations. There must be a cost for non-compliance otherwise there is considerable potential for “moral hazard”, i.e., producers take the payments offered by government but do not meet the conditions attached to these.

To what extent does cross-compliance meet Tinbergen’s requirements and the basic conditions with respect to environmental objectives outlined above?

1. It is highly unlikely that the magnitude of income support payments to which an individual farmer is entitled will correspond to the value of the environmental services generated by the land farmed by that farmer, since payments are typically based on historical entitlements. From an environmental perspective the payment may be too high or too low. If it is too high one could argue that this does not matter, part of the transfer achieves the environmental outcome that society values, part provides for a redistribution of income of which society approves. This argument is undermined when funds are limited such that we fail to realize the total environmental benefits that could result from reallocation, or if the recipients of the transfers are viewed to be undeserving in some sense (e.g., they are wealthy in comparison to other members of society so that

they do not qualify for the payments on equity grounds). If the payment is too low there is a strong likelihood of failure – farmers who could generate high environmental benefits receive low levels of payment and so do not produce these benefits. There is also the issue of whether it is efficient to rely on fixed income support payments to achieve environmental aims, or whether it is more efficient to use environmental quality rewards through which payments are linked to the degree to which standards are exceeded.

2. The spatial distribution of payments is unlikely to correspond to the spatial distribution of environmental benefits. Payments that have been based on past production will be larger for the most productive farms, whereas environmental benefits may be higher in more marginal production areas (e.g., better habitats for wildlife, more threatened species). This is not to say that biodiversity should be neglected in the most highly productive agricultural areas, but that their total contribution to biodiversity may be more limited. In the United States, for example, payments are heavily concentrated in mid-part of the country and only about 25% of farmers receive any money from price and income support programs (Claassen et al. 2007). There is some overlap between the concentration of payments and environmental issues, e.g., the risk of soil erosion, but it is imperfect. If payments were oriented towards the provision of environmental services by farmers the distribution would be quite different – much more of the money would be directed to farms in environmentally sensitive areas.
3. There may be a particular weakness in trying to use cross-compliance to address simultaneously both positive and negative externalities, e.g., farmers use too much fertilizer or intensify production and destroy wildlife habitat, but also maintain a particular landscape. Apart from the distributional issue of paying polluters not to pollute, rather than applying the polluter pays principle, it would be more efficient to link payments directly to the specific management or practice requirement that generates each externality. Unbundling payments makes it clear to producers exactly what is being targeted and what are the benefits of compliance relative to compliance costs.
4. Monitoring is expensive and likely to be relatively weak. Remote sensing is a relatively cheap option. Through this we can verify, for example, whether a wetland area that is not supposed to be drained is being maintained. However, monitoring some aspects will require on-farm inspection and even then monitoring production practices, such as the use of agro-chemicals, is difficult. How can we tell if the decline in a bird population is due to the overuse of pesticides by a particular farmer, for example?

5. There is often a reluctance to impose penalties for non-compliance. Politicians are often reluctant to impose penalties on farmers, although there are some exceptions (e.g., manure management in the Netherlands). According to a study by the U.S. General Accounting Office (GAO 2003) enforcement of cross-compliance in the United States has been weak. This is due to the lack of suitable staff, a lack of emphasis on environmental provisions or reluctance of field staff to identify non-compliance. Even when violations are identified, penalties are often waived. The future effectiveness of compliance monitoring under the single payment scheme and the effectiveness of enforcement among the member states of the European Union is open to question (Alliance Environnement 2007).

A limited amount of analysis has been done of the efficiency of cross-compliance, i.e., examining whether it actually achieves its aims and is cost effective. Claassen et al. (2004) conclude that cross compliance has reduced soil erosion in the United States, but that only 25 percent of the total reduction in annual erosion between 1982 and 1997 can be attributed to the measure – the other 75 percent was unrelated to cross compliance under government payments. When we consider that such payments (excluding those made under specific conservation programs) have averaged roughly \$18 billion in recent years (2000-2006) this might be considered rather a lot to pay for such a limited result. Claassen et al. also evaluate whether the environmental effectiveness of cross-compliance could be enhanced by extending it to nutrient management. They conclude that this could be effective in those areas where the problem is excessive application of fertilizer since crop farmers are the main recipients of payments, but it would be much less effective where the problem is due to animal waste, since many livestock farmers do not receive payments. This seems to suggest that greater emphasis on more targeted approaches, such as the Environmental Quality Incentives Program (EQIP), which can cover both crop and livestock farms would be a preferred approach.

In a recent study Claassen et al. (2007) examine the cost-effectiveness of using cross-compliance relative to payments under environmental programs, like EQIP, that are targeted to specific performance outcomes in the United States. They conclude that the latter approach is substantially more cost effective, but would result in a significant redistribution of spending – away from traditional recipients who are able to deliver only modest environmental gains to other producers. In the United States the barriers to the implementation of more effective environmental policies for agriculture are primarily political and this may well be the case in other countries.

Conclusions

The instruments used to implement current agricultural policies in OECD countries are a

relatively inefficient means of achieving environmental aims. The principal reason is that it is difficult to adapt these to provide the necessary degree of targeting to achieve environmental outcomes. Payment levels are tied to historical entitlements rather than to potential contributions to environmental quality. Cross-compliance can be used to enhance the environmental effect of income support (or at least to moderate its negative impact), but cannot be viewed as an efficient long-term approach to achieving environmental objectives in agriculture. At best, it has a transitional role in the development of improved agri-environmental policy. Moreover, it is important to bear in mind that farm programs, regardless of their environmental content, are (by definition) only directed at farmers. While farming is an important part of the landscape it is not the sole factor in environmental quality. Other aspects of land-use cannot be neglected, e.g., the decisions taken by the owners/managers of forestry, wetlands, woodlands, as well as those who make decisions on settlement patterns (the use of land for housing and transportation etc.). Land management is not a sectoral issue. A policy that addresses environmental quality in rural areas would ideally encompass all relevant sectors and decision makers and would have a territorial rather than a sectoral focus.

References

- Alliance Environnement (2007). Evaluation of the application of cross compliance as foreseen under Regulation 1782/2003. Part I: Descriptive Report. Auzeville and London.
- Claassen, R., Breneman, V., Bucholtz, S, Cattaneo, A., Johansson, R., and Morehart, M. (2004). “Environmental compliance in U.S. agricultural policy: past performance and future potential.” Agricultural Economic Report 832. Economic Research Service, U.S. Department of Agriculture, Washington, DC.
- Claassen, R., Aillery, M. and Nickerson, C. (2007). “Integrating commodity and conservation programs: design options and outcomes.” Economic Research Report Number 44. Economic Research Service, U.S. Department of Agriculture, Washington, DC.
- Lichtenberg, E. (2002). “Agriculture and the environment.” In B.L. Gardner and G.C. Rausser (eds.) Handbook of Agricultural Economics Volume 2A: Agriculture and Its External Linkages. North Holland.
- OECD (2007). Producer and Consumer Support Estimates, OECD Database 1986-2006. Paris. Available online at www.oecd.org
- Tinbergen, J. (1956). Economic Policy: Theory and Design. Amsterdam, North Holland.
- U.S. General Accounting Office (2003). “Agricultural Conservation: USDA needs to better ensure protection of highly erodible cropland and wetlands.” GAO-03-418. Washington, DC.