

Causes of Multifunctionality: Externalities or Political Pressure

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1. Introduction

The interface between agriculture and environmental policy has received increasing attention in recent years, sharpened by ‘food scares’ such as BSE, Foot and Mouth Disease, the safety of Genetically-Modified Organisms, as well as the increasing knowledge and concern over agriculture’s contribution to greenhouse gas emissions. At the same time both regions have experienced pressure to liberalise agricultural trade and to remove production subsidies.

The two regions have responded very differently to these pressures. We argue, following Baylis et al. (2004) that the differing responses of the two regions is attributable to a contrasting view of the relationship between agriculture and the rest of the natural world; the United States, we suggest, views agricultural production and the environment as substitutes, whereas the EU views them more as complements. The agri-environmental policies which result are almost opposites: the EU encourages compensation for the positive externalities of agriculture, while the United States focuses on limiting negative externalities. The EU is concerned about the abandonment of land, and subsidises farmers to retain marginal pasture in cultivation, while the United States, via the Conservation Reserve Program, works towards returning less-productive agricultural land to its pre-farmed state. As a corollary, there is, we suggest a difference in the targeting by the two regions. The EU is rather less defined, using average payments for agri-environmental services for whole countries, while the United States has a more nuanced system of calculation of payments through the Environmental Benefits Index (EBI).

Not surprisingly, the EU programs that are based on the precept that agriculture has positive externalities have been viewed with scepticism in some quarters (specifically in the United States), the concern being that these are just a more acceptable way of delivering subsidies to farmers. As the OECD notes, ‘a key policy concern is to distinguish between agri-environmental measures that actually address market failures by internalising environmental externalities or ensuring the provision of public goods associated with agriculture, from policies that appear to be merely labelled ‘green’ and used as a means of disguised protection’ (OECD 2003). The EU, by contrast, argues that their programs are addressing legitimate externalities. In this paper, we use econometric techniques to test whether the EU agri-environmental programs are in response to specific externalities or, alternatively, whether they are substitutes for more traditional forms of agricultural support.

Within Europe, there are startling differences among agri-environmental programs, and we investigate the reasons behind these differences. Our hope is that understanding them will give us further insight into the differences between the Americans and the European approaches. Our findings are that the very ‘specificity’ of European agriculture makes a single unifying theory not necessarily impossible but certainly unproven to date. We find that EU agri-environmental programs (AEPs) do not appear to be targeted to negative externalities, but neither do they seem to be straight substitutes for price subsidies. There is some evidence, presented below, that the ‘greener’ the member state, the higher the spending on AEPs, while states with a heavier dependence on the agricultural sector tend to spend less.

An important element of multifunctionality is the maintenance of rural livelihoods, and so we spend some time reviewing the concept of rural life in European thought. American attitudes to agriculture and environment are then investigated using the contrasting backdrop of European policies and attitudes as a counterfoil because, as noted above, the main thrust of this paper is the study of the underlying motivations of the European agri-environmental programs. We propose a number of reasons for differences in agri-environmental policy, and test for these using data from the EU. A summary and conclusion end the paper.

2. The European approach

In Europe, the primary response to the Uruguay Round has been to emphasise the linkages between agriculture, the environment, and the development and management of rural areas. The EU, supported by its farm organisations, has taken the view that the positive externalities of agriculture are not marketable and that these are consequently under-produced relative to the levels that society might desire. They also argue that these non-marketed outputs will suffer if agricultural support prices are reduced by trade liberalisation. The EU position is supported by a variety of empirical evidence indicating Europeans genuinely value these environmental services. Surveys by Eurobarometer have shown a consistently high appreciation for the work of farmers in cultivating the landscape (EC, 2004). More specifically, a Finnish study (Yrjola, 2004) found that the WTP of Finnish consumers/citizens for multifunctional agriculture was ‘remarkable’. The Swedish branch of the WWF has bought herds of cattle which are rented out to farmers in order to maintain grazing on environmentally interesting areas. A significant amount of work is required from volunteers, in order to manage these herds, indicating a revealed preference for a certain type of farmed landscape. The jointness of production of marketable commodities and public goods is often termed multifunctionality, although this term, as Garzon (2005) observes, has fallen out of favour as sustainable rural development is instead emphasised. There is no obvious parallel in U.S. policy-making to the EU’s payments for positive externalities.

AEPs began on an ad hoc basis in some member states in the 1980s and were optional until 1992 when they became an ‘accompanying measure’ during the Common Agricultural Policy reforms of that year (Agri-environment Regulation 2078/1992). They were later embodied in Rural Development Regulation 1257/1999 as part of the ‘Agenda 2000’ CAP reform. They function by encouraging farmers to make commitments beyond usual Good Farming Practice. Farmers are not paid for merely conforming to current environmental legislation, in application of the Polluter Pays Principle. More than conformity is required. For example, a widely adopted AEP is support for conversion to organic farming, the goal being the reduction of the nitrogen balance. The maintenance of extensive pastures is similarly encouraged, to prevent the abandonment of farming land, the loss of rural communities which would follow, and the disappearance of a culturally important landscape feature.

The EU approach, therefore, focuses on reduction of inputs and the encouragement of beneficial outputs rather than restricting harmful outputs, in contrast to the U.S. approach which disregards positive externalities and attempts only to limit negative output. Thus in the EU organic farming is encouraged as a way of controlling nitrate leaching while in the United States organic farming does not feature at all, because U.S. policy is taken up with end results rather than processes.

The EU approach is rather flexible, and is therefore in conformity with one of the EU’s core principles, that of ‘subsidiarity’: decisions are taken at the lowest feasible level. It is up to member states to decide what measures, if any, to take, and how much to spend. In some cases, regions within countries make such decisions (Italy, Spain, Germany), and in all cases it is the farmer who makes the final decision on whether to take part. The range of programs offered and their uptake is given in table 1 below. It is noteworthy that organic farming is the only program common to all member states.

Type of measures	B	DK	D	Fin	F	GR	IRL	I	NL	AT	P	S	E	UK
1 meadows and pastures														
2 arable land														
3 reduced stocking rates														
4 rare breeds														
5 permanent crops/viticulture														
6 maint.. of abandoned land														
7 20-year set-aside														
8 loss of domest. plant species														
9 nature conservation														
10 organic farming														
11 demonstration projects														
12 education and training														
13 'basic' support														
14 access to land														

Source: DEFRA, 2002

The planners are naturally aware of the pragmatism of farmers, and so the payments are pitched at an attractive level. The EC remarks that ‘providing agri-environmental services can serve as an interesting income opportunity for farmers engaged in this field’ (EC, 2005). The flexibility and site-specificity alluded to above makes AEPs, at least in the view of the EU, ‘a highly refined tool for environmental integration’ (EC, 2005). The voluntary nature of the measures means that uptake of AEP funding is very variable within the EU, as we show below. As an example of the variations, in Sweden, Austria and Italy, expenditure for AEPs is much higher than the EU average¹, while Belgium, Spain, the Netherlands and Greece hardly reach 30%. As noted above, discovering why this variation exists is one of the aims of this research.

The EU approach decoupling payments from production and then paying farmers for non-marketed outputs has not been well-received by the United States. The suggestion has been made that multifunctionality is merely a thinly-veiled means of keeping farmers in business, repackaging protectionism pre-Uruguay Round style. An editorial in *Agra Europe* commented: “[the EU] has gone to enormous lengths to create, both domestically and internationally, the camouflage of ‘multifunctionality’ to justify the continuation and probable increase of expenditure of more than 40 billion a year on bolstering an industry which is quite capable of surviving without subsidies” (*Agra Europe* editorial, 9/28/2001). It should be noted that an OECD report (OECD 2003) considered that ‘environmental payments are a statistically significant determinant of agricultural production and trade’.

In summary, we have argued above that AEPs within the EU are geared towards recognising both positive and negative externalities of agriculture, in contrast to the U.S. approach which is concerned almost exclusively with the negative externalities. As our econometric analysis, presented below, shows, there is some evidence of citizen demand for the positive externalities of agriculture within the EU.

3. Different views of the Agri-environmental nexus

¹ The EU average is 50% of EAGGF Guarantee expenses. Cofinancing by member states is 15% in Objective 1 areas and 40% in others.

Some commentators have attributed the differences in demand to a fundamental clash of agri-ecological ideologies. The Europeans are seen as viewing the natural environment as having been produced in part by generations of farming and ranching, whereas for Americans, “nature” is seen as being at its best when undisturbed by any human activity (Burrell, 2001; Hodge, 2000).

Despite its declining importance in strictly economic terms, for Europeans agriculture and rural life retains great emotive power. This attitude was summed up in a speech made by the EU Agricultural Commissioner Franz Fischler at the 1996 Cork Conference on Rural Europe: ‘The European rural space is a socio-economic model in the broadest sense of the word, which must be preserved for the benefit of the whole of European society’ (Rural Europe, 1997:2). Similarly, a 1988 Eurobarometer opinion poll showed that the EU is inclined to reserve a particular treatment to agriculture, and as long as the cost of support under the CAP is manageable, then the public is prepared to see agriculture as not only an economic activity. This attitude has if anything strengthened since then, as a similar 2003 survey indicates (EC 2004).

Behind attempts to legitimise AEPs there is the constant presence of cultural nostalgia. The almost folkloric figure of the farmer, especially the smaller, less technologically advanced one, remains in the popular imagination a representative of the days when European countries were basically rural societies.

For Europeans the rural life continues to have a symbolic value for those citizens who feel uncomfortable with the modernisation of society, globalisation and urbanisation. It is a place of refuge, the pastoral life a rural idyll. Against this background, the strongly expressed reluctance to cultivate GMOs and other products of a highly technical world is more understandable.² Linked with this have been agri-environmental programs to preserve traditional technologies, endangered breeds of farm animals, and preserve what is considered natural capital in its widest sense.

Much of the lifestyle associated in the mind of the urban European with farming has long gone, if indeed it ever existed. However the myth remains strongly etched, and multifunctionality can be seen as an attempt to salvage some last features of the old rural life before they disappear forever. The place of the farmer as a seasoned custodian of the land is one such feature. Interestingly, for people who so enjoy looking back, the desire to retrieve ‘traditional’ farming and landscape on behalf of absent future generations is often noted (Barthelemy, 2004).

A further related view is that the EU is adjusting to internal pressures of its own, notably enlargement and the strain on the budget that the new members, who tend to be less wealthy, bring with them. At the time of writing (July 2005) the EU had failed to agree on a budget for the period beyond 2007. The EU had wanted spending to rise to 1.14% of GDP to finance the new members, but the wealthier countries, such as Germany, France, Austria, the Netherlands and the UK have rejected this and prefer to retain the current 1% limit.

Extension of production-linked payments under CAP to all new members would have been extremely expensive, especially as the new members depend more heavily on agriculture as a share of GDP and employment. Poland for example has nearly 20% of its workforce in agriculture. Decoupling of subsidies from production and encouraging the ‘old’ EU members to cease farming at maximum output and instead consume the products of the new members would make economic sense. This would be politically popular at home, and would

² A study published by Environics International (2000) into perceived risks of biotechnology found that in the United States 66% of people interviewed thought that the benefits of biotechnology outweigh the risks. The corresponding figure for France and Greece is 22%.

also appease critics in less developed nations demanding an end to the dumping and closed markets which tend to go along with a cossetted domestic farming community.

4. Wilderness and the American approach

While European policies reflect the view that continuance of extensive farming can benefit the environment when undertaken in a responsible manner, the U.S. view is in strong contrast to this, contending that there is a conflict between expanding (or maintaining) agricultural production and the environment. Through the Conservation Reserve Program (CRP), farmers in the United States are paid to return their farmland to its pre-farmed state, seeded with traditional cover crops or plant native trees. The underlying assumption is that land attains a higher environmental value when it is taken out of farming and returned to its natural state; stewards are not needed for the land, or farmers do not act as the best stewards.

‘Landscape’ and ‘organic’ payments further illustrate this difference: , in 2001 the majority of EU agri-environment payments were targeted at landscape and wildlife management (Buller, 2001). In the US there are no payments for landscape. Payments for wildlife habitat fall under the Wildlife Habitat Incentives Program (WHIP) which receives only about one half of one per cent of total US agri-environment funding. A large portion of agri-environment payments support organic farming in the EU, while organic farming is not subsidised at all in the US.

To summarise the U.S. philosophy: land is at its best when it is wilderness and untouched by human hand; the land areas which are farmed should be subjected to output restrictions on negative externalities, while the inputs and methods used are irrelevant. This contrasts with the EU view that agriculture and the environment are complements. For the United States, land should either be farmed intensively and subject to controls on negative externalities, or returned to its pre-farmed state. The concept of a cultivated landscape, for example, having a social value does not exist within U.S. agri-environmental policy.

5. Possible reasons for differences between EU and US approaches

Above we have described a number of fundamental differences in the EU and U.S. policy. It is therefore reasonable to ask whether there is any one underlying root cause for such differences. We split these differences into demand, supply and political causes.

Following Baylis, Rausser and Simon. (2004), the position we take in this paper is that the difference can be attributed to purely economic considerations if a) the marginal dollar currently being spent on reducing negative externalities in the United States generates a larger net social benefit than would be generated if this dollar were redirected towards promoting positive externalities and b) the reverse inequality holds for the EU.

From our description above of the different attitudes held by European and American citizens to agriculture, it is reasonable to suppose that utility mappings in the EU and U.S. specifications will be quite different. This is because utility mapping depends crucially on factors that are difficult to measure, such as the non-pecuniary benefits that farmers receive from farming; the relative weights that environmental lobbies assign to the range of environmental priorities and the use-value that consumers derive from environmental amenities.

Variations in consumer preferences could conceivably lead to an affirmative answer to one or both of the above. Since Europeans in many EU member states live only a few hours away from farmland, it seems plausible that the appearance of the rural landscape is more important

to Europeans than Americans, who are located much further away from the agricultural heartland. However if this were indeed the case we would expect in Europe to see those farmers located in countries with greater domestic tourism receiving higher level of compensation for producing environmental goods. In the United States we note that there are certainly areas which benefit from agri-tourism, such as farms in Vermont, but there are no U.S. programs to preserve such landscapes.³

Related to this is the possibility that in wealthier members of the EU the environment is becoming a luxury good.⁴ Bimonte has modeled a 1996 sample of 36 European countries and their share of land devoted to protected areas, such as parks, and found that this hypothesis could not be rejected (Bimonte, 2002). Clearly Bimonte's study took in a much wider range of countries than the EU-15 with which we are currently interested, but if anything this strengthens the argument: the EU-15 would be the wealthiest countries in out of the 36.

Supply of externalities can also affect the optimal policy. As mentioned above, due to production technology and environmental characteristics, agricultural production can produce different externalities in different regions. Conceivably, production in the United States may produce more negative externalities while that in the EU may produce less. If this is the case, the distribution of agri-environmental programs within the EU should also reflect this pattern: that those countries with the largest externalities should spend the most on agri-environmental measures.

There are also political factors that may affect policy outcomes. The more obvious of these is lobbying. Perhaps agri-environmental programs are just a result of pressure from EU producers to transfer more income to them in a way that would not attract unwanted public (or trade) attention, that would potentially erode those benefits in the future.

There are also structural factors that can affect policy outcomes. For example, the EU member states jointly finance agri-environmental programs while in the United States the national programs, with minor exceptions, are federally funded. In terms of the issue space in the EU, there is an implicit joint restriction on the set of negotiable policies because individual states insist on their right to tailor programs to meet their own needs. In the United States individual stakeholder groups and geographic regions do not feel obliged to challenge programs that do not result in direct benefits to them. They do not pay for the programs and so have little motive or justification for intervention.

“Issue Space,” i.e. the set over which parties can bargain, can also affect policy outcomes. An example of the restrictive issue space is the disagreement between the UK and the other EU members, especially France, over the ‘special’ rebate the British receive. The rebate from the EU was negotiated by Mrs Thatcher in 1984 as part of continued British membership. Now that the UK has overtaken other EU members in terms of wealth, it does seem unusual that the rebate should continue, especially as there are now much poorer members of the club. It appears that the British may use annulment of the rebate as a requirement for further CAP reform, that is reduced protection for European agricultural markets. In the words of the British Treasury⁵, ‘Any negotiation of the British rebate would have to be conditional on very radical alterations to the current CAP’.

³ The one possible exception is the U.S. Farmland Protection Program (FPP). While the FPP preserves farm land from development, it does not target “landscape”.

⁴ Little work has been done in Europe on monetary value and landscapes. Of the fifteen studies which have been done, nine were in the United Kingdom and six in Italy (Tiziano, 2004).

⁵ Reported in The Daily Telegraph, 15 May 2005.

There are also differences in “access” that may be determined by political structure. For example, a first-past-the-post system may make it difficult for non-traditional parties and groups to find representation at the elected level. However, a system of proportional representation with a sufficiently low cut-off, may allow a wider range of views to be heard. Proportional Representative (PR) systems may therefore be more flexible in responding to changes in public demand, and more representative of minority views, as long as those minorities are nationally distributed. However, PR systems may be less representative of specific regional concerns

A further related view is that differences in agri-environmental programs are a result of the EU is adjusting to internal pressures of its own, notably enlargement and the strain on the budget that the new members, who tend to be less wealthy, bring with them. Extension of production-linked payments under CAP to all new members would have been extremely expensive, especially as the new members depend more heavily on agriculture as a share of GDP and employment. Poland for example has nearly 20% of its workforce in agriculture. Decoupling of subsidies from production and encouraging the ‘old’ EU members to cease farming at maximum output and instead consume the products of the new members would make economic sense. This would be politically popular at home, and would also appease critics in less developed nations demanding an end to the dumping and closed markets which tend to go along with a cossetted domestic farming community.

In the following section, we explicitly test several hypotheses about EU agri-environmental expenditure:

- (1) Is it driven by the supply of negative externalities,
- (2) Is it driven by the demand for positive externalities,
- (3) is it purely a means to transfer income to producers? and
- (4) is it affected by political institutional structure.

We also ask whether the result of the 2002 reforms were fundamentally different in terms of their targets, than the 1992 reforms.

6. Econometric analysis of the uptake of AEMs within the EU

Our analysis used econometric techniques to regress funds spent on AEMs from 1992 to 2006 against a range of potential supply and demand variables. We have also included political variables, such as voting structure and methods within member states of fund allocation. Belgium and Luxembourg’s statistics have been amalgamated. We were not able in all cases to obtain data for every year for every member state, and so have had to make appropriate adjustments. Because of data constraints, two countries are effectively removed from the sample (Spain and Ireland). However, when the variables with the missing data are removed, results remain virtually unchanged. The sources of the data are the EU (Eurostat), the FAO, and the OECD.

For supply, we consider a number of factors that represent technology and the production of externalities. Specifically, we include the amount of chemical inputs (nitrogen fertilizer and pesticides) used per hectare and irrigation per hectare of farmed land to represent farming intensity. We also include farm size to represent technology. If the agri-environmental programs are intended to reduce intensive farming practices, they will presumably be targeted at those regions with the highest degree of intensive agriculture.

To represent demand for positive externalities produced by agriculture, we use the amount of domestic tourism. We also include a couple of variables, specifically the percent of Members of the European Parliament representing the Green Party and the amount of environmental

expenditure per GDP to capture the “greenness” of the member state. Last, we include GDP per capita and GDP per capita squared to capture the effect of income on the demand for environmental goods.

A number of variables capture the lobby of the farm sector. The lagged agricultural expenditure is included. If the agri-environmental expenditure is simply a means of delivering agricultural subsidies, those regions with the highest agricultural expenditure will take most advantage of the agri-environmental payments. We also include whether the member state was using cross-compliance rules, thus demanding that farmers meet certain minimum practices before receiving other agricultural funding. If the country uses cross-compliance, producers may demand more agri-environmental funding as compensation, or, at a minimum, may be less resistant to transferring price support to environmental payments, since in either case they have to undertake some level of environmentally-friendly production practices.

We also include the percent of the population living in the rural area and the percent of GDP provided by agriculture, to capture the strength of the agricultural industry, both in terms of potential vote and in terms of economic strength.

Last, we include a number of political variables, such as the percent of seats elected using proportional representation, and the participation in European and domestic elections. These are intended to capture “voice,” both in terms of whether the populace (particularly minorities) feel they have access, and the degree of public apathy, both to the EU and in general.

The percent of agricultural expenditure going to agri-environmental measures was estimated using a panel regression with random effects. Different dummies representing country grouping were included, but were not found to be significant.

7. Results

Overall, agri-environmental expenditure seemed to be correlated to demand, but negatively correlated to supply (see regression results in table 2). Countries with more intensive farming practices, whether that was represented by the amount of farmland irrigated or chemical intensity, spent less on agri-environmental measures than their more extensive counterparts.⁶ Thus, the countries that conceivably have the largest production of negative externalities are investing the least amount of money in changing their production. Conceivably, this is due to the fact that countries with established intensive production technology are loathe to give up their comparative advantage (and price supports), while farmers who are already extensive, do not mind being funded to become more so. More predictably, those countries with smaller farms had a higher portion of their agricultural expenditure go to agri-environmental programs. Farmers with smaller holdings may not receive the same amount of traditional subsidies as their larger counterparts, and therefore may be more willing to use agri-environmental expenditure that may be more accessible to them. For example some of the agri-environmental programs subsidised the use of traditional farming practices, presumably requiring a smaller farmed acreage.

If a country used cross-compliance, that country was more likely to spend a greater percent of their agricultural budget on agri-environmental measures. As noted above, this may be because producers already have to adopt environmentally-friendly production practices to

⁶ The percent of farmland irrigated was only significant at the 16 percent level, however its sign remained unchanged regardless of the exact specifications.

receive agricultural support, and are therefore less likely to raise concerns about making some of these payments explicit.

In terms of demand, there is reasonably strong evidence that countries with a greater demand for environmental goods spend more of their agricultural budget on the environment. The greater portion of Members of the European Parliament representing the Green Party, the greater the portion of agri-environmental expenditure. A larger environment budget also led to a greater portion of the agricultural budget going to agri-environmental measures. This result is perhaps unsurprising, however it does indicate that agri-environmental funds were not being used as a substitute for other environmental expenditure. A greater amount of domestic tourism also increased the agri-environmental expenditure, perhaps indicating that there are some perceived positive externalities produced by agriculture that are demanded by a populace that likes travelling the countryside.

Agri-environmental goods do seem to have a positive income elasticity. The greater the GDP per capita, the greater the supply of agri-environmental funding, relative to other forms of agricultural support.

The financial contribution of the agricultural sector increased the agri-environmental expenditure, while a larger proportion of population in the rural area decreased it. This apparently contradictory result can perhaps be explained by noting that a large agricultural value-added often results from a larger processing sector and the production of high value crops. These crops are not those that tend to receive the bulk of government financial support, and in some cases that support may even make inputs more expensive for processors. Therefore some components of the agricultural industry may not have been upset to see some funds go to agri-environmental programs as opposed to price supports.

The fact that the larger the rural population, the smaller the portion of agri-environmental payments may indicate that people in the rural area would be pleased to have the CAP remain as is. Specifically, they may feel that their interests are best served by continued agricultural subsidies that do not rely on changes in production technology.

Past agricultural expenditure does not seem to affect the degree of funding going to agri-environmental measures. Although the coefficient is positive, it is far from significant, and when the change in agricultural expenditure was included, the two variables decreased in significance even further. The implication is that agri-environmental payments are not explicitly being used as a substitute for agricultural subsidies, and that regardless of their level of agricultural subsidisation, countries have a relatively similar portion of their budget going to agri-environmental measures, all else equal.

Political structure does affect the degree of agri-environmental expenditure. Countries with proportional representation had a larger agri-environmental expenditure. Since PR in some countries has allowed new parties such as the Greens to gain standing in the legislature, this may be understandable. The implication would seem to be that a system that allows a broader representation facilitates environmental expenditure. Interestingly, the lower the interest in the EU as represented in the turnout in EU elections relative to domestic elections, the higher the agri-environmental expenditure. This result may be due to the fact that other agricultural expenditure is determined at the EU level, while, since agri-environmental measures are co-financed by the European Commission and the member state, agri-environmental programs are determined, at least in part, at the country level. Thus, if a country had a strong interest in traditional agricultural support, they would have to make their voice heard through the European Parliament, while the member state has more control over agri-environmental expenditure. That said, the greater the overall apathy (as represented by turnout in domestic elections), the greater agri-environmental expenditure. This result may represent the fact

that younger, urban voters tend to have a lower turnout, but have a higher demand for environmental expenditure.

The same regression was run for all years and then separately for the 1992-1998 period, to separate out the effects of the 2002 reform. The 2002 reform was explicitly designed to address the concerns with EU enlargement, and we attempted to determine whether this goal changed the factors affecting agri-environmental expenditure. The only notable change in the results was that the lagged agricultural expenditure was significant (and positive) for the earlier reform years, whereas it was not for the entire time period (see table 3). Although this is a weak result, it may indicate that the earlier reform was more concerned with converting price supports to forms of existing agri-environmental expenditure, while in the recent reforms, the concern was more with converting potential agricultural subsidies in the incoming states into more production-neutral programs. Thus, for members of the EU-15, switching funds out of price supports into agri-environmental payments mattered less than ensuring Poland do so.

8. Summary and conclusions

The EU agri-environmental programs tend to be going to member states that already do what the programs encourage .i.e. those that have to change their current technology and production patterns the least. Perhaps this is not surprising, however it does indicate that the largest potential gains are being foregone. Specifically, note that those countries with the highest agricultural chemical intensity are spending the least on agri-environmental measures. When one notes that Austria and Sweden have two of the largest agri-environmental programs, the result is perhaps not surprising, but it does indicate that the funds are not going to reduce intensification where the intensification is the highest.

We see a similar pattern of environmental programs to compensate for cross-compliance rules in the United States. For example, when the Conservation Reserve Program (CRP) was introduced in 1980, it coincided with the introduction of ‘sod-buster,’ a cross-compliance rule requiring that producers not farm highly-erodible soil if they are to receive government price supports. Notably the primary target of the CRP was to fund farmers to take highly-erodible soil out of production.

The fact that a larger rural population leads to a smaller portion of agri-environmental expenditure may indicate that these are adopted by a somewhat grudging agricultural sector, imposed by urban green demand.

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Table 1: Average agriculture and agri-environment expenditure by country, 1992-1998 (million euro)

	Agri-environment	Tot Ag.	Agri-environment as % of tot
Belgium + Luxembourg	4.02	306.67	1.59
Denmark	4.70	238.22	1.99
Germany	193.82	2420.78	9.17
Greece	2.82	228.33	1.31
Spain	31.07	846.67	4.33
France	109.38	3349.22	3.27
Ireland	45.62	207.11	55.30
Italy	140.63	1256.89	8.92
Netherlands	6.75	882.56	0.80
Austria	182.67	1051.43	24.35
Portugal	37.83	250.00	17.48
Finland	88.63	1569.29	8.68
Sweden	38.28	327.43	18.69
UK	24.95	1144.22	2.11

Table 2: Summary Statistics

Variable	Number of Obs	Mean	Std. Dev.
Agri-environmental programs as % of total agricultural expenditure	92	0.39	0.84
Agricultural value-added as a % of GDP (t-1)	140	2.57	1.92
Farm size (t-1)	127	17.06	12.49
Rural population as % of total	154	22.75	12.69
Percent of farm land that is irrigated (t-1)	140	0.20	0.20
Farm chemical consumption per ha (t-1)	154	38.75	26.79
Agricultural expenditure (t-1)	145	1.02	0.99
percent of MEPs that are Green party members	140	5.59	5.15
Environmental expenditure as a % of GDP	106	0.48	0.24
Domestic tourism per capita	96	4.47	2.84
Cross compliance programs (1 if in place)	154	0.64	0.48
Participation in EU elections relative to domestic elections	148	73.28	17.98
Participation in domestic general elections	154	76.84	9.36
Percent of seats elected using proportional representation	168	0.65	0.44
GDP per capita	154	20.72	6.53

Table 3: Regression on Agri-environmental programs as percent of total agricultural expenditure

Variable	Coefficient	Std. Err.	P-stat
Agricultural value-added as a % of GDP (t-1)	0.326	0.126	0.01
Farm size (t-1)	-0.120	0.020	0
Rural population as % of total	-0.077	0.018	0
Percent of farm land that is irrigated (t-1)	-2.147	1.517	0.157
Farm chemical consumption per ha (t-1)	-0.023	0.005	0
Agricultural expenditure (t-1)	0.080	0.171	0.64
percent of MEPs that are Green party members	0.076	0.027	0.006
Environmental expenditure as a % of GDP	4.404	0.839	0
Domestic tourism per capita	0.044	0.037	0.228
Cross compliance programs	0.398	0.243	0.101
Participation in EU elections relative to domestic elections	-0.040	0.006	0
Participation in domestic general elections	-0.088	0.025	0
Percent of seats elected using proportional representation	1.364	0.473	0.004
GDP per capita	0.248	0.123	0.043
GDP per capita ²	-0.003	0.004	0.366
year	0.104	0.076	0.171
dummy for 2002	-0.035	0.494	0.944
Constant	6.511	2.724	0.017
R ²	0.940		
Number of observations	40		
Number of countries included	12		

Table 4: Regression on total agricultural expenditure

Variable	Coefficient	Std. Err.	P-stat
Agricultural value-added as a % of GDP (t-1)	178.305	58.923	0.002
Farm size (t-1)	5.941	7.169	0.407
Rural population as % of total	53.026	7.344	0
Percent of farm land that is irrigated (t-1)	-2878.614	656.340	0
Farm chemical consumption per ha (t-1)	11.594	3.708	0.002
percent of MEPs that are Green party members	44.990	10.045	0
Domestic tourism per capita	73.881	25.148	0.003
Cross compliance programs	-410.350	136.111	0.003
Participation in EU elections relative to domestic elections	16.757	3.259	0
Participation in domestic general elections	-20.913	8.877	0.018
Percent of seats elected using proportional representation	-1617.266	212.717	0
GDP per capita	218.045	72.544	0.003
GDP per capita^2	-4.379	1.697	0.01
year	0.914	33.004	0.978
dummy for 2002	619.038	140.742	0
Constant	-1932.130	1048.968	0.065
R ²	0.91		
Observations	75		
Number of countries included	12		

Table 5: Comparison of results for 1992 reforms alone and 1992 and 2002 reforms combined

Variables	Before 2002		For entire period	
	Coef.	Std. Err.	Coef.	Std. Err.
Agricultural value-added as a % of GDP (t-1)	0.030	0.030	0.326	0.126
Farm size (t-1)	-0.005	0.006	-0.120	0.020
Rural population as % of total	0.004	0.005	-0.077	0.018
Percent of farm land that is irrigated (t-1)	-0.350	0.368	-2.147	1.517
Farm chemical consumption per ha (t-1)	-0.002	0.001	-0.023	0.005
Agricultural expenditure (t-1)	0.063	0.033	0.080	0.171
percent of MEPs that are Green party members	0.004	0.007	0.076	0.027
Environmental Expenditure as a % of GDP	0.273	0.262	4.404	0.839
Domestic tourism per capita	-0.007	0.007	0.044	0.037
Cross compliance programs	-0.079	0.059	0.398	0.243
Participation in EU elections relative to domestic elections	-0.005	0.002	-0.040	0.006
Participation in domestic general elections	0.008	0.006	-0.088	0.025
Percent of seats elected using proportional representation	0.049	0.107	1.364	0.473
GDP per capita	0.044	0.042	0.248	0.123
GDP per capita ²	-0.001	0.001	-0.003	0.004
year	0.035	0.015	0.104	0.076
dummy for 2002			-0.035	0.494
constant	-0.757	0.740	6.511	2.724

Bold implies significant at the 5 percent level. Bold italics indicate significant at the 10 percent level