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## **Causes of Multifunctionality: Externalities or Political Pressure?**

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## Introduction

The interface between agriculture and environmental policy has received increasing attention in recent years. This attention has been sharpened by ‘food scares’ such as BSE, Foot and Mouth Disease, the safety of Genetically-Modified Organisms, agriculturally-sourced water pollution as well as the increasing knowledge and concern over agriculture’s contribution to greenhouse gas emissions. At the same time pressures to liberalise agricultural trade and to remove production subsidies in the European Union and the United States have grown. Caricatures of the ‘barley baron’ who collects a large subsidy cheque while African peasants starve have become a commonplace in the European press. Similarly, the 2002 farm bill debate was peppered with frequent revelations of which wealthy celebrity was receiving millions in farm subsidies.

Countries have responded very differently to these pressures. For example, the United States policy has increased its use of conservation programs, which traditionally take agricultural production and the environment as substitutes, whereas the EU has introduced programs that view them more as complements.<sup>1</sup> Programs 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. The EU, by contrast, argues that their programs are addressing legitimate externalities. 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). In this paper, we ask what are the targets of the EU agri-environmental policies? 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.

Even within Europe, there are startling differences among agri-environmental programs. We hope that understanding the differences in agri-environmental programs within the EU 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 measures (AEMs) do not appear to be targeted to negative externalities, nor 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 AEMs, 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

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<sup>1</sup> A more detailed discussion on the differences between the American and European approaches is available in Baylis, Rausser and Simon (2003)

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. We then move on to a brief discussion of the enlargement of the EU, with the incorporation of ten new states in May 2004. A summary and conclusion end the paper.

### **Different views of the agri-environmental nexus**

Some commentators have attributed the differences in demand between the Americans and the Europeans to a fundamental clash of agri-ecological ideologies, and so it is worth spending some time reviewing this purported issue. The Europeans are portrayed 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).

#### ***The European view of agriculture***

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).

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. This approach is encapsulated in the concept of multifunctionality. The EU, supported by its farm organisations, has taken the view that the additional benefits 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.

There is some empirical support for this position, in that non-farming citizens sometimes themselves attempt to provide ‘missing’ additional benefits. A Finnish study (Yrjola 2004) found that the WTP of Finnish consumers/citizens for multifunctional agriculture was ‘remarkable’. Sweden gives a further interesting example of non-farming citizens filling the perceived space between actually-existing agriculture and their ideal situation. 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, a revealed preference for a certain type of farmed landscape.

AEMs began on an ad hoc basis in some member states in the 1980s. They 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.

AEMs 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 AEM is support for conversion to organic farming, the goal being the reduction of the nitrogen balance. The maintenance of pastures, particularly alpine, 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 rather than restricting harmful outputs. Thus organic farming is encouraged for example, as a way of controlling nitrate leaching. 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 planners are naturally aware of the pragmatism of farmers, and so the payments are pitched at an attractive level. In the words of the EC, ‘providing agri-environmental services can serve as an interesting income opportunity for farmers engaged in this field’ (EC2005). The flexibility and site-specificity alluded to above makes AEMs, 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 AEM funding is very variable within the EU (see table 1). As an example of the variations, in Sweden, Austria and Italy, expenditure for AEMs is much higher than the EU average<sup>2</sup>, 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.

### *American Response to European AEMs*

Not surprisingly, the EU approach of 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)

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<sup>2</sup> The EU average is 50% of EAGGF Guarantee expenses. Cofinancing by member states is 15% in Objective 1 areas and 40% in others.

considered that ‘environmental payments are a statistically significant determinant of agricultural production and trade’.

### ***European Cultural Nostalgia***

Behind attempts to legitimise AEMs there is the constant presence of cultural nostalgia.<sup>3</sup> The almost folkloric figure of the farmer, especially the smaller, less technologically advanced one, remains in the popular imagination a representative of the good old 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.<sup>4</sup> Linked with this have been AEMs to preserve traditional technologies, endangered breeds of farm animals, and generally discourage intensive farming.

Related to this is the possibility that in wealthier members of the EU the environment is becoming a luxury good.<sup>5</sup> 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 EU15 with which we are currently interested, but if anything this strengthens the argument: the EU15 would be the wealthiest countries in out of the 36.

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).

### ***Wilderness and the American approach***

The European policies reflect the view that continuance of farming can benefit the environment when undertaken in a responsible manner. For example, AEMs especially in Less Favoured Areas (LFAs) aim at keeping land productive, although mowing late in the season instead of grazing might be required. Abandonment of farmland is seen as harmful to the environment, often because birds and other creatures which have developed with the farming ecosystem would then lose habitat.

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<sup>3</sup> The well known British conservative philosopher Roger Scruton’s recent book *England: An Elegy* laments lost cultural values; the TV channel ‘Gold’ has a continuous diet of heart-warming tales of the times when everyone knew their place.

<sup>4</sup> 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%.

<sup>5</sup> 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).

In contrast the U.S. view is that there is a conflict between expanding (or maintaining) agricultural production and the environment. U.S. policy focuses primarily on the negative environmental externalities while EU policy is concerned with potential positive externalities generated by agricultural production.

For example, farmers in the United States are often specifically paid to abandon farmland through the Conservation Reserve Program (CRP). Furthermore, farmers are paid a premium through the CRP if they seed traditional cover crops or plant native trees, in an attempt to return the land to its pre-farmed state. 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<sup>6</sup> and wildlife management (Buller 2001). In the United States, 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 U.S. 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 United States.

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. There is no value attached to agricultural landscapes or the cohesion of rural life.

### **Possible reasons for differences between EU and U.S. approaches**

Above we have described a number of fundamental differences between the EU and U.S. policies. It is therefore reasonable to ask whether there is any one underlying root cause for such differences. Finding the root cause goes beyond interesting philosophical speculation about worldviews; knowing the root cause would certainly be helpful in assessing the success of trade negotiations for example. We split these differences into demand, supply and political causes.

Following Baylis, Rausser and Simon (2003), 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

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<sup>6</sup> As a typical example, in Voralberg, Austria, an extra area-based ‘landscape’ payment for farms of less than 2 ha was made available in 1999 (OECD, 2000).

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.<sup>7</sup>

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.

Structural factors that may also 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.

The 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 simmering 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,

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<sup>7</sup> 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".



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 Treasury<sup>8</sup>, 'Any negotiation of the British rebate would have to be conditional on very radical alterations to the current CAP'.

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<sup>9</sup>, who tend to be less wealthy, bring with them. At the time of writing (May 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 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.

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<sup>8</sup> Reported in The Daily Telegraph, 15 May 2005.

<sup>9</sup> In May 2004 these countries joined the EU: Czech Republic, Poland, Hungary, Estonia, Lithuania, Latvia, Slovenia, Slovakia, Cyprus and Malta. Romania and Bulgaria will join in 2007. Talks with Turkey may start by the end of 2005.

## **Econometric analysis of the uptake of AEMs within the EU**

Our analysis used econometric techniques to regress funds for AEMs from 1992 to 2002 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. Following Osterburg (2004) 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. Summary statistics are presented in table 2.

## Results

Overall, Agri-environmental expenditure seemed to be correlated to demand, but negatively correlated to supply (see regression results in table 3). 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.<sup>10</sup> Thus, the countries that conceivably have the largest reduction of negative externalities that 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 that are already extensive, do not mind being funded to become more so. More predictably, those countries with smaller farms had higher 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, that presumably require 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 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.

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<sup>10</sup> The percent of farmland irrigated was only significant at the 16 percent level; however its sign remained unchanged regardless of the exact specifications.

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 performed for overall agricultural expenditure and the differences were notable (see table 4). The relative participation in EU elections now strongly positively affected the amount of total agricultural expenditure, while proportional representation had a strong negative effect. Also interesting is that cross-compliance rules tended to lead to lower agricultural expenditure. Further, lagged agricultural chemical concentration increases agricultural expenditure, implying that overall agricultural expenditure goes to those member states that use more intensive

farming methods. This latter finding is mitigated by the effect of irrigation, which shows that countries with large amounts of irrigated land receive less agricultural subsidies. This result may be due to the fact that irrigated land tends to produce higher value crops (such as horticultural produce) which are not as highly subsidised.

Not surprisingly, the degree of rural population and the lagged influence of agriculture on the economy both now have a positive effect.

The regression on the percent of agri-environmental payments 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 5). 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.

## **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, two countries with non-intensive agricultural production, 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. That said, the results do not support the cynical view that agri-environmental characteristics are solely a means of transferring income to producers in a more acceptable fashion. The portion of the agricultural budget going to agri-environmental expenditure was not a function of past agricultural support, nor did a reduction in agricultural spending lead to an increase in agri-environmental funds.

However agri-environmental schemes seem to be demanded by the public. Those member states with a greater interest in the environment and domestic tourism have larger agri-environmental programs. Likewise, 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. Also notable is the fact that the richer countries spent more on agri-environmental payments. This result is echoed in the United States where the Senators who supported the farm bill amendments to convert funding from price supports to conservation measures were also predominantly from non-farm, wealthier states with a

history of environmental consciousness (for example, from the northeastern and the western United States.)

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 ‘sodbuster,’ 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.

Political variables affected the use of agri-environmental measures. The greater the national level of representation and the greater the access, the greater the portion of agri-environmental expenditure. However, the greater the interest in the EU, as represented by relative electoral turnout, the lower the agri-environmental payments. Perhaps those countries with the largest interest in retaining traditional farm supports have a higher turnout. Last, overall voter apathy also leads to higher agri-environmental measures. Again, comparing this result to the United States, traditional farm states have the highest voter turnout, while the more urban states tend to have greater political apathy. However those same urban states tend to show greater support for environmental measures.

In conclusion, it appears that agri-environmental programs may have not been uniquely demanded by the farm community, and rather by the urban populace. Anecdotal evidence illustrates that this result also holds in the United States. However, the programs do not appear to be targeted where the greatest changes may be needed. Thus, farmers who are strongly tied to their intensive production methods appear to be able to push back (or at least not adopt) these kinds of programs. Instead the funding is going to help producers continue to practice extensive and/or traditional farming.

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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 <sup>2</sup>	-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 <sup>2</sup>	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 <sup>2</sup>	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	<b>0.326</b>	0.126
Farm size (t-1)	-0.005	0.006	<b>-0.120</b>	0.020
Rural population as % of total	0.004	0.005	<b>-0.077</b>	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)	<b>-0.002</b>	0.001	<b>-0.023</b>	0.005
Agricultural expenditure (t-1)	<b>0.063</b>	0.033	0.080	0.171
percent of MEPs that are Green party members	0.004	0.007	<b>0.076</b>	0.027
Environmental Expenditure as a % of GDP	0.273	0.262	<b>4.404</b>	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	<b>-0.005</b>	0.002	<b>-0.040</b>	0.006
Participation in domestic general elections	0.008	0.006	<b>-0.088</b>	0.025
Percent of seats elected using proportional representation	0.049	0.107	<b>1.364</b>	0.473
GDP per capita	0.044	0.042	<b>0.248</b>	0.123
GDP per capita <sup>2</sup>	-0.001	0.001	-0.003	0.004
year	<b>0.035</b>	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